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NATO SeaSparrow Program: Cooperation Based on Trust

Dabrowka Smolny*

Abstract: The author examines the background, rules and structure of the NATO SeaSparrow Program in the context of the “Smart Defense” initiative, introduced by Secretary General Anders Fogh Rasmussen at the NATO Summit in Chicago in 2012 as an attempt to counteract the defense budget cuts in the Allied Countries. The main objective of the study was to identify the mechanisms of the NATO SeaSparrow Program that could serve as the basis for future programs developed within the NATO initiative.

Keywords: NATO, SeaSparrow, Surface Missile System, SeaSparrow Program

Introduction

The purpose of this article is to analyze NATO’s program for the development and production of ship-launched short-range missiles serving the direct defence of naval vessels, known as the NATO SeaSparrow Surface Missile System (NSSMS), in terms of the mechanisms that have allowed it to function for more than 45 years, involving twelve member nations.

The author of this paper will also attempt to identify the so-called “good practice,” on which international cooperation programs in the development and production of weapons could be based, especially in the context of the concept of “Smart Defense.”

The production and procurement of weapons, and thus technical upgrading of the armed forces, is of interest to both civilian and military communities. The discussion comes alive especially at the time of procurement (or just an intent) of expensive military equipment. Words of opposition and disapproval of the high cost of arms borne by the taxpayer often come in times of relative peace and subjectively perceived security. However, when the relations between countries are strained and continuation of their cooperation is called into question, the public looks much more favorably at dollars spent on the armed forces.

Regardless of changing public opinion, one can assume it is correct to claim that, both now and in the future, states will continue to invest in defense, primarily in order to ensure the achievement of their own goals and national—and allied—interests. An old Latin adage, “Si vis pacem para bellum,” which can be interpreted as no one attacks the strong, is fitting here. The main challenge of shaping the future demand for weapons is the nature of the foreseeable risks. It is necessary, therefore, to develop the technology to deter and/or to combat and defeat these threats.

According to a report prepared by the Stockholm International Peace Research Institute (SIPRI) the transfer of defense technologies in 2009–2013 was about 14% higher

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than in 2004-2008.\(^1\) In line with the ongoing trend for several years, most European countries have gradually reduced defense spending. Significant restrictions have also been noticed in the American defense budget. The primary factors affecting the size and nature of the production of weapons include:

- A significant reduction of defense spending, as well as deference of the implementation of armaments’ long-term acquisition and modernization programs in Europe and the United States in connection with the financial crisis; but it is worth noting that the difficulty of maintaining high spending on armaments is nothing new, especially in democratic countries where the authorities have to reckon with the opinions of voters.
- A decrease in the demand for massive equipment in the absence of prospects for military conflict on a large scale, although there is more and more talk about the need to revise the forecasts of the security environment, especially in the context of the situation in Ukraine.
- An increased demand for raising the efficiency of the technology, interoperability, situational awareness, and precision in asymmetric conflicts.
- Shortening the time of the development cycle for equipment through the introduction of “single-purpose” technology in place of complex and expensive technologies requiring long years of research.\(^2\)

Taking into account the need to ensure effective defense of national and Allied interests with a simultaneous decrease in defense spending, NATO members have undertaken an initiative to prevent the negative effects of the occurring trends. “Smart Defense” is an initiative involving the development, acquisition, and maintenance of the ability of Allied forces on the basis of cooperation between member states. It is a consequence of the financial crisis of recent years, which has caused significant cuts in defense spending, thereby aggravating the disparities in defense investments between Europe and the United States. “Smart Defense” operates in areas that are crucial in the capacity of NATO’s armed forces. These capabilities were defined at the Lisbon Summit in 2010 and include ballistic missile defense, intelligence, surveillance and reconnaissance training and preparation, and effective involvement and protection of troops. Member states are committed to giving priority to the development of these capabilities by developing specialization in certain fields and searching for common international solutions.

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NATO’s role is to assist in determining what countries can do together better, cheaper, and with less risk.3

The cooperation in the development and production of weapons systems has a long tradition within NATO. A prime example of such cooperation, from which one can draw patterns, is the program for the development and production of short-range missile systems for ships to defend against maneuvering missiles, known as the NATO SeaSparrow Missile System (NSSMS), which is celebrating its 46th anniversary this year.

From Project to Program

Project Context

The NATO SeaSparrow project started in favorable circumstances, both political and economic. The 1960s were the period of the first serious challenge to NATO. The Alliance was based on American military presence in Europe and the adoption of strategic guidance by the USA. With its nuclear weapons, the United States gave an illusory belief (perhaps much needed by Europe after the World War II experience) of having the power of deterrence against all attacks. The consequence of this belief was that the conventional forces of the Alliance remained less developed. This was, at the same time, convenient for European governments due to budgetary constraints. As a result, the European partners possessed insufficient defense capabilities, which were significantly influenced by their poorly developed industrial bases. This resulted in the steady increase of disparities between American and European NATO forces.4 In this period, however, the Soviet Union began to build its own nuclear capability, thereby calling into question the NATO concept of massive retaliation based on the nuclear superiority of the United States. The Allies thus began to realize that nuclear forces were not enough to prevent aggression.

Another impetus to start cooperation in the framework of the project was the development of new arms technologies and related hazards. In the context of shipboard defense, particular attention was paid to defense against jet aircraft, which flew at high speeds and at low altitudes and left little time for defensive reactions. An additional challenge was the maneuvering of aircraft missiles, which allowed attacks from a distance. The United States Navy, based on the experience of the Army in the development of anti-aircraft systems, began a program in 1960 to adjust the MIM-46 Mauler system for use at sea. However, due to numerous errors, the program was cancelled. The American Navy later began another, this time successful, attempt to adapt missiles used by the Air Force. For this purpose, the air-to-air AIM-7E Sparrow missile was considered,

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4 To help European allies develop their potential, the United States signed a number of bilateral framework agreements for data exchange (so-called Master Data Exchange Agreements). Their goal was to partially transfer American technology to European armament factories in order to facilitate their reconstruction. Cf. Francis M. Cevasco, “Origins of a Four Decade Success Story. NATO SeaSparrow’s founders got it right,” Common Defense Quarterly 4 (2009): 18.
which without modification entered into the Navy arsenal under the name of the RIM-7E SeaSparrow. Missile tests conducted in 1967 on board the USS Bradley frigate highlighted a number of problems (such as reduced operating range, dimensions that were too large) caused by a mismatch of the construction for new tasks.\(^5\)

In the same year (1967), there was an incident that drew attention to a different kind of maritime threat, namely surface-to-surface maneuvering missiles. On October 21, near Port Said in the Sinai Peninsula, two Egyptian Komar type missile boats sank the Israeli destroyer “Eilat,” firing a total of four Soviet-produced “Styx” missiles. This incident was the first successful attack using (maritime) surface-to-surface type missiles, and it killed 47 Israeli sailors. In light of these events, Western countries stepped up the development of their system of short-range missiles.\(^6\)

**Beginning of the Cooperation**

This event motivated Denmark, Italy, Norway, and the United States to launch a NATO development project that would allow for the reduction of the system development and acquisition costs, while maintaining standards and interoperability. The NATO SeaSparrow Missile System Cooperative Development and Production Agreement served as the basis for formal cooperation and was concluded in 1968 (Table 1). The Project was established as a formal NATO project, and its project office (NATO SeaSparrow Project Office, or NSPO) was located in Washington, DC. In October 1969, the parties signed a contract for the development of the NATO Mk57 SeaSparrow missile system with the Raytheon Company. To save time and reduce costs, it was decided to integrate the (semi-active homing) air-to-air Sparrow missile—the adaptations of which were already working for use at the sea—with European weapon components, such as a fire control computer, control displays, and fire control tracking and illumination radars. As a result, the participating nations started an unprecedented and complex international project. In 1972, the first model of the system was developed; the nations decided to start its production, and three years later the system was fully operational.

Over time, more countries have joined the consortium: Belgium and the Netherlands (1970), Germany (1977), Canada and Greece (1982), Turkey (1987), Portugal (1988), Australia (1990), and Spain (1991). In 2002, Italy withdrew from the agreement after decommissioning the SeaSparrow system from its naval units.

The following companies are involved in the project: BAE Systems (Australia), Honeywell (Canada), Terma (Denmark), RAMSYS, Diehl BGT Defence, MBDA-LFK (Germany), ELFON, INTRACOM, HAI (Greece), Thales (Netherlands), Nammo Rau-

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\(^6\) Since 1966, the Design Group 2, consisting of representatives of Italy, France, Norway and the United States (Germany, Denmark and the Netherlands participated as observers) and operating under NATO’s Maritime Armament Group, has conducted research on a common ship self-defense system against maneuvering missiles. Cf. Francis M. Cevasco, “Origins of a Four Decade Success Story,” 18.
Table 1: NSSMS Project MOUs.

<table>
<thead>
<tr>
<th>MOU’ Name</th>
<th>Validation dates</th>
<th>Scope</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 NATO SeaSparrow Missile System Cooperative Development and Production</td>
<td>1968 – present</td>
<td>Developing and testing a shipboard self-defense anti-air warfare weapon; Eliminating duplication of efforts amongst the MOU partners; Ensuring standardization and interoperability amongst the MOU partners; Implementing a cost and work-share process. (currently used by US only, effectively inactive)</td>
</tr>
<tr>
<td>2 NATO SeaSparrow Missile System Cooperative Support</td>
<td>1977 – No end date. Can only terminate by the withdrawal of 12 participating governments</td>
<td>Provides for the organization, structure, and procedures of the project, as well of the support of the NSSMS Fire Control System.</td>
</tr>
<tr>
<td>3 Evolved SeaSparrow Missile Engineering and Manufacturing Development (E&amp;MD)</td>
<td>1995 – Expired</td>
<td>Improvement of the kinematic performance needed to address the emerging threat; Development of the Mk25 Quad Pack Canister for use in Mk41 VLS.</td>
</tr>
<tr>
<td>4 Evolved SeaSparrow Missile Cooperative Production</td>
<td>1997–2014 After 2014, production continues, but not on a cooperative basis.</td>
<td>Cooperative production of a new and improved version of the SeaSparrow missile that will provide effective intercept of high speed manoeuvring anti-ship cruise missiles at greater intercept range. Development and initial production of life cycle elements incl. spare parts, test equipment, technical data, training, and technical support. Planning for and establishment of depot level repair and refurbishment facilities.</td>
</tr>
<tr>
<td>5 Evolved SeaSparrow Missile In-Service Support</td>
<td>2001–2016 MOU Amendment signed to extend MOU through 2030</td>
<td>Provides for the In-Service Support of ESSM Block 1.</td>
</tr>
</tbody>
</table>
Evolved SeaSparrow Missile Block 2 Engineering and Manufacturing Development Negotiations completed. In final staffing for signature in 2014. Features a dual-mode X-band seeker and other enhancements that will collectively enable the missile to defeat future threats.

Evolved SeaSparrow Missile Block 2 Cooperative Production Under negotiation. Notional signature date end 2016. Cooperative Production of ESSM Block 2

Evolved SeaSparrow Missile Block 2 In-Service Support Negotiations expected to start in 2016-2020 timeframe To provide for the In-Service Support of ESSM Block 2

foss (Norway), Indra (Spain), Roketsan (Turkey), Raytheon, Alliant Techsystems, BAE Systems Land and Armament, and Lockheed Martin (USA).

Rules of the Consortium

The cooperation of member nations of the consortium is based on the principle that the work share of nations’ individual defense industries corresponds with the financial contributions to the project of the member nations, which in turn corresponds with the number of systems and missiles the individual nations intend to acquire.

Other rules of the consortium assume that:

- Each member nation shall have one vote;
- Every vote has the same weight;
- All decisions are taken unanimously;
- Decisions are based on the principle of trust;
- Member nations are partners, not customers;
- The project is managed by an international project office, which consists of representatives of all member nations;
- The United States is pursuing contracts for supplies and services on behalf of all member nations;
- A strong international military-industrial support network is maintained.7

Program Structure

The structure of the program8 consists of two formal organizational units (Figure 1): the NATO SeaSparrow Project Steering Committee (NSPSC) and the NATO SeaSparrow Project Office (NSPO).

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8 Ibid., 20.
The Steering Committee is composed of senior officers of all countries participating in the project, and is historically chaired by a US Navy (rear-) admiral. The Committee establishes the policy, provides strategic direction of the project, approves the annual budgets, and supervises the work of the Project Office.

The head of the Project Office is the Project Manager (US Navy captain). One of his or her two deputies is a captain from a non-US member nation. Representatives and subject matter experts from all member nations (military and civilian) work in the Office. The NSPO, among other responsibilities, collects information about the functioning of the project, serves as a forum for discussion of technical changes, provides the infrastructure for the project, is responsible for the execution of the agreements on cooperation in the development, production and in-service phases, is responsible for mission assurance, and has the financial resources to execute the contracts with suppliers and government agencies.

Program Evolution

In the 1980s, the production of weapons by the Soviet Union and the Warsaw Pact countries repeatedly exceeded the production of the USA and NATO in numbers. This was a consequence of low military spending, especially by European Member States, constrained by the public opinion. In the period from the mid-70s to mid-80s, the governments managed to increase defense budgets in Europe to 3% of their respective GDP, yet this was not sufficient to offset the gap between the potential of the Warsaw Pact and NATO. Therefore, it was decided to compensate for the quantitative imbalance with better quality. At the same time, it was recognized that the cooperation of countries would allow them to achieve a synergy effect, i.e. achieve more (and better) results at a lower
cost. Consequently, a number of facilities for technology transfer were introduced. The United States Congress passed an amendment to the Brooks Act, known as the Nunn-Warner Amendment, which excluded military technologies from complicated acquisition procedures. This was intended to facilitate and speed up the process of acquiring technology especially important for the defense of the country. This provided new opportunities for the functioning of the NATO SeaSparrow consortium.

Initially, the NATO SeaSparrow Surface Missile System was developed cooperatively, and the RIM-7 SeaSparrow missiles were procured by the non-US member nations through Foreign Military Sales (FMS) cases. Later on, the missiles that succeeded the SeasSparrow missile, Evolved SeaSparrow Missile (ESSM) Blocks 1 and 2, were also cooperatively developed and produced. It should be noted that in the initial years of the project, due to providing the SeaSparrow missile, the United States had the position of “primus inter pares.” Thanks to the FMS program, the buyers within the consortium had a privileged position in relation to other (non-consortium) countries (i.e. they were informed of the plans to modify the missile). Nevertheless, the issues related to technical changes to the missiles remained in the hands of the Naval Air Systems Command (NAVAIR) and the partners did not have a casting vote. The role of the NSPO was to manage the system elements (fire control system, launchers, etc.), provide information, identify potential problems, perform analysis, and communicate recommendations, as well as to help with the integration of the missile with national systems.

The position of the USA changed when it realized that the capabilities of the missile were no longer sufficient in the light of new threats, which were related to armaments production based on Russian designs by the Warsaw Pact countries. Therefore, it was necessary to significantly modify or develop a new missile. Hence, in the mid-80s, NATO launched two new projects (NATO Frigate Replacement, NFR and NATO Anti-Air Warfare System, NAAWS), and the consortium decided to observe the development of these projects before taking further steps with their own system. At the same time, the participating nations attempted to develop a general plan for future improvements.

In 1991, NAVAIR decided to stop the production of the RIM-7P version in favor of the RIM-7R version, which had been read, wrongly as it turned out, by the members of the consortium as a proposal for wider involvement in the missile development program. In the same year it was decided to close the NAAWS project, but NATO SeaSparrow consortium members agreed that there was still an operational requirement of self-defense of the vessels too small for the Aegis system. A discussion on the development of the Evolved SeaSparrow Missile, ESSM, started, and was based on the involvement of a greater number of partners. The development of ESSM Block 1 started with the planning phase of the contract, the costs of which were covered by Australia, Belgium, Canada, Germany, the Netherlands, Norway, Portugal, and the USA. In time, Belgium with-
drew, but its place was taken by Denmark, Greece, and Spain. In 1995, the nations signed the MOU on the development of the missile (with Belgium, Italy, and Portugal signing as non-contributing participants).\textsuperscript{11} ESSM was to be integrated into a variety of combat systems of various ship classes (i.e. USN aircraft carriers, ANZAC frigates, German, and Dutch ships equipped with the APAR multifunction radar system, Danish STANFLEX ship class, ships equipped with the Aegis system from Norway, Spain, and the USA, and ships of various nations including Germany, Greece, Turkey, the Netherlands, and Canada, equipped with the traditional “Dutch Configuration” fire control systems). It was decided to retain the guidance section of the SeaSparrow missiles and improve their kinematic capabilities (and range) by replacing the existing rocket motors with much more capable propulsion stacks. Australia, Germany, and the United States (later joined by the Netherlands, Norway, Spain, and Turkey) also expanded the scope of cooperation to develop the Mk25 quadpack canister, which allowed the fitting of four ESSMs in one cell of the Mk41 Vertical Launching System.\textsuperscript{12}

Currently, the system consists of two types of missiles for trainable and vertical launch, and five types of launchers (Mk48, Mk56, Mk41 and Mk57 Vertical Launching Systems and the trainable Mk29 launching system). The missile has continuously undergone (software) improvements expanding its capabilities to defeat a wider spectrum of the threats. In late 2014, an MOU has been signed for the development of ESSM Block 2, which reuses the propulsion stack of ESSM Block 1 and adds a state-of-the-art dual mode (active and semi-active homing) guidance section.

The NATO SeaSparrow project initiated over 45 years ago as an agreement between four states, the purpose of which was the development of a ship self-defence system, is one of the most successful and longest-running NATO projects. The project involves 12 countries and 17 defence companies. The system is deployed by navies of 19 countries on board of well over 25 different ship classes ranging from small frigates (<500 tons) to nuclear-powered aircraft carriers, making it a highly versatile and the most widely deployed weapons system in the world.\textsuperscript{13}

**Conclusion**

Based on the analysis of the NSSMS project, several conclusions concerning the mechanism and the general principles of the project can be derived. These can serve as the base material for future international cooperation projects under the “Smart Defense” concept.

The mechanism of the project is very straightforward, making it possible to operate for nearly 50 years. In short it can be described as follows (Figure 2): a group of countries agree to develop, produce, deploy, and maintain a certain type of missile system to

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\textsuperscript{11} The ESSM production MOU was signed in 1997. Belgium and Portugal have observer status.


\textsuperscript{13} NSPO information materials.
defeat a specific threat set. To reduce the costs they adapt an existing weapons system. Each member nation deposits in the account of the consortium an amount proportional to the number of missiles and systems it wants to acquire. Then, one entity (the US Navy), on behalf of all members, carries out a tender procedure. The task of the company that wins the contract is to involve the industry from countries belonging to the consortium and to share the work so that the companies of each country got a job with a value proportional to the financial contribution paid by the member nation. Even if the unit cost of produced missiles would be slightly higher due to the production cooperation of several entities, the economies of scale as a consequence of the participation of twelve countries balance these costs and even reduce them significantly. This means that the contributions paid to the common budget return to the state in the form of a work share, which makes this solution attractive enough to apply the mechanism to successive modifications of the missile and attracting new members to the consortium. If Poland decided to join the program, Raytheon, as the prime contractor, would be tasked to split the work between all companies to offset the financial contribution paid by the Polish government by the workshare for Polish industry. Of course, this would result in less work for others, but at the same time governments would bear lower costs.
The analysis of the program’s mechanism enables defining a number of so-called good practices (principles) with regard to the cooperation. These first of all include the aforementioned rules on which the consortium is based, including balancing financial commitment with the work share, the equal weight voting principle whereby members’ votes are equal, and making key decisions unanimously. However, one must pay attention to other equally important solutions.

The use of the described mechanism is possible due to the existence of a strong network of military-industrial cooperation. Partners understand that fundraising may be easier if industry engages in the project, because seeing individual interest will lead companies to pressure the governments of their countries to participate and develop the program.

It is worth paying attention to another aspect of the cooperation, namely that the US Navy awards one contract on behalf of all member nations to a single contractor (now Raytheon), which definitely makes the procedure faster and easier.

Equally important is the fact that the member nations of the consortium are joint owners of the project, not customers. This allows for better cost control and product development according to the needs and requirements of collective defense (compared to the purchase of “off the shelf” products, or simply buying what is available).

However, the guiding principle is considered to be the one of trust. Thanks to this, it was possible to make the aforementioned solutions work and provide a basis for nearly 50 years of collaboration involving 12 countries and 17 defense companies.
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