NMIO Technical Bulletin
National Maritime Intelligence-Integration Office

APRIL 2012 VOLUME 2

NMIO Director's View:

Rear Admiral (Sel) Robert V. Hoppa, USN

I am pleased to present to you the second edition of our National Maritime Intelligence-Integration Office's (NMIO) Technical Bulletin. My office received positive reviews on the first issue via comments and strong readership numbers, and we hope this one will continue building momentum. Before turning to this edition's contents, I would like to discuss NMIO's priorities of focus and announce positive changes to U.S. Maritime Domain Awareness (MDA) and NMIO.

In early February, NMIO received strategic guidance from the Office of the Director of National Intelligence. This guidance reinforced the importance of maritime information and intelligence integration and information-sharing across the Global Maritime Community of Interest (GMCOI) which is comprised of the Intelligence Community; Interagency; federal, state, local, tribal and territorial governments; foreign partners; maritime industry, and academia. The strategic guidance gave NMIO four priorities of focus:

- GMCOI Development: "Expand on existing partnerships to incorporate non-intelligence community maritime partners and organizations."
- Improve Information/Intelligence Sharing: "Identify and resolve issues inhibiting information sharing through interagency and international collaboration and special programs."
- Advocate GMCOI Collection and Analytic Priorities: "Serve as the Intelligence Community's primary representative on the national stage for maritime issues related to intelligence integration, information sharing, and Domain Awareness."
- Science and Technology: "Engage academia, think tanks, the private sector and foreign governments to understand the implications of emerging technologies..."

Recently, two developments have occurred in the U.S. MDA community. First, NMIO has assumed the chairmanship of the national MDA Executive Steering Committee (MDA ESC) which coordinates and promotes federal interagency MDA efforts. Second, MDA mission sets have begun to be streamlined by combining the National Maritime Domain Awareness Coordination Office (NMCO) with NMIO. Until this time, each office had a different focus: NMCO was maritime domain awareness, and NMIO was maritime intelligence integration. Now, NMIO with these two mission sets and the MDA ESC chairmanship will be in a great position to produce a comprehensive, all-encompassing MDA approach to improve situational awareness and national maritime security.

NMIO has a great Technical Bulletin for you this quarter with articles ranging from European Maritime Surveillance to New Zealand's National Maritime Coordination Centre. We hope it will continue to broaden the conversation and encourage you to participate by submitting your ideas for future issues. I trust this latest edition will continue to build momentum and serve the Global Maritime Community of Interest well.

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European Maritime Surveillance Networking - MARSUR

Change of mindset: Security used to be about secrecy, now it is about transparency

The world today offers a very complex environment. It is not just the traditional military threats that we are looking into, but also the multiple interlinked issues of the globalized world that might affect our safety and security. This means that organizations that are dealing with safety, security, and defence have to look into these challenges with a broader mindset than before. What has changed the most is the international cooperation and networking needed to successfully respond to the challenges and threats today.

The key to enhanced security and safety lies in deepened and widened cooperation, in which all countries and organizations should be involved. In other words, true cooperation is characterized by give-and-take for the common good.

MDA co-operation

SUCFIS
-Finland — Sweden
-Shared sensor coverage
-Services
        -Radar plot sharing
        -VoIP and E-mail

SUCBAS
-Baltic Sea states excl Russia
-Decentralized architecture
-Services
        -Vessel data sharing
        -Notifications
        -VCOI list sharing
        -Cameras
        -Chat
        -File sharing

MARSUR
-CDSP operation support
-Decentralized architecture
-SUCBAS type services
-EU wide
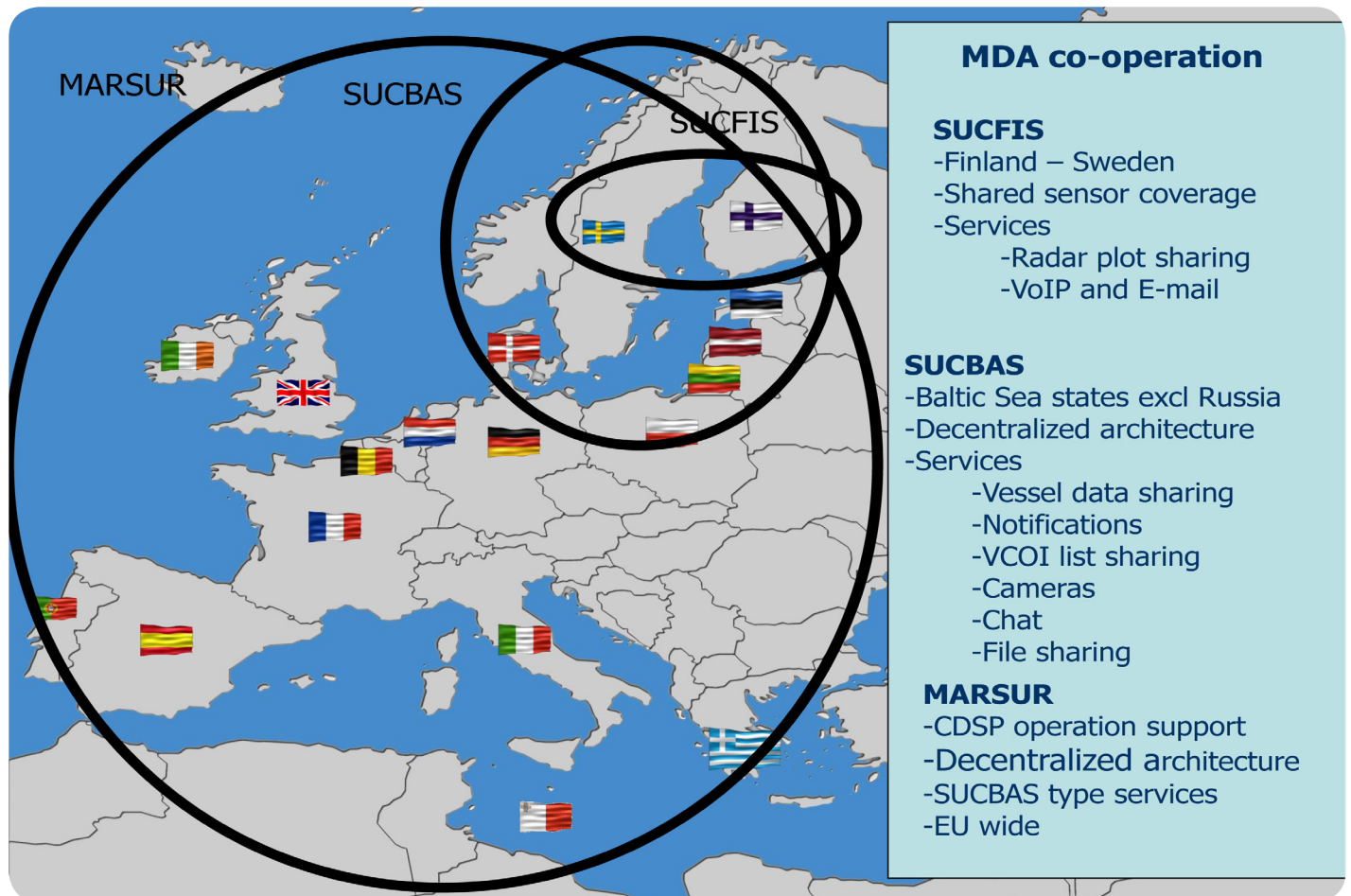
"Best practices and lessons learned from the home ground"

Since 1994, all the actors in the maritime domain in Finland started to develop a mutual environment where maritime surveillance information could be shared. The reason for that was to be more cost effective, but also the will to concentrate of doing things together rather that alone.

International cooperation involving Finland's exchange of maritime-related information started 1999. In the beginning, it was mutual naval exercises with Sweden. As a result of these exercises, both countries found that there was a need for a common information sharing platform. These experiences led to the Sea Surveillance Cooperation between Finland and Sweden (SUCFIS) agreement, which has been operational since 2006.

European Maritime Surveillance Networking - MARSUR

Based on the best practices and lessons learned from SUCFIS, Finland and Sweden started to plan wider cooperation around Baltic Sea States, to be called Sea Surveillance Cooperation Baltic Sea (SUCBAS). In the beginning there was just a wild dream and a crazy idea, but this has now grown into a real success story and has been referred to as such around the world.

European Maritime Surveillance Networking (MARSUR) Creating the Culture of Cooperation.
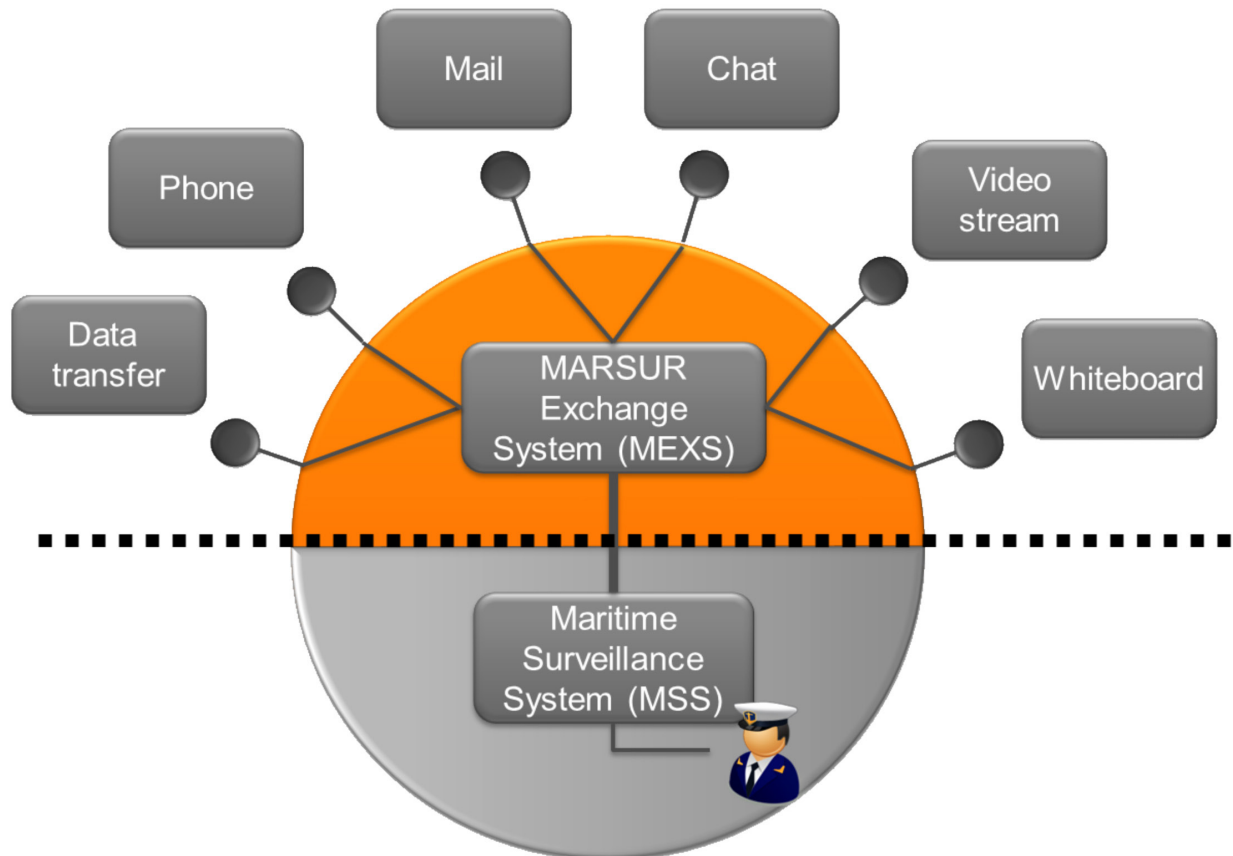
The European-wide MARSUR is the first project to integrate sea surveillance at the European level, and it is an excellent forum for cooperation. Our pragmatic approach was to do much more than imagine possibilities. European MARSUR is a key contributor of, and plays a significant role in maritime surveillance activities by European Nations, in the European Common Security and Defence Policy (CSDP), as well as in the safety and security of the European Union. It is also one of the best examples of the pooling and sharing activities.

For now 15 European countries have signed the agreement, and there are more to come. The technology in MARSUR allows not just the cooperation between navies, but also with all the maritime-related agencies that wish to join the initiative. The beauty of MARSUR is that there is no need for new and often expensive systems. Member States envisaged the MARSUR networking in a regional, non-centralized approach by connecting their national Maritime Surveillance Systems with their existing sensors and having also the manual sharing of information possible. This was achieved in a system-of-systems solution through a type of proxy with a sharing of the contact details of each participating member state. The development has been a fascinating journey of creating a culture of cooperation between the participating member states for the benefit of Europe.

"Built by the Military for a Common Good"

Built by the military, MARSUR is not meant only for the armed forces. It is intended as the "defence layer" contribution to the Common Information Sharing Environment of European Union (CISE), but can be used by any other user community. Each partner in MARSUR has

full control on the information he wants to share.

MARSUR presents the technological and functional results in the development of a solution that fulfils the need for information sharing, whilst maximizing cross border, cross sector interoperability through the use of best practices. It is not just technology, the key is the networking with people. Cooperation will not exist without the trust between the people and trust is based on mutual experiences.

"Need to Know, Responsibility to Share" - The shift from an Information System to federated thinking
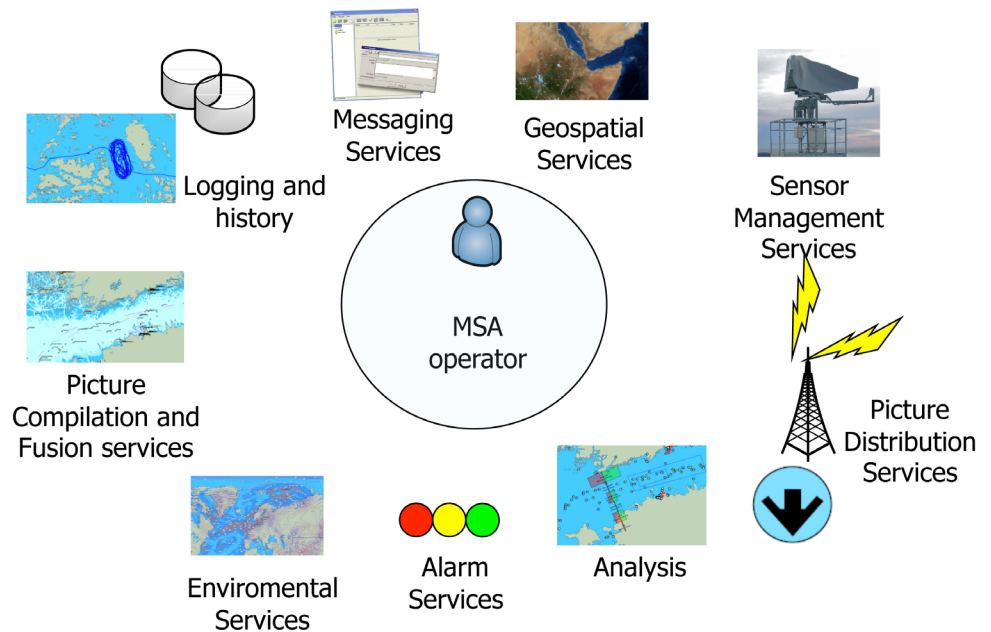
There are two ways to interconnect integrated systems for information exchange. One would be to develop a new independent system, and the other one to develop a federated type of solution for existing systems.

To avoid another expensive and proprietary development that would require its own sensors and data collection, MARSUR instead uses the already-existing resources through a system-of-systems solution. The services of each national system are made available through an interface, acting as transfer component and synchronizing the information between the partner nodes. Attention was paid to the latest technologies available and to the use of open standards reducing cost, offering a less error-prone solution, and more flexible support for wider Interoperability.

The technology behind the automated MARSUR Exchange System (MEXS)

MARSUR Exchange System (MEXS) is a logic handling unit, offering interfaces both to the national systems and to the MEXS network, as well as adaptations for mapping the interface. To maintain system integrity among the different services in the MEXS, the concept of virtualization was used. The MEXS communication can be adapted to the chosen transport mechanism which is important when operating with low bandwidths. This approach releases the MEXS protocol from the network implementation and makes it possible to use almost any transport protocol and bandwidth (for example in wire, fiber, radio or satellite networks).

The most challenging Interface is the human interface

But as Europe develops new systems and networks to provide greater maritime security and interoperability, one must remain committed to compatibility and the ability, as well as the willingness, to talk to one another. To the maximum degree possible, one must use unclassified databases that make it easier to connect and work together. We are convinced that "shared knowledge equals results."

There are always people who start by saying that it cannot be done, let's change it. Everything can be reached, it is all about people, trust, and common will.

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NORAD and Maritime Domain Awareness

The Canada-United States North American Aerospace Defence Command (NORAD) has been defending the skies of North America since 1958 and more recently since 2006 has also been tasked with warning the governments of Canada and the United States of threats from the maritime environment. The purpose of NORAD's Maritime Warning mission is to facilitate a response that could be unilateral, bi-lateral or bi-national dependent on national intent. In addition to maritime warning, NORAD has become increasingly involved in North American maritime domain awareness (MDA) that includes involvement with both nation's government maritime and security agencies, expansion into the maritime advisory realm, and a closer watch on Arctic maritime developments.

NORAD's maritime area of operations is global. The complexity of carrying out this mission is complicated by the many divisions between federal agencies and organizations. Potential maritime threats that NORAD may encounter include state and non-state sponsored threats, weapon proliferation, illegal immigration linked to terrorism, threats to the global maritime supply chain, and threats to critical maritime infrastructure. One of NORAD's mission is to warn of maritime threats at sea, in port or within internal waterways to meet its essential mission: the timely warning which creates a decision advantage that facilitates threat response by the appropriate departments and agencies of the two countries.

The aim of the NORAD maritime warning mission is to achieve a higher level of maritime security for the United States and Canada through its ability to process, assess, and share maritime intelligence and information from global sources. Success of the warning mission is dependent on information sharing processes that enable a shared understanding and the ability to warn the governments of both countries. Maritime surveillance and control are not part of the NORAD maritime mission and continue to be executed by national commands and, as appropriate, coordinated bilaterally between the two countries.

MOTR/MERP

Two vital MDA processes that work in conjunction with NORAD maritime warning are Canada's Maritime Event Response Protocol (MERP) and the United States' Maritime Operational Threat Response (MOTR). They are independent whole-of-government mechanisms intended to ensure collective and coordinated efforts across civil and military agencies that have emerged in Canada and the United States. The MERP is part of

Canada's Federal Emergency Response Plan to coordinate the response of federal agencies to a maritime threat or event. The MOTR is part of the U.S. National Strategy for Maritime Security and is the United States' plan to achieve a coordinated national-level response to threats against the U.S. and its interests in the maritime domain.

Canada and the United States face a number of transnational, complex and lethal threats in the maritime environment. The response to these events frequently crosses the mandates and authorities of multiple federal level departments/agencies and there is potential for these maritime events to be in the national interest of both Canada and the United States concurrently. Accordingly integration, alignment, and coordination are critical. As originally established, the American MOTR and Canadian MERP processes have different initiation thresholds, did not interface and did not include participation of members from the other country inevitably leading to non-synchronized understanding and actions. Given that maritime threats do not always respect geographic boundaries, a means of effective and rapid communication and coordination between Canada and the United States would best position both nations to respond successfully to maritime threats to North America. To better enable efforts, a Canadian and U.S. maritime security bi-national dialogue led by Transport Canada and the U.S. Global MOTR Coordination Office has been convened to develop the MOTR/MERP Strategic Integration Protocol. Building on the momentum of the first meeting, NORAD was included in the follow-on working group.

The MERP/MOTR Strategic Integration Protocol will provide guidance for enhanced coordination of bi-national efforts, including strengthened parallel planning and aligned efforts, supporting a perimeter approach to improve the efficiency and effectiveness of the maritime security response capabilities of both nations. The Protocols, which emphasize the value of parallel planning, coordination, communication, and alignment are intended to complement rather than supplant or replace existing national-level mechanisms command authorities or responsibilities. The Strategic Integration Protocol is without prejudice to any future decisions by either country on maritime events or threats.

NORAD Maritime Advisory

As the NORAD Maritime Warning mission moves into its sixth year, NORAD has become recognized as one of the major players in the Canada-U.S. MDA community and has embraced this relatively new role with equal priority to its aerospace warning and

control missions. A NORAD Maritime Warning was transmitted for the M/V SUN SEA incident involving the transport of illegal migrants into Canada. This warning was not sent until the ship was at sea and it was a potential threat. Since that incident, experience has demonstrated the need for another form of maritime communication, the NORAD Maritime Advisory message, that will enable NORAD to advise the two governments and bi-national mission partners with much greater lead time of an emerging potential threat intended to ensure all players have full situational awareness long before it may become necessary to take action to defeat that maritime threat. It can be expected that the NORAD Maritime Advisory Message may become much more commonplace in the future than the more urgent NORAD maritime warnings.

The Arctic

It is common knowledge that with a retreating polar icecap the Arctic sea lanes are gradually opening and the natural resources of the Arctic seabed are becoming more accessible. Accordingly there have been many news media reports of increased international interest in the Arctic. Russian ice stations close to the Canadian Arctic Exclusive Economic Zone and Chinese icebreakers exploring the Arctic have made headlines. With this vast opening "back door" to North America another route will soon be available from the sea. The U.S. and Canadian Arctic territories and seas lie within the NORAD area of operations and the increased interest in the region has not gone unnoticed by NORAD. For years, NORAD has been tracking maritime vessels of interest that have entered this region and NORAD is working on becoming an

active participant in Canadian and U.S. Arctic military exercises and operations. To date there is NORAD involvement in the Canadian led OP NANOOK 2012 and NORAD will continue to monitor Arctic developments with great interest.

Maritime warning is critical to addressing the full spectrum of Maritime Homeland Defense and Maritime Homeland Security challenges facing Canada and the U.S. Timely warning requires close collaboration between the numerous commands, departments, and agencies engaged in MDA activities. NORAD acts as a facilitator in dealing with maritime threats. Synchronization of the MERP and MOTR processes is a huge step forward in coordinating national response capabilities.

While our cooperative intelligence and information sharing efforts continue to improve, there remains room for improvement. NORAD's maritime warning mission continues to be a topic of discussion at the Permanent Joint Board on Defence (PJBD), Military Cooperation Committee (MCC), and Tri-Command Staff Talks (talks between Canada Command, USNORTHCOM and NORAD). These strategic level fora are very supportive of the progress being made.

The NORAD maritime warning mission remains a work in progress and fortunately progress is being made.

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New Zealand National Maritime Coordination Centre

New Zealand's maritime area of interest covers about 7 billion square kilometers made up of one of largest Exclusive Economic Zone in the world (Extended Continental Shelf, and areas of the Pacific Ocean). The area of operations extends from the Ross Ice Shelf in Antarctica to the tropics, just south of the Equator.
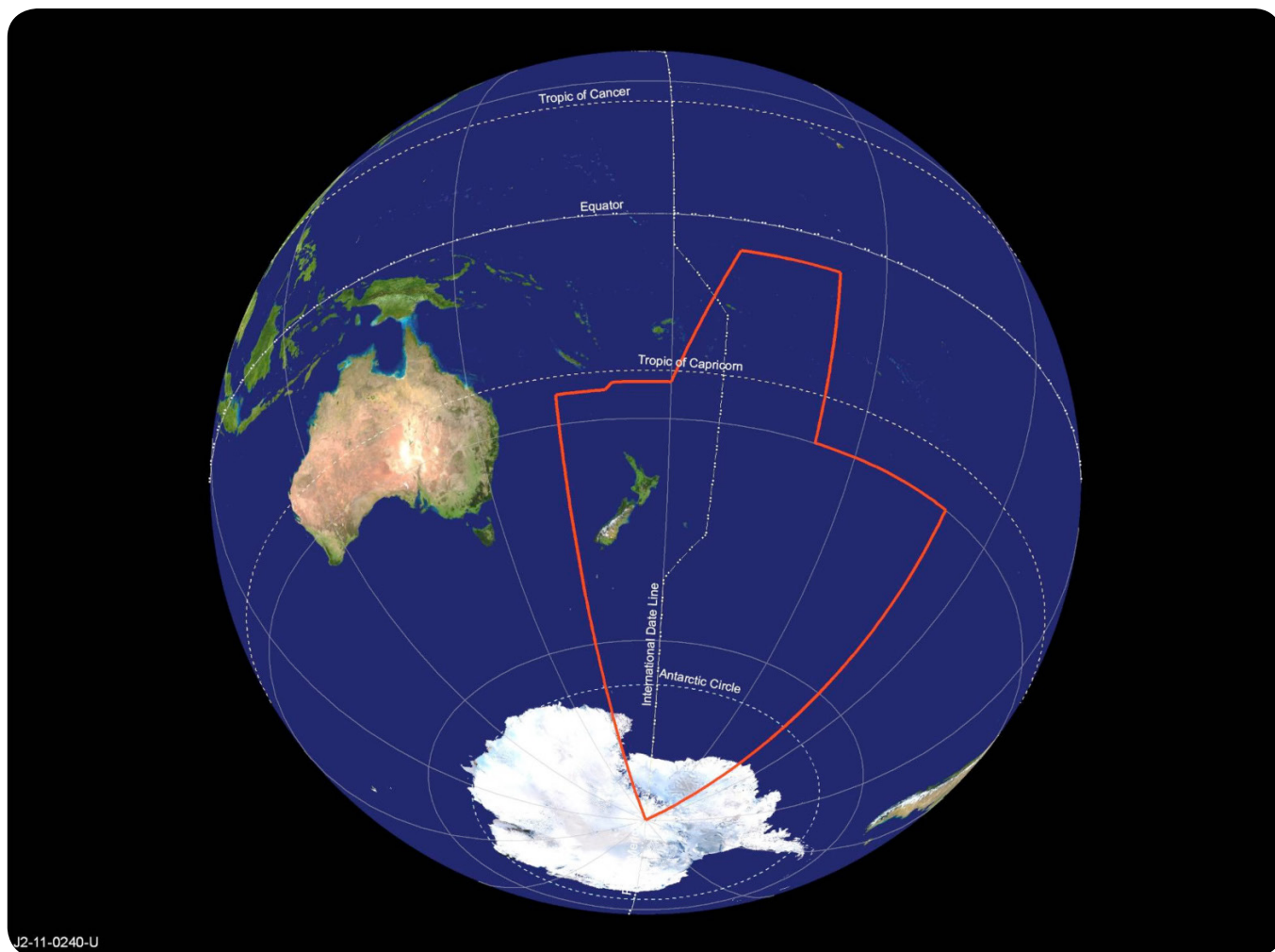
The New Zealand National Maritime Coordination Centre (NMCC) is an operationally independent part of the New Zealand Customs Service, working in partnership with a range of agencies including NZ Customs Service, Ministry of Fisheries, Maritime New Zealand, NZ Police, Department of Prime Minister and Cabinet, NZ Defence Force, Ministry of Foreign Affairs and Trade, and the Department of Conservation. The NMCC has two main roles, to coordinate maritime tasking, and develop the New Zealand Maritime Picture.

Coordinate Maritime Tasking

NMCC determines which area of interest presents the highest risk to New Zealand as a whole and allocates surveillance resources to those areas. Residual resources are allocated to areas determined to be of lower risk. As a result, surveillance patrols can address issues of more than one agency, thus ensuring New Zealand gets best value for the use of the asset.

Available surveillance resources include four 55 meter Inshore Patrol Vessels, two 83 meter Offshore Patrol Vessels owned and operated by the Royal New Zealand Navy, and a fleet of P3K-2 Orion aircraft operated by the Royal New Zealand Air Force.

Compile the Maritime Picture

NMCC produces the New Zealand Maritime Picture using a range of unclassified sources (Automatic Identification System (AIS), Vessel Monitor System (VMS), platform locater reporting, etc). The picture is disseminated to participating agencies for analysis and action using the Multi-Agency Network which also provides email chat and file sharing functions.

International Interests

New Zealand's isolation means many threats to it originate from other areas of the globe. For that reason, NMCC maintains close working relationships with counterpart organizations, particularly around the Pacific Rim. The purpose behind these relationships is to share information on matters of mutual interest, and to obtain the longest possible warning time of any threats originating from other regions.

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ONR Global – Pushing the Leading Edge of International Science and Technology

ONR Global is the Naval Research Enterprise window on the world

With engagements spanning six continents and seventy countries, Office of Naval Research (ONR) Global is a technology broker - connecting the international science and technology (S&T) community to the Naval Research Enterprise (NRE), consisting primarily of the Navy labs, warfare centers and affiliated universities, and providing an interface between operational Sailors and Marines and the NRE.   The mission of ONR Global is to search the globe for promising, emerging scientific research and advanced technologies to enable Office of Naval Research to effectively address current needs of the Fleet Force and to investigate and assess revolutionary, high-payoff technologies for future Naval missions and capabilities. Our responsibility is to the Navy and Marine Corps, and spans all domains, from the surface to the bottom of the ocean; to the air and into space; and Marines on the ground; and even cyberspace. Our quest for knowledge focuses upon such areas as power and energy; directed energy weapons and hypersonics; information dominance; autonomous systems; total ownership cost reduction; expeditionary and irregular warfare; and naval warfighter performance.

ONRG-DC
ONRG Int'l Liaison Office
CNO Executive Panel ★ ★ ★ ★
CNO(N2N6) ★ ★ ★
CNO(N81) ★

Mechanicsburg
NAVSUP ★ ★

ONRG-London
Technical Director
Executive Officer

ONRG-Prague

San Diego
COMTHIRDFLT ★ ★ ★
COMNAVSURFFOR ★ ★ ★
CG I MEF ★ ★ ★
NMAWC ★ ★

Newport
CNO SSG ★ ★ ★ ★

Naples
COMUSNAVEUR ★ ★ ★ ★

ONRG-Tokyo

Norfolk
COMUSFLTFORCOM ★ ★ ★
COMNAVAIRFOR ★ ★ ★
COMSECONDFLT ★ ★ ★
COMSUBFOR ★ ★ ★
COMMARFOR ★ ★ ★
COMNAVNETWARCOM ★ ★
COMNECC ★ ★
COMNWDC ★ ★

Bahrain
COMNAVCENT ★ ★ ★

Honolulu
USPACOM ★ ★ ★ ★
COMPACFLT ★ ★ ★ ★
COMMARFORPAC ★ ★ ★
COMSUBPAC ★ ★

Yokosuka
C7F ★ ★ ★

Okinawa
III MEF ★ ★ ★

Camp LeJeune
CG II MEF ★ ★ ★

ONRG-Santiago

ONRG HQ - Singapore
Commanding Officer

★   Joint Command
★   Naval Command
SA   Science Advisor
AD   Associate Director

ONR Global is comprised of two major, complementary programs: the Science Advisor Program and the International Science Program. The former is concerned with the introduction of relatively mature technologies into the Fleet Force in the near term, while the latter focuses on fundamental research that will have payoff for the future naval forces.

The Science Advisor Program: Interfacing between the Warfighter and the NRE

ONR Global Science Advisors are scientists and engineers assigned to the staffs of U.S. Combatant Commands, as well as major Navy and Marine Corps commands worldwide and focus on delivering S&T solutions to solve operational problems. The program currently includes 26 Science Advisors that serve as ambassadors from the Chief of Naval Research to the fleet

forces they serve.   Upon completion of their tours, ONR Science Advisors return to their respective home commands with a stronger understanding of the operational needs of the fleet force and more robust relationships throughout the NRE that enable them to assume more critical leadership and technical positions.

The International Science Program: Finding Innovative S&T Globally, Enhancing Global Technical Awareness, and Contributing to Theater Security Cooperation

The primary engines of the International Science Program are the 23 Associate Directors located in ONR Global offices in the UK, Czech Republic, Japan, Singapore, and Chile. The Associate Directors are PhD level scientists and engineers who engage foreign governments, academic institutions, and industries to tap into global S&T resources that will enhance or develop new opportunities for cooperative research. Many of our Associate Directors are fluent in a relevant foreign language. While performing their primary mission of mining innovative international S&T, they also contribute to the overall U.S. defense relationship with various countries and deliver enhanced global technical awareness to the naval forces.

Engagements that Contribute to the Welfare and Security of Today's and the Future's Sailors and Marines

Nobel Prize Level Research

ONR Global and ONR have been co-funding the research of Professor Andre Geim of the University of Manchester for the past five years. In 2010 he was selected for the Nobel Prize in Physics for the invention of graphene, an unusual material that consists of a sheet of carbon only one molecule thick. Because of its unique electrical and mechanical properties, scientists predict that graphene will have application to future systems that are relevant to naval forces, including ultra-miniaturized circuits that could be incorporated into the uniforms of warfighters.

Virtual Training

Immersive Infantry Trainer (IIT) prepares Marines in a virtual environment that provides combat conditions and settings in a controlled, safe, realistic, challenging, repeatable environment, so they are better prepared for the real-world situations they will encounter when they deploy. The goal of the IIT is to teach and reinforce combat decision making and small unit mission rehearsal.

Reducing Life Cycle Costs

In 2004, ONR Global identified a revolutionary type of pitch-adapting ship propeller that was being researched in Germany. The composite material design allows the propeller to flex proportional to the ship speed resulting in greater efficiency and approximately a 5% fuel savings. In addition, the new approach is expected to be a significant maintenance & life-cycle cost saver. In 2009, ONR incorporated this revolutionary technology into a Future Naval Capabilities program which is scheduled to be delivered to Naval Sea Systems Command (NAVSEA) in 2013.

Ship Corrosion

Joint projects between NAVSEA, Commander, Third Fleet (C3F), ONR Science Advisors, and Associate Directors such as CG Superstructure Cracking are leading to corrosion mitigation technologies to lessen water intrusion into spaces housing electronics and combat system equipment. Composite patching work is offering structural relief to halt further crack propagation which will result in longer-life spans for hulls and cost-saving measures for the U.S. Navy in a resource constrained environment.

Suspicious Activity Reporting – Maritime Sector

The Nationwide Suspicious Activity Reporting (SAR) Initiative (NSI) training strategy is a multifaceted approach designed to increase the effectiveness of state, local, and tribal law enforcement and public safety professionals and other frontline partners in identifying, reporting, evaluating, and sharing pre-incident terrorism indicators to prevent acts of terrorism. The overarching goal of the training strategy is to facilitate appropriate agency implementation of the SAR process and to enhance a nationwide SAR capability. To increase the effectiveness of this multifaceted approach, the NSI has developed training programs for frontline officers, analysts, and chief executives regarding the behaviors and indicators of terrorism-related criminal activity.
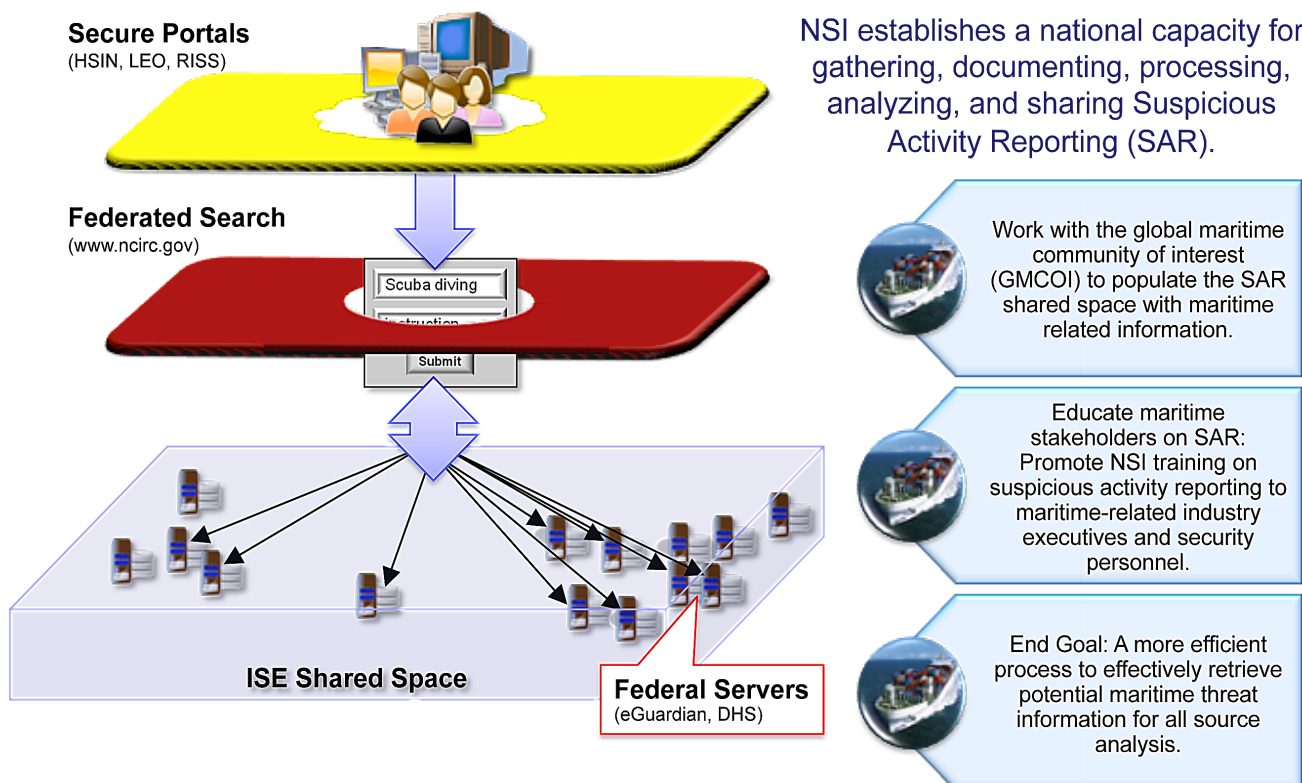
While continuing to provide high-quality training for the law enforcement community, the NSI is developing SAR awareness training for other key non-law enforcement constituencies, or "hometown security partners," that are important to the SAR effort, including fire and emergency medical service personnel, call takers (e.g., 9-1-1 operators), emergency managers, corrections and probation and parole officers, and other related occupations, such as those charged with protecting the nation's critical infrastructure. The National Maritime Intelligence-Integration Office (NMIO) in partnership with NSI is bringing another SAR awareness training

program to the public, specifically to the maritime industry and the port facilities they work in. The purpose is not to empower port and private safety officials to act on behalf of law enforcement but to have them understand the critical role they play in identifying and reporting suspicious activity to state, local, tribal, and territorial law enforcement.

Outreach and Coordination

The success of the NSI largely depends on the ability to earn and maintain the public's trust. As such, advocacy groups served an essential role in the shaping of the NSI Privacy Protection Framework and also assisted in the development and review of NSI products and resources. As the NSI /NMIO partnership moves forward, community outreach will help in addressing concerns of citizens and advocates by demonstrating that agencies engaged in the SAR process have adopted and maintain appropriate privacy and civil liberties safeguards.

The NSI is a critical aspect of the U.S. Secretary Department of Homeland Security "If You See Something, Say Something™" campaign, which is a simple and effective program to raise public awareness of indicators of terrorism and terrorism-related crime

Secure Portals
(HSIN, LEO, RISS)

Federated Search
(www.ncirc.gov)

Scuba diving instruction

Submit

ISE Shared Space

Federal Servers
(eGuardian, DHS)

NSI establishes a national capacity for gathering, documenting, processing, analyzing, and sharing Suspicious Activity Reporting (SAR).

Work with the global maritime community of interest (GMCOI) to populate the SAR shared space with maritime related information.

Educate maritime stakeholders on SAR: Promote NSI training on suspicious activity reporting to maritime-related industry executives and security personnel.

End Goal: A more efficient process to effectively retrieve potential maritime threat information for all source analysis.

and to emphasize the importance of reporting suspicious activity to the proper local law enforcement authorities. America's Waterway Watch, a combined effort of the Coast Guard and its Reserve and Auxiliary components, is a another public outreach program encouraging those who live, work or play around America's waterfront areas to simply report suspicious activity to the Coast Guard and/or other law enforcement agencies. Both of these programs, "If You See Something, Say Something™" and America's Waterway Watch, plus the NSI underscore the concept that homeland security begins with hometown security, where an alert public plays a critical role in keeping our nation safe.

Moving Forward

With the outreach of the NSI Program Management Office's (NSI PMO) training portfolio to other key constituencies, such as the maritime industry, the NSI PMO and NMIO are now working to identify gaps and develop necessary training to ensure that timely, relevant information is shared with and among law enforcement agencies and other public safety partners.

NMIO in partnership with NSI is tailoring SAR Awareness training for the maritime industry. Why the maritime industry? In the U.S. alone, we conduct 95% of our commercial trade via maritime conveyances— moving over 2,000,000,000 tons of freight a year and handling $264, 000,000,000 in annual commerce. The U.S. maritime responsibility includes 164,000 employees in water transportation and ports; 200,000 foreign sailors; 7,000,000 cruise passengers; and 134,000,000 ferry passengers. And, managing the security of our coasts means that we have to cover over 25,000 miles of inland waterways, 95,000 miles of shoreline, 240+ shipyards, and 1,000 harbor channels.

NMIO and NSI plan to complete the development of the maritime industry sector training by the fall of 2012. The delivery of the new training model will be in the form of a short training program, identical in format to other "Hometown Security Partners" training, and will be accessed via training portals and hard-copy CDs or DVDs and will serve to educate those professions within the maritime industry who have a great potential of being exposed to indicators and behaviors associated with criminal and/or terrorist activity.

POC: Mr. Robert Hall, Architecture Integration Branch Chief, NMIO, rlhall@nmic.navy.mil

ONR Global (cont. from pg 11)

Humanitarian Assistance –Disaster Relief

The March 11, 2011 Tohoku earthquake, the most powerful to have hit Japan with a magnitude of 9.0, triggered destructive tsunami waves which led to major loss of life, loss of infrastructure and the partial meltdown of the Fukushima Daiichi Nuclear Power Plant. ONR Science Advisors, already in the field, provided hands-on support to Operation TOMODACHI by manning the U.S. Pacific Command (USPACOM) S&T Cell at Headquarters in Camp Smith, Hawaii. Science Advisors worked around the clock, seven days a week, screening technology to help with radiological status, airborne plume modeling, hydrodynamic and ocean monitoring to assist with the greater Department of Defense efforts to provide humanitarian assistance/disaster relief.

Sending Scientists and Engineers out with the U.S. Naval Fleet Forces

ONR Global connects scientists and engineers with naval operational forces. Bringing the scientific community and the fleet together is accomplished through the Scientist to Sea, Scientist to Undersea, and Scientist to Field programs sponsored by ONR Global. Through these programs, scientists are able to embark on U.S. Navy surface ships, submarines, or participate in the day-to-day duties of Marines in the field. Riding in an amphibious navy vessel, eating MRE's during a field exercise, and talking to the crew while monitoring ship operations give scientists a deeper understanding of the lives the Sailors and Marines are living.

Conclusion

ONR Global is identifying S&T resources with the assistance of the Science Advisors and Associate Directors that are contributing to fleet force driven solutions for current and future U.S. Naval challenges. Future S&T relevant to naval needs requires productive global dialogue and ONR Global's long history, international presence, and dynamic staff contribute to making that dialogue possible.

As we keep a sharp lookout for both technologies that can help us—and those that can beat us—it is comforting to know that our global partners bring so much knowledge and expertise to the table, and we are honored and privileged to share in their exciting scientific research and technological innovation.

POC: Dr. Clayton Stewart, Technical Director, Office of Naval Research Global, Clayton.Stewart@onrg.navy.mil

High Neutron Sources to Detect Nuclear and Chemical Weapons

A Key deficiency in global threat detection capabilities is the dependence on passive detection methods in monitoring for the illicit transportation of special or bomb grade nuclear materials (SNM), and the dependence upon hands-on inspection to find explosives, chemical weapons, and contraband such as illegal drugs. A new generation of portable High Intensity Neutron Sources may provide keys to solving both problems.

Neutrons provide a particularly good means of probing the interior of cargo containers. Unlike X-rays, neutrons interact with the nuclei of the material being interrogated and are capable of penetrating through thick layers of steel and lead. Neutrons interact with material by nuclear scattering of the neutrons and by neutron capture or activation. By detecting the inelastic scattering and capture of neutrons, as well as gamma-ray release, the elemental identification of materials could be determined. This method can also detect SNM.

Identification of special nuclear materials shielded with lead and boron impregnated plastic is very difficult with passive systems such as the large-area helium-3 plastic scintillator panels. Active interrogation methods provide advantages over the weaknesses of a purely passive approach. RTI International is exploring an active interrogation approach, to scan cargo containers and human-occupied vessels for the presence of SNM. These advantages include the ability to rapidly scan through shielding and maintain a safe environment for operators and human occupants of scanned vessels, while detecting nuclear material with higher efficiency.

This technique uses the emission of 14.1 MeV neutrons produced by a neutron generator to interrogate the target. The direction of generated neutron and its time of flight is known by tracking the direction of the by-product alpha particle. Any additional neutrons and gamma rays produced by the neutron beam then identify the materials. Radiation for this technology is approximately 10 µrem per scan limit for a 10 second scan time (equivalent to the dosage one receives in going through the scanning machine at the airport) making it appropriate for use with human occupied vessels and vehicles.

Neutron generators can also help in the detection of explosives, chemical weapons and contraband such as illicit drugs. RTI International expects to obtain a high-flux fast neutron source for its Research Triangle Facilities in the near future. Neutron sources are capable of outperforming X-rays for specific of cargo inspection operations. Neutron scanners are particularly capable of determining the chemical composition of cargo elements. Specifically, explosives, chemical weapons, and contraband such as illicit drugs can be identified using either neutron inelastic scattering analysis or prompt gamma-ray neutron activation analysis.

The established methods for the screening of baggage and cargo rely heavily on content identification through visual imaging with X-rays. Most X-ray based systems are not sensitive to light elements such as Hydrogen, Carbon, Nitrogen, Oxygen, Fluorine, and Chlorine. Even improved X-ray tomography systems (although more sensitive to these elements), still rely on hands-on inspections to identify suspicious contents. High intensity portable neutron generators can enable a system capable of scanning a container for its elemental composition. Neutron scanning systems will be able to scan individual segments of a container for the elemental

chemical ratios of their contents. These elemental ratios can in turn be used to identify the chemical signatures of explosives, chemical weapons, and contraband.

Conclusions: Neutron source scanning systems provide added capability for the determination of cargo chemical composition. In particular, explosives, chemical weapons and contraband illicit drugs can be identified using neutron scanning methods. Special Nuclear Materials can be detected and located through active interrogation scanning methods.
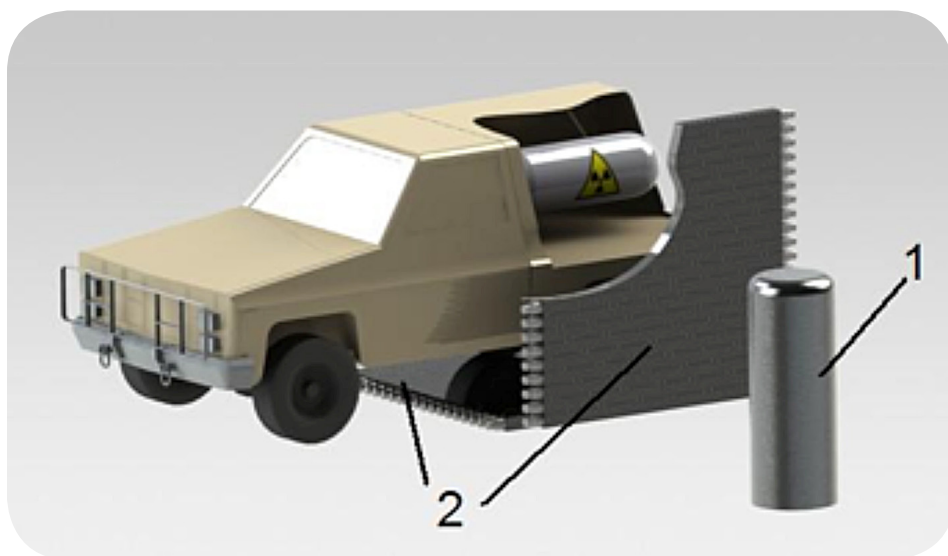
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