Maritime situational awareness
The chilean approach named
"vigilancia, control, alerta y respuesta"

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I. Introduction

New topics in the international security agenda

There is no doubt that the concept of international security is no longer a matter of concern only for the National States authorities, Governmental Institutions, or for those organizations responsible for the security of the national citizens, such as Police Organizations, Bureau of Investigations and other law enforcement agencies.

Today, the concept of security and international security is a matter of major concern for the common people. The statistics regarding security matters show that the feelings of common people about insecurity in their houses, in the public transport services, in the metro, and in general, in all transport services, is one of the most relevant issues nowadays.

The reason is very clear, the feelings about insecurity are very powerful because they affect the core organization of the society which is the family, and this creates a need to have confidence in the institutions responsible for these matters. Thus, the same organizations and the top level authorities of the national states must have, as one of their most important duties, is to provide by all means possible, not only the proper organizations and institutions to ensure the security and protection of the people, but also, and more important, to make those people feel confident in these

institutions and feel that they can live peacefully and quietly as members of the national society.

Unfortunately, the modern world, the fast transfer of information, the possibility to be a witness of what is going on almost at the same time things are happening will represent, at the end, the first sign of threats to the security of the normal people, who will see in the images of reality, the various threats to their own security.

Earthquakes, storms, hurricanes, and all the list of natural catastrophes, are only part of the safety and security concerns of people. As we will see in this paper, the list of new topics in the international security agenda is very long, and there is no doubt that it will increase in the near future.

This paper intends to show a maritime view of this problem, how some of these threats together with the lack of governance have already converted democratic and prosperous countries into what we know now as "Failed States[1]", and being the Chilean Navy responsible for running the Chilean Maritime Administration through the Directorate General of the Maritime Territory and Merchant Marine, it is the Chilean Navy and particularly this Directorate General, the institution responsible for the maritime safety and security issues in Chile.

Brief description of the chilean maritime organization

The Chilean Navy is under the authority of the Ministry of Defense, whom at the same time, depends on the President of the Republic.

The organizational structure of the Chilean Navy is built around five distinct bodies: The Directorate General of Logistics, the Directorate General of Personnel, the Directorate General of Finance, the Naval Operations Command, and the Directorate General of the Maritime Territory and Merchant Marine.

The latter, commonly known in the maritime community as DIRECTEMAR, is the naval body that acts, by virtue of the Law, as the National Maritime Authority in all national and international maritime activities carried out within its jurisdiction. Additionally, our staff has the power to oversee activities performed within our maritime territory, acting as Maritime Police.

DIRECTEMAR, in coordination with other State agencies, is responsible for promoting and controlling activities carried out by the maritime community.

According to the Chilean Navigation Act[2], the Directorate General of the Maritime Territory and Merchant Marine is the National Maritime Authority and it is empowered to represent the Chilean State, at a national and international level, regarding maritime issues.

Mission

DIRECTEMAR is the organization within the Chilean Navy through which the Government of Chile oversees the compliance of laws and international agreements presently in force in order to protect:
  · Life at sea
  · The marine environment
  · Natural marine resources

and control the activities carried out within the maritime field under its jurisdiction, thus contributing to the maritime development of the nation.

Our vision

Along with our Mission we have created the following Vision: "To be a maritime public service of excellence." All our efforts, across the entire organization, are directed towards achieving this goal in such a way that the actions of all our naval personnel and civilian employees are guided by it.

II. MSA global challenges

Threats to maritime trade operations

In the beginning, threats to maritime trade operations were related to situations such as search and rescue, water pollution, maritime law enforcement and monitoring of daily maritime/fishing/coastal related activities.

Currently, the concept of "asymmetric threats" must be added; being sea banditry or robbery, terrorism, and piracy, the most common situations.

The maximum expression of terrorism in modern times occurred on September 11, 2001, with the attacks to the United States of America. Almost immediately after those tragic and criminal actions, the international community got organized to face the increasing terrorist threat, which was able to demonstrate its evil capability.

The response of the International Maritime Organization (IMO) was fast, hard and determined, with the purpose of not allowing the international maritime transport to be an easy target for the international terrorism.

Criminal organizations, sea bandits, pirates and terrorists, use Sea Lines of Communications (SLOC s) for:

- Conducting illegal activities,
- Providing their own logistics, and
- Generating economic income.

Therefore, all States shall have a Global Maritime Situational Awareness, to prevent the use of sea lines of communication for illegal activities and terrorism.

Global challenges to maritime trade operations also include industrial fishing and pleasure boating. In other words, these are challenges to global stability.

From piracy to humanitarian operations, some involve illicit / criminal operators and some involve legal and governmental organizations.

The stability and governance of every country is affected by these threats against their Maritime Safety and Security.

- **Piracy**
- **Drug dealing**
- **Illegal migration and slavery**
- **E.E.Z. (resources exploitation)**
- **Trade disruption**
- **Search and rescue**
- **Substandard vessels[3]**
- **Substandard crews[4]**
- **Criminal organizations**
- **Damage to the environment**
- **Political and religious extremism**
- **Terrorism**
- **Humanitarian operations**

Lastly, the so-called **"Social Networks,"** such as Facebook, Twitter and other Internet social sites, have also been included in the list of threats to International Security, just because they can be used for illegal purposes against people, the governance and permanent institutions of the State. According to the gathered information from the Internet, there are more than 350 websites considered as social networks.

III. Areas of confluence and choke points

An international need of maritime situational awareness

In this regard, it must be said that almost all states engaged in the international maritime trade are very concerned about these areas of confluence, because in most cases, the international trade represents the way through which countries like Chile base their own development.

There is no doubt about the importance of the international maritime trade for Chile, considering that the main destinations of our exports and imports transported by sea are within the Asia Pacific basin.

Another relevant consideration is that 91.1% of the Chilean cargo is transported by sea, representing 48% of the Gross Domestic Product (GDP).

In addition to that, and considering that the Pacific Ocean concentrates more than 40% of the global population, generates 43% of world trade and produces 53% of global GDP, maritime shipping in this area is of utmost importance for the Chilean economy.

Our country is the third largest user of the Panama Channel, one of the most important areas of confluence and choke points in the world.

Based on the importance of these areas of confluence, there is an international need of maritime situational awareness, in order to have an effective control of the areas of navigation, to protect the valuable cargoes transported by sea, which represent a great interest for criminal organizations, not only for their value, but also for the possibility of hijacking the vessel and her crew members, requesting the payment of very high amounts of money for the liberation of people and the release of ships.

A Somalian Piracy Threat Map registering 2010 activities, shows that the piracy disrupting the maritime trade reaches far most of the territorial waters of the Horn of Africa, so a multilateral effort needs to continue while failed states maintain their status, otherwise the global economy may be affected.

S.A.R. area of responsibility

Based on the International Convention on the Law of the Sea, the coastal states usually consider as their Area of Jurisdiction, the 200 miles of Exclusive Economic Zone, in which the states have the right to protect their marine resources, such as fishing and seabed minerals.

In addition to that, the International Maritime Organization (IMO) through the Search and Rescue Convention (SAR 79), gives to some coastal states, the responsibility to establish Maritime Rescue Coordination Centers, in order to fulfill rescue operations in a defined Area, taking into account the organization, assets and facilities to run such operations.

The Chilean Maritime Search and Rescue area of responsibility, comprises 26,476,000 square kilometers and is legally based on the International Law of the Sea Convention, the Safety of Life at Sea Convention (SOLAS 74) and on the Search and Rescue Convention (SAR 79).

If we trace an imaginary line from Valparaiso to the West border of the search and rescue area of responsibility, the distance to be covered extends to 3,100 nautical miles.

If we compare the territorial continental area with the maritime area of responsibility, we can see that the latter is 35 times bigger that the land area, which shows the dimension of the efforts we have to make, especially when we think about SAR assignments.

It should be emphasized that in the areas and duties mentioned previously, the Chilean State, through the Navy, uses all means according to its operational capability in order to fulfill the tasks assigned.

SAR Area of Responsibility is not only for navigational seaworthiness purposes.

ISPS Code implementation makes for Chile this Area of Responsibility the place to monitor asymmetrical threats.

Surveillance, control, alert and response - SCAR
(vigilancia, control, alerta y respuesta) - VCAR

We fulfill our duties incorporating a strategic perspective, which involves surveillance, control, alert and response of the Maritime Area of responsibility.

The **S**urveillance, **C**ontrol, **A**lert and **R**esponse (SCAR) concept has been defined as: "the effective and timely awareness of all the activities carried out in the maritime, river and lake areas of responsibility and which may impact the national security and our maritime interests, in order to alert, prevent, protect and provide a prompt response in accordance with the requirements of our national interests."

Therefore, DIRECTEMAR has nowadays different ways to obtain information on what is happening in its area of responsibility, such as through satellite communications, maritime patrolling, air maritime surveillance, automatic information systems, coastal radars and vessel traffic systems which provide the necessary information to obtain a clear surface picture of the situation within its jurisdiction

This is our Maritime Situational Awareness (MSA) vision,
…this is our Maritime Domain Awareness (MDA) approach.

The SCAR / VACR Model is not different from other countries model for MSA and is based on the need of having a recognized maritime picture of the area of responsibility, and many times out of it, since the challenges and threats to maritime trade operations (MTO) are global as well.

So the more knowledge on the surface picture we have, the better response we can provide.

Maritime Situational Awareness. C4 ROOM

In order to fulfill the required control and to monitor both the area of jurisdiction and the area of responsibility, in the facilities of the Directorate for the Maritime Safety, Security and Operations of DIRECTEMAR, there is a special room equipped with state-of-the-art technology to allow the organization to monitor and analyze sea and inland waterways areas of responsibility, in order to provide Maritime Situational Awareness that could impact the maritime national interests.

The Command, Control, Communications and Computer (C4) operations room, keeps watch 24/7 over the entire area of responsibility and beyond, in order to foresee and generate a knowledge database for decision making upon any situation related to vessels of interest.

Among the capabilities, the room has different equipment for VHF and HF communications, real time video conference, real time video cameras connected to the different Chilean ports and areas of geographical interest, access to Internet, access to the Automatic Information System, access to Satellite Vessel Monitory System, access to the Global Mar-

itime Distress Safety System, to various databases and information data bases, satellite te-
lephony and other state-of-the-art systems.

IV. GRAFIMAR

One of the most important assets in service in this moment is the Computer Platform
called GRAFIMAR, which main characteristic is the integration of all the data provided
by maritime authorities, particularly by the Captain of the Port's Offices, regarding the
registry of merchant and fishing vessels, artisan fishing boats, maritime personnel, crew
members of all vessels and boats under Chilean flag registry. It includes complete infor-
mation regarding the vessel and the people onboard, which allow the organization to have
real time information of all vessels operating in our jurisdiction and even of those vessels
operating overseas under Chilean flag.

Grafimar is the result of more than 15 years of implementation, with the participation of
very highly qualified technical personnel, specialized in information technologies. This
software was developed within the organization with the participation of members of the
maritime authority staff along the country, who have been for a very long time populating
the databases with relevant information.

It is also capable of linking web-based maritime industry related portals to correlate data
and produce valuable information for the decision making process.

Grafimar has many data sources, most of them are developed and managed by our organ-
ization, and some of them are purchased data from vendors.

- PRE ARRIVAL NOTIFICATION
- DEPARTURE & ARRIVAL SYSTEM
- S.I.A.N.
- L.R.I.T.
- MSSIS SeaVision (COASTAL AIS)
- INMARSAT POLLING
- AIR & SURFACE SURVEILLANCE
- MINI VTS SATATIONS (Lantano / Teseo)
- COSPAS-SARSAT EPIRB L.U.T.
- INTERNET WEB PORTALS
- INTERAMERICAN COOPERATION AGREEMENTS (Convenios Colco)
- AIS (SATELLITE) VIA WEB SERVICES
- V.M.S.
- REGIONAL PLEASURE AND FISHERMEN BOATING MOVEMENT SYSTEM
- CHILREP (QTH)
- AMVER
- CRT-AMAS
- DIRINMAR DATABASES
- REMIX / OASIS (IFC Singapore)

The use of different technologies has enabled our country, represented by DIRECTEMAR, to enhance its capabilities regarding the projection of its port and maritime presence, in which the use of GRAFIMAR should be highlighted. This system interacts with a group of source applications and allows to graphically display a dynamic vision of the surface picture in real time.

GRAFIMAR integrates and shares information to facilitate the analysis and decision making processes in keeping a secure and protected maritime trade, as well as all other activities related to life at sea.

In this way, it is possible to access external websites that are useful for intelligence purposes. In the same way, this application offers us the possibility to visualize the SAR area of responsibility corresponding to MRCC Chile, where we fulfill our duties related to control.

Collection of AIS data using MSSIS

Grafimar is a surface picture visualization tool that enables the Chilean Maritime Authority to make data mining on the numerous databases maintained by the Directorate General of Maritime Territory and Merchant Marine, Maritime Governors, Captain of the Ports and the two Technical Directorates established for: Maritime Safety, Security and Operations, and Maritime Interests and Aquatic Environment Protection.

This also allowed the organization to develop a GRAFIPUERTO version, which provides us information regarding the capabilities of every single port of our country, with logistics information including, among others, vessels that are operating in port, information about their crew and the ISPS Code requirements, and information regarding the stevedores operating in real time onboard those vessels.

It also shows real time closed circuit TV images, allowing the maritime authority to see what is happening in all port areas of our country.

GRAFIMAR and GRAFIPUERTO are very important tools in the decision making process when facing an emergency situation, and as I mentioned before, they are based on the integration of many different data bases.

MSSIS participant partners

MSSIS encourages participation by all countries through data sharing in order to achieve the universal goal of a safer, more secure, global marine environment.

Albania	Ecuador	Kenya	Portugal
Argentina	Estonia	Liberia	Romania
Australia	Finland	Lithuania	Sao Tome & Principe
Bahrain	France	Malta	Senegal
Belgium	Gabon	Mauritania	Serbia
Benin	Gambia	Mauritius	Seychelles
Brazil	Georgia	Mexico	Singapore
Bulgaria	Germany	Montenegro	Slovenia
Cameroon	Ghana	Morocco	Spain
Canada	Greece	Mozambique	Sweden
Cape Verde	Guinea	Netherlands	Togo
Chile	Iceland	New Zealand	Tunisia
Colombia	Iraq	Nigeria	Turkey
Croatia	Israel	Norway	Ukraine
Denmark	Italy	Pakistan	United Kingdom
Djibouti	Jamaica	Peru	United States
Dominican Rep.	Jordan	Poland	Uruguay

VRMTC-A à MSSIS Sea Vision
(Virtual Regional Maritime Traffic Centre for the Americas)

VRMTC-A was the beginning of an information sharing tool at a global scale using MSSIS data.

Now, the system is moving to a new web-based portal called "MSSIS Sea Vision" at https://mda.volpe.dot.gov/SeaVision

MSSIS Sea Vision displays the same coastal AIS MSSIS voluntary network, but it is capable of managing satellite AIS from vendors of this technology

As established on its webpage, the Maritime Safety and Security Information System (MSSIS) is a freely-shared, unclassified, near real-time data collection and distribution network.

Its member countries share data from Automatic Identification Systems (AIS), coastal radar, and other maritime-related systems.

MSSIS is intended to promote multilateral collaboration and data-sharing among international participants, with a primary goal of increasing maritime security and safety. Data sources may range from a single sensor to an entire national vessel tracking network. MSSIS is perfectly suitable as a one-stop source for streaming global maritime data. Since the data distributed by MSSIS maintains its original, internationally recognized format, and is delivered to users in near real time, member organizations are able to utilize the feed to meet their specific mission requirements.

Chile entered MSSIS in 2008, and was presented during the 7th International Maritime and Naval Exhibition & Conference for Latin America (Exponaval-2008). Since then, more and more Chilean coastal AIS stations have been added to the network.

Furthermore, MSSIS started to feed the VRMTC-A portal and now feeds MSSIS Sea Vision portal, managed by the Volpe Centre from the Department of Transport of the U.S.A.

Information Fusion Centre – Singapore

Since Chile is part of various working groups engaged in maritime trade operations and naval cooperation and guidance for shipping, the IFC Singapore became a relevant actor for maritime security, thus, IFC is envisaged to be the node to enhance collective under-standing of the maritime domain in order to strengthen maritime security in the region and beyond.

To achieve the above-mentioned, general aims are:

- To collate & fuse white shipping information that is shared among maritime security partners.
- To sense-make collated & fused information to build a coherent maritime situation picture and maritime domain knowledge base.
- To deliver actionable information to partners timely to cue operational responses.

Chile participates actively in this initiative since 2009, when we were invited to the Mar-itime Information Sharing Exercise (MARISX). This year we are participating in Singapore and from Chile activating our Operational Centre co-located in DIRSOMAR.

LRIT system

Due to the existence of asymmetric threats worldwide, the IMO implemented a long-range identification and tracking system which provides information upon the request of coastal States, for Flag State, Coastal State and Port State Control purposes. Although these re-quests have a cost, they allow the obtainment of a surface picture for Search and Rescue operations, which is free of charge for the requesting countries.

This information is included in the GRAFIMAR platform enhancing its surface picture with current information.

The LRIT Data Center managed by Chile through DIRECTEMAR is located at the Infor-mation Technology facility and is operative 24/7.

Chile is the Data Center provider for Mexico and Colombia.

V. Naval Co-operation and Guidance for Shipping (NCAGS)

NATO's review of its policy for operations involving merchant shipping has led to the development of Naval Cooperation and Guidance for Shipping (NCAGS), with its associated tactics, techniques and procedures, to replace Naval Control of Shipping (NCS).

To provide NCAGS support to military commanders and merchant shipping in peacetime, tension, crisis and conflict through cooperation, guidance, advice, assistance and, where necessary, supervision.

Additionally, to provide military guidance, advice or assistance in respect of participating nations' global, maritime commercial interests to enhance the safety of merchant ships and to support military operations.

Although Chile is not a NATO member country, our participation in the Pacific and Indian Oceans Shipping Working Group (PACIOSWG), allowed us to experience through Bell Buoy NCAGS series of exercises, the opportunity to adapt NCAGS doctrine and policies as a valuable tool to organize and to get operational the Maritime Situational Awareness.

One of the various responses that NCAGS can determine is Maritime Interdiction Operations with use of tactical boarding teams.

VI. Fast Action Anti Terrorist Group (FAATG)

Since Chile is member State of international treaties and conventions on security, illegal drugs trafficking, smuggling, piracy and illegal immigration, the Chilean Navy has a special trained fast action antiterrorist group for maritime interdiction operations. The team is in permanent training and ready to go any place where they could be necessary.

Their essential mission is to protect maritime security in national and international waters and port facilities.

The first team has participated in international exercises in the South Pacific Ocean and in the Panama Canal area on Panamax Exercises since 2003.

Panama Exercises are carried out in order to train different forces and navies to protect the Panama Canal from the attack of an asymmetric threat, usually represented by a terrorist group with the mission of destroying or, at least, producing a major damage in the Canal, affecting the international maritime commercial trade.

Final remarks

Since the birth of the Republic of Chile, the Maritime Authority (DIRECTEMAR) has been an integral part of the Navy. It offers a maritime public service that fully satisfies the needs of the Chilean society.

The world's social and technological evolution has impelled DIRECTEMAR to adapt and optimize its capabilities and resources in order to face the new challenges. This is an iterative process which requires planning and programming to maintain the quality of the service provided.

Pursuing Safety and National development the Chilean maritime administration has been established to protect the State's maritime interests within the national maritime jurisdiction and project them to the international sphere.

In addition to that, DIRECTEMAR services provided to the maritime sector has allowed the organization to develop human, material and financial resources that help to provide safety, monitor the legislation in force and meet the requirements of the maritime users.

To provide a maritime public service of excellence, the Chilean Navy through the General Directorate of the Maritime Territory and Merchant Marine, has the legal framework, the personnel and the assets, to fulfill all its duties according to the Navigation Act and the national and international regulations.

The Maritime Situational Awareness implemented in the Chilean area of responsibility and maritime jurisdiction, in terms of Surveillance, Control, Alert and Response, allows the Chilean Maritime Administration to perform a very effective and timely awareness of all the activities carried out in the maritime field and which may impact the national security and our maritime interests, in order to alert, prevent, protect and provide a prompt response in accordance with the requirements of our national interests.

Notes

[1] The term **failed state** is often used by political commentators and journalists to describe a state perceived as having failed at some of the basic conditions and responsibilities of a sovereign government. Common characteristics of a *failing state* include a central government so weak or ineffective that it has little practical control over much of its territory; non-provision of public services; widespread corruption and criminality; refugees and involuntary movement of populations; and sharp economic decline. *Noam Chomsky's 2006* **Failed States: The Abuse of Power and the Assault on Democracy**

[2] Supreme Decree N° 2.222 dated on 21st May 1978, "Ley de Navegación".

[3] In reference to those ships which do not comply with the minimum standards established in the International Maritime Organization (IMO) International Conventions regarding the safety of vessels and the protection of the marine environment.

[4] Reference to those crew members of a ship which do not comply with the minimum standards established in the International Maritime organization (IMO) International Convention regarding the Standards of Training, .Certification, and Watchkeeping of seafarers.