MCMVs or off-board MCMs?

Modern trends and caveats of new technologies

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LEONARDO
LAND & NAVAL DEFENCE ELECTRONICS

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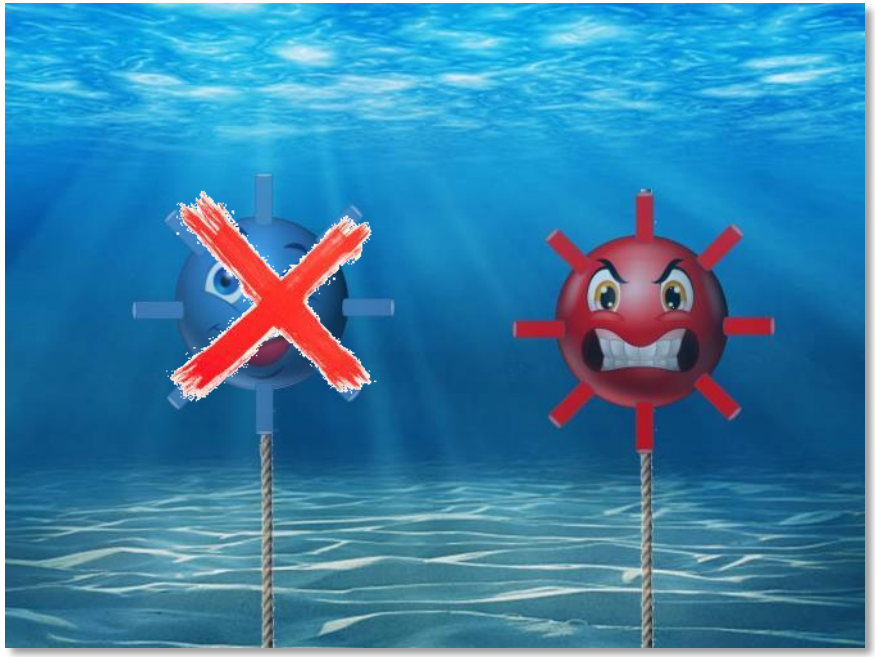
The difficulties of talking about naval mines

- Whoever fears naval mines?
- «Do they still exist?»
- Are Governments keen on spending money on MCM?
- Have you ever seen a movie about mine hunting?

Naval mines identity: never friend

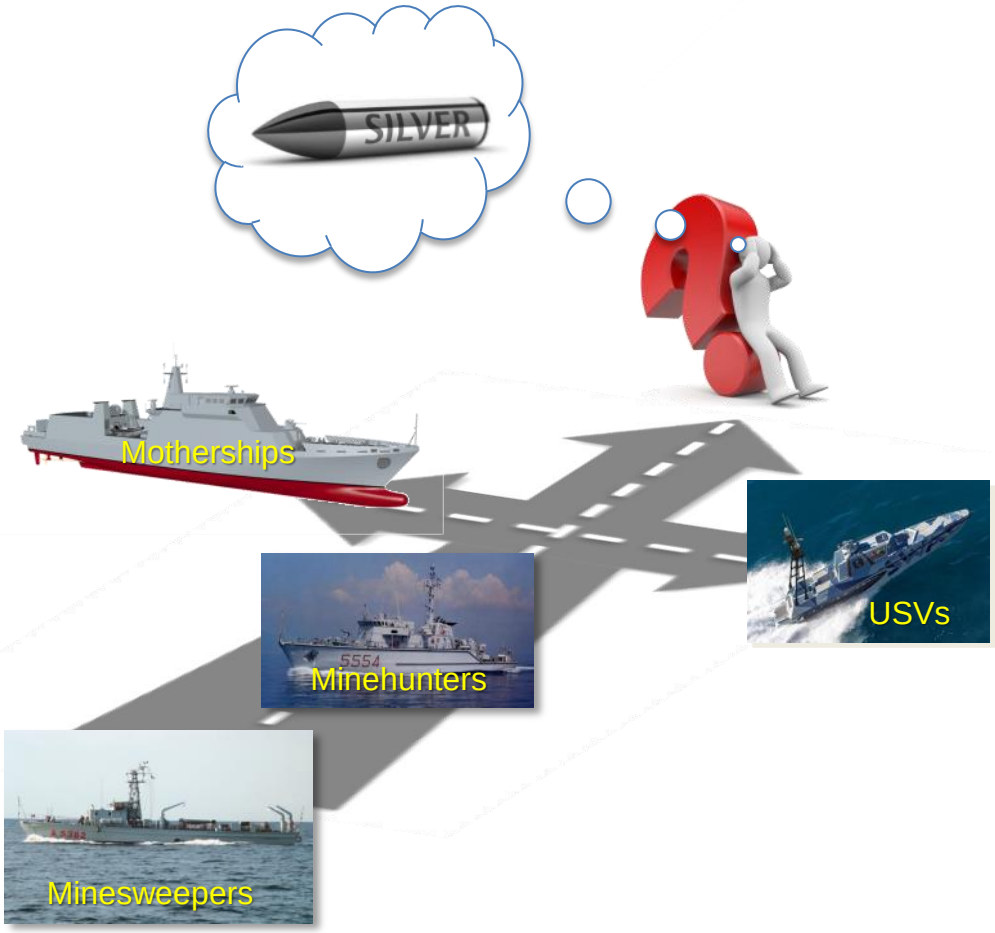
- Often cited as the most disloyal weapon
- Holds the highest rate damage/cost
- Quick to deploy,
- Difficult to neutralize
- You do not know if there is or not, where it is located and which target could activate it

Mines have no friends, only potential targets



Which Countermeasures?

- Over the last three decades Mine-Countermeasures (**MCMs**) have evolved together with the technological evolution of mines, platforms and sensors
- Now there is a broad consensus among Navies about the way in which MCMs should be executed in the future
- Taking out the man "**from the loop**" and assigning the dirty work to the machines has become a primary objective
- The last 20 years have seen an increase in interest towards **autonomous systems**
- However, as the recent cancellation of some programs has shown, it is a complex and expensive goal and nobody can reasonably claim to be close to the implementation of the so-called "**Silver Bullet**" against mines



Dominant school of thought

- The dominant school of thought is apparently hasty to abandon the traditional methods by virtue of the fact that new ones are mature and ready to take over
- I'm afraid we are running the risk to lose the priceless know-how of the Minehunters' crews, culmination of many years of operational training
- Above and beyond the question of who is right, is it correct to think that there is only one possible answer to the problem of countering mines?

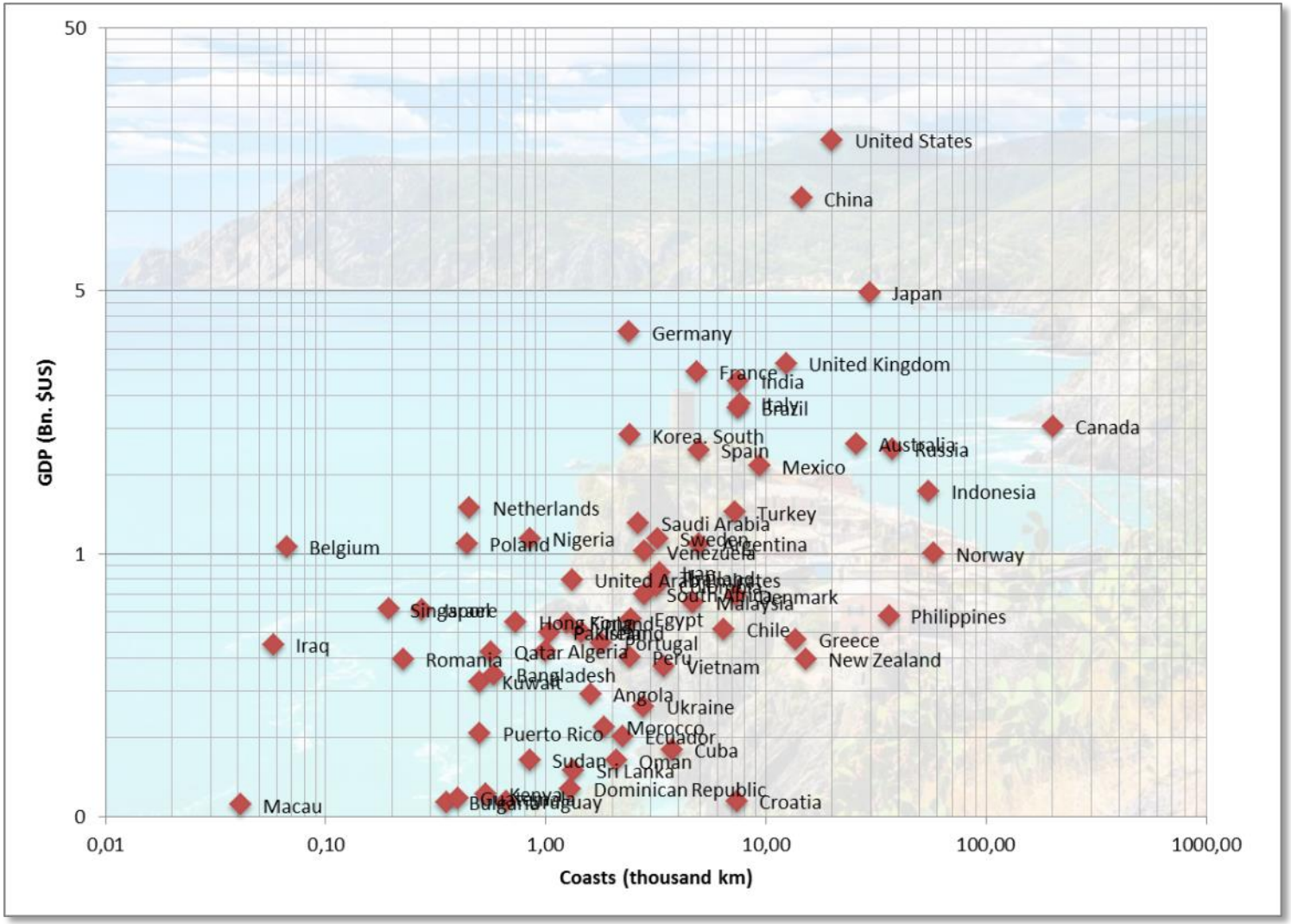
Do nations have the same attitude toward MCM?

The graphs shown in the following slides compare the nations of the world having access to the sea on the following data:

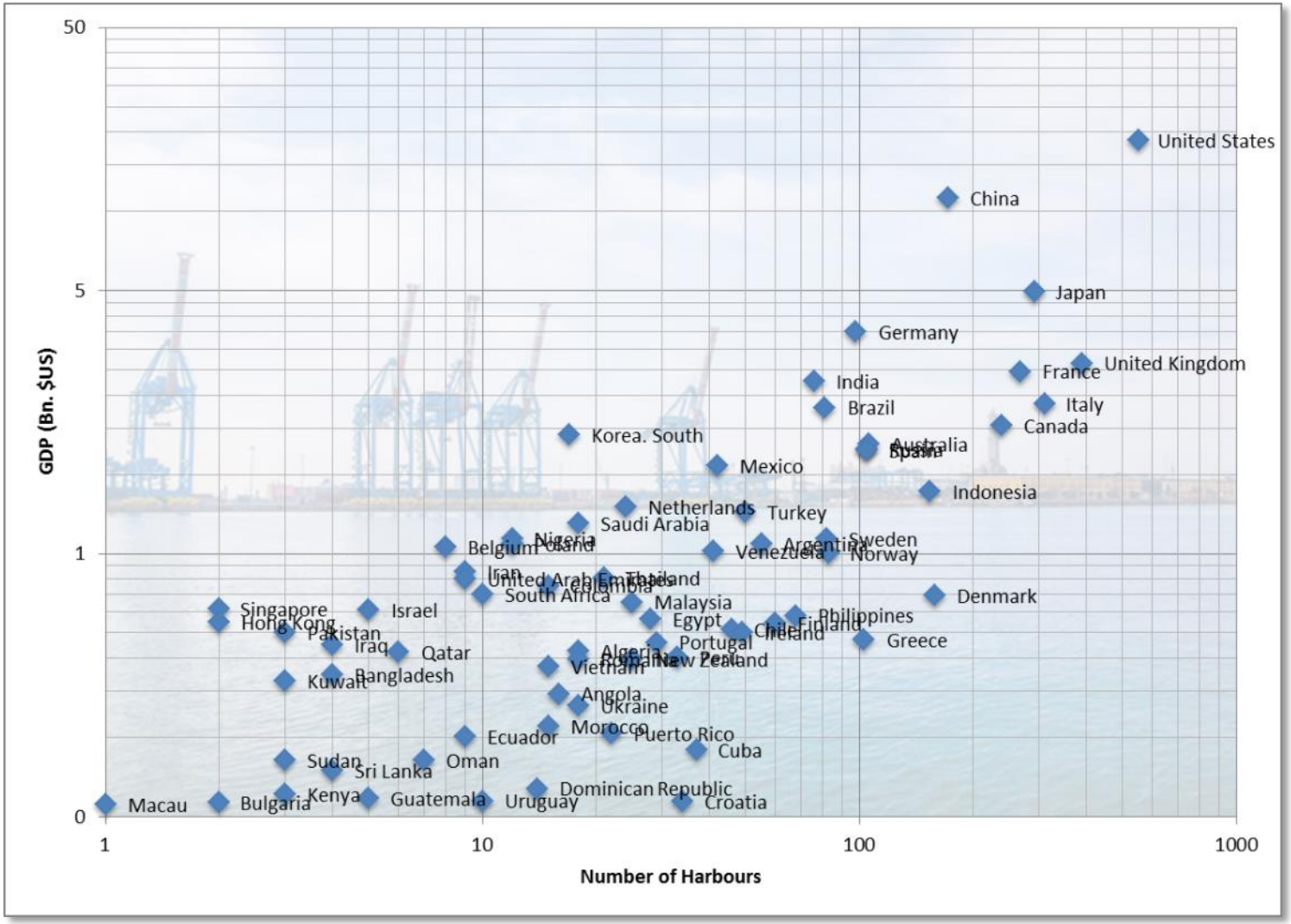
- the **length of the coasts** (km)
- the **number of ports**
- the Gross Domestic Product (**GDP**)

That is, data showing in some way the **extent of the effort** required for ensuring the **safe navigation** within their territorial waters but also their **spending power**

Coasts vs GDP



GDP vs Number of Harbours



Do nations have the same attitude toward MCM?

What then cannot emerge from the graphs is the different **operating concept** that every single nation normally adopts in the use of the **MCM forces**:

- There are superpowers, like the **United States of America**, for which the MCM forces operate not only within their territorial waters, but are also deployed to protect the fleet in long-haul **overseas expedition**
- Then we have nations, like **Italy**, with thousands of kilometres of coastline and a consequent high number of ports and access routes to survey
- But there are also **other** nations that, despite having less coastline or accesses to the sea and consequently smaller naval forces, still want to be able to cope with the threat of mines

I do believe that there is not an equally valid solution for all these three realities (not to mention all the others)

Scoring the goal

Different approach for different players… but same effectiveness…

Available MCM solutions

From the Minehunters to «All in a box» solutions

Available MCM solutions

Minehunters

- ↘ more expensive and slower than other platforms.
- ↘ unsuitable for long-range operations
- ↗ able to remain on task for days
- ↗ able to perform the MCMs in full (Search, Classification, Identification and Disposal of mines)
- ↗ to this day the only effective manned solution to safely approach mines. And where the mines really are, nobody knows
- ↗ effectively used in many extra MCM areas

Despite known cons, we still have ongoing Minehunters' **Production** / **Modernization** programs.

Available MCM solutions

AUVs

- ⇗ one of the most effective and powerful tools for Rapid Environment Assessment
- ⇗ quickly deployable, thus suitable for long-range operations
- ⇘ not suitable for Identification and Disposal
- ⇘ on their own they are not enough.
- ⇘ endemic difficulties in communicating in real time with mothership

Unfortunately MCM is not just about Search and Classification...

Available MCM solutions

Multirole platforms

Multirole platforms are most likely the future.

Allow compacting into a small number of units, capabilities that would otherwise require significantly larger fleets of specialized units.

The major dispute remains on the intrinsic characteristics of the platform: general purpose carriers, or low signature, shock resistant platform with own search tools?

It should however be emphasized that the MCM role and the constraints that this imposes are often ill-fitting with other roles.

If we look at an important and very interesting project like the LCS, our feeling is that the MCM component is the least mature at the moment.

For the time being, Multirole units remain much more expensive than expected

Around the world there are already significant examples of Multirole platforms and several new programs are now underway (e.g. BE/NL)

Available MCM solutions

USVs

In the past, they were designed primarily for minesweeping operations.

- ⇗ Today there are integrated solutions able to perform all MCM, including Neutralization
- ⇗ They have considerable potential from the standpoint of autonomy and communication, to the point that they can be used as a true projection of the Mothership on the field.
- ⇘ By contrast, because of their size (tradeoff between sea keeping and ease of transport), their ability to operate is strongly conditioned by weather conditions.

Available MCM solutions

"MCM Box"

Whatever the sensors and the instruments, the idea is to have all the tools for Mine Hunting (C2, Vehicles) stowed in one or more containers.

The advantages are obvious: rapidity of movement, possibility of using any Vessel Of Opportunity as a platform, including the possibility of not having a platform at all

Which Countermeasures (reprise)?

We do believe that there's **not a single solution** and that, when facing an expression of interest to MCM by a particular nation, the right thing to do is carefully **analyze all the factors** that contribute to the definition of a technical solution, starting obviously from the **operational need** but without neglecting aspects such as: the **geography**, the **skill** and the specific competence of local naval forces and, obviously, the **spending power** of the country

Leonardo experience and solutions in MCM

Leonardo is long experienced in **MCM**.

Thanks to the acquisition of historical brands like **Datamat** and **Selex**, its experience in this specific sector dates back more than **35 years**.

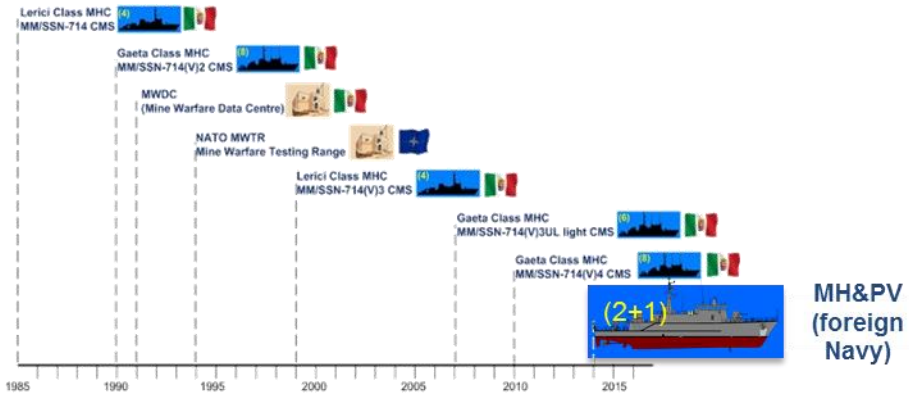
Since the design and delivery of the first Italian Minehunter (**Lerici**), the company has provided the **Italian Navy** with **five generations** of **Combat Management Systems** (**CMS**) for Minehunters.

Leonardo is able to discuss **MCM** with any interlocutor, be it a **technical** or **operational** counterpart. We have a good knowledge of this sector and related technical solutions

Regardless of our preferences and beliefs, **customer-oriented** as we are, we adapt our choices to its requests and needs, giving us, at the same time, the chance to keep on developing our competence.

Although we have an **important portfolio** of products specific in the **naval field**, we are primarily **systems integrators** and suppliers of turnkey solutions, therefore we do not have preconceived preclusions in adopting any S/S beneficial for the fulfillment of the requirements.

In this respect, it is significant that in the context of its many MCM programs, LEO has successfully integrated **MCM Sonars** from **3 different manufacturers**.



MCMVs or off-board MCMs?

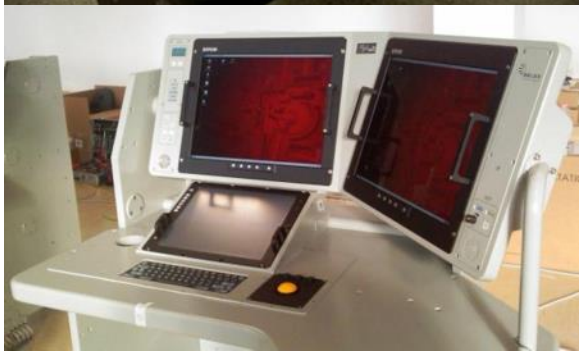
Leonardo solutions

Current and future MCM and unmanned Programs

Leonardo experience and solutions in MCM

Current and future MCM Programs

Gaeta class mid-life modernization



Under the important modernization program of the Gaeta class (8 vessels), Leonardo has developed the new CMS.

Worth mentioning are the new Multi-functional Consoles (MFCs) specifically designed for the use on board of Minehunters. Made of carbon and aluminum, they are characterized by low signature and shock resistance according to MIL-STD 901D. In addition to the standard controls, they can integrate specific controls (e.g. joysticks), for the remote control of systems like fire control systems or ship dynamics.

The CMS is the heart of the C/S and allows operators to plan, monitor and evaluate ship missions, thanks to the high level of integration with ship sensors (Sonar, Radar, Navigation system, etc.) and actuators (ROVs, Ancillary Propulsion, etc.).

Leonardo experience and solutions in MCM

Current and future MCM Programs

Mine Hunting & Patrolling Vessel (MH&PV)

The MH&PV program provides the supply of two Minehunters (with a third optional) and relevant services (Training, ILS) for a Foreign Navy.

Leonardo is responsible for designing and supplying the entire combat system.

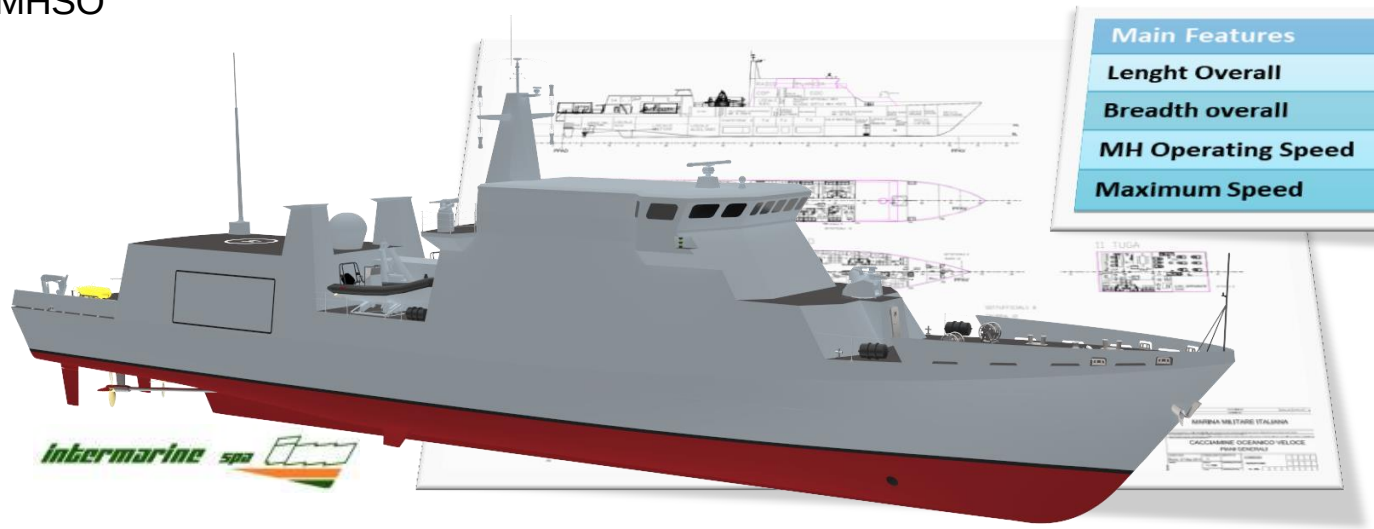
These vessels have Mine Warfare (Route survey, Lead Through, Reconnaissance, Mine Hunting, etc.) as their primary mission, but in addition they shall be able to carry out other activities like Patrolling, Search and Rescue (SAR) and anti-divers commando warfare.

Historically, MH are naval units that in peacetime operate on their own, but in a situation of crisis they must operate under the protection of major units, being them actually almost unarmed. This concept has been largely overcome in MH&PV.

Leonardo experience and solutions in MCM

Current and future MCM Programs

MHSO



Main Features	
Lenght Overall	76 ÷ 78 m
Breadth overall	11 ÷ 12 m
MH Operating Speed	0 – 6 knots
Maximum Speed	18 ÷ 20 knots

MHSO is a study underway at Intermarine shipyard, in cooperation with the Italian Navy and with the support of Leonardo for the C/S design.

The driving requirement is for a bigger and faster platform than the traditional MCMVs, whose primary mission is to carry out Minehunting missions in close proximity of the mine field (therefore with very low signatures and very high shock resistance), with own Mine Detection & Classification capability, but also capable of carrying a wide range of unmanned vehicles as well as containerized modules enabling different secondary missions.

Leonardo experience and solutions in MCM

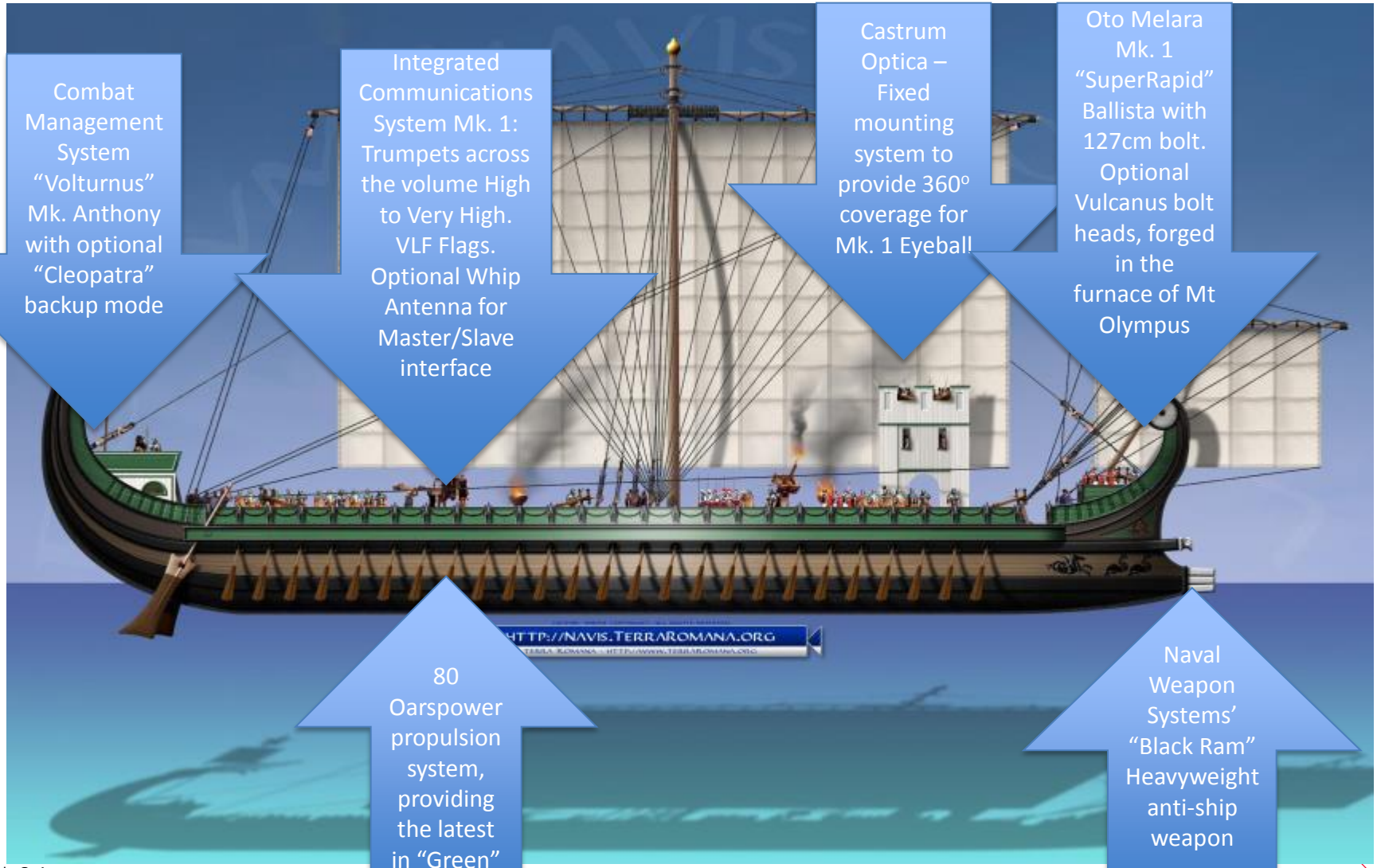
Current and future unmanned Programs

Autonomous solutions

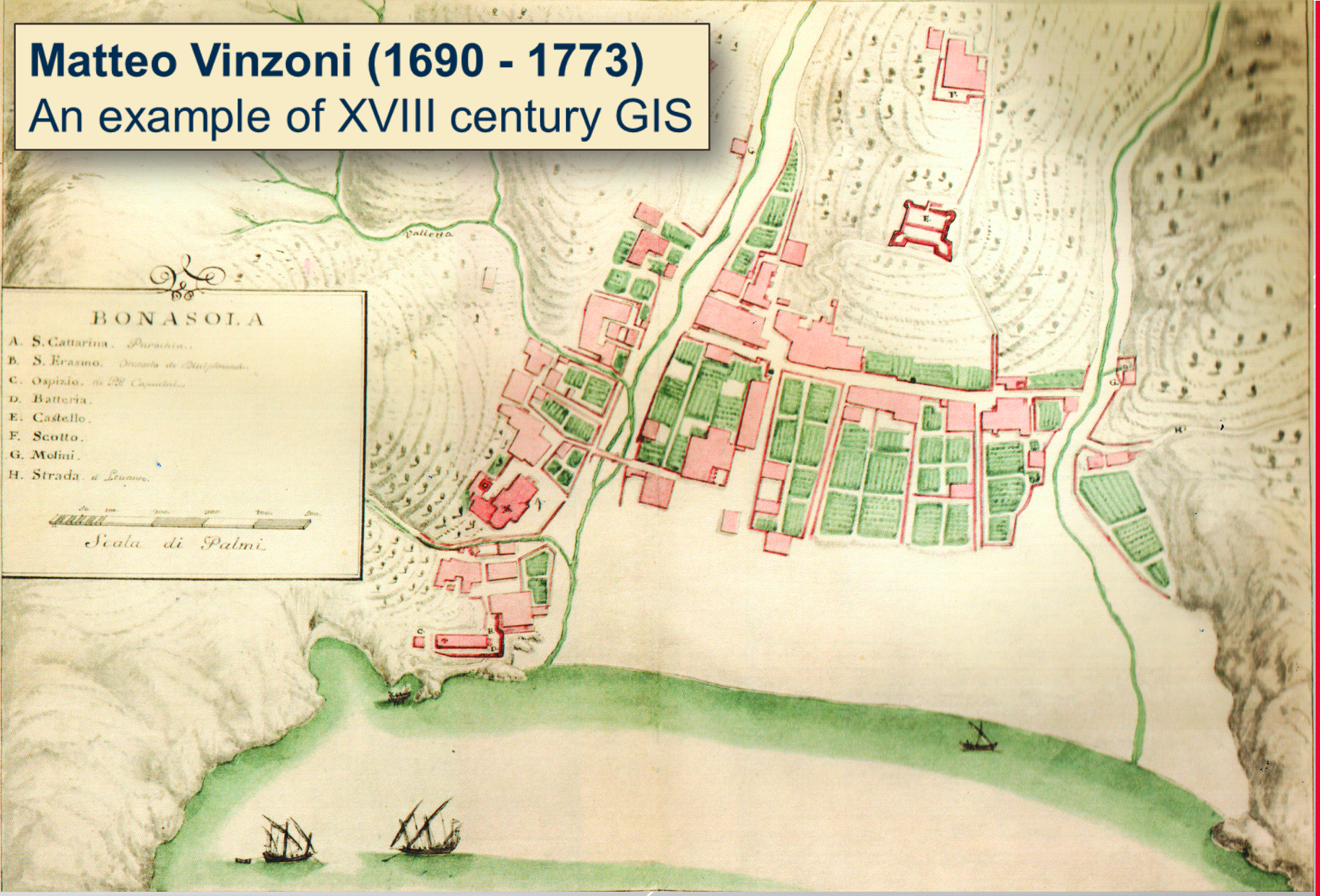
The SWAD is the result of a research project carried out by the SD division of Leonardo in order to achieve a USV with chasing, interdiction and attack capabilities in anti-piracy missions, thanks to its capacity to reach the high speed of 70 knots and the remotely controlled HITROLE® 12.7mm machine-gun.

The AW HERO is a Rotary Unmanned Aerial System (RUAS), developed by Leonardo SD division.
The modular payload bays (frontal and underbelly) of the AW HERO allow integrating on-board it a variety of payload role kits, which include: Electro-Optical/Infra-Red system (EO/IR), maritime RADAR, Automatic Identification System (AIS), LIDAR, hyperspectral camera, distress sensors and storage.

Our Origins – Defenders of the Republic



Matteo Vinzoni (1690 - 1773)
An example of XVIII century GIS



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Thank You