Unmanned Systems: The Future of the Italian Navy by 2035

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Introduction. Technological innovation is revolutionizing the way operations are conducted at sea. The Italian Navy, in its strategic vision **Future Combat Naval System 2035** dedicated to multi-domain operations, identifies **unmanned systems** (pilotless vehicles, commonly known as *drones*) as one of the pillars for maintaining effectiveness and security in future scenarios. These systems, which include remotely piloted aircraft, surface units, and autonomous submarines, allow the fleet's operational capabilities to be extended without risking human lives. Below we will see what naval drones are, why they are important, how the Navy intends to integrate them into its strategy, and what challenges and advantages they pose for future security and operations.

What unmanned systems are and why they matter in the modern naval context

Unmanned systems in the naval field are platforms without onboard pilots, controlled remotely or equipped with a certain level of decision-making autonomy through **Artificial Intelligence** systems. They can be of different types: **air drones** (UAVs) that take off from ships or coastal bases, **unmanned surface vehicles** (USVs) similar to small robotic boats, or autonomous **underwater drones** (UUVs/AUVs) capable of diving to great depths. These vehicles are employed in numerous key roles: surveillance and **ISR** (Intelligence, Surveillance & Reconnaissance), support for special forces (e.g., transport of underwater teams), mine detection and neutralization, logistical transport, anti-piracy patrols, and much more. Essentially, naval drones act as **force multipliers**, extending the Navy's reach and persistence in areas where manned units would incur high costs or risks. For example, small UUVs can continuously inspect seabeds or critical underwater infrastructures, while a swarm of air drones can monitor a vast area 24/7, providing operators with a constant flow of information.

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From a strategic standpoint, the use of unmanned systems has become relevant because modern threats are complex, hybrid, and distributed across multiple domains (sea, air, land, space, cyber). To effectively counter them, naval forces must be able to **“be everywhere”** quickly, gain informational superiority, and react flexibly. Drones precisely meet this need: they increase **operational persistence** (continuous presence) in areas that could not be covered solely by manned assets, reduce personnel exposure to dangerous situations, and, in many cases, allow missions to be conducted at lower costs. In today's naval context, several advanced navies are already integrating drones onto their ships: consider the programs to have an **embarked UAV on every unit** for maritime surveillance tasks, reducing the need to launch

piloted helicopters for each reconnaissance. The Italian Navy, traditionally at the forefront of technology, has also begun experimenting with various categories of drones in real missions for some years now.

It is important to emphasize that **unmanned systems** will not completely replace traditional means, but rather **complement their capabilities**. Large naval units – such as frigates, destroyers, and manned submarines – will remain at the center of the maritime tool, but will increasingly be accompanied by swarms of small and medium drones capable of performing specific tasks in synergy. In other words, we are moving towards a **“system of systems”** approach: the main ship acts as a mothership or **operational hub** that coordinates multiple sensors and unmanned platforms deployed in the vicinity. In a typical operation, we might see, for example, a frigate sending an underwater UUV to inspect a sonar contact at depth, launching a surface drone to explore a less accessible coastal area, and simultaneously deploying a helicopter drone for aerial surveillance: all while the human crew remains safely onboard, focused on mission command and control. This very **human-machine interaction** is the core of the modern operational concept in the maritime domain.

Integration of Drones in the Future Strategy of the Marina Militare

The Marina Militare has planned to **thoroughly integrate unmanned systems** into all operational dimensions, investing in emerging technologies such as **artificial intelligence**, decision-making autonomy, and **interoperability** between platforms. In the document “Future Combat Naval System 2035,” drones are a **procurement priority** for the near future. This means that the Navy will not only acquire new models of unmanned vehicles but will also adapt its ships, employment doctrines, and infrastructures to make the most of them. In this vision, every new major unit must be able to operate as a **“drone-carrier” platform** capable of launching, controlling, and recovering aerial, surface, and underwater vehicles depending on the mission. Advanced studies are already underway to configure multi-role ships with these capabilities: for example, the Italian project called **“Sciamano Drone Carrier”** aims to design a dedicated drone carrier ship, funded by the National Military Research Plan and entrusted to Fincantieri for the concept design. The idea is to equip this platform with advanced command and control systems to manage swarms of unmanned vehicles, with related automatic launch

and recovery systems.

In parallel, the Navy is already integrating drones on **existing units**. In 2023, on the patrol vessel Paolo Thaon di Revel, the new version of Leonardo's drone-helicopter **AWHero** was presented, while on the frigate **Carlo Bergamini**, the first launches and recoveries of the fixed-wing drone **ScanEagle** provided by Boeing took place. Additionally, the acquisition of a total of **14 drones** between vertical and fixed-wing aerial platforms to be used on board ships is underway. On the underwater front, the Navy already has autonomous **AUVs** like the **Hugin 1000** (capable of mapping the seabed up to 3000 meters) and tethered ROVs like the **Pluto Gigas** and **Multipluto** for underwater inspections and interventions. These robotic systems are used, for example, by minehunters in mine search activities and by underwater units for seabed surveys and marine environment protection. The goal for the future is to connect all these assets in an **integrated network**: ships, helicopters, drones, and even satellites must share data in real-time, allowing a unified view of the battlefield and faster, more informed decisions thanks to **AI** and data fusion capabilities.

*The **SAND**, a surface drone developed by Fincantieri, during a demonstration: this USV can autonomously navigate for over 72 hours and is now equipped with a launch system for two underwater drones (UUV), operating as a true **“multi-domain node”).*

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A key aspect of the strategy is indeed the **collaboration between drones and traditional means** (*manned-unmanned teaming*). Crewed platforms will serve as advanced decision-making centers, capable of directing both piloted units and a multitude of subordinate drones.

For example, a ship could simultaneously control a group of UAVs in formation (*aerial teaming*) or coordinate the combined action of a surface and an underwater drone to locate and neutralize a mine. This requires high **interoperability**: for this reason, Italy has led European projects like **OCEAN2020**, demonstrating in multinational exercises the integrated management of multiple heterogeneous drones (aerial, naval, underwater) connected to onboard networks. Moreover, Italy's commitment to the **NATO Maritime Unmanned Systems Initiative (MUSI)** confirms the willingness to develop common standards with allied navies and share progress in this field.

From a technological standpoint, the Navy is heavily focusing on **autonomy and AI**. Next-generation drones must be capable of navigating and performing actions with minimal human supervision, using advanced algorithms to avoid collisions, identify targets, and adapt to changing scenarios. In parallel, work is being done to ensure that all these systems “communicate” effectively with the ships' weapon systems and command centers. Notably, a Navy official highlighted that one of the major challenges is **integrating the acquired drones with the complex combat software of naval units** already in service. It should also be noted that, at least in the medium term, **the human element will remain central**: currently, for example, the surface drone SAND, although equipped with autopilot, maintains **a human operator in the loop** who supervises maneuvers and can intervene for final decisions. Similarly, the Navy emphasizes that personnel must be trained to make the best use of these new technologies, ensuring that humans continue to have control in critical decision-making processes even in the presence of advanced autonomous systems.

Finally, **sustainability** and innovation go hand in hand: the new drones and the ships that will host them will be designed with attention to **eco-compatibility** (reduction of emissions and consumption) and **operational efficiency**, in order to increase autonomy and reduce the logistical-maintenance footprint. In summary, the future strategy of the Marina Militare foresees a balanced and interconnected force, in which unmanned systems are fully integrated together with sensors, weapons, and personnel in a highly dynamic multi-domain scenario.

Challenges, advantages, and future implications for security, training, and operational sustainability

The large-scale adoption of unmanned systems brings **great advantages**, but also **new challenges** to face. On the **advantages** side, we have already highlighted how drones increase **surveillance coverage** and operational persistence, allowing for continuous monitoring of vast maritime and underwater areas. Moreover, they **reduce risks** for human crews by taking on dull, dirty & dangerous missions instead of flesh-and-blood sailors. An additional benefit is **tactical flexibility**: drones of different sizes can be quickly launched when needed and in large numbers. For example, a *swarm* of drones can confuse and saturate enemy defenses, carrying out electronic jamming missions or acting as decoys for enemy missiles. In a conflict scenario, this can provide a decisive advantage while protecting larger units. Drones can also perform **search and rescue** tasks (thanks to thermal sensors and cameras, a UAV can locate shipwrecked individuals or vessels in distress much faster than a helicopter) and **logistical support** (transporting small loads between ships, for example). All this makes the naval force more **efficient and responsive**.

On the other hand, there are **important challenges**. One concerns **security** and **defense against similar threats**: just as we employ drones, potential adversaries will too. The Navy will therefore need to equip itself with anti-drone countermeasures (such as electronic systems or rapid artillery) and strengthen **cybersecurity**, as drones and communication networks could be targets of cyberattacks. An emblematic case that highlighted these vulnerabilities is the sabotage of the **Nord Stream** pipelines in 2022, which showed how underwater infrastructures are exposed to hostile incursions. To protect submarine cables and pipelines under the sea, the coordinated use of underwater drones and fixed sensors will be essential, but it will be necessary to ensure their operation even in the presence of enemy tampering or **electronic interference**. Another challenging area is **doctrinal and training**: the massive introduction of unmanned systems requires updating tactics and operational procedures, and especially **training personnel** in new skills. Specialized operators will be needed to pilot drones (even if in the future many functions will be automatic) and analysts capable of managing the large amount of data collected by these platforms. The Navy has already established dedicated departments, such as the First Remote Piloted Aircraft Section established to manage embarked UAVs, and will need to continue on this path by investing in **simulated training** and training integration between traditional crews and robotic units.

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No less important is the aspect of **operational sustainability**. Integrating dozens of new systems means having to ensure their maintenance, logistics chain (spare parts, batteries, special fuels), and constant technological updating. There is a risk that the addition of drones increases complexity and costs if standardized and efficient solutions are not adopted. The Navy will therefore need to optimize procurement and maintenance processes with a more dynamic approach, keeping pace with the rapid life cycle of high-tech. In perspective, the use of unmanned technologies could also lead to savings: for example, using small electric-powered drones for routine patrols instead of large ships consumes less fossil fuel and reduces emissions, contributing to "**Green**" eco-sustainable defense objectives. Furthermore, well-designed drones can have lower operating costs (less personnel employed, fewer on-board requirements). The important thing will be to incorporate these systems into a **long-term vision**, evolving the organization and ensuring that every new unmanned capability is truly useful and sustainable over time.

Conclusions. Unmanned systems represent a monumental transformation for the Marina Militare and, more broadly, for the way naval operations are conceived. Their development and integration into the strategic vision for 2035 promise to make our naval force more **versatile, effective, and ready** to face multidimensional threats. Aerial, naval, and underwater drones will work in concert with traditional units, extending their vision and operational reach far beyond current horizons. Challenges abound – from doctrinal adaptation to cybersecurity, from personnel training to fleet modernization – but the Marina has already decisively embarked on this innovative path. Finally, although machines become smarter, **the human factor will**

remain central: it will always be the discernment and experience of sailors and commanders that best exploit these new technologies. Balancing tradition and innovation, the Marina Militare of the future will thus be an integrated tool where **men and drones** operate side by side, ensuring Italy's maritime defense and security in a sustainable and effective manner.

Tags: technological innovation, naval drones, Marina Militare, unmanned systems