



Navy 2035: drones, cybersecurity and sustainability – the focus remains on humans

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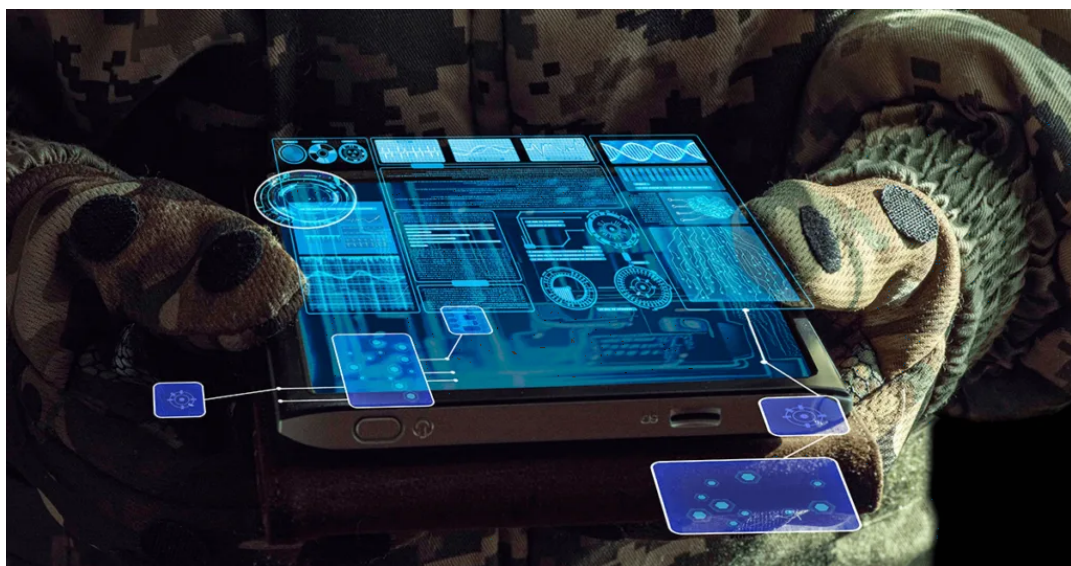
The Italian Navy has outlined its vision for the evolution of the **Maritime Instrument** by 2035, detailing how it intends to tackle the challenges of an increasingly complex world. In a document titled *“The Future Combat Naval System 2035 in Multi-Domain Operations”*, the Navy presents a strategy based on technological innovation, the use of **unmanned** systems (i.e., without human pilots), **information superiority** through data integration, enhancement of **cybersecurity**, focus on **environmental sustainability**, advanced personnel training, and **human-machine** interaction. The goal is clear: to ensure that, despite the rapid pace of new technologies and threats, the human factor remains the central pivot of the future system.

A multi-domain future based on technological innovation

According to the Navy, the next 15 years will see **multi-domain scenarios** characterized by hybrid threats, technological competition, and competition for natural resources, along with the

growing importance of cyber and space domains. In this context, the sea remains a crucial theater—especially for a maritime country like Italy—on which well-being, prosperity, and national security depend. The Navy therefore deems it necessary to equip itself with cutting-edge military capabilities in all operational domains (land, sea, air, space, and cyber) to support national interests. This gives rise to the concept of the **Future Combat Naval System 2035 (FCNS 2035)**: an integrated set of advanced platforms and systems, **state-of-the-art**, interconnected with each other and also **eco-sustainable**. This “system of systems” must evolve and adapt constantly at the pace of innovation, seizing new **challenges and opportunities** as they arise.

Technological availability will be a key factor. The document explicitly mentions disruptive technologies such as **Artificial Intelligence**, **Big Data**, quantum computing, **robotics**, new materials, hypersonic weapons, and biotechnologies. To remain competitive, the Armed Forces must quickly perceive changes and be able to adopt innovative solutions before adversaries. This will also require a new approach to capability development: the Navy emphasizes the need for synergies from the outset between the military world, industry, and academic research, to tackle the technological challenge without delays and with maximum coordination. In other words, innovation must become a continuous and shared process, allowing the naval instrument to adapt in an **agile and dynamic** way to rapid technological advances.



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Information superiority and cybersecurity

In future combat, having **information control** will be decisive. The Navy aims to achieve **information superiority** by building a single digital network that connects **vehicles, sensors, command systems**, and simulators, allowing the collection and **fusion of vast amounts of data** in real-time. Every unit—from ship to drone—must be able to exchange information smoothly and securely within this “system of systems.” This will enable a complete and shared situational awareness, providing commanders with an advantage in making quick and informed decisions.

To achieve this goal, **cybersecurity** becomes fundamental. The new systems will be designed *by design* with stringent cybersecurity requirements. This means that from the development phase, the protection of networks and data from hostile attacks or intrusions will be ensured. The document emphasizes the **security and integrity of data**: every piece of information collected must be classified, stored, and shared securely, even when exchanged with other Armed Forces or allies. Additionally, methods will be implemented to verify the **confidentiality and accuracy** of the various information sources that feed surveillance and data analysis systems.

On the operational level, the Navy plans to create a central **Fusion Center**, capable of merging information from heterogeneous sources (ground sensors, satellites, radar networks, etc.) and ensuring redundancy in emergencies. At the same time, new **Command and Control** systems will be developed, integrated with those of allies and equipped with **big data analytics** and artificial intelligence tools. These advanced systems will be able to sift through the growing mass of collected data, even predictively, to identify patterns and provide support to the decision-making process. In practice, commanders will have a sort of “digital brain” capable of transforming raw data into useful information, increasing the speed and quality of decisions.

It should be considered that modern conflicts no longer take place only in the physical domain, but increasingly also in the **informational and cognitive space** (propaganda, cyber attacks, electronic warfare). Consequently, dominating the **cyberspace** and managing information effectively becomes crucial to prevent or win future crises. The Navy therefore intends to prepare to operate effectively also on this invisible front, defending its networks and leveraging intelligence as a force multiplier.



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Unmanned systems and new autonomous capabilities

A central chapter of the 2035 vision concerns the extensive use of **unmanned systems**, that is, vehicles without a human pilot on board. The Navy foresees that **drones and autonomous vehicles**, whether aerial, surface naval, or underwater, will play an increasingly crucial role – both as a potential **threat** in the hands of adversaries and as a **resource** to be exploited in the service of the Armed Force. Consequently, the acquisition of these autonomous platforms is considered a **strategic priority**. Integrating them will allow the Navy to expand its operational range and capacity without unnecessarily exposing human personnel to danger.

The **drones of the future** will be highly sophisticated. They will be equipped with **Artificial Intelligence** and advanced algorithms that will enable them to conduct missions with a significant degree of **autonomy**. For example, an underwater drone could patrol an area alone for many hours, detecting anomalies, or a swarm of aerial drones could automatically coordinate to monitor a vast area. The ability to operate in **teaming** will be important: unmanned systems must be able to collaborate both *among themselves* (drone with drone) and *with* units with human crews. In other words, drones will become “team members” in every respect, integrated into formations and controlled in synergy with traditional platforms.

From a technical point of view, these unmanned vehicles are required to be **modular and reconfigurable**, so they can be quickly adapted to different tasks. They must also ensure **resilience, autonomy, and operational persistence**: the Navy wants drones capable of continuously monitoring areas of interest for extended periods, maintaining functionality even in

difficult conditions. This will be useful in missions ranging from force protection to **electronic warfare**, from ISR (Intelligence, Surveillance and Reconnaissance) reconnaissance to anti-mine warfare or amphibious support. Furthermore, to avoid overloading communications, these systems will integrate **onboard data processing** (edge computing) capabilities, so they can immediately analyze part of the collected information.

A crucial aspect will be the **operational integration** of drones and traditional means. Ships, submarines, and aircraft will become true **mobile hubs**: they must be able to launch, control, and recover unmanned platforms directly from the sea, even in rough seas or difficult conditions. Drones must interface with onboard systems as if they were additional sensors or weapons of the mother unit. Imagine a frigate launching a swarm of small drones to explore the horizon: those drones will extend the ship's "vision" and range, sending real-time data to its command center. This ability to extend presence on the field in multiple directions will provide a huge tactical advantage, allowing simultaneous presence on multiple fronts.

The massive use of autonomous systems will bring benefits but also new requirements. On the one hand, it will reduce the direct exposure of sailors to risk – drones can perform “dull, dirty, dangerous” missions instead of humans. On the other hand, it will be necessary to develop specific **doctrine** and **training** to make the best use of these technologies. The Navy must ensure that crews and commanders can effectively orchestrate operations with drones, always maintaining human control over critical decisions. It is indeed reiterated that **man retains the initiative** and supervision over machines: the optimal relationship is one of **human-machine teaming** where each – human and artificial autonomy – does what it does best. We will return to this point shortly, as it represents the core of the strategic conclusion.

Sustainability: continuous innovation and “green” commitment

In outlining the future of the naval instrument, the Navy adopts a very broad and ambitious concept of **sustainability**. It is articulated on two levels: **operational-technological** sustainability and **environmental** sustainability.

On one hand, *sustainability* means ensuring that naval forces maintain a **technological advantage** over time. In practice, it is no longer enough to ensure routine maintenance of equipment; a continuous cycle of **upgrades and improvements** must be implemented to

keep ships, aircraft, and systems constantly up to date with technical evolution. The document clearly states that future systems must be designed from the outset with the possibility of **hardware and software upgrades**, **scalability**, and **federable interoperability** with other assets in mind. At the same time, **data** is considered a strategic resource to be cultivated: continuous investments in IT infrastructures (the *infostructures*) will be needed to store, protect, and effectively exploit the large volumes of information generated by new sensors. Logistics and maintenance processes will also need to evolve: the Navy hopes to reduce manual workload through **advanced digitalization**, the use of innovative solutions such as **digital twins** (virtual replicas of systems) and augmented reality, thus improving efficiency and optimizing the valuable available “man-hours.”

On the other hand, sustainability means taking responsibility for **environmental protection**. The Navy of 2035 will be an increasingly **“green”** Navy. New units will need to have **lower pollutant emissions**, consume less fuel, and ensure greater operational autonomy, thanks also to the use of **renewable sources** on board (for example, hybrid systems, solar panels, alternative fuels) and the use of low-impact recyclable materials. The idea is to combine military effectiveness with ecological responsibility: quieter and more efficient ships and submarines that reduce their environmental footprint without sacrificing performance. This “green” approach is not just an adaptation to environmental regulations but is seen as an additional efficiency factor – for example, a vehicle that consumes less can operate longer away from the base, increasing its **strategic autonomy**.

A key element of operational sustainability concerns the **human factor**. The document highlights that to manage increasingly complex and technological systems, it will be essential to have **sufficient and highly specialized personnel**. Sustainability, in fact, also involves having the right staffing: you cannot introduce a new super-technological ship if you do not have a sufficient number of qualified technicians to operate and maintain it. It is therefore necessary to plan in advance the recruitment and training of professionals with new skills, otherwise, there is a risk of *under-utilizing* advanced assets or overloading a few specialists to the point of exhausting their energies. This holistic vision ties together technology, processes, and people, with the idea that only by considering all these aspects can the Navy truly sustain the futuristic capabilities it aspires to in the long term.



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Advanced training and the centrality of the human factor

Despite the strong push towards high technology, the Navy emphatically reiterates that **the cornerstone of the future system will always be the person**. The document explicitly states that, in the face of so much innovation, the **dominant and irreplaceable** element of the *Future Combat Naval System 2035* continues to be the human being. Even in 2035, with drones and artificial intelligence in the field, it will be the flesh-and-blood sailors who hold the **decisive role in decision-making processes**. Machines can help, they can accelerate analyses and actions, but **they cannot replace** the human capacity for judgment, critical-creative thinking, and sensitivity in dealing with ambiguous situations or ethical dilemmas. In summary, humans will remain **“at the helm”** of the system: technology will be a powerful support, but responsibility and the final word will belong to well-prepared human commanders and operators.

To ensure this, **staff training** becomes a strategic investment as important as the acquisition of new systems. The Navy plans to revolutionize training methods by introducing a system of **distributed and advanced training**. This involves **Live Virtual Constructive (LVC)** solutions, an architecture where all the Armed Forces simulators – naval, aerial, submarine, terrestrial – are interconnected in a network and can interact with each other in real-time. In practice, it will be possible to conduct integrated exercises where a commander in a land-based bridge simulator “sees” and coordinates the action of virtual ship crews, simulated drones, and possibly amphibious troops or special forces connected from their simulator. This immersive

training, also federated with allies, will allow for the creation of complex and realistic scenarios at reduced costs, honing personnel skills without consuming real platforms. Moreover, the use of **predictive simulation** (for example with digital twins) will allow for experimenting with new tactics and solutions in a virtual environment before applying them in the field.

In parallel, the Navy is adjusting study and selection programs to forge new professional figures specialized in key areas of innovation. Experts in **mechatronics** (for automatic and robotic systems), specialists in support and management of **unmanned** systems, **big data** and **cybersecurity** analysts, **artificial intelligence** engineers, and operators capable of interacting with “intelligent” machines will be needed. These skills must be developed *in advance*, keeping pace with the introduction of new technological systems, to avoid having advanced equipment without personnel capable of fully exploiting them. Long-term planning of recruitment, training courses, and career paths will thus be an integral part of the success of FCNS 2035.

Besides technical skills, the Navy emphasizes the need to cultivate a **culture of innovation** at all hierarchical levels. This means encouraging open-mindedness towards change, experimentation, and the adoption of new ideas. Tomorrow's leaders will need to be as solid in the traditional values of the sailor as they are flexible and up-to-date on technological innovations. The document talks about adjusting the *attitudes to be selected* in Academy entries and competitions: alongside classic courage and discipline, the importance of qualities such as innovative problem-solving skills, familiarity with digital tools, and a propensity to work with automated systems will be highlighted. All this, however, without distorting the **essence of a good sailor**, which remains founded on solid ethical principles, sea knowledge, and practical experience.

In conclusion, the vision of the Navy for 2035 is that of an armed force projected into the technological future but with roots firmly planted in its values. Drones, digital networks, artificial intelligence, and “green” ships will revolutionize the way of operating at sea, offering unprecedented opportunities for effectiveness and security. At the same time, challenges will not be lacking: from protection against cyber-espionage to the management of complex systems, to the need for constant investment in updates. Above all, however, the Navy sends a reassuring yet ambitious message: **at the center of the system will remain the human**, with their ability to adapt, ingenuity, and sense of responsibility. It will be the sailors, properly

trained and supported by new technologies, who will constitute the true **pillar of the Future Combat Naval System 2035**, ensuring that Italy can successfully navigate the turbulent waters of the near future.