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gmv INNOVATING SOLUTIONS

The Future of Military Aeronautics: Innovations and Technological Trends

INTERVIEW
GD. Rafael Gómez Blanco
Director of Engineering, Spanish Air and Space Force Logistics Support Command (MALOG)

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Letter from the president

When my father founded GMV in 1984, the internet was in its infancy and vastly different from the global network we know today. It was primarily restricted to academic, research, and military institutions, with no access for the general public. Since then, the internet has become a transformative force, connecting the world in ways previously unimaginable. GMV was one of the first companies in Spain to connect to the internet, fostering its adoption and ensuring secure access for numerous businesses and public administrations.

Looking ahead, artificial intelligence promises to extend this transformation even further. It has the potential to automate repetitive tasks, freeing up time for creativity and innovation. In healthcare, it will diagnose diseases and personalize treatments. It will enhance security, optimize cybersecurity, and revolutionize transportation with autonomous vehicles, making our cities safer and more efficient. Artificial intelligence will also revolutionize defense with autonomous systems capable of carrying out missions of all kinds.

Human oversight in the development and application of artificial intelligence is essential to ensure its proper, ethical, and safe operation, correcting biases and validating results. Humans must take responsibility for the actions of artificial intelligence, particularly in critical areas such as healthcare, justice, and security, to ensure accountability and compliance with legal standards and respect for human dignity.

In June, we gathered the entire GMV team to celebrate our first 40 years: an impressive assembly of human intelligence charged with emotions. Today, as during these past 40 years, GMV leads the way in technological developments that are changing the world, leveraging them for the benefit of our clients.

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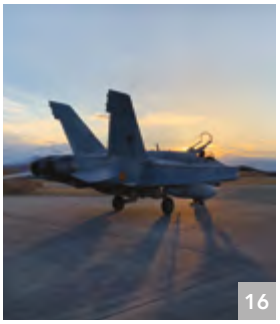
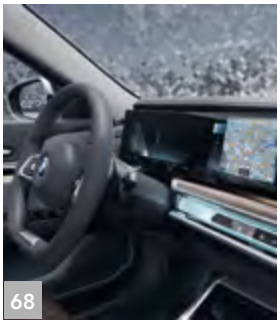




The Future of Military Aeronautics: Innovations and Technological Trends

Military aeronautics is constantly evolving. In recent years, it has grown significantly due to the need to adapt to new threats arising from current military conflicts, as well as the opportunity to take advantage of technological progress. In this article, we'll explore the main trends that will shape the future of military aeronautics, in light of recent developments and our armed forces' ongoing programs, such as the Future Combat Air System (FCAS), SIRTAP, and the Eurodrone.

01 Next-generation combat air systems

FUTURE COMBAT AIR SYSTEM (FCAS)

The FCAS is one of the most ambitious programs in the field of European defense. Signed in 2019 by the defense ministers of Spain, France, and Germany, and recently joined in 2024 by the Belgian Ministry of Defense, this project aims to develop an integrated system combining manned and unmanned aircraft, as well as ground, sea, and space systems. At the heart of the FCAS is the Next Generation Weapon System (NGWS), which includes:

- **Next Generation Fighter (NGF):** a sixth-generation fighter with advanced low observability capabilities, high flight efficiency, state-of-the-art sensors, and compatibility with various types of remote operators. These range from combat versions to decoys, communications links, and drones on joint intelligence, surveillance, and reconnaissance missions (JISR), among others.

- **Remote Carriers or Remote Operators:** unmanned aerial vehicles that operate in conjunction with the NGF, acting as force multipliers and reducing the exposure of manned fighters to enemy threats. These missions may include JISR, electronic warfare, or even offensive missions. Remote Carriers will be integrated in a coordinated manner with FCAS manned fighters, using advanced technologies such as artificial intelligence and big data to process and use information in real time.

- **Combat Cloud:** consists of a decentralized and highly resilient information network that enables real-time integration and collaboration between different platforms and forces in multiple domains: air, ground, sea, space, and cyber. The main goal is to provide information superiority. The combat cloud also facilitates interoperability and connectivity between different systems in the battlespace, allowing fighter aircraft, remote operators, satellites, and other units and platforms to operate in a coordinated manner.

EURODRONE

The Eurodrone is another key project in the modernization of European defense. This medium-altitude long-endurance (MALE) drone has a range of more than 24 hours and is designed for surveillance, military operations support, and security missions. Its development is based on minimizing technological risks by using commercial solutions and advanced components, such as automatic navigation and control systems.

The Eurodrone is designed for intelligence, surveillance, target acquisition, and reconnaissance (ISTAR) missions, with modular mission capabilities and an architecture that means it can be operated in non-segregated airspace, setting this program apart from other developments.

With the Eurodrone, the European aeronautics industry aspires to occupy a leading technological role in the MALE drone area, a position that has so far belonged to the United States and Israel.

SIRTAP

Analogous to the Eurodrone pull effect in the MALE drone area, SIRTAP will position the Spanish aeronautical industry, under the leadership of Airbus, as a leader in the high-performance tactical drone segment.

The SIRTAP, with a payload of more than 150 kg and an endurance of more than 20 hours, will perform advanced ISTAR missions with all-weather capability thanks to its advanced mission system.

02 Artificial intelligence and autonomous operation

Artificial intelligence (AI) and automation are transforming military aeronautics. These technologies make aerial platforms more autonomous, improve decision making, and optimize mission performance.

FCAS/NGWS incorporates AI technologies to achieve advanced levels of autonomy. This includes the ability of drones and fighter aircraft to perform coordinated operations (swarming) and collaborate with human pilots. The evolution of on-board AI is expected to enable goal-driven autonomous operations, rather than operations based on specific events. As a requirement for system design, it is expressly stated that at all times there must be a human operator in the control loop with the power to decide which functions are delegated to the autonomous systems.

AI improves mission and navigation systems, enabling better mission planning, route optimization, and real-time adaptation to changing conditions. This is crucial for operations in complex and hostile environments where it is often not possible to use satellite-based navigation (denied environments).

AI enables advanced analysis of large volumes of data collected by a network of sensors. This helps users extract critical information about the terrain, weather conditions, and enemy positions, improving the decision-making process.

AI also plays a crucial role in predictive maintenance. Advanced algorithms can predict system failures before they occur, enabling preventive maintenance and reducing aircraft downtime.

03 Electronic warfare and cybersecurity

Electronic warfare and cybersecurity play a key role in modern military operations.

Advanced electronic countermeasures make it possible to jam and deceive enemy radar, navigation, and communications systems. These technologies are essential to ensure battlefield superiority and protect air forces from electronic attacks.

Cybersecurity in hyper-connected environments is another critical challenge. From a cybersecurity standpoint, TPM (Trusted Platform Module) technologies will be available and used for identification, authentication, encryption, and integrity verification of devices on board the aircraft, as an additional security measure. PUF (Physically Unclonable Functions) technologies will also be used to prevent the introduction of counterfeit components into on-board equipment that could lead to system vulnerabilities. These breakthroughs ensure that flight control and communications systems remain safe and operational, even in critical threat situations.

04 Augmented reality and virtual reality

Augmented reality (AR) and virtual reality (VR) are transforming training and operations in military aeronautics.

The use of AR and VR allows pilots to be trained in simulated environments, replicating combat situations without the risks and costs associated with live training. These technologies improve the readiness and responsiveness of air forces.

Constructive simulation technologies and digital twins enable more effective mission planning, execution, and evaluation. These systems provide an accurate representation of operational scenarios, allowing strategies to be adjusted and optimized in real time.

Today's fighter aircraft present visual information to the pilot via Heads-Up Displays (HUD), which project images, flight information, and tactical information. In fighter aircraft, such displays are being replaced by direct projections on helmet visors (Helmet Mounted Display or HMD), which facilitates the introduction of augmented reality technologies to improve the pilot's situational awareness and speed up decision making.

05 Connectivity and combat networks

Connectivity is essential for modern military operations. Breakthroughs in combat networks enable effective integration and coordination between different platforms and systems.

FCAS incorporates a cloud-based combat network with a scalable architecture, enabling an operational view shared by all units on the battlefield. This improves decision making and coordination between allied forces, providing benefits that include the following:

- Interconnectivity and real-time data sharing including drones, satellites, and ground and maritime units.
- Data fusion and analysis, combining information from multiple sources with the ability to identify patterns.
- Collaborative operations, for example in navigation or target designation.

The military IoT (Internet of Things) connects various devices and systems, improving communication and information exchange in real time. This advanced connectivity is crucial for complex mission execution and resource optimization. Expected progress in processor and sensor miniaturization technology as well as in connectivity between distributed systems, will allow for the deployment of swarms of platforms that will collaborate in the execution of a wide range of functions.

06 Cutting-edge sensors

Sensors are a fundamental part of modern military systems, providing critical data for navigation, reconnaissance, and decision making.

Hyperspectral sensors are one example of these new trends. Multi- and hyperspectral sensors are replacing traditional electro-optical sensors, offering enhanced detection and data analysis capabilities. These sensors allow for greater accuracy in target identification and threat assessment.

07 Human-machine interfaces

Interaction between the pilot and the aircraft is crucial for mission success. Advanced human-machine interfaces enhance this interaction, facilitating control and decision making.

Mixed reality and haptic devices provide new forms of interaction between pilot and aircraft. These technologies allow for greater immersion and control, improving operational efficiency and reducing the pilot's cognitive load.

AI-based virtual personal assistants provide real-time support for the pilot, managing information and tasks to enable a more effective focus on the primary mission.

08 Mission management

Efficient mission management is essential to the success of military operations.

The ability to evaluate operational alternatives in real time is crucial for battlefield adaptability. Breakthroughs in computing and data analytics enable rapid and accurate evaluation of different options, improving decision making and mission effectiveness.

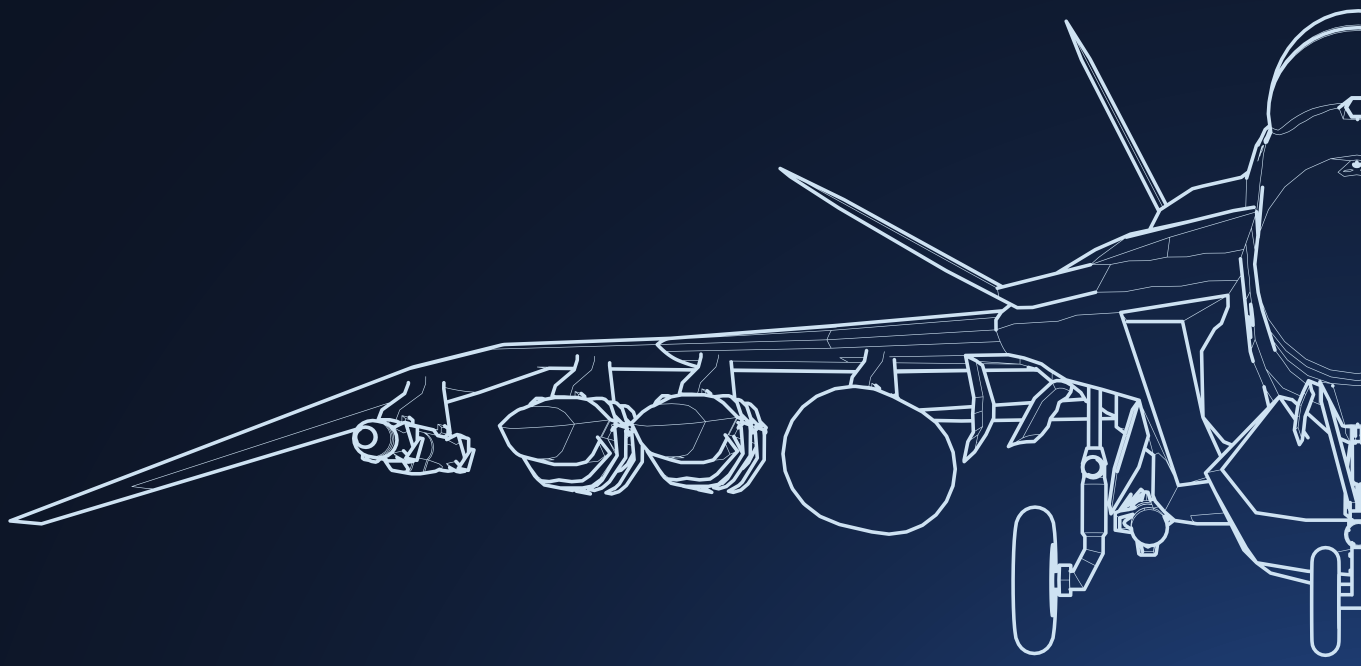
This area is particularly relevant, as the state of the technology makes it possible to introduce relevant doctrinal changes, opening up a new scenario in operational research and challenging the limits of current military capabilities.

09 Manned-Unmanned Teaming Technologies (MUT)

One of the most innovative and promising areas in military aeronautics is Manned-Unmanned Teaming (MUT) technology. This concept involves close and coordinated collaboration between manned and unmanned aircraft to maximize mission effectiveness.

MUT technologies allow manned and unmanned aircraft to operate together, sharing information and assigning tasks efficiently. Drones can perform reconnaissance, surveillance, and attack missions under the supervision of manned aircraft, improving operational capability and reducing risks to human pilots. The areas that incorporate such collaboration include navigation, communication, sensors, and weaponry, among others.

The key to the success of MUT technologies is secure and reliable communication between manned and unmanned platforms. Breakthroughs in connectivity, cybersecurity, and control systems enable seamless and effective interaction, ensuring that all units can coordinate and adapt quickly to changing battlefield conditions.



GMV's role

As a leading company in the aerospace sector, GMV is playing a key role in the development and implementation of many of these groundbreaking technologies. With a strong presence in programs such as FCAS, SIRTAP and Eurodrone, GMV is contributing significantly in several key areas:

Development of autonomous systems

GMV is a member of the SATNUS consortium, which is leading Spain's contribution to the Remote Operator Pillar of the NGWS/FCAS program. The company's tasks focus on the areas of navigation, avionics, MUT, power electronics, recovery systems, and in-flight refueling, among others.

Navigation and control systems

GMV is at the cutting edge of robust navigation, flight control, and automatic landing systems development for unmanned vehicles. These systems are essential when it comes to ensuring accurate and safe operations in complex and challenging environments.

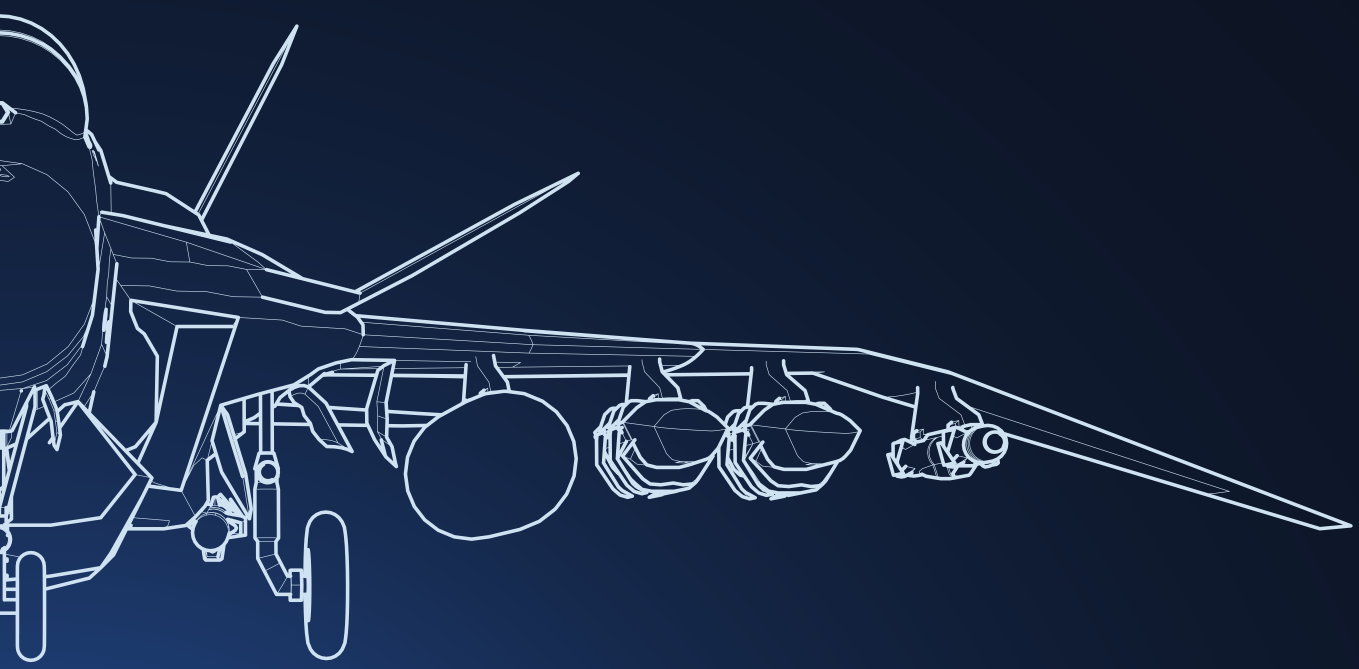
GMV has been selected by Airbus for the development and production of the SIRTAP navigation system. This system will have state-of-the-art GNSS and inertial sensors, and will incorporate jamming and spoofing mitigation technologies. The GMV-developed solution will provide the necessary precision and integrity to allow for fully automated flight, including taxiing, takeoff, and landing.

GMV is also in charge of the pilot's forward-looking camera, which plays a crucial role during these taxiing, takeoff, and landing maneuvers.

Autonomy and artificial intelligence

The company is exploring new autonomy and artificial intelligence applications, such as the AI-GNCAir (Artificial Intelligence in Guidance, Navigation and Control for Aerial Applications) project, which is researching the most advanced technology in the use of smart data fusion for aerial vehicle navigation. The goal of the project is to recommend a generic GNC architecture for the safe use of AI-based algorithms in the aeronautical domain.

As part of the application of AI in the aeronautics field, GMV is leading the SAFETERM project for the European Defense Agency (EDA). The goal of SAFETERM is to improve current medium altitude long endurance (MALE) RPAS flight termination systems and procedures. The main requirement of the SAFETERM system is to increase the overall level of safety in the management of emergency situations involving loss or degradation of the command and control link, as well as other failures. It therefore allows for safe flight termination in the event of failure of both the autonomy and the pilot's remote control capability, by establishing alternative safe



landing areas through artificial vision techniques.

Avionics for critical systems

GMV is responsible for the design, development, manufacture, and logistics support of the ground flight control computer (GFCC) within the Eurodrone program. This system will provide AIRBUS with a reliable safety-critical computer responsible for steering and controlling the Eurodrone UAS.

The GFCC is a DAL-A safety critical system, in charge of managing the flight orders sent by the UAS operator (DUO) and displaying the system information so that the DUO has accurate data and can accomplish its mission. The Eurodrone is designed to operate in non-segregated airspace. To comply with strict safety measures, several GFCCs are installed at each ground control station (GCS). Each GFCC is equipped with several boards, both COTS and custom designed, in a 19-inch rack. GMV will also be in charge of the manufacture of this equipment and the validation work, which will include burn-in tests.

Simulation

GMV provides advanced simulation tools and services that offer crucial capabilities in terms of maximizing the operability and efficiency of both manned and unmanned aerial platforms.

GMV has developed a complete range of high-fidelity simulators and emulators for L3Harris's WESCAM MX series EO/IR surveillance and guidance systems. These simulators are designed to provide training and integration capabilities to WESCAM MX camera operators, enabling effective training at a fraction of the cost of in-flight training. GMV's emulator systems offer authentic hardware and software interfaces, allowing development, integration, and maintenance activities to be carried out without the need to install a real turret in the integration lab or on the vehicle platform.

Conclusion

The future of military aeronautics will be shaped by the integration of advanced technologies that improve the efficiency, lethality, and survivability of air forces. From autonomous systems and advanced propulsion to electronic warfare and cybersecurity, each technology trend plays a crucial role in transforming military operations. Programs such as the FCAS, SIRTAP, and the Eurodrone are clear examples of how innovation and international cooperation are shaping the future of air defense. As these technologies continue to develop, air forces will be better equipped to meet the challenges of the 21st century and beyond.

GMV, with its leadership in several of these technological areas, will continue to be a key player in this transformation, providing groundbreaking solutions to ensure the operational superiority and safety of the air forces of the future.

GD. Rafael Gómez Blanco

Director of Engineering, Spanish Air and Space Force Logistics Support Command (MALOG)

Major General of the Air Force Engineers Corps. Since joining the Air Force as an aeronautical engineer, he has been assigned to the Weapons and Experimentation Logistics Center, where he successively held the positions of flight test engineer, head of the Aeronautical Software Laboratory, and head of the Embedded Software Development and Test Engineering Squadrons.

After reaching the General Staff, he was assigned to the Logistics Support Command, where he was in charge of the engineering of various fighter and trainer aircraft and systems, including the EF2000, EF-18, C.101, F-5, and MQ9 Predator B, and became the head of the American Fighter Aircraft Section.

Subsequently, he was appointed head of the Albacete Air Arsenal and deputy director of engineering for Fighter Aircraft and Remotely Manned Systems. Since 2023, he has been the director of engineering and infrastructure for the Air and Space Force and is the Air Force's representative on the Ministry of Defense's Airworthiness Council. He has more than 700 flight hours as a test engineer in 30 different aircraft. He is an elected member of Spain's Royal Academy of Engineering, holds a PhD in aeronautical engineering from the Polytechnic University of Madrid (UPM), and has been a researcher and professor in fluid mechanics at the UPM's School of Aeronautical Engineering, Carlos III University of Madrid, Alfonso X el Sabio University, and the Astrobiology Center (INTA-CSIC).

Gómez Blanco is also the co-director of the master's degree program in flight testing and aircraft certification. He has participated in numerous conferences and received various military and academic decorations and awards, including the Air Force's awards in Engineering, Sustainment, and Safety in 1998, 2008, and 2014, and won Spain's 1992 Outstanding University Graduate award upon completing his degree in aeronautical engineering.

What are your duties as MALOG's Engineering Director?

MALOG's Engineering and Infrastructure Directorate is in charge of oversight, management, administration, control, and analysis of activities related to airworthiness, life-cycle engineering, and engineering in connection with the construction work, buildings, and facilities that make up the Air and Space Force's infrastructure, including aspects related to environmental protection. We at MALOG also manage and coordinate activities aimed at promoting innovation projects, serving as the focal point for these initiatives with research centers, universities, and professional associations.

You've been a strong supporter of BACSI. What does this project consist of and what are its goal?

The BACSI (Connected, Sustainable, and Intelligent Air Base) project was designed by our General Staff to serve as a catalyst for internal and external talent that would allow us to drive innovation in the Air and Space Force.

Using the central concept of the Air Base as the core of our aerospace operations, BACSI is structured around six functional areas that cover practically all our activities: global connectivity, energy efficiency and environmental sustainability, process optimization, force protection, operational safety, and new technologies for sustainability.

Today, BACSI is already an ecosystem with room for all players who can contribute knowledge and ideas to identify technologies that will help us be more effective in our missions and more efficient in the use of available material and human resources.

The various BACSI initiatives are open to companies, universities, and research groups of all sizes seeking to experiment or adapt their products and ideas to aerospace operating environments. These environments are structured through specific use cases, with a specific defined purpose, which allow us to understand how these products should evolve to address the present and future needs of the Air Force.

What opportunities do technologies such as autonomous systems, new sensors, and artificial intelligence open up for the maintenance and production of aerospace systems, specifically unmanned aerial systems?

There's no doubt that these technologies have a major impact on practically all military capabilities present and future, and that obviously includes unmanned aerial systems. It's no surprise that they top the European Union's list of key enabling technologies and the United States' list of critical and emerging technologies, among others. In particular, these technologies have brought about a paradigm shift in the accessibility of features and levels of automation and autonomy that were previously typical of complex and expensive systems and that can now be implemented in small drones at lower costs.

But in this full-fledged revolution of unmanned aerial systems, these systems are complemented by equally relevant technologies, most notably the following: the constant evolution of digital microelectronics, the maturity of micro-electromechanical systems (MEMs), the tremendous development of multiple algorithms and mathematical techniques applicable to computing, new materials and new manufacturing technologies, the improvements in energy density and battery safety, the revolution of electric motors and actuators, and the crucial growth of communications and data link systems. These are technologies that, driven by eminently civilian developments, must be incorporated quickly and efficiently into the military sphere.

It is assumed that future fighter aircraft, whether manned or unmanned, will incorporate many new capabilities and technologies. Where is engineering heading in this area?

Today's fighter aircraft have made remarkable progress in automation, digitalization, and connectivity processes since the first digital aircraft were developed in the late 1970s, and they'll continue making progress in the short- to medium-term future. Bear in mind that today over 80 percent of the functions of manned military and civilian commercial aircraft are performed automatically. These are aircraft that can perform complex maneuvers and missions, take off and land autonomously even from aircraft carriers, have sophisticated sensors in multiple spectrum bands, and are capable of exchanging massive amounts of data through multiple and complex networks. For several years now, our technology has been able to control complex unmanned spacecraft millions of kilometers away from Earth remotely or automatically and in extreme conditions.

But making progress in these familiar areas is not enough. Recent years have shown us that the civilian world is far ahead of the military when it comes to technological progress, both in terms of novel contributions and speeds of development. From today's perspective, it is extremely difficult to predict what new technology will surprise us tomorrow. This technology is sure to be every bit as accessible —or even more accessible— to our potential adversaries as it is to us.

> "Speed in identifying new technologies and the ability to adapt, incorporate, and test them will be key to future success"

Complex, rigid systems that are difficult to evolve, modify, and adapt technologically and that require great maintenance efforts that lead to reduced operational availabilities will be of no use to us. The complexity of these systems and the scenarios in which they are involved will require mission planning systems that must be capable of configuring and verifying all the necessary systems as simply and quickly as possible.

That's why our new designs must not only incorporate the technologies already identified for operational benefit, but also use them to simplify their maintenance and configuration processes, maximizing their operability and operational capacity. They must be platforms with highly flexible architecture, as well as design and certification schemes that allow for extremely fast modification cycles in order to smoothly and efficiently incorporate all the disruptive technologies that will emerge and that will quickly render current systems obsolete. We must assume that there will be constant redesign and upgrade cycles for their sensors, communication systems, process systems, actuators, accompanying aircraft, etc.

As such, we must also pay special ongoing attention to the evolution of emerging technologies and must get our engineers involved in the scientific world in order to take better advantage of these technologies, thus reducing the timeframes for identification, maturation, and incorporation of this technology into our systems.

> "The use of UAS will allow for agile and modular incorporation of new technologies into the weapons system, minimizing modifications to the manned aircraft or other systems"

The linear model of innovation, which was developed during the Cold War and led to the technological superiority of the West, is behind us now. Today it is not possible to apply a sequential process of basic research (scientists) and applied research (engineers); we need to break with this dichotomy and speed up development in cyclical or integrated models.

Speed in identifying new disruptive technologies and the ability to adapt them, incorporate them into our systems, and test them in advanced virtual or real experimentation environments will, in my opinion, be the key to future success.

But this new model of innovation, experimentation, and incorporation of technologies is not only up to engineering and the operatives who will get involved in engineering. It must also go hand in hand with much more flexible and agile management and contracting mechanisms that make the implementation of this model a reality.

And moving on to technology, Manned-Unmanned Teaming (MUT), is a key concept and technology in programs such as FCAS/NGWS, but what are the possible current technical limitations of both MUT and what is your long-term vision for this concept?

The MUT concept makes it possible to tap into the great development of unmanned aerial systems (UAS) and to incorporate, taking a modular and hierarchical approach, vehicles that operate in coordination or cooperation with manned aircraft. Operation with high-value reusable sophisticated UAS, together with lower-cost single-use UAS, makes it possible to multiply the capabilities of the main manned system, expanding its area of action, increasing its possibilities to access compromised areas, multiplying the simultaneous availability of its sensors and effectors, both in quantity and diversity, and increasing the system's survivability.

Additionally, and in line with what I discussed in my previous answer, the use of UAS will make it possible to incorporate new technologies into the weapon system in an agile and modular way, minimizing modifications to the manned aircraft or other systems and also making it possible to continue progress in simultaneous developments.

But in order to tap into all the possibilities of this concept, we have to ensure flexible architecture, capable of managing a variable number —sometimes very high— of cooperating complexes that are different from each other in terms of typology, behavior, and information provided and required. The management and fusion of a huge amount of information will require a gigantic processing and information management capacity that will certainly have to be distributed among the different cooperating parties, through the exchange of the optimal amount of data at each point in the operation. To make this possible, we must incorporate robust and agile communication systems, which will operate in different bands and even technologies simultaneously, to improve their resilience and effectiveness.

But even the most advanced communication systems will not be able to guarantee uninterrupted service, and so there must be mechanisms in place that establish the autonomous action of UAS in compromised situations, by defining clear and simple rules based on the rules of engagement that are translated into actions consistent with said rules, in all foreseeable environments and taking into account the ethics of these decisions.

Therefore, in order to decisively further these intricate developments, new certification and experimentation models in synthetic environments will

be needed to simulate scenarios as close as possible to the high complexity of the operations envisaged.

The Air Force has been the Air and Space Force for some time now. What are the main technological challenges involved in it taking on these responsibilities in outer space?

The technological development we have been talking about throughout the interview is also applicable to the space environment, making it accessible to more and more governments and private corporations. We're seeing significant growth in the number of satellites in all orbits, especially low orbits, the proliferation of commercial applications (communications, observation, etc.), and an increase in space junk. At the same time, we also expect major growth in terms of high-altitude aerial vehicles, both long-endurance, low-speed aircraft and commercial supersonic aircraft.

This means that we're facing a saturated aerospace environment, with an exponential increase in automation and integration and an operational continuum between airspace and outer space, globally interconnected through new communications networks, and which may also be the main vector of cyber threats.

This scenario has meant that, in recent years, the Air Force has gone from being a user of space, as a means of observation and satellite communications, to focusing on space surveillance, equipping itself with the capabilities to identify and predict potential threats coming from outer space in order to be able to prevent them.

The space surveillance radar at Morón, the use of other own or shared sensors, including commercial ones, and the development of information systems to use these data and improve simulation and prediction capabilities in coordination with our own and allied

command and control systems, are the backbone of our capabilities in the short term.

What do you think the roadmap for Spanish industry and companies should be so that they can prepare themselves to face all these challenges you've described?

Spain has a top-notch agile and innovative industry, nourished by the magnificent talent of our engineers and technologists. Our talent is also recognized in other Western countries, and we must retain it by offering innovative and quality projects on an ongoing basis.

However, our industry is still small in size, which makes it difficult both to compete internationally and to ensure the stability of our own or associated innovation groups in critical areas. In addition, some of these companies compete with each other in the same technologies. This fragmentation also takes place with research groups at technology centers and universities.

That's why it is essential for these companies to specialize in the most important technological fields and cooperate openly among themselves, with small technology companies, and with research groups and universities, so that Spain can have a well-coordinated, experienced, sizable ecosystem in key technologies for our developments.

This partnership must align with operational users in experimentation and training centers, who can help develop new concepts, quickly identify new disruptive technologies, and provide the necessary capacity to adapt and incorporate them into our current and future systems.

GMV to develop a Deployable Air Operations Coordination Center for the Spanish Air Force

The center will offer state-of-the-art capabilities, enabling the integration of its systems into various networks including mission networks, command and control (C2) networks, WAN networks, and tactical radio communications networks

GMV has won a contract from the Spanish Air Force to modernize an advanced Deployable Air Operations Coordination Center (AOCC-D). The company, with a long track record in the development of command-and-control solutions, will equip the center with state-of-the-art technology for a total of €1.9 million.

The AOCC-D will offer cutting-edge capabilities that will make it possible to integrate its systems into various networks, including mission networks, Command and Control (C2) networks, WANs, and tactical radio communications networks. The contract also provides for the modernization of the Deployable Base Operations Center (BOC-D) and the Deployable Air Operations Center (AOC-D) to align their technology with that of the new AOCC-D.

The project covers specification through installation and testing, ensuring delivery of a complete AOCC-D module for the Air and Space Force. This deployable center will provide the capability to operate in international theaters of operations, in line with the requirements established by national legislation and Spain's international commitments.

GMV will equip the AOCC-D with network elements to enable the integration of information systems and functional tools needed for planning and conducting air operations. It will also have secure voice, fax, and data communications capacity, cabling infrastructure for global SATCOM communications, and secure military messaging and videoconferencing systems, among other advanced features.

Framework Contract with DFS for iCAS air traffic management system support

In March, GMV signed a framework contract with DFS (Deutsche Flugsicherung GmbH), the German air traffic service provider, through Telespazio Germany. This contract extends GMV's support for the development, integration, and deployment of the iCAS system until July 2025.

The iCAS system, managed by DFS, controls air traffic over the majority of German airspace and is currently operational in the Karlsruhe and Munich control centers.

The new framework contract encompasses remote support services from GMV's headquarters, including:

- Supporting the deployment of different development and test chains used by DFS for formal testing and acceptance activities.
- Developing and executing automated tests using DFS's proprietary frameworks.
- Preparing and executing performance scenarios for each formal integration and acceptance test.
- Analyzing observations and/or incidents reported by the operations teams in Karlsruhe and Munich.
- Training DFS technical teams on how to develop, integrate, and debug new functionalities on the current versions of the iCAS system.

This framework contract is the result of an excellent initial collaboration between DFS and GMV, which began with a support contract signed in June 2023 and extended through the end of March 2024.

GMV conducts iCAS system training at Karlsruhe control center

DFS (Deutsche Flugsicherung GmbH), the air traffic service provider in Germany, has commissioned GMV to conduct two training courses on their iCAS air traffic management system, which currently controls upper airspace from the Karlsruhe control center.

These courses aim to train new members of the DFS Systems team, who provide technical and operational support for maintaining air traffic services, as well as air traffic controllers for addressing operational issues.

The training is divided into two modules. The first module focuses on maintenance and troubleshooting, teaching participants how to configure the system and analyze potential Issues from a technical supervision perspective, covering both hardware and software components. The second module centers on the operational aspects of the system, including flight plan management, data correlation, SSR codes, special areas, and airspace consolidation/sectorization.

GMV has already carried out the two training sessions, the first at the beginning of April, lasting two days, and the second at the end of June for eight days.

The course carried out by GMV has satisfactorily met all the established objectives and has received excellent feedback from DFS, both from the participants and the organizers.

GMV presents its advances in navigation and unmanned systems at UNVEX'24

On 4 and 5 June, the city of Barcelona hosted the ninth edition of UNVEX. This is one of Europe's most important events on remotely operated systems, showcasing the latest innovations and applications in the air, at sea, and on land.

GMV, which has a wealth of experience in the UAS domain, took part as an exhibitor in these two days of conferences, exhibitions, and demonstrations. The event brought together the main players involved in systems used in the air (remotely piloted aircraft systems, RPAS), on land (unmanned ground vehicles, UGV), and at sea (unmanned surface/underwater vehicles, USV/UUV).

The company presented some of its aeronautical solutions, highlighting its developments in intelligence, surveillance, and reconnaissance (ISR) systems and the PASSER, SEEKER, and SOLO unmanned platforms designed and developed by GMV and Aurea Avionics. It also exhibited its CSD-SIERRA and IRIS systems, which are designed for data exploitation and dissemination in the field of joint intelligence, surveillance, and reconnaissance (JISR).

In the field of navigation, the flight control computer of the ATLANTE long-range tactical unmanned vehicle was showcased following successful flight testing. The ***Dronelocus®*** family, a range of systems developed by GMV to support all types of operations related to unmanned aircraft systems in the U-Space, was also featured at the event.

Daniel Montero Yéboles, GMV's Director of Aeronautics and Embedded Systems for Defense, presented "GMV's experience in advanced navigation systems for UAS", highlighting the company's role in advanced navigation systems and giving an overview of the technologies GMV is currently developing in various Ministry of Defense programs. Of particular notes is the company's involvement in the SIRTAP (High Performance Remotely Piloted System) program.

SONORA partners present project results

A workshop was held on May 17th as part of SONORA (Support to Standardisation Actions for EGNOS and Galileo in U-Space), a European Commission project developed by a consortium led by EY Consulting that also includes GMV, CATEC, MCI, and RP Legal & Tax.

The aim of SONORA is to advance the future of the U-Space industry and unmanned aerial systems. U-Space encompasses the services and procedures being developed to enable a high number of orderly, smooth, and safe unmanned aircraft operations. The European Commission has established a regulatory framework to manage drone traffic automatically and integrate it with manned aviation. Spain's Ministry of Transport, Mobility, and Urban Agenda has drawn up the National Action Plan for U-Space Deployment (PANDU) to comply with this European regulation.

The workshop, intended as an interactive platform for sharing the project's findings with all stakeholders, focused on the legal and technical aspects of EGNSS solutions in U-Space and the drone industry. It also covered commercial and market aspects to facilitate the daily use of EGNSS solutions in drone operations.

The event showcased the results of two testing campaigns conducted in 2022 and 2023 within the project framework. These tests were highly successful and provided promising results to better understand unmanned aerial system operations in urban environments.

Opinion

Navigating the Future: Cloud-Native Innovation in Galileo

In the digital age, the intersection of cloud computing and navigation technology represents a paradigm shift in how we explore and interact with our world. Cloud-native architectures are reshaping revolutionizing the software development ecosystem, offering a new model for operational systems. Traditional infrastructures based on virtual machines often suffer from limitations such as resource inefficiency, longer deployment times, and higher operational overhead. In contrast, cloud-native solutions provide key advantages, including expandability, scalability, security, and observability.

At the forefront of this transformation is the development and deployment of containerized applications and microservices, which encapsulate both the application and its dependencies. Kubernetes, a pivotal technology, leads this orchestration movement by automating the deployment, scaling, enhanced security, and management of containers. The flexibility and scalability offered by cloud-native solutions provide the perfect environment for operational systems that must continuously scale and remain flexible while meeting demanding cybersecurity and high availability constraints.

At the Navigation Testbed, Performance Monitoring, and Infrastructure (NTI) division we understand that the application of this disruptive technology in navigation will clearly position our division, business unit and GMV as one of the key players in the coming years. In this context, the Galileo Second Generation System Testbed Project (G2STB) represents an ideal scenario to showcase the enormous benefits of these technologies within the satellite navigation ecosystem that had already been applied in smaller projects and internal developments. After all, the G2STB, a project led by GMV within the Galileo Second Generation (G2) context, aims to define the infrastructure and algorithms for the next generation of Galileo satellites.

Considering the complexity of a system with multiple capabilities as the G2STB, GMV has designed a cloud-native architecture as the best solution, configuring the G2STB considering the following key design drivers:

- Microservices architectures with real-time interfaces based on most modern streaming protocols and services, with gRPC[1] as an internal substitute of the NTRIP protocol, or Kafka[2] as the streaming message broker. This provides flexibility, scalability, and resilience in the system, allowing for efficient handling of data streams and communication between services.

- Centralization of the platform backed up by the S3 object storage solution, a de facto standard in cloud-native environments. It ensures reliable and scalable storage, facilitating easy access and management of large amounts of data while also enhancing data durability and availability.

- Unified observability platform: GMV has implemented a unified observability platform supported by mainstream technologies like Prometheus[3], Grafana[4], and Elasticsearch[5]. This allows for comprehensive monitoring and logging, providing real-time insights into system performance and enabling quick identification and resolution of issues.

- Operations based on GitOps: The operations of the G2STB are based on the GitOps paradigm, which is a modern approach to operating Kubernetes-based systems. This approach leverages Git repositories as the source of truth for the desired state of the system, ensuring consistency and reliability in deployments and operations.

Cloud-native solutions offer clear advantages such as expandability, scalability, security, and observability

Adrián García
Division Head Navigation Testbeds and Infrastructure (NTI)

- Infrastructure as Code (IaC): GMV utilizes IaC technologies[6] for deploying, managing, and maintaining the overall system. This approach allows for automated, repeatable, and scalable infrastructure management, reducing the potential for human error and speeding up deployment times.

We successfully deployed the first version of the G2STB infrastructure at the European Space Research and Technology Centre (ESTEC) in December 2023, providing a state-of-the-art cloud-native platform. This platform already includes new software prototypes that are deployed as services and which are poised to enable the testing of the future G2 Early Capabilities (complete functional chains generating and disseminating the signal-in-space information related to all the G2 services). By leveraging the latest cloud-native technologies and principles, the G2STB project not only demonstrates the feasibility and advantages of these approaches but also sets a new standard for satellite navigation systems.

1. (https://grpc.io/)
2. (https://kafka.apache.org/)
3.(https://prometheus.io/)
4. (https://grafana.com/)
5. (https://www.elastic.co/elasticsearch)
6. (https://learn.microsoft.com/en-us/devops/deliver/what-is-infrastructure-as-code)

GMV lays the foundations for the new Galileo signal authentication service

GMV has been awarded as a prime contractor the Message and Measurement Authentication Receiver for Initial Operations (MMARIO) project by the European Commission.

The project is related with initial activities regarding the implementation of a new Galileo enhance service to provide Galileo satellites with signal authentication, the Assisted Commercial Authentication Service (ACAS). The main purpose of this project is to develop and optimize a fully functional ACAS receiver and ACAS prototype server, with state-of-the-art technology and performance, and to demonstrate its use in an operational environment including real GNSS authentication signals processed by a dedicated testing platform. The project also intends to cover robust anti-spoofing algorithms able to discern, to the extent possible, between natural impairments (e.g. multipath) and targeted interference, detecting and mitigating the latter ones.

AS the prime contractor, GMV will lead the activities on the development of both the ACAS receiver and the ACAS server supported by Qascom and Universidad Autónoma de Barcelona (UAB). In addition, Airbus is included as a subcontractor to lead the activities related to the development of a test platform in order to experiment with the ACAS receiver and server. GMV will also lead the activities on the experimentation to derive relevant outcomes which may be used to improve the service and/or user implementation in view of a future operational implementation.

The outcomes of this project are meant to be used to support the initial operations activities for the establishment of the ACAS service. The project activities will be executed during the next two years, until 2026 mid-year.

GMV showcases satellite navigation services and solutions at ENC

GMV participated in the European Navigation Conference (ENC) held at ESA's European Space Research and Technology Centre (ESTEC) in Noordwijk, the Netherlands, from May 21 to 24.

In this edition, this conference's main topic was resilience in the field of navigation, recognizing the vulnerability of position and time information from satellites. Particular emphasis was placed on the development of resilient solutions incorporating redundancy in the signal domain, ground and space infrastructures, and on-board implementation. The conference also addressed vulnerabilities in navigation, data, guidance, and control functions.

The conference featured several presentations and sessions given by industry experts, with GMV standing out as one of the world leaders in global navigation by satellite systems. A total of fifteen technical papers from various GMV subsidiaries were accepted and presented during the event. Additionally, GMV had a significant presence in the exhibition area, where they showcased the latest updates on their products, including ***GMV Gsharp***® and the newest signal simulators and user receivers for Galileo Second Generation (G2G).

GMV has been contributing to the development of satellite navigation for over 30 years, making it one of the main participants in the implementation of Europe's satellite navigation strategy. GMV's expertise and the experience of its professional teams have positioned the company at the forefront of navigation system development and various GNSS applications. GMV has been a pioneer in the use of GPS, GLONASS, EGNOS, and Galileo signals.

Completion of civil works for Galileo's TTCF-8 station

In late 2022, GMV signed a contract with the European Space Agency (ESA) to install the eighth telemetry, tracking, and control (TT&C) station for the Galileo project's ground segment, GCS-FOC2. This new station, TTCF 8, will be located at the control center in Fucino, L'Aquila region, 120 km from Rome, Italy.

Following months of contract negotiations and system design in collaboration with a consortium comprising GMV, Indra, and Telespazio Italia, civil works began in late December 2023. These works included laying the foundation, soil compaction, and site preparation, along with installing all necessary infrastructure (ducting, power installations, security, fencing, and preparing the area and roads for deploying construction shelters, cranes, and containers with antenna materials) required for subsequent tasks. Construction also began on an adjacent building that will house an office and warehouse to support installation activities.

Preparatory activities concluded in mid-May with an inspection at Fucino conducted by GMV, Indra, and Vertex Antennentechnik (the antenna subcontractor). This inspection verified the civil work of a 10-meter-tall building, which will host the installation of a 13.5-meter diameter parabolic antenna. It confirmed the adequacy of both the antenna anchoring elements and the building structure.

This is the first significant milestone in the Fucino deployment, followed in the upcoming months by equipment integration and factory testing before installation at the station. The station is expected to be operational by mid-2025, enhancing the Galileo constellation's capacity for satellite fleet control. Currently, there is considerable demand at the other seven TTCF stations worldwide (French Guiana, Reunion Island, New Caledonia, French Polynesia, Redu, Kiruna).

This increased capacity will also enable GMV to modernize the technology of the other seven antennas in the Galileo network, a responsibility GMV will take on in the coming years. The Fucino station has also been chosen as one of the initial systems to undergo upgrades to support the ground segment of the second generation of Galileo satellites. GMV will oversee these upgrades to ensure compatibility with both generations.

GMV inaugurates the "Space Sector Forum"

GMV participated in the "Space Sector Forum 2024", organized by SPACE PL (Polish Space Industry Association) and held in Warsaw, Poland, on June 4th.

The Forum this year focused on critical themes, including the Polish space strategy, security, and international collaboration. Featuring dedicated panels exploring these topics, the event provided a dynamic platform for knowledge exchange and idea sharing, crucial for advancing the sector.

At the exhibition area, GMV showcased its activities in Poland and highlighted its contributions to the sector. Paweł Wojtkiewicz, GMV's Space Director in Poland, officially opened the conference and joined a roundtable discussion on the Polish Space Strategy and the National Space Program.

GMV explores role of administration in advancing space sector

GMV sponsored the fifth edition of the Space Engineering Conference, held from June 11 to 13 and organized by the Space Committee of the Spanish Institute of Engineering and the space group of the Official Association of Aeronautical Engineers of Spain (COIAE).

The Conference opened with remarks from Teresa Riesgo, Secretary General for Innovation at the Spanish Ministry of Science, Innovation, and Universities. She provided an overview of the current state of the space sector, highlighting the establishment of the Spanish Space Agency (AEE) and the introduction of the aerospace PERTE initiative.

The event brought together national and international participants to discuss sector insights. Over three days, the agenda featured presentations and roundtable discussions involving companies, startups, public institutions, and universities, covering various timely topics from around the space sector.

The program was organized into sessions focusing on five areas: Applications and Operations, Technology, Space Infrastructure, Science and Exploration, and Economy and Society.

In addition to its sponsorship, Jorge Potti, GMV's Director of Strategy, contributed to a panel discussion titled "The role of the administration in advancing the space sector", alongside representatives from the Spanish Space Agency (AEE), Inta, and COIAE.

GMV: ready to road-test performance capabilities of *GMV GSharp®* in UK

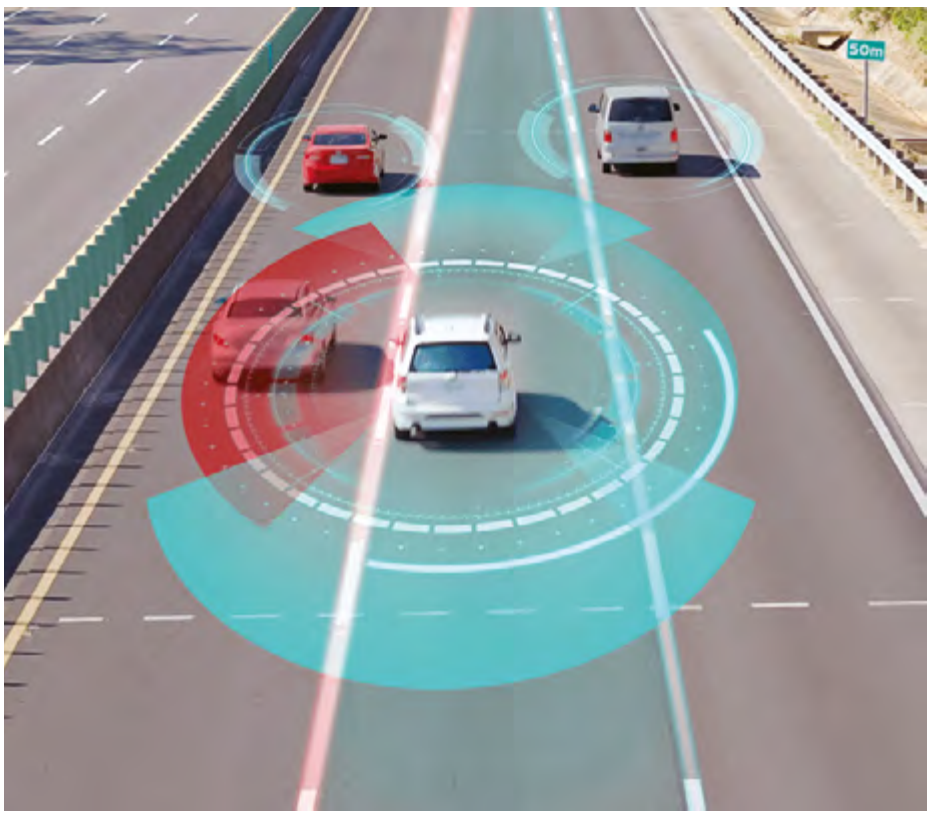
Recently, as part of the CORSICA project led by the European Space Agency (UKSA), successful integration was completed on ***GMV GSharp®*** with the stations of the UK's national mapping agency, Ordnance Survey (OSNET).

CORSICA, managed by GMV in the UK, falls under the "Unlocking Space for Business" program by the UK Space Agency (UKSA), designed to stimulate British private enterprises to develop innovative, operational, and sustainable projects using satellite services.

This project, initiated earlier this year and set to conclude by year-end, aims to advance towards a future generation of high-precision and integrity navigation services. It seeks to improve the performance of the ***GMV GSharp®*** service in the United Kingdom by using data from additional high-quality stations across the territory. The goal is to demonstrate improvements in performance, coverage, and availability achievable through the integration of stations from the UK's national mapping agency, Ordnance Survey (OSNET), into GMV's service.

GMV GSharp® delivers high-precision GNSS-based positioning with robust integrity, leveraging corrections from a dedicated Correction Service (CS) and integrating additional onboard sensors (such as IMU or wheel speed sensors) crucial for autonomous driving systems and other applications.

Following the integration phase with OSNET stations, the project is now poised to road-test the performance improvements achieved.



LEO-PNT program kicks off under GMV's leadership

On April 9th and 10th, GMV's headquarters in Madrid hosted the kickoff meeting for the LEO-PNT In-Orbit Demonstrator, a European Space Agency (ESA) initiative spearheaded by GMV. The project aims to validate services and advance key technologies for low Earth orbit (LEO) satellites in positioning, navigation, and timing (PNT) through the deployment of a five-satellite constellation.

The kickoff meeting drew around 50 participants, including representatives from the consortium of companies partnered with GMV, such as OHB System AG, Alén Space, Beyond Gravity, and Indra. The European Space Agency was also well-represented at the event.

During this meeting, GMV and its partners presented the scope and timeline of planned activities for the project. From a technical perspective, discussions focused on key elements of Pathfinder A, the first satellite in the demonstrator constellation scheduled for launch by late 2025.

Two months later, the project achieved two significant milestones: the System Requirements Review (SRR), which finalized system specifications and segments, and the Design Key Point A (DKPa), where the preliminary design of Pathfinder A was unveiled.

These milestones represent GMV's initial strides as leader of a comprehensive space mission, solidifying its position as a prominent player in the European aerospace industry.

GMV leads the creation of the first European standard for GNSS receivers for Galileo timing

GMV has recently reached a significant milestone in the STARLITE project, with the standard developed in this project successfully passing a Europe-wide validation survey with 100% positive votes.

Funded by the European Commission, the STARLITE project aims to develop the first international standard for Galileo GNSS timing receivers. Launched in January 2022 and due for completion in July 2024, this first international standard has been developed as part of the European standardization organizations CEN/CENELEC, which set up the international working group led by GMV, where experts from various countries collaborated in drafting the standard.

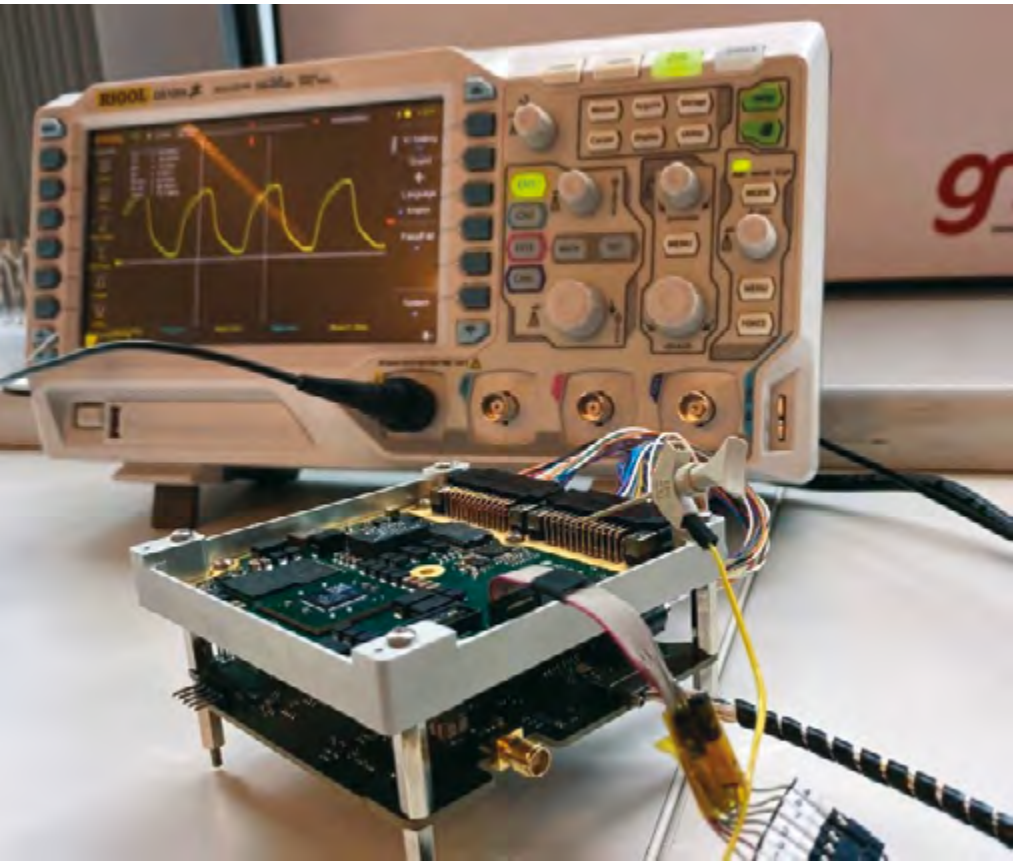
The validation phase, which concluded on May 30, confirmed the international consensus needed to publish the standard. The comments received during this survey will be managed and implemented before final publication, which is scheduled for December 2024.

This standard is crucial for the future timing service of the Galileo Second Generation System. It has been developed taking into account the characteristics of the timing service so that anyone using receivers developed according to this standard can benefit from its capability commitments, thus reinforcing GMV's position as a leading company in GNSS timing and receivers.

Securing 100% positive votes is a major achievement, since the necessary international consensus for publication of the standard as a European standard was reached. This success has enabled GMV to enter the final review of the project, due to take place in mid-July, with renewed confidence.

GMV has led the drafting of the standard, in collaboration with ALTER, UNE, EY, the JRC (Joint Research Centre), and the European Commission.

GMV secures key ESA contract for Precise Satellite Positioning and Timing in Low Earth Orbit



GMV in Poland has been awarded a key contract after successful negotiations with ESA to provide accurate positioning and timing in Low Earth Orbit. The project is a relevant continuation of the already commercialized SEXTANS GNSS receivers developed in the Flight Segment department for spaceborne applications: launchers and satellites.

NAVTIME Rx will provide high accuracy, in orbit, in real time (20-30cm in position and below 1 mm.s-1 velocity) through on-board Precise Orbit Determination (P2OD) and accurate PPS distribution (below few nanoseconds). Thanks to this activity, GMV will extend its portfolio of GNSS receivers with more capacities for Telecom, Navigation, Scientific satellites at moderate cost for its customers and small size (CubeSat form factor).

The project is an ESA NAVISP project (Navigation Innovation and Support Program), the program aiming at driving innovation and fostering the development of satellite navigation technologies.

The project kicked-off at the end of May 2024 and finish with an engineering qualification model of the receiver after 18 months.

GMV through its Polish subsidiary is the prime of the project and it is in charge of the design and development of the triple band and dual constellation GNSS receiver (E1/E5/E6, L1/L5), of the P2OD engine and clock disciplining, and performance testing. The Space Research Center and Semicon - a Polish SME - will oversee the mechanical design, electronics production and environmental tests. The performance tests will be conducted in SRC facilities in Borowiec (time laboratory) and in Warsaw University of Technology (navigation laboratory.

GMV, present at the fourth edition of ICSSA

GMV participated in the fourth edition of ICSSA (International Academy of Astronautics Conference on Space Situational Awareness), organized by the Department of Mechanical and Aerospace Engineering at Embry-Riddle Aeronautical University (ERAU) and the Conference Department at the University of Florida (UF), with support from the International Academy of Astronautics (IAA) and the American Institute of Aeronautics and Astronautics (AIAA).

From May 8 to 10, renowned experts in space surveillance, including Keiran McNally from GMV's Space Surveillance and Traffic Management division in the U.S., convened at this event to discuss a broad range of topics related to the detection, identification, prediction, tracking, and removal of space debris, as well as issues related to liability and insurance.

EU initiative to create a space information sharing and analysis center

In its Space Strategy for Security and Defence (EUSSSD), the European Union (EU) has begun creating a center to analyze and share information about the space sector to enhance its security. The EU Space Information Sharing and Analysis Centre (ISAC) initiative boasts participation from the European Union Agency for the Space Programme (EUSPA), the European Commission (EC), and the industry.

GMV is one of the founding members of this new organization, which aims to strengthen security and improve the overall resilience of the EU space sector so as to prevent, address, and mitigate security challenges, including cybersecurity.

The first meeting of the board, held on April 24, was cochaired by the European Commission and EUSPA, and the 12 founding members attended, representing both large industrial groups and small and medium-sized enterprises (SMEs) from throughout the European Union, including GMV. The actions carried out at the inaugural meeting of the board include establishing the common standards for EU Space ISAC functioning and creating a working group dedicated to security and cybersecurity threats.

Information will be shared and affected in the following ways:

- Sharing information regarding the latest security incidents.
- Sending early warnings.
- Improving the cybersecurity position of the industry and the EU by sharing information about asset and system resilience.
- Collaborative approach to security, leveraging resources and know-how.
- Access to experience and guidance with know-how, exchanging information with public agencies.
- Support in response to incidents and recovery from them.
- Development of industry and network know-how.

To this end, on 24 April the terms of reference of this new EU space ISAC were signed, which will contribute to the security of the EU Space sector. As a founding partner, GMV will be one of the companies that will contribute to establishing the EU space ISAC.

GMV signs Zero Debris Charter, the world's leading initiative to reduce space debris

On 6 June, GMV joined more than 40 companies, research centers, and international organizations at the ILA Berlin Air Show to sign the Zero Debris Charter, demonstrating its dedication to the long-term sustainability of human activities in space. By signing the Charter, GMV reaffirms its commitment to implementing debris reduction standards and technologies to make clean and sustainable use of space a reality. GMV has not hesitated to join this initiative since its launch in 2023 and is contributing its experience to define its technical development by participating in workshops with other international experts.

At the 2022 Ministerial Conference, ESA member states endorsed the implementation of a Zero Debris approach for their missions and have since encouraged partners and other stakeholders to follow a similar path. In this regard, ESA has long been leading a profound internal transformation of its space debris mitigation and recovery practices and intends to stimulate similar efforts in Europe and beyond. In 2023, the Agency announced the launch of the Zero Debris Charter initiative. Developed by and for the global space community, the Charter aims to build a global consensus on space sustainability. It brings together a wide and diverse range of space organizations to define ambitious and measurable goals to mitigate and clean up space debris by 2030.

GMV has set the global standard for studying, monitoring, and preventing the proliferation of space debris. Active in this field since the late 1990s, GMV has been involved in numerous projects with ESA, the European Union Agency for the Space Programme (EUSPA), the European Commission, several national space agencies in Europe, and several defense ministries and satellite operators worldwide.

Due to its significant activity in this field, GMV has been aware for years of the need to urgently and consensually address the growing congestion of the space environment and to take urgent and concrete action to mitigate it, thus ensuring the safety and sustainability of space operations.

The Charter was signed by Miguel Ángel Molina, GMV's Deputy Director General for Space Systems.

GMV showcases in-orbit services portfolio at MILSSA

GMV sponsored the nineteenth annual "Military Space Situational Awareness" (MILSSA 2024) conference, held from April 22 to 24 in London.

As Europe's premier conference focused on space domain awareness, this year's forum brought together key stakeholders from the military, government, and industry sectors to discuss the future of the field. With a renewed emphasis on alliance and collaboration and more than 250 attendees, this event remains a pivotal gathering for professionals in Space Situational Awareness (SSA).

This year's three-day event concentrated on military and defense issues, such as international collaboration, space debris, and industry knowledge. Topics covered included space junk, sustainability, in-orbit services, active debris removal, space domain awareness, space weather, and orbital warfare.

In addition to showcasing its products and services for the space sector at a booth, Mark Dumville, GMV's Space Director in the UK, and Alberto Águeda, GMV's Director of Space Surveillance and Traffic Management, participated in a roundtable discussion titled "In-Orbit Services".

GMV will supply the new space domain awareness system for Spanish Ministry of Defense

The contract includes development, acquisition, installation, and start-up of the hardware and software needed to operate this system at Spain's Space Surveillance Operations Center

Spanish Ministry of Defense, through its Directorate General of Weapons and Material, has awarded a €2.7 million contract to GMV, for the development, deployment, support and maintenance of the Space Situational Awareness and Control System (CCSE) that will be used at the Spanish military Space Surveillance Operations Center (COVE).

Established in 2019, with Initial Operational Capability (IOC) since 2021, this center is tasked with monitoring and understanding key aspects of space activities and providing essential support services to the Armed Forces operations.

GMV has been providing support to this center from the very beginning, assisting its participation to the Global Sentinel exercises organized by the U.S. Space Command. As part of its support, GMV has supplied its operational orbit determination tool known as ***Sstod***, for processing data from the Spanish space surveillance radar located at the Morón Air Base, near the city of Seville.

To help the center achieve full operational capability (FOC), the Spanish Ministry of Defense's Sub-Directorate General of Procurement, which is part of its Directorate General of Weapons and Material, announced a competitive tendering process at the end of 2023 for a Space Situational Awareness and Control System (CCSE), and GMV has been awarded the contract.

The functionalities covered by this contract include orbit calculation and propagation, build-up and maintenance of a space object catalog (both open and classified), prediction of atmospheric reentry, calculation of overflight events, planning of observation and sensor calibration campaigns, calculation of Global Navigation Satellite System signal degradation, and integration and processing of space weather data.

This system is expected to go into service at the end of 2024. To comply with this timeline, the system will be based on GMV's commercial off-the-shelf (COTS) system known as ***Ecosstm***, which is already being used in other operational environments such as the German Armed Forces' Space Domain Awareness Center (*Weltraumlagezentrum*), the civilian space surveillance systems of various other countries such as Greece, and GMV's commercial space surveillance center known as ***Focusoc***.

With this new contract, GMV is further solidifying its position as the European leader in the development of space surveillance and command and control systems, which is an area where the company already has extensive experience in both civilian (institutional and commercial) and military applications.

Photo: Space Surveillance Operations Center (COVE)

GMV welcomes visitors from POLSA and AEE

On 19 June, GMV welcomed a delegation made up of members of the Polish Space Agency (POLSA) and the Spanish Space Agency (AEE) as part of the 2024 Poland-Spain Space Sector Technical Conference organized by Spain's exporting and foreign investment company ICEX and the Economic and Trade Office of Spain in Warsaw.

The goal of this conference was to strengthen the ties between Poland and Spain in the space field and to open up new avenues for joint technological development.

The visit included a tour of GMV's space infrastructure, including a stop at the replicas of the Galileo program's operations room and the Eutelsat room, the latter equipped for corrective and evolutionary maintenance of operational systems. The latter room is an exact replica of Eutelsat's development environment (SDF), used for both the control center and orbital operations activities.

The delegation also had the chance to visit GMV's robotics laboratory, where the company is developing, integrating, and testing groundbreaking systems for space exploration and in-orbit or aerospace transportation services, as well as ***platform-art***©, the advanced robotics laboratory for testing guidance, navigation, and control (GNC) systems, avionics systems and complex space missions, such as precise landings on the Moon or Mars, active space junk removal, and formation flying missions.

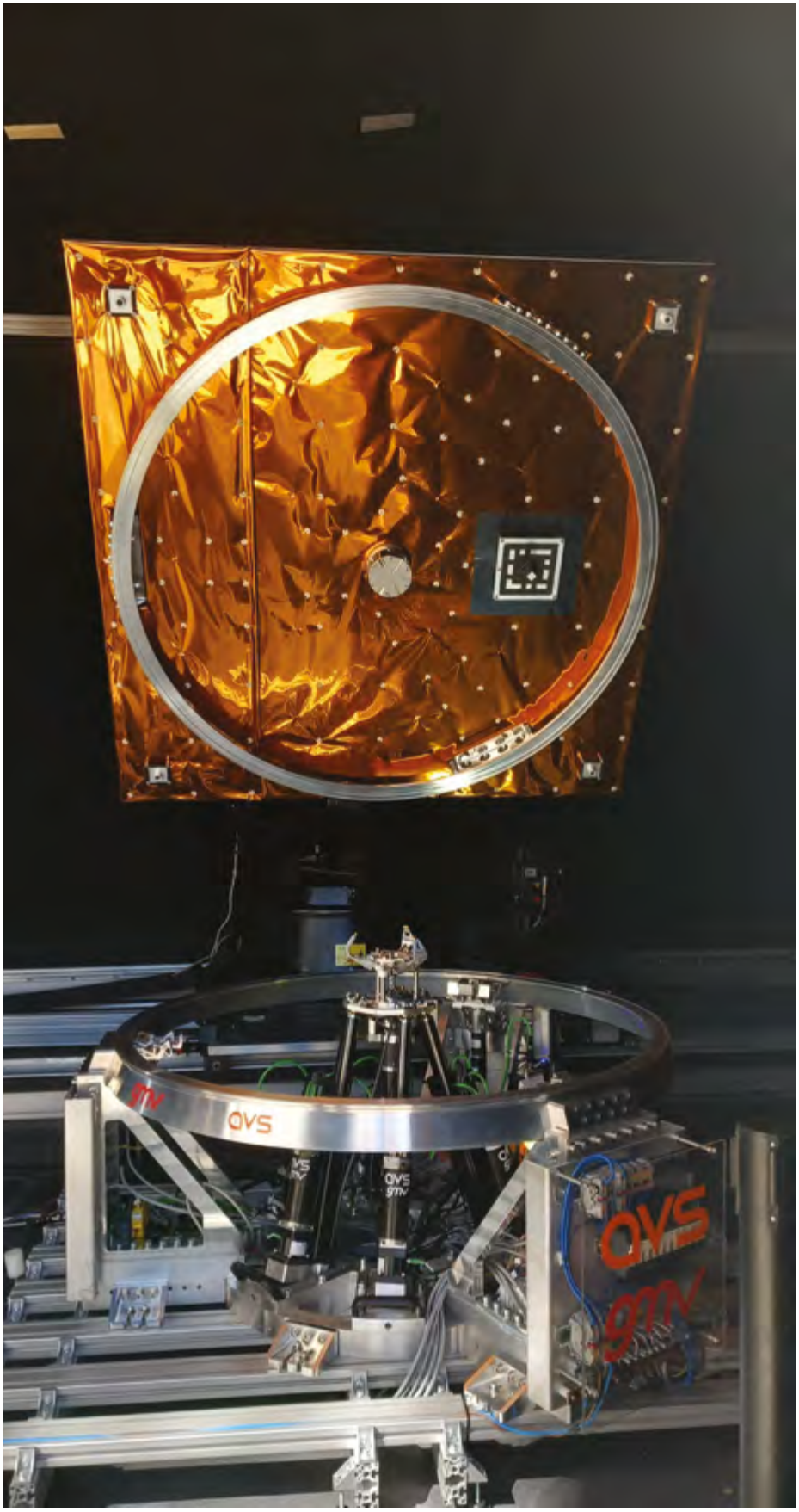
Bolstering the security of commercial space applications

On 24 and 25 April in Paris, GMV participated in CYSAT, a European event focusing on cybersecurity for commercial space applications, which brought together a selection of speakers and offered an invaluable opportunity for networking and knowledge sharing.

Indeed, CYSAT's goal is to bring together leading experts in space security and information technology to build a European ecosystem that can address the current and future challenges facing Europe's space industry. GMV set up a stand to showcase its space products and services, and its representatives included Julio Vivero, Business Partner INT for GMV's Secure e-Solutions, and Daniel López Montero, Data Scientist in GMV's Artificial Intelligence and Big Data department, who participated in the "Space SOCs: Common Mistakes, Challenges and Tips" presentation.

CYSAT was also the venue for the first meeting of the EU Space Information Sharing Centre (EU Space ISAC) initiative, which involves the European Union Agency for the Space Programme (EUSPA), European Commission (EC), industry, public agencies, and academia. GMV is one of the founding members of this new initiative, which aims to strengthen security and improve the overall resilience of the EU space sector in order to prevent, address, and mitigate challenges having to do with security, including cybersecurity. The first meeting of the board, held on 24 April, was co-chaired by the European Commission and EUSPA, and was attended by the twelve founding members, representing both large industrial groups, including GMV, and small and medium-sized enterprises (SMEs) from throughout the European Union.

GMV tests key technologies for Space sustainability



Just as we safeguard marine ecosystems and forests, protecting space is vital for its sustainable and safe future use. Each day, we all interact with around 100 satellites that deliver essential services like Earth observation, weather, telecommunications, satellite navigation, geopositioning, and banking transfers. So, space is increasingly recognized as an ecosystem in need of protection.

GMV is currently conducting trials in its state-of-the-art robotics laboratory, ***platform-art***©, to develop technologies crucial for space debris removal, maintenance, refueling, and in-orbit assembly of complex infrastructures.

Among these technologies, two stand out:

The unified CAT system: Return Capture Payload Bay, designed for space debris removal. This specialized payload is integrated into a service vehicle equipped with advanced guidance, navigation, and control (GNC) systems. It facilitates precise approach, synchronization, capture, stabilization, gripping, and securing of spacecraft at the end of their operational life or in case of early failure, enabling their removal from orbit.

MIRROR, a multi-arm assembly robot for assembling large structures in orbit, such as antennas, telescopes, or “solar farms”. It also provides crucial maintenance, repair, and upgrade services to spacecraft and space infrastructures.

Finally, the mechanical device ASSIST, the first and most advanced European initiative, is advancing the standardization of satellite refueling interfaces. Built on an open interface framework, it is currently progressing towards in-orbit demonstration.

GMV analyzes viability of lasers to maneuver objects in orbit

Since the launch of Sputnik in 1957, which marked the beginning of the space age, over 6,500 rockets have been launched into space, carrying more than 17,000 satellites. Among them, about 11,500 remain in orbit today, although not all are operational, including recent megaconstellations like Starlink in Low Earth Orbit (LEO).

However, the sheer number of satellites is just one part of the problem posed by overcrowding Earth's low orbit. Over the years, more than 640 explosions have scattered debris of various sizes in space. While not all debris has been cataloged, those that have reveal staggering numbers: over 36,500 objects larger than 10 cm and a staggering 130 million pieces ranging from 1 mm to 1 cm.

If any of this debris is on a collision course with a satellite, operators have no choice but to maneuver the satellite, consuming precious fuel needed to maintain orbit and perform operations. These maneuvers not only disrupt nominal satellite functions (such as Earth observation or telecommunications) but also risk shortening the satellite's operational lifespan.

However, there may be another option to consider. What if it were possible to divert the space debris fragment instead of maneuvering the satellite itself? This is precisely the alternative being investigated by GMV's new project: LMT, or Laser Momentum Transfer, which recently got underway. The aim of this project is to use a ground-based laser system capable of maneuvering objects in orbit using two techniques: momentum transfer via photon pressure generated by the ground-based laser, or thrust generation through laser ablation of the object, employing a significantly more powerful laser in this case.

To analyze the viability of this concept, a consortium has been formed led by GMV (from Spain and Poland), LUMI Space (a British company specializing in laser technology for space applications), and SAB Aerospace (based in the Czech Republic, tasked with platform design).

If proven viable, the project would advance to a subsequent phase involving a proof-of-concept mission in orbit.

Exploring new frontiers at DASIA 2024

Once again, GMV took part in DASIA 2024, the International Conference on Data Systems in Aerospace, held from May 28th to 30th in Opatija, Croatia.

DASIA, organized annually by Eurospace since 1996, aims to unite specialists in space data systems, fostering networking and serving as a platform for discussing and advancing understanding of issues within the space industry.

At this event, GMV representatives presented alongside other industry professionals. João Gomes and Hugo Castaign from GMV's Flight Segment and Robotics unit showcased "Conversational Automated Program Repair for ARM Assembly Code using LLMs". Their presentation highlighted the development of the AIRaider tool and its role in supporting space software developers. They emphasized the innovative use of Large Language Models (LLMs), specifically ChatGPT, for automated program repair. Their approach, incorporating conversational methods and real-time feedback loops, proved highly effective in fixing errors in ARM assembly code.

GMV presents results of avionics subsystem for launchers

The subsystem has been designed following modular architecture based on commercial components, which gives the proposed solution great flexibility and agility

In late January, GMV presented the results of its "Affordable Avionics Technology for Microlaunchers" initiative at the European Space Agency (ESA) headquarters in Paris. This project, co-funded under ESA's Future Launchers Preparatory Programme (FLPP), enabled the complete development of a microlauncher avionics system. This includes guidance, navigation, and control (GNC) subsystems, embedded software, and avionics, all designed with a modular architecture using commercial components for enhanced flexibility and agility.

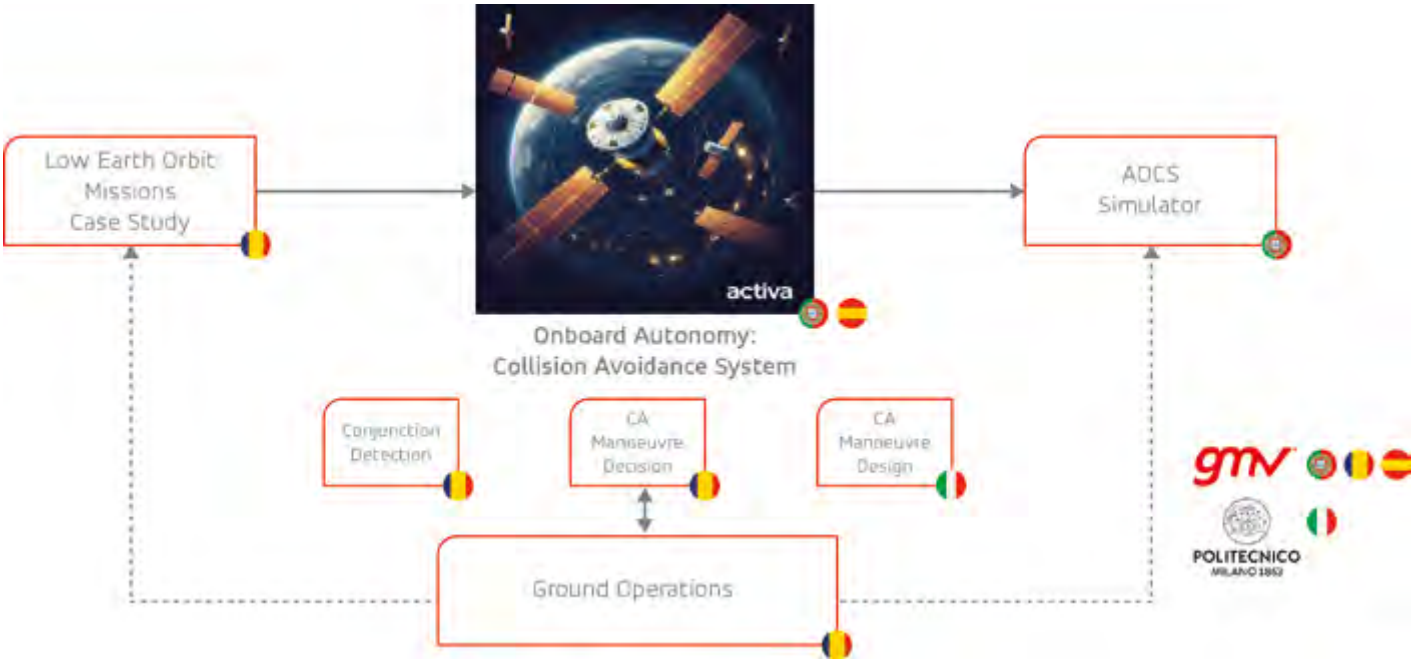
The results presentation attracted representatives from key European launcher industry players, along with institutional figures from ESA and CNES, who showed keen interest in the project's substantial advancements.

Development of the system began in 2017, and within two years, the avionics subsystem achieved full qualification. By October 2023, it was validated in an operational setting during the inaugural flight of PLD's MIURA 1.

Throughout this endeavor, GMV explored and implemented various improvements, including the potential integration of a fully autonomous flight termination system (AFTS) and technologies to streamline the industrialization of launcher avionics systems.

Industry firms and attending agencies expressed keen interest in these activities, recognizing the quality of the work showcased, exemplified by the successful launch of MIURA 1.

GMV Leads ACTIVA Project to Enhance Spacecraft Autonomy and Efficiency



In ACTIVA (Advanced Control Techniques for Increased Onboard Autonomy), GMV in Portugal, Romania, and Spain, together with Politecnico di Milano (POLIMI), will study, design, develop, simulate, and validate the use of advanced control techniques to enable more efficient spacecraft operations by leveraging onboard autonomy and decision-making.

With the advent of mega-constellations of thousands of satellites and the ever-increasing risk of collision with a space object or debris in low Earth orbit (LEO), current orbit maintenance and collision avoidance management practices from the ground may no longer be viable from a cost perspective.

The ACTIVA onboard optimized guidance system aims to increase the autonomy of orbit maintenance to reduce ground intervention, which is constrained by staff working hours and communication links with ground stations, among other factors.

This project will involve a holistic analysis of the European Space Agency's LEO missions and the research and development of advanced techniques within an attitude and orbit control system (AOCS) framework for a collision avoidance system (CAS) with collision detection and avoidance maneuvers, taking into account physical, payload, and mission constraints.

The Guidance, Navigation, and Control (GNC) team in Portugal will lead the project and focus on AOCS, CAS, and simulator implementation, supported by three teams: the Robotics and Onboard Autonomy (ROA) team in Spain for autonomy aspects; the Ground Space Safety Segment Programs (GS2P) team in Romania for ground operations, case study definition, and CAS algorithms; and the POLIMI team for maneuver design algorithms.

MBSE 2024

In late May, GMV participated in MBSE2024, an event organized by the German Aerospace Center (DLR) in collaboration with the European Space Agency (ESA) in Bremen, Germany.

Elena Alaña, Head of the Software Engineering Section (OBSW), delivered a presentation titled "Definition of a Metrication Model for Model-Based Engineering", and Tiago da Silva, also from GMV's OBSW in Portugal, presented the article "Digitalization for GNC Preparation".

GMV Partners with ESA for SATIS mission

The goal of the mission is to characterize the physical properties of the asteroid Apophis before, during, and after its approach to Earth

ESA selected GMV (Portugal and Romania) to perform the mission analysis and design of the GNC/AOCS subsystem for the SATIS mission in a consortium led by RedWire.

The SATIS mission concept is based on a 12U-XL CubeSat that will rendezvous with the asteroid Apophis two months before its Earth closest approach (ECA) at a distance of 31,500 km from Earth on Friday 13 April 2029. The mission objective is to characterize the physical properties of the asteroid before, during, and after ECA in order to observe any changes induced by the effects of Earth's gravity on this potentially hazardous asteroid (PHA), thus providing unique data for planetary defense purposes. Due to the specific mission constraints, SATIS will start with an April 2027 launch on a dedicated micro-launcher equipped with a kick stage. The kick stage will be used to inject the CubeSat into the required escape velocity vector. Once launched, the CubeSat will use a high performance miniaturized electric propulsion system for the two-year interplanetary transfer to reach its rendezvous with Apophis. Communication and navigation will be provided by a miniaturized X-band transponder interfacing with ESTRACK deep space ground stations. On arrival, the CubeSat will co-fly with Apophis and perform observations using a miniaturized hyperspectral camera in different spectral bands (VIS/NIR/SWIR).

GMV will use its experience with small body missions (HERA, RAMSES, COMET-Interceptor, etc.) to produce a cost-effective AOCS/GNC system, which will be responsible for controlling the spacecraft's orientation, position, and velocity. To achieve this, the GNC will use images from a dedicated navigation camera, processed on board, to command the spacecraft's orientation and point the camera and scientific payloads at the target asteroid and thus obtain the scientific measurements to expand our knowledge of the universe. It will also control the velocity change maneuvers required to ensure the CubeSat's safety and ability to gather scientific images. Additionally, GMV will design all low-thrust trajectories, including launcher separation, interplanetary transfer, asteroid arrival, and proximity operations.

The mission's industry consortium, of which GMV is a key member, recently completed its mission definition review (MDR), marking the end of Phase 0 and the start of Phase A.

GMV strengthens cybersecurity of telecommunications satellite data

GMV has been awarded the contract for the European Space Agency's (ESA) Trusted Platform Modules for Space SATCOM project.

The aim of the project, led by GMV in Germany and involving other German cybersecurity subcontractors, is to demonstrate the capabilities of a hardware security module (HSM) that integrates a TPM module and provides security as a service via CAN-bus to the rest of the satellite's modules, using a flatsat prototype.

The HSM is a physical tamper-proof device that protects secret digital keys and helps strengthen asymmetric/symmetric key cryptography. It is used when deploying public key infrastructure (PKI), authentication, zero trust, etc., to achieve a high level of data privacy and trust. These devices provide an additional layer of protection by keeping the decryption keys separate from the encrypted data. This prevents the disclosure of encrypted data even in the event of a hack.

HSMs are usually presented as a plug-in system that can be connected directly to a computer or network server. This concept is being extrapolated to space to provide a new reference that can comply with the concepts of space avionics open interface architecture (SAVOIR). HSM tools often make backup copies of the keys they manage externally, and certificate authorities (CAs) typically use them to generate, store, and manage asymmetric key pairs.

Innovation applied to spatial operations data systems

The ninth edition of the European Mission Operations Data System Architecture Workshop (ESAW) took place from 13-14 June at the European Space Operations Center (ESOC) in Darmstadt, Germany.

The event covered topics from the perspective of both traditional space missions and new domains such as CubeSats, robotics, space exploration, and Space-as-a-Service, among others.

The workshop was divided into different sessions, with GMV giving several talks on a wide range of emerging technological solutions, starting with a presentation on the DevSecOps approach for multi-mission operations within the framework of the European Space Agency's EGOS-MG (Ground Operation System - Multi-Mission Generation) program.

The company also presented progress on the AI-Aided-XR project, which focuses on applying artificial intelligence-assisted virtual reality and augmented reality and virtual reality-assisted machine learning.

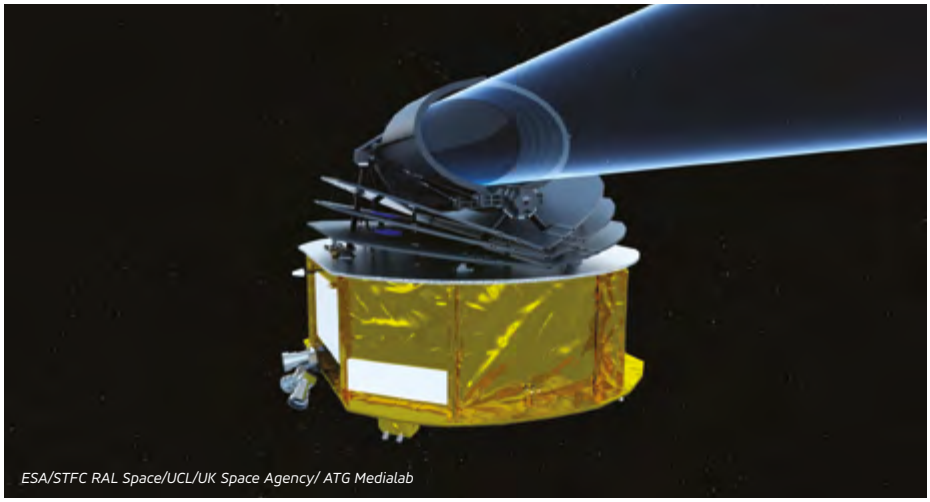
Additionally, GMV discussed the adoption of security-by-design principles in critical infrastructure, specifically in the case of Galileo's Ground Control Segment (GCS), where GMV is responsible for cybersecurity.

Other topics addressed by GMV included the advantages of digital twins (DT) in the space domain and the benefits of implementing cloud-native and cloud-agnostic approaches to achieve a dynamic, adaptable, cost-cutting strategy with access to a large amount of compute, storage, and bandwidth resources.

GMV also took part in the exhibition area, showcasing its breakthroughs in areas such as DO (Distributed Operations) and AI for satellite constellation operations, as well as GMV's ***Ecosstm*** solution for SST (Space Surveillance and Tracking), SDA (Space Domain Awareness), and STM (Space Traffic Management) control centers.

GMV Achieves Major Milestone in ARIEL Mission

GMV in Portugal was selected in 2023 to design, implement, and validate two of the four attitude and orbit control system (AOCS) modes of the ARIEL (Atmospheric Remote-sensing Infrared Exoplanet Large Survey) mission for Airbus UK, the ARIEL AOCS system leader. In Q1 2024, GMV passed the preliminary design review (PDR) milestone for its AOCS modes, which marks the end of Phase B2 and the start of Phase C, with ESA acceptance of all GMV designs and associated validation.



ESA/STFC RAL Space/UCL/UK Space Agency/ ATG Medialab

ARIEL will measure the spectrum of a large population of known transiting planets in our galaxy. A ~1.0 m off-axis telescope collects infrared light from distant star systems and focuses it onto a spectrometer as the planet passes in front of or behind its sun. This spreads the light spectrum and extracts chemical fingerprints of the planets' atmospheric gases. Visible light is also used for photometry, star monitoring, and fine tuning the telescope's line of sight. During the 3.5-year operational mission, up to 500 previously discovered exoplanets will be observed several times. They range from Jupiter- and Neptune-sized objects to super-Earths in a wide variety of environments.

GMV is responsible for two AOCS modes. One is the coarse pointing mode, where the spacecraft spends most of its time. This mode is responsible for maintaining the spacecraft's attitude, rotating between observations and maneuvers, and managing the momentum of the reaction wheel. The second is the orbital maneuver mode, which is responsible for all delta-V maneuvers and wheel jettisoning. In the recently started Phase C, GMV will produce the final version of the AOCS modes software, which will be integrated into Airbus UK's full AOCS simulator and perform all associated verification and validation (V&V) tasks to ensure the quality of the flight-ready software.

Phase C will last two years, culminating in the critical design review (CDR) milestone expected in Q1 2026, which will mark the end of AOCS software development. In Phase D, the AOCS software will be integrated into the full ARIEL onboard software and validated in the final spacecraft test in what is known as the AIT/AIV phase.

Brussels hosts the fourth edition of The European Space Forum

On June 24 and 25, Brussels became the epicenter of the European space sector by hosting the fourth edition of The European Space Forum, held under the theme "Sustainable Innovation for Global Leadership". The event comes at a crucial time, marked by challenges, technological changes and increasing competition in the space sector, as well as a context of debates on the future of EU space legislation in the quest to shape the role and configuration of the sector in Europe.

GMV attended the event as Platinum Sponsor and took a leading role in the conference. Miguel Angel Molina, GMV's Deputy General Manager of Space Systems (EST), took part in the session "Space for a Secure Europe: From IRIS² to Quantum Encryption and Beyond". The speakers highlighted the transformative nature of today's industry thanks to the IRIS² initiative, which aims to provide secure, resilient and autonomous connectivity in Europe.

Mariella Graziano, GMV's EST Flight Segment Strategy and Business Development Director, was also present at the session "Greening the Space Sector - Exploring technology and policy solutions". She spoke about the technological solutions, practices and policies needed to make the space sector more sustainable, stressing the need to promote standards that facilitate greater sustainability without, however, affecting the competitiveness of European industry.

NASA's new LRO mission planning system ready to begin operations

The week of June 11-14, validation and acceptance testing of the Lunar Reconnaissance Orbiter (LRO) planning system upgrade was conducted at NASA Goddard Space Flight Center in Greenbelt outside of Washington DC, USA.

LRO is a lunar orbiter that has been mapping the surface of the Moon since its launch in 2009, helping to identify potential lunar landing sites for future missions. Its planning system is based on ***GMV Flexplan®***, GMV's solution and "brain" of the ground segment, which is responsible for coordinating the whole mission and receiving information not only from the satellite itself but also from the ground infrastructure.

These tests have aimed to renew the underlying technologies to mitigate the obsolescence of the system that has been operating the mission since launch. The ***GMV Flexplan®*** upgrade will allow this mission to continue with its crucial task, guaranteeing that it will be using the most up-to-the-minute technologies for years to come.

During the tests, NASA representatives gave a very positive assessment of ***GMV Flexplan®*** as a planning tool, highlighting its robustness and proven in-flight efficiency. GMV's upgrade work was also praised for its quality and accuracy. The validation was a resounding success, enabling the upgraded system to go live.

The meeting culminated in a demonstration for the operations team of various NASA science missions, including a presentation of the latest version of this solution, which includes advanced mission-planning functions, demonstrating GMV's ongoing commitment to innovation and excellence in its technological solutions.

This acceptance underlines GMV's capacity to provide high-tech space solutions, reinforcing its position as a key partner in major international projects.

With ***GMV Flexplan®*** GMV not only guarantees the continuity of this critical mission but also operates missions of the European Space Agency (ESA), the European Organisation for the Exploitation of Meteorological Satellites (EUMETSAT), NASA's Goddard Space Flight Center and commercial operators like Astroscale.

New edition of the International Symposium on Space Flight Dynamics

GMV played a significant role in the “29th International Symposium on Space Flight Dynamics (ISSFD)”, held in Darmstadt, Germany, from April 22 to 26.

The Symposium was co-organized by the European Space Agency’s (ESA) European Space Operations Centre (ESCO) and the European Organisation for the Exploitation of Meteorological Satellites (EUMESAT).

Hosting a series of talks and presentations, it provides an international forum for specialists in the field of space flight dynamics. It aims to provide an international forum for specialists in the field of space flight dynamics, with an emphasis on operational activities and results.

GMV presented three posters and six technical papers covering diverse topics such as flight dynamics, interplanetary orbit determination, mission analysis, and operational activities in missions like MSR-ERO, Ceres, and HERA.

GMV Secures Contract for Copernicus Support to External Actions (SESA)

The consortium led by e-GEOS, with GMV as a production center, has been awarded a contract extension by SatCen to supply geospatial products for the Copernicus Service on Support to EU External and Security Actions. This leading consortium includes Airbus, CLS Group, Telespazio Iberica, and IABG.

The intelligence provided by this service strengthens European crisis management capabilities by improving prevention, preparedness, and response. It also provides assistance during crises and emerging crises, helping to prevent global and trans-regional threats from having a destabilizing effect.

The contract requires the meticulous analysis of a wide range of satellite imagery under tight production schedules to provide geospatial intelligence in the form of maps and reports. It also offers a diverse array of products tailored to different levels of activation and information requirements, in line with the European Union's external and security agenda.

The service can be activated inside and outside the EU territory and supports the EU and its Member States in the framework of applicable EU policies and legislation in the main policy groups, linked to key responsibilities of the EU institutions and Member States. SatCen will act as a conduit between end users and industry and will oversee the quality assessment of the final deliverables.

GMV's facility in Portugal will serve as a production hub and will also be responsible for internal evaluations to strengthen the quality of maps to support tactical and strategic decision-making. This proactive approach aims to minimize product rework due to quality issues, thereby boosting delivery efficiency.

The Copernicus program seeks to establish an autonomous Earth observation system using satellite networks, ground stations, airborne assets, and information services. The aim of this comprehensive approach is to capture different perspectives of the planet, enabling a deeper understanding of evolving dynamics and their impact on society. Copernicus services are key to transforming satellite and in-situ data into actionable insights through rigorous processing, integration, and validation protocols.

EarthCARE successfully launched

As planned, EarthCARE (Cloud, Aerosol and Radiation Explorer) was successfully launched at 3:20 pm local time on 28 May (12:20 am CET on Wednesday 29 May) from Vandenberg, California.

EarthCARE, the most complex of the European Space Agency's (ESA) Earth Explorer missions, will study and analyze the role of clouds and aerosols in heating and cooling the Earth's atmosphere. The mission is equipped with four state-of-the-art instruments that will work together to provide a complete picture of the interplay between clouds, aerosols, and radiation, thereby improving our understanding of climate change.

GMV is playing a major role in this mission. In addition to participating in the launch campaign and supporting mission operations, the company developed the satellite control center and was involved in the initial development phases of the L0 and L1 level processors for the European instruments, namely the Atmospheric Lidar (ATLID), the Broadband Radiometer (BBR), and the Multi Spectral Imager (MSI). It also defined and implemented the BBR's L2 level processing module for radioactive flux estimation.

Using these instruments, the mission will collect critical data to improve the accuracy of models describing cloud development, behavior, composition, and interaction with aerosols, as well as to refine future climate models and support numerical weather prediction.

GMV expects to continue to play a supporting role in maintaining and upgrading EarthCARE products throughout the life of the mission, providing further insights that will improve our understanding of climate change and the impact of clouds and aerosols.

Prominent presence of GMV at the EGU General Assembly

GMV made a significant impact at the annual European Geosciences Union (EGU) General Assembly held in Vienna, Austria, from April 14 to 19.

The EGU is a key platform for global scientists and researchers to showcase their work, share ideas, and engage with experts from every field of geoscience.

Each year, this assembly gathers thousands of geoscientists in Vienna, focusing on Earth, planetary, and space sciences.

As a leading company in Earth observation, GMV played a prominent role. In addition to presenting two posters and two technical papers covering a variety of topics and missions, the EO4Multihazards team, part of the European Space Agency project led by GMV, organized a workshop highlighting the role of Earth observation in assessing and managing multiple risks (threats) in the session titled “Multiple risk assessments: innovative approaches to mitigating, managing, and adapting disaster risk to climate change”.

GMV Launches EOP-LABS Project

After successfully passing the three evaluation stages of the ESA INCUBED program application and the negotiation meeting, the EOP-LABS project is ready to be launched. The goal is to provide a payload data ground segment (PDGS) solution "as a service," easily accessible to any user worldwide through the Amazon Web Services (AWS) marketplace.

With this approach, any user can easily access the GMV solution online and set up, test, and operate their own processing chain for the desired steps without the need for a physical processing facility. This will bring significant benefits in terms of cost reduction and time-to-market of products, as the customer will not need to procure or configure any hardware (there will be associated cloud services). It should also act as an entry point for new space companies by removing the need for in-house processing infrastructure, which is sometimes a barrier for small start-ups or even research institutes that could drive forward developments in the space industry.

Regarding the project's technical scope, the GMV Portugal team will prepare its ***GMV Prodigi*** PDGS solution for certification as an AWS provider in the marketplace.

With its unique features, ***GMV Prodigi*** offers a high level of adaptability to each specific mission, while maintaining a simple multi-mission approach for setup and use.

GMV will follow the AWS integration procedures and verification campaigns required to achieve certification. The validation campaign will then be carried out for a real mission to ensure the quality of the products and to monitor and quantify the expected benefits for users. At the end of the nine-month project, GMV will be one of the first companies in the world to offer such an easily accessible and flexible solution.

Once activated, the service will have a permanent GMV support team to assist users with their operations.

GMV highlights the importance of the space sector at the 4th Conference on European Funds

On Thursday, May 16, Madrid took center stage in discussions on Europe's economic and technological future as it hosted the 4th Conference on European Funds, organized by *elDiario.es* under the theme "Innovation for sustainable growth". The event focused on the impact of European funds in critical areas such as promoting sustainable energy, decarbonization, industrial transformation, security and aerospace challenges, and advancing the digitalization of Spain's economy.

The conference opened with remarks from Spanish Prime Minister Pedro Sánchez, who emphasized that "European funds represent a historic opportunity for Spain to modernize our productive framework."

Throughout the day, government officials discussed the challenges of fostering innovation that supports sustainable growth through European aid and shared insights on the various topics discussed.

Following the address by the Minister of Science, Innovation, and Universities, Diana Morant, underscoring the space sector's strategic importance and its role in generating high-quality employment, a roundtable discussion was held on "The future of aerospace". Participating in this discussion were GMV General Manager Jesús Serrano and other sector representatives including Juan Carlos Cortés, recently appointed Director of the Spanish Space Agency. During his remarks, Jesús Serrano expressed appreciation for the establishment of the Spanish Space Agency, commending Spain's steadfast commitment to the European Space Agency (ESA) and highlighting how funding support has enabled Spanish firms to compete not only in European and EU-wide programs but also in the global commercial and institutional markets. He emphasized the ongoing need for investment in the space sector due to its significant impact on strategic infrastructures.

The roundtable discussion also addressed key topics such as the space-defense relationship, future applications, space sustainability, cybersecurity issues in space, and the demand for technological talent.

Leveraging GMV Technology to Enhance Power Line Safety Corridor Monitoring

In recent years, remote sensing (RS) technology has emerged as a powerful tool for monitoring various infrastructure assets, including power lines. GMV employs an integrative approach, combining data from multiple sources such as satellite imagery, aerial surveys, and ground-based information. This integration provides comprehensive visuals and actionable insights that are crucial for effective monitoring and management.

Rede Elétrica Nacional, S.A. (REN) recently commissioned GMV to develop a comprehensive multitemporal change detection study using Earth observation data. The study covers the period from 1976 to 2024 and aims to map and classify buildings and detect construction dates within the safety corridor of a 75-kilometer-long overhead power line in Batalha, Portugal.

Power lines are critical infrastructure components responsible for delivering electricity to consumers, serving as the backbone of the electricity distribution network. Ensuring their safety and integrity is paramount. Security corridors around these lines are essential to maintaining the reliability and operational integrity of the power grid. Regular monitoring of these corridors is necessary to identify and mitigate potential risks such as encroachment, vegetation overgrowth, and structural integrity issues.

Several risks can affect power lines, including new construction and vegetation. These obstructions can interfere with power lines, causing short circuits, damage to power lines and poles, and even fires. These incidents can lead to extensive damage to the network and serious environmental impacts, including forest fires.

There are significant benefits to be gained from incorporating GMV technology into the monitoring of power line safety corridors. Firstly, it boosts efficiency by providing continuous and automated monitoring capabilities. This reduces the need for manual inspections, which are time consuming and resource intensive. Secondly, the accuracy of RS technology ensures precise detection of changes and potential hazards, enabling timely intervention. Finally, the ability to proactively identify and address risks through advanced data analysis and visualization techniques greatly enhances risk mitigation strategies.

WORLDSOILS project concludes

Under the ESA Earth Observation program, the WORLDSOILS project, initiated in 2020, aimed to develop a cloud-based prototype capable of estimating soil carbon content on regional and continental scales. It leveraged soil databases, multi-temporal satellite imagery, and predictive modeling techniques.

The assessment of soil resources in the European Union (EU) has seen exponential growth in recent years through initiatives such as the Soil Strategy for 2030, the Nature Restoration Law, and Carbon Capture Regulation. Soil, being a complex medium, undergoes biophysical, chemical, and mechanical processes of degradation and regeneration, necessitating precise observation. Satellites played a crucial role in predicting and modeling these processes, complementing on-site measurements.

WORLDSOILS progressed through three phases: the first assessed the viability of various analysis methods, data sources, and user requirements; the second phase focused on system design, implementation, and testing; the final phase dedicated a year to producing maps predicting Soil Organic Carbon (SOC) for all of Europe, alongside verification and validation with national soil quality centers in Wallonia, the Czech Republic, and Central Macedonia. Additionally, a test was conducted on soils in the Piracicaba region, São Paulo state, Brazil.

The project results were presented at the Earth Observation for Soil Protection and Restoration symposium on March 6-7, 2024, at ESA-ESRIN headquarters.

Alén Space designs and manufactures four satellites for Sateliot's 5G constellation

The countdown has begun for the launch of the four satellites built by Alén Space for Sateliot's 5G constellation. These satellites are scheduled to be sent into orbit in July aboard a SpaceX rocket from Vandenberg Space Force Base in California, USA.

Alén Space's team completed the final preparations for these state-of-the-art nanosatellites at their facilities in Nigrán, Spain. The satellites will be part of the first phase of the world's first commercial low Earth orbit (LEO) constellation based on 5G technology for the Internet of Things (IoT).

This project is a significant milestone for Alén Space. The company has successfully designed and manufactured four satellites, showcasing the technical and production capabilities of its team, which has effectively tackled the technological challenges presented by Sateliot.

The CubeSat 6U nanosatellites, measuring 20x10x35 cm and weighing 10 kilograms each, are designed for a service life of five years and will operate in a sun-synchronous orbit (SSO) at an altitude of 500 to 600 kilometers.

Sateliot's project aims to provide global and continuous connectivity to all IoT devices using the 5G protocol. To achieve this, the constellation's payloads feature innovative technology based on a new 5G standard patented by Sateliot and validated by the European Space Agency (ESA) and the 3GPP.

Key technical challenges of this mission include thermal management, with temperatures fluctuating between –60 and 60°C in 90-minute cycles, and battery management. The onboard batteries are designed to maintain a charge of at least 20% during periods when the satellite is in shadow and not receiving direct sunlight.

GMV and Alén Space meet in Málaga with small satellites industry

GMV participated in "The Small Satellites Systems and Services Symposium" (4S Symposium), hosted by the European Space Agency (ESA), the Centre National d'études Spatiales (CNES), in collaboration with the University of the Balearic Islands (UIB), held in Palma de Mallorca, Spain, from May 27 to 31.

This event, focusing on the small satellites industry, explores advancements in technological innovation, disruption, and transformation in numerous sectors, including space. The program included technical sessions covering mission and system analysis, applications such as Earth observation, science, telecommunications, and navigation, as well as new technologies at the system, subsystem, and component levels. A dedicated session addressed the access of small satellites to space, including launchers, orbit transfer vehicles, and cross-platform compatibility.

GMV presented a poster titled "Interfaces for ADR/IOS Standardization, co-engineering & ground validation". Alén Space also showcased their range of services and solutions at a dedicated booth.

GMV among the leading European companies to participate in the European Defense Fund

GMV has been selected to contribute to eight projects in the European Defence Fund (EDF) 2023 call for proposals, consolidating its position as a major player in strengthening the European Union's strategic and technological independence

In the latest EDF call, GMV has once again demonstrated its excellence and ability to lead and collaborate in highly complex and strategically significant projects. Of the selected projects, GMV is leading GENIUS, a groundbreaking project combining autonomous systems, artificial intelligence, and combat cloud for defense applications. The project focuses on solutions to increase the accuracy of explosive detection, which will significantly improve mine and improvised explosive device (IED) anti-mine technologies.

GMV is also playing a prominent role in projects such as NG-MIMA, which seeks to blaze new trails in military aviation; FIRES 2, which is advancing in the development of high precision, long-range artillery systems; and EMISSARY, which is strengthening space surveillance capabilities.

The complete project list includes:

- **GENIUS** (with GMV as the coordinator): Innovation in autonomous systems for detection and neutralization of improvised explosive devices.

- **NG-MIMA:** Integrated modular avionics for military platforms.
- **FMBTech:** Innovating technologies for the future main battle tank.
- **EMISSARY:** Increased capacity for space domain situational awareness.
- **FIRES 2:** Development of high-precision, long-range artillery ammunition that prevents the possibility of collateral damage, continuing the activities of the FIRES project.
- **ESOCA:** Enhancement of European strategic air transport capabilities for large cargo capacity.
- **OPTIMAS:** Secure laser communications between aircraft and satellites.
- **SEACURE:** Integrated systems for submarine warfare and protection of critical maritime infrastructures.

As a result, GMV has joined the group of European companies with the most extensive participation in European Defence Fund programs. It was awarded eight EDF 2023 projects, taking part in a total of 36 projects between EDIDP and EDF, three of them as the leader.

The awarded projects will focus on the development of capabilities in force protection systems, mission systems, aviation, command and control, space surveillance, navigation, and secure communications.

GMV has become a European leader with regard to the European Commission's various defense initiatives, particularly its Preparatory Action on Defence Research (PADR) and European Defence Industrial Development Programme (EDIDP). In fact, GMV is among the top companies in Europe in terms of participation in this type of European Commission projects.

GMV develops bidirectional information exchange capability between MARSUR and CISE network

In late 2005, a European decision led to the launch of a maritime surveillance project through the European Defence Agency (EDA). Known as MARSUR (Maritime Surveillance), its aim is to interconnect existing national maritime surveillance systems across Europe.

Since its inception, MARSUR has evolved through phases, integrating continuous technological improvements. Currently, GMV collaborates under an EDA framework to develop MARSUR III. Here, GMV upgrades the Maritime Information Exchange System (MEXS) and Maritime User Interface (MUI), enabling restricted data exchange and enhancing interoperability with other maritime security networks.

To achieve desired interoperability with key maritime networks, the Agency initiated a second specific contract. GMV will establish bidirectional data exchange between MARSUR and the Common Information Sharing Environment (CISE) by deploying an additional network element as a bridge. This enhancement is slated for completion by late 2024.

This development strengthens cooperation among national maritime surveillance systems and bolsters European maritime security, facilitating coordinated and effective responses to threats and emergencies. MARSUR's evolution marks a substantial step towards a more integrated and efficient maritime surveillance infrastructure in Europe.

GMV showcases maritime surveillance capabilities at "NATO Digital Ocean Industry Symposium"

In April, GMV participated in the "Digital Ocean Industry Symposium", a NATO initiative held in Brussels. The symposium aims to enhance maritime situational awareness from the seabed to space by leveraging emerging and disruptive technologies (EDT) that facilitate the networking of current and future sensors, systems, and data exploitation tools. Oceans and seas play a crucial role as vital transit and access routes. Their protection and defense present significant challenges, necessitating the adoption of new technologies and the creation of ecosystems between industries and the defense sector. Proper and secure use of information in any form is essential. Keeping up with the latest advancements, from electronic warfare to artificial intelligence, is essential.

Begoña Rojo, from GMV's Defense and Security business development department, presented GMV's capabilities in Maritime Domain Awareness (MDA). She highlighted how GMV products like SIMONS, SOCRATES, and CSD address these challenges.

GMV applies artificial intelligence in the development of maritime rescue applications

AUTOVIGIA, an R&D project aimed at developing maritime rescue applications that improve ship tracking systems and automatically detect anomalous behavior, is launched

In early April, the AUTOVIGIA R&D project was launched within the framework of Spain's Recovery, Transformation, and Resilience Plan. This project is managed by the Center for Technological Development and Innovation (CDTI) in collaboration with the Ministry of Defense through the Directorate General of Armament and Material (DGAM).

The main objective of AUTOVIGIA is to design R&D services to develop maritime rescue applications that improve ship tracking systems and tools that use artificial intelligence to automatically detect anomalous behaviors. The proposed solution will use information provided by SAR and/or V/IR satellites, cross-referenced with data obtained from the AIS maritime system, to facilitate the interpretation of possible illegal actions.

The challenge is formidable, given that around 12,000 ships navigate European waters daily, sharing their positions to prevent collisions and manage maritime traffic. It is crucial that this wealth of information does not impede operators from making timely decisions, ensuring effective control of maritime traffic, detecting illegal activities, monitoring areas of interest, and identifying and tracking vessels and other elements. Additionally, maritime rescue operations in Spain encompass an area of approximately 1,500,000 square kilometers, equivalent to three times the size of our country.

The initial phase of the project, spanning three months, focuses on analyzing and designing software for detecting, identifying, and classifying vessels and critical elements. It also includes selecting and specifying the necessary hardware for implementation.

Following development, the solution will undergo validation in pre-operational scenarios at various operational centers to be determined.

GMV is partnering with Digital Earth Solutions, a spin-off of the Spanish National Research Council (CSIC) with over 20 years of expertise in ocean dynamics research.

This collaboration strengthens GMV's strategy in maritime surveillance and Earth observation, reinforcing its leadership in defense and security technology.

GMV receives delegation of Dutch defense firms

In April, GMV hosted a delegation from the Ministry of Defense, as well as representatives from the Dutch Embassy and the NIDV (The Netherlands Industries for Defence & Security) association.

This visit was part of a bilateral Industrial Day with the Netherlands, organized by Spain's Directorate General of Armament and Material (DGAM) in collaboration with TEDAE (Spanish Association of Defense, Security, Aeronautics, and Space Technology Companies) and AESMIDE (Association of Companies Contracting with Public Administrations).

José Prieto, GMV's Director of Business Development and Institutional Relations for Defense and Security, delivered welcoming remarks before attendees explored the company's activities in space, defense, and security.

This meeting provided an excellent opportunity for Dutch companies to explore GMV's capabilities in command and control, ISR systems, and navigation systems. Antonio Estival, Javier Sanz, and Carlos Quesada from GMV's Defense and Security division guided the delegation through these areas. The visit also fostered discussions on potential collaborations in priority projects linked to the European Defence Fund (EDF), which are of great interest to companies from both countries.

The delegation also gained insights into GMV's activities in surveillance and space robotics from Miguel Ángel Molina, Deputy Director of EST Space Systems, and Mariella Graziano, Director of EST Strategy and Business Development at Science, Exploration, and Transportation Systems.

The defense industry: a catalyst for economic and technological development

During the Advanced Strategic Studies Course for Ibero-American Senior Officers at CESEDEN, Begoña Rojo, from GMV's Defense and Security business development department, took part in the round table discussion "The defense industry as a catalyst for of economic and technological development".

Organized by the Leading Brands Forum on May 12 in Madrid, the event saw participation from representatives from over 15 Latin American countries.

In her presentation, Rojo showcased GMV's capabilities in defense and security and explored the industry's current challenges. She highlighted how companies like GMV can contribute to talent retention, technological excellence, responsiveness, and internationalization, factors that are essential in the interconnected defense and security market.

STORE launches: an innovative project in AI algorithm training using optronic data

The kick-off meeting for the STORE (Shared daTabase for Optronics image Recognition and assEssment) project was held in February, coordinated by Thales and financed by the European Defense Fund (EDF). STORE brings together a consortium of 20 partners, GMV among them, from eight member states of the European Union and Norway.

The project, which has funding close to €24M aims to create a shared image database protected by the most advanced technology allowing artificial intelligence (AI) algorithms to be developed and assessed for automated recognition of objectives in various scenarios of operational interest.

As threats have become more and more sophisticated (hypersonic missiles, combat drones, drone swarms, etc.), optronic sensors have had increasing importance and need to offer the highest levels of field performance. The project will contribute to automated management and tactical analysis of data in land combat situations, thanks to technological innovation in deep optronic data learning.

Within the framework of the project, GMV will provide its experience and leadership at the European level to design, develop, and roll out the shared database to exchange images and AI models that will allow us to demonstrate improvements in recognition of objects of interest in the defined operational scenarios.

STORE will lay the foundation for the first scalable, shared database of defense images in Europe and will explore various algorithmic solutions for detecting threats. It will particularly involve issues of data governance and profitable development of a variety of technologies. As it combines optronic sensors with AI-based analysis techniques, it will establish future functionalities related to increasing the perception they have with combatants on the battlefield, enhancing their tactical situational awareness, shortening the decision-making cycle to make reaction times quicker and, as a result, improving their capacity for survival.

SISCAP R&D project completed

On 7 June, GMV successfully completed the operational demonstration of the Spanish Foot-Soldier System (Sistema Combatiente a Pie: SISCAP) project at the Los Alijares maneuver area, next to the Toledo Infantry Academy. This R&D project, developed in joint venture with Indra, overseen by the Directorate General of Weapons and Material (DGAM) of the Spanish Ministry of Defense, focuses on the development and integration of technologies to provide foot soldiers with the appropriate means for effective combat operations. The SISCAP program is divided into seven subsystems: weapons and ammunition, fire effectiveness (EFU), information and communication (SIC), maintenance, survivability, energy supply (FAL), and readiness (training). The first two phases of the program focused efforts on fire effectiveness, the information and communication system, and the power supply. The rationale was that effectiveness, information superiority, and power autonomy are the most critical aspects of the system. GMV is responsible for the latter two (SIC and FAL) and, in particular, for the electronics and software of the soldier's main computer (central processing and power distribution unit, UCPE) with command and control capabilities, as well as the integration of these subsystems.

SISCAP is in the consolidation phase and these tests aimed to demonstrate the capabilities of all the subsystems developed in the previous phase, both in a day and night environment. To this end, the progress made in this phase was tested against previous demonstrations, such as increased system autonomy and improved robustness and maturity. New system capabilities were also demonstrated, namely augmented reality and the integration of remotely piloted autonomous systems (RPAS) such as the Black Hornet.

A battery charger (CBS) was also developed. The CBS not only allows the system to be connected to the VCR8x8 vehicle for data, power, and intercom, but also enables system charging using traditional or alternative energy sources such as solar panels.

GMV has been involved in the SISCAP project since 2017, in a joint venture with Indra. After this operational demonstration, phase 1-b of the SISCAP program will come to an end, giving way to future phases in which the number of prototypes is expected to be increased to include the remaining subsystems.

GMV reflects on cyber operations with the Army

In May, the University of Jaén (UJA) hosted the eighth edition of the conference "The Army and future challenges". This year's theme was "The Army and cyber operations".

Inaugurated by the Chief of Staff of the Army, General Amador Enseñat y Berea, and UJA president Nicolás Ruiz, these biennial conferences have become a key event for defense culture organized by the Army, as well as a high-level forum open to institutions, universities, companies, and civil society.

Manuel Pérez Cortés, General Director of Defense and Security at GMV, highlighted how GMV is tackling the threats and challenges of cyberspace, particularly in the reliable and secure use of Positioning, Navigation, and Timing (PNT) functions. He discussed the company's capabilities and solutions for addressing the new landscape brought about by the digital transformation of the Armed Forces and the evolving operational environments.

GMV shows its technological leadership and commitment to Europe's defense, security and space sustainability

GMV was present at ILA Berlin 2024, Germany's biggest aerospace trade fair and one of Europe's most outstanding events of the global aerospace industry, held from 5 to 9 June in Berlin-Brandenburg Airport. Under the motto "Pioneering Aerospace," the fair brought together more than 600 exhibitors from over 25 countries and attracted approximately 95,000 visitors, including representatives from industry, government and members of the armed forces.

ILA Berlin covers the entire spectrum of the aerospace industry, from aviation, space, defense, advanced air mobility and the supply chain.

As a leading company in the development of aeronautics and space technology, GMV played a leading role in the fair. The company showcased its aeronautics solutions, highlighting its developments in intelligence, surveillance and reconnaissance (ISR) systems and unmanned platforms, PASSER, SEEKER and SOLO, designed and developed by GMV and Aurea Avionics. It also exhibited its flight-proven solutions for unmanned aircraft and navigation systems, the A400M crane control system, and the high-fidelity EO/IR L3 HARRIS WESCAM MX™ Series EO/IR sensor simulator.

During the event GMV's stand was visited by the Spanish Ambassador in Germany, Mr. Pascual Navarro.

GMV showcases its solutions for the soldier of the future and its in-vehicle navigation systems in Paris

As a key player in the European Union's strategic and technological autonomy, GMV was present at the latest Eurosatory international exhibition, a major defense and security event held every two years, which brought the leading companies in the sector to Paris from 17 to 21 June.

In the Spanish pavilion, GMV presented its pioneering solutions for the soldier of the future, its simulation systems, and its land vehicle navigation systems.

Specifically, GMV exhibited the main computer for the Spanish Army's Foot-Soldier System (Sistema Combatiente a Pie: SISCAP). This system integrates command and control, battery power management, and signals from optronic sensors and the soldier's visor. The company also presented the systems it has developed to enhance the soldier's capabilities, such as the combatant charger (CBS), capable of charging up to three batteries simultaneously and powering the SISCAP system, and the LGB10/11 ruggedized minicomputers, designed for hostile environments where small size and low power consumption are required.

In the field of land vehicle navigation, GMV presented the ISNAV and ISNAV mini family of navigators. The capabilities of these navigators can be adapted to the mission and vehicle characteristics, offering advanced positioning, navigation, and timing (PNT) capabilities and the possibility of integrating Galileo Public Regulated Service (PRS) capabilities. The two on display were the ISNAV navigator that will be fitted to the Spanish Army's new DRAGON wheeled combat vehicle (VCR 8x8) and the ISNAV mini navigator, part of the upgrade to the ATP 109 artillery pieces.

In the scope of the M109 and SIAC artillery upgrade programs, GMV also presented the SBT solution. This device is designed to interconnect elements regardless of their interface (Ethernet, UDP, unicast or multicast, TCP, RS422 and RS232 serial protocols, or Bluetooth), thus enabling connectivity to "legacy" systems that would otherwise require complex and costly integration.

Finally, together with the above, GMV showed its full range of high-fidelity simulators and emulators for the L3HARRIS WESCAM MX™ series of EO/IR surveillance and location systems.

Among the distinguished visitors to GMV's stand were the Secretary of State for Defense, María Amparo Valcarce; the Spanish Ambassador to France, Victorio Redondo Baldrich; and Lieutenant General Fernando Miguel García y García de las Hijas, Head of the Army Logistic Support Command. GMV also received visits from various delegations, including those from Singapore, the Netherlands, and Portugal.

GMV joins the INCIBE's cybersecurity Strategic Initiative for Innovative Public Procurement (IECPI)

Launch of the Luis Valle R&D+i Program, which focuses on the development of a sovereign digital identity solution and a cybersecurity operations center (SOC) for the space sector

The Strategic Public Procurement of Innovation Initiative (IECPI) by the National Cybersecurity Institute of Spain (INCIBE) is an industrial development model aimed at promoting innovation and competitiveness through public administration by addressing previously identified problems and needs.

In this context, GMV has received INCIBE's endorsement for launching the Luis Valle R&D+i program, focusing on two main projects: the development of a sovereign digital identity solution and a Security Operations Center (SOC) for the space sector.

During the presentation of the Luis Valle R&D+i program's key guidelines, Héctor Estrada, head of the Transport and Space sectors at INCIBE, highlighted that "the mission of INCIBE is to ensure that the level of cybersecurity of Spanish citizens and companies ranks among the top five in the world and that Spain becomes a European benchmark in cybersecurity innovation and the provision of related products, services, and professionals."

Juan Jesús León, director of Products and New Developments for GMV's Secure e-Solutions, elaborated on the sovereign digital identity solution and its advantages over traditional methods, where third parties like governments or companies store and manage personal data. With sovereign digital identity, users control their own information. This solution is crucial for online services, financial transactions, and healthcare, where identity verification and privacy are essential.

"Most sovereign identity solutions use blockchain technology to eliminate centralized issuing authorities," added David Álvarez, head of the Software

Development Cybersecurity section for GMV's Secure e-Solutions. However, GMV's project advances beyond this by using Identity-Based Cryptography (IBC), also known as Identity-Based Encryption (IBE).

The second project in the Luis Valle R&D+i program is developing a SOC for the space

sector to mitigate potential security incidents in satellites. “Satellites play a critical role in communications, Earth observation, navigation, national security, and critical infrastructures.

Any incident can have significant socio-economic and national security consequences,” explained Julio Vivero, International Business Partner for GMV’s Secure e-Solutions. Disruptions to the critical services provided by satellites could impact global connectivity, emergency services, telecommunications, and access to vital information.

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GMV's participation in the "IV STIC & RootedCON Conference" in Panama

From April 10 to 12, GMV took part in the "IV STIC & RootedCON Conference" in Panama, themed "Govern and share: keys to cybersecurity success".

As a GOLD sponsor, GMV contributed a presentation by Juan Jesus León, Director of Products and New Developments for GMV's Secure e Solutions, focusing on "Technological advancements in digital identity".

During his presentation, Juan Jesús León discussed how digital transformation is enabling organizations to streamline interactions with customers and citizens, emphasizing the importance of digital identity in combating fraud, protecting privacy, and enhancing user experience. The GMV executive highlighted emerging technologies like sovereign identity, passwordless authentication, artificial intelligence, and identity-based cryptography, crucial for deploying robust digital identity solutions.

The conference was organized by the National Cryptologic Center (CCN-CERT), in collaboration with the National Intelligence Center (CBI), the Joint Cyber Command, RootedCON, the National Cybersecurity Institute (INCIBE), and Panama's National Authority for Government Innovation, with support from the Organization of American States (OAS), CSIRT Americas Network, and the Inter-American Development Bank (IDB).

GMV attends "1st National Digital Fraud Cybersecurity Conference"

GMV played a prominent role in the inaugural edition of the "Digital Fraud Cybersecurity Conference", held in mid-April in Madrid and organized by CyberMadrid (Madrid Cybersecurity Cluster), with support from the Madrid City Council, the Regional Government of Madrid, and the National Institute of Cybersecurity (INCIBE).

In collaboration with Recorded Future, GMV delivered the presentation titled "Prevention Along the Card Fraud Kill Chain", featuring Juan Ramón Gutiérrez, GMV's lead for forensic services and threat intelligence, and Pablo Valenzuela, Principal Sales Engineer at Recorded Future.

The experts underscored the importance of deploying threat intelligence services backed by robust intelligence platforms to significantly enhance the prevention of credit card fraud. They highlighted how anticipation and gaining a tactical advantage are critical in early detection and fighting organized crime in this domain.

Opinion

The current state of cybersecurity in Latin America

Emerging cybersecurity trends, threats and risks in Latin America in 2024

The digital transformation in sectors such as energy, transportation, and healthcare in Latin America is leading to a significant rise in cyberattacks targeting these critical infrastructures. Enhanced awareness of data privacy and the implementation of stricter data protection laws in the region are driving all stakeholders—public sector, private sector, and citizens—to recognize the importance of cybersecurity, thereby increasing the demand for privacy-focused solutions.

Supply chain attacks are escalating, specifically targeting key infrastructure companies in Latin America due to their significant impact on both public and private sector operations and security.

The advancement and application of AI in cybersecurity are enhancing threat detection systems, automation, and the development of new security technologies. However, cybercriminals are also leveraging these capabilities to execute more complex and harder-to-detect attacks.

What is GMV's contribution to this significant cybersecurity challenge?

Our extensive experience with CERT services, deployed in both Europe and South America, combined with the continuous integration of AI and cutting-edge technologies, ensures the reliability, efficiency, and quality of our services.

As a Gold member of the National SOC Network and forums such as First, CERT, CSIRT.es, and TrustedIntroducer, and through the implementation of specialized sectoral SOCs, we demonstrate our commitment to excellence in key cybersecurity areas. These include security governance, planning, and the preparation of preventive measures (penetration testing, red teaming, management systems, security control implementation, continuity and recovery plans, DevSecOps, cybersecurity consulting and advisory services, training, and drills) as well as reactive measures such as forensic analysis and incident response.

Óscar Gaspar
Country Manager de GMV en Colombia

GMV addresses AI risk prevention at “Revolution Banking”

In May, GMV participated in “Revolution Banking”, an event organized by IKN marking its tenth anniversary. Held at Madrid’s Cívitas Metropolitano stadium, the gathering brought together leading banks and technology pioneers to explore cutting-edge technologies, disruptive trends, and business opportunities driving sector growth.

José Carlos Baquero, Director of AI and Big Data at GMV’s Secure e Solutions, joined the panel “The best defense is detection”. The discussion emphasized essential preventive measures to safeguard against potential risks of artificial intelligence (AI) to data security and privacy, while also exploring AI’s role in fighting cybercrime.

The GMV executive underscored GMV’s dedication to remaining at the forefront of the latest trends and technologies in cybersecurity. Specifically, artificial intelligence is increasingly pivotal in automating routine and repetitive security penetration testing, reducing the time and resources required for such assessments. This is particularly important in sectors like fintech and banking where security is critical, and swift response to threats is imperative.

AI is also significantly enhancing the precision and detection capabilities of penetration testing by leveraging machine learning algorithms and advanced data analysis techniques. This allows for quicker and more accurate identification of sophisticated threats compared to conventional tools.

Finally, Baquero highlighted AI’s role in developing custom threat models and simulating advanced, targeted attacks. This proactive approach equips organizations with better readiness to face real-world threats.

Cybersecurity in the legal sector

On April 23rd, Madrid hosted the inaugural “CiberLegal” conference, organized by Red Seguridad and the Madrid Bar Association. The event aimed to explore the state of cybersecurity within Spain’s legal sector, focusing on key risks and threats, preparedness strategies, current technologies, and future advancements.

Eva Martínez, Director of Secure e-Solutions at GMV, underscored the transformative impact of new technologies on legal practices and the attendant risks. Emphasizing computing as pivotal to digital transformation, Martínez discussed the imminent advancements in quantum computing, promising unprecedented computational speeds. However, she also highlighted the cybersecurity challenges posed by these advancements, particularly concerning the vulnerability of current security measures like digital certificates to quantum computing threats. As a result, proactive efforts are essential to develop robust solutions for this evolving landscape.

Along with computing, connectivity has enabled all the value-added services we use daily, such as our online meetings, SaaS services, ChatGPT, etc. This has caused a shift in the landscape for cybersecurity professionals. Just a decade ago, a security officer could protect their most valuable assets within their fortress, relying on perimeter security. However, today these assets can be found on mobile devices, in emails, within ChatGPT, in third-party supply chains, in SaaS applications, and they all need to be controlled. All these risks arising from the introduction of new services are exploited by cybercriminals, turning cybercrime into a highly profitable business that now generates more revenue than drug trafficking.

To conclude, Eva Martínez highlighted a positive development: “Information sharing has begun among security operations centers, such as the National SOC Network, of which GMV is a member. The adversary is common to all, and we must be well-organized to confront them in a coordinated manner.”

GMV and ITH support the creation of a Security Operations Center (SOC) for the hospitality sector

The Hotel Technological Institute (ITH) has proposed establishing a Security Operations Center (SOC) for the hospitality sector. This initiative aims to address and mitigate the rising cybersecurity incidents affecting the sector due to the major digitalization underway.

These conclusions stem from the Hospitality SOC Feasibility Study conducted by ITH in collaboration with GMV. The report was presented at GMV's headquarters in Tres Cantos, Madrid, and featured Álvaro Carrillo de Albornoz, director of ITH; Paula Miralles, innovation project coordinator at ITH; and Joan Antoni Malonda, Tourism Business Developer at GMV.

A "Guide to cyber-risks in the hospitality sector" has also been developed to help tourist accommodations better understand the risks they face, the potential consequences of a cyber incident, preventive measures, and resources to enhance their digital security.

This cybersecurity project is supported by the General Secretariat of Industry and SMEs of the Spanish Ministry of Industry and Tourism through the Innovative Business Clusters (AEI) program. With the advancement of digitalization, the project leaders emphasize the need for increased investment in cybersecurity to protect both guests and hotel operations.

GMV and "Women 4Cyber" join forces to promote and showcase the role of women in cybersecurity

In May, GMV signed a collaboration agreement with "Women 4Cyber", an initiative striving to establish itself as a leading advocate for promoting and showcasing women's contributions to cybersecurity in Spain, while also fostering gender diversity within the sector.

GMV joins the "Women 4Cyber" community to leverage its extensive expertise and leadership in cybersecurity, amassed over more than 30 years. Their objective is to cultivate a more robust, innovative, and inclusive ecosystem, where women play a pivotal role in achieving sector excellence.

GMV commits to bringing medical imaging space technology to Primary Care

GMV's HealthTech Observer initiative celebrates first anniversary at La Paz University Hospital, With Alisse Project Taking Center Stage

Medical imaging is a key resource for increasing the efficiency and accuracy of diagnostic and therapeutic procedures, as well as for early disease detection. Before the age of AI, achieving diagnostically reliable medical images required specialized expertise, typically relying on hospital radiology services or specialized centers.

Extended stays in space can predispose astronauts to conditions like muscular atrophy or skeletal deterioration. There are also concerns about declining liver function due to fatty infiltration, initiating a process of fibrosis. In response to these health challenges, the European Space Agency (ESA) initiated the Alisse project two and a half years ago. GMV leads this initiative, collaborating with prestigious institutions such as La Paz University Hospital and Complutense University of Madrid, leveraging their radiological expertise and research capabilities.

Medical imaging experts recognize that the emergence of deep learning, a subset of AI using artificial neural networks trained to interpret data, has significantly advanced the interpretation of various types of images at scale, often integrating multiple sources of information.

Thanks to Alisse, software developed by GMV using this technology, the task of acquiring high-quality diagnostic images is now within reach of non-specialists. Originally designed to safeguard the health of astronauts during space missions, the project's scope has expanded to benefit Earth-based applications. This advancement allows for the diagnosis of certain conditions based on high-quality medical images in remote areas lacking access to hospitals or radiological centers. Primary care facilities decrease their dependence on specialized services, resulting in quicker results for patients and resource optimization for hospitals.

The 3rd conference organized by GMV's HealthTech Observer initiative, inaugurated by Fátima Matute, Madrid Regional Minister of Health, focused on these issues, delving into the results of Alisse. Dr. Gonzalo Garzón, head of Radiology at La Paz Hospital and lead researcher, reported that over two and a half years, this technology has labeled over 50,000 images from more than 70,000 annual ultrasound studies at the hospital complex. The Madrid hospital streamlined image organization to train AI in identifying various

pathologies in target organs such as the heart, eyes, kidneys, bladder, muscles, and deep venous system, Dr. Milagros Martí De Gracia, head of Emergency Radiology, explained.

Carlos Illana, the project's technology lead, highlighted, "Given that 80% of medical decisions rely on diagnostic imaging according to the World Health Organization, this project not only supports astronaut health but also benefits Earth-bound patients by reducing travel needs from remote areas (sometimes hours away from hospitals) and shortening diagnosis times."

MEDEA and MedP-Big Data projects showcased at CPI Health Museum

During a groundbreaking event on Innovative Public Procurement (CPI) in June, the Andalusian Regional Government unveiled projects and prototypes developed within Spain's regional health services, acquired under this model. The inaugural CPI Health Space event aimed to highlight achievements and advancements in implementing CPI within the healthcare sector.

MEDEA and MedP-Big Data, using GMV technology, were featured at the Museum, a key venue of the event. MEDEA serves the healthcare services of Extremadura, while MedP-Big Data supports those of the Autonomous Regions of Valencia and the Canary Islands. The exhibition area featured over fifty prototypes, showcasing a variety of proposals for enhancing public health.

MEDEA is a pioneering project in Spain, leveraging GMV's expertise and advanced algorithmic developments to create a personalized drug prescription support tool (PoPS). Meanwhile, MedP-Big Data aims to enhance personalized patient care, improve the efficacy and efficiency of treatment prescriptions and preventive measures, using big data technology and artificial intelligence.

These success stories exemplify best practices that enhance healthcare service delivery and inspire future initiatives. GMV's digital health team had the opportunity to demonstrate these prototypes to interested visitors at the museum.

"Aggregating data, amplify knowledge": GMV attends 2nd Data Day at Vall d'Hebron Hospital

In May, under the banner of "Aggregating data, amplifying knowledge", GMV explored the technological aspects of Vall d'Hebron University Hospital's new data platform, VHTeDade. Developed using GMV's technology, this platform promises to furnish the institution with clinical insights, enhancing both the efficacy and efficiency of patient care.

Organized by the hospital's Information Systems Directorate, the event not only delved into the operational aspects of their data platform but also covered critical themes such as the European data landscape, the evolving roles of hospitals, the transition from primary to secondary data usage, and the future potential of generative artificial intelligence (AI) in consultations.

Opinión

Healthcare beyond hospitals: cyberattack prevention and response

Today's digital ecosystems empower healthcare services to be more responsive to citizens' needs by embracing innovative approaches. A prime focus is on bringing healthcare closer to patients' homes, epitomized by the "Liquid Hospital" ecosystem. Leveraging cutting-edge technologies such as the Internet of Things (IoT), this ecosystem is advancing solutions like AI-driven data analytics, comprehensive telemedicine, and control systems.

However, with technological progress comes the need to address key considerations in solution design. It is vitally important to ensure the preservation of essential features from older models amidst the shift towards user-centric care environments. This transition poses significant cybersecurity challenges. Data no longer resides solely in hospital data centers; it travels and resides on users' devices, making them potential targets for cybercrime. Criminals seek out spaces with weaker defenses and surveillance to exploit for financial gain.

Looking ahead, the rise in fraud, data theft, and extortion attempts targeting users of these advanced systems is inevitable. Therefore, proactive measures are imperative to extend robust detection mechanisms to safeguard users' new private spaces effectively.

From this context arises the concept of a liquid CERT (Computer Emergency Response Team)—a team of professionals, processes, and specialized technologies capable of monitoring activity within the new environments of the liquid hospital and detecting any anomalies that may arise. This liquid CERT reacts swiftly to prevent the impact of potential cyber incidents that could jeopardize citizens' health, potentially leading to tragic consequences if the cyberattack extends to hospital systems.

A liquid CERT addresses these needs by leveraging monitoring and response capabilities, adapting traditional monitoring environments to the specific requirements of a liquid hospital. One proposal to facilitate adaptation involves adopting next-generation 5G mobile network access technology, which inherently ensures certain aspects of security and communication quality for mobile devices, addressing security deficiencies seen in earlier technologies like 3G and 4G.

Oscar Riaño
Jefe de Sección VLL de Secure e-Solutions de GMV

Providing security to the systems that form the basis of the healthcare activity of the future is not an option and liquid CERTs are gaining importance in the selection of the strategy of organizations to prevent, detect and act against potential cyberattacks.

GMV to upgrade public transport technology in New York's Westchester County

The $16 million contract and GMV's new office consolidate the company's presence in the New York metropolitan area

Westchester County is home to a diverse population of more than 1 million people, with rail and bus connections into New York City. Following a competitive procurement, the County selected GMV to upgrade its transit technology platform to deliver more efficient service, better oversight of operations and improve the customer experience on Bee Line buses. GMV has more than 25 years of experience delivering technology solutions for buses and trains in places like Los Angeles, Barcelona, Warsaw and Sydney, and the company is excited to bring this technology to New York.

On each Bee Line bus, the company will install the ***GMV Hub***, a rugged vehicle

computer that is specifically designed and built by GMV for transit systems to ensure robust performance and long service life. The ***GMV Hub*** uses an open architecture to control a range of onboard systems including GPS, bus operator touchscreen, automatic passenger counters, next stop announcements and a dedicated sensor for precision tracking in indoor bus depots. The ***GMV Hub*** also functions as a digital video recorded (DVR) to store footage from security cameras on each bus. This multifunction device significantly reduces the project's equipment cost and delivers great value to the County.

ITS Suite is GMV's cloud native software that delivers a suite of applications from GMV and its partners to enhance the County's visibility and control of their bus operations. Each app is focused on a key transit function, and all apps are integrated for real-time data exchange:

- Planning and scheduling software will generate an optimized set of routes and schedules to serve customers as efficiently as possible and reduce operating costs.
- Dispatch software enables control center staff to monitor the entire fleet and take quick action to keep buses moving.
- Garage management software will choreograph bus movements inside the depots to ensure vehicles are ready for service.
- Video management software enables live remote viewing of bus cameras and secure storage and playback of video evidence.

GMV "plays well with others," and this philosophy enables the company to deliver best in class products from third-party partners in a single, coordinated solution. A modern technical architecture built on cloud computing, microservices, and application program interfaces (APIs) makes this collaboration possible, and GMV's project management skills ensure successful delivery.

GMV wins the contract for the Transformation of Public Transport in the Murcia Region

GMV has won the contract for implementing the new central ITS management system (SCREM) for the Region of Murcia. This project is in line with the region's objectives for improving public transport capacities, offering a comprehensive solution designed for future growth with third party suppliers, based on European standards and incorporating state-of-the-art technologies. This project is part of a strategy funded by the Recovery, Transformation and Resilience Plan (PRTR), aimed at improving transportation infrastructure leveraging innovative technological solutions.

With a 24-month lead time and a two-year warranty, this system highlights GMV's experience in developing intelligent transport systems over almost 30 years. The new set of GMV ***ITS Suite*** applications, developed from scratch with modern technologies, has become a distinctive element in the market and is already in use by several clients in Spain. This solution provides a comprehensive and scalable response, surpassing existing systems on the market.

This includes the installation of the new ***DTD200®*** onboard vending machine, developed entirely by GMV, in the Region of Murcia's bus fleet (134 vehicles), together with ***TVM10®*** and ***TVM150®*** vending and recharging machines, an onboard video-surveillance system, solar-powered user information panels, and all the central systems. These central systems comprise fleet management and fare management.

The new equipment will allow users to validate bus entry using various methods such as CARM card, QR codes, EMV, and to recharge their user cards at different points in the region with credit card or cash automatically. An additional distinctive feature is the ABT (Account-Based Ticketing) system. All these enhancements offer a complete and modern solution that is adaptable to new technologies and future applications, improving the end-user experience.

This GMV system for the Region of Murcia offers an advanced and comprehensive technical solution that meets the region's objectives, guaranteeing the modernization and scalability of the Central ITS Management System and associated components in the region's public transport system.

GMV renews its contract with Renfe for the maintenance of its onboard communications platform

GMV has renewed its contract with Renfe for maintenance of the onboard communications platform software installed in Renfe Viajeros' fleet, covering vehicles running on the *Cercanías*, *Media Distancia*, and *Alta Velocidad* networks. This agreement, which will run for the next 36 months, bolsters GMV's position as a reliable and essential technological partner for the national railway transportation company.

The contract includes the comprehensive maintenance service of the onboard communications platform system software, providing preventive maintenance activities, corrective maintenance, and developmental maintenance to enable the system to develop in line with the railway operator's needs.

The system is hosted in the servers located in the Renfe Group's data processing center (DPC) in Delicias. The control stations are distributed across the management centers of the different departments that Renfe has throughout Spain. The system also includes the possibility of accessing basic functionalities through a web access point within the RENFE network. Finally, connected to this central system are a total of 834 vehicles from different business areas operating in the different Renfe networks.

The communications platform is based on GMV's robust ***SAE-R®*** product, an Operational Support System interconnected with multiple systems, including the onboard diagnostics systems, the energy measurement system, the legal recorder, the passenger information system, the video information system in some series, the public address and intercom system, the video surveillance system (CCTV), and the passenger counting system.

The relationship between GMV and Renfe has been a long and fruitful one. GMV was originally selected to supply this system for the Cercanías and *Media Distancia* fleet in 2008, having previously outfitted the *Mercancías* and *AVE-Larga Distancia* fleets with similar systems. This ongoing development and renewal of contracts underlines Renfe's commitment to technological innovation and GMV's uniform and global control of its whole fleet.

GMV presents its solutions at IT TRANS 2024

From 14 to 16 May, GMV took part in IT TRANS 2024, a leading congress and exhibition for the European public transportation industry, held in Karlsruhe, Germany. GMV was a major contributor to the event, showcasing its range of solutions for urban public transportation: fleet management (CAD/AVL) and passenger information systems; planning and optimization systems for timetables, services, and shift plans; efficient eco-driving systems; and account-based ticketing (ABT) systems.

As part of the VIP delegation's guided tour of the major exhibitions, entitled "Public Transportation Solutions for a Better Future," International Business Development Manager César Martínez spoke about GMV, its products, and how it is harnessing artificial intelligence (AI) to bring public transportation into the future.

Rafal Krzysiak, Head of Business Development for Poland and the Baltics, took part in the session "Improving the Employee Experience: A Closer Look at Staff Shortages in Public Transportation," where he explained how GMV is helping to retain staff by gamifying good driving.

For his part, Iker Estébanez, Business Development Head of GMV´s Intelligent Transportation Systems sector, participated in the session "Monitoring Passenger Flows and Line Occupancy," where he outlined how the company is integrating big data and AI models to predict transportation demand and support real-time decision-making in the daily operation of public transportation.

GMV: repeat winner of the contract for Galicia's Operational Support System (SAEGAL)

GMV has once again been selected to supply Galicia's Operational Support System. This contract award represents the continuation of the SAEGAL project, launched in 2015, consolidating GMV as a reference in the implementation of Operational Support Systems (OSS), as the first client to put its trust in ***ITS Suite***, now a leading product.

Since its first contract was awarded in 2015, GMV has successfully supplied Galicia's Operational Mobility Center (*Centro Operativo de Movilidad de Galicia*: COMGA), providing an advanced, centralized solution of ticketing and OSS systems to serve both the public administration and the various transport operators of the region. With the award of the SAEGAL2 system in 2020, the concept was extended to an OSS hub or an OSS of OSSs and the new GMV-developed ***ITS Suite*** OSS platform was implemented. With this latest project award, GMV will extend the system to include school transport operations, develop new functions, and operate and maintain the system. The new project will also expand and give greater capacity to the account-based ticketing (ABT) system XenteNova QR, a system that allows people under 21 years of age who use Galicia's interurban public transport to travel 60 times free of charge using a QR code on their smartphone.

GMV's OSS system will enable the administration to gather real-time historical information and estimates of bus stop arrival times for Galicia's 127 public transport services, plus the 67 school-transport services. To this end, the groundbreaking ***ITS Suite*** platform will be updated, the IT infrastructure will be made more robust, the integration of local OSSs will be improved to gather more information on the performance of services by transport companies, and new functions will be developed to improve the information available to the public administration (dashboards in Power BI, route player, etc.) and to improve the information available to public transport users (extension of SIRI services, GTFS-RT, etc.).

This project not only reinforces GMV's position as a leader in intelligent transport solutions but also highlights the importance of technological innovation in the ongoing improvement of public transport.

GMV to implement the new Central ITS Management System of the Government of Aragón (SITPA)

The Government of Aragón has awarded GMV the contract for implementing Aragón's Central ITS Public Transport Management System (SITPA). This strategic project will transform public transportation management in the region, integrating advanced technologies and services aimed at improving efficiency and the user experience.

The SITPA, funded by the Recovery, Transformation, and Resilience Plan, will centralize all public transportation operations under a single system, optimizing communication and resource management. This system, based on the ***ITS Suite*** platform, will integrate the level 3 operational aid systems (OSS) of the various transport operators in the region into a central level 4 system.

This system will act as a multi-operator and multi-fleet control center, enabling comprehensive and centralized management of transportation resources. In addition, an advanced ticketing system will be implemented that will include prepaid ABT, postpaid ABT and ABT with MultiToken accounts (EMV, QR). In this way, this new regional OSS will allow the interoperability of different possible local OSS solutions that make up the interurban transport network of Aragon, resulting in a meeting point for integrated mobility and reliable information in real time.

The project will also incorporate various OSS modules, from the reception and processing of information in real time to the management of content on information panels. The support and intelligent services components will cover data mining, payment method management, and customer care.

GMV will provide the necessary technology and architecture for the effective rollout of the system, integrating the information of the local OSSs and will also guarantee the system's adaptability through its three-phase implementation: minimum, basic, and complete core system. This ensures an efficient transition, minimizing any possible interruption in service and allowing for adjustments based on emerging needs and user feedback.

Adhering to European standards and designed to incorporate new technologies, GMV's SITPA represents an integral and adaptable solution, ready to face the future challenges of public transport in Aragón and improve the quality of service offered to residents.

GMV's Precise, Safe Positioning: Enhancing Your Rearview Mirror Experience

GMV is integrating its secure, reliable, and high-precision positioning technology as a key component in the new BMW 7 Series.

GMV has reached another milestone in automated driving by integrating its safe, high-precision and reliable positioning technology as a - key component of the BMW Personal Pilot L3 function, the new feature available for order in the new BMW 7 Series.

SAE Level 3 automated driving represents a significant advancement in autonomous vehicle technology. The vehicle automatedly manages specific driving tasks within defined conditions, requiring human intervention only when the system encounters challenges beyond its capabilities. This is a

noteworthy departure from more driver-dependent levels, enabling users to disengage under specified circumstances while helping to enhance both comfort and safety on public roads.

The unveiling of Level-3 functionality in BMW 7 Series models establishes the BMW Group as a pioneer in the industry. This accomplishment is a source of pride for GMV, as a significant contributor to it. This signifies a substantial progression from mere driving test trials or proofs of concept to the realization of a fully developed and commercially available solution.

GMV's proprietary positioning solution consists of two components: the onboard Safe Positioning Engine software (SPE) and a Safe GNSS Correction Service (SCS).

The SCS and SPE have been implemented and tested with the added goal of compatibility with third-party implementations. However, when they are used together, they achieve full potential in terms of safety, required in Level 3 automated driving applications, as all ***GMV GSharp®*** elements contribute to the overall automated driving solution.

The Safe Correction Service (SCS) provides BMW Group vehicles with corrections to the Broadcast Ephemeris across various GNSS constellations, augmentation data for mitigating local atmospheric effects, and safety-related information for computing a reliable user position. The Safe Positioning Engine (SPE) integrated in the vehicles' on-board unit also uses these corrections, together with GNSS signals and information from other sensors, to compute a reliable vehicle position, speed, and heading.

This production launch milestone adds the ADL3 function to GMV's positioning solution market portfolio, consolidating GMV as one of the primary worldwide suppliers of GNSS based high accuracy positioning solutions.

GMV to implement smart and safe mobility use cases in the ASCENDER project

GMV will provide the Barcelona Supercomputing Center (BSC) with information based on communication technologies and V2X standards to enable research into real-time computing processes for use cases on intelligent and secure mobility. Using information from multiple data sources, including video cameras and vehicle sensors (GPS, radar, lidar, etc.), the BSC will develop the workflows for the data analysis and characterization processes of complex urban environments.

As an additional data source, GMV will provide the computing environment with data from V2X equipment located both on the road (roadside units) and in vehicles (on-board units), making use of the ITS-G5 standard and 802.11p and C-V2X (5G) communications.

During the project, GMV will collaborate with the BSC to characterize traffic and information available in urban environments, identifying high-risk scenarios in real time that may lead to traffic accidents in highly complex urban areas. Edge computing resources strategically distributed in different parts of the city will be able to process the multiple data sources and send the generated alerts to the end users connected through the V2X network.

Characterization of the environment will be used to generate alerts and compile traffic statistics (congestion, violations, risk situations, etc.) that can be used to design and define safer, more efficient traffic and mobility management policies.

Final demonstrations of the R3CAV autonomous driving project

In May, the consortium of companies of the R3CAV project (Robust, Reliable and Resilient Connected and Automated Vehicle for people transport) welcomed the mayor of Alcobendas, Rocío García Alcántara, at the site in the municipality where over the past few months the final validation tests of the public transport use cases launched in this town have been carried out.

R3CAV is a project funded by the CDTI (Center for Technological Development and Innovation), financed by the NextGenerationEU funds from the European Union, and supported by the Spanish Ministry of Science and Innovation. The consortium, led by the Renault GROUP, comprises Alsa, GMV, Indra, MASERMIC, MASMOVIL, and SIGMA.

As part of the project certification, on May 29, the CDTI visited the test circuit in Alcobendas, and checked that the systems developed are operating correctly with a real-time demonstration.

During both visits, the mayor and the CDTI took part in a live display of the autonomous vehicle, making journeys with fixed stops and on-demand stop requests, detection of road obstacles, and C-V2X communication between vehicle and infrastructure for traffic-light priority management at intelligent intersections, the latter of which is one of the GMV-led use cases.

The visit also included a display of the equipment and different sensors onboard the autonomous vehicle, such as a Demokit with ***GMV GSharp®*** software providing the precise positioning solution, the available C-V2X and 5G communications systems, as well as the deployed infrastructure, traffic lights, control units, and Roadside Units (RSU).

With these demonstrations, work was completed in Alcobendas on the use case for public transport in the R3CAV project.

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GMV awarded Enhanced Galileo Green Lanes Operation & Maintenance for 2024

Designed to monitor the transit times of goods at EU borders, its functions have been extended to include control of railway lines

During the COVID-19 pandemic, the European Commission (EC) defined a Trans-European transport NeTwork (TEN-T), where the crossing time in internal land borders should not exceed 15 minutes, including any necessary check.

The European Union Agency for the Space Programme (EUSPA) devised the Galileo Green Lanes system to monitor the crossing times for freight transport in the European Union borders, so that the transport of food, medical equipment, medicines, and other essential goods could be ensured among the Member States.

After an initial proof of concept, the EUSPA awarded GMV and TIS the development of the actual system to enter operation, with the intention to not only support the TEN-T during the pandemic but also identify possible problems in the transport infrastructure along Europe.

The developed system integrates information from several traffic information providers as well as from smartphones fitted with the project's mobile application, so that it can give an estimation of the crossing times of freight transport across the land border crossings.

In a second phase, the EUSPA requested additional functionality to also monitor railway transport across the European Railway Network, focusing special attention on the border with Ukraine, in the context of the armed conflict, and to ensure the flow of essential goods and humanitarian aid.

In 2024, EUSPA relied again in GMV to ensure the correct operation of the system, so that the EU authorities can leverage independent information about the transport infrastructure to define new policies and plan future investments in transport development.

Autonomous vehicles and connected barriers at the Spanish ITS Congress

April saw the 24th edition of the Spanish Congress on Intelligent Transport Systems. The theme was "ITS as a core instrument for the digitalization of mobility," and the event highlighted innovative steps being taken in the ITS sector with the support of the European Union's Next Generation funds. GMV played a key role in the event, with several talks on intelligent transportation systems and autonomous and connected vehicles.

Beatriz García Navarro, project manager and head of GMV's Automotive TIER-1 Division, spoke about autonomous and connected vehicles and the need to equip them with enough autonomy for the vehicle to be aware of its surroundings and exchange information with other vehicles (V2V), as well as with smart road infrastructure through vehicle-to-infrastructure technology (V2I). With this goal in mind, García Navarro noted that Road Steel Engineering is developing a new generation of barriers that includes a control unit with different sensors. This control unit will be connected to RSUs (Roadside Units), and through the use case developed by GMV on both the RSU and OBU (On-Board Unit) sides and the use of the management and configuration tool for these devices (the C-ITS Hub), these barriers will be able to send information to vehicles traveling on the road. In this use case, GMV has integrated the information from the barrier control unit using IEEE 802.11p and 3GPP (C-V2X)/PC5 technology to demonstrate the system's operation.

The implementation and launch of these connections is intended to expand the information available to the vehicle and increase its caution or anticipation of certain risk situations. First, users of the road network can be informed of possible accidents that may be obstructing the road, detected by the barriers. Second, with regard to the opening barriers, users can be notified if the existing barriers on the road are open, as well as changes in the road's conditions.

By moving towards a fully connected and safe road system through V2X connectivity, GMV and Gonvarri are not only making progress in the field of mobility but also laying the foundations for a future where vehicle-infrastructure interaction is essential to accident prevention and smart mobility. This joint effort not only highlights the importance of collaboration between technology companies and manufacturers but also invites us to reflect on how technology can continue to shape the foundations of how we get around on a daily basis.

César Lucas and Javier Miller spoke about intelligent transportation systems. César Lucas's presentation looked at the different strategies to be applied when migrating from production ITS systems to next-generation ITS systems, focusing on how to minimize the impact on users and control centers, something made possible by the versatility of GMV's equipment.

Javier Miller, meanwhile, discussed the evolution of GMV's ITS systems for Cyprus. "The development of ITS systems for Cyprus includes the management of school routes through an app that will perform the functions of CAD and a validation system. This enables monitoring and supervision of the school transportation service and student access to the vehicles authorized for the service with no need to install complex on-board hardware components. Account-based ticketing (ABT), the option to pay by card, and the use of debit and credit cards as an ID card for passengers' accounts are being added to the field of sale and validation systems."

GMV signs collaboration agreement with Innova-IRV at Transfiere Forum

The signing of this agreement reaffirms both companies' commitment to strengthening and promoting mutual cooperation in innovation and technological development.

GMV and Innova-IRV have entered into a Collaboration Agreement during the Transfiere Forum, the European Forum for Science, Technology, and Innovation held in Malaga. The agreement, signed by Luis Fernando Álvarez-Gascón, general manager of GMV's Secure e-Solutions, and José Manuel Leceta, the general manager of Innova IRV, reflects both organizations' commitment to strengthening and promoting mutual cooperation in innovation and technological development, pooling their knowledge and experience.

GMV and the Institute will work together to identify challenges and promote innovation and technology transfer projects that address current and future challenges, creating innovative solutions to improve the competitiveness of our economy, make it more digital, and ultimately benefit society as a whole.

"This agreement enables us to access a network of first-rate business innovation hubs, with a national focus and international dimension," says Álvarez-Gascón. "The Innova IRV model is being developed with the aim of gaining competitiveness, attracting investment, and promoting the creation of new technology-based companies, all of which are goals we share. GMV is aligned with all Innova IRV's technological lines of action and will initially focus on initiatives related to smart agro, digital health, and cybersecurity."

Meanwhile, Leceta says that the agreement will mean "strengthening the synergies between the two organizations by developing collaborative projects with industry and generating new innovation investment opportunities."

Luis Fernando Álvarez-Gascón moderated the Innova-IRV Panel on exploring leadership opportunities in European data-driven innovation spaces, while Patricia Tejado, director of digital public services for GMV's Secure e Solutions, participated in the round-table discussion on the innovation ecosystem in the Spanish region of Castilla y León, speaking in particular about the role of large companies in these ecosystems and how this role can be maximized in the case of the flagship cybersecurity initiative in Castilla y León.

In his moderation, Álvarez-Gascón highlighted data spaces as "centers of innovation and value creation. They embody a genuine European effort to secure a foothold in the data economy and to articulate our vision for a digital society." In this process, "it will be essential to invigorate the ecosystem and all its stakeholders through public-private partnerships," he concluded.

Digitalization in tourist destinations at the “5th Edition MYT Summit”

The 5th edition of the MyT Summit, a key event in the tourism sector held on May 29th in the Balearic Islands, received continued support from GMV as a sponsor.

This summit is a pivotal platform for professionals from different sectors linked directly or indirectly to tourism to discuss and share insights. With a balanced participation of both women and men, it aims to establish benchmarks and foster a more competitive and sustainable tourism industry.

Tourism is an industry that is constantly evolving and growing, necessitating effective management involving all stakeholders in the tourism value chain. GMV, recognized for its leadership in technological innovation, participated in the panel discussion titled “Digitalization and tradition in destinations: building the experience”. The panel featured Patricia Tejado, Director of Digital Public Services at GMV, alongside Jaume Monserrat (President of Turistec), Verónica de Íscar Alonso (Chief B2B Sales Officer at Civitatis), Ana Macarro Sanz (Account Manager in Tourism, Leisure, and Transportation at Hiberus), and Adolfo Borrero Villalón (President of the Smart Cities Commission at AMETIC).

During the session, Patricia Tejado highlighted GMV’s ***uTile PET*** (Privacy-Enhancing Technologies) as a leading solution in the tourism sector for establishing federated data networks, ensuring continuous data security and privacy protection.

GMV and Peoplematters join forces to transform HR management with a groundbreaking pay equity solution

GMV and Peoplematters have announced a strategic alliance to introduce an innovative solution aimed at enhancing efficiency and equity in managing personnel within organizations. The solution is incorporated into the client’s comprehensive human resources management platform, addressing the changing needs of HR departments through state-of-the-art technology that facilitates the organization's regulatory compliance.

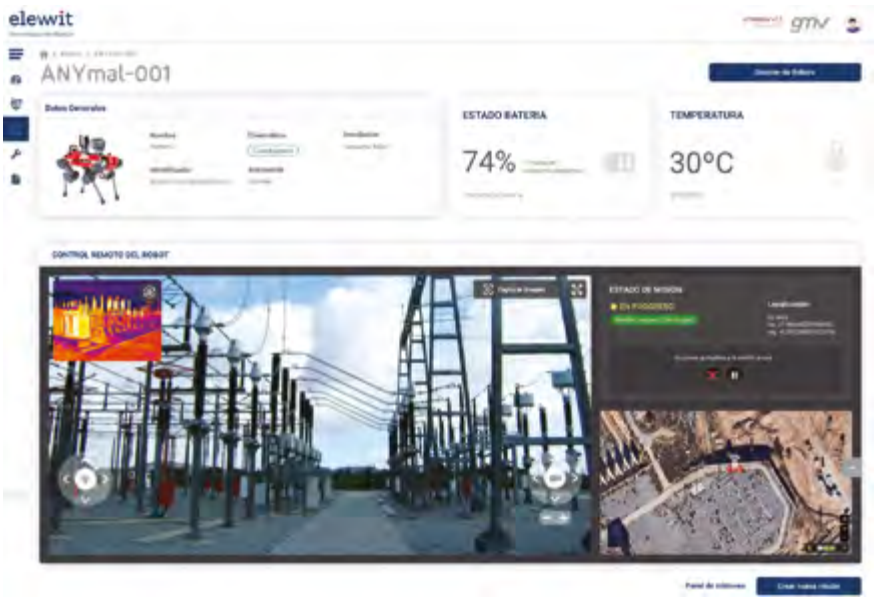
Known as “PAIT” (Pay Analytics Intelligence Tool), the solution incorporates advanced analytics and artificial intelligence algorithms in salary management to proactively address potential wage disparities. It also helps address strategic workforce planning more effectively, ensuring the security of employee data.

One of the key features of PAIT is its ability to forecast a future pay gap, giving companies a competitive advantage similar solutions don’t offer. The tool also offers an intuitive and visual customized dynamic analysis, making it possible to analyze the pay gap by several different variables and see improvement trends, significantly setting it apart from other solutions available on the market.

The Spanish government’s 2024 Regulatory Plan calls for the European Union directive on equal pay and transparency to be incorporated into Spanish legislation this year. Once again, companies will have to put a great deal of work into complying with new regulatory requirements, in this case incorporating the standardized management of equality, and specifically of the pay gap, as another people management process.

uPathWay : transforming the future of industrial facility inspection

At the forefront of industrial transformation, GMV's autonomous robotic platform ***uPathWay*** is revolutionizing the energy sector, ushering in a more collaborative, efficient, and sustainable era. A prime example of its impact is the ASUMO project (Advanced SUbstation MOnitoring), which demonstrates ***uPathWay***'s pivotal role in this evolution.



Led by Elewit and Red Eléctrica (both part of the Redeia group), ASUMO embodies the vision of a smarter industry by integrating ***uPathWay*** into a quadruped robot capable of autonomous missions: from reading analog indicators and conducting thermographic reports to detecting oil leaks and tracking discharges.

uPathWay's solution is pivotal, combining precise GNSS (Global Navigation Satellite System)-based location with dynamic routing to enhance mobility. This specially designed quadruped robot not only optimizes inspection processes but also increases sampling frequency, reduces downtime between inspections, and significantly enhances the management of electricity substations. The ***uPathWay*** unified control panel also enables operators to centrally oversee a diverse fleet of inspection vehicles across various substations and vehicle models, providing integrated inspection results from a single control point.

GMV presents quantum computing projects as hallmark of innovation at Quantum CARLA

At the "Quantum CARLA: Quantum Careers Symposium" in late March, leading experts in quantum computing gathered, including Ana María Sánchez Montero, Head of Quantum Computing Section of GMV Secure e-Solutions sector.

During her industry panel session, Sánchez Montero provided an engaging overview of her 15-year career at GMV, transitioning from environmental protection through Earth observation satellites to current roles in Artificial Intelligence and Big Data within GMV's division.

Her presentation highlighted GMV's pioneering role in quantum computing research and application, featuring projects like CUCO that promise to revolutionize GMV's approach to challenges in various industries. It not only showcased why GMV is a top employer but also underscored its dedication to innovation and technological advancement in emerging fields such as quantum computing.

GMV's *uPathWay* solution emerges as pivotal technology for smart industry at "Advanced Factories"

GMV's presence at the "Advanced Factories" event in Barcelona from April 8 to 10 was highly impactful, notably due to the unveiling of ***uPathWay*** by GMV. This innovative solution not only represents a breakthrough in industrial practices but also promises a paradigm shift in process automation towards greater efficiency.

What sets ***uPathWay*** apart in the industrial landscape is its capability to integrate diverse technologies such as artificial intelligence and robotics. Its quick deployment feature eliminates the need for extensive mapping and RTK antenna deployment, enabling it to operate effortlessly in both indoor and outdoor environments—from factories to open fields—adapting to a wide array of industrial applications.

At the event, GMV captured the audience's attention with compelling outdoor demonstrations at Fira de Barcelona, showcasing ***uPathWay's*** ability to autonomously manage tasks through an intuitive web interface. This interface enables easy administration of robots, missions, routes, alarms, and reports, effectively centralizing fleet and facility management. This flexibility is critical as it directly addresses the challenges faced by many key sectors such as agri-food, energy, and logistics, demonstrating ***uPathWay's*** potential to significantly enhance industrial process optimization through its efficiency and precision.

GMV attends one of Europe's foremost events in quantum technologies

From May 7th to 10th, the Kursaal in San Sebastián hosted the fourth edition of the "Quantum Matter International Conference, QuantumMatter 2024". The goal of this event is to bring together the wide range of communities involved in the science and technology behind quantum information and matter, two revolutionary components in the field of information processing that are playing a key role in helping experts discover and apply paradigms in quantum technologies and computing.

As a sponsor and exhibitor, GMV showcased its expertise, innovation, and commitment to advancing the quantum industry. This participation underscored GMV's dedication to supporting the growth and development of the quantum community. By aligning its brand with this high-profile event, GMV is consolidating its position as a key player in the quantum panorama, and emphasizing its commitment to expanding the limits of quantum technologies.

One example of this is CUCO, which is the first project in Spain focused on quantum computing at the national and commercial levels. Led by GMV the project is subsidized by the Center for Industrial Technological Development (CDTI) with support from the Ministry of Science and Innovation under the Recovery, Transformation, and Resilience Plan. The project's aim is to investigate how quantum computing can be applied in strategic industries such as industry, finance, space, defense, and logistics. Thanks to this collaboration, research is now being performed on quantum computing solutions that can be applied to fields such as Earth observation and the fight against climate change.

The AgrarIA project leverages artificial intelligence in agriculture to address the water crisis

In a backdrop of critically low Spanish water reserves, standing at just 54.7% of total capacity in early March, the AgrarIA project emerges as a beacon of hope for Spain's agri-food sector. Its primary aim is to apply advanced technologies to develop more technological, innovative, sustainable, and environmentally committed agricultural production methods.

A study conducted within the project by TEPRO and GMV has demonstrated significant strides in optimizing water usage in agriculture through the application of artificial intelligence and the analysis of climate data. This collaborative effort has successfully crafted predictive models for soil volumetric water content available for cultivation, leveraging key variables such as precipitation, evapotranspiration, specific crop coefficients tailored for almonds, and water content. These models are based on climate data analysis and make it possible to anticipate crop water requirements and optimize the use of irrigation. According to simulations carried out on a 13-hectare farm in Carmona, Seville, with Lauranne variety almond trees, there were estimated reductions of up to 58% in the irrigation water used for certain periods throughout the production cycle.

Predicting soil water content not only helps to anticipate irrigation needs but also contributes to streamlined and more effective use of irrigation water by adapting agricultural practices to predicted climatic conditions. The results of the simulations require field validation, but they are very encouraging and can be used to optimize the use of irrigation, ensuring an efficient and sustainable use of water resources.

The AGRARIA Project: ARTIFICIAL INTELLIGENCE APPLIED TO THE AGRICULTURAL PRODUCTION VALUE CHAIN 2050 (TSI-100114-2021-0) project has been funded by the Spanish Ministry for Digital Transformation and Public Service, through the R&D Missions in Artificial Intelligence 2021 program, within the framework of the Digital Spain 2025 Agenda and the National Strategy for Artificial Intelligence, with European Union funding through the Recovery, Transformation and Resilience Plan.

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GMV presents federated data spaces driving innovation at #AIAMSummit24

AMETIC held the seventh edition of the "AI Intelligence Summit 2024 #AIAMSummit24" in May under the theme "Artificial Superintelligence". José Carlos Baquero, GMV's AI and Big Data division director, highlighted the pivotal role of applied AI and federated data spaces in fostering innovation. Baquero also introduced two key GMV projects: INESData and TARTAGLIA.

INESData, spearheaded by the Polytechnic University of Madrid, aims to establish a data spaces incubator in Spain. This initiative will develop technology, provide storage and processing infrastructure, and support four national data spaces (language, mobility, media, legal), promoting data ecosystem growth in Spain and Europe.

In the healthcare sector, GMV leads the TARTAGLIA project, funded by the Secretariat of State for Digitalization and Artificial Intelligence (SEDIA)'s R&D Missions Program in AI. TARTAGLIA seeks to create a secure ecosystem for collaborative AI tool development. GMV uses its ***uTile*** tool to train AI algorithms, employing advanced cryptographic techniques to extract secure insights from patient data These aids healthcare professionals in diagnosing and treating diseases like Alzheimer's, macular degeneration, and prostate cancer, fostering competitive markets in Spain and Europe.

The summit underscored the importance of collaborative, holistic approaches to data-driven innovation, advancing both technological capabilities and business growth within the AI realm.

Regulation, digitalization, and collaboration: key factors for sustainability in logistics and transportation

Under the theme “Advancing decarbonization and digital transformation in the industry: transportation and logistics”, enerTIC hosted a breakfast colloquium in April to discuss the challenges of sustainability and digitalization in this sector. The event featured participation from technology companies such as GMV.

The event highlighted the crucial need to digitize manual processes, including transitioning from paper documents to digital formats and utilizing advanced systems to manage inventories, fleets, and routes. Implementing technologies for real-time data analysis is essential for enhancing operations and meeting market demands.

Emerging technologies like artificial intelligence (AI) and machine learning were underscored for their role in logistics planning and execution. These tools boost efficiency and reduce carbon emissions. AI-driven route optimization lowers fuel consumption and emissions, while automation in warehouse management and real-time transportation planning enhances inventory handling. Ensuring cybersecurity with IT and OT tools, along with training staff in new technologies, is vital. The industry also faces a shortage of qualified personnel, affecting workforce succession.

A significant issue discussed was the lag between technological progress and regulations. Bureaucracy, high taxes, and strict regulations create a complex and costly operational environment, impacting competitiveness. Encouraging public-private collaboration and fostering cooperation within the sector is essential for improving competitiveness in the global market. Strengthening synergies between industry and government is crucial for sustainable sector development.

Flexibility, collaboration, and technological innovation: keys to achieving 2030 sustainability goals

At the end of March, the enerTIC platform hosted a breakfast discussion titled “New challenges and opportunities in advancing the transformation of the energy sector in distribution and marketing”. Participants included the ASEME electrical companies association and firms such as Axpo, Cepsa, Enagas, Enel, Iberdrola, and Naturgy, alongside technology providers like GMV. The goal was to address the main challenges the energy sector will face in the coming years.

Energy marketers stressed the importance of establishing dialogue with distributors to comply with regulations and meet consumer needs. The biggest challenge is adapting to societal changes, as consumers are increasingly generating their own energy. Currently, 3% of energy comes from self-consumption, with households generating 17% of this amount.

Technology is crucial to addressing these challenges. Implementing smart meters and advanced demand management systems allows for precise energy consumption monitoring and more personalized consumer interactions.

Digitalization and artificial intelligence are essential for analyzing large data volumes, predicting consumption patterns, and adjusting energy supply accordingly. This enhances supply management and enables new business models, such as predictive maintenance and personalized energy management.

Integrating energy storage systems is vital for managing renewable sources and ensuring a constant, stable supply. This requires regulations that promote energy storage with incentives for both companies and consumers.

Ultimately, collaboration among governments, regulators, companies, and consumers is essential to overcoming technical and regulatory challenges, leading to a more resilient and sustainable energy system by 2030.

GMV showcases robotic inspection capabilities at AEQT Innovation and Technology Commission Meeting

GMV has demonstrated its expertise in robotic inspection during a live demonstration at Messer Ibérica. Held as part of the Chemical Business Association of Tarragona (AEQT)'s Innovation and Technology Commission meeting, the event highlighted ***uPathWay***, GMV's groundbreaking solution designed for industrial inspection tasks.

uPathWay represents a comprehensive approach enabling autonomous operation of vehicles, effectively addressing inspection needs in specialized environments like the chemical sector. This innovative platform controls and coordinates robots to carry out repetitive and even dangerous tasks that operators previously had to perform.

The demonstration underscored ***uPathWay's*** capacity to optimize inspection processes in critical settings. The solution presented offers a combination of advanced technology and precision, making it an invaluable tool for the chemical industry in terms of efficiency and safety.

GMV at UC3M's 2nd Artificial Intelligence Applications Conference

On April 19th, the second Conference on Applications of Artificial Intelligence took place at the Auditorium of the Carlos III University of Madrid's Puerta de Toledo campus. The event featured concise presentations and roundtable discussions aimed at showcasing diverse perspectives on the current landscape of Artificial Intelligence (AI). Key figures from leading technology firms and public research bodies, including José Carlos Baquero from GMV's Secure e-Solutions division, highlighted the ethical and regulatory dimensions of AI development, alongside its practical applications.

The first section covered aspects related to new AI-driven citizen services to societal needs, emphasizing collaboration opportunities and reviewing ethical and regulatory aspects in their development. The second section, which included José Carlos Baquero, presented several AI applications in engineering currently available for fields such as aerospace, telecommunications, software, cybersecurity, predictive maintenance, and customer service, among others. Finally, the third section explored trends and AI's impact on business management, underscoring its role in transforming value chains and sectors, with examples including intelligent assistants, predictive analytics, recommendation systems, and automation tools.

Speakers collectively emphasized the profound growth and transformative impact of generative AI technologies, significantly influencing economic and social sectors worldwide.

GMV celebrates its 40th anniversary with over 3,000 people

Company professionals from 12 countries gathered at the Cívitas Metropolitano stadium in Madrid

Not all meetings are the same, and it only takes a few examples to see why. In the workplace, there may be planning meetings, brainstorming meetings, problem-solving meetings, or board meetings. But there are also meetings that bring people together for a different, more festive purpose. This is what happened on 5 June at the Cívitas Metropolitano stadium in Madrid, during GMV's 40th anniversary celebration: a genuine meeting of the more than 3,000 professionals who make up the company.

The celebratory meeting was an opportunity for participants to come face to face with colleagues they may only have interacted with through a screen or didn't know at all. Coming from 12 countries and representing 50 different nationalities, the more than 3,000 people in attendance embodied the diversity, multiculturalism, and plurality that GMV stands for today.

During the event, participants were able to see GMV in its true colors: the scaffolding, the structure, the pillars that have supported the company throughout its 40-year history. GMV's CEO, Jesús Serrano, began by giving a snapshot of the company's current situation, with an overview of each of the sectors in which it operates, and told the 3,000 professionals that "our history shows us that the future is in our hands. Together we have no limits."

This was the story told by more than 30 interviewees who took part in a video that recounted the company's history, from its beginnings as a working group in the Flight Mechanics Department of the School

of Aeronautical Engineering to the present day.

After reviewing the company's past and present, GMV's President, Mónica Martínez Walter, used her speech to highlight the family aspect of GMV and the passion and talent that its more than 3,000 professionals put into their daily work, which bodes well for the company's future. She said that, like her father, GMV's founder Juan José Martínez, she could not have imagined what GMV would become over the years, nor could she have imagined the company's bright future, a place, she said, where she hopes "the people who work there will engage in projects that challenge their skills and ignite their creativity."

To talk about GMV, its past achievements, its present, and its future is inevitably to talk about its values. Knowing them is essential to understanding what the company is all about. And to talk about them, GMV invited Pau Gasol to its 40th anniversary celebration. He shared his personal experiences as one of the top players in the history of Spanish and world basketball. Ignacio Ramos, GMV's Director of People and Infrastructure, explained that the decision to invite the former Los Angeles Lakers player was an easy one, as he represents all the values that have been with the company over the past 40 years, including "talent, hard work, willingness to take on challenges, and teamwork." Pau Gasol, for his part, emphasized the importance of always seeking greater challenges in order to surpass oneself, of good leadership that always thinks of the good of the team, and of excellence understood as having "a purpose that is greater than oneself, that has a great impact."

GMV, committed to talent

As part of the Global Talent Internship, which took place in March and April, GMV welcomed 26 students from advanced and intermediate vocational training courses to the company's offices in Madrid and Valladolid. These students have joined the GMV team as interns and will have the chance to develop their knowledge in different areas of the organization, immersing themselves in a real working environment and cutting-edge technological projects.

Over a three-month period, the student interns will complete their respective training in IT system administration, multi-platform application development, online application development, and electronic maintenance. GMV then offers real opportunities to join the organization, depending on the performance and skills demonstrated by the students. The number of vocational students taken on as interns has increased year on year, reflecting GMV's confidence in the technical training and specialization offered by these courses.

GMV's offices in Lisbon and Tres Cantos also opened their doors in April to two of the student teams sponsored by the company – Aerotéc and UPM Racing – in a meeting between university students and technology industry professionals. The main purpose of both meetings was to support university projects that bring students into professional environments and allow them to develop practical skills. This collaboration between GMV and the student teams not only helps the students develop their technical skills, but also strengthens the links between academia and industry, promoting a well-rounded education for the talent of the future.

GMV is firmly committed to professional development and offers opportunities for a wide range of profiles. At the same time, it deeply values the diversity of technical skills and recognizes it as a fundamental pillar for driving collective excellence.

Forbes includes GMV among the 100 best companies to work for in 2024

GMV has been chosen by the specialist business and finance magazine Forbes to form part of the VI FORBES Ranking of the 100 best companies to work for in Spain in 2024. The list, published in the Spanish edition of the magazine, includes companies from various sectors.

The company makes its debut in this national ranking, which is based on the results of a study carried out by Sigma Dos among more than 2,000 companies with more than 250 employees, and reveals the best practices in Human Resources. The areas of assessment include such areas as talent management, remuneration and compensation policies, the working environment, training strategy and professional development.

Within this ranking Forbes singles out GMV's attraction, development, flexibility and commitment to the Sustainable Development Goals (SDGs) as some of the mainstays of its talent management, helping its workforce to swell to over 3,000 professionals in the last year. This result reflects GMV's corporate vision, which is based on the recognition of human capital as one of its mainstays. This milestone is a source of pride for the company and acts as a spur for further progress in all the value proposals aimed at GMV's human team.

GMV, key player in the 4th edition of 'Wake Up, Spain!

From April 15 to 19, took place the fourth edition of Wake Up, Spain!, a symposium organized by EL ESPAÑOL, Invertia and Disruptores under the slogan "Spain's great opportunities in a changing Europe", held at the Palacio de Linares in Madrid, headquarters of Casa América.

During the series of meetings, members of the Government, social agents, regional presidents, mayors, major businessmen and national leaders presented their points of view on various current issues, divided into different focuses.

King Felipe VI inaugurated the 4th edition of this forum, highlighting its evolution "as a meeting point for the world of politics, business, technology and civil society" which, as he remarked, "seeks to enrich and promote the necessary public debate through proposals that can be used for the benefit of a better Spain".

As a leading Spanish firm in technology development, GMV played a leading role in the event through its CEO, Jesús Serrano, who took part on Wednesday 17 in an interview within the defense block. During his speech Serrano spoke of the company's beginnings and how, from its leading position in the space field and on the basis of its knowledge of space infrastructures, GMV is now a benchmark company in space applications in the defense field. He also highlighted how, while maintaining its family business nature, the company now operates in 12 countries, has over 3,200 professionals and a turnover of over 370 million euros in 2023.

In his presentation, Serrano commented that, in the field of defense, the size of a country's industry depends strongly on national investment and budgets and on the characteristics and size of the national market, emphasizing that "from our point of view, in the defense market the size of the companies is relevant, but the technology incorporated is even more so, as are competitiveness and collaboration between companies".

In the current context of growing geopolitical tensions, GMV's CEO shared that society is becoming more aware of the importance of the defense sector for maintaining our freedoms, democracy and way of life. In this regard he stressed the strategic importance of space in the deployment of military technologies and the need to protect space assets against new threats.

Innovation and entrepreneurship: GMV's hallmarks underpin the InNorMadrid Awards

For another year, GMV showed up to support the Madrid Norte Digital - Knowledge Tech Transfer Awards, an initiative of the Madrid Norte Transfiere project, backed by the Social Council of the Autonomous University of Madrid (UAM). The awards recognize and support the implementation of digital solutions by both UAM researchers and companies, shining a spotlight on the most innovative projects with the greatest potential for growth, with the aim of promoting the transfer of knowledge and technology between science and business.

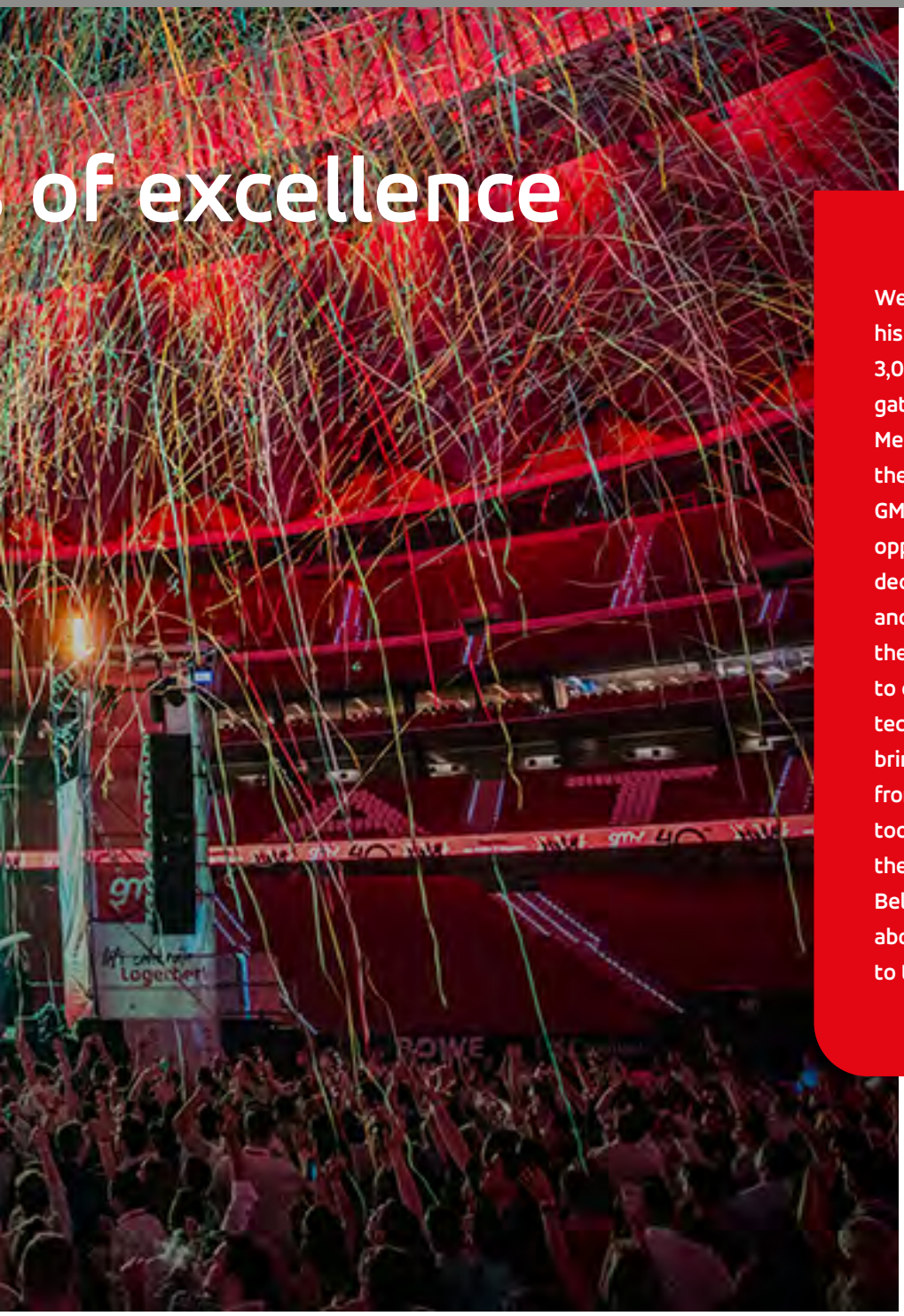
The awards ceremony took place on 11 April 2024 at the Rector's Office of the Cantoblanco campus of the UAM in Madrid. Javier Zubieta, director of Marketing and Communications for GMV's Secure e-Solutions participated in the event with Amaya Mendikoetxea, rector of UAM; Félix Zamora, vice rector of Transfer, Innovation, and Culture at UAM; Eduardo Sicilia, chairman of the UAM Social Council; Luis Suárez de Lezo, secretary general of InNorMadrid and AICA; and Ana Ramírez de Molina, deputy minister of Universities, Research, and Science of the Community of Madrid.

GMV celebrates 40 years

Diogo Silva

Division Head GCS for the Galileo 2nd Generation in Spain

"It was a pleasure to participate in the 40th anniversary event, where we had the opportunity to meet so many colleagues from all over the world, and where the passion and values that have made this journey possible and that are essential to continue growing were shared in a very personal way. The sight of over 3,000 employees proudly celebrating GMV's history in those stands gave us a very real idea of the size of the company and will remain in our memories forever"

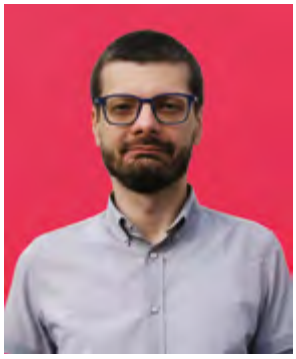


# of excellence

Wednesday, 5 June 2024, was a historic day for GMV. More than 3,000 people from 12 countries gathered at Madrid's Civitas Metropolitano stadium to celebrate the organization's 40th anniversary. GMV's professionals had the opportunity to pay tribute to four decades of challenges overcome and dreams fulfilled, and to share their enthusiasm for the chance to continue writing the future of technology. It was no easy task to bring together over 3,000 people from across the globe, but GMV took on the challenge and rose to the occasion with flying colors. Below, six of our professionals talk about the event and what it meant to them.

Dawid Luszczki

Java engineer in Warsaw



"This year I am also celebrating my 40th birthday, so I personally relate to the length of time that is a company history. However, for me, this event has been a great opportunity to finally meet in person people that I have been working with for some time now. Even though we have already seen each other and known each other through videocalls, meeting in person was still full of many surprises (for example the surprise of how tall we are in real life). These small experiences really made us happy when coming back to work after the event"

Ricardo Alves

Software engineer in Portugal

"The GMV's 40th anniversary event was incredible. It was interesting to learn about the history of GMV from its founding to the present day, the different stages the company has gone through, as well as where it intends to go. For me, the highlight of the event was the performance of the orchestra from the Polytechnic University of Madrid, excellent quality. I'm looking forward to the next GMV event"

Avdhesh M. Yadav

Project Manager, Intelligent Transportation System in USA

"Attending our company's first grand event with over 3.2K+ highly qualified professionals was an amazing experience. Everything was organized exceptionally well, from the seamless registration process to the engaging sessions and networking opportunities. The event was a true testament to our team's dedication and attention to detail, creating an atmosphere of professionalism and innovation. It was an inspiring and valuable experience, setting a high standard for future events"

Ana María Verdeguer

Cybersecurity consultan in Madrid

"I had the incredible opportunity to participate in the 40th anniversary party of our company, and it was truly an unforgettable experience. The event's program was thoughtfully crafted, with moments dedicated to reminiscing about GMV's beginnings, celebrating our milestones and achievements over the past four decades, and looking forward to the future. Encouraging speeches from the President, the CEO and from Pau Gasol, the special guest, inspired us all to continue striving for excellence in the future. The entertainment, food, and ambiance were exceptional (special mention to GMV's Band), providing a perfect backdrop for celebrating. One of the most remarkable aspects of the party was the chance to meet and connect with colleagues from the different offices in person. I am very proud to be part of GMV for almost ten years and looking forward to many more years of growth and achievements together"

Sarah Louise

DSB Cyber security engineer in UK

"GMV 40th was an incredible event! It really put into perspective the dedication and pride that every employee has. It was fantastic to meet so many colleagues, many of whom I have only spoken with virtually. I'm sure many of us will remember it for a while to come and for all the right reasons"

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