

# News

No. 87

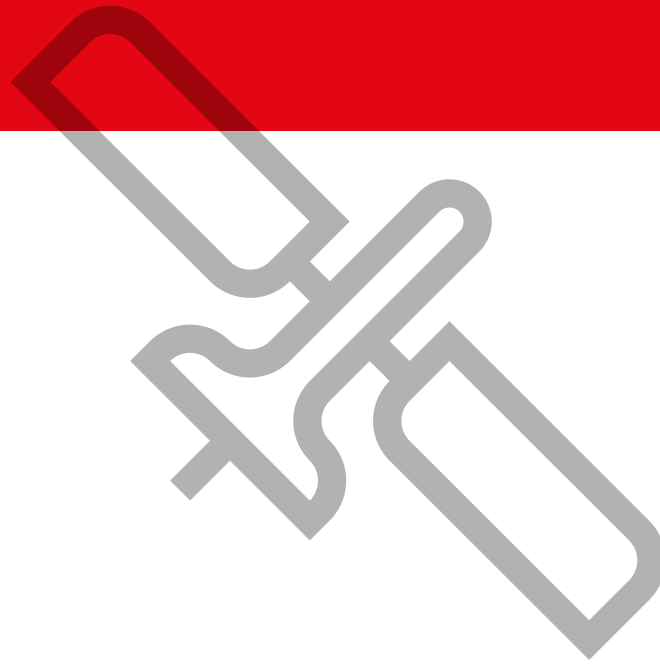
**gmv**<sup>®</sup>  
INNOVATING SOLUTIONS

## Defining New Space



INTERVIEW  
**Guillermo Lamelas**  
CEO, Alén Space

# GMV will be at the leading trade fairs for the space sector



## **SPACE & DEFENSE SEVILLA SUMMIT**

On October 25 and 26 at the FIBES Exhibition and Congress Center in Seville and whose theme is aimed at stimulating Spain's commitment to innovation, digitization, technology and advances in security, space and defense. With an international focus, it seeks to promote the value and global growth of Spain in the field of sustainability. As well as the involvement of the public and private sector, stimulating job creation and boosting research.

## **SPACE TECH EUROPE**

14 to 16 November in Bremen, Germany, a meeting point for engineers, buyers, and leading companies in the space sector to connect with manufacturers from the entire supply chain for civilian, military, and commercial clients.

## **UK SPACE CONFERENCE**

November 21-23 in Belfast, UK, an unmissable meeting that brings together the space industry with users, entrepreneurs and members of governments and universities. The conference provides a platform for the space sector to exchange ideas, plans and partnerships that will foster development and success in the emerging space age.

## **MORE INFORMATION**

[www.gmv.com](http://www.gmv.com)



## Letter from the president

If we consider human history to be driven by our ability to adapt and innovate, we find ourselves now in one of its most thrilling chapters. At GMV, we harness the insights and expertise acquired over our nearly 40-year journey in pioneering fields like space technology to develop solutions that until recent years were no more than science fiction.

We are currently immersed in the New Space revolution, celebrating the flawless operation of GMV's avionics system for micro-launchers during the launch of PLD Space's Miura 1 rocket. We are also working to enhance satellite and nanosatellite constellations by complementing them with pseudo-satellites in the stratosphere. And our recent alliance with Alén Space strengthens our collective capabilities in the nanosatellite sector, which paves the way to more affordable and flexible uses of space.

Artificial intelligence is another pillar of the current technological revolution,

that we apply to enhance satellite communications, or to provide swift responses to natural disasters through the analysis of satellite observation imagery, or to facilitate medical breakthroughs such as the development of individually optimized cancer treatments. This technology is also essential for our advanced robotics solutions aimed at satellite repairs in orbit or the construction of megastructures in space.

On the horizon, quantum computing emerges as the next significant leap forward. GMV is pioneering this field, collaborating in the installation of Spain's first quantum computer and leading the way in the creation of innovative algorithms.

For GMV, technology is more than just a tool; it is a strategic means to anticipate and sustainably address emerging demands. We are not just committed to embrace innovation, it is our core essence.

*Mónica Martínez*

# No. 87

# CONTENTS

## Published

GMV

## Editorship-Coordination

Marta Jimeno, Marta del Pozo

## Area Heads

Luis Mariano González, Mariella Graziano,  
Isidro Prieto, Juan Ramón Martín Piedelobo,  
Miguel Ángel Molina, José Prieto, Enrique Rivero,  
Javier Zubieta

## Writing

Antonio Abascal, José María Alises, Leticia  
Alonso, Inmaculada Armengol, Joaquín Autrán,  
Patricia Ayora, Francisco Ayuga, Carlos Bayod,  
David Calle, Javier Castañedo Guerrero, Maole  
Cerezo, Marta del Pozo, Joaquín Estremera, Alex  
Fay, Raquel Fernández, Fernando Gandía,  
Néstor Ganuza, Beatriz García, Rossana Gini,  
Marta Gómez, Sara Gutiérrez, Cristina Hernández  
Felipe Jiménez González, Iván Llamas,  
Fátima López, Álvaro Manchado, Gerard Margarit,  
Eva Martínez Ferrer, Antonio Ramón Martín,  
Belén Martín Peiró, David Merino, Daniel Montero  
Yébeles, Cristina Muñoz, Ricardo Píriz,  
Eric Polvorosa, Isidro Prieto, Víctor Pozo,  
Enrique Rivero, Irma Rodríguez, Marta Saburit,  
Javier Sanz Albert, Tatiana Teresa Pagola,  
Guillermo Tobías, Patricia Zambujo, Inma Zamora,  
Javier Zubieta

## Article

Miguel Ángel Molina

## Art, design and layout

Paloma Casero, Verónica Arribas

## MORE INFORMATION

marketing@gmv.com

+34 91 807 21 00

Magazine No. 87. Third Quarter of 2023  
© GMV, 2023



## 3 LETTER FROM THE PRESIDENT

## 6 ARTICLE

*Defining New Space*

## 12 INTERVIEW

*Guillermo Lamelas  
CEO, Alén Space*



6



12



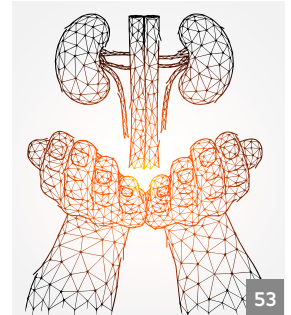
18



44



49



53



57



60



67

## 16 AERONAUTICS

*Joint National Office established for the NGWS/FCAS program*

## 18 SPACE

*GMV develops a cryptographic module for the Galileo authentication service*

## 40 ROBOTICS

*MIRROR tests a success*

## 44 DEFENSE & SECURITY

*The ISAR Project demonstrates its potential in a real environment*

## 49 CYBERSECURITY

*Opinion | Celia, can you help me build a better world?*

## 52 HEALTHCARE

*GMV implements artificial intelligence in the European Urological Evidence Center*

## 54 ITS

*GMV improves the experience of public transport users in Houston*

## 57 AUTOMOTIVE & MOBILITY

*GMV takes another step in the provision of positioning technology for automated driving*

## 60 ICT

*The first phase of the Quantum Spain project to build the first Spanish quantum computer completed*

## 67 CORPORATE INFORMATION

*GMV, among the 100 Best Companies to Work for in 2023*

## 72 TALENT

*GMV launches buddy program to help onboard new onboarders*

# Defining New Space

**T**hough there is no true consensus on what is meant by New Space, it can be said that the term covers an emerging industry and movement in the field of space and space technology development. In contrast to the traditional methods employed by government space agencies such as NASA in the United States or ESA in the European Union, which have been modified and adapted to meet the needs of these new trends, New Space is marked by the proactive involvement of private companies and entrepreneurs who are driven to innovate and market space solutions, as well as venture capital investors seeking to expand their investment portfolios.

The New Space industry covers a wide range of companies, from major corporations to startups, involved in specific fields such as space technology, telecommunications, space tourism, launch services, Earth observation, asteroid mining, etc. Some

of the key aspects of New Space are as follows:

**PRIVATE COMPANIES:** New Space does not depend heavily on public agencies but rather is focused on private investors' development and operation of space technology.

**COST REDUCTION:** one of the main goals of New Space is to significantly reduce the costs associated with access to space, also known as the "democratization" of space. This goal is achieved by reusing components or systems in the production of rockets and spacecraft and by taking more industrial approaches to the design, construction, production, and validation of all the elements of a space mission.

**TECHNOLOGY INNOVATION:** New Space has promoted innovation in several fields of space technology, with examples including the development of reusable rockets and the creation of advanced spacecraft and more efficient

propulsion systems that are smaller and lighter but offer end users higher-quality services.

**COMMERCIALIZATION OF SPACE:** in addition to traditional governmental missions, New Space seeks to exploit space for commercial applications such as space tourism, asteroid mining, Earth observation, and satellite constellations for global connectivity.

**COMPETITION AND COLLABORATION:** as more companies break into the space market, competition has intensified, accelerating the pace and efficiency of developments. At the same time, some of these companies work with public space agencies on joint projects.

**ACCESS TO LOW EARTH ORBIT:** New Space has made it possible to gain greater access to different orbital levels (LEO, GEO, MEO, Exploration, and Interplanetary). Access to low Earth orbit (LEO) is particularly notable and has led to the proliferation of satellite

constellations with several applications, such as communications, Earth observation, and weather monitoring.

#### DEVELOPMENT OF SPACE

**ECOSYSTEMS:** New Space has promoted the growth of wide-ranging space ecosystems that bring together space tech companies, investors, startups, and universities working together on the expansion of the space industry.

In a nutshell, New Space has brought about a revolution in the space industry by increasing the participation of the private sector, theoretically boosting technology innovation, and reducing the costs of access to space. The participation of the business sector, driven by a significant presence of private investors in space projects, has resulted in a diversification of space applications and opportunities, including the development of the space tourism industry, asteroid mining, Earth observation, and the expansion of global connectivity through satellite

constellations, leading to significant growth in the space industry in recent years.

## The origins of New Space

The emergence of New Space is thanks to the convergence of a number of different factors in recent decades.

These factors have brought about a significant shift in how we approach the space industry and space exploration. Some of the drivers of New Space are as follows:

#### TECHNOLOGICAL PROGRESS:

technological progress in fields such as computer science, electronics, propulsion, and manufacturing has made it possible to create more advanced and efficient space systems. This, in turn, has made space more accessible and has opened the door to new innovation opportunities.

**THE REUSE REVOLUTION:** companies such as SpaceX have demonstrated the feasibility of reusing rockets and spacecraft, significantly reducing launch costs and transforming the economics of the space industry.

**COMMERCIAL INTEREST:** recognition of the commercial opportunities space offers (examples include space tourism, the creation and exploitation of a permanent colony on the Moon, asteroid mining, Earth observation, and satellite constellations for global connectivity) has attracted investors and entrepreneurs seeking to capitalize on these opportunities.

**DEREGULATION AND FAVORABLE GOVERNMENT POLICIES:** certain countries have implemented policies that promote private sector investment and participation in space exploration. This has paved the way for private companies to become involved in space activities.

**COMPETITION:** competition among private companies in space has spurred innovation, translating into cost reduction and greater efficiency. Companies compete to offer high-quality space services at competitive prices, benefiting consumers and public space agencies.

**DEMOCRATIZATION OF ACCESS TO SPACE:** New Space also pursues the democratization of access to space by significantly reducing development and implementation costs. For example, it seeks to increase the availability of launch services, a key element in the deployment of space missions. This makes it possible for a wide range of players, from small startups to major companies, to develop their innovative businesses and ideas.

In short, New Space has come about as the result of a combination of technological progress, commercial incentives, favorable government

policies, and greater competition within the space industry. This shift has led to a revolution in space exploration and exploitation, with a greater emphasis on the participation of the private sector and technological innovation.

## Is New Space sustainable?

Sustainability, not just in New Space but in other contexts as well, is a key concept, and one that is constantly changing. As the space industry grows and diversifies, sustainability issues must be considered and addressed in order to ensure that space exploitation will be responsible and have a long-term vision. Sustainability issues in relation to New Space include the following:

**SECURITY AND RESPONSIBILITY:** the use of space on a massive scale by an increased number of companies and new players raises concerns about security and responsibility in the event of accidents or conflicts in space. International regulations and agreements must be established to address these issues and minimize the significant environmental impact on the Earth and in near space. Care must be taken to minimize negative impacts.

**MANAGEMENT OF SPACE DEBRIS:** one of the most pressing challenges in terms of sustainability is the growing accumulation of space debris in the Earth's orbit. Collisions and the accumulation of fragments pose a risk to spacecraft and satellites in orbit. The space community is working on measures to reduce, clean, and actively mitigate space debris.

**EFFICIENT USE OF RESOURCES:** sustainability is also linked to the efficient use of resources in space. This



includes the efficient management of fuel and energy, as well as minimizing space pollution.

**REUSING AND RECYCLING:** the focus on reusing rockets and spacecraft, which has been one of the key features of New Space, can be considered sustainable, as it reduces the need to manufacture new vehicles for each launch. Furthermore, the ability to recycle space components can also contribute to sustainability.

**ENVIRONMENTAL CONCERNS:** the environmental impact of space activities, such as rocket emissions and space pollution, is also a sustainability issue, and must be monitored and kept to a minimum.

**ETHICS AND RESPONSIBILITY:** sustainability in space also has to do with ethical issues and responsibility. This includes taking into account possible interference with celestial entities, preserving places of scientific interest, and managing space resources in a fair and equitable manner.

**INTERNATIONAL STANDARDS AND REGULATIONS:** effective international standards and regulations that address issues such as debris management, orbit coordination, and liability for damage caused in space, are needed to promote sustainability in space.

Overall, the sustainability of New Space is a growing concern and a priority for the space community and industry. As space exploration and activity continue to expand in scope, it is expected that additional measures will be put in place to address these challenges and guarantee a sustainable and responsible use of space. There are currently significant initiatives in progress both in Europe and the United States that seek a way to safely regulate access to space, with approaches drawing from experiences in the field of air traffic control.

# Is New Space profitable?

The profitability of New Space may vary widely depending on the company and the specific business approach. Certain activities and segments within New Space are proving to be somewhat profitable, while others are still in development and may require significant investment before they can generate profits. Some aspects to bear in mind when considering the profitability of New Space include the following:

**COMMUNICATION SATELLITES:** the launch and operation of satellite constellations to provide communication services and high-speed internet may be profitable, but this is yet to be seen, even with projects in the advanced stages such as SpaceX's Starlink, EUTELSAT's OneWeb, and others still to come, such as Rivada, Beetlesat, Startical, etc.

**SPACE TOURISM:** space tourism is a segment that has sparked great interest, with some companies beginning to offer suborbital and orbital trips. As infrastructure and demand increase, it could become a profitable sector in the future.

**EARTH OBSERVATION:** companies that offer Earth observation services through satellites have found commercial applications in fields such as agriculture, natural resource management, disaster prediction and more. This could be profitable thanks to growing demand for higher-quality ground data with lower latency.

**ASTEROID MINING:** though in its infancy, asteroid mining is a field in which some companies are investing, so much so that there are even countries that have

established regulations for these kinds of activities. It remains to be seen whether or not it is feasible to extract any useful material, and whether or not this is a lucrative business.

**MOON EXPLORATION:** we no longer look to the Moon solely out of scientific interest (though this interest hasn't gone away) but also in the hopes it will help us conserve our planet through the exploitation of its resources, as well as the establishment of permanent lunar bases in the future. In the same line, there are areas of interest associated with a preliminary analysis of the lunar surface using lunar rovers, orbiters, and sensors of different kinds.

**SPACE RESEARCH AND DEVELOPMENT:** many New Space companies are involved in space research and development, creating innovative technology that they can license to government agencies or use in commercial applications. This income can contribute to profitability.

**COMMERCIAL LAUNCHES:** offering rocket and satellite launch services to third parties is another segment in which some companies have found business success. Companies offering commercial launches, such as SpaceX, are currently in the process of turning a relatively successful profit on their investments, while others are in the process of demonstrating their technical viability. Obviously, the market will decide which companies survive.

However, it should be noted that New Space also comes with significant risks and costs, especially in the early phases of technology and business development. Investment in research and development, competition in the

market, and the need to comply with regulations and standards can affect profitability. The potential relaxation (or lack thereof) in the application of these "rules" may significantly condition the feasibility of the concept. Patience is also needed, as profitability often depends on a long-term vision and the ability to overcome initial obstacles, which may condition the continuity of private investors.

Finally, the profitability of New Space depends on specific factors in each company and project. Some companies have been successful making profits, while others are still in the research and development phase. Profitability in this sector continues to evolve as new technologies are developed and new commercial opportunities in space are explored.

Another significant aspect is the availability of public, but especially private, funding to make the process sustainable. In the early days of New Space, access to this funding was relatively straightforward, but in the future it may be significantly affected

by the initial profitability of some companies and sustainability over time in terms of the availability of these funds.

Ultimately, the evolution of New Space will depend on how the benefits of innovation, application diversification, and competition are balanced against concerns regarding privatization, security, and the environment. Many see New Space as an exciting opportunity to make progress in space use and exploration, but they also recognize the importance of adequate regulations and international cooperation to ensure that it unfolds in a responsible and sustainable manner.

## GMV as a part of New Space

When GMV was founded in 1984, it could be described as a startup. It emerged as a Spanish university

spin-off and was a pioneer in New Space at the time, though its origins and subsequent development were shaped by its connection with the European Space Agency (ESA) and the development of space programs in Europe at an institutional level. This in itself speaks to a difference between the mid-1980s and today's day and age, where private initiative clearly has a greater presence.

GMV is currently an industrial group with over 3,000 employees and is internationally renowned for both relevance and the quality of its projects. It is the sixth-largest space industrial group and the top medium-size (Midcap) space company in Europe.

From the beginning, GMV has been committed to continuous investment in R&D, the ongoing pursuit of innovation in its processes and developments, and the diversification of its activities, without being daunted by the technological challenge all of this may entail. This last point in particular has always been at the very core of the group's

identity, and will undoubtedly be part of its future. In one way or another, GMV has been able to adapt to the most demanding and competitive settings, which is why it's safe to say the company is part of New Space as defined in this article.

GMV is also a driver of new and currently emerging companies and projects that are shaping the development of New Space. Specifically, GMV plays a crucial role in the Miura 1 project by PLD Space, leading the development of avionics, software, and GNC (guidance, navigation, and control) systems for the company's micro-launcher. GMV's involvement is pivotal for the future success and consolidation of this family of launchers, as well as its market profitability in the not-too-distant future. This was clearly a major technological development and a step forward for GMV in terms of its capabilities.

And GMV has recently taken an even bigger step, incorporating the startup Alén Space into the group with the goal of more efficiently penetrating

the current market and providing this company with the support and boost it needs. The new ideas and capabilities Alén Space contributes will be driven by the experience and support GMV can offer.

Through cutting-edge technological projects, giving momentum to companies with a promising profile in the space sector and assisting in the process of developing and integrating innovation, success is guaranteed in a highly competitive environment such as New Space.



# Guillermo Lamelas

## CEO Alén Space

Guillermo Lamelas, born in Ferrol, A Coruña, in 1974, is the co-founder and CEO of Alén Space. He holds a degree in Telecommunications Engineering from the University of Vigo (1997) and an MBA from Insead (2006).

Before coming to Alén Space, Guillermo spent over five years as Head of Business Acceleration at Wayra and Open Future, the Telefónica Group's open innovation initiative and one of the world's largest entrepreneurship support networks.

In July 2023, it was announced that Alén Space would become part of the GMV group of companies through an acquisition agreement. The transaction involves GMV's acquisition of a majority stake in the company and a share capital increase. The aim is to allow Alén Space to increase its turnover more than tenfold over the next five years, to become a European and global leader in the small satellite industry. Under the terms of the agreement, Alén Space will continue to operate under its own brand and will retain its current management team.

In this interview, Guillermo Lamelas, CEO of Alén Space, tells us about the origins, history, and development of the

company, as well as its progress in the New Space industry.

### How did Alén Space start? In what areas does it specialize?

Alén Space is a developer and manufacturer of small satellites, delivering end-to-end solutions to companies that base their business model on space technology or that can improve or enhance their business model through New Space ventures.

The company is the result of the enthusiasm, effort, and perseverance of a group of people at the University of Vigo, led by Professor Fernando Aguado, who in 2007 decided to take on the design and manufacture of the first

Spanish nanosatellite (Xatcobeo), which was launched in 2012 and successfully completed its mission.

In 2014 we launched Humsat-D, a demonstrator satellite for data collection serving humanitarian purposes, which was supported by the United Nations Office for Outer Space Affairs (UNOOSA) and the European Space Agency (ESA). Humsat-D operated successfully for more than a year.

In 2013 the Brazilian Space Agency (AEB) selected and contracted the group to build the Brazilian satellite SERPENS. This satellite was developed based on the blueprints of the Xatcobeo and Humsat-D satellites, given the proven





track record of both. SERPENS was launched from the International Space Station in 2015.

Thanks to the reliability and technical excellence demonstrated by our previous satellites, work began on two new nanosatellites developed by our team. One was for a private company. The goal of the other, Lume-1, developed for the University of Vigo as part of the Interreg-Sudoe FIRE-RS project, is the early detection and characterization

of forest fires. Both satellites are in successful operation.

Along the way, seeing the market potential of small satellites, the team secured funding from the Galician Regional Government's Ignicia program to transfer the technology and knowledge developed to a new company, and in 2018 the Alén Space brand was born.

**What are the values that make Alén Space a pivotal company in the New Space industry?**

The values that guide our business come directly from the characteristics of our team. They are as follows: flexibility to adapt to the needs and working methods of our clients and a constantly changing internal and external environment, swift action to address the challenges raised by our clients, excellence to lead the way in our industry and foster pride in a job

well done, and responsibility to taken on our clients' challenges and establish long-term relationships based on trust. These values are underpinned by our exceptional team and the portfolio of technology solutions they have developed.

With these foundations, we strive for relationships of mutual trust with our customers so that we can innovate and disrupt from space with a focus on transparency.

**In 2012, the Strategic Aerospace Partnership of the University of Vigo (which would later become Alén Space) launched Xatcobeo, Galicia's first satellite. How has the landscape changed since then?**

In 2012, the year Xatcobeo was launched, fewer than 50 satellites of its kind were sent into space worldwide. According to Euroconsult, more than 18,000 small satellites are expected to

GMV's commitment to New Space is perceived as a strong endorsement of the sector

be launched over the next decade. The change that has led to this dramatic increase is new commercial interest in small satellites. While in 2012 they were mainly used for educational and scientific purposes, they have gradually taken their place in providing commercial solutions to the market.

### What projects is Alén Space currently working on?

Alén Space is currently developing five 6U satellites, while providing technology and methodological support to several leading companies and institutions in Spain and abroad.

One of the projects we like to highlight is SATMAR, a technological demonstrator that, with the support and funding of Puertos del Estado, will allow us to deploy communications for the maritime industry according to the new VDES standard.

### In your opinion, what are the main synergies that the agreement between GMV and Alén Space will create?

Though these companies are very different in terms of size and history, they're quite similar in terms of values

and culture. In this respect, we hope that the merger will nurture the most positive aspects of our shared culture.

What's more, the capabilities of both companies are perfectly matched and put us in an unbeatable position to seize the many opportunities that are opening up in the space industry on a national, European, and global scale.

### How do the employees of Alén Space feel about this new chapter starting with this agreement?

Without losing sight of the projects we're currently working on, there is a sense of excitement and anticipation for all the opportunities that this agreement will open up, both for the company and for their own careers.

### What about your customers? How have they received the news of the agreement?

Overall, the agreement has been very well received by our clients, our partners, and the wider industry community. The fact that a company as prestigious as GMV is betting on New Space through Alén Space, with the values we've talked about, is seen as a strong endorsement of the entire

The capabilities of both companies put us in an unbeatable position to seize the many opportunities that are opening up in the space industry on a national, European, and global scale

sector and the role Spain wants to play in it.

### What do you see as the main challenges facing the space industry in the short, medium, and long term?

In our field, I think the main challenge has to do with the consolidation of the expectations placed in New Space. We need the expected demand to materialize, and we need to be able to cover a significant part of this demand. To achieve this, we must be able to maintain the advantages of New Space in terms of agility and cost, while at the same time learning about the traditional space industry and increasing the quality and reliability of our solutions. This path will necessarily involve a gradual industrialization of the industry and its entire supply chain.



# The tenth edition of "AED Days" focuses on sustainable aviation



■ GMV attended the "AED Days" event, organized by the Portuguese cluster and bringing together key stakeholders in the aeronautics, space, and defense sectors. The event, with an impressive 620 participants, 289 companies and 21 nationalities represented, highlighted the importance of sustainable aviation, the desire and need for internationalization, and the emerging defense and space landscape open to all.

The hybrid event has become a major showcase for Portugal's innovation

and technology. This year it took place from 30 May to 2 June at the Taguspark in Oeiras and featured various talks, workshops, lectures, forums, and networking sessions.

José Neves, President of AED Cluster Portugal and Homeland Security and Defense Director at GMV in Portugal, had the honor of opening the event with a speech on the role of companies in developing new solutions and the importance of innovation in the work of all players in the defense ecosystem. Neves also highlighted the

intention to "raise the cluster's profile internationally," "promote collaboration among individuals and nations," and "enhance the country's credibility," all by promoting knowledge and fulfilling the primary goal of the AED Days Event to foster "connections and collaborations."

Teresa Ferreira, Satellite Navigation Director at GMV in Portugal, also took part in the event, moderating the panel discussion entitled "Space and Defense: Protecting Portugal," with speakers from the Armed Forces, Navy, Air Force, and Army General Staff.

## GMV attends the anniversary of the Portuguese Air Force

GMV witnessed with thousands of visitors, the aerobatics in the skies of Beja, Portugal.

Along with the celebrations of the 71<sup>st</sup> Anniversary of the Air Force, the Beja Air Show is an open and free-air festival. This event is a unique opportunity for visitors to appreciate the beauty of aviation by witnessing aerial demonstrations and acrobatic performances. But the dynamics of the event also involve interactive

activities with virtual reality glasses and flight simulators, exhibitions of national and international aircraft, and various other products from the aerospace sector and the region.

At our booth, Hugo Reis, GMV's Homeland Security and Defense Project Manager, had the opportunity to present our SAFETERM solution. A system that leverages state-of-the-art artificial intelligence technologies to enhance

safety in Remotely Piloted Aircraft Systems (RPAS) emergencies, ensuring safer flight termination.

José Neves, President of AED Cluster Portugal and Homeland Security and Defense Director at GMV in Portugal, was one of the speakers at a conference, discussing various projects and perspectives for the future of the Portuguese space and aeronautic sectors.



# Joint National Office established for the NGWS/FCAS program

As a SATNUS partner, GMV took part in June in the kick-off meeting together with other representatives of Spanish industry

**I**n June 26<sup>th</sup>, Spain's Minister of Defense, Margarita Robles, visited the country's new Joint National Office for the Future Combat Air System (FCAS), as a show of support to demonstrate her Ministry's commitment to that European program. GMV is a partner in the SATNUS joint venture, which is a member of the Joint National Office, and the company was represented during the Minister's visit by its CEO, Jesús B. Serrano.

The Joint National Office (*Oficina Conjunta Nacional*) was inaugurated with an initial meeting held in early June, which was presided over by Amparo Valcarce, Spain's Secretary

of State for Defense. GMV attended that inaugural meeting along with representatives from the other Spanish companies participating in the NGWS/FCAS program and from the Ministry of Defense's program office.

The FCAS program is one of Europe's largest aerospace defense projects. In the upcoming years, with a planned operational date of 2040, Spain, Germany, and France will be the three Member States responsible for leading each of the program's pillars, which will give Europe a leadership defense position with fully mature technologies. GMV is one of the program's key Spanish participants. Specifically, it is a member of the

SATNUS consortium, which is focused on developing novel technologies and assessing new concepts for unmanned aerial vehicles (UAVs).

The scope of the NGWS/FCAS program also makes it a key project in terms of Spain's technological sovereignty, by putting the country at the leading edge of technological development and innovation. For GMV, it will enhance the company's leadership position in the European defense industry, specifically in UAVs, where it has already established a reputation as a developer of innovative technological solutions in areas such as avionics, mission systems, navigation, and guidance and control.



# GMV develops a cryptographic module for the Galileo authentication service



MV has developed a secure cryptographic module that incorporates all the cryptographic algorithms and functions required by the Galileo Open Service Navigation Message Authentication (OSNMA) service. The module has been developed in accordance with the most stringent and widely recognized international standards: ISO/IEC 19790:2012 “Security requirements for cryptographic modules” and ISO/IEC 15408:2022 “Evaluation criteria for IT security.” This ensures that the end product is robust, effective, and secure. In order to provide significant added value in terms of



reliability (guaranteed by the National Cryptographic Center, Spain's national cryptological certification authority), the module has been developed in compliance with the cybersecurity requirements established by the Common Criteria for Information Technology Security Evaluation (CC). This will allow it to obtain the CC certification after passing the corresponding official evaluation by an independent accredited laboratory.

This Common Criteria certification will give the module international guarantee recognition and facilitate its inclusion in the list of certified

products published by the Common Criteria organization and the CCN Catalog of ICT Security Products and Services (CCN-STIC 105).

In anticipation of the necessary migration to post-quantum cryptography, which is expected to begin in early 2025, GMV has designed and developed the module according to the principle of cryptographic agility, so that future updates to new post-quantum algorithms and all those required by Galileo's emerging authentication services can be done easily and at least partially automated. This will enable GMV to cope with

the cryptographic challenges arising from the development of quantum computing technology and the release of new Galileo authentication services.

The aim is to have a secure and reliable cryptographic module that guarantees the effective use of the cryptographic algorithms and functions required by current and future Galileo authentication services. This is the first step in the capability-building process that will provide GMV with technological independence in the field of cryptography, which is becoming increasingly necessary, widespread, and relevant.



# Galileo is growing, and so is GMV



■ Five years after the start of the Galileo GCS contract, for the development of Galileo Ground Control Segment, GMV, together with the European Space Agency (ESA) and the European Union Agency for the Space Programme (EUSPA) took another step towards the completion of the Galileo

program infrastructure. The company opened a new tracking station in Kourou, French Guiana, bringing the total number of telemetry and tracking stations in the Galileo network to seven. These stations are located in the cities of Kiruna, Noumea, Reunion, Redu, Papeete, and finally, as of this summer, Kourou.

GMV, as the main contractor, was supported by subcontractors such as Indra and COPI Vertex to carry out the work, which was complicated by the pandemic and the supply chain crisis but which finally concluded successfully with the launch of the program's last station.

The operational deployment, following one already carried out by GMV in the Galileo ground segment (GCS v3.0), has two main goals. The first is to increase the capacity of the Galileo stations. With 28 satellites already in orbit, another 10 on the ground ready to be launched and awaiting the second generation of Galileo, the program needs to increase the number of stations to continue to enable control and monitoring of the constellation. The second goal is to enable the current network of stations to start a cycle of obsolescence resolution that GMV will also lead in the current contract for the next three years, as well as a complete redesign of the Redu antenna and the deployment of the eighth station, which is to be located in Fucino and is expected to be operational by 2026.

When this work is concluded, the ground tracking and telemetry network infrastructure will be complete, both for the first and second generations of Galileo.

## Present and future of satellite navigation

The 14<sup>th</sup> ESA/JRC International Summer School on GNSS, organized by the European Space Agency (ESA) and the Joint Research Centre (JRC), took place in July in Kiruna, Sweden. The Summer School, sponsored this year by GMV, trains the next generations of scientists and engineers to master space-related applications.

This year's program focused on giving students a comprehensive overview of satellite navigation, an area in which GMV is a clear leader, covering concepts such as global navigation satellite systems (GNSS); signals and data processing in receivers; and positioning, navigation, and timing (PNT) solutions. The Summer School,

which included a series of lectures on the present and future of satellite systems, also focused on having the students develop an innovative group project covering all stages of entrepreneurship, from an initial business idea or plan to the technical implementation and commercialization of the final product.

# Successful qualification of the new Galileo Service Center Infrastructure

■ The Qualification Review meeting of version 1.4.1 of the Galileo Service Centre (GSC) Infrastructure took place in Madrid on July. This milestone, which is crucial for launching the Galileo OSNMA (Open Service Navigation Message Authentication) in the next months, has been successfully closed. The Galileo OSNMA service will allow Galileo users to certify that the messages used for calculating their positioning information have been broadcast by Galileo satellites and not falsified. This verification layer is an invaluable feature as it protects the Galileo signal from spoofing attacks. This is a major achievement for European GNSS; it is the first signal from a constellation of navigation satellites to provide this service worldwide, making Galileo the most robust and secure GNSS system.

The GSC, part of the infrastructure of the European Galileo navigation program, is responsible for generating the OSNMA messages and delivering them to the Galileo Ground Mission Segment for their later dissemination to users through the Galileo satellites. The main role of this center, located in Torrejón de Ardoz (Spain), is to offer support and advice to the Galileo user communities and to provide added-value navigation services. It is designed as a think-tank for knowledge exchange, performance analysis, GNSS awareness, and added-value service delivery support.

The new version (V1.4.1) of the GSC, which has just been qualified, will make it possible to deploy the Galileo OSNMA. The previous version (V1.4) is currently in the air in test mode, allowing users to test the new

OSNMA interfaces before the launch of the operational service.

The GSC is run by the European GNSS Agency (EUSPA) with support from Spain, which provides the Galileo program with the necessary infrastructure and facilities to host the center. In 2014, a GMV-led consortium, together with Indra, won the framework contract for the provision of GSC infrastructure. During all these years, the GSC Infrastructure consortium has played a major role in this great success, highlighting GMV's work and confirming its position as a reliable partner. During the implementation phase, the consortium worked closely with EUSPA and other stakeholders to develop the GSC, upgrade Galileo's services and make Europe's GNSS the global leader in secure and robust navigation.



# The G2IOVGCS projects officially kicks off



■ GMV chose the Viñuelas Castle, located in the municipality of Madrid, in the area known as Soto de Viñuelas, near GMV's head offices in Tres Cantos, as the venue for the kick-off meeting (KOM) of the project to develop the ground segment for the in-orbit control and validation (IOV) of the second generation of Galileo (G2G).

The primary objectives of the European Galileo second-generation satellite navigation system are to introduce new state-of-the-art services and

technologies; improve existing services and tech; increase the accuracy and robustness of the system; strengthen security; and reduce the system's maintenance costs. These efforts seek to consolidate and enhance Galileo's position across the globe.

The new contract signed between GMV and ESA is worth over €200 million. This includes the contracting of core G2G activities for a value of around €155 million. These activities will be carried out over a period of 42 months,

from mid-2023 until the end of 2026, with options for extension until 2028.

The event, which was attended by a sizable representation of GMV professionals involved in the Galileo project at a general level and representatives from other corporate departments and sectors, was also attended by representatives of the European Space Agency (ESA), the European Union Space Programme Agency (EUSPA), and subcontracting firms.

## Extension of the GCS-FOC2 framework contract

■ This July, GMV signed an extension of the Ground Control Segment (GCS) contract activities until late 2026, including a new work order to complete all first-generation Galileo activities in the GCS field. This work order was signed with the European Union Agency for the Space Programme (EUSPA) within the GCS FOC2 framework contract, awarded to GMV in 2018. The signing of this extension and the new work order include the development of operational improvements, as well as a new deployment strategy that will ensure the flexibility the program needs in order

to accommodate the various launches scheduled in 2024 and 2025 and the parallel deployment of the mission segment.

The contracted activities that GMV will carry out over the next few years make up the final contribution to the development of the Galileo infrastructure during the Full Operational Capability (FOC2) infrastructure, which will include the full deployment of the constellation in the space segment (including up to 38 satellites), a centralized monitoring of the

system's security, and all the first-generation Galileo services.

These new first-generation activities will be carried out in parallel with, and independently of, the contract awarded to GMV by the European Space Agency (ESA) in June 2023 for the development and deployment of the GCS of the second generation of Galileo. The performance of both contracts at the same time until 2026-2027 will be a major undertaking for GMV as it cements its place as the main contractor in Europe.

# PASSport project test campaign in Hamburg

■ Ports are heavily trafficked areas with many entry points operating non-stop, exposing them to vulnerabilities that could lead to failures or disruptions in their daily operations, thereby degrading their services and infrastructure.

The purpose of the EUSPA project known as PASSport (Operational Platform managing a fleet of semi-autonomous drones exploiting GNSS High Accuracy and Authentication to improve Security & Safety in port areas) is to engineer and qualify a solution that extends situational awareness in order to improve security and safety in port areas.

One of the novel features of PASSport is the use of a fleet of semi-automated aerial and underwater drones, integrating Galileo capabilities and other sensors to make port surveillance more reliable, allowing the drones' imagery to detect and locate potential targets, and enabling safe and efficient guidance, navigation, and control (GNC) in challenging environments with obstacles and potentially adverse weather conditions.

GMV is involved in PASSport in three ways. First, it provides OSNMA- and PPP-enabled GNSS receivers based on an evolution of the MAGIC user terminal (wizaRX) that can be integrated into the aerial drones to improve their positioning accuracy and integrity, while also implementing authentication capabilities. Second, it uses the **SRX-10i**/DINTEL interference monitoring system to ensure the robustness and protection of the GNSS signal against any possible radiofrequency interference. Third, it provides **Shiplocus**<sup>®</sup>, its commercial, multi-application platform for port management and maritime traffic operations.

The project involves several validation campaigns to demonstrate the capabilities of the PASSport solution.

In June, the developed solution was successfully tested in the Port of Hamburg during the local Homecoming Homeport event. In terms of authentication, the team demonstrated the performance of

the OSNMA Galileo service with advanced GNSS receiver solutions through a number of tests. The **SRX-10i** product was also deployed on site to demonstrate its ability to detect GNSS interferences in an operational maritime context. A new demonstration will take place in the Port of Valencia in October 2023, with all the GMV products mentioned above.



# GMV GSharp®: Safe high-accuracy reliable positioning solution for multiple market domains

■ GMV, as a world-renowned supplier of positioning technologies, has consolidated and evolved its high-precision commercial solution by significantly expanding its client portfolio.

**GMV GSharp®** solution serves customers from a wide range of sectors and user applications. Its precise GNSS products are used in several LEO missions by multiple space operators, its high-accuracy corrections are broadcast by major players in the provision of precision agriculture solutions, and its high-accuracy and safe corrections, together with its SPE, are used by world-renowned automotive OEMs.

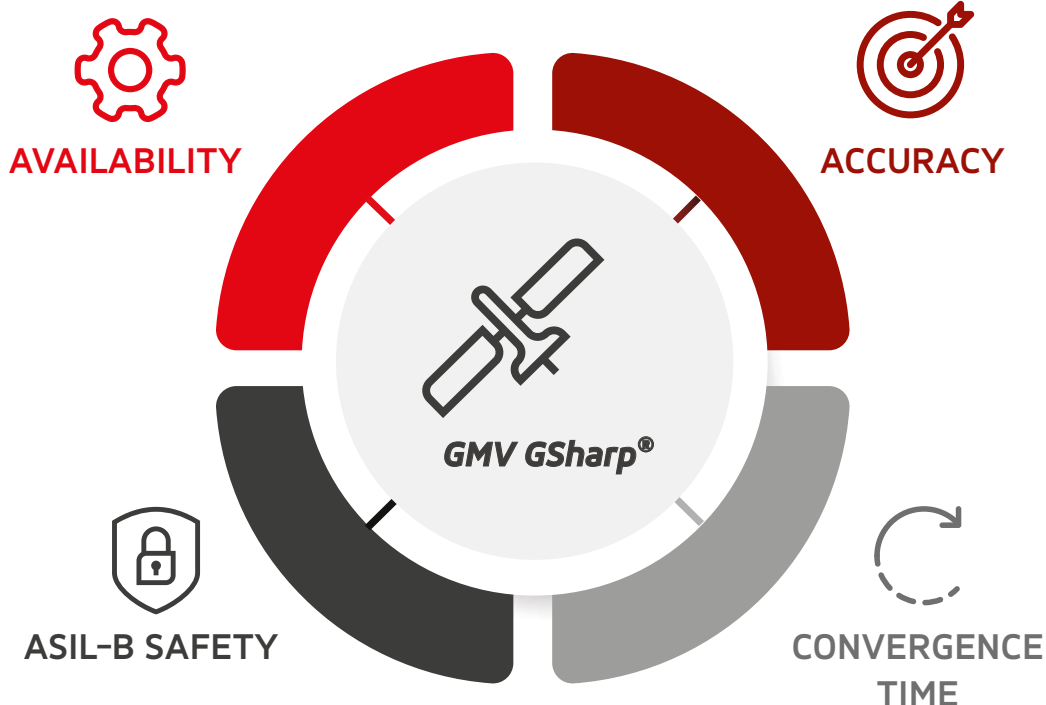
In this regard, **GMV GSharp®** is GMV's High Accuracy solution flagship, a Safe High-Accuracy Reliable Positioning Solution for multiple market domains. The **GMV GSharp®** solution comprises

three main pillars: the Safe Correction Service (SCS), the Safe Positioning Engine (SPE), and the Global GNSS Station Network (GGSN). The Safe Correction Service (SCS) computes the GNSS satellite orbits, clocks, biases, and ionospheric corrections along with integrity flags and error bounds for delivery to GMV customers. These corrections are computed in two redundant processing facilities – one in the US and one in the EU – that are operated and monitored 24x7. For safety-related applications, an ISO 26262 and ISO 21448 compliant safety processor system validates the corrections and provides additional integrity information.

The SPE is the on-board element that calculates position, velocity, track angle, heading angle, and the associated integrity status and protection levels for the various

outputs. This computation is based on the GNSS information provided by the measurement engine in combination with the IMU data, other sensors, and correction service data provided by the SCS. It has been developed in compliance with ISO 26262 (ASIL-B process), ISO 21448 (SOTIF process), and ISO 21434 (cybersecurity). It is also adaptable to other standards such as CENELEC EN 50128 for rail and DO-178/ED-12 for aviation, as well as space industry standards.

The Global GNSS Station Network (GGSN) is a global reference network deployed, owned, and operated by GMV, which allows continuous monitoring of all flying GNSS satellites. It collects GNSS observation and navigation measurements in RTCM and raw format, together with NavBits, which are delivered in real time to GMV's processing facilities.





# GMV wins the contract to develop new White Rabbit switch

■ White Rabbit is an emerging open hardware technology designed for time distribution over fiber optic networks using Ethernet, independent of GNSS. Initially developed to synchronize particle physics experiments at CERN, the European Organization for Nuclear Research, White Rabbit has gradually found applications in a wide variety of fields, such as comparing remote atomic clocks (metrology), synchronizing arrays of antennas in radio telescopes, and recording highly accurate timestamps in stock market transactions. Offering sub-nanosecond precision, White Rabbit stands out as the ideal solution for synchronizing large and intricate distributed systems.

The White Rabbit switch, in its latest version (v3.4), stands as the cornerstone of this technology, although CERN is in the process of finalizing specifications and prototyping an upgraded version (v4). A standout feature of the new switch will be the integration of an expansion card, facilitating the incorporation of additional functions. This card will enable the development of attractive



proprietary solutions while upholding the ethos of open hardware.

One of the planned applications for the expansion card is to house a quantum atomic clock, replacing the oscillator on the White Rabbit motherboard, which is the default system. The significant advantage of this alternative clock lies in its superior capability to maintain precise time in the event of interruptions or temporary unavailability of the synchronization source, a feature commonly known as holdover. A common requirement, especially in telecommunications, is not to exceed a deviation of 1.5 microseconds over 24 hours from the loss of the synchronization source.

This performance surpasses that of the standard White Rabbit switch by approximately three orders of magnitude.

Innovate UK granted GMV a £2 million contract this year to develop an upgraded version of the White Rabbit switch with enhanced clock holdover capabilities. This project is part of the Quantum positioning, navigation, and timing systems funding program. GMV is spearheading the development effort, with the aid of IQD, a respected clock manufacturer based in the United Kingdom. Through their involvement in CERN's new White Rabbit Collaboration Program, the company is set to join the global White Rabbit community.

## Challenges in the European space sector

This July, the 3<sup>rd</sup> European Space Forum took place in Brussels with the theme "Strength, security, resilience – Protecting Europe's interests in and through space." Against a background of challenges, technological change, and increasing competition in the space industry, and in light of the recently approved European Union Strategy for Security and Defense, the key themes of the forum were security and defense, sustainability, competitiveness, innovation, and connectivity.

Those attending had the opportunity to network and exchange views on how to secure Europe's position as a key player in the new age of space-related innovation. Some of the topics of discussion that received the most attention were those related to space, defense, and security; issues surrounding Europe's funding deficit and investment in space; the goals of the Infrastructure for Resilience, Interconnectivity and Security by Satellite (IRIS2) initiative;

and space traffic management (STM).

GMV attended the event as a Platinum sponsor. Enrique Fraga, GMV's EST Space Systems General Manager, took part in the session on "Delivering on the goals of secure, autonomous connectivity in Europe," in which he highlighted, among other points, the transformative nature of today's industry thanks to the IRIS<sup>2</sup> initiative, a way to provide secure, resilient, and autonomous connectivity in Europe.

# Current threats to Global Navigation Satellite Systems

■ The use of technology, applications, and services associated with GNSS (Global Navigation Satellite Systems) is increasingly widespread, cementing GNSS as a key element of critical industries in both the public and private sectors. This critical dependence on GNSS systems results in an increase of risks and threats that, if not adequately addressed, may have devastating consequences. According to the European Commission, 7% of the European economy currently depends on navigation satellite signals.

There are several aspects to take into account in relation to this new reality: First, each and every one of the many threats must be considered, in the knowledge that enemies will analyze all vulnerabilities and attack the

weakest point. Second, the security of GNSS systems is not only affected by cyberthreats, but also by a wide range of natural, technical, logistical, human, and physical threats.

A GNSS system is a complex ecosystem covering not only the three specific segments (space, ground, and user) but also the industrial field and the associated services and applications, making it necessary to analyze and consider the threats intrinsic to each field. It is also necessary to consider indirect threats, as threats to one segment or field may affect another segment or field due to interconnectivity among them. In addition to typical threats to GNSS systems, the space industry must pay

special attention to cyberthreats to intellectual property and the supply chain. The Russia-Ukraine war has reshaped the current state of threats, increasing the risk to GNSS systems. Cooperation among all components of the GNSS ecosystem is of vital importance to keep networks, systems, and services secure.

GMV is fully aware of the serious and complex nature of the current situation, which is why it is constantly analyzing the threats to GNSS systems and preparing strategic intelligence reports on the threat that are distributed to the government agencies involved, helping design more secure systems and boosting trust in the systems and services developed and provided by GMV.

## GMV participates in the new edition of ION GNSS+ 2023



■ Once again, GMV was present at the new edition of ION GNSS+ 2023, in Denver, Colorado. The conference, hosted by the non-profit organization Institute of Navigation (ION), brought together a diverse group of international leaders in satellite navigation and other fields related to Positioning, Navigation, and Timing (PNT) technologies. Its purpose was to present key findings from R&D activities, unveil innovative products, engage in discussions about current sector policies, and facilitate knowledge exchange.

GMV, which attended the event with a dedicated space, showcased several innovations, including the **GMV GSharp®** solution—a high-precision positioning service designed for a diverse range of applications across various markets.

GMV also unveiled additional applications and innovations, such as ASGARD, a maritime receiver equipped with spoofing detection and mitigation capabilities through Galileo's OSNMA service OSNMA (Open Service

Navigation Message Authentication). The sub-decimeter-level precision attainable with HASTAG, GMV's positioning engine designed for Galileo's high precision (HAS) service was presented. And furthermore, it was possible to monitor the performance offered by SouthPAN, the pioneering SBAS system developed as a service. GMV had a prominent presence at the event, participating in 14 different sessions. These sessions encompassed a wide range of topics, including the standardization of Galileo time receivers, GNSS integrity monitoring with LEO Satellites, the features of the PPP-RTK service in Australia using 3GPP LPP and 5G, GMV's contribution to projects such as PASSport of the EUSPA or SouthPAN of the governments of Australia or New Zealand, as well as the participation of GMV's role as a panelist in discussions addressing challenges in autonomous applications.

# GMV, key supplier of the Galileo Reference Centre

The company was awarded a contract for operation, maintenance and support services for the GRC for 18 months

**G**MV recently signed an 18-month contract extension with the European Union Agency for the Space Programme (EUSPA) for the operation, maintenance, and support of the Galileo Reference Centre (GRC). These activities will ensure the continuation of the GRC mission while the GRC V2 tender process is completed. The contract is also a clear demonstration of the excellent work performed by GMV on the GRC project over the past years.

EUSPA awarded GMV the first contract for the GRC, one of Galileo's

key facilities, in 2016. Under that contract, GMV was responsible for the development and subsequent operation of the monitoring infrastructure for all Galileo services, independent of the rest of the Galileo system. Initially a four-year framework contract, it was extended several times until early 2023. This latest contract extension has allowed the inclusion of monitoring capacity and new Galileo system services, such as the Galileo High Accuracy Service (HAS) and the Open Service Navigation Message Authentication (OSNMA), which were not foreseen in the original contract.

GMV's flexibility has allowed the original GRC infrastructure to be upgraded to monitor not only the above Galileo services, but also GNSS constellations such as BeiDou and Glonass, in addition to Galileo and GPS.

Apart from the challenge of designing and developing a GRC infrastructure that could easily evolve in line with EUSPA's needs, the GRC activities included operating the system under a strict service-level agreement (SLA). The GMV team also carries out research and experimentation at the request of EUSPA to address any unexpected behavior of Galileo.



# EAGLE-1 mission on track for launch

■ The EAGLE-1 mission, planned for the end of 2024, will launch a satellite into low Earth orbit (LEO) to provide Europe with a secure quantum key distribution (QKD) system from space. The project, which includes ground and satellite infrastructure, is led by the company SES and its consortium of 20 European partners, with support from the European

Space Agency (ESA) and the European Commission (EC).

EAGLE-1 will be the first secure European sovereign QKD system in space. It will rely on the EAGLE-1 satellite, manufactured by SITAEL, and will use laser communications and the advanced QKD operations center in Luxembourg.

As part of the EAGLE-1 program, GMV has been entrusted to provide a ground control center based on its **Hifly®** product and a flight dynamics system based on **FocusSuite**. The launch of the satellite will be followed by three years of in-orbit validation.



# GMV to provide FDS for Viasat's GX7, GX8, and GX9 satellites

■ GMV will provide its innovative flight dynamics system (FDS) for Viasat's upcoming GX7, GX8 and GX9, satellites. These new satellites will add capacity and capabilities to Viasat's GX network, which provides high-speed global broadband services. Each satellite will deliver approximately twice the total capacity of the entire current GX constellation and will use software to simultaneously create thousands of independent beams of varying size, bandwidth, and power that can be reconfigured and repositioned in real time.

Manufactured by Airbus Defence and Space, the GX7, GX8, and GX9 satellites will be anchored on Airbus' innovative

Onesat platform. The three Ka-band spacecraft will use digital payload design, including onboard processing and active antennas, to adjust their coverage, capacity, and frequency.

The mission is supported by Viasat's partnership with GMV, which lends its specialized expertise in flight dynamics systems for precise ground control. The company's proven track record highlighted by its contributions to previous successful Inmarsat missions speaks to the importance of this collaboration.

These satellites represent an important technological milestone for Viasat and are central to the expansion of the GX network. The

satellites will support sectors such as maritime transport, aviation, and defense by providing customers with enhanced broadband services. Their transformative impact extends beyond industrial applications, with the potential to bridge communication gaps in remote regions and drive innovation across the global connectivity landscape.

Viasat's partnership with GMV is focused on innovation and precision, ensuring that upcoming missions are carried out with the utmost accuracy. As the GX7, GX8, and GX9 satellite program progresses, the potential for high-speed global communications will continue to benefit customers through enhanced connectivity.

# EUMETSAT accepts the telemetry and telecommand station of EPS-SG

■ The Telemetry, Tracking, and Control (TTC) component of the EPS-SG Mission Control and Operations (MCO) sub-segment, developed by a GMV-led consortium, was fully accepted by EUMETSAT at the Final Acceptance Review Meeting. The MCO is a major building block of the overall EUMETSAT Polar System - Second Generation (EPS-SG) ground segment. The MCO will enable end-to-end monitoring and control of the Metop-SG spacecraft, from telemetry acquisition to transmission to the control center for Metop-SG satellite monitoring, mission planning of ground- and space-based resources, and command uplinking for immediate or delayed onboard execution.

The TTC component is physically located in Svalbard, close to the Arctic Circle. Its development by GMV represents several firsts in the company's history: First of all, it is the first time GMV has been responsible for the design, component procurement, and production of an S-band ground station. In addition, GMV has developed

a simulator for end-to-end data flow tests at a ground station (including hardware in the loop). This is also the first time GMV has performed an on-site acceptance of a ground station in Svalbard.

The production involved GMV's coordination of three companies to run test campaigns in four different countries, civil works and on-site integration and testing in polar conditions, and the acquisition of very important know-how for future projects.

The ground station has been in operation for EUMETSAT for more than two years, during which time it has undergone all types of tests and has been operated with in-orbit satellites, demonstrating its quality and suitability.

EUMETSAT expressed its satisfaction with the product and congratulated all members of the EPS-SG MCO team, led by GMV. As a further result of the acceptance, the GMV-led team was also contracted to maintain the ground station.

## Final meeting of the European Space Agency's GDA Climate initiative

The most recent meeting of the "GDA Climate" initiative, held at the European Space Agency (ESA - ESRI) facilities in Frascati, Italy, served to present the latest results of the different use cases carried out during the project and the views of the main clients—the Asian Development Bank (ADB) and the World Bank (WB). The meeting was a success, as all the milestones and goals were met with the quality required and on time. The overall goal of the ESA's GDA program is to enhance international development operations by using Earth observation solutions, as an effective and sustainable way to address a wide range of issues.

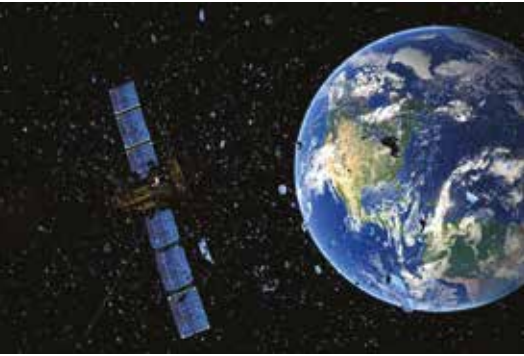
GDA Climate is just one stop on a journey that began five years ago with the EO4SD Climate project. Its scope of activity has recently broadened, with a €450,000-extension of the contract that seeks to track activities and continue providing the WB and ADB with more up-to-date reports and value-added layers of information on which to base decision-making in daily monitoring tasks associated with the major projects that these clients usually manage.

Outside of the GDA, GMV is also working with the BM and the ADB on other initiatives related to Earth observation for sustainable development.



© ESA

# First operational version of mission system for the German Space Situational Awareness Centre



■ At the end of 2021, GMV was awarded two contracts by DLR for the development of its new product line for catalogue build-up and maintenance. The first was to develop a new astrodynamics library (called BaSSTDa) implementing the low-level algorithms used in the Space Surveillance and Tracking (SST) domain.

The purpose of the second contract was to develop, install, and integrate the civilian German Space Situational

Awareness Center (GSSAC) Mission System (GMS). The main contribution of this system to the EU SST partnership is the build-up and maintenance of the space objects catalogue by processing SST data shared by the EU SST members. This catalogue is at the heart of the EU SST services, as it provides the space objects information (characteristics and orbital data) to the other services within the partnership (collision avoidance, fragmentation, and re-entry). We are proud to say that GMV is responsible for its complete development and operationalization.

The system includes all the software required for SST data processing, as well as databases and archives, system interfaces, and the framework responsible for orchestrating the process. It is made up of the following components: external interfaces handling, including data ingestion

(external auxiliary data) and data sinks (generated by GMS); data processing software, as the core of the GMS responsible for building up and maintaining the object catalogue; orchestration and framework software responsible for controlling the flow of data across the different modules and for the overall orchestration (data ingestion, pre-processing, storage in databases and/or file system, etc.); portal software, a web-based graphical user interface to access all input and output data; product generation software and product submission software responsible for submitting products to internal and external users.

After two years of intense work, GMV implemented the first operational version in DLR. Its entry into operation is scheduled for the second quarter of 2024, once the validation and acceptance phase has been completed.

## GMV attends several ESA's conferences in Poland

The combined 12<sup>th</sup> International ESA Conference on Guidance, Navigation and Control Systems and 9<sup>th</sup> International Conference on Astrodynamics Tools and Techniques took place in Sopot, Poland, from 12 to 16 June, bringing together numerous stakeholders from the space industry.

GMV presented seven papers and two posters on a wide array of topics, including machine learning, artificial intelligence, convex optimization, verification and validation, fault tolerance, reusable launchers, novel attitude and orbit control systems, in-orbit assembly,

vision-based navigation and its application in the HERA mission, and scientific CubeSats.

A highlight of GMV's participation in the event was the presentation by the Portuguese team, led by Guidance and Control Section Head Pedro Lourenço, of GMV's work on the verification and validation of optimization-based control systems (a joint initiative with ENAC - Ecole Nationale de l'Aviation Civile, IMTEK, the University of Freiburg, and Thales Alenia Space). For his part, Technical Leader Francisco Cabral presented GMV's design, development,

validation, and verification of the AOCS/GNC for HERA, as well as his team's work on refactoring this subsystem for the Comet Interceptor, while minimizing the validation efforts by transferring heritage between small-body missions.

Guidance Navigation and Control Division Head Ambroise Bidaux-Sokołowski chaired the conference sessions on image processing, vision-based navigation, and autonomous navigation, where Julia Wajoras presented "GMVision", a co-processor for complex vision-based autonomous space navigation.

# Greek SST system goes live with GMV software

Over the summer, GMV successfully delivered key components of its SST COTS software suite (**FocusSST**) to the National Observatory of Athens (NOA), the signatory of authority for EU SST partnership and national SST coordinating body. **FocusSST** components were installed in both the Greek National Operations Center (GRNOC) and the network of affiliated observatories hosting Greek optical telescopes and participating in the EU SST Partnership.

The following **FocusSST** components were installed at the GRNOC: **Senplanner**, **Sstod**, **Closeap**, and **Reenpred**. With this software, the GRNOC will be able to perform skillfully the SST operations, namely optical sensor planning and tasking, orbit determination and sensor calibration, conjunction detection and collision risk assessment and avoidance, and re-entry prediction. In addition, most of these operations run automatically as part of routine operations.

**Gendared**, which is also part of **FocusSST** and is responsible for the astrometric reduction of the images taken by the optical sensors, was installed at four optical observatories for the following telescopes: GR-Kryoneri (NOA), GR-Skinakas 1 (FORTH), GR-Thessaloniki 1 (AUTH), and the Baker Nunn camera (NTUA).

All these software components, adequately integrated and adapted in collaboration with the skilled personnel of the team, work together and in a fully automatic manner on a daily basis.

This enables the Greek SST system to respond to tasking requests and provide routine measurements in near real time to the EU SST Database as a Greek contribution to the EU SST Partnership. It will also enable NOA to provide collision avoidance and re-entry analysis services to users in EU and non-EU territories. It will further support the advancement of the relevant research and service upgrade of the country in the domain, and in collaboration with national and international stakeholders and satellite operators from the private and public sector.

It is worth noting that Greece keeps investing large funds into the development of new SST/SSA assets as the on-going installation of a tracking radar system and new optical/camera sensors.

With this project, GMV in collaboration with the GR-SST system demonstrate the ability to provide a fully integrated and operational SST system based on **FocusSST** components that meets EU SST requirements and additional national needs.

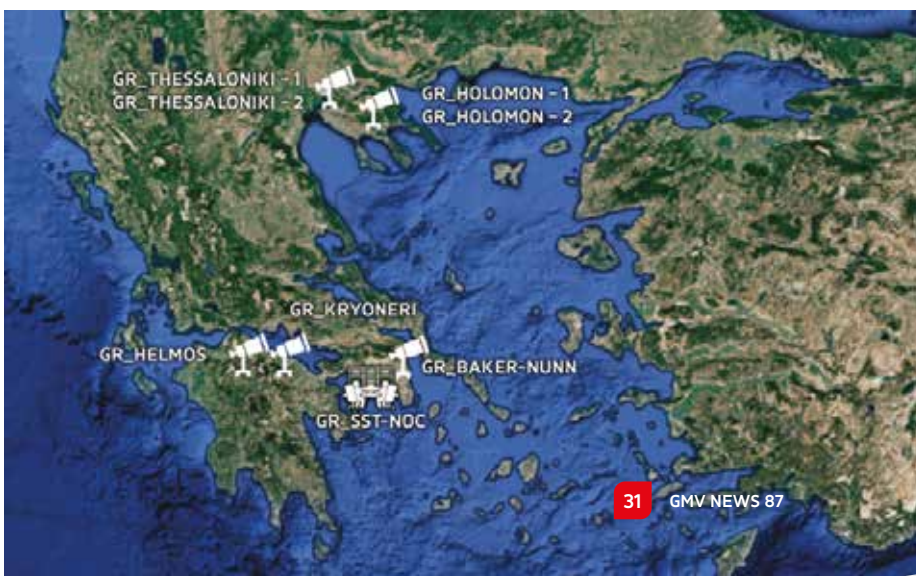
## GMV attends the main Space Domain Awareness conference in the US

From September 19 to the 22, GMV attended the annual Advanced Maui Optical and Space Surveillance Conference (AMOS) held in Maui, (Hawaii).

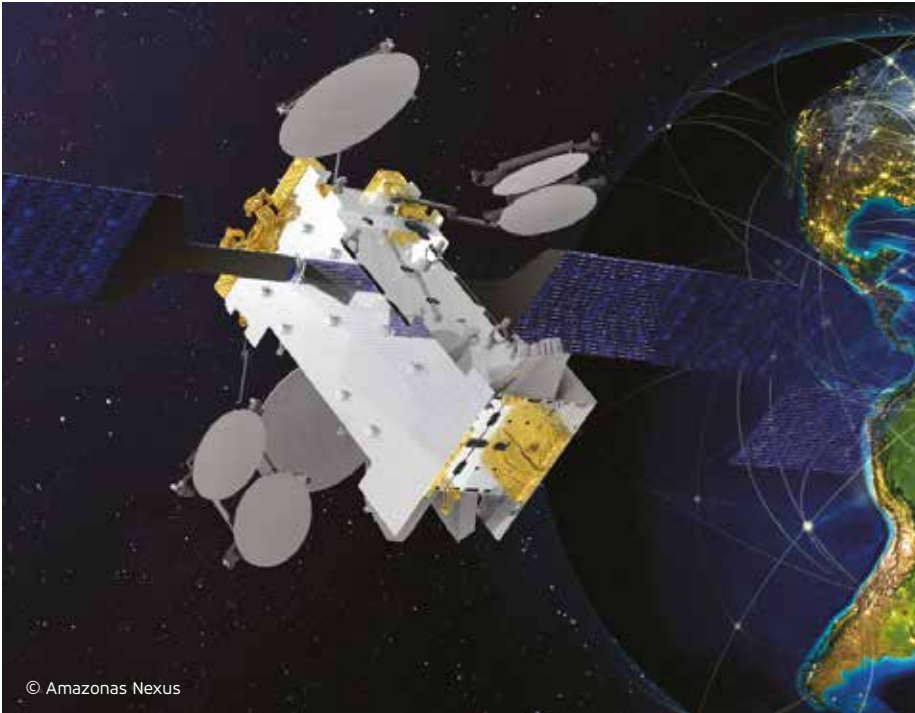
GMV's participation in AMOS was seen in a presentation by Angel Gallego, Military SST and SDA Programs Coordinator at GMV, on "RSO characterization and attitude estimation with data fusion and advanced data simulation," which described the methodology in space domain awareness (SDA) to estimate the altitude of spatial objects and characterize them in terms of shapes, sizes, and materials, using multiple data types from different sensors and external catalogs and innovative data simulators.

In a conference as important and impactful as AMOS, this project demonstrates GMV's advances in SDA in military spatial surveillance with innovative technology, in addition to the ability to manage the most difficult problems currently seen in the field.

As a sponsor of AMOS, GMV had the chance to bring visibility to its products in the field of SDA, with a unique opportunity to network and contact future clients in this field.



# Launch of Amazonas Nexus



■ Hispasat's new satellite, Amazonas Nexus, became operational recently. Made using Thales Alenia Space's Spacebus NEO platform, the satellite features a cutting-edge Digital Transparent Processor (DTP) that was successfully launched this February.

Amazonas Nexus is a high-performance geostationary satellite for the air and maritime mobility market that will also offer access to high-quality Internet in places as remote as Greenland or the Amazon rain forest.

GMV was in charge of the real-time telemetry and command processing system based on its **Hifly**® product, as well as two other ground subsystems: the flight dynamics system based on **FocusSuite**® and the ground segment monitoring and control system based on **Magnet**, **Flyplan** and **FleetDashboard**.

These systems, installed in Hispasat's operation stations in Spain and Brazil, offer a complete package of software and features for controlling the Amazonas Nexus satellite in an efficient, secure, and automatic way. In addition to the software, GMV also provided Hispasat with training, support, and maintenance for the ground control center systems, as well as operations support during the LEOP and on-station phases.

Hispasat is one of GMV's leading clients, and uses the control center and flight dynamics system provided by GMV to control its entire fleet of satellites, now including Amazonas Nexus.

## GMV attends the inaugural edition of Airspace Integration Week

In September Madrid stood at the forefront of the aviation and airspace management industry during the inaugural Airspace Integration Week. This groundbreaking event unfolded across two complementary venues: IFEMA and Cuatro Vientos Airport. Over four days, more than 2,500 professionals and 63 companies from the air navigation sector convened to explore cutting-edge trends in airspace integration.

The Airspace Integration Week delved into diverse themes, ranging from current and future air traffic management (ATM) to drone operations (U-Space), space traffic management (STM), and civil-military cooperation. GMV participated

in the event, hosting its own booth and presenting a selection of its technological solutions.

GMV made a significant impact with numerous presentations across various panels, notably in UAV applications for Air Navigation Service Providers (ANSP), where the company unveiled solutions for ILS/VOR inspection and GNSS interference detection.

Additionally, GMV asserted its position as a pivotal player in Communication, Navigation, and Surveillance (CNS), showcasing its extensive involvement in projects like SouthPAN and its expertise in ADS-B monitoring.

Furthermore, the company shared its experience in autonomous contingency and emergency management through SAFETERM. Lastly, it underscored its leading position in Europe within the domains of SSA (Space Situational Awareness), SST (Space Surveillance and Tracking), STM (Space Traffic Management), and SDA (Space Domain Awareness) during a presentation on space-related capabilities.

GMV's participation highlighted the company's dedication to innovation and its significant contribution to advancing the aerospace and airspace management industry.



# Hera enters the final testing phase

GMV is in charge of the asteroid proximity flight operations and designing and developing the probe's autonomous guidance, navigation and control (GNC) system

**T**hirteen months ahead of its launch, the European probe Hera has been successfully assembled in Bremen, Germany, and delivered to European Test Services (ETS) at ESA's ESTEC technology center in the Netherlands for environmental testing.

Hera's assembly consisted of integrating two modules: 1) the "Core" module, which houses the onboard computer, subsystems, measurement instruments (AFC, PALT, TIRI, SMC and Hyperscout), and two CubeSats (Juventas and Milani), and 2) the "Propulsion" module, which contains tanks, pipes, and thrusters

that will propel Hera to its destination. As prime contractor, OHB is leading this phase as well as the overall mission.

As part of Hera, GMV is responsible for the mission analysis of the close proximity operations and the design and development of the probe's autonomous Guidance Navigation and Control (GNC) system. This system has two features that will be key to the mission's success and make it a groundbreaking development. The Hera GNC not only autonomously executes the flight plan defined by the operations team on ground, but it can also increase its level of autonomy,

allowing it to calculate maneuvers required to fly at a certain altitude on board or perform an escape maneuver if there is a risk of collision.

In addition, GMV is also responsible for the mission analysis and the design and development of the GNC system for Juventas, one of the two CubeSats that Hera will deploy around the binary asteroid system.

Henceforth, Hera will undergo a period of environmental testing at the ETS center before being shipped to Kennedy Space Center in Florida for launch on a Falcon 9 rocket in October 2024.



# EUCLID successfully launched

■ As scheduled, on 1 July the European Space Agency's (ESA) EUCLID mission was successfully launched from Cape Canaveral, in the United States.

The goal of the mission is to create a three-dimensional map of large-scale structures, making it the most complete map of the universe to date. Furthermore,

it will make it possible to learn about the distribution of dark matter and better understand the origin of the accelerated expansion of the universe. To do so, the mission will observe, over the course of six years, two billion galaxies in an area covering more than 35% of the celestial sphere and will download 150,000 high-definition images (more than 1

petabyte) from its orbit around the Lagrange point L2, 1,500,000 km from Earth.

The European Space Agency's Operations Center (ESA/ESOC) flight dynamics service (FDS) in Darmstadt, Germany included five individuals from GMV, who were involved in the development and preparation of the operations for the mission launch. Specifically, during the LEOP (Launch and Early Operation Phase) operations, this team participated in three main technical areas: trajectory optimization, validation of orbit determination and the optimized trajectory, as well as the creation of guidance, navigation, and control commands (for example, the first trajectory correction maneuver). GMV was also involved in Assembly, Integration, and Validation (AIV) activities, as well as those related to the development of the Software Verification Facility (SVF), as part of the Thales Alenia Space (the mission's main contractor) teams in Italy.



## Artificial intelligence applied to satellite fleet management

■ Managing a large network of fleet assets is becoming a challenging task. However, operations management for fleets of assets can be streamlined thanks to advancements in AI, which is predicted to be a game changer. With the ability to monitor and control fleet operations, AI-based systems can increase overall productivity. As technology continues to advance, AI will remain a critical tool for managing large fleet networks.

AI technology has an important place in ESA's Agenda 2025: the Artificial Intelligence for Automation (A2I) roadmap developed at ESA ESOC is a living document that is regularly updated with newly identified use cases in a range of application domains.

In this context, the first phase of the project is an initial market analysis and identification of mission architectures (e.g., Earth-bound or lunar constellations) and corresponding use cases for the deployment of artificial intelligence in the operation of its large network of fleet assets.

Potential use cases include health monitoring, coupled communications and imagery tasking, gateway diversity, congestion awareness, emergency response management, spare capacity management, resource allocation / dynamic and collaborative resource allocation for SATCOM fleets, resource planning, routing and forwarding, space network access: satellite IoT/M2M, and space network data handling.

Selected use cases will be advanced to the design, development, validation, and demonstration phase in realistic operational conditions and systems.

The knowledge and experience gained will be presented in the final study report and used to draw up a future development plan with proposed updates of the ESA's A2I roadmap.

The consortium is led by GMV, which leads the AI team. As subcontractors, Saarland University will support the consortium with AI expertise and Thales Alenia Space France with telecom expertise. Finally, Planet and Eutelsat, as operators interested in the potential application of the project, will provide advice on the viability and applicability of the solution.

# GMV successfully completes first flight test for the SCC4HAPS project

■ GMV successfully completed one of the flight tests of the Satellite Control Centre for High-Altitude Pseudo-Satellites (SCC4HAPS) project, carried out under the European Space Agency (ESA)'s Advanced Research in Telecommunications Systems (ARTES) Core Competitiveness programme with the support of the Romanian Delegation. The objective of the project is to extend the capabilities of satellite fleet control solutions to include High-Altitude Pseudo-Satellites, or HAPS, and thus allow their integration into satellite systems.

HAPS are aerial platforms that operate in the stratosphere, at an average altitude of 20 kilometers. This positions them above commercial air traffic, above the strong air currents generated by the general atmospheric circulation, and above the moisture of the troposphere. HAPS can complement satellite missions, and is showing promise for their application in the fields

of telecommunications and Earth observation.

GMV's team in Romania was responsible for monitoring the first actual test flight using the ATD's high altitude tracking/tele-command platform and balloon system, and for testing the various applications included in the software that GMV has developed for this mission. Testing took place near Buzau, Romania, about 60 km from the border with Ukraine, under adverse weather conditions with wind gusts of 30 to 60 km/h. The total flight time was 1 hour and 53 minutes, with the balloon reaching a maximum altitude of 35,300 m.

It is worth emphasising that some of the primary challenges presented by this project were overcome during this testing phase. For example, successful results were achieved for use of the on-and-off commands for the telecommunications payload, reception of the telemetry by the

balloon's onboard equipment, and use of the University of León (ULE) simulator to validate the capabilities of the integrated control centre, which allows the management of multiple HAPS of various types.

The system used during the flight has been developed by GMV. The main test was operated from Bucharest, and a second portable system was operated at the launch site and transferred during recovery of the balloon equipment. During the flight, both tests provided the commands for the ATD balloon and University of León (ULE)'s HAPS fleet simulator, while also receiving the telemetry.

The purpose of this project is to facilitate problem-free use of HAPS by telecommunications satellite operators, which is expected to usher in a new era of integrated multi-layer operations, consisting of satellites, HAPS, and ground infrastructure.

## Introduction of artificial intelligence and machine learning in SATCOM payload control systems

■ In recent years we have seen a revolution in the SATCOM market, mainly due to the rapid development of software-defined and all-digital payloads, capable to respond to users' dynamic requirements.

While payload advancements offer an almost infinite number of reconfiguration options, there is an underlying problem: How can operators manage these complex systems in such a changing environment? Without a doubt, artificial intelligence (AI) and machine learning (ML) are our best allies.

ATRIA project aims to apply AI/ML techniques to relevant SATCOM use cases selected by Eutelsat's experienced operators in order to facilitate their operations. To this end, GMV (as consortium coordinator and system integrator) has developed a system prototype called AI-PCS that integrates the AI/ML modules developed by the consortium's AI experts.

The first use, AI-PCS tackled the gateway diversity problem, predicting the need for a switch operation between gateways to minimize downtime, analyzing the correlation

between the amount of rainfall and the beacon signal levels at the gateway locations. It then uses weather forecasts as input in real time. For the second use case, AI-PCS predicts per-beam traffic congestion by analyzing operator's traffic and capacity data.

The AI-PCS system has been validated in an operational environment using real-time data Skylogic and weather forecasts from third-party systems. The real-time results have led to a successful on-site acceptance test. The project is currently continuing with new and challenging use cases.

## GMV successfully concluded SMARTGRIDS-DEMO



■ GMV successfully concluded SMARTGRIDS-DEMO, a co-funded activity supported by ESA Space Solutions through the ESA ARTES Business Applications Space Solutions Program.

SMARTGRIDS-DEMO aimed to determine how space-based assets could be used to benefit stakeholders in the energy network sector. By making the best of Earth Observation satellite data, the project developed services that can

efficiently monitor transmission lines and mitigate problems arising from the management, maintenance, and operation of the energy grid infrastructure.

Thanks to the cooperation of the European Network of Transmission System Operators for Electricity and several European Transmission System Operators (TSOs), GMV was able to consolidate the sector's needs and develop three services.

The Vegetation Management service helps TSOs to prevent vegetation encroachment in the Right of Way (ROW), i.e., the land corridor immediately below and adjacent to the transmission lines. During the project, GMV's team developed a cutting-edge deep learning model that predicts the height of vegetation from monocular optical satellite imagery. The model is the core of a pipeline that delivers three

products: the "Vegetation Pruning Recommendation for ROW" shows the distance between the top of the vegetation and the conductors by classifying it into different categories; the "Vegetation Pruning Recommendation for border zone areas" identifies the vegetation exceeding a height threshold set by the TSO (see figure), the "Average Vegetation Height for border zone areas" provides the average vegetation height on a span level.

The main product of the Change Detection service is the "Change Detection map", which identifies and classifies unnatural changes within the ROW.

The Disaster Management service provides an urgent analysis to identify and assess damage at a given location in response to a user request triggered by a disaster event.

## GMV's participation in the BIGMIG-DEMO program comes to an end

■ GMV successfully concluded BIGMIG-DEMO, a co-funded activity supported by ESA Space Solutions through the ESA ARTES Business Applications Space Solutions Program.

The goal of the project was to develop space-based services to support non-governmental organizations, giving them access to geospatial products that provide factual evidence to aid in migration prevention and management as well as to support media outlets, providing them with unbiased, measurable, and independent Earth Observation-based evidence. The service provides bespoke satellite-based analyses to assist investigative and analytical journalists in their reporting activities regarding humanitarian and environmental crises, climate change, anomalous urban

developments, or the effects of policy implementation.

In conflict and crisis situations especially, information is often scattered, witnesses are scarce, remote areas are difficult to access, and safety concerns prevent the presence of independent observers. As a result, journalists and international aid organizations find it difficult to monitor the events closely. GMV's services enable the integration of Earth Observation-derived products with other sources of information such as witness testimonies, photos, and videos. All this information, like pieces of a puzzle, can help them to better understand the scenario under analysis.

After consolidating the needs of the sectors, GMV developed and demonstrated

its services by implementing several use cases identified by the project's anchor users.

During the project, GMV implemented machine learning-based pipelines to produce accurate and large-scale crop type maps and land cover maps (see figure), with the aim of improving farming efficiency and supporting community resilience to forced migration. GMV also mapped the damage to road networks, buildings, and agriculture caused by Cyclone Idai in Mozambique, helping to plan aid delivery in the aftermath of the humanitarian crisis. Statistical analyses and geospatial products showing changes in urban infrastructure were also produced to assist journalists in an investigation. These results will hopefully contribute to the publication of a report on the matter.

# GMV celebrates the success of the launch of the Miura 1

■ On Saturday, October 7 at 02:19 CET (00:19 UTC), the launch of the PLD Space Miura 1 rocket was successfully completed, from the facilities of the El Arenosillo Experimentation Center (CEDEA), belonging to the National Institute of Aerospace Technology (INTA).

The final objective of this first launch has been to carry out a flight test that would allow the technologies developed so far to be validated in real conditions, and in particular propulsion and avionics.

Specifically, the flight lasted 306 seconds, during which Miura 1 reached an apogee of 46 kilometers high.

According to the first information available, everything seems to indicate that the performance of all the

vehicle's subsystems was nominal, without any significant deviation or degradation from the predefined trajectory. This includes the avionics system, developed by GMV.

Since 2017 GMV has been working on the design, development and end-to-end qualification of the complete avionics system for the Miura 1 suborbital rocket. This system includes all the systems that make up the avionics of a launcher: the power subsystem (from the energy storage to power distribution); the data management subsystem (in charge of executing the mission timeline, but also collecting data from sensors, activating valves and sending telemetry data); the guidance, navigation and control (GNC) subsystem, based on COTS sensors and actuators; the onboard software, the management of payloads in microgravity and wiring (harness).

Within the framework of this activity, GMV has also begun to develop technologies for autonomous localization and the in-flight termination system.

Last flight represents the culmination of a long, challenging but extremely interesting journey, with many results and lessons learned achieved with perseverance and commitment assumed by many parts of GMV.

This success has once again demonstrated GMV's strong capabilities in GNC, critical SW, flight HW design, testing, integration and full end-to-end validation.

GMV's avionics suite for micro-launchers has thus reached a level of maturity that very few companies in the sector have at this time.



# Alén Space invests in a new cleanroom for future space missions



■ Given predictions of a growing industrialization of all the productive processes of the small satellite sector, Alén Space remains committed to continuing to increase its technical capabilities and therefore its own facilities as well, with the ultimate goal of providing its clients and partners with the best services.

The nano- and microsatellite company recently opened a new area at its

headquarters in Nigrán (Pontevedra). The space, 120 meters in area, houses a cleanroom adapted to the demands of the sector and for the exclusive use of the company.

Specifically, the supplier specializing in the implementation of these kinds of rooms, Ingeniería para Salas Limpias S.L.U., designed and assembled an air handling unit (AHU) with F9+G4 filtration stages and H14 absolute filters in order to

guarantee an efficient ventilation and air quality system, in addition to a low level of particles and microbes per cubic meter.

The investment in this new space, dedicated to assembly, integration, and verification of satellite components, is a step further in the company's growth strategy, especially in the undertaking of complete missions.

Alén Space's previous facilities were insufficient for the large number of orders coming in, which is why the decision was made to set up a larger and improved cleanroom based on the quality criteria set out in ISO 14644-1, the standard that certifies a room's compliance with maximum particle concentration limits.

In the medium and long term, Alén Space will be continuing its investment plan focused on more workspaces that help it keep making progress in terms of innovation and development, in addition to guaranteeing its own line of production.

## Alén Space's team participates in some of the leading events in the small satellite industry

In recent months, several members of the Alén Space team were present at the most prestigious events in the nanosatellite industry, such as Space-Comm Expo, which took place in Farnborough, the United Kingdom, and SmallSat Conference, which took place in Utah, the United States.

In its third edition, Space-Comm brought together the vast majority of the players in the international supply chain for the manufacture, development, and marketing of space communication products and

services. The event took place over the course of two days, from 7 to 8 June, with more than 150 exhibitors from all over the world presenting their most innovative solutions to the many visitors who flocked to the Farnborough international exhibition and conference center.

Meanwhile, the Alén Space team is no stranger to the SmallSat Conference, where it's always had representation. As on previous occasions, the company had a business stand at the event, which this year took place from 5 to 10 August. With

the theme "Missions at Scale," the 37th edition of this industry conference focused on the development of large-scale missions with small satellites, especially in relation to the technological progress that will enable the deployment of major constellations.

At both events, the team had several meetings with the commercial leads interested in turnkey services for missions, as well as its line of standardized products and communication subsystems.

# Collaboration between Alén Space and Astralintu leads to new expansion opportunities in ground segment services

Alén Space and Astralintu Space Technologies maintain a strategic partnership for future collaboration agreements. The coordination between both companies reinforces their solidity in terms of the ground segment

**S**ince 2022, Alén Space and Astralintu Space Technologies, an Ecuadorian company specializing in space mission operation services and logistics, have enjoyed a close business relationship that was recently strengthened with the installation of a ground station for satellite control and monitoring.

At the start of the year, Alén Space provided its comprehensive ground segment solution (GS Kit) to Astralintu, thus consolidating a strategic association for both organizations with a view to future collaboration agreements.

This ground station, named AST-GS1, is now operational and

is the first station in the future Equatorial Ground Station Network (ESGN) Astralintu plans to use to track and provide data from payloads hosted in its clients' satellites, as well as other crucial services within the operations phase of any kind of mission.

The solution designed by Alén Space includes all the elements needed to install and assemble a LEO satellite tracking station (structure, control and radiofrequency coaxial cables, adaptable Yagi antennae, amplifiers, internal elevation and azimuth rotors, and control and management software) in three different reception bands: VHF, UHF, and S-band.

The coordination between Astralintu and Alén Space opens the door to both companies solidifying their ground segment solutions and products, in addition to expanding their respective client portfolios into new markets.

The two companies also share an interest in developing their businesses in emerging countries (with a special focus on Latin America), especially for companies and institutions that have a need to continue developing new technologies related to the space and satellite communications industry.



# MIRROR tests a success

The final tests of the MIRROR project took place in July at **Platform-art**<sup>®</sup>, GMV's robotics laboratory, which allows the replication of some of the orbital conditions relevant to system validation



**A** The testing and functional validation phase of MIRROR (Multi-arm Installation Robot for Ready ORUs and Reflectors), a project led by GMV for the European Space Agency and involving Leonardo and the Italian Institute of Technology (IIT) as subcontractors and SENER as technology supplier, was completed at the end of July.

The main objectives of MIRROR are to prototype and validate a robotic

system for in-orbit service and to develop its flight design. This system has been equipped with advanced sensing and handling capabilities that allow it to assemble, repair, and maintain or upgrade subsystems and elements present on orbital structures and satellites of different classes. Space robotics projects such as this are key to the future of the industry, as they are expected to enable the in-orbit assembly of large structures, including large scientific instruments (e.g. composite reflectors

for telescopes) or even space-based solar power plants. Equally important is the potential for sustainable space management, extending the life of satellites by repairing and upgrading their components.

GMV led the requirements specification phase of the prototype, including the manufacturing, assembly, integration, and safe operation of the system. During the final phase of the project, a test bench was developed and the prototype underwent laboratory validation. The





tests were successfully completed, demonstrating the feasibility of the concept. This paves the way for an eventual next phase, during which the flight system will be developed.

MIRROR is an autonomous robot with three arms, which it uses to manipulate, transport, and assemble structural modules, as well as to move around structures using standard connectors. With this unique feature, it will become a key tool for the assembly and maintenance of large in-orbit structures.

GMV has developed a precise visual navigation system for MIRROR, which includes cameras and lights on each arm, as well as image processing algorithms and software. The standard connection elements (SIROM) installed on each of its arms allow not only mechanical couplings, but also power and data connections with the structure, tools, or any elements being handled. The autonomous control solution developed by GMV gives the robot a high level of autonomy to perform

assembly and transportation tasks, as well as robustness against environmental uncertainties and possible failures.

All these features make MIRROR a very versatile system, capable of playing a key role in the development of new orbital robotics applications, including the assembly, maintenance, and repair of large structures, for which there is growing interest from the major space agencies and the wider aerospace industry.

# Successful completion of the critical design review for the in-orbit assembly of large space antennas



■ IOANT (In-Orbit Assembly of Large Space Antennas) is dedicated to advancing the technological readiness of critical GNC (Guidance, Navigation, and Control) technologies. The project encompasses laboratory-based study and concept testing phases, with partial execution taking place on GMV's **Platform-art**®. The consortium, led by GMV in Portugal, also includes collaboration from the GMV delegation in Poland, the National Technical University of Athens, and the INEGI (Institute of Science and Innovation in Mechanical and Industrial Engineering).

The contract, awarded within the framework of the European Space Agency's (ESA) Advanced Research in

Telecommunications Systems (ARTES) program, aims to enhance communication capacity substantially. This is particularly important for large solid reflectors that exceed the capabilities of existing launch vehicles. The solution involves splitting the payload into multiple launches and conducting in-orbit assembly operations.

An in-orbit assembly system requires multiple vehicles for material transportation. It also entails the placement and connection of modular components, intricate manipulators, and interconnection mechanisms. Throughout the assembly process, the structures undergo substantial changes in their physical properties, particularly in terms

of mass moment of inertia (MMI) and flexibility.

GMV's proposed solution overcomes the challenges of this system with its versatility and adaptability to diverse scenarios.

IOANT works with other parallel GMV initiatives, including in-orbit maintenance technologies within the European Commission's PERASPERA program, such as SCHUMMAN, EROSS+, IOD, and CAT. These initiatives encompass various aspects such as interfaces, robotics, autonomy, and visual servicing.

The IOANT project showcases GMV's expertise in assembling, repairing, inspecting, and maintaining complex infrastructures like antennas, solar farms, and telescopes in orbit. The IOANT GNC solution, coupled with their solutions in mechanical interfaces and for refueling, robotics, onboard autonomy, and image-based inspection, establishes GMV as an ideal partner for these types of solutions.

## Key meeting between GMV and Mech-Mind Robotics

In October, GMV welcomed a visit from Mech-Mind Robotics, a leading company specializing in industrial 3D cameras and artificial intelligence-driven software for smart robotics applications. The purpose of this meeting was to explore innovative projects within the realms of industrial and space robotics.

The discussions delved into the potential applications of Mech-Mind Robotics' technology in GMV's ongoing projects. The meeting also considered the prospect of integrating Mech-Mind's advanced solutions into space robotics projects, where GMV holds a leading position in visual odometry technologies.



# GMV tests lunar rover at unprecedented speeds

■ During July, GMV carried out field tests within the framework of RAPID (Robust and -Semi-Autonomous Platform for Increased Distances), a space robotics project of the European Space Agency (ESA). The preliminary tests were carried out in an open field scenario in the towns of Colmenar Viejo (Madrid) and Cabanillas (Navarra).

Space robotics is identified by the main European and global space players as a key technology for the future of the sector. In Europe, both the European Space Agency (ESA) and the European Commission (EC) are financing multiple developments related to space robotics

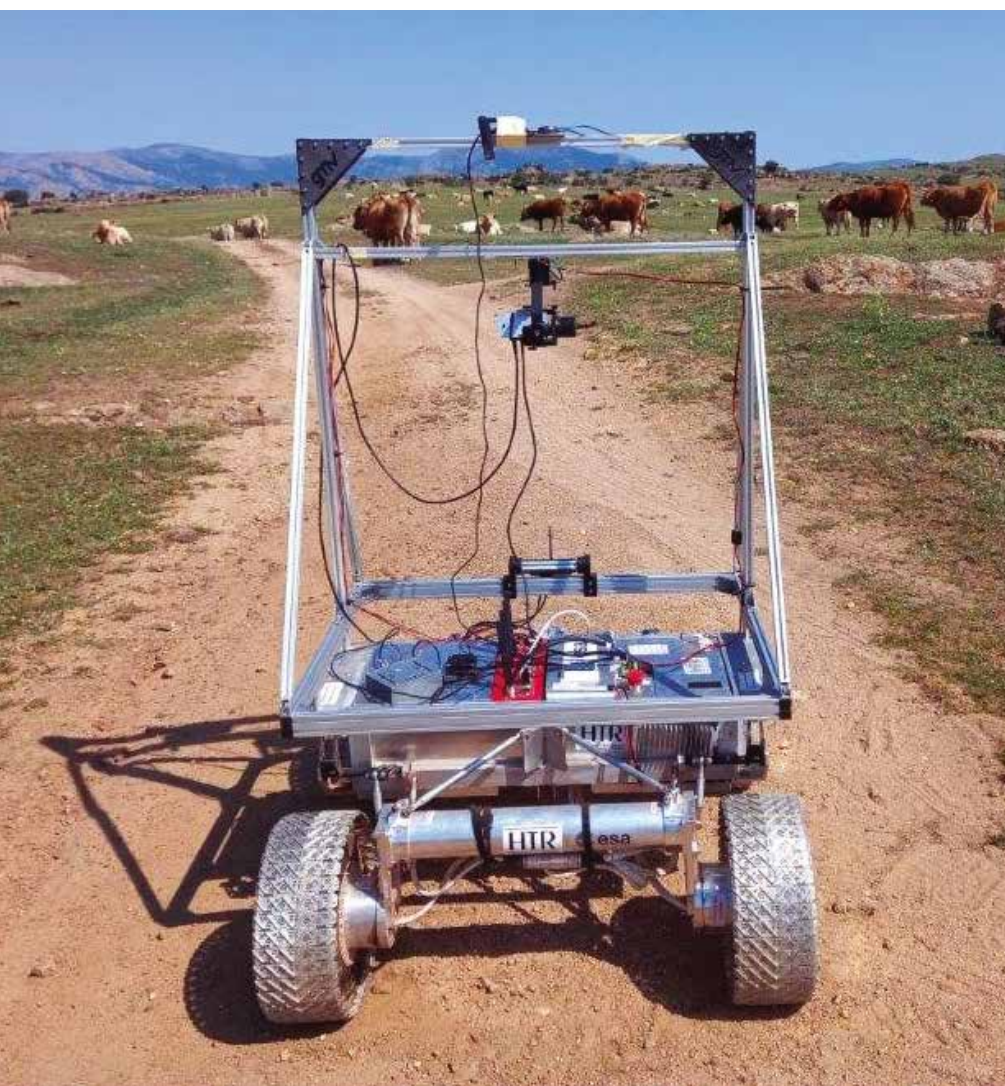
technologies, thanks also to their possible reuse in complex and hostile terrestrial environments, such as rescue, mines, nuclear power plants, etc.

In this context, and within the RAPID project led by GMV for ESA, GMV has designed and developed a state-of-the-art robotic platform, an autonomous rover capable of crossing lunar areas safely at an average speed of 1.0 m/s, a speed never reached on the surface of a distant planet, using a guidance, navigation and control (GNC) system based on visual navigation, that is, on images generated/acquired by cameras installed on the rover itself.

In a first stage of the project, the terrain characteristics for the mission were defined, including the distances to be covered, the type of obstacles, the characteristics of the lunar soil, as well as the functional, operational and testing requirements of the system and its components. Subsequently, GMV designed the RAPID mobile platform, capable of meeting the proposed requirements, in particular speed. For this, an improvement was necessary with respect to the state of the art of all the subsystems involved, first of all, locomotion. GMV has led the project, carrying out system tasks and coordinating the different elements corresponding to the subcontractors, and has been directly involved in the development of a semi-autonomous guidance, navigation and control (GNC) subsystem, with the main objective of achieving driving continuous, that is, going beyond the current state of the art (stop-and-go), avoiding stops during crossings.

Both field tests, carried out in the final phase of the project, were a complete success and have served to compile various performance parameters of the vehicle in open fields, with obstacles and in orographic conditions similar to the landscapes that the vehicle would find in regions of the Moon or Mars, which has allowed the rover to be prepared for future planetary exploration missions.

In addition to the RAPID project, GMV is leading other space robotics projects as part of the ESA, such as the European Moon Rover System, or the European Commission's PERASPERA, which involves the development of the operating system for space robot control (ESROCOS project) and autonomy or artificial intelligence systems (ERGO project).



# The ISAR Project demonstrates its potential in a real environment

GMV is implementing a multidomain tactical cloud that integrates the sensors and systems onboard manned aircraft, unmanned aircraft, and rescue ships with the ground coordination centers.

**I**n June, Las Palmas de Gran Canaria hosted the pilot test of the ISAR (Comprehensive Maritime Rescue Innovation) project, which seeks to improve search and rescue services and fight pollution through cutting-edge technology.

During the official presentation of the project, in October 2022, GMV and Austrian company Schiebel focused on meeting the delivery date of June 2023. Since then, both companies have successfully completed each of the planned phases, from requirements gathering to the design and development of the various solutions.

The final test took place in a real environment in Las Palmas de Gran Canaria. For the tests, SASEMAR

designed a series of scenarios simulating real situations rescue teams face on a daily basis. Vessels from the Spanish Maritime Rescue and Safety Society (SASEMAR), aerial assets, coordination centers, and the drones acquired within the scope of the project. Special resources such as dummies, containers, fish oil, emergency rafts, and smoke machines were used to enhance the realism of the various situations.

The tests concluded with the simulation of the sinking of a Spanish-flagged fishing vessel with nine crew members who abandoned the boat after it collided with a sinking container. Upon receiving the alert from the boat in distress, the Las Palmas Coordination Center activated the operation using the ISAR system. From that moment



Members of GMV and SASEMAR, during the tests in Las Palmas de Gran Canaria

onwards, response time is key and the system deployed by GMV facilitates real-time communication, enabling the sharing of images, videos, and relevant information for addressing the emergency.

GMV's solutions help SASEMAR cement its place as one of the world's leading agencies in search and rescue services, as well as in fields such as safety at sea and the fight against pollution.



# NAVANTIA contract for the deployment of the CSD on the F-110 frigate



■ NAVANTIA and GMV have signed a technical supply and assistance contract for the F-110 combat system's (SCOMBA) MAJIIC (Multi All-Source Joint ISR Interoperability Coalition) system. The goal of the contract is to equip F-110 frigates with JISR (Joint Intelligence Surveillance and Reconnaissance) capabilities. The work planned for the combat system of the Spanish Navy's future F-110 frigate includes providing SCOMBA with the capabilities needed to participate in a JISR network based on the STANAG 4559 NATO standard, which covers the results of the MAJIIC program. These capabilities will be reached through the integration of the **SAPIIEM JISR Suite**,

a suite of JISR applications and services developed by GMV in accordance with the standards defined in the MAJIIC/STANAG 4559 program.

The SAPIIEM tools, developed as part of projects with the Spanish Ministry of Defense's Directorate General of Weapons and Material (DGAM), provide the Armed Forces with the joint ISR capability that makes it possible to synchronize and integrate the planning and application of all means of obtaining, processing, using, and sharing the resulting information and intelligence, at the right time and in the right format. These tools were developed based on the JISR

interoperability concepts, complying with the architecture defined in the multinational MAJIIC program and the standards, procedures, and processes agreed upon in this program and subsequently adapted and advanced in the NATO standard (STANAG 4559).

The main goals are the deployment of the MAJIIC/SAPIIEM capability in F-110 frigates in order to provide them with JISR capability (integrated with sensors and the SCOMBA combat system) and the sharing of information among other boats and land, through the national networks and eventually mission and coalition networks.

# Demonstration of the ISNAV system's anti-spoofing capabilities in the RIPTIDE project

■ The Resilient PNT Testing for Defence (RIPTIDE) project has reached an important milestone with the execution of its first field tests on Spanish soil in July, at INTA's Marañosa campus in Madrid. RIPTIDE is a Category B project promoted by the Spanish and Italian defense ministries and coordinated by the European Defence Agency (EDA). Its main objective is to provide EU Member States with a platform for cooperation in the field of superiority in positioning, navigation, and timing (PNT) tests, thus enhancing the operational capability of their armed forces. GMV and INTA are the Spanish partners in the project.

The tests in Spain focused on defining standards and regulations for possible attacks that could affect military navigators. Two of the main threats analyzed were spoofing, where a GNSS signal is imitated, and jamming, where a GNSS signal is jammed in

order to disrupt the vehicle's nominal navigation.

Navigation reliability and accuracy are paramount in defense, and the ability to cope with potential attacks is critical to mission success. During the tests, the ISNAV navigator developed by GMV and used in the Spanish Army's 8x8 Dragon vehicle demonstrated its anti-spoofing and anti-jamming capabilities against simulated attacks. The tests were carried out on an ISNAV navigator fitted to one of the 8x8 demonstrator vehicles. Through the RIPTIDE project, GMV is strengthening the anti-spoofing capabilities of the ISNAV family of navigators by upgrading the algorithms to account for the evolving nature of attacks.

ISNAV uses a multi-constellation, multi-frequency GNSS receiver that significantly improves signal availability and accuracy. The

measurements received from each satellite are combined with data from an inertial sensor, providing a wealth of information on the quality of the measurements and the presence of attacks, as well as accurate estimates of the vehicle's position and heading in real time, even in challenging situations.

The multinational collaboration on this project constitutes an important cooperative framework for sharing knowledge, experience, and resources in the continuous improvement of PNT technology for defense purposes. With a focus on innovation and adaptability, RIPTIDE opens up new possibilities for protecting navigation and overcoming technological challenges in the military field. The RIPTIDE project is planning to expand its scope to include tests on other platforms, such as the Tornado fighter and state-of-the-art military helicopters.



# CESTICS visits the GMV offices in Tres Cantos



■ The General Manager of the Spanish Defense Ministry's Center for Information and Communications Systems and Technology (CESTIC), Lt. Gen. Jose María Millan Martinez, together with the Head of Cybersecurity Headquarters, Gen. Roberto Villanueva Barrios, and the Deputy General

Manager for Information and Telecommunications Plans and Services, Col. Pablo Moreno Galdó, visited GMV's premises at the Tres Cantos Technology Park on 13 July last. They were welcomed by the General Manager of Defense, Manuel Perez

Cortes, accompanied by Luis Fernando Álvarez-Gascón Pérez, General Manager of Secure E-Solutions, and Miguel Ángel Molina, Assistant General Manager of EST Space Systems, who presented the work GMV is carrying out in the interests of the Defense Ministry.

## The Portuguese Navy visits the GMV offices in Lisbon

■ This year The EA-IDEIA tour, which this year focused on the Lisbon region and the Tagus Valley, visited GMV's Portugal site in July. The event aims to promote collaboration between industry and academia with the participation of the various units of the Portuguese Navy's

research, development, experimentation and innovation oversight structure.

The Navy delegation (together with other Portuguese entities such as Idd, IAPMEI, and AED) was welcomed in GMV's Lisbon offices by GMV's general manager in

Portugal, Alberto de Pedro; GMV's Director of Defense and Security in Portugal, José Neves; GMV's director of Satellite Navigation Systems in Portugal, Teresa Ferreira; and the manager of the National Security department, João Cintra.

During the meeting GMV had the chance to present the most important projects being worked on by GMV's Portuguese subsidiary and also discussed with members of the navy the steps to be taken to modernize the navy, making this meeting an ideal opportunity to discuss the need for closer cooperation between industry and academia and to increase collaboration with a view to future projects.





## Opinion

# Celia, can you help me build a better world?

In the digital and connected world we live in, the emergence of new resources such as multichannel, remote work, robotics, wearables and artificial intelligence facilitate our daily work and personal lives. However, as with any resource, they also carry risks that we must manage. Specifically for those mentioned above, cybersecurity professionals work to protect citizens and organizations, protecting our personal data and our very identity from the risk of impersonation in the virtual world. We also do this by protecting critical infrastructure that guarantees essential services, such as energy, water, telecommunications and transportation, and by tackling cyberterrorism, among other things.

The demand for professionals specializing in cybersecurity continues to rise, as shown in ObservaCiber's study "Analysis

and diagnosis of talent in Cybersecurity in Spain," conducted by the National Institute of Cybersecurity and the National Observatory of Technology and Society. This study also highlights that female talent accounts for 31% of the sector, up from 12% in 2018.

In GMV we are also experiencing this situation of talent demand and diversity. However, the growing number of women with ICT degrees and the human resources policies explain the results of the diversity and inclusion survey our company conducted this year. In the survey, almost 90% of employees agreed that GMV's culture is diverse and gender-inclusive.

However, this is a general trend in the sector's companies, where there are more and more female CISOs (Chief Information Security Officers), such as at Vodafone, Telefónica and MásMóvil.



*Eva Martínez Ferrer  
Director of GMV's Secure e-Solutions Services sector*

"The demand for professionals specializing in cybersecurity continues to rise"

## FUTURE GENERATIONS IN CYBERSECURITY

I have personally been fortunate enough to be involved in cybersecurity services for telecom and media operators, helping to monitor their assets. This was in addition to providing security intelligence, managing vulnerabilities, and responding to incidents. That's why I would like my daughter Celia to join us and be able to tell us that women make up 50% of the professionals in the sector. We women have tremendously valuable qualities, like the instinct of protection, which gives us superpowers to detect any danger and even act ahead. Similarly, we have the ability to multi-task to multiply our impact and take care of everything needed, in addition to being resilient, which enables us to adapt to this uncertain and challenging sector.



# GMV shares its AI know-how to help SMEs in their digitalization process



■ In June GMV took part in the Technology Breakfast: Artificial Intelligence and Security Operations Center in Valladolid, together with INCIBE, AETICAL, Instituto para la Competitividad Empresarial de Castilla y León (ICE), CSA, and AIR Institute, which aimed to share knowledge about artificial intelligence (AI) and the Security Operations Center to SME managers in Castilla y León, and increase the visibility of the value of these tools to help them transform their businesses.

Patricia Tejado, Director of Digital Public Services of GMV's Secure e-Solutions,

shared the technology group's experience, giving some examples of groundbreaking projects in sectors such as agriculture and healthcare, like Agraria and TARTAGLIA, which are references in the search for R&D Missions of SEDIA (Secretary of State for Digitalization and Artificial Intelligence). Tejado also touched on the application of this technology in the security sector, where she said it will soon begin to materialize as specific solutions for vertical security operations centers in the fields of space, transport, and

industry as part of projects carried out through INCIBE's Innovative Public Procurement (CPI) program. These projects are scheduled to start up shortly and will deliver improved security services in strategic sectors where threats are increasing.

The training is part of the Centr@ Tec program run by the Institute for Business Competitiveness of Castilla y León (ICE) and aims to help SMEs in the region to optimize costs and sharpen their competitiveness thanks to AI and a security operations center.

## GMV attends the APWG.EU conference in Dublin

The Anti-Phishing Working Group (APWG.EU), an international consortium that fights fraud and identity theft caused by phishing, hosted the "Tech Summit and Researchers Sync-Up 2023" conference in Dublin on June 21 and 22, where there were presentations on the results of recent cybercrime research,

the most innovative solutions and tools against cybercrime and fraud prevention, and case studies on new attack methods used by cybercriminals.

José María Legido, GMV's Manager of International Markets for Secure e-Solutions, participated in a

discussion panel entitled "Public-private collaboration in the fight against cybercrime" along with Hyemin Lim (Interpol), David Watson (Shadowserver), and Shaun Durkan (Garda National Cyber Crime Bureau), and chaired by Mike Dewar (Mastercard).

# Anatomy of a real cyberattack and mitigation strategies

■ In June, GMV gave a presentation at EUROLOG, the annual congress of the ELA (European Logistics Association), focusing on the anatomy of a real cyberattack to tackle the growing problem of cyberthreats in the logistics sector. The presentation by Ricardo Marín, Head of Barcelona Area - Cybersecurity and Infrastructure Division in GMV's Secure e-Solutions and member of CONETIC's Cybersecurity Directive, sought to provide attendees with knowledge for dealing with cyberattacks, giving a step-by-step guide and recommendations.

The session began by highlighting the different phases of "Black Basta" ransomware, from initial recognition to actual exploitation and subsequent impact. Attendees deepened their understanding of the cybercrime group's mindset and methods, helping them to identify potential vulnerabilities in their organizations.

GMV presented several cybersecurity tools and technologies that can help mitigate



the risks associated with cyberattacks. These tools include intrusion detection systems and endpoint protection software, for example. Attendees learned the importance of implementing robust network monitoring systems to identify suspicious activity quickly.

GMV also stressed the need for periodic vulnerability assessments and penetration tests. By regularly assessing their

systems and networks for weaknesses, organizations can proactively address potential vulnerabilities before they are exploited by malicious actors.

By implementing robust cybersecurity measures, promoting employee awareness and conducting regular vulnerability assessments, organizations can significantly improve their resilience to cyber threats.

## GMV, present at the 3<sup>rd</sup> ISACA Madrid Conference

■ The Third ISACA Madrid Conference was held under the title "What does the present hold for us? The Future Starts Now," which addressed issues regarding new emerging technologies (AI, Blockchain, cryptocurrencies, cloud computing, etc.), as well as their risks and opportunities.

The Conference was attended by Mariano J. Benito, Privacy and Cybersecurity Ambassador of GMV, at the round table "Landing for Blockchain and Cryptocurrencies. Beyond Speculation" with Luis Pastor, Vice President of Alastria; Jorge Gomes Duran, CEO of GivitNFT, and Jose Miguel Cardona (ISACA Madrid Board of Directors) who chaired the discussion.



# GMV successfully completes the MedP–Big Data project

■ In July GMV took part in the event “Cognitive assistants in healthcare: the ‘big-data personalized medicine’ project pilots a new paradigm,” held by the Canary Islands Health Service, the Regional Ministry of Universal Health and Public Health of Valencia and the Barcelona Supercomputing Center, to showcase use cases of artificial intelligence in healthcare projects in the framework of the GMV-led MedP–Big Data project. The technological developments implemented by the group will enable the health services of the Canary Islands and Valencia to promote personalized and precision medicine, using big data and artificial intelligence in healthcare and in the promotion of healthy living.

Inmaculada Pérez Garro, digital health manager of GMV’s Secure e-Solutions, used her attendance at the event to highlight the project’s major learning outcomes as well as its coming challenges. The Big Data Personalized Medicine Program, promoted by the Ministry of Science and Innovation and co-financed by ERDF funds through the Spanish Pluri-regional ERDF Operational Program (POPE 2014-2020), has been a substantial challenge, both due to

the number of organizations involved and the complexity of accessing and subsequently sharing health data, as well as the extensive time required.

As Pérez Garro emphasized at the event, some of the lines of GMV’s strategy for carrying out this ambitious project include “partnership-based work and the definition of a development and growth plan once the project has

been completed.” Because, as the executive explained, the aim must be to develop a plan for development and growth that includes intelligent healthcare centers with personalized care, health promotion schools, care services in every location, etc. This means putting data governance at the core in order to make the most of it by reusing it and developing industrial models.



## Lessons learned in healthcare entrepreneurship

■ In June ESCP Business School’s Entrepreneurship Hub and SPRIM hosted a workshop where GMV shared its over 20 years’ experience in the sector. As part of the European Healthcare Innovation and Entrepreneurship Ecosystem promoted by both entities, Carlos Illana, product manager of GMV’s Secure e-Solutions, explained the company’s innovation model, accompanying his presentation with various examples of success stories from this model.



# GMV implements artificial intelligence in the European Urological Evidence Center

The project aims to make the largest urology database in Europe available to health specialists

**G**MV has developed a data capture and analysis platform for urology and other related medical disciplines for the European Urology Evidence Hub (UroEvidenceHub), promoted by the European Association of Urology EAU Guidelines - Uroweb. The aim is to provide specialists with the largest European "Real World Data" database in urology, which will help specialists to make decisions on the approach to different diseases, as well as to develop clinical guidelines. This platform represents a major step forward in the application of personalized and precision medicine in male pathologies.

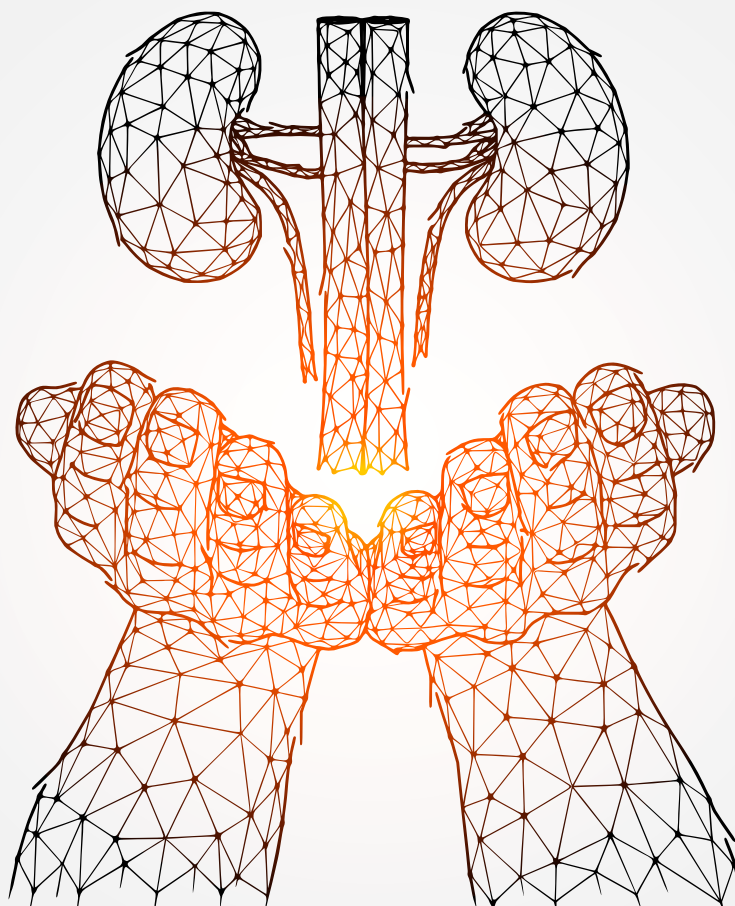
To process the data collected from patients with urological diseases, such as prostate cancer, and to standardize it to provide quality information, GMV has used the inhouse-developed **Antari®** system, a non-face-to-face medicine platform adaptable to different settings for use at home or in healthcare centers and hospitals, with specific features for clinical and epidemiological data mining and the monitoring of remote rehabilitation programs. This data was standardized in accordance with the common European OMOP CDM model, a certification of which the company has pioneered in Spain.

Following the first phase of data processing and standardization, the project's second stage consisted of analyzing the data, using a

federated learning model and secure multiparty computation using **uTile PET**, a GMV-developed tool. Using cutting-edge artificial intelligence algorithms and big data analytics techniques, data science teams will analyze high-quality, anonymized/ encrypted data, with the goal of breaking down the complexity of urological conditions and better understanding the factors that determine the evolution of patients. The **uTile PET** software also ensures that sensitive data is never exposed

or transferred across departments, organizations, or locations. Likewise, GMV has developed all the necessary technology to deploy a federated network that allows machine learning models to be trained safely.

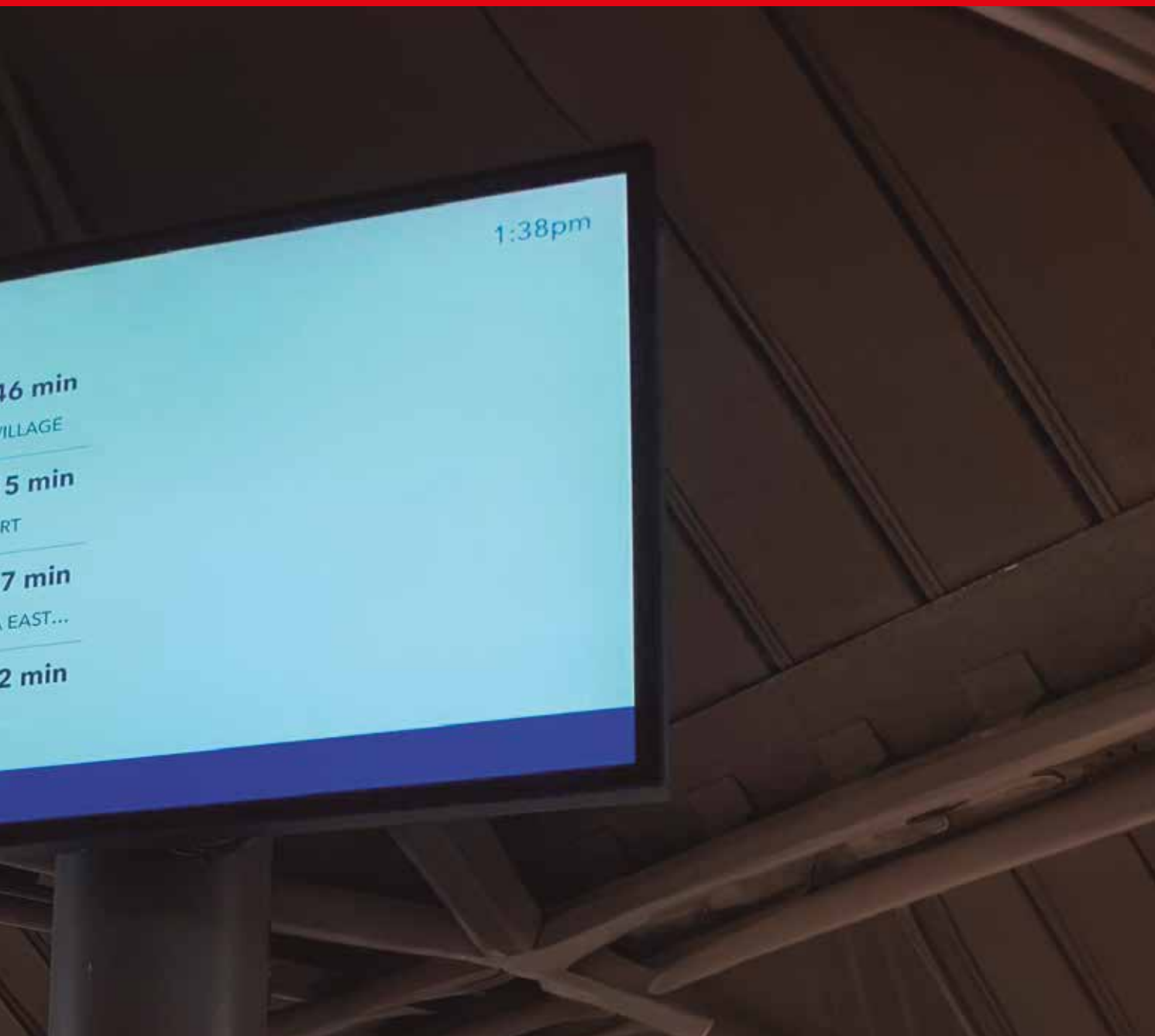
The European Urology Evidence Center was made possible thanks to the work carried out in groundbreaking projects such as PIONEER and OPTIMA, promoted by the Innovative Medicines Initiative (IMI), where GMV also applied its technology.





# GMV improves the experience of public transport users in Houston

Under the \$26 million contract, GMV will provide METRO with content management technology and expand installation, maintenance, and support for up to 3,000 digital signs



**T**he Metropolitan Transit Authority of Harris County (METRO) has signed a new contract with GMV to expand its digital signage project in Houston, Texas.

Valued at more than \$26 million, the contract calls for GMV to implement a cloud-hosted content management system and provide installation, maintenance, and support for the growing digital signage network over a seven-year period. With up to 3,000 digital signs planned for transit centers, rail platforms, and bus stops, it is one of the largest investments

in real-time signage by a US transit agency.

Since 2019 Metro has deployed more than 200 new real-time digital signs at key transit centers and platforms on the METRORapid Silver Line. Each site-specific installation uses a combination of multimedia video screens and LED scrolling message signs to put the right information in front of passengers. The system ensures that passengers can easily find live bus departure times, transit service alerts, and public service announcements to help them complete their journey with confidence. GMV's software manages

the real-time flow of data to the signs, enabling Metro staff to post messages to them individually or in groups, publish multimedia content, and monitor digital signs remotely from the office.

The project expansion will include signage at transit centers, current and planned light rail platforms, park & ride facilities, and forthcoming BOOST bus lines. The new BOOST lines combine high frequency bus service with bus stop amenities to enhance the passenger experience on Metro's busiest routes. These improvements are part of METRONext, a 2019 voter-approved investment in Houston's public transportation system.

## GMV attends the new edition of TRAKO to present its solutions for the railway sector

From September 19 to 23, GMV was present as an exhibitor at the fifteenth edition of the TRAKO International Railway Transport Fair, the largest and most prestigious meeting of the railway industry in Poland and one of the largest in Central and Eastern Europe, which takes place in Gdansk (Poland) and which every two years brings together the main organizations, operators and companies in the sector.

As in previous editions, the event generated growing interest not only among exhibitors, but also among visitors and industry specialists. This is a presentation of cutting-edge technologies around transport systems and railway infrastructure in Poland, Europe and around the world.

GMV, as a leading company in the design, development and deployment of intelligent transportation systems for the railway sector, GMV did not miss this event and had a large stand to show its innovations in the ticketing system, as well as the new functionalities developed in its product **SAE-R**<sup>®</sup>, an application suite that is already a reference in the field of AVLS systems for railway operations.

## GMV will implement new ITS systems in Cyprus

■ Since 2016 GMV has been the regular supplier of ITS technology both for the Ministry of Transport, Communications and Works of the Republic of Cyprus, and for public transport operators (6 companies) in the country. GMV technology is implemented in a fleet of nearly 800 urban and interurban buses, including a complete monetary system, a computer-aided dispatch system (SAE) and a user information system (PIS).

The Ministry of Transport, Communications and Works of the Republic of Cyprus has once again trusted GMV for the implementation of an Account Based Ticketing (ABT) system as a complement to the monetary system. ABT systems are a cutting-edge technology which places the user's accounts in the cloud and not on the transportation card, which is simply an identifier. This allows much greater flexibility when generating rates or titles, with relevant benefits for both the Transport Operator and the end user.

In addition, a pilot bank card payment system on the bus is going to be delivered using EMV Transit Level 3 technology, which will be the first reference in Cyprus for a system of this type. It will be deployed on buses in the Famagusta district fleet, with the medium-term objective of deploying it also in the rest of the country. Among

other elements, GMV will deliver the new **TV100** contactless card validators, which allow for the validation, in the same reader, of both regular transport cards and bank cards. In addition, GMV will deliver the rest of the system elements to obtain EMV Transit level 3 certification, including the payment gateway, subcontracted to Switchio by Monet+, a leading company in international electronic payment solutions.

Another subsystem acquired by the Ministry is a monetary and operating support system (FMS) for the school bus fleets of Cyprus. This system includes five operators and about 750 buses. As relevant features, this system will be supported by payment through ABT and GMV's **ITS Suite** platform for the fleet management part. In addition, the onboard equipment will consist of the delivery of an Android mobile application for locating the buses and paying by card within them.

Finally, GMV will deliver other subsystems such as a new topology editor based on **GMV Planner**, GMV's solution for transportation service planning and optimization, and a Business Intelligence tool. Likewise, the project includes the renovation of the panels at the main bus station in Nicosia and the migration to the cloud (Azure) of the entire IT infrastructure.





# GMV takes another step in the provision of positioning technology for automated driving

The company achieves a new contract that cements its position as an automotive supplier of safe, reliable, and precise positioning solutions based on global navigation satellite systems

**G** MV has been chosen again by the premium car manufacturer BMW Group for the supply of the next generation of safe and precise positioning technology for automated driving.

Following an ambitious roadmap, GMV's positioning solution comprised by two components -an onboard Positioning Engine software (PE) and a GNSS Corrections Service (CS) providing the vehicles with corrections to the Broadcast GNSS Ephemeris, augmentation data and safety-related information

for computing an accurate and reliable user position- will be enhanced by incorporating new features which will lead to even better performance than the one already in place.

Both CS and PE have been developed, validated, and evolved over the last years in order to be able to cope with the requirements laid down by the different GNSS-based high accuracy positioning markets, including the automotive market, for which ISO 26262 and ISO 21448 (SOTIF) (among others), the strictest automotive standards, plus the

highly demanding quality practices for critical software have been adopted.

This milestone will allow to capitalize on all the work carried out so far and bring to market an enhanced product, evolved according to the most demanding needs of automated driving where new features targeting the increase of the Operational Design Domain of the localization function in highways, the improvement of performance in urban environments or the incorporation of further constellations to the ones currently used will be included.



# Success of the first integration tests of the ERASMO project

■ ERASMO (Enhanced Receiver for AutonomouS MObility) is a project co-financed by the EUSPA (European Union Agency for the Space Programme) which will allow a high level of maturity for automated driving.

In July the first integration tests of the ERASMO project took place at the facilities of the Université de Technologie de Compiègne (UTC) in France.

In addition to being charged with the technical direction of the project,

within the development of the EAPE (ERASMO Advance Positioning Engine), GMV supplies both the high-precision algorithms based on GNSS and the algorithms that combine the information received by the different sensors to provide the position integrity required by the connected autonomous vehicle. GMV is also a leader of the cooperative positioning and 5G working group within the project and has developed V2X services for the exchange of information between vehicles and their environment in a cooperative manner. Likewise, GMV

provides the so-called middleware, which is communications software responsible for uniting all the elements of the system in a synchronized and robust way.

For three days, the Nextium by Idneo, GMV and Artisense teams met in person with UTC scientists with the aim of carrying out a series of software and hardware interface tests of the EAPE positioning engine prototype, as well as the validation and integration tests of algorithms with V2X services, cameras and middleware. To do so, the EAPE was installed in a Renault ZOE. The tests were carried out in both static and dynamic vehicles.

The result of this integration and the conclusions obtained mark a significant milestone in the project. The series of tests have been essential to validate the current development of ERASMO and to be able to continue with improvements detected in the prototype.



## First review meeting of the pilot project for the application of GNSS in payment for the use of infrastructure

■ Last July, Bip & Drive, a payment platform for mobility services and leader in Spain in the electronic tolling sector, hosted the first review meeting of the pilot project it is developing together with GMV at its headquarters in Madrid. The objective of this pilot is the implementation of a RUC (Road User Charging) system based on the distance traveled, using the GNSS and communications capabilities of smartphones.

Payment for the use of infrastructure is a measure that contributes to the development and maintenance of the road network as a complement to other

sources of financing. RUC systems are also a tool that allows the application of mobility management policies in cities and roads, such as controlling congestion in urban centers or promoting the use of more sustainable vehicles.

There are multiple technologies for RUC, from physical payment in traditional toll plazas, to the use of DSRC devices such as Via-T or free-flow systems based on license plate recognition. Through the use of GNSS, this project aims to overcome the different limitations that these technologies present with respect to flexibility, both in terms of the road network in which they can be deployed,

since they require adequate infrastructure, and in terms of policies, applicable rates.

During the meeting, the partners analyzed the progress, the conclusions of the first two months of testing and the actions to be addressed towards the completion of the pilot. After six months of pilot testing, in a real and controlled environment of more than 100 km of highway, the conclusions can serve as a reference for the implementation of a system of this type in real operation and, in the future, for the deployment within the vehicles themselves, which already have the necessary positioning and communications capabilities.

# R3CAV project follow-up meeting

■ On July 4, the successive quarterly meeting to monitor the R3CAV project (Robust, Reliable and Resilient Connected and Automated Vehicle for people transport) took place at the Alcobendas (Madrid) offices of the MásMóvil Group.

Subsidized by the CDTI, R3CAV is financed by the European Union through NextGenerationEU funds and is supported by the Spanish Ministry of Science and Innovation. The consortium of companies carrying out the project, led by the Renault GROUP, is made up of Alsa, GMV, Indra, Masermic, MásMóvil, and SIGMA.

R3CAV's main objective is to research and develop new connected technologies,

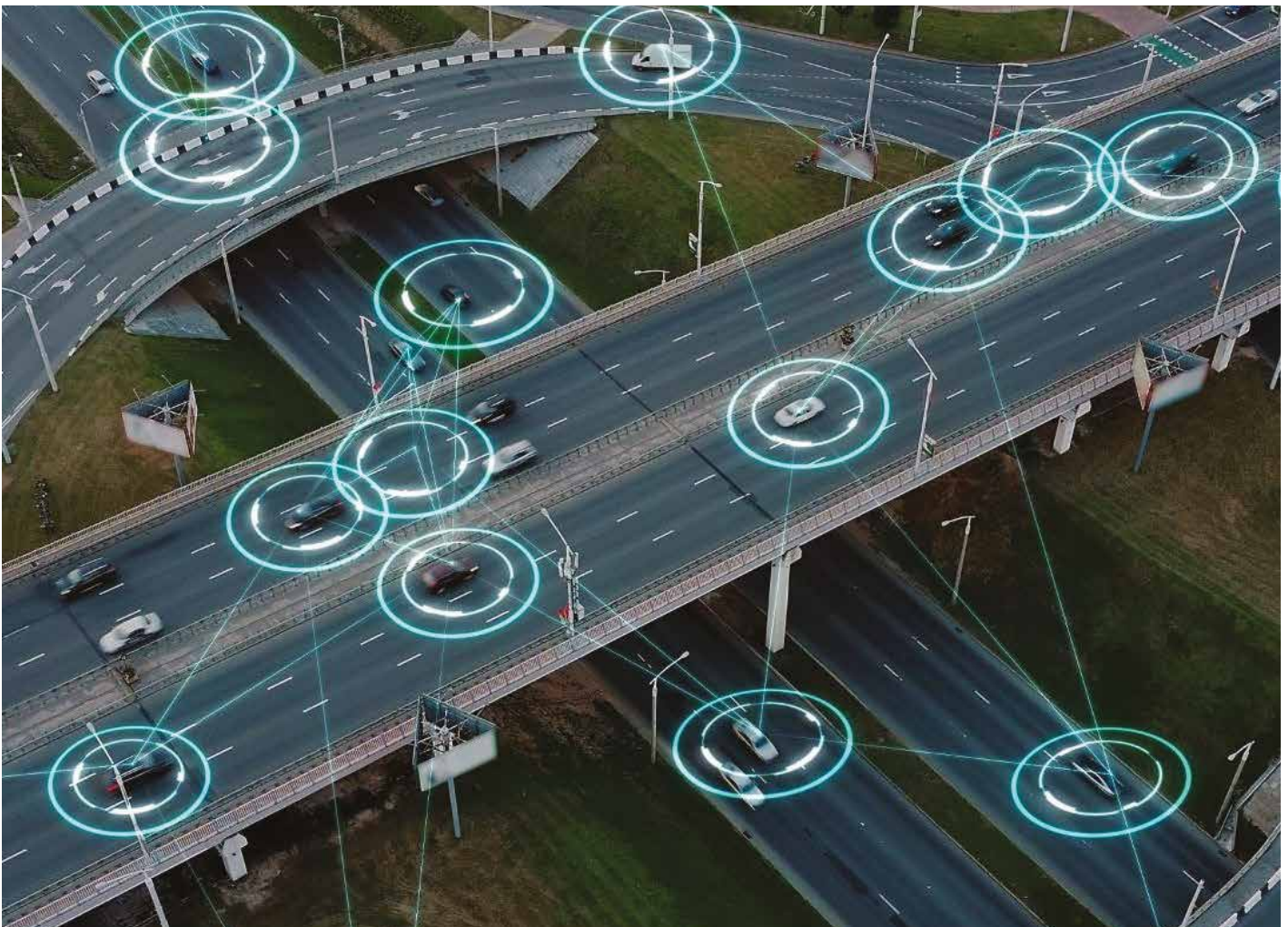
as well as to design and develop a new adaptive architecture of the future connected autonomous vehicle, capable of operating at different levels of autonomy, starting with advanced predictive driving assistance systems and extending up to being completely autonomous without a driver.

The alignment between the partners is vital for a satisfactory integration of the developed system, so the meeting began with the sharing of the defined project architecture, considering the senders and receivers of communication belonging to the infrastructure of each company involved. The messaging used by each element that is part of the system

architecture for correct communication was also specified.

During the course of the meeting, the activities and progress of the different tasks of the consortium in the two use cases contemplated in the project were reviewed. On the one hand, the developments of the R3CAV project will be validated in an open environment in Alcobendas (Madrid). The second use case will take place in a controlled environment, at the Renault factory facilities in Villamuriel de Cerrato (Palencia).

The meeting concluded with a summary of actions for the proper progress of project activities.



# The first phase of the Quantum Spain project to build the first Spanish quantum computer completed

Spain to have the first purely European quantum computer for public use in Southern Europe

**T**he joint venture made up of Qilimanjaro Quantum Tech and GMV has completed the first scheduled delivery of the Quantum Spain project, which aims to install the first quantum computer in Spain, located in the Barcelona Supercomputing Center - Centro Nacional de Supercomputación (BSC-CNS), as part of the Quantum Spain project.

The first part of the project consisted of giving the Barcelona Supercomputing Center access to a chip through what is called "Quantum-as-a-Service" (QaaS), i.e. remote connection to the Qilimanjaro

facilities at the Quantum Computing Technology laboratory of the Institut de Física d'Altes Energies (IFAE) in Barcelona.

This chip (Gen0), manufactured by QuantWare, will enable the Spanish academic and business community to execute the first quantum circuits entirely under Spanish control. It is the first in a series of seven QPUs (Quantum Processing Units) to be provided to the BSC over the life of the contract, the latest, Gen6, being a 30-qubit chip.

Together with the access to the chip, a manual has also been provided with

the basic utilities of the libraries that provide access to the Qilimanjaro servers to send orders to the quantum chip. Qilimanjaro's QaaS servers will be available 24/7 through a service to receive requests for orders. GMV provides user support services.

Once the installation at the BSC headquarters is completed, Spain will have the first purely European quantum computer for public use in southern Europe, integrated with the MareNostrum 5 supercomputer, the most powerful in Spain and among the most advanced in Europe and the world.

## How to extract the full power of data without compromising user privacy

Pablo Gonzalez, data scientist at GMV's Secure e-Solutions, took part in June in the "Valladolid AI" event with a presentation on how GMV's **uTile PET** solution can fully unlock the power of data without compromising user privacy.

This solution allows users to securely and privately perform computations on distributed data, while respecting privacy principles and building mutual trust between stakeholders. In addition, PETs (Privacy enhancing technologies) strategies and techniques include federated learning architectures, which can develop machine learning systems without the need to communicate personal data between participants, key techniques in new scenarios such as, for example, data spaces.

**uTile PET** employs advanced cryptographic methods that keep the data encrypted while all the necessary computations are performed. In this way, we ensure that organizations' sensitive data are never exposed or transferred across departments, organizations, or countries.

## GMV contributes to agricultural production automation

■ The experts at Agerpix Technologies and GMV are working together in the AgrarIA project on a proof of concept to automate fruit production using artificial intelligence and robotics. The aim is to provide the agri-food sector with an autonomous robot equipped with artificial vision that can identify and select ripe crops for harvesting, carry out selective weeding, and apply spot treatments based on the needs it detects via imaging, among other functions.

The latest tests have shown that the robot is capable of autonomously moving around a field to assess the fruit, and calculate the next harvest based on the collected data. The AgrarIA project is funded by

Spain's Ministry of Economic Affairs and Digital Transformation, through the R&D Missions in Artificial Intelligence Program of the State Secretariat for Digitalization and Artificial Intelligence (SEDIA) (file no. MIA.2021.M01.0004), using funds from the country's Recovery, Resilience, and Transformation Plan. This project seeks to explore the applicability and viability of artificial intelligence (AI), together with other technologies related to Industry 4.0, in real solutions to define new methods of agricultural production that will make the future Spanish agri-food sector more technologically-oriented, innovative, sustainable and committed to energy efficiency and the reduction of the carbon footprint.



# Tech talent to boost digital and sustainable agriculture

■ The University of Seville and GMV are working to foster the development of STEM talent that can transform the agrifood sector with technologies that will enable it to meet its major challenges. GMV has demonstrated to the future engineers the capabilities of its **uPathWay** development using a robot that can perform various agricultural tasks. This public-private collaboration aims to leverage the experience and knowledge of both companies to advance the integration of enhancing technologies

in the agricultural sector thanks to the talent of the Andalusian community.

To give future agricultural engineers a chance to see for themselves in person, in June GMV gave students of the Digital Agriculture and Agrifood Innovation Master's degree a demonstration of the performance of its autonomous traffic solution, **uPathWay**, in the experimental vineyard of Seville University's Technical School of Agricultural Engineering (ETSIA).

The GMV-developed solution, **uPathWay**, enables robots and agricultural machinery to move autonomously to perform various tasks such as sowing and harvesting, crop-health monitoring and precision irrigation.

With this collaboration GMV and the University of Seville aim to equip the new generation of agricultural professionals with the skills and knowledge needed to drive the digital transformation in the agrifood industry.



## Artificial intelligence, the key to sustainable development and efficiency

In June GMV's Industry Manager of Secure e-Solutions, Miguel Hormigo, explained during the session "Artificial Intelligence, logistics and the agrifood supply chain: from farm to table", held at the International Conference of Artificial Intelligence applied to the agrifood chain, how robots and automated systems are being used in the agrifood

sector to cultivate, harvest, and process crops more efficiently and sustainably.

The agrifood sector is in the midst of a transformation that is now affecting every process, while also generating new business models that can improve productivity and sustainability. The Congress brought together top

professionals at the international level, along with industry leaders and agriculture experts. The common aim was to encourage progress in relation to the transformative potential of artificial intelligence (AI), for application throughout the entire agrifood chain: production, processing, logistics, distribution, and hospitality.

# Language Technologies for Real-World Data

■ On June 31, the Language Technologies Group of the Artificial

Intelligence and Big Data Commission of AMETIC hosted the Presentation Conference: Language Technology Use Cases, which GMV took part in.

José Carlos Baquero, Director of the Artificial Intelligence and Big Data Division of Secure e-Solutions at GMV, delivered a talk entitled “Language Technologies for Real Life Data” in which he explained how the advance of language technologies enables the analysis of texts generated in everyday clinical practice, allowing the retrospective analysis of information recorded in electronic records, disease databases, and other information sources.

During his talk Baquero presented GMV’s success story with Madrid’s Puerta de Hierro University Hospital, in collaboration with Azierta and led by Dr. Eduardo Rodenas. This case

study aims to analyze and utilize the clinical information of patients with renal cell carcinoma to build the patient’s disease chronology. Information on 586 patients was available for ten years, which amounted to about 17,000 information files, already anonymized at the source. For this project GMV used **uQuery**, a proprietary product of NLP (natural language processing) technologies that can extract discrete and processable data from text, enabling it to analyze much more information than people, in a faster, more consistent and impartial way.

Using language technologies, we can leverage real-life data and manage treatment progress, the relationship between treatments and responses, the analysis of survival according to treatments, the suitability of treatments and patient progress.



# Everything you wanted to know about generative artificial intelligence

■ Patricia Hernando and Borja Irigoyen, Big Data Engineers at GMV’s Secure e-Solutions, took part in June in the meetup “Everything you wanted to know about Generative AI,” hosted by IBM, to explain the importance of LLMs (Large Language Models). LLMs are machine

learning models trained on large amounts of data to understand and learn linguistic patterns, allowing them to answer questions, write texts, come up with ideas, and simulate conversations in a coherent and convincing manner. Given their encyclopedic knowledge and ability to

adapt to different topics and writing styles, LLMs can be applied across a wide range of areas, from virtual assistants and chatbots to machine translation, content creation, and decision-making support.

During their presentation at the event, the GMV experts discussed the state of the art of the various LLMs. They also covered how a generative text model is developed and how GMV has used multiple technologies to develop its own model for several use cases: programming a function, asking a question about a programming language, and describing a concept, to name a few.

These technologies are playing an ever greater role in business solutions that help to optimize business operations, boost employee productivity, and streamline organizational processes.





# GMV gives Cepsa's employees a closer look at robotics



■ In June, GMV participated in an event hosted by Cepsa at its facilities in Algeciras, Huelva, and Madrid. Titled "IoT Days," the goal was to familiarize the company's employees with Internet of Things (IoT) technologies and their various applications. GMV took part by presenting demonstrations that highlighted the potential of IoT in the areas of robotics and automation.

The team from GMV gave two demonstrations to Cepsa's employees. The first focused on the collaborative robot ("cobot") that Cepsa is now using in its laboratory at the La Rábida Energy Park in Palos de la Frontera, near the city of Huelva. This cobot is automating the sample assessment process there, and it represents a new innovation milestone and one of GMV's contributions

to promoting the circular economy. The employees were able to get a first-hand look at how this cobot streamlines and optimizes the tasks it performs, highlighting the benefits of automation for increasing productivity and improving process safety and efficiency.

The second demonstration was centered on **uPathWay**, GMV's outdoor robotics solution that allows for autonomous movement of a vehicle with no need for any modifications or additional installations. This system demonstrated the power of automation for performing multiple tasks from a cloud platform, such as inspecting assets at a production plant or transporting samples. The employees were able to observe how the robot independently navigated within the designated zones while performing inspections and capturing valuable data, all as a way to improve safety and reduce the need for human intervention in potentially hazardous environments.

By participating in IoT Days, GMV gave Cepsa's employees a closer look at IoT technologies and robotics, along with more detailed knowledge about their capabilities and potential benefits for the company.

## Tech solutions to manage water

Transforming air into drinking water to supply it to oil platforms or deserts, using sludge from wastewater treatment plants to fertilize dry and infertile land, or irrigating greenhouses with desalinated water are some of the examples of the revolution that the water sector is undergoing, which were shared at the event hosted by CTA (Corporación Tecnológica de Andalucía) on June 14 in Seville.

Manuel Gómez Langley, Business Partner of Digital Public Services Critical Infrastructures of GMV's Secure e-Solutions, shared some of the environmental sustainability support initiatives GMV collaborates in, such as SOS ARTIC 2022 or the BEWATS (Beach Waste Tracking System) project, as well as sector-specific GMV experiences. These included cybersecurity, advanced and secure data exploitation and the application of remote sensing for flood analysis within Copernicus' emergency service (EMS-RM)

or to analyze drought and soil erosion as a key element of resilience to climate change.

GMV also presented one of the disruptive opportunities for the sector: the progression towards a new paradigm of software-defined automation, referring to GMV's **VirtualPAC** product, a solution to securely implement, manage and operate the remote control, monitoring and control systems used to manage the complete water cycle.

## Quantum computing to optimize image acquisition from Earth observation satellites

■ GMV took part in the "QBN Meeting on Quantum Computing & Applications", held in late June in Barcelona, where it presented the progress made in applying quantum computing to optimize image acquisition from earth observation satellites.

The space sector is faced with the problem of selecting the optimal

subset of images to be captured by a satellite, the solution to which is extraordinarily complex.

Overcoming certain problems more efficiently can provide a significant competitive advantage, as well as paving the way for solving more complex problems in the future, such as those involving multi-satellite

constellations, which require even longer computation times.

Anton Makarov, Data Scientist of GMV's Secure e-Solutions, presented the results of GMV's leading research into solving this optimization problem with quantum computing, which forms part of the CUCO project.



## Sharing tourism data, a central theme at the "MyT Summit"

In June, the fourth year of the "MyT Summit" was held in Palma de Mallorca, hosted by AnySolution and co-hosted by Turistec® and the Palma City Council.

One of the topics discussed was the potential of sharing tourism data in a panel where GMV, represented by Joan Antoni Malonda, Tourism Business development of GMV's Secure e-Solutions, debated with representatives of the public company, such as Laura Flores, director of business development and new technologies of SEGITUR,

Jennifer Ruiz, director of Mastercard's Tourism Innovation Hub and Nuria de Lama, consulting director of IDC.

The round table emphasized the importance of data to understanding tourist spending per stay, but also to understanding their preferences and to enabling companies to readapt their strategies in response to new demands. In the public sphere, SEGITUR's director of business development and new technologies stressed that administrations have an obligation to share data and explained how the company is doing this through an

intelligent destination platform that is used as a basis to share data and provide services based on it.

GMV's representative agreed with the roundtable participants on the tremendous potential of data also in the tourism sector, and explained how, thanks to digital technology, this data can be leveraged, guaranteeing data sovereignty to its owners through federated models. Malonda also mentioned the company's success stories in areas such as healthcare, where GMV is carrying out projects of this nature with notable success.

# GMV, among the 100 Best Companies to Work for in 2023

The rankings, prepared by “Actualidad Económica,” highlight the company's commitment to attracting, developing, and retaining talent

**G** MV reaffirms its prominent position in the “2023 Best Companies to Work for Ranking,” as reported by Spanish business magazine “Actualidad Económica”.

The company maintains its position in this national ranking, which is based on the results of a survey assessed by independent consultants and experts across various people-related

aspects, including talent management, compensation policies, workplace environment, training strategy, and Corporate Social Responsibility. This achievement underscores GMV's corporate vision centered on human capital as one of its core pillars.

In the context of these rankings, “Actualidad Económica” underscores attraction, development, and retention as the three cornerstones of GMV's

talent management strategy. These pillars have contributed to a 16% increase in its workforce over the past year, reaching a total of 3,000 professionals.

This recognition fills the company with pride and serves as a driving force to continue advancing in our commitment to the well-being of the people who comprise GMV's human team.



# GMV and the Polytechnic University of Madrid Open the “GMV Tech Lab”

■ GMV and the Polytechnic University of Madrid (UPM), through the School of Computer Systems Engineering (Escuela Técnica Superior de Ingeniería Informáticos, or ETSISI), have expanded their cooperation within the framework of the GMV-UPM Program, opening the “GMV TechLab,” a new IT lab for the students.

The GMV-UPM Program was created in 2004 to lay the groundwork for collaboration between the two organizations both in training and in project development. The GMV program initially focused on the School of Space and Aeronautics Engineering (Escuela Técnica Superior de Ingeniería Aeronáutica y del Espacio, or ETSIA-ETSIAE), with activities aimed at training experts in aerospace systems and

carrying out R&D+i projects in this field while contributing to furthering the discipline and connecting it with science, technology and the most advanced management techniques.

The program's goals included expanding outreach and collaboration with other UPM schools, leading to joint activities with the ETSISI in recent years. The opening of the laboratory on the UPM's south campus is a new milestone in this regard. With this initiative, GMV is expanding the agreement signed with the UPM, highlighting its potential as an employer and showing students how the program can help them complete their education and improve their employability.

The goal of the ETSISI's new computer science laboratory is to offer students interning with GMV a space where they can work on their projects, connect further with the company and the university, meet other interns, and enjoy a flexible working environment.

The opening event, which took place on 26 September, was hosted by Agustín Yagüe, head of the ETSISI, along with Ignacio Ramos, GMV's Manager of Corporate Strategy for People and Infrastructure, and was attended by former and current members of the program, UPM and ETSISI professors and students, and GMV professionals who are ETSISI alumni.



# Space, people, and technology at GMV's new work center in Germany

■ In July, GMV unveiled its new work center in Germany: "GMV Mäander". The new offices aim to consolidate people who were previously scattered across various locations, while also preparing for the anticipated growth of GMV's activities in Germany. Situated in the industrial zone of Glitching, near Munich, this state-of-the-art office spans across two floors, covering a total area of 2,555 square meters.

Designed to empower GMV professionals in advancing the company's presence in the space industry, the office features a sleek and modern exterior, coupled with a meticulously designed interior flooded with ample natural light.

The new facility encompasses various notable areas, including spaces for classified project development, laboratories, and a production area for electronic systems. Additionally, it houses a data processing center and a demo room to showcase GMV's product range. To enhance employee well-being



and work-life balance, the facility also features rest areas such as a coffee corner, changing rooms, and a cafeteria.

This new work center is seamlessly integrated into GMV's worldwide network of offices, enabling all professionals to collaborate within a unified space and facilitating communication among GMV's personnel,

both within the office and across the company's other locations. In addition to bolstering GMV's corporate presence in Germany and aligning it with its current and future growth trajectory, these new offices will reinforce the notion of being part of a larger organization and foster collaboration among GMV employees, encouraging sharing synergies and expertise.

## GMV opens new offices in Bogotá

■ Recognizing the growth potential in Colombia, where it currently employs 16 professionals and holds ambitious expansion goals, GMV took a

significant stride towards addressing this growth on July 27<sup>th</sup>, with the opening of new offices in Bogotá, Colombia.

The new offices, spanning nearly 500 square meters, are located in the heart of Bogotá's business district. They boast distinctive facilities, including the Cybersecurity Incident Response Center, which serves as an extension of the one already established at GMV's Valladolid site. This extension greatly enhances the service hours available for supporting clients.



In the design of these offices, the primary goals were to ensure functionality in the facilities and to prioritize the comfort of the professionals working there. This approach aimed to create a modern and spacious environment while also reinforcing GMV's image in the country.

# This year's summer internship program comes to an end

■ In July, GMV welcomed 45 students to its facilities, in the context of the grants it awards for its summer internship program. Most of these students worked at GMV's facilities in Madrid, with one of the interns working in Barcelona. This internship program has experienced remarkable growth in recent years, and it continues to provide opportunities for students with a wide range of profiles and career ambitions. The aim of the program is to give students a first point of contact with the working world, while also strengthening the links that exist between GMV and educational institutions, which is a reflection of one of the company's fundamental values.



Historically, GMV's internships in Spain have been offered to first year students in the Master's degree program in Aeronautical Engineering at the Technical University of Madrid (UPM). However, this year those opportunities were expanded and the number of interns was doubled, by selecting students from other Master's degree programs at UPM, and from other

universities as well. Specifically, third year students from university programs in Aeronautics, Physics, Mathematics, and other subjects were also able to participate.

Ignacio Ramos, GMV's Manager of Corporate Strategy for People and Infrastructure, and Cristina Hernández,

head of the Talent Acquisition and Employer Branding area at GMV, were in charge of welcoming the new interns. They gave a presentation highlighting the various sectors into which the company is organized, along with some of its major projects and the exciting career opportunities awaiting the students in the future.

## A culture of teamwork, sports, and wellbeing



■ In July, our GMV colleagues in Germany took up the challenge of participating in the Company Race held in Munich. This event features runners

representing a variety of companies, competing on a 5.6 kilometer course that ends at the Olympic Stadium in Munich. However, for GMV this is more than just an

athletic competition: it is also a way of demonstrating that teamwork, camaraderie, and a spirit of self-improvement are shared values at the company, both inside and outside of the workplace.

This activity has taken place as part of GMV's Wellbeing program, which is focused on promoting a good work environment from a perspective of health, knowledge, and safety. Also as part of its Wellbeing program, GMV provides information, tools, and strategies for everyone who works at the company, as a way to help them improve their physical, emotional, financial, and social health.

# GMV strengthens its commitment to information security

■ GMV maintains an information security management system (ISMS) that is certified under the UNE ISO/IEC 27001:2017 standard, and the scope of that certification has now been expanded. The ISMS is used to protect the security of information related to clients, collaborators, and employees, in compliance with the applicable national legislation and international standards on data protection and privacy.

Information security is an essential element of all of GMV's processes, and it has therefore been seen as a priority ever since the company was first established. The purpose of the ISMS used at GMV is to define, implement, and allow continual improvement of the controls and procedures used to minimize and manage the risks associated with the organization's internal processes. These are risks that may arise in relation to developing products and systems; executing projects, programs, and services;

and managing data pertaining to clients, collaborators, and employees. The ISMS also ensures compliance with all legal obligations relating to data protection and privacy.

The ISMS used by GMV was already certified based on the ISO 27001 standard, covering the company's information security activities focused on the information systems used in its digital security and ICT systems business area. However, in 2022, as part of its continual improvement strategy, GMV decided to make further progress in this area by implementing qualitative improvements for its ISMS. As a result of those efforts, the certification body has expanded the company's ISO certification under that same standard, to now cover the processes used in its space, aeronautics, defense and security, cybersecurity, intelligent transportation systems, automotive, healthcare, and telecommunications sectors at

its Spanish facilities in Madrid and Valladolid.

GMV's commitment to information security is a shared task that requires a contribution from everyone at the organization. This is why GMV involves its entire workforce, by offering awareness-raising and training activities that cover the main risks, along with the best practices that are used to protect the company, while also ensuring that the system will not interfere with the rest of GMV's business activities.



## Event for journalists on Space and the media

■ On September 27th, GMV and the Madrid Press Association (APM) held an event for APM members on how the growth and evolution of Spain's space industry have made this sector one of the driving forces of Spain's economy.

This informative session gave journalists the opportunity to learn firsthand about the evolution of the space industry in recent years and its growing prominence in Spain, as well as the benefits space technology can offer society and applications for this technology in our daily lives. It will also address topics of particular interest for the media and the challenges news professionals face when it comes to covering and providing accurate and useful information for the public.

Speakers included Miguel Ángel Molina, GMV's Deputy General Manager of Space Systems; Juan Carlos Gil from GMV's Space Innovation Systems department, a science expert; Alberto Águeda, GMV Space Systems' Director of Systems and Space Traffic Surveillance and

Management, and Teresa Guerrero, a journalist "at El Mundo" specializing in science and environment.

The event ended with participants engaging in a Q&A session with the four speakers.





# GMV launches buddy program to help onboard new onboarders

**O**ver the last five years, GMV has expanded its workforce by 50% to over 3,000 employees. New recruits embark on this chapter of their career with enthusiasm and excitement, but like any type of change, it can bring moments of stress and uncertainty. Not to mention the new ways of working that they face, with a changing professional environment and teams sometimes spread across multiple locations. In order to offer new employees the best possible conditions, GMV has set up various initiatives to welcome and support them.

One of these initiatives is the buddy program, which matches new employees with someone of trust in the company who can offer them support and help them settle into their new role. Buddies are not mentors, coaches, or managers. They are peers who act as onboarders, welcoming newcomers to the company, sharing the company culture in a personable way, and providing guidance and support in whatever they need to make their onboarding as easy and effortless as possible. Although GMV has always handled this process naturally, the flexibility offered by the company's working models has led to the creation of a specific program.

GMV's buddy program is even more comprehensive, as it connects new recruits with exemplary colleagues with extensive knowledge about the organization. This makes it easier to pass on GMV's culture and values in a clear and straightforward way, while creating lasting bonds.

Following the success of an initial test-run in selected business areas and countries, plans are underway to roll out the program across the company. Below, a number of colleagues share how and why they joined the program and the value it has brought them.





Headquarters Madrid (Spain)



**Javier  
Gallardo  
(buddy)**

Security  
Auditor &  
Ethical Hacker

Regardless of one's technical expertise when starting a new job, there's a human factor that will leave its mark and stay with the employee indefinitely.

I see the buddy program as a valuable tool to ensure that new colleagues finish their first day at GMV feeling confident that joining the company was the right decision, and that they continue to feel this way as time goes

on and they are fully integrated into the team. When we look back on our first day at GMV, do we remember what our fears were? Did we know who to talk to if we had questions? Did we think we would be a nuisance if we asked too many questions of the person sitting nearest to us? A buddy is someone you can turn to from day one to allay any fears you may have. It's someone who will ensure your integration, not only by explaining how GMV operates internally, going through the tools used on a daily basis for opening tickets, training, etc., or answering scheduling questions, but also by talking to you about GMV traditions, inviting you for a coffee, and asking you what you need to make sure you're doing all right. I think it helps

you feel at home much more quickly with the people you work with, the teams you work in, and the company in general. This program is a huge advantage for GMV, as it will ultimately result in improved efficiency.

It's not a program that lasts just a few days and then it's over; people will always have questions or concerns, so having someone to lean on will provide valuable reassurance.

This is based on my own personal experience in the program, which I have taken part in several times. I am happy to help and can always be counted on to support any new colleagues who join us.



**Gonzalo  
Martínez  
(onboarder)**

Ethical hacker

It's been a whole year since I embarked on my journey as "GMVer", and I can say with absolute certainty that the "buddy" program has had a

significant impact on my time at the company.

Ever since I joined, my "buddy" has been my go-to source for all things related to the ins and outs of GMV and the company's values.

On top of that, this program is a key ingredient in the great working atmosphere we've got going on at GMV. It's not just about knowledge transfer; it

also helps newcomers like me find their place on the teams and promotes that great team spirit.

And here's the kicker: for many of us who started at GMV as interns, this is our first taste of the working world.

So, naturally, I hope to pay it forward in the future and become a "buddy" myself. I'd love to help others just as much as Javier has helped and continues to help me.



**Marius Andrei (buddy)**  
FPGA engineer

“Hardest thing to do is to do nothing...”  
When a “buddy” can be affected? A “buddy” is the most useful when he knows how to do nothing. But nothing should be explained in this case. A good “body”, in my opinion, needs, without exception, to have good intention. He needs to make herself very clear, in the beginning, that, if can help and if his help is required,

he will do it, no matter what. This is my definition of nothing. This is the base. From now on, everything else is organic, everything needs to adapt to *paysage*. This kind of nothing will provide safety and trust to anyone. Like Queen Ana of Romania said: *E foarte important ca un popor să nu se simtă singur* (It is very important for a country not to be alone).



**George Boldeanu (onboarder)**  
Remote sensing engineer

Changes, in every chapter of life, are difficult parts which are full of stress. I’ve decided to change my career adventure from the public sector to the private one with GMV. So, I really expected to have such a pressure on my shoulders. But then I was introduced to a program called buddy, which, to be honest I was skeptical. For my surprise, this was not the case. In fact, even if I had a buddy from within a different

division, the differences in the technical background didn’t impose a challenge.

The most important thing that I felt in my discussions with my buddy was passion. For me, if there is passion in your work, everything is possible and foremost that means that you are appreciated. My thoughts then were «One day I want to transmit this to others who begin their journey.”



Headquarters Bucharest (Romania)



SPACE

## Global Solutions for the space sector

We at GMV put all our efforts and know-how into providing our space clients with the best possible answer to their needs. For almost 40 years, GMV has established itself as a reliable, proactive and close partner, working as a team to find innovative solutions that add value and successfully meet the constant challenges faced by the sector.

GMV has had the opportunity to work with and supply systems, products and support services to Space Agencies, Satellite Operators and Satellite Manufacturers worldwide, becoming one of their main suppliers. The knowledge acquired by GMV in the space sector has allowed it to position itself in the global market and diversify its activity thanks to an extensive program of technology transfer to other sectors of interest.

[marketing.space@gmv.com](mailto:marketing.space@gmv.com)  
[gmv.com](http://gmv.com)

## SPAIN

### Headquarters

Isaac Newton 11 PT.M. Tres Cantos - 28760 Madrid  
Tel.: +34 91 807 21 00 Fax: +34 91 807 21 99

Santiago Grisolia, 4 PT.M. Tres Cantos - 28760 Madrid  
Tel.: 91 807 21 00 Fax: 91 807 21 99

Juan de Herrera n.º 17 PT.Boecillo - 47151 Valladolid  
Tel.: +34 983 54 65 54 Fax: +34 983 54 65 53

Andrés Laguna, n.º 9-11. PT.B. - 47151 Boecillo, Valladolid  
Tel.: 98 354 65 54 Fax: 98 354 65 53

Albert Einstein, s/n 5ª Planta, Módulo 2 Edificio Insur Cartuja - 41092 Sevilla  
Tel.: +34 95 408 80 60 Fax.: +34 95 408 12 33

Edificio Nova Gran Via, Avda. de la Granvia 16-20, 2ª planta  
Hospitalet de Llobregat, 08902 Barcelona  
Tel.: +34 932 721 848 Fax: +34 932 156 187

Mas Dorca 13, Nave 5 Pol. Ind. L'Ametlla Park L'Ametlla  
del Vallés - 08480 Barcelona  
Tel.: +34 93 845 79 00 - +34 93 845 79 10 Fax: + 34 93 781 16 61

Edificio Sorolla Center, Nivel 1 Local 7, Av. Cortes Valencianas,  
58 - 46015 Valencia  
Tel.: +34 963 323 900 Fax: +34 963 323 901

Parque Empresarial Dinamiza. Av. Ranillas, 1. Edificio Dinamiza 1D  
planta 3ª oficina B y C 50018 Zaragoza  
Tel.: +34 976 50 68 08 Fax: +34 976 74 08 09

## GERMANY

Zeppelinstraße, 16 82205 Gilching  
Tel.: +49 (0) 8105 77670 160 Fax: +49 (0) 8105 77670 298

Europaplatz 2, 64293 Darmstadt  
Tel.: +49 (0) 6151 3972970 Fax: +49 (0) 6151 8609415

## BELGIUM

Rue Belliard, 40 - Bureau n.º 117 1040 Brussels  
Ph.: +32 278632 25

## COLOMBIA

Carrera 7 #99-21 Oficinas 1802-1803 110221 Bogotá  
Ph.: +57 (1) 6467399 Fax: +57 (1) 6461101

## USA

2400 Research Blvd, Ste 390 Rockville, MD 20850  
Ph.: +1 (240) 252-2320 Fax: +1 (240) 252-2321

523 W 6th St Suite 444 Los Angeles, 90014  
Ph.: +1 (310) 728-6997 Fax: +1 (310) 734-6831

15503 W. Hardy Road Houston, Texas 77060

## FRANCE

17, rue Hermès - 31520 Ramonville St. Agne. Toulouse  
Ph.: +33 (0) 534314261 Fax: +33 (0) 562067963

## MALAYSIA

Level 18, Equatorial Plaza Jalan Sultan Ismail. 50250 Kuala Lumpur  
Ph.: (+603) 9205 8440 Fax: (+603) 9205 7788

## THE NETHERLANDS

Joop Geesinkweg 901, 1114AB Amsterdam-Duivendrecht

## POLAND

Ul. Hrubieszowska 2, 01-209 Warsaw  
Ph.: +48 22 395 51 65 Fax: +48 22 395 51 67

## PORTUGAL

Alameda dos Oceanos, 115, 1990-392 Lisbon  
Ph.: +351 21 382 93 66 Fax: +351 21 386 64 93

## UNITED KINGDOM

Airspeed 2, Eight Street, Harwell Science and Innovation  
Campus, Didcot, Oxfordshire OX11 0RL

Enterprise Centre. Innovation Park, Triumph Road  
Nottingham NG7 2TU  
Ph.: +44 (0) 1159667200 Fax: +44 (0) 1159682961

## ROMANIA

SkyTower, 246C Calea Floreasca, 32nd Floor, District 1, postal code 014476,  
Bucharest  
Ph.: +40 318 242 800 Fax: +40 318 242 801