News

gmv®
INNOVATING SOLUTIONS

Single market for data, a driver for the economy

INTERVIEW
Yvo Volman
Director of the Data Directorate
DG for Communications Networks,
Content and Technology
European Comission

INTERVIEW
Carme Artigas
Secretary of State for Digitalization
and Artificial Intelligence
Ministry of Economic Affairs and
Digital Transformation

37th AMETIC Meeting on the Digital Economy and Telecommunications

August 30th to September 1st 2023
Santander (Spain)

With the theme of 50 years of driving transformation in Spain, the 37th edition of the Meeting on the Digital Economy and Telecommunications will soon be taking place in the Spanish city of Santander, from August 30th to September 1st. This event is organized by AMETIC, the association representing the digital industry in Spain, which is celebrating its 50th anniversary this year.

As in previous editions, GMV will be a sponsor of this year's meeting, which will bring together major players from the world of technology in Spain. The aim is to discuss the present state of the industry as well as its future, at a time when digitalization is playing such an important role in relation to economic recovery, industry, and society.

GMV will be taking part in the panel of experts discussing cybersecurity, represented by Javier Zubieta, GMV's Manager of Marketing and Communication for Secure e-Solutions.

August 30th to September 1st, 2023
Magdalena Palace, Santander

We'll see you at #Santander37!

Organized by:

Letter from the president

Over the past few years, GMV's growth has surged driven by our successful progression up the ranks of the supply chain. We are now integrating large systems, coordinating our contributions with those of multiple international subcontractors. GMV was awarded the maintenance and upgrading contract for the Galileo satellite navigation system´s ground segment in 2018, which was a challenge worthy of the most important players in the European space industry. When that system became fully operational in 2022, the results demonstrated our ability to perform at that same level, paving the way for future contracts of similar or even greater scope and complexity. Witness our recent success in securing the ground control segment contract for Galileo's second generation.

Building upon these achievements, we sought to enhance our capabilities further in the space sector. This prompted our acquisition of Alén Space in June of this year. Alén Space is an innovative startup that is widely recognized for its development of nanosatellites, several of which have already been launched and successfully deployed in orbit. Adding GMV's comprehensive suite of capabilities in space systems and our established position in the space market, while leveraging the joint expertise of both the GMV and Alén Space teams, we aim to produce top-quality, efficient, and cost-effective satellites that can cater to a broad range of applications. Together we envision ourselves at the forefront of small satellite manufacturing and the advancement of associated technologies on a global scale.

Mónica Martínez

No. 86

CONTENTS

50

12

16

20

6

24

44

58

74

80

Single market for data, a driver for the economy

Are data the new black gold? Although many people believe so, not all data are as precious as oil. The only data that truly hold up to the comparison are those that provide valuable information and improve decision-making. Considering that each person on Earth generates an estimated 1.7 MB of data per day, it stands to reason that only certain data are likely to create wealth – whether it be economic, scientific, demoscopic, or of another nature – contributing to the development of the so-called "data economy".

By now, every media outlet, business, and political figure has at some point spoken on the advantages and potential risks of artificial intelligence. Everyday people, too, have at least heard of it. They may even know that this intelligence, much like human intelligence, works with data, albeit in huge volumes that are unmanageable for the human brain (hence the term "big data") and are previously processed, qualified, harmonized, anonymized, and analyzed by data scientists. The more knowledgeable bunch might have an idea of how they work, that is, with instructions and algorithms that dictate predetermined behaviors for data handling.

When combined, data and artificial intelligence can boost national economies, increasing the activity of current businesses and stimulating the creation of new ones. In fact, the data economy is expected to account for as much as 4.9% of European GDP by 2025. Mindful of this, the European Union (EU) is committed to building a European data economy within its Digital Single Market.

Data constitute a major asset for companies because, when properly processed, they can offer competitive advantages in decision-making and the development of new products and services. This is no different for public administrations, which generate huge amounts of data. Harnessing these data can lead to better and faster decision-making, greater productivity and efficiency, and cost savings. They can also be used to promote transparency policies that increase public trust, detect possible cases of fraud or misuse of public resources, and strengthen cybersecurity.

Artificial intelligence absolutely devours data, and in some cases even those of an entire country are unable to satiate its appetite. Reluctance to share data in the public and private sectors, especially data from various countries, stems from mistrust when there is no framework of guarantees in place once the data leave their home territory. In order to remedy this issue, the EU is also promoting a single market for data in which data can flow freely across Union borders and sectors for the benefit of companies, researchers, and public administrations, while upholding the European values of sovereignty, privacy, transparency, security, and fair competition.

This single market is being promoted in strategic economic sectors of public interest, such as those related to manufacturing, sustainable energy, mobility, health, finance, energy, agriculture, and public administration. The EU is also endorsing certain initiatives that GMV is involved in, such as Gaia-X, which aims to develop an open, federated, interoperable cloud-based data infrastructure, and the International Data Spaces Association (IDSA), which advocates an architectural model that can be used as a blueprint for developing data spaces.

DEVELOPMENTS IN SPAIN
According to Spain's Chief Data Officer, Alberto Palomo, the EU's data strategy regards the data economy and digital value chains as key areas for its

transformation, for which the Digital Single Market is a driving force. This market rests on three essential pillars: easier access to online services and resources, removing barriers between states and ensuring consumer protection; momentum towards an ecosystem of digital networks deployed on modern, efficient, and secure infrastructures; and citizen empowerment for digital inclusion and the general use of these advances.

The Spanish government, Palomo explained, is currently developing a legal, political, and resource-structuring environment that will be more conducive to the deployment and establishment of this incipient and sovereign new

data economy. The aim is to seize the opportunity offered by the NextGenEU funds through various initiatives, namely those referred to in the Digital Spain 2026 Strategy, which are being deployed under the National Artificial Intelligence Strategy, the Public Administration Digitalization Plan, the National Digital Skills Plan, the SME Digitalization Plan, the Plan for Connectivity and Digital Infrastructures, and the Strategy for the Promotion of 5G Technology.

These priorities, organized financially and policy-wise throughout the Recovery, Transformation and Resilience Plan, are also supported by new organizational structures, whose task is to develop and deploy a strategic vision. Against this backdrop, the Spanish government's Data Office was set up in 2020 under the State Secretariat for Digitalization and Artificial Intelligence. This unit plays a facilitating and coordinating role, focusing on the strategic and conceptual development of new data and information infrastructures, and drawing on methodologies that are easy to transfer and deploy across different sectors. The office combines an outward-looking vision centered on promoting and supporting industrial sectors and an inward-looking perspective aimed at bolstering the digital transformation of the Administration, said Palomo.

Likewise, to make the Spanish data economy a reality, the country needs

technological and organizational instruments that align with the European data strategy. First, acknowledged Palomo, it is necessary to support and stimulate the development of a single market for data in line with the European values of free competition and respect for digital rights using the "federated data ecosystem" model. This model is chosen because it brings together a dynamic market for the supply and demand of data sets and services, as well as the ability to technically interconnect participants and assets that are located in a distributed manner. This distribution is precisely what sets it apart from traditional technology intermediation schemes (the "platform model"), as it prescribes a minimum level of governance between participants to enable their interaction, while allowing them to maintain their autonomy and discretion as to whether or not to take part in data transactions.

This, in turn, entails major interoperability challenges, as technical rules must first be agreed upon to connect the different distributed IT systems and to identify, characterize, and deploy new data repositories that provide data subsets that will shape sector-specific data spaces.

Beyond these technology-related issues, it is necessary to agree on common best practice standards and codes that promote interconnectivity at the business, legal, and organizational levels, thus providing the flexibility needed to ensure that value is properly extracted from the shared data sets.

DATA SPACES
As the expert pointed out, any strategy for deploying data spaces in Spain must address considerations about the data economy in the nation's strategic productive sectors, as well as highlighting the value of the data available in public administrations. Similarly, it is essential to think about how to invigorate the community and sector leaders, as well

as which models and methodologies to implement to yield quality data.

To this end, Spain has designed a general reference framework which, in the words of the expert, "considers elements that enable the viability and sustainability of data spaces" and "is structured around business development, sufficiency in project management and execution, the strengthening of capabilities within the national technology industry, and the promotion of reusable common resources that echo the voice of the sector." This framework encompasses the analysis of market conditions, economic models, the promotion of cooperation and collaborative innovation, the generation of open-source technical solutions, the promotion of demonstration environments and execution infrastructures, and the development of pilots to validate hypotheses, standards, and compliance mechanisms, as well as a characterization of the contractual and regulatory needs of future participants.

The aim is to establish reliable data governance, both in the various data spaces and at the core of those involved in them, focusing efforts on strategic areas to ensure social and territorial cohesion, in which administrations play a leading role, and on the decisive boost to the digital reindustrialization of the Spanish economy. We advocate fostering business and innovation ecosystems from more mature technological scenarios, too, turning technological obsolescence and advancement to our advantage through European initiatives and standards.

Sovereignty and privacy are key determinants of any data space, and the technologies needed to safeguard them are therefore a fundamental part of its design and operation. Thus, as its deployment progresses, we will see mechanisms and tools developed to guarantee decentralized identity management (likely based on distributed ledger blockchain infrastructures), while also adhering to the founding philosophy of the Web 3.0.

Privacy-enhancing technologies such as compute-to-data, synthetic data generation, differential privacy, and secure multi-party computation will also be further developed, as will incipient technologies aimed at remote or unattended regulatory compliance, which is precisely the focus of the Gaia-X initiative, said Palomo.

According to Patricia Tejado, Director of Digital Public Services of GMV's Secure e-Solutions, the development of data spaces requires an assimilation and awareness phase for all those involved, as well as development in accordance with cybersecurity criteria from the design phase, something that has taken more than a decade to be considered a must in any process or development dealing with new systems.

In her opinion, the definition of use cases and the ecosystem's ability to highlight the value of these spaces will encourage sharing. This, without forgetting the need for security-enabling and privacy-preserving technologies for data access and use.

On this point, Carlos Alonso Peña, Director of the Data Office Division, referred to the Simpl initiative, which is financed by the European Commission's Digital Europe Programme. The purpose of this initiative is to implement sector-specific data spaces by developing

middleware for building cloud-based data ecosystems and infrastructure services, based on European values and developed under open-source licensing schemes, ensuring knowledge dissemination and community building.

This project has a practical focus and seeks to achieve results as quickly as possible. Therefore, in addition to supplying the software, it will provide a testing environment for stakeholders to experiment with it. It will ideally be available before the end of 2024, serving as an example for the national data space initiatives yet to be carried out, depending on their degree of maturity at

that time. Simpl will be developed under the guidelines of the Data Spaces Support Centre, so its convergence with the various European initiatives underway to build data spaces (Gaia-X, IDSA, FIWARE, and BDVA) is guaranteed, said Alonso Peña.

ADMINISTRATIONS, THE GREAT DATA BANKS

Administrations must become key players in the planned sector-specific data spaces. As Alonso Peña explained, it is necessary to establish new data-based partnerships between administrations and industry, fostering a culture of open data with which the latter can develop new business models. In the expert's opinion, actions should be enhanced to make the massive data sets held by administrations, which are of proven value, available to the productive sector.

Open data in general, and high-value data sets (HVDS) in particular, are some of the key building blocks for sector-specific data spaces. In any case, the sector-specific knowledge of public bodies involved in deploying sector-specific data spaces is essential, and these bodies must be present in the public-private collaboration mechanisms that are put in place.

As Alonso Peña pointed out, public administrations are essentially large data banks, gathering vast amounts of data as they perform their duties in service interactions with citizens, as well as in their relations with the private sector and civil society. As a result of the digitalization process underway in public administrations, their procedures and processes need to be reconsidered and reoriented to make them more agile, transparent, and responsive.

However, technology cannot be brought in without first carrying out a thorough review of its structures and procedures, as well as the required human resources and training.

Data, understood as a public asset, are a key part of the digital transformation process taking place in public administrations, redefining their relationship with citizens and productive sectors as they unwaveringly seek to promote the common good for society and foster a fair and inclusive economy. Data is a public asset to be preserved and processed for the implementation of quality public services and policies.

Strengthened collaboration within the public sector is embodied in public data spaces. By taking a much more interdisciplinary and interdepartmental approach and by harnessing the latest technologies, the aim is to scale up current information processing methodologies, specifications, and practices, thereby achieving a seamless and continuous exchange of data between administrations, industrial sectors, and citizens. Public sector data spaces should be built around the General State Administration Data Platform provided as a common service by the General Secretariat for Digital Administration, in order to take advantage of its storage capacities, analytical possibilities, and data governance tools.

THE IMPORTANCE OF TOURISM

The tourism industry is responsible for over 280 million jobs worldwide, both direct and indirect, and its contribution to global GDP in 2021 exceeded 5.8 trillion dollars, according to the World Travel & Tourism Council (WTTC). Tourism also contributed €159.49 billion to Spain's GDP in 2022, 1.4% more than in 2019, according to the quarterly report "Tourism Outlook by the Alliance for Excellence in Tourism (Exceltur)."

Data are clearly important in the tourism sector, and tools such as the UNWTO Tourism Data Dashboard provide statistics and analyses on key indicators of inbound and outbound tourism at global, regional, and national levels. Data cover arrivals, export share and contribution to tourism GDP, outbound markets, seasonality, and accommodation (data on number of rooms, guests, and overnight stays).

According to Dolores Ordóñez, Vice-President of Gaia-X Hub Spain, the creation of a tourism data space means a new scenario with numerous possibilities for personalizing the tourist experience. She said: "An obvious example is what is known as seamless travel, where, thanks to data sharing between the various entities that interact during travelers' journeys from home to destination, travel efficiency is enhanced, traveler satisfaction goes up, and we get to know our visitors better."

In this sector, Tejado said, the advantages of data sharing and the reluctance to share data between competing organizations are no different from those in other industries. Privacy-enhancing technologies (PETs) offer one possibility for overcoming potential "mistrust," as they allow secure and private calculations to be performed on distributed data without exposing them or moving them out of organizations. The data economy "is going to be a reality that will boost our GDP sooner rather than later," she concluded.

Alberto Palomo
Chief Data Officer for Spain; chairman of the Gaia-X Governmental Council

With a PhD in Theoretical Physics from the Autonomous University of Madrid, he is an expert in data analytics and data strategizing. He is responsible for designing and coordinating the rollout of a national data infrastructure, both for the Spanish government and for key industries in the country.

Carlos Alonso
Director of the Data Office Division of the Ministry of Economic Affairs and Digital Transformation

Holding a degree in Computer Science from the Polytechnic University of Madrid, he is director of the Data Office Division, the objective of which is to stimulate the sharing, management, and use of data across all productive sectors in the economic and social landscape.

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

Graduate in Telecommunications Engineering from the University of Valladolid. She directs the Digital Public Services of GMV's Secure e-Solutions, taking part in the shift to a more open administration and promoting the reuse of data in government offices.

Yvo
Volman

Director of the Data Directorate
DG for Communications Networks, Content and Technology
European Comission

Yvo Volman (1965) is Director of the Data directorate in the Directorate General for Communication Networks, Content and Technology of the European Commission.

Yvo studied at the Universities of Amsterdam and Strasbourg and holds a PhD in European law awarded by the European University Institute in Florence.

He worked for the Dutch Ministry of Economic Affairs in the areas of industrial and technology policy, before joining the European Commission in 1998. In the Commission, he dealt with legislative and strategic issues as well as funding programs related to the information market, digitization, and data.

How will a single European data market be able to improve public services for the participating countries?

Data has an immense value. Pertinent, high-quality data can be used in any business or public policy context to enhance existing services or products, or to create new ones. For example, (better) use of private and public sector or citizens' data can result in concrete improvements for all in the fields of health (e.g. personalised medicine), mobility (e.g. real-time information services on public works, accidents and alternative routes), or environment/energy (e.g. optimised energy use through user-friendly personalised gas/electricity consumption apps).

The 2020 European data strategy aims to create a true European single market for data, where data can flow freely across sectors and borders and where more data is available for use, for the benefit of the economy and society. A European single market for data would mean that public administrations (as well as businesses and citizens) have optimal conditions to find, access and reuse relevant data, also across borders, for the performance of their public duties.

A clear regulatory and data governance framework is crucial for reaping the benefits of data and foster data-driven policy and innovation. In line with clear data access and reuse conditions and in full respect of data protection rules, public administrations will be able to access and reuse pertinent data. The public sector will have the possibility to extract valuable knowledge and insights from this data, which they can use to enhance their execution of public tasks. This will foster data-driven public policy and improve public services.

And how will data spaces and the single European data market contribute to wealth creation?

Data spaces are an important step towards creating a genuine European single market for data. They combine two essential characteristics to make easy and efficient data sharing a reality: on the one hand, making sure that there is a well-functioning technical IT infrastructure in place that allows you to find, access, process, share and reuse data in a secure and privacy-preserving way. And, on the other hand, to put in place a comprehensive data governance framework that allows you to understand according to which conditions and rules you can access and reuse data or make your data available to somebody else. So, it is all about setting the right framework conditions to create a real data market that works, with clear rules and fair conditions for the benefit of all.

The creation of common European data spaces in strategic sectors and domains of public interest, such as agriculture, mobility, manufacturing or the Green Deal, should turn this vision into reality. The different data spaces will need to be interconnected and it should be easy for data users/providers to be active in several of them. Gradually, the interconnection of all data spaces will contribute to the European single market for data. It is a bit like our European roads system, including its common European rules to use them, that has gradually been created at local, regional and national level, and is interconnected at European level.

The data spaces will facilitate data sharing and reuse, which will contribute to more innovative products and services in many different sectors. For instance, data collected by precision farming techniques, such as soil moisture and nutrient levels, can be used to develop more efficient manufacturing processes in the fertilizer industry. Similarly, data generated by home IoT appliances can be used to develop personalized healthcare solutions. The potential applications of cross-sector data

> The 2020 European data strategy aims to create a true European single market for data, where data can flow freely across sectors and borders

sharing are vast, and its impact can be transformative across industries.

Which digital technologies do you think are essential for ensuring sovereignty and privacy in these data spaces?

Several digital technologies exist to ensure sovereignty and privacy in data spaces. This includes, for example, (homomorphic) encryption, blockchain, zero-knowledge proofs, differential privacy and federated learning.

Various solutions already exist on the market to handle data access and sharing in a secure and privacy-preserving way. The Commission has been funding promising research and innovation in this area. In the field of privacy preserving technologies, several Horizon 2020 and Horizon Europe projects are delivering convincing results. This will make the EU's digital environment even more robust to keep up with the challenges in this field and ensure that data is shared and used the 'European way': by empowering individuals and businesses to keep track of their personal and non-personal data and to decide how it is used, in a secure and privacy-preserving way.

In your opinion, what are some of the critical points that could make it harder to implement these data spaces?

Implementing the common European data spaces in a cohesive, interconnected manner is a significant

task. Currently, data spaces in the various sectors are still quite different in terms of maturity. We should avoid creating data space silos that result from a lack of interoperability or common standards, as well as insufficient cooperation and coordination. Failing to collaborate would also increase the risk of duplicating efforts and wasting precious time, money and resources.

In order to prevent this, cooperation and coordination structures are being created at the European level. Firstly, the European Commission is funding a dedicated Data Spaces Support Centre (DSSC) that is aimed at helping the public sector and companies that want to create or operate within data spaces. The DSSC contributes to the consistent development of common European data spaces by setting up and organising the important network of stakeholders and collectively creating a coherent, data sovereign, interoperable and trustworthy data sharing environment.

Secondly, the Data Governance Act provides for the establishment of a European Data Innovation Board (EDIB) by September 2023. Composed of relevant authorities from Member States and representatives of relevant bodies in specific sectors or with specific expertise, EDIB will, among other tasks, propose guidelines for common European data spaces, namely purpose- or sector-specific

> We should avoid creating data space silos that result from a lack of interoperability or common standards, as well as insufficient cooperation and coordination

or cross-sectoral interoperable frameworks of common standards and practices to share or jointly process data. The DSSC will play an important role in supporting its work.

Finally, the Commission has created a new instrument which will bring together Member States for large-scale actions to achieve digital transformation: the European Digital Infrastructure Consortium (EDIC). There are currently discussions ongoing with Member States to accelerate the creation of EDICs in different domains, including several common European data spaces.

What role is Simpl playing in this overall European data strategy?

The Digital Europe Programme funds the development of an open-source cloud-to-edge middleware platform, called Simpl. Simpl will be modular and made of building blocks. These open source, cloud-to-edge smart middleware building blocks will be used for the deployment of the common European data spaces announced in the 2020 European data strategy.

Simpl will ensure that data sets and their infrastructures can be seamlessly interconnected and made interoperable. It will be smart and modular, to allow the replacement or addition of components without affecting the rest of the system. Simpl will be open source, allowing insights into all parts of the architecture (without any proprietary claims) and simple deployment. It will be green, scalable and elastic, by allowing a monitoring of its environmental performance, and the addition of new users without affecting performance. Finally, Simpl will be secure and interoperable, where trust, confidence and compliance with regulations are built into the system.

End February, the Commission launched the public procurement

for its provision. A Minimum Viable Platform should be released by the beginning of 2024. In parallel and starting as early as possible in 2024, an open testing environment (Simpl-Labs) will be made available for stakeholders to experiment with. Progressively use cases, such as the common European data spaces, will be on-boarded and integrated, helping them to adjust Simpl to their specific needs (without compromising its generic nature).

Spain's State Secretariat for Digitalization and Artificial Intelligence (SEDIA) is fully committed to creating and implementing data spaces at the national level, with a clear leadership role in some of them (such as tourism). What can you tell us regarding this?

Spain has been very supportive of the EU data strategy and its implementation. It is also very active in several data spaces and especially the tourism data space. Tourism is one of the strategic sectors in the EU for which a common European data space will be developed. I can only welcome the active support of Spain in this field as well as its endeavours at national level to create a tourism data space.

It is not surprising to see the involvement and leadership role of Spanish actors in the two EU coordination and support actions currently funded by the Commission (DATES and DIGITAL-2021-PREPACT). These actions prepare the ground for a common European tourism data space, which involves organising the network of stakeholders, creating a blueprint architecture and elaborating a roadmap, in close cooperation with the Data Spaces Support Centre.

As a Member State where tourism is one of the key economic activities, Spain will be able to bring in its extensive knowledge and expertise in the field to successfully roll out

a national as well as a common European data space for the benefit of the whole tourism value-chain. This also includes citizens in their role as tourists and therefore end users of related date-driven services and products.

What can public administrations do to encourage participation by industry in these data spaces?

Public administrations can take several steps to encourage participation by industry in data spaces. Active involvement of both public administration and industry is crucial for ensuring the success of the policy and regulatory framework for data being put in place by the European Commission. Such a framework creates a stable and predictable environment for businesses to operate in. This is being done with the 2020 European data strategy and more specifically with the Implementing Regulation on High-Value Datasets under the Open Data Directive, the Data Governance Act, which is applicable from September 2023, and the upcoming Data Act. With a smooth implementation of these horizontal European data rules in all Member States, national public administrations will contribute to creating the right European business climate for data sharing.

Public administrations can furthermore develop business incentives, such as funding opportunities, tax breaks or other financial incentives, in line with State Aid rules. This can encourage businesses to invest in data infrastructure and help offset the costs of data sharing. They can also act as a launching customer for innovative data products and services.

Finally, public administrations can encourage data-driven collaborations (between businesses and with public administrations), raise more awareness of the benefits of data sharing, and establish national policies to promote best practices in data management. This can especially help smaller businesses to understand the value of data sharing and feel more comfortable participating in data spaces.

What message would you give to Spanish industry to encourage and motivate its participation in these data spaces?

Spanish industry should not miss out on the current momentum to help building common European data spaces. This is the time to get involved and help shaping them to your needs. We need all stakeholders to work together to create a robust and diverse European data ecosystem. Spanish industry can contribute to this effort by participating in the current common European data space initiatives, investing in data infrastructures and adopting responsible data management practices. It is encouraging to see Spain taking the lead in the common European data space for Tourism.

By participating in common European data spaces, Spanish industry will get the best conditions to get access to and reuse a wide variety of data from all over Europe. At the same time, they will have the opportunity to offer their own data under their own conditions to a big pool of European data reusers.

Improved access to and reuse of data can help companies to unlock new business opportunities, gain valuable insights, and develop new products and services that meet the changing needs of your customers. I encourage Spanish industry to join Europe in the effort to create common European data spaces and become part of a dynamic and thriving European data ecosystem for the benefit of all.

Carme
Artigas

Secretary of State for Digitalization and Artificial Intelligence
Ministry of Economic Affairs and Digital Transformation

Carme Artigas holds a degree in Chemical Engineering from the Institut Químic de Sarrià in Barcelona and in Chemical Sciences from the Ramon Llull University and a degree in Executive Management in Venture Capital from the Haas School of Economics at Berkeley University in California. She defended her thesis on quantum chemistry and cancer at the Max Plank Institute in Munich. She was appointed Secretary of State for Digitalization and Artificial Intelligence in January 2020. She is considered one of the leading experts in the practical application of big data and artificial intelligence in Spain.

Could you briefly describe the main lines of Spain's data strategy and how it is progressing?

Data has become society's primary transformative power. Aside from the purely economic perspective, its capacity to generate knowledge, drive innovation and empower individuals and communities is indisputable. It is a tool to address industrial reindustrialization, and environmental, social, and health challenges while contributing to collaboration, fostering open innovation and improving the accountability of companies (ESG scope) and public administrations (transparency plans). There is no formally approved strategy, but various initiatives have been carried out in the areas mentioned above.

To promote the use of data in the interest of society and the economy, certain pillars have been established consisting of generating and rolling out an appropriate regulatory framework, promoting a data culture, developing an ethical framework for data processing, implementing robust technological infrastructures to guarantee strategic digital independence, promoting trust, security and interoperability between distributed data sets by fostering the concept of data space and encouraging public–private collaboration in the field of data.

There have been contributions to establishing the foundations to promote a fair and inclusive data economy by major, already implemented initiatives: such as the Digital Kit, aimed at increasing the digital maturity of Spanish SMEs; the Digital Training Plan—which seeks to guarantee the training and digital inclusion of workers and citizens as a whole—to boost the creation of quality jobs, reduce unemployment, increase productivity, and contribute to closing gender, social, and territorial gaps; and the creation of

the Charter of Digital Rights—as a reference framework to guarantee the rights of citizens in the new digital world.

What disruptive technologies do you believe will contribute to leveraging more from global data strategies and policies?

Global data strategies and policies must eventually be implemented in specific organizations, both public and private, and their transformation into data-driven organizations is essential. This will enable advanced technologies and tools to be used for descriptive, predictive, and prescriptive analytics (business intelligence, big data, machine learning, deep learning), generative algorithms (LLM, GPT), process automation (RPA) and advanced information preservation techniques (blockchain), catalyzing new business use cases. And, beyond everyday life, technology aimed at guaranteeing data sovereignty and, by extension, the digital sovereignty of organizations and countries, will have a profound scope.

Among all the technologies currently incubating, I would highlight the transformative power of artificial intelligence tools in general and, specifically, generative algorithms, all combined with the potential of quantum computing. We are probably on the verge of a qualitative leap in capabilities, with an impact that is still difficult to measure.

How will a single European data market help to create wealth and improve our public services? What is the contribution of the implementation of data spaces?

Creating a single market for shared data is a core component of the European Commission's strategy, which aims to boost the data economy to align with European values of sovereignty, confidentiality, transparency, security, and fair

competition. It is particularly critical at a time when the data economy is expected to account for up to 6% of European GDP by 2025.

We have a historic opportunity to direct the full potential of the data economy towards building a more efficient, fruitful and resilient production model, and commit to data as the decisive tool for moving towards economic growth based on talent, innovation and value-added activities, where decision-making is based on evidence and quantitative capabilities.

The concept of data space is a cornerstone for the development of this new data economy, enabling its access, exchange and legitimate reuse, positioning it as a resource without competition, whose usefulness grows as its use becomes more widespread, in a clear example of the network effect. But data spaces go beyond a bilateral exchange of information, constituting, in their most advanced version, authentic distributed sharing networks where value can be realized around the "oil of the 21st century," guaranteeing that it is shared equitably between companies, individuals and public bodies. Although technological environments for data sharing have existed for a long time, the creation of data spaces that guarantee European values and principles is not only a technical challenge but

> We have a historic opportunity to direct the full potential of the data economy towards building a more efficient, fruitful and resilient production model

also a challenge of coordinating the participants, governance and the search for incentives, the adoption of standards, and, of course, of interoperability.

Which economic sectors are taking advantage of the possibilities offered by using and sharing data, and what strategies is your department developing to encourage sectors that are lagging behind or less convinced of its potential?

Using one approach or another, economic sectors are already working and advancing towards effective use of data. At our department, we are focusing on the use and sharing of data and following the strategic lines defined in the Recovery, Transformation and Resilience Plan (PRTR), specifically in C12.I1 (development of sectoral data spaces in projects for the digitization of strategic productive sectors) and C14.I2 (digitization and intelligence for destinations and the tourism sector), as well as the contents of the different PERTEs (as projects of a strategic nature), to support the promotion of the data economy in key sectors. Promoting them means public-private collaboration initiatives must be created, involving administrations, companies, technology centers, innovation centers, specialized digitalization support centers, academia, and the third sector, among others.

For example, the mobility sector aims to deploy connected vehicles

Using one approach or another, economic sectors are already working and advancing towards effective use of data

to promote reindustrialization and strengthen value chains. Also, in the field of health, we are working to develop a national health data space to improve prevention, diagnosis, treatment, and research, promoting precision medicine. The agri-food sector seeks to optimize the value chain and address challenges such as competitiveness, sustainability, traceability, and food safety. In the tourism sector, data is fundamental for the development and sustainability of the tourism industry, enabling the extraction of value from non-traditional data sources and guaranteeing that the information is secure and private.

Finally, initiatives to enhance the value of the Spanish language should be mentioned, considering the generation of data spaces around linguistic corpora as a multidisciplinary activity generating added value in various industrial sectors.

How are the different data initiatives impacting the recovery plan?

The Bank of Spain, in its February 2023 report on the macroeconomic impact of the Recovery, Transformation and Resilience Plan, provides a classification according to the type of expenditure and sector of activity, which quantifies its effect, taking into account not only the direct impact but also its diffusion through production chains, amplifying its impact on GDP from 1.15% to 1.75% on average per year and over a 5-year horizon.

To achieve the impact mentioned above, the drag effect between sectors is fundamental, and, in this sense, the different actions related to data, through interoperability and thus enabling its reuse, will be crucial.

In terms of specific measures, there are several projects aimed at promoting and creating sectoral data spaces, including the PERTE Electric and Connected

Vehicle, with funding of €100M; the PERTE for cutting-edge health—through its National Health Data Space and incorporation into the European data space (EHDS)—with funding of €100M; the agri-food PERTE, with a budget of €50M, where the sectoral data space will support competitiveness, sustainability, traceability and food safety, and the demographic challenge of the sector itself, or the PERTE for the social and care economy, with a data space for the common good and social innovation and endowed with an appropriation of €15M.

In terms of guaranteeing companies and individuals control over their data, do you consider that the Data Governance Act covers all the necessary aspects to ensure it? What measures would you highlight?

The Data Governance Act (DGA) is designed to create a framework that facilitates data sharing, promoting the availability of data and the creation of a reliable and secure environment to realize new innovative services and products. Its main measures include a more extensive reuse of protected information held in the public sector (fully respecting its privacy and confidentiality), a framework to promote neutral data brokering services, guaranteeing data sovereignty, and mechanisms for altruistic data transfer.

This Data Governance Act will be complemented by the Data Act, which aims to establish standardized rules on access to and fair use of data, address imbalances in contractual relationships between providers and users regarding data ownership and use, promote its interoperability and efficient portability, and ensure minimum conditions for users of data processing services.

Both regulations must be understood in conjunction with the Open Data Directive, the Digital Markets Act and the Digital Services Act, the General Data Protection Regulation, the regulation on the framework for the

free circulation of non-personal data, the regulation of artificial intelligence, cybersecurity regulations, and other sectorial regulations. It is precisely in this joint and uniform interpretation that we find one of the main difficulties for the practical application of the Data Governance Act in the different Member States, the major challenge being to avoid the fragmentation of the digital single market. Along the same lines, the technical and operational challenges related to interoperability, data quality and security should be addressed in greater depth, promoting the use of common standards, innovative tools and the appropriate best practices and codes of conduct.

The Spanish Gaia-X hub was presented in July 2021. Where do we stand today and what role is the private sector playing?
In fact, in July 2021, and at the

Secretary of State's office, we submitted an expression of interest to assess the interest of the national ecosystem in the new data economy based on the values and mission of the pan-European initiative, Gaia-X. With these results, which showed the enormous interest (312 responses were received), we coordinated the hub's founding group, which held its inaugural assembly in March 2022, and from then on became a private non-profit association. The association began operating in the middle of last year, to become the voice of the national industry in all matters relating to the enhancement of the sharing and use of data while preserving digital sovereignty. The support received from the Secretary of State's Office reflects this public-private collaboration on issues with a transformational capacity for the country.

In the hub, five thematic working groups have been promoted on different sectors (industry, mobility, agri-food, health, and tourism) and innovative technologies for interdisciplinary technical support. These groups are working to define the unique challenges of each sector, structuring them around use cases, seeking to highlight the value of shared data in a data space.

The hub has a professional management team aimed at coordinating the working groups and ensuring their interconnection and synergies, with the ultimate goal of designing and implementing projects with a transformational base and capacity for sustainability, tasks that the Data Office has been collaborating on with determination, providing regulatory capacities, sharing best practices, and advising on market needs.

Paris Air Show celebrates aeronautics excellence

Paris–Le Bourget Airport opened its doors after four years to host the 54th Paris Air Show, a landmark event for the global aeronautics industry. GMV participated in the event, which took place from 19 to 25 June, with a company booth in the Spanish pavilion.

GMV is a supplier of solutions that are relied upon by aeronautics manufacturers, air navigation service providers, aviation organizations, and system operators. At its booth, GMV showcased the latest technological advancements in aeronautical systems that it participates in with major European programs, such as FCAS and EURODRONE. GMV presented navigation solutions proposed for new programs like the new SIRTAP unmanned aircraft, as well as equipment under production like the A400M crane control unit. Additionally, they presented a wide range of solutions for processing and distributing intelligence information from unmanned RPAS systems.

On Spain's Aeronautics Day, GMV's booth was attended by the president of the company, Mónica Martínez, and visited by important institutional figures as the Secretary of State for Defense, María Amparo Valcarce; Air Force General Javier Salto Martínez-Avial; the EDA's Director of Industry, Emilio Fajardo; and the Secretary for Economic Development of Yucatán, Ernesto Herrera Novelo.

GMV signs memorandum of understanding with Embraer

The aim of this MOU is to enhance Portugal's Defence Technological and Industrial Base

GMV and several Portuguese companies (Centro de Engenharia e Desenvolvimento de Produto, Empordef Tecnologias de Informação, and OGMA – Indústria Aeronáutica de Portugal S.A.) signed a memorandum of understanding with Embraer in Portugal during the four-day state visit to the country by Brazilian President Lula da Silva, which was also attended by Portuguese Prime Minister António Costa, as well as other political and business figures. José Neves, GMV's Homeland Security and Defense Director in Portugal, also attended the signing, which took place on 24 April at the OGMA's facilities.

GMV and Embraer have been collaborating for over 15 years on research and development in the area of integrated modular avionics (IMA), including projects within the European Union. An MOU had already been signed in September last year. Now this partnership has been renewed with the intention of extending the ties of cooperation with new businesses, new technological developments, and new defense strategies.

The A-29 Super Tucano military aircraft is used by 15 air forces around the world, including in the United States, the armed forces of Mali, Mauritania, Nigeria, Burkina Faso, and Angola. However, this MOU extends beyond the companies' potential strategic relationship as regards development and systems integration for the A-29 Super Tucano. It also encompasses the A-29N model, which was recently launched to meet the needs the North Atlantic Treaty Organization (NATO) member countries. This includes research, technological development, and innovation processes intended to expand and increase long-term business relationships between the companies during the development, production, and operational support phases of the A-29N aircraft.

GMV will be equipping the CIAR with a cybersecurity system for satellite positioning and communications

The Rozas Airborne Research Center (CIAR) is the central infrastructure for the Galician regional government's Civil UAVs Initiative, which is being used to advance technologies for civilian use of unmanned aerial vehicles (UAVs). A variety of projects have already been carried out as part of this initiative, to give the CIAR the tools it needs to create an innovation hub for UAV technologies.

GMV and the Galician Innovation Agency (GAIN), which is part of Galicia's regional government (Xunta de Galicia), recently signed an agreement to develop a cybersecurity system capable of detecting radiofrequency interference in the area surrounding the Rozas aerodrome. The purpose of this system is to protect the satellite communication and positioning systems relied upon by UAVs, so that they can be operated continuously in the area

around the CIAR with the required level of security. To do this, the system will monitor the global navigation satellite system (GNSS) positioning signals sent by the satellites, as well as the signals used for communication links between the control stations and UAVs.

Satellite positioning is essential for UAVs, because it allows these aircraft to determine their position accurately throughout their entire flight. Because these systems and the GNSS services provided by satellites have such high availability, UAVs can make use of advanced features such as autonomous flight. The new cybersecurity system, which will be developed by GMV together with the Galician company CENTUM research & technology, will be used to protect the CIAR, as well as the GNSS signals used by UAVs, against any

intentional or unintentional jamming or spoofing. Jamming attacks interfere with the original satellite positioning signals, so that UAVs are unable to make use of them. On the other hand, with the type of attacks known as spoofing, an attempt is made to replace the authentic signal, to confuse a UAV's navigation system, or even take control of the aircraft's positioning.

The system being developed in this project led by GMV will also include a cybersecurity solution to protect the frequency bands used for communicating with UAVs. This is essential to prevent any loss of control that could be caused by attacks on the communication link between an unmanned vehicle and its corresponding ground control station, or the controls being used by a UAV's pilot.

This cybersecurity system will consist of a network of ground stations and a sensor installed on board the UAVs. The ground stations will continuously monitor the appropriate radiofrequency bands, while the UAV's onboard sensor will be used for geolocation of any interference sources coming from areas not covered by those ground stations. It is expected that the solution proposed by GMV and CENTUM research & technology will be delivered to the CIAR in mid 2024.

GMV re-elected to the presidency of AED Cluster Portugal

José Neves, Director of Homeland Security and Defense at GMV in Portugal, has been reelected as President of the Portuguese Aeronautics, Space, and Defense (AED) CLUSTER.

Until 2017, the Aeronautics, Space, and Defense sectors were each represented

by separate associations Proespaço, DANOTEC, and PEMAS, respectively. In that year, the merger of the three gave rise to AED Cluster Portugal, which accounts for 1.4% of the GDP and employs around 18,500 people.

The strategic objectives of AED Cluster Portugal fall within four main

pillars: Financing and Regulation; People and Skills; Innovation and Value; Markets and Opportunities. Its clear mission is to promote the advancement and consolidation of Portugal as an international reference in the global markets of Aeronautics, Space, and Defense.

GMV analyzes cybersecurity risks affecting military aircraft

■ The Cyber Resilience for the Air domain and Investigation of the Feasibility for an Aviation Cyber Exercise (CRUCIAL HINTS) Project is a major stepstone for GMV towards the analysis of cybersecurity challenges, specific to the Air domain while considering the various sources of cyber threats. This project is led by GMV, in consortium with NLR from the Netherlands.

When overlooking the current and future scenarios where armed forces operate, we do notice that improving cyber resilience of the Air domain is a priority. This is a sector highly affected by rapid technological change and involves complex systems where paying sufficient attention to cybersecurity risks is both essential and a big challenge.

Promoted by the European Defence Agency (EDA), this Framework Contract will rationalize, in its first stage, the communication, navigation, and surveillance (CNS) infrastructures modernization, together with the adoption of emerging and disruptive technologies, such as Artificial Intelligence and Machine Learning. An activity as challenging as this is only possible thanks to the knowledge and expertise held by the entire consortium.

Another important milestone is to address the impact on cyber resilience stemming from the global supply chain used for aviation, with a focus on military aviation requirements. This challenge will be tackled by the GMV Portuguese team, which will apply a formal Cyber Risk Assessment methodology. This will allow our experts to evaluate and analyze potential risks and vulnerabilities of the current and future overall ground and air infrastructure participating in aviation. The analysis will be complemented with consultancy actions on the next steps to be taken in order to reduce those risks and ensure a safer future.

Technological solutions for expanding the UME's capabilities

At the end of April, GMV attended a workshop organized by the recently created Drones Unit of Spain's Emergency Military Unit (UME). This purpose of this event was to evaluate and present the latest technological solutions that can help improve that Unit's response to emergency situations.

To help understand the capabilities currently existing in this area, the UME organized this event in collaboration with the Subdirectorate General of Planning, Technology and Innovation (SDGPLATIN), which is part of Spain's Directorate General of Weapons and Material (DGAM). GMV was invited to participate in this workshop, which took place along with an associated exhibition space at the UME's military headquarters (the Torrejón de Ardoz Air Base near Madrid).

In collaboration with Aurea Avionics, GMV presented its mini-drone and micro-drone solutions, including the fixed wing SEEKER and SOLO drones and the multirotor PASSER model. The company's presentation was focused on the capabilities that these systems can contribute to the UME's new Drones Unit and the missions it will be carrying out.

GMV to head up Galileo ground segment after securing a new contract

The contract comes on top of those already signed by GMV for the Galileo First Generation (G1G), bringing the total contract value since 2018 to more than €500 million

GMV is selected by the European Space Agency (ESA) for the development of the ground control segment for the in-orbit validation (IOV) system of the Galileo Second Generation (G2G).

The primary objectives of the Galileo Second Generation, also known as G2G, 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. Galileo currently serves more than four billion users worldwide, delivering global positioning, navigation, and clock synchronization services with a positioning accuracy of up to 20 cm.

The new contract signed between GMV and ESA exceeds 200 million euros, including the activities initially contracted for around 155 million euros plus a set of optional activities. 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 contract comes on top of those already signed by GMV for the Galileo First Generation (G1G), bringing the total contracts value since 2018 to more than €500 million.

The ground segment covered in the recently awarded contract will be responsible for controlling the two new second-generation satellite platforms, which are currently in the design and production phase. A total of 12 satellites are expected to be launched over the next three years. The new ground control system is scheduled to come into operation in 2025, coinciding with the launch of the first satellite of this second generation.

In addition to providing control and monitoring capabilities for the future satellites, this new project marks a technological leap forward compared to current developments. It includes features such as post-quantum cryptography, deployed microservices, improved automation, and new user interfaces, to name only a few. These upgrades will help to make the ground segment flexible, scalable, expandable, robust, and autonomous. Development will be carried out for the first time in Galileo following the "Agile" methodology, in order to support future phases of the system, and particular stress will be placed on aspects related to cybersecurity.

The project comes in addition to the activities already entrusted to GMV in 2018 for the ground segment of the Galileo First Generation (G1G), for which GMV has already deployed the first of the two contracted versions, currently providing services to a total of 28 satellites. GMV will deliver on both contracts simultaneously until the end of 2026, when Galileo's ground control segment will be unified to manage up to 50 satellites for constellation parallel replenishment.

The contract ceremony and the kick-off-meeting of the proyect took place on June 10 in Madrid. The event was attended by a large representation of GMV professionals, representatives of the European Space Agency (ESA), the European Union Agency for the Space Program (EUSPA), as well as representatives of subcontractors.

Presentation of the Master's Degree in Aerospace Engineering at FCT NOVA

On March 30th, at the UNINOVA Auditorium of he NOVA School of Science and Technology (NOVA FCT), the presentation of the new Master's Degree in Aerospace Engineering in Portugal took place. This Master's program, based on an interdisciplinary approach, focuses on two scientific research areas: Avionics Systems and Aerospace Mechanics. GMV participated in this event as part of a roundtable discussion themed "Empowering the Future Competitiveness of the Space Industry in Portugal", along with major industrial stakeholders TAP, Embraer, Tekever, chaired by the Aeronautics, Space and Defense Industry Cluster in Portugal.

João Branco, GMV's Space Systems Director in Portugal, emphasized the importance of developing the Portuguese space industry within the European context, with a focus on international collaboration. Research and Development (R&D) drives highly advanced solutions that enable a country like Portugal to leap to the forefront and contribute effectively. To progress in Portugal's response capabilities, a close connection between academia/institutes and universities (the paragon of R&D) and companies like GMV is crucial.

This connection allows for the contextualization, guidance, and transformation of R&D into engineering technological solutions. The potential of the space sector as a foundational industry was also highlighted, generating highly skilled employment, and creating a significant technological spillover effect for other sectors, while providing one of the highest quality returns for the country.

GMV welcomes GEODE project consortium to its headquarters

In mid-June GMV's headquarters hosted two important events within the GalilEO for EU Defence (GEODE) project: the second meeting of the standardization working group and the progress meeting with the European Commission to review the period between January 2022 and June 2023.

The GEODE project aims to boost the competitiveness of the European Union's industry in the highly strategic field of positioning, navigation, timing, and precise time synchronization (PNT) for defense purposes.

Launched under the umbrella of the European Commission's European Defence Industrial Development Programme (EDIDP) and co-funded by Belgium, Germany, Italy, France, and Spain, GEODE is supported by EU funding to the amount of nearly €44 million.

The Spanish industrial team – made up of GMV, Indra, and Tecnobit – has top-level responsibility in the project for the complete development of the solution for naval military platforms (GNSS/PRS receiver with security module and controlled reception pattern antenna). Within this team, GMV is responsible for integrating the GNSS/PRS receiver system and, specifically, for developing all the receiver's signal processing, navigation, and synchronization functions.

The GEODE Standardization Workshop #2 was held on 13 and 14 June and was attended by both the Spanish team and other European partners (Airbus Defence & Space, Antwerp Space N.V., Diehl Defence, Fraunhofer IIS, Leonardo, Safran, TAS-I, TAVS, Telespazio, and FDC). The purpose of this event was to continue the standardization-related activities initiated at the first workshop, held in Paris on 4 and 5 April. It was used to develop a preliminary standard specification intended to establish common minimum characteristics in order to meet the needs of the majority of EU military users in the land, sea, and air domains.

This was followed on 15 and 16 June by a progress meeting, which was attended by members of the European Commission and the Spanish Ministry of Defense. These two days were an opportunity to review where the project is at now, the progress made since it began, and its roadmap for the coming months.

GMV maintains its relevance in the EGNOS evolution program

■ GMV recently renewed all the maintenance contracts it was responsible for under the European satellite augmentation system, EGNOS V2 (European Geostationary Navigation Overlay System), whose imports amounted to more than 6 million euros.

These renewals include the Central Processing Facility Processing Set (CPFPS), EGNOS-V2 Data Access System (EDAS), EGNOS-V2 NOTAM System (EURONOTAM), EGNOS-V2 Application Specific Qualification Facility (ASQF) and Analysis Tool Pre-processor Assembly, Integration and Validation (ATPAIV).

The maintenance of the CPFPS, ASQF and ATPAIV has been renewed with Thales Alenia Space, which under contract with the European Union Agency for the Space Program (EUSPA) is the main contractor for the maintenance of the EGNOS V2 system. The maintenance of EDAS and EURONOTAM has been renewed with ESSP, operator of EGNOS V2.

The EGNOS system increases the accuracy and integrity of the positioning signals of the global navigation satellite system GPS. The EGNOS Safety of Life service, used mainly in the aviation sector to perform precision approaches to European airports, has improved with great safety of the aviation sector.

Increasing EGNOS services in Europe and keeping the system up and running as well as adapting it to respond to user needs is critical. While contributing to these objectives, the signing of these contracts allows GMV to continue working and remains involved in EGNOS, a program in which the company has been involved for more than 25 years, as responsible for the design, development, validation and maintenance of the CPFPS, EDAS, EURONOTAM, ASQF and ATPAIV.

With the renewal of these contracts, GMV also reinforces its position in the satellite navigation sector, a prestige that the company has achieved thanks to its long experience in engineering, development, validation and maintenance of this system, among other things.

This news reflects the opinion of its author and not necessarily the opinion of the European Union or the European Union Agency for the Space Programme (EUSPA), which are not responsible for any use that may be made of the information it contains.

Phase 1 of the G2TURN project successfully completed

■ Phase 1 of the G2TURN (G2G Test User Receiver Non-PRS) project, carried out by a GMV-led consortium, has recently been successfully completed. Its objective is to develop a prototype GNSS receiver to be used by the European Space Agency as a qualification tool in Phase C/D of the development of the Galileo Second Generation (G2G) satellites. This receiver will be used both for ground testing with the satellites and evaluating the performance of the G2G system once deployed, emulating different commercial receivers and use cases.

The final version of the G2TURN receiver will incorporate all Galileo Non-PRS (Public Regulated Service) services and their corresponding signals, including Open Service (OS), Advanced RAIM (ARAIM), Emergency Warning Service (EWS), OS Authentication (OS-A), Signal Authentication Service (SAS) and Timing Service (TiS).

The G2TURN receiver includes a combination of hardware, software, and firmware elements that are the result of GMV's ambitious internal R&D program in the area of GNSS receivers.

During the project's lifecycle, four versions of the receiver will be developed, each one including additional capabilities and features. In phase one of the project, GMV has successfully developed the initial version (Build 1) conceived as a first functional implementation of Galileo G2G's OS services. A crucial factor in closing this phase was the use of the G2G satellite signal simulator being developed by GMV Portugal as part of the G2RFCS project together with Orolia and Tecnobit.

The joint use of the G2TURN receiver and the G2RFCS signal simulator is further proof of the European Space Agency's confidence in GMV's experience and know-how in the G2G system.

Boosting innovation at the European Navigation Conference

GMV attended the European Navigation Conference (ENC) held at the ESA's European Space Technology and Research Centre (ESTEC) in Noordwijk, Netherlands, from May 31 to June 2, 2023. This conference served as a platform for researchers, practitioners, and industry experts to discuss and exchange knowledge on various aspects of navigation, including satellite navigation systems such as GPS, Galileo, EGNOS, GLONASS, and BeiDou, as well as other related technologies.

In this edition, the main theme of the conference was resilience in the field of navigation, with a focus on the vulnerability of position and timing information provided by satellites Particular emphasis was placed on the development of resilient solutions incorporating redundancy in the signal domain, ground and space infrastructures, and on-board implementation. Additionally, the conference addressed vulnerabilities in navigation, guidance, and control functions.

The conference featured a series of presentations and sessions delivered by industry experts, with GMV standing out as one of the crucial players in the field of global satellite navigation systems (GNSS), presenting a total of twelve technical papers.

GMV was also well represented in the exhibition area, showing the various clients and visitors the latest GMV product innovations.

GMV has been contributing to the development of satellite navigation for over 30 years, making it one of the main participants in the implementation of Europe's satellite navigation strategy. GMV's expertise in this field and the experience of its teams of professionals have brought the company to a leading position both in the development of navigation systems and various GNSS applications, where GMV has been a pioneer in the use of GPS, GLONASS, EGNOS, and Galileo signals.

GMV analyses the possibilities that a LEO constellation can provide for the PRS service

■ The GMVAD-led consortium involving OHB AG Systems and Antwerp Space has recently been chosen by ESA to carry out the Extended Services for PRS and Resilience Integrated in Tiered Orbits (ESPRITO) project, set to take place over two 12-month stages. The ESPRITO project objectives are to perform a mission and function analysis and define the requirements for a system based on a LEO constellation, in order to enhance and extend the capabilities of the existing Galileo Public Regulated Service (PRS).

The Galileo PRS is a positioning, navigation, and timing (PNT) service intended for use by authorized government agencies for sensitive and security-related applications. These challenges can be met with a

LEO system that complements the currently used Medium Earth Orbit (MEO) constellation in Galileo. However, the needs of PRS users are constantly evolving: improved positioning performance (PVT), increased data volume and transmission rates, as well as enhancements in system management and user operability. These challenges can be met with a LEO system that complements the currently used Medium Earth Orbit (MEO) constellation in Galileo.

European government authorities have initiated the development (or plan to do so, as is the case for the European Commission) of small satellite constellations to provide new capabilities such as secure data communications, navigation, and

continuous ground support to users. These multi-orbital architectures based on a LEO constellation will deliver the wherewithal to support the Galileo PRS and evolve PRS use cases, in order to serve the needs of government services and Member States.

There is, however, a need to analyze and specify critical aspects that are unique to LEO constellations, so as to accommodate these evolving PRS use cases and integrate them into future European satellite constellations.

The ESPRITO project aims to establish missions and system-level concepts, functions, and specifications for the integration of services that will help bolster European security and improve the resilience of government users.

The second phase of the UKSBAS testbed begins

■ In March, the next phase of work (Phase 2A) of a UKSBAS (UK Satellite Based Augmentation System) testbed kicked off. The work is being funded through Element 3 of the ESA NAVISP programme and is being primed by Inmarsat Navigation Ventures Ltd. with GMV-UK as a major subcontractor.

The initial Phase 1 project closed earlier in the year, having successfully secured a PRN code and demonstrated a non-operational legacy (augmentation of GPS L1) SBAS service over UK territory including a live signal-in-space (SIS) from the Inmarsat 3F5 geostationary satellite and use of the Goonhilly Earth Station for uplink. This represented the first UK Position, Navigation and Timing (PNT) SIS. Importantly, interoperability with EGNOS was demonstrated over the UK service area. In addition to the standardised aviation-based service, an innovative maritime service was demonstrated through generation of (offline) modified/bespoke SBAS message types.
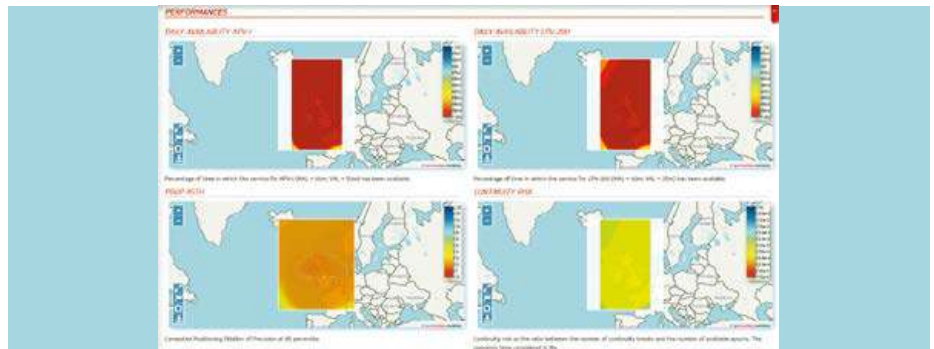
The project also defined a roadmap for the potential evolution of UK SBAS capabilities, services and applications. This roadmap is being further developed in Phase 2A.

Phase 2A will extend the testbed to include Dual-Frequency Multi-Constellation (DFMC) SBAS and will prepare for the inclusion of Precise Point Positioning (PPP) in a follow-on phase of work.

The GMV role includes provision of key ground segment software items (including **magicSBAS** for generation of the SBAS augmentation data), monitoring of the performance of

the testbed and leading downstream demonstration activities in the civil aviation and maritime sectors.

It will further design and prepare for demonstrations in other transport sectors (road, rail, unmanned aerial vehicles) which will then be carried out in a future phase.

The UKSBAS testbed initiative follows the withdrawal of the UK from the European EGNOS programme, including the loss of availability of the Safety of Life (SoL) service and its associated working agreements for use in civil aviation approach operations.

GMV will be part of the Spanish Space Agency's Governing Council

■ On April 20th, the Spanish Space Agency (*Agencia Espacial Española* or AEE in Spanish) formally established its Governing Council. This took place at a meeting held at the agency's headquarters in Seville, led by Diana Morant, who is Spain's Minister of Science and Innovation and president of the AEE. Once this council had been created, Jorge Potti, GMV's Corporate Director of Strategy, was appointed as a member to represent the Spanish space industry.

Through this position on the Governing Council, Mr. Potti will be contributing

the knowledge and experience he has gained from working in the Spanish and international space industry for more than 35 years. This appointment represents a recognition of his outstanding professional career, which has evolved in tandem with GMV's growth as a multinational business group.

His appointment also represents a milestone for GMV, because it helps solidify the company's top position in terms of relations between the space industry and the public sector. With almost 40 years of history, more than

3,000 employees, and a presence on five continents, GMV continues to consolidate its leadership status in the space industry.

The AEE will be responsible for planning Spain's strategic actions in relation to the space industry, covering aspects related to technological developments as well as the various uses of space. The agency will also play a role in coordinating the country's governmental bodies with authorities related to space, through a national policy that will be used to organize activities in the public and private sectors, both in Spain and internationally.

Raising our reputation within the UK Defence sector

GPS-denied area

Magnetic navigation

Terrestrial image analysis

Celestial navigation

Terrestrial radiofrequency, Atomic clock

Inertial sensor, Chip-scale atomic clock, Terrestrial radiofrequency

Inertial sensor, Chip-scale atomic clock
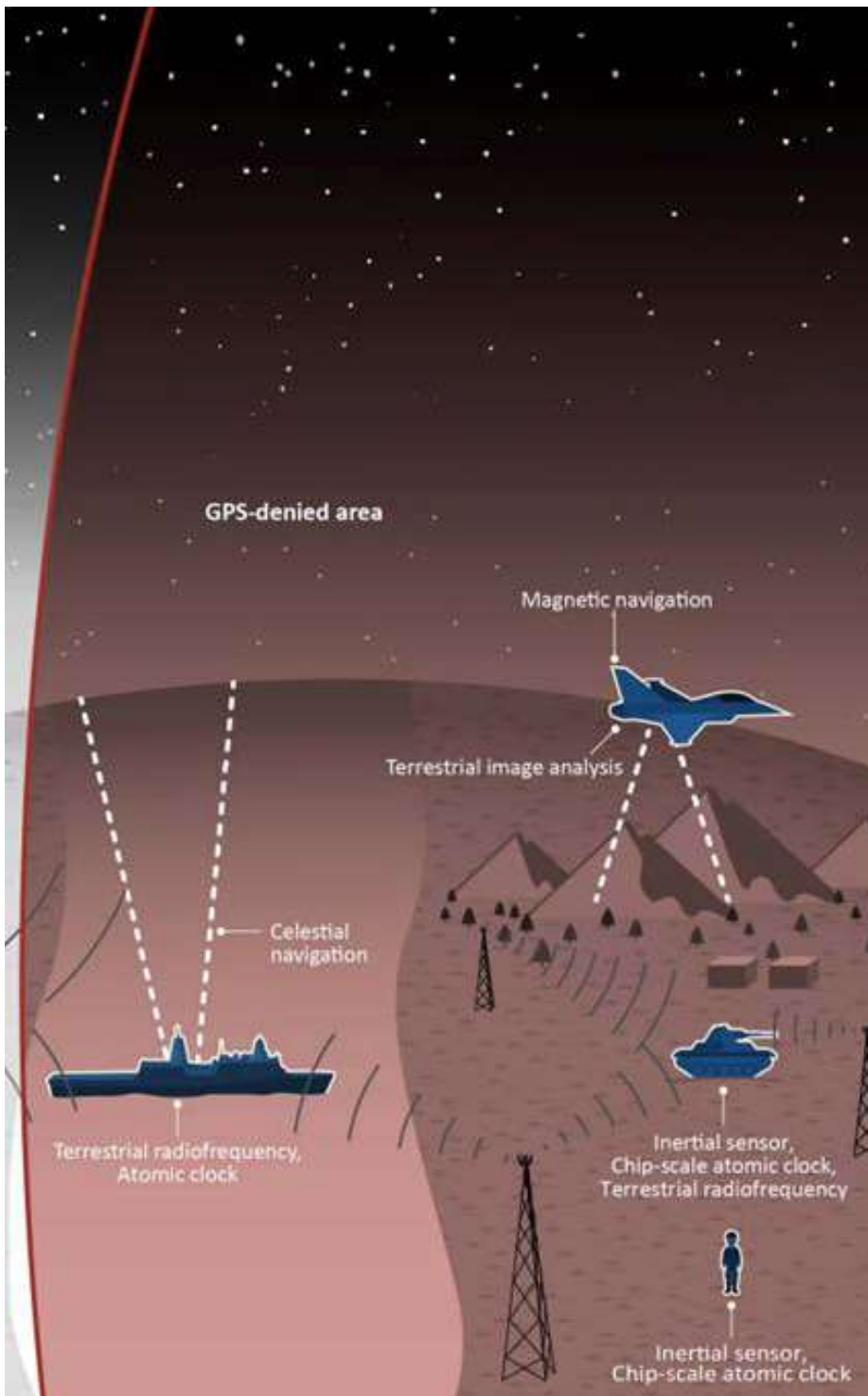
Source: GAO analysis of DOD information. / GAO-21-320SP

GMV NUSP/PNTUK have recently won a major contract within the MOD (the UK Ministry of Defence) Bright Corvus Science and Technology programme that is developing the next generation technologies for the UK armed forces. The contract is to design and develop of an open, modular, sensor agnostic PNT architecture that maintains very high accuracy global and relative Position Navigation and Time (PNT) to allow defence forces to continue operations in GNSS denied theatres. The significance of this contract is that GMV are priming, with incumbent UK military contractors QinetiQ and Raytheon as subcontractors.

A further success within the Bright Corvus programme is from NUSP/TAF with a contract to design and prototype a solution that wirelessly transfers accurate time and frequency information, again in GNSS denied environments. NUSP have other bids submitted within Bright Corvus and are hoping that further positive news will arrive soon.

The Bright Corvus contracts have partly been facilitated through our successful track record in other defence activities. A short, intensive and highly successful activity within the MOD's Alternative Navigation (AltNav) programme to develop integrate GNSS, IMU, image based navigation sensors, and Signals of Opportunity has recently been completed with demonstrations showing performance when GNSS is degraded or denied.

GMV are also assisting QinetiQ within their Robust Global Navigation System (R-GNS) receiver developments for the MOD, having developed the user control and visualisation software, and are delivering the receiver software for SBAS implementation and multi-antenna attitude determination.

■ GMV have had recent successes supplying into the UK Defence sector. There are a number of space-related programmes driven by UK Defence which have originated from NATO collaborations, from the need for sovereign capability following Brexit, and from the proliferation of space-based and electronic warfare and counter-space activities coming out of Russia and China.

GMV awarded at the Asia-Pacific Spatial Excellence awards

■ The 5G precise positioning testbed project, carried out by the technology consortium comprising GMV, FrontierSI, Ericsson and Optus and its demo partners Kondinin, Platfarm and Position Partners, won the International Partnership award at the Asia-Pacific National Space Excellence Awards dinner in May. In addition, the project also received the prestigious J.K. Barrie Award, the most valuable award the panel of judges can bestow. Jess David Calle Calle, Division Head Algorithms and Positioning Services at GMV, and Adrián Chamorro Moreno,Positioning Engine Product Manager, received both awards on behalf of GMV.

The 5G Precise Positioning Testbed project aims to demonstrate the capabilities of the 5G-based LTE Positioning Protocol (LPP) in tests in real-world environments and use cases as part of the 5G Positioning Testbed, a project funded through the Australian Government's 5G Innovation Initiative.

The results obtained thus far are a crucial breakthrough for the use of 5G technology in high-precision positioning. The test suite demonstrated the capabilities of each of the 5G LPP operating modes for high-precision GNSS-based services, including OSR (Observation Space Representation), SSR (State Space Representation), and SSR with atmospheric corrections. The tests have been performed on real use cases and with equipment provided by the partners to study the technical feasibility in a number of applications. Field tests showed that the solution can achieve centimeter accuracy with fast convergence times using a commercial receiver and antenna.

GNSS-based precise positioning is currently the most widely used technology for calculating absolute positions at the user level. In cases where centimeter accuracy is required, GNSS corrections are necessary to reduce the typical errors that occur in the broadcast navigation message and position calculation. For years, the distribution of GNSS corrections has been based either on PPP (Precise Point Positioning), or RTK (Real Time Kinematics) corrections distributed via geostationary (GEO) satellites over the L-band, or on point-to-point transmissions via NTRIP over the Internet. Both options have their drawbacks: broadcasting via GEO satellites requires a complex ground infrastructure and maintenance costs are often high, and the distribution of NTRIP (Networked Transport of RTCM via Internet Protocol) is not scalable due to the point-to-point connections required for each user.

8th IAA Planetary Defense Conference held in Vienna

In April, the United Nations Office of Outer Space Affairs, the United Nations Vienna International Center (VIC), and the Austrian Academy of Sciences hosted the eighth edition of the International Academy of Astronautics (IAA) Planetary Defense Conference.

This schedule for this year's event featured more than 120 sessions, where the subject of planetary defense was discussed from a variety of perspectives. GMV participated in the exhibition area with two technical posters.

During the four workshops held at the event, the subjects discussed included the contributions being made to planetary defense by ESA, NASA, and JAXA, along with new discoveries of near-Earth objects (NEOs), advances in their monitoring and characterization, the consequences and legal implications of a potential impact event, contingency plans being developed for a case of impact, approaches to deviation and disruption, and strategies for awareness-raising and communication, among others.

GMV participated with two technical posters and, as is now tradition, awarded three prizes to the three student authors of the best technical papers presented to the audience during the conference.

GMV will build yet another key element of ESA's next generation ground data systems infrastructure

■ The EGOS-MG project is the central element in the definition and implementation of ESA's Multi-Mission Ground Systems infrastructure. It covers the development and deployment of the basic infrastructure and related environments to achieve a new multi-mission concept, which implies a step forward in the direction to share common software, environments, services and processes across missions.

The EGOS-MG concept implies a radical change in the way the missions are operated at ESOC, allowing a significant increase in the level of sharing and commonality, and reducing the cost to setup and operate ESA's mission ground segment data systems. The project is following several steps:

1. EGOS-MG system engineering, covering the definition of the system concept, requirements, and overall system architecture.

2. Design and implementation of the DevOps environment (DEV), supporting the development, deployment, and maintenance of EGOS-MG systems.

3. Adaptation of existing EGOS systems to the new concept.

4. Implementation of the Operational Environment (OPS), providing the runtime platform and a set of common services and stores.

GMV has been actively participating in the project since 2020, when it was awarded the EGOS-MG DevOps project (step 2). GMV is also involved in the adaptation of SIMULUS and MCS infrastructure (step 3). Finally, ESOC has recently entrusted a GMV-led consortium with the step 4 of the process. This activity involves two main tasks:

■ The production of the run-time environment, covering development and validation of common services and stores on a private cloud infrastructure based on Kubernetes.

- The common services include resource allocation, user authentication and authorization, configuration, file transfer and resource monitoring.

- Access to the services is enabled through a web portal and REST APIs (for automation), which also support the administration of the platform and configuration of the services for each mission.

■ The progressive integration and validation of EGOS-MG systems (responsible for mission control, mission planning, mission simulation, etc), in the context of two pilot missions.

GMV returns to Space-Comm to showcase the potential in the UK space industry

On June 7 and 8, the Farnborough International Exhibition Centre, United Kingdom, hosted the third annual Space-Comm Expo, a trade exhibition focused on the commercialization of space for business, defense and supported by ADS, KTN, UKspace, ESA – European Space Agency and the UK Space Agency.

This year, GMV once again joined the exhibition with a large booth where the company presented its activities in space, in particular focused on the activities and opportunities of GMV in the UK: PNT, Robotics, Earth Observation, Ground Control Systems, Lunar Exploration, and Space Domain Awareness. Over two days, GMV's team of eight engaged with key stakeholders from all of the leading space companies in the UK, from a wide range of startups and suppliers, from leading government agencies (UK Space Agency, MOD, DSIT), as well as new talent emerging from the UK's universities.

For GMV, attendance at The Space-Comm Expo is a opportunity and recognition of the growing brand that GMV carries in the UK space sector, making a bold statement of intent as well as reinforcing GMV's commitment to investment and growth, backing up the UK Space Strategy which is now starting to take a hold across the UK space sector and government.

GMV leads next generation GOVSATCOM system testbed

■ As the world increasingly moves towards the digital realm, the European Commission (EC) and European Space Agency (ESA) are meeting the demand for critical telecommunications infrastructure through the IRIS2 initiative. As part of that effort, ESA's ARTES 4.0 Space Systems for Safety and Security (4S) program awarded a GMV-led consortium the first phase for the 4S System and Services Test Bed (4SSTB), wich is on-going.

GMV is supported by an experienced international team, including Magister Solutions of Finland, the Technical Research Center of Finland (VTT), Telespazio Belgium, and the National Technical University of Athens (Greece).

The 4SSTB will act as a digital twin for future secure satellite missions, showing how missions will react to changing scenarios and allow researchers a glimpse of the entire system's behavior with the click of a button. This insight can be used to de-risk future technological developments, diagnose potential issues with the system, streamline new technology development, and vet system security, all from the safety of the digital realm. While the concept of such a system testbed is simple, bringing it to life is a far more complex undertaking.

Increasing demand for connectivity from both governments and citizens has resulted in countless satellite networks, each with an even greater number of users. Government and pan-government agencies often focus on areas such as secure communication systems, crisis management, border/marine surveillance, and air traffic control. The civilian sector uses mass-market communications (fixed and mobile broadband) and low rate "internet of things" applications (IoT). To successfully represent so many unique domains, the 4SSTB will undergo rigorous development efforts during the first phase of the project.

To outline how the testbed should perform, the 4SSTB team will first leverage existing satellite constellations and technology to define key performance indicators (KPIs). Engineers, strategists, and developers will work side by side using an agile methodology to define each aspect of the mission. Everything from the end users on their mobile phones to the size and orbit of the satellites overhead will be factored in and outlined in requirements. Finally, exhaustive testing and verification will confirm the testbed is performing as planned. Once complete, the 4SSTB will be a powerful tool that puts space systems to the test, so that final users don't have to.

GMV provides active data curation service for USSPACECOM's Joint Task Force – Space Defense Commercial Operations Cell

The service evaluates the quality of the data provided by the various commercial suppliers to the system

In December 2022, GMV began providing active data curation services to the U. S. Space Command's Joint Task Force-Space Defense (JTF-SD) Commercial Operations cell (JCO). The active data curation service evaluates the quality of the data provided by the different commercial providers.

The JCO integrates commercially available Space Surveillance and Tracking (SST) data and services to complement U.S. Space Force capabilities with commercial unclassified and shareable resources. A data curation service monitors and analyzes the data received or produced in a system to characterize and determine the quality of the data, detecting and isolating possible inconsistencies and anomalies.

GMV provides this active data curation service, which is based on the state-of-the-art algorithms developed in *FocusSST* product. As part of the JCO activity, it retrieves observations from sensors and orbital data from different providers in real-time from the Unified Data Library (UDL). Two different processes are executed automatically upon reception of the data: First, observations collected are used to perform the calibration and characterization of the

sensors, estimating the sensor time and observable biases and noises based on precise orbital information. Second, the orbital information retrieved from the UDL is compared to a common reference, the GMV's *Focusoc* service, to determine the consistency among the different sources and detecting possible anomalies or deviations.

In addition to the active data curation service, for the last three years, GMV has actively participated in another activity promoted by the JCO, the Sprint Advance Concepts Training (SACT). It consists of a real time operations scenario of a couple of days duration where different JCO cells

(from countries like United States, France, United Kingdom and Australia), together with commercial companies around the world are organized in three shifts to cover 24/7 global operations. In addition to the data curation service, GMV has also participated with *Focusoc* for collision assessment purposes, and demonstrated many other capabilities from *FocusSST* such as data fusion through orbit determination, reentry prediction, telescopes image processing, etc.

These activities position GMV as a reliable and relevant partner providing commercial services and capabilities not only in Europe but also in the U.S.
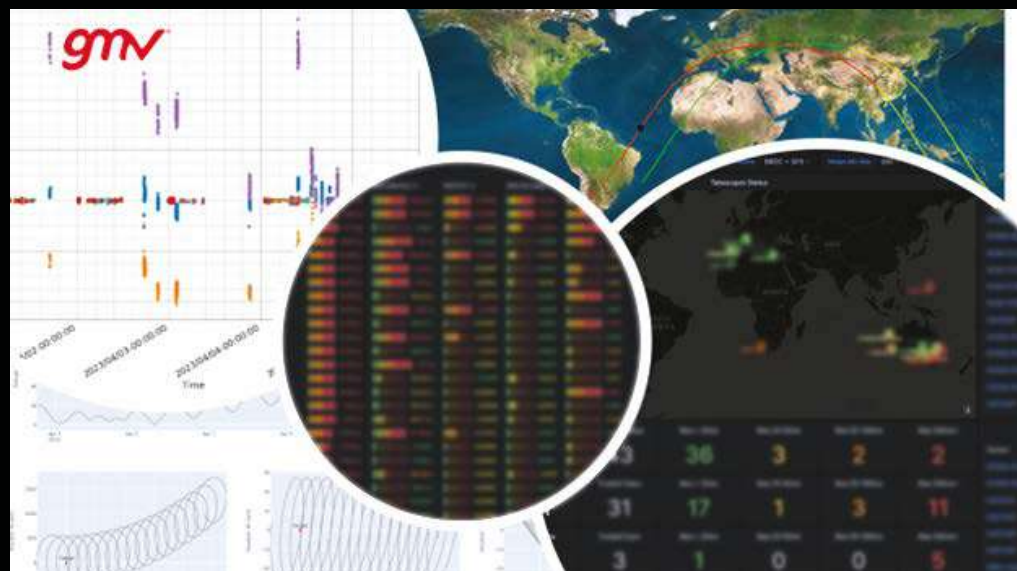
GMV demonstrates its leadership in STM in the European Union

■ Following the Joint Communication to the European Parliament and the Council on an EU Approach for Space Traffic Management (STM) issued in February 2022, DG-DEFIS (The Directorate-General for Defence Industry and Space) proposed the creation of a so-called EU Industry and Start-ups Forum (EISF) on STM. This forum is aimed at promoting the competitiveness of the European industrial sector working on STM and the precursor Space Surveillance and Tracking (SST) activities to achieve a higher level of strategic autonomy in Europe.

The forum's ambition is to ensure that all the potential capabilities and innovation offered by European companies are used to further develop the public services delivered by the EU SST. Additionally, it also serves as a transparent mechanism, teaming up the European Union's space industry and start-ups with the EU SST and DG DEFIS' policy-makers in regular and constructive dialogue.

Since then, four meetings have been made in Brussels in April & November 2023 and in February & May 2024. The impact of those meetings has been outstanding, involving tens of industries from all across the EU and more than 100 attendees to all meetings both on site and online.

As part of these meetings, three working groups have been created within the EISF for the provision of commercial data to the EU SST, for the development of innovative commercial sensors and value chain (data processing capabilities) and for the definition of new services.

Thus, being a key provider of technology, products and services to the EU SST system, GMV has been present to all these EISF meetings with several colleagues. Additionally, expert GMV staff are co-chairing, on behalf of European large industries, two of these three working groups, thus proving our leadership in this domain.

Seeking a safer and more sustainable space

The city of Osaka, Japan, hosted in May the 12th IAASS Conference, under the title "Making Space Travel Safer,". GMV was present in this year's edition, which was organized in collaboration with the Japan Aerospace Exploration Agency (JAXA) and where over a hundred professionals attended from different countries. This meeting seeks primarily to promote international cooperation and showcases scientific advances in the field of safety and sustainability of space systems.

In this context, the event emphasized the need to create a culture of space security and promote peaceful and responsible use of space. With the growing number of commercial spaceports and organizations and the emergence of a commercial market for human spaceflight, the conference addressed the need for mutual understanding, trust and international cooperation in space endeavors.

As part of the "Space Debris & STM" session on the second day of the conference, Jesús Tirado, Head of SST&STM Technology&Products of GMV, gave the talk on "Growth of the Global STM Industrial Landscape: The GMV Case", in which he highlighted the progress made by the space industry in space-debris surveillance and space-traffic management and GMV's leading role in it.

For over 20 years GMV has been investing considerable R&D efforts in developing various solutions to the problem of space debris, taking part in many major projects carried out by ESA and national agencies. In this respect, the company has become a global reference in the study, monitoring, proliferation prevention and elimination of space debris, with more than 100 engineers working in eight different countries (Spain, France, Germany, United Kingdom, Poland, Romania, Portugal, and the United States).

GMV provides pilot collision avoidance services for ESA's Swarm mission

■ In October 2022, through the Space Debris Office (SDO) the European Space Agency (ESA) awarded a contract to GMV to provide Conjunction Assessment (CA) Services under a pilot regime to the three Swarm satellites, controlled by ESOC. These services, based on GMV's commercial CA service **Focusoc**, are provided for test and evaluation in parallel and complementing the current operations and will provide SDO and the Swarm flight control team with all the needed information and resources to assess the service, operate safely and mitigate collision risk.

The service will be based on GMV's state-of-the-art COTS software for collision avoidance, **Closeap**, as core processing infrastructure located at GMV facilities. This includes the most relevant capabilities and functionalities related with CA: close encounter prediction, estimation of the probability of collision, collision avoidance manoeuvre computation, etc.

In addition, Space Situational Awareness (SSA) data is continuously updated, processed and augmented to include it in the analyses, by means of the use of GMV's flight dynamics tools based on **Focussuite** COTS software. To set an example, all the orbits present in the American 18SDS SP high accuracy catalogue are daily processed and extended, and operational ephemeris are screened against them, thus providing augmented services. Additionally, other available orbit or Conjunction Data Message (CDM) are also processed.

GMV provides CA services to more than 10 operators and more than 80 satellites through the **Focusoc** service, finding EUTELSAT, OPTUS, JSAT or HISPASAT among its users.

This contract aims at enhancing this service by benefitting from ESA's feedback on the pilot service and paving the way for a potential future external service provision to ESA. The focus will be on the enhancement of existing and established collision avoidance processes at ESA, e.g. via the incorporation of new data sources to the system, such as telescope or radar observations, and the improvement of the performances of the service with a substantial benefit for the commercial users, especially in the LEO regime.

With this new project, GMV strengthens its position as European industrial leader in Space Situational Awareness (SSA), Space Surveillance and Tracking (SST) and provision of institutional and commercial CA services in Europe.

©ESA

Key participations in Military Space Surveillance and SDA

GMV attended the 18th annual Military Space Situational Awareness Conference in London on 26–27 April. This event focuses on space surveillance from a military perspective, in the so-called Space Domain Awareness (SDA).

The concept of SDA goes beyond the concepts of civil space surveillance (SSA/SST), in which GMV is already one of the uncontested leaders at European level, and deals with the detection, identification and characterisation of space objects of interest, to understand and describe their intentional behaviour. It is therefore of particular relevance in the military domain and is already becoming one of the fundamental pillars in Space Security and Defence.

With GMV's participation in this conference, we are sharing our experience in space surveillance accumulated over the years, now applied to the military field, and strengthening our position. GMV currently also has an important participation in several military space surveillance projects: development and provision of COTS for the German Military SSA Centre (Weltraumlagezentrum) and for the Space Surveillance Operations Centre (COVE) of the Spanish Air and Space Force, collaboration in military exercises (US DoD/DoC SACT's & Global Sentinel and USSF's JCO), highlighting the important role in the projects of the European Defence Industrial Development Programme (EDIDP) dedicated to Space, in which SDA covers a large part of the activities.

JUICE: An unprecedented exploration mission

■ On April 14, the Jupiter Icy Moons Explorer (JUICE) was successfully launched from the European Space Port in French Guiana, onboard an Ariane 5.

JUICE is part of the Cosmic Vision 2015 2025 program of the European Space Agency (ESA). The aim of this mission is to study the existence of habitable environments around the planets known as gas giants, and for this purpose, Jupiter's system will be used as an archetype for the numerous giant planets that are now known to exist in orbit around other stars.

GMV is playing a fundamental role in this mission, because in addition to designing and developing the mission control system (MCS), which is responsible for tracking the spacecraft and for all ground segment control operations, the company will also be responsible for providing maintenance and support for this system during the mission's entire duration.

GMV has also contributed to the development of various components of the flight dynamics system (FDS), and it will also be involved in their operation. This system is responsible for determining and controlling the spacecraft's orbit and attitude. GMV will also be contributing to maintenance of this FDS during the mission's entire duration.

GMV is a provider of satellite control systems not just for the ESA (with GMV acting as a supplier for most of its Earth observation missions as well as for its planetary exploration missions such as Bepi-Colombo and Solar Orbiter), but also for the European institutional market in general (where GMV is a supplier for the Galileo mission control center for the European Commission, and for Sentinel 3, MTG, and EPS SG for EUMETSAT). This predominant position in the institutional market complements the leading position that GMV now holds in the worldwide market for commercial satellite operators.

GMV demonstrates its commitment to the space industry at 2023 Space Symposium

GMV recently attended the Space Symposium for the first time, at its 38th edition held in the USA in April at The Broadmoor resort in Colorado Springs, Colorado. The first edition of the Space Symposium took place in 1984 with 250 attendees, although this year the number of participants exceeded 7,000, including visitors, speakers, exhibitors, students, etc. This is an annual conference that brings together space professionals from around the world, to discuss the latest developments in space technology, policy, and exploration.

At this year's edition, the participating experts discussed subjects that included, among others, moon and Mars exploration and colonization, the challenges presented by the need for space sustainability and environmental protection, and cybersecurity in the space industry.

José Miguel Lozano, president of GMV North America, participated along with other industry professionals in a discussion panel held on Wednesday, April 19th, entitled "Commercial SSA: the next game changers". He took advantage of this opportunity to share his views on the challenges facing the field of space traffic management (STM), which are arising from the growing number of objects in orbit, especially those associated with satellite mega-constellations.

He also described GMV's participation in developing numerous space situational awareness (SSA) products and services, which are now being used extensively by companies and institutions worldwide. Finally, he emphasized the importance of data fusion technologies and development of services adapted to each type of user, from the institutions responsible for STM to the various satellite operators, to cover everything from minor missions to mega-constellations.

Contract with Gilmour Space Technologies to validate the GNC subsystem of the Eris Block 1 microlauncher

Gilmour Space is an Australian space technology company based in Queensland that designs and integrates hybrid propulsion-based micro-launchers

T hanks to its legacy in micro-launcher Guidance, Navigation and Control (GNC) development, GMV has signed a support contract with Gilmour Space Technologies in Australia. The support contract is for an independent validation of their Eris Block 1 micro-launcher GNC subsystem, designed by Gilmour Space and currently under validation at their facilities.

Gilmour Space is an Australian space technology company headquartered in Queensland, that is designing and integrating micro-launchers based on hybrid propulsion. More recently the company has started developing their G-class satellite (G-Sat) platform to be launched into LEO orbit. Eris Block 1 is a three staged launcher targeting to inject up to 215 kg of payload mass into a reference Sun Synchronous Orbit (SSO) of 500 km altitude.

Expertise and infrastructure available at GMV for GNC subsystem design, integration and qualification has been matured in different ESA, EU and commercial programmes over the past 35 years. This makes GMV a trusted and valuable partner to provide an independent verification and validation of the Gilmour designed system.

In the specific area of Launcher GNC, GMV started working in the Hermes program in the early nineties, passing

through the Ariane 5 programme for trajectory optimisation for the ESC-B version. One of the most relevant experiences has been the contribution

given at VEGA-FPSA (Flight Programme SW Alternative), which flew for the first time on VV02 in May 2013 exactly 10 years ago.

GMV develops the attitude and orbit control system for the ARIEL mission
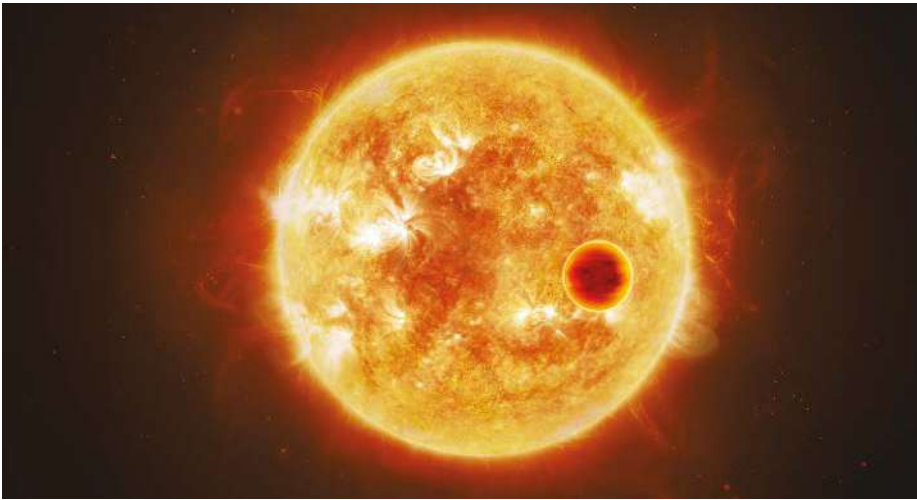
■ ESA's exoplanet mission Ariel, the Atmospheric remote-sensing infrared exoplanet large-survey mission, is scheduled for launch in 2029. It has already moved from study to implementation phase. This mission will study what exoplanets are made of, how they formed and how they evolve, by performing a spectroscopic survey of a diverse sample of about 1000 extrasolar planets, simultaneously in visible and infrared wavelengths. Ariel will be able to detect signs of well-known ingredients in the planets' atmospheres, such as water vapor, carbon dioxide and methane, for example. It is a key mission by addressing one of the most important themes of ESA's Cosmic Vision program: What are the conditions for planet formation and the emergence of life?

GMV will develop and implement two of the four AOCS modes designed to go aboard the spacecraft of this mission.

For the GMV space sector Portuguese team, participating in this mission is one of the most challenging projects. The AOCS (Attitude and Orbit Control System) sub-system acts as the brain of the spacecraft as in an autopiloted vehicle, pointing its instruments to the required orientations.

GMV shortlisted for awards at EXPANDEO

■ GMV was a finalist for the awards presented at EXPANDEO, the annual conference of the European Association of Remote Sensing Companies. This is a landmark event offering European Earth observation companies the chance to exchange knowledge about market opportunities in various sectors while growing their business.

Each year, the European Association of Remote Sensing Companies (EARSC) recognizes companies and technological developments that have made an outstanding contribution to the European Earth observation (EO) ecosystem. GMV was shortlisted for the awards this year, alongside Airbus and CloudFerro, the latter ultimately winning out over its fellow nominees. According to Antonio Tabasco, head of GMV's Remote Sensing and Geospatial Services Division, "Making the shortlist for the prestigious EARSC 2023 Award is a source of immense pride and joy. GMV has always striven to push the boundaries of what is possible in the field of Earth observation and this nomination is the result of the hard work, dedication, and innovation displayed by our team".

EARSC is a non-profit, membership-based organization that coordinates and promotes the activities of European companies providing geo-information services based on Earth observation.

Commercialisation Day focusing on Health and BioTech

At April, GMV attended the Commercialisation Day event focusing on Health and BioTech. The colleague Gerard Margarit contributed to a panel discussion about how Earth Observation would play a role in the provision of actionable information to stakeholders and practitioners within the public health domain.

The goal is to open a new activity line where Earth Observation can complement the information datasets that are currently used to evaluate risk triggers and assess exposure towards such triggers. In the event, ESA presented the program EO4Health Resilience, which can represent an interesting activity line in the incoming years.

World Emission: Using satellite data to improve emission inventories for air pollutants and greenhouse gases

■ Clean air is of vital importance for our health and for the environment. Greenhouse gases emissions are also one of the factors responsible for climate change. GMV is proud of the work that its team is contributing to the World Emission project, which is focused on improving emission inventories by using measurements collected by satellites.

This project began in 2022, and it is divided into two phases, each lasting for one year. The first phase has now been completed, and one of the team's most recent accomplishments has been obtaining the European Space Agency's approval for initiation of the second phase.

GMV is the leader of the World Emission project, and it is also acting as its technology integrator. GMV is also overseeing the general technical coordination of seven organizations. In addition, GMV is responsible for designing the validation plan, which is a key aspect for comparing the satellite data with measurements taken from Earth. For the full project, GMV is also in charge of the communications work package, stakeholder participation, and user requirements.

Currently, World Emission is working with 11 different atmospheric gases at a variety of scales: from localized sources to regional and worldwide production at an unprecedented scale. All of these data sets are being integrated into a single online portal. This is being made freely available to the public, as a way of encouraging the use of emission inventory information analyzed based on satellite data.

One of the first challenges the consortium had to confront was the need to organize an international workshop just seven weeks after the project began. Another challenge for the consortium was the difficult work of creating the World Emission portal within a period of only nine months. The team is also now deeply involved in the work required to implement the complete service and validate the final products.

Emergency management activity in Portugal thanks to the activation of Copernicus EMS–RRM service

■ In August 2022, a severe forest fire occurred in the Serra da Estrela National Park, Portugal. The fire, fueled by strong winds and high temperatures, posed challenges for firefighters in their efforts to control it. Regrettably, it became the largest wildfire in the region in the past 50 years, resulting in an affected area of approximately 25,000 hectares. The fire led to the evacuation of local communities and caused extensive damage to the natural environment, including forests and wildlife habitats. Unfortunately, the aftermath of the wildfire was compounded by a series of devastating floods that struck the region in the weeks following the fire, causing further destruction and hardships.

The goal of this activation led by the Portuguese GMV team is to assess the current situation of a specific area of interest, focusing on several aspects, such as vegetation (real-time and recovery status after the event), land use and land cover, and the accessibility of the road network. Additionally, the activation aims to evaluate the risks of soil erosion, landslides, and soil loss, considering the post-fire situation and the potential impact of recovery efforts being implemented or planned in the area.

EMS RRM (Emergency Management Service Risk and Recovery Mapping) Flex is specifically designed to assist emergency responders, humanitarian aid organizations, and public authorities in the assessment and management of risks associated with natural disasters. The generation of up-to-date maps and geospatial data is a crucial aid in disaster risk reduction, preparedness, response, and recovery efforts.

First image of Meteosat Third Generation
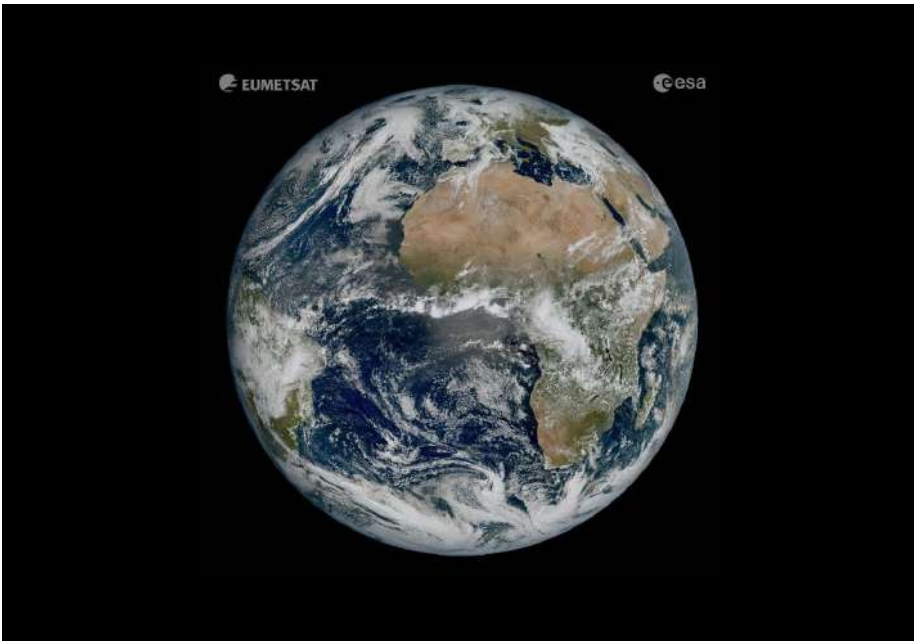
■ The first image taken with the Meteosat Third Generation Imager 1 (MTG-I1) weather satellite looks simply spectacular taken by the first of a new generation of satellites that aims to create a revolution in weather forecasts in Europe and was launched on December 13, 2022.

The first image was taken by the FCI (Flexible Combined Imager) instrument on March 18, and received widespread coverage when it was published and presented by EUMETSAT to media at the start of May. The image shows an extraordinary level the detail of the clouds, their structures, and all the weather activity. The high resolution together with the increased frequency of the images sent will provide the information necessary to improve forecasts and studies about weather.

GMV's Data Processing (DAP) and Engineering and System Studies (EGS) teams, who have been working on developing the simulators, instrument quality tools, and operational data processors for nearly 10 years, are well familiar with this milestone.

The data provided by the simulators have made it possible to verify and validate the processing chains in the pre-launch development phases.

The level 1 processors prototype and the tools for analyzing their performance made it possible to validate the processing algorithms' quality and configure them to obtain this remarkable first image.

MTG-I1 is in the "Commissioning" phase until the end of 2023. In this phase we will continue working with the ESA and EUMETSAT to improve instrument calibration and image quality before passing the baton to the operational processors, which are also developed in GMV.

Leaders in CO2M, the Copernicus mission to fight climate change

■ CO2M is a new mission in the Copernicus Sentinel Expansion Missions Program that will consist of a constellation of three identical satellites with the primary objective of measuring carbon dioxide (CO_2) in the atmosphere produced by human activity. Calculating these human-made emissions caused by burning coal, oil and natural gas for energy and transportation, deforestation and intensive use of agricultural land is one of the cornerstones of the Paris Agreement signed by the international community to advance the fight against climate change. Therefore, with this new mission, the European Union will provide the necessary data to effectively monitor emission reduction targets.

GMV is highly involved in the mission, in which it develops solutions such as operational data processors from L0 to L2 for the three instruments that the satellite carries on board, the mission control center, the satellite's operational simulator and the validation, verification and integration service for the entire Ground Segment.

We are immensely proud that GMV is present and can collaborate so actively in such an important mission that will bring about a transformation towards a greener, healthier, more inclusive and resilient continent.

GMV celebrates 25 years of the Copernicus program

GMV is an active participant in various projects from the space and services components

T he 25th anniversary of the European Union's Earth observation program, known as Copernicus, took place in June. Created in 1998, the program has now been providing information services for 25 years, based on satellite Earth observation data and in-situ data, for the benefit of all European citizens.

The Copernicus program is coordinated and managed by the European Commission, and executed as a collaboration among the EU's Member States, the European Space Agency (ESA), the European Organisation for the Exploitation of Meteorological Satellites (EUMETSAT), the European Centre for Medium-Range Weather Forecasts (ECMWF), various EU agencies, and the company Mercator Océan. Copernicus was established through signing of the Baveno Manifesto, which proposed development of a European environmental monitoring program, initially under the name Global Monitoring for Environment and Security (GMES).

Since the Copernicus program first began, GMV has been involved in all of its phases, throughout the entire value chain, beginning with mission analysis (S1, S2, CO2M, ROSE-L, S1-NG) and the instrument simulators (CHIME, CIMR) for the Sentinel satellites.

The company has also worked on critical elements of the space component, such as the instrument control software (S3-OLCI, S5), control centers for all of the Sentinel satellites, the flight dynamics system (S3, S4, S6), mission planning (S1, S3, S5, S6), and instrument data processing operations (S2, CO2M). GMV is also responsible for maintenance and updating of all simulators and auxiliary software systems for the first-generation Sentinels.

In addition, GMV provides critical operational services for the system, such as precise orbit determination (POD) for all of the Sentinel satellites and support during flight operations.

In the user component, GMV provides emergency management services (rapid mapping / risk and recovery mapping) and security services (border surveillance), while also contributing to maintenance and operation of the WEKEO system, which offers access to the Copernicus data and services provided by EUMETSAT.

In addition to the Copernicus program, GMV has been working in the field of Earth observation (EO) and its applications ever since the company was first founded, and over the years it has solidified its track record as a leading company in this area. GMV's client portfolio and service provision areas have continued to expand over time, with a wide range of services and applications now being covered.

25TH ANNIVERSARY OF COPERNICUS

# GMV, key player in the European cooperation scenario for Defense projects

GMV has been awarded six of the projects selected by the European Defence Fund under the second call of the EDF (European Defence Fund) program

The EDF is intended to sharpen the competitiveness of the European Union defense industry and thus strengthen the EU's strategic autonomy. In this second call for proposals announced on June 26, the Commission has supported a total of 41 joint defense research and development projects across the European Union, with a total budget of 832 million euros in funding. Given their scale and importance, the projects awarded to GMV, one of them as leader, total 203 million euros and account for 24% of the budget allocated for the 2022 funds.

GMV's involvement once again targets strategic areas for the company. In fact, the value it brings to the table was crucial in clinching these deals, which in turn will improve the company's international standing with respect to key technologies. The awarded projects focus on developing capabilities in anti-missile early warning systems, avionics, command and control, unmanned systems, navigation and the use of artificial intelligence in various fields.

In alphabetical order they are as follows:

- CONVOY (ClOud iNtelligent explosiVe detectiOn sYstem): led by GMV, this project combines technologies for detecting and recognizing hidden threats such as improvised explosive devices and landmines.

- EC2 (European Command and Control System): continuation of the EDIDP ESC2 command and control project, which will provide the EU with a multi-domain command and control solution that will ensure interoperability with all government actors.
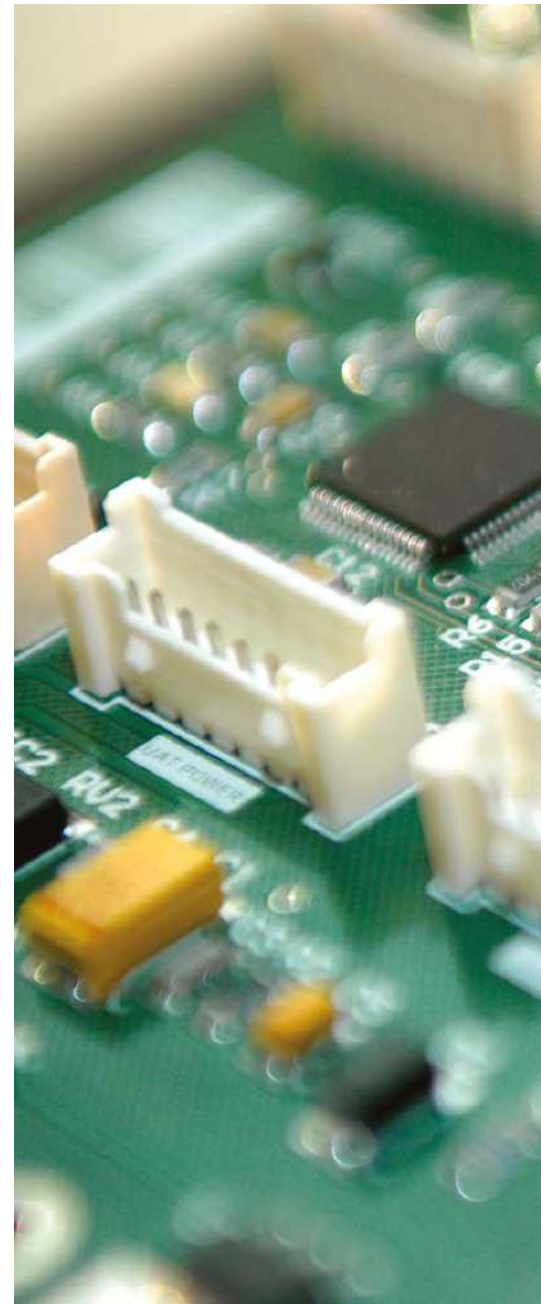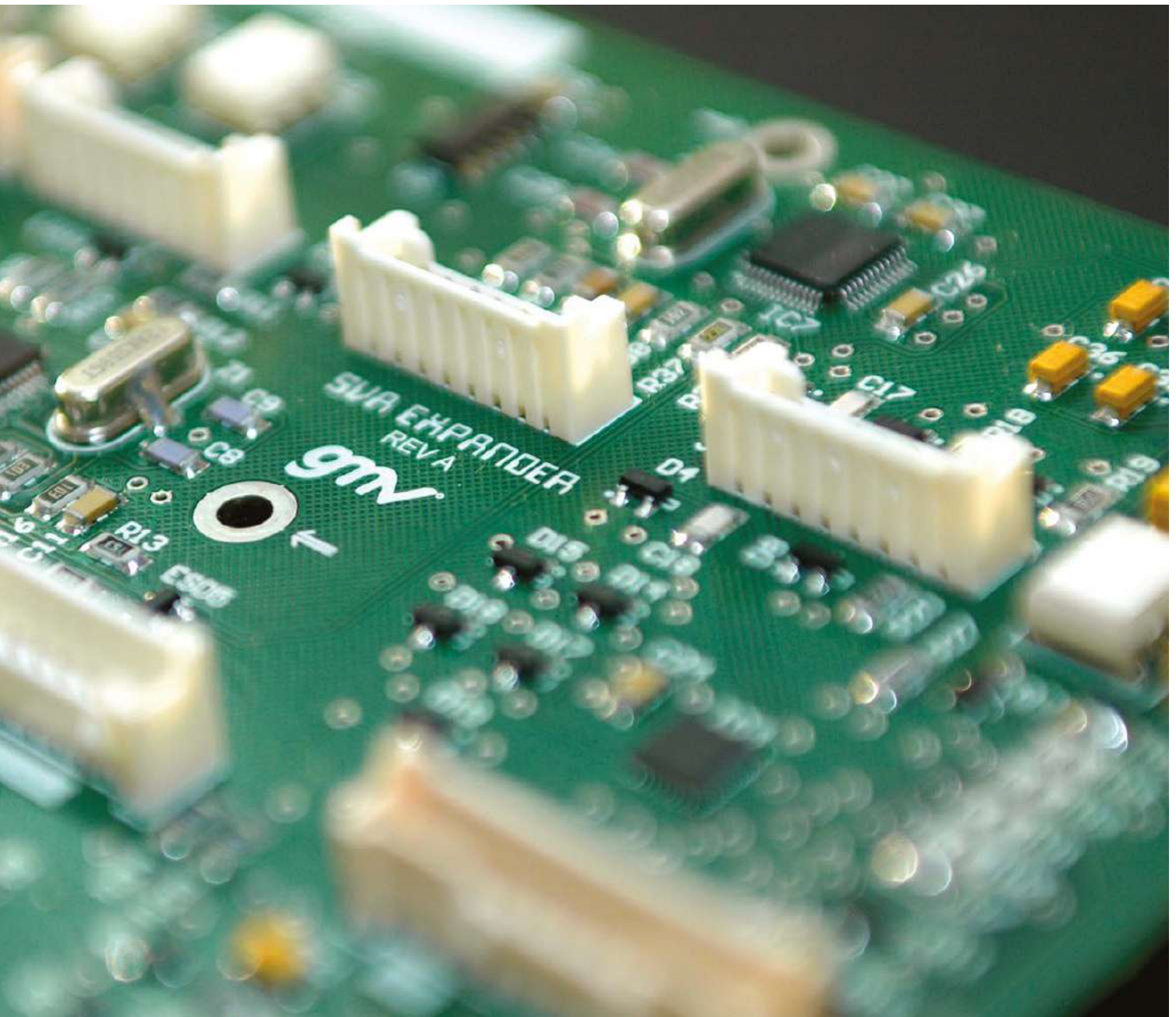
- FASETT (Future Air System for European Tactical Transportation): analysis of EU Member States' transport aircraft replacement needs in the 2030–2040 timeframe to identify opportunities for the development of a new European air transport platform.

- ODINSEYE2 (multinational Development INitiative for a Space-based missile earlY warning architecture II): continuation of the EDIDP ODInSEYE project that will provide the EU with a space-based missile early warning system.

- STORE (Shared daTabase for Optronics image Recognition and Evaluation): optimization of integrated image recognition systems based on artificial intelligence and development of a European defense image database.

- SWAT-SHOAL (SWArm and Teaming operation of manned & unmanned underwater vehicle SHOAL): development of a system-of-systems concept, based on swarm technologies, to integrate manned and unmanned naval assets to achieve higher performance and efficiency in a broad spectrum of underwater missions.

Participation in European PESCO and EDIDP/EDF projects represents one of GMV's strategic lines of operation in the area of security and defense in its international activity and consolidation of critical areas for the company, which has proven to be an essential aspect for allowing its proposals to be selected. In total GMV is taking part in 27 projects, two of them as leader, a result that puts the company in the top positions in terms of participation in this program.

GMV participates in V2CN-23 exercises

■ Between February 19 and 26, GMV took part in the execution phase of the FMN National Verification, Validation and Confirmation exercise (V2CN-23), where the technology group collaborated with the Armed Forces Intelligence Center (Centro de Inteligencia de las Fuerzas Armadas: CIFAS). The exercise, executed jointly by Spain and Portugal and with the participation, in addition to CIFAS, of the Spanish Army and the Joint Cyberspace Command (MCCE), is part of the Defense Staff's responsibility to ensure the operational effectiveness of the Armed Forces through the supervision of its units, in this case focusing on the general area of the federated mission networks or FMN and, more specifically, in the area of command and control (C2).

During the exercise GMV provided support in configuring, setting up, and running the interoperability tests of the JISR (Joint Intelligence Surveillance and Reconnaissance) processes using the SAPIIEM systems (CSD SIERRA, SIERRA Tools, ATENEA, SEISMO), developed by GMV as part of projects with the Spanish Ministry of Defense's Directorate General of Armaments and Material (Dirección General de Armamento y Material: DGAM).

The FMN (Federated Mission Networking) concept is based on the ability to interconnect C2 networks from different countries or international organizations with full interoperability, by complying with the standards and requirements determined by the FMN organization itself.

Throughout the year, apart from the implementation and technical verification of the JISR exchange area, GMV provided advice and technical support to integrate JISR tools with functional services of other FMN areas provided by NATO and extract opportunities for future developments of JISR systems adapted to new services and technologies offered in FMN.

GMV showcases its navigation systems and the TALOS Artillery Command and Control System at FUERZA 2035

In May, GMV participated in the 18th FUERZA 2035 workshop for companies, which had the purpose of aligning the Spanish Army's future operational needs in the areas of geopositioning and "specific" munitions with the initiatives being developed by companies and universities. During the event, GMV presented an exhibition focused on GNSS (Global Navigation Satellite Systems) and its artillery command and control system, TALOS.

TALOS is the company's C4I system used for tactical planning, management, and execution of military operations, and it allows for integration of several combat functions (command, fire support, intelligence, logistics, and communications). The TALOS system provides comprehensive management for the fire support cycle, and allows for integration with the fire support systems of the allied nations from the ASCA group (USA, France, Germany, Denmark, Italy, Netherlands, Norway, Turkey, UK).

GMV also showcased products such as the Galileo PRS PRESENCE2 receiver, the ATLANTE FCC UAS navigation system, and the ISNAV and ISNAV Mini ground-vehicle navigation systems. The event also served for the company to provide an update on the current status of European Defense Fund projects, namely the ECOLORSS project, which is being led by GMV, and the FIRES and HYDEF projects, where GMV is participating in design of the guidance, navigation, and control systems for munitions, including resilient navigation solutions for degraded GNSS environments.

GMV leads final demonstration for the iMUGS European Defense Project

The main objective is to increase the defensive capabilities and strategic autonomy of the European Union in the field of UGVs

On April 26th, the final demonstrations scheduled for the iMUGS (Integrated Modular Unmanned Ground System) defense project took place at the San Juan del Viso military grounds in the city of Alcalá de Henares near Madrid, organized by GMV. That project's primary objective is to increase the European Union's defensive capabilities and strategic autonomy, The project, which concluded in June, is aimed at developing the standard European unmanned ground system (UGS), by integrating robotics systems into the manned technology that European defense forces already have available.

Endowed with an investment of 32.6 million euros, iMUGS culminated with a final event organized by GMV with the collaboration of Escribano Mechanical & Engineering and in which the deployment of unmanned systems in the field of battle, as well as its use as (swarming).

Two THeMIS UGVs manufactured by Milrem Robotics and modified by other companies participating in the project were used during the demonstration. At the technical level, iMUGS has consisted of developing a scalable architecture and design, suitable for application in manned and unmanned ground and aerial vehicles, with the aim of standardizing the European systems and the subsystems they use for command and control, communications, sensing, payload management, and autonomy algorithms.

GMV has been responsible for coordinating the command and control and C4ISR interoperability subproject, where it has developed a C2ISR system to manage UxVs. That system is capable of planning and executing joint operations between manned and unmanned systems. It also allows control of the payloads installed on the platform, and use and distribution of data from the UGV's data sensors, as a way to ensure interoperability and standardization of interfaces with C2 systems, C4I databases, and existing ISR networks.

GMV's participation in the iMUGS project is based on the company's acquired experience with C2 ground systems, C2 combatant systems, and joint ISR (JISR) interoperability, all of which are areas where GMV is one of the leading companies in Europe. The iMUGS consortium, led by the company Milrem Robotics (Estonia), has brought seven countries together: France, Estonia, Finland, Spain, Germany, Latvia, and Belgium, along with a total of 13 companies, each responsible for a specific area of the project.

Anti-submarine capabilities, an essential aspect of the defense industry

On April 25, GMV participated in the Workshop on Anti Submarine Capabilities, which was organized by the Circle of Technologies Foundation for Defense and Security (Fundación Círculo de Tecnologías para la Defensa y la Seguridad) and held at the Spanish Navy's headquarters in Madrid. This event focused on the need to recover a fundamental aspect of the defense industry: naval and aerial capabilities for anti submarine warfare (ASW). For various reasons, these capabilities have sharply decreased in various countries, but they are now taking on special importance again in our current international context.

Javier Sanz, GMV's Manager of JISR Programs, took part in the workshop, which was organized as a series of roundtable discussions featuring participation by industry experts. These discussions emphasized the current challenges existing in relation to anti submarine warfare, as well as the related innovations being developed in the Spanish defense industry.

Javier Sanz's participation centered on the JISR systems and interoperability solutions developed by GMV in collaboration with the Directorate General of Armaments and Material (*Dirección General de Armamento y Material*: DGAM) and how they can help to improve the efficiency of anti-submarine defense resources, stressing that the integration of Spain's intelligence and data fusion capabilities is a clear force multiplier in anti-submarine defense.

FEINDEF, focused on innovative technology for Defense

■ GMV took part in the 3rd International Defense and Security Exhibition (FEINDEF) from 17 to 19 May. The event was held at the IFEMA fairgrounds in Madrid and was organized by the Spanish Association of Defense, Aeronautical, and Space Technologies (TEDAE) and the Association of Public Administration Contractors (AESMIDE), in collaboration with the Ministry of Defense.

The company used its booth to showcase defense and security solutions and systems developed for the Spanish national security forces and corps, ministries of defense of other nations, and the sector's top international agencies, including NCIA, Frontex, EDA, and EEAS.

GMV's booth, where GMV's President, Mónica Martínez, was present, welcomed important institutional visits, including Fernando García González, Chief of the Joint Chiefs of Defense Staff (JEMACON); the Chief of Defense Staff (JEMAD), Admiral General Teodoro López Calderón; the Air Chief of Staff (JEMA), Javier Salto Martínez-Avial; the Navy Chief of Staff

(AJEMA), Antonio Piñeiro; the director of CESEDEN, Lieutenant General of the Marine Corps, Bisbal Pons, and the director of CESTIC, Lieutenant General D. Millán.

The solutions that GMV presented at FEINDEF highlighted its experience in key technologies, including systems for guidance, navigation, and command and control, as well as other cross-cutting technologies such as those in the fields of simulation and critical aircraft software engineering. GMV showcased its solutions in the aeronautics and navigation fields, and also in the areas of JISR (Joint Intelligence, Surveillance and Reconnaissance), unmanned aerial systems (UAS), and foot soldier systems, among others. GMV was also present at other booths, such as the European Future Combat Aircraft System (FCAS) program as a member of SATNUS Tecnologies, SL, and SMS, as a member of the consortium whose aim is to increase strategic autonomy and national sovereignty in the field of missile systems and other high-performance guided munitions.

GMV signs new contract with Frontex

■ As a key contractor for the European Border and Coast Guard Agency (Frontex) since 2010, GMV is now providing the agency with IT services related to designing, developing, implementing, maintaining, and updating its Restricted Communication Network (RCN) and the associated systems. This is taking place in the context of the European Union's Regulation establishing the European Border Surveillance System (Eurosur).

These services are helping Frontex expand exchanges of information and operational cooperation among the national authorities of the EU's Member States, and with the European Agency for the Management of Operational Cooperation at the External Borders.

With these services, Frontex and those other authorities will be obtaining some of the infrastructure and tools they need to improve their situational awareness and ability to react at the external borders of the EU's Member States, in order to detect, prevent, and respond to situations involving unlawful immigration and cross-border crime. This will in turn make a contribution to ensuring protection of the migrants and saving lives.

With a total budget of €17 million, this new framework agreement between GMV and Frontex is focused on provision of information and communication technology (ICT) products and services for a Restricted Communication Network (RCN). The agency will use those products and services to perform exhaustive, high-quality maintenance

and updating for that network and its applications, all in line with the European Commission's proposal for the EU Regulation on the European Border and Coast Guard (EBCG).

The products and services that GMV will be providing under the new framework agreement as part of Lot 1 will be used in relation to key areas such as evolution, maintenance, and technical assistance for the RCN, along with delivery of related products for supplying ICT hardware and the corresponding licenses and services.

This new contract will help GMV further consolidate its position as a key supplier for Frontex, strengthening the relationship between the company and the agency, and confirming the company's successful results when supplying the products and services required.

GMV will be managing the CyberSOC of Red.es

The services provided by GMV will help increase the overall level of cybersecurity and cyber resilience

GMV is providing its services for the Cybersecurity Operations Center (CyberSOC) of the Spanish public-sector organization known as Red.es. It will be doing this through its GMV CERT Center for Excellence, which is recognized as a member of the Forum of Incident Response and Security Teams (FIRST), an association that brings together teams of this nature from all countries worldwide.

The services provided by GMV will help increase the overall level of cybersecurity and cyber resilience for the Red.es assets and business processes, in line with the Spanish government's National Cybersecurity Plan.
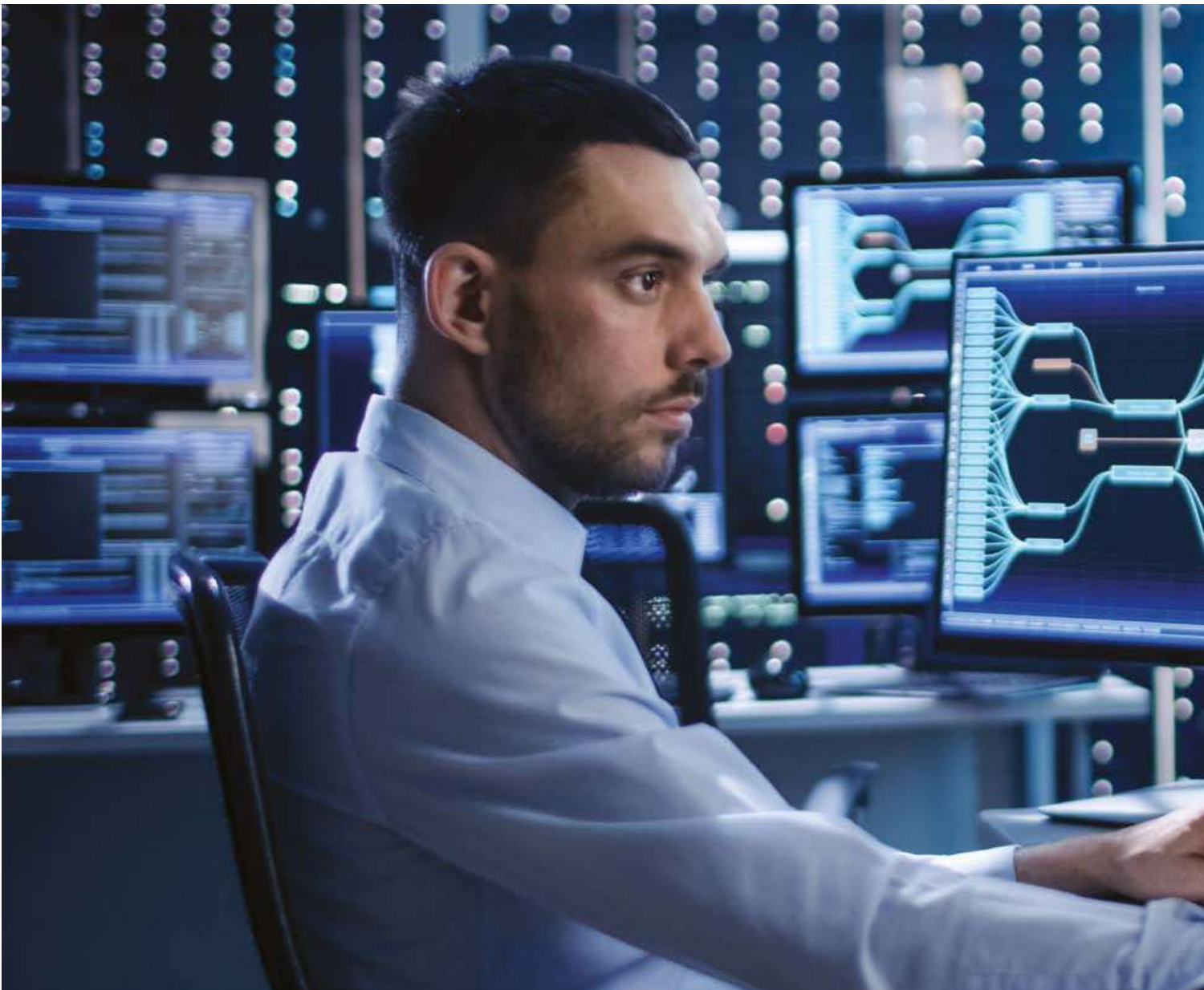
In the forums where it has a presence, such as the National Network of Cybersecurity Operations Centers (CyberSOCs) for the public sector and the CSIRT.es forum, GMV is sharing information related to the cyberspace infrastructure that cybercriminals have been using to carry out their unlawful activities, such as data theft, denial of service and ransomware attacks, etc. In addition, as a way of warning other centers so that they can develop preventive alert measures, GMV is sharing information regarding some of the new forms of cybercrime it has identified, along with any other relevant information that could be useful in the area of cyberdefense.

As a specific example, Spain's National SOC Network (*Red Nacional de* SOC) has been assembled as a country-level organization, with the mission of facilitating information exchanges among security and response centers that provide services to Spain's public-sector institutions. Those information exchanges are helping to enhance protection of the digital public services that governmental agencies are providing to the country's citizens. It is also possible that the CyberSOC for Red. es will be joining that network of security operations centers, which the Spanish government introduced about a year ago.

The head of GMV-CERT, Óscar Riaño, explains why contracting SOC services is

so important: "These days, in a scenario with such rapid digitalization, we have all become aware of the importance of cybersecurity during the process of implementing and offering services from cyberspace. Having SOC services available in those situations will help ensure that all of the information can be managed under adequate conditions of integrity, confidentiality, and availability. It also demonstrate an organization's commitment to addressing the operational aspects of cybersecurity, which must be understood as an essential and central aspect of quality and continuity for all types of internal or external services being provided."

White Paper Prize in competition for top privacy-enhancing technologies

■ Inspired by the shared priority of using data to address critical global challenges, and based on the commitments made by the USA and UK to democratic values and the fundamental right to privacy, the UK US Prize Challenge has been created with a focus on recognizing outstanding privacy-enhancing technologies (PETs), under two scenarios: predicting a pandemic and detecting financial crimes.

The winning solutions demonstrated the ability to combine more than one PET, making it possible to train AI models to make better predictions but without exposing confidential information. The multiple focuses now being applied to privacy protection have driven development of innovative solutions that can address practical concerns about data privacy, in real-world scenarios.

During the final phase of this Prize Challenge, a "red team" was responsible for testing the privacy guarantees of the competing solutions, to see if it was possible to reveal the source data used to train the models. The solutions announced as the final winners were those that were able to withstand these simulated attacks.

GMV was named as one of the United Kingdom Winners, with awarding of one of the White Paper Prizes. GMV proposed a "boosting" algorithm with distributed learning, with the ability to ensure privacy thanks to an encryption approach known as Secure Multi-Party Computation. In the financial sector, this technique represents a major advancement in the ability to take maximum advantage of confidential information provided by various institutions, while still guaranteeing data privacy.

GMV's work is recognized by Netskope

■ In April, GMV's offices in Madrid received a visit from Netskope, a developer of cybersecurity solutions. For years, the two companies have maintained an ongoing partnership that has continued to grow stronger, and it has now reached the gold level.

Nathalie Dahan, GMV's Manager of Business Development and Partner Strategy, was given a trophy by Miguel Angel Martos, Netskope's Country Manager for Iberia, as recognition for the work that GMV has performed.

Opinion

What will cybersecurity be like 20 years from now?

In 20 years, cybersecurity experts will be solving problems that involve technologies we cannot even imagine today. Right now, we may be living during a time in history when new models based on ecosystems, servification, bulk data sharing, and the coexistence of the cyber and physical worlds is still in an embryonic state of receptivity, in terms of adopting the associated enabling technologies such as artificial intelligence, quantum computing, 6G, biotechnology, nanotechnology, collaborative and autonomous robotics, exoskeletons, drones, 3D printing, etc.

The combination of these technologies is now creating the roadmap for what is to come, for future generations but surely for our own generation as well. There will also be social, professional, ethical, and legal challenges that will increase the digital gap existing between countries, organizations, individuals, and generations.

Some of the paradigms we can already predict include reinvention of the concept of intellectual cyberproperty, adaptation of taxation to cybertaxation, the need to confront the existence of a few localized megaproviders in specific countries and the unequal anti-monopoly laws that apply to them, ownership rights and monetization of servifiable data, the potential for protecting the right to anonymity in a cyber-physical world, and human-robot coexistence.

GMV'S VALUE IN THE PRESENT AND FUTURE

GMV's goal for the future is to continue its existence as a trustworthy and innovative engineering firm, collaborating actively with its clients and partners, while continuing to set itself apart in the markets where it has a presence. Cybersecurity is one of those markets, and it is one that is playing an increasingly important role in industries such as space, defense, intelligent transportation, and healthcare, where GMV has established a very reputable position.

Our company is also firmly committed to ongoing innovation, with participation and leadership in R&D initiatives as a member of strategic consortiums, in the

Javier Osuna
GMV's Manager of Cybersecurity Consulting and Services of GMV's Secure e-Solutions sector

"GMV's goal for the future is to continue its existence as a trustworthy and innovative engineering firm, collaborating actively with its clients and partners"

fields of cybersecurity, privacy, quantum computing, artificial intelligence, robotics, and biomedical research, among others.

RSAC: a journey to the epicenter of cybersecurity

■ GMV recently attended the RSA Conference (RSAC), which is one of the largest international gatherings dedicated to the field of cybersecurity. This year's edition was held in San Francisco, from April 24 27. GMV had a high-profile presence at the conference as part of the Spanish delegation, which was organized by Spain's public exporting and investment company (ICEX) jointly with the country's National Cybersecurity Institute (INCIBE), in collaboration with the Economics and Trade Office of the Consulate of Spain in Los Angeles.

Under the theme "Stronger Together", this year's event featured almost 450 booths, which brought together hundreds of leading companies and representatives from a very extensive range of startups, to show off their highly innovative solutions. In summary, these were four days marked by innovation, learning, and networking, where GMV was able to present its technological cybersecurity solutions to the U.S. market, with a special emphasis on the **uTile PET** (privacy-enhancing technology) solution, along with its potential use cases for allowing processing of confidential data

and information without compromising security or privacy.

One of the topics highlighted during the conference was the role played by artificial intelligence in practically all cybersecurity disciplines, and a message that was heard repeatedly was that although AI is enhancing opportunities to counteract cybercrime, there are also new threats emerging because cybercriminals are using AI too. During the presentations and panel discussions at this year's event, data protection, threat intelligence, and incident response were three of the most heavily discussed subjects.

Cybersecurity and tourism: a need or a priority?

In mid-April, Joan Antoni Malonda, GMV's Tourism Business Developer, participated in an event held in Palma de Mallorca entitled Cybersecurity and Tourism: A Need or a Priority? This gathering was organized by the University of the Balearic Islands (UIB) and the Balearic Islands regional government, in collaboration with INCIBE, SEGITTUR, and AnySolutions.

GMV's expert shared his knowledge during the discussion panel on "Cybersecurity as a Strategy for

Competitive Tourism", along with Dr. Llorenç Huguet i Rotger (Professor of Computer Science and Artificial Intelligence at UIB), Xavier Pascuet (Tourism Director for the Municipality of Calvià), Dolores Ordoñez (AnySolution, Turistec®), Víctor Pujadas (Intec Cybersecurity), and Iván Gutiérrez Agüero (Tecnalia Research & Innovation).

Malonda shared his views on how technology is reshaping the way tourism companies interact with their

customers, and how the industry is in the midst of a digital transformation process, which will deliver benefits while also presenting challenges. One of the benefits he described was secure handling of large quantities of personal and financial data pertaining to tourists, who are the industry's customers. He pointed out, however, that this could give rise to a potential cyberattack against a hotel chain's IT systems, jeopardizing its operations and directly affecting its business, with the resulting loss of reputation and customer trust.

Borrmart recognizes GMV for its cybersecurity track record

■ Almost 500 security and cybersecurity professionals gathered in Madrid on May 11th, at an event organized by the Borrmart Group to commemorate 100 editions of its magazine Red Seguridad (Security Network) and 500 editions of Seguritecnia (SecurityTech). As a reflection of Borrmart's fingerprint logo, the event was named Fingerprint 2023 (Huella 2023 in Spanish). The attendees included numerous experts representing the business world, governmental agencies, and NGOs.

Luis Fernando Álvarez-Gascón, GMV's General Manager for Secure e Solutions, was present at the event to receive an award granted by Borrmart to GMV for its work in the field of cybersecurity, presented by Yolanda Dura, Director of the Red Seguridad magazine.

Primary concerns related to cybersecurity

■ In mid-April, GMV participated in a seminar organized by the Spanish Association of ICT Users (AUTELSI), with support from Spain's National Cybersecurity Institute (INCIBE). The focus of this event was to address some of the primary concerns existing in relation to cybersecurity.

Mariano J. Benito, GMV's Privacy and Cybersecurity Ambassador, participated in the interesting conversations that took place during the "Dialogue among ICT managers and cybersecurity specialists" and "Cybersecurity challenges, obligations, and solutions" roundtable discussions, with the latter focused on those arising in view of Spanish Royal Decree 311/2022 on the National Security System and the European Union's new Network and Information Security (NIS2) Directive. This new legislation is having effects on supply chains, product certification, incident management, resource availability, etc., with the corresponding need for organizations to address these challenges and develop suitable solutions.

GMV attends 9th edition of the Revolution Banking event

At the end of May, GMV once again participated in Revolution Banking, which is a leading event for the banking industry, held in Madrid and organized by IKN Spain. The purpose of this event is to introduce the latest technological innovations in the industry, and to learn about tools that can help achieve open, personalized, sustainable, and secure banking practices.

At this year's gathering, GMV again acted as a sponsor and had a booth in the exhibition area, where it was able to present some of the company's most iconic projects to a large gathering of banking professionals, along with the solutions and services the company has developed as a way to assist major banks with the digitalization process.

The event featured three parallel presentation rooms, where more than 70 speakers were able to share their knowledge and experience. In the Cyberresilience room, José Carlos Baquero, Manager of Artificial Intelligence and Big Data for GMV's Secure e-Solutions sector, took part in the "Industry View" discussion, which addressed the question of: Are there new points of entry or exit for cyberattacks, and if so, how do we deal with them? There was an emphasis on the benefits of artificial intelligence for financial institutions, in relation to costs, sustainability, taxation, and security, along with the ways in which AI can be used to prevent and mitigate fraud.

3rd ICT Security Workshop: "A unified cybershield for Ibero-America"

■ Spain's National Cryptology Center (CCN-CERT), National Cybersecurity Institute (INCIBE), and Joint Cyberspace Command, together with the Dominican Republic's National Department of Investigations (DNI), organized the 3rd ICT Security Workshop, which was held in the Dominican Republic from April 19 21 in Punta Cana.

This four-day gathering brought together leading companies in the field of cybersecurity, with the aim of protecting cyberspace in Spain and Latin America by creating a protective shield, to provide security and peace of mind for the public sector, companies, and individuals.

In addition to acting as a Gold sponsor for this event, GMV contributed a talk entitled "Disruptive technologies for self-sovereign identity", which was presented by Juan Jesús León, GMV's Manager of Products and New Development for Secure e Solutions. He explained that "the new self-sovereign identity paradigm is primarily supported by blockchain technologies, although there are also solutions that apply classic public key infrastructure (PKI) approaches". He also stressed that "it is possible to build a complete, advanced self-sovereign identity solution supported by technologies such as identity-based cryptography, isogeny-based cryptography, secure multi-party computation, and data meshes. Although these innovative technologies may sound complicated, the resulting architectures are very simple, and they provide many operational advantages by eliminating the need for blockchain and PKI technologies."

CYSAT 2023: Cybersecurity for space applications

Once again this year, GMV attended the CYSAT event, which took place in Paris on April 26th and 27th. This is the only event in Europe devoted entirely to cybersecurity for space applications.

Many critical services on Earth currently rely upon collection and transmission of satellite data, which means that issues of data confidentiality, integrity, and availability must be addressed in order to protect against cyber threats. In this context, CYSAT 2023 brought together numerous participants from the space and cybersecurity industries.

Julio Vivero, a Business Partner for Secure e-Solutions at GMV, gave a presentation entitled "*CheckerSat*: A cybersecurity solution for operational ground systems", in which he shared his knowledge and experience regarding the cybersecurity problems currently affecting commercial space applications, along with GMV's solutions available in this field. He also took part in the panel discussion entitled "The role of cloud services in securing the ground segment and space data", together with other industry experts.

CheckerSat is a solution developed by GMV, designed for effective protection of space mission ground segments against advanced threats. It shifts the protection paradigm from focusing on what is known to be malicious to what is known to be secure, so in contrast to antivirus solutions, only approved operations (i.e., those known to be secure) are accepted, while all others are rejected. *CheckerSat* monitors the processes running on a system, as well as all incoming and outgoing connections, the integrity of system files, disk encryption, and the use of USB devices, so that a single solution can be used to defend space missions against a wide range of threats.

2nd edition of the Andalusia Cybersecurity Congress

■ In March, as part of the Andalusia Cybersecurity Strategy 2022–2025, the regional government of Andalusia and the Andalusia Digital Agency (ADA) hosted the 2nd Andalusia Cybersecurity Congress. This event brought together representatives from governmental agencies, private IT security firms, and professionals such as Ana Romero, GMV's Cybersecurity Manager for the Galileo Ground Control Segment, in that company's Secure e-Solutions sector, who discussed the latest trends in cybersecurity and analyzed the industry's current status and future directions.

Specifically, Romero presented an overview of cybersecurity in relation to the navigation systems that provide services in both military and civilian contexts, and which are not widely understood by the public. She made reference to maritime search and rescue as one good example of how these navigation systems are used. She also explained that "entry of new actors into this space is also increasing the potential for these services to be compromised by a cyberattack", and therefore, "cybersecurity by design, throughout the entire life cycle, is the best way to secure these systems and mitigate risks".

In addition to participating in the scheduled events at the Congress, GMV also had its own booth, where the company's representatives met with clients, collaborators, and local authorities. Those visitors included Antonio Sanz, who is Andalusia's Regional Minister of the Presidency, Interior, Social Dialogue and Administrative Simplification, and Raúl Jiménez, who is Managing Director of the ADA. They expressed their interest in GMV's activities in the field of cybersecurity, and specifically the company's cybersecurity management for Galileo, which is the European Union's global navigation satellite system (GNSS) that offers free signals for use by governments, companies, and the public.

Lessons learned in Industrial Cybersecurity, to help ensure industry continuity

■ As part of marking its 10th anniversary, the Industrial Cybersecurity Center, a Spanish NGO, hosted an event entitled "A decade of experiences in Industrial Cybersecurity". This gathering brought together some of the most relevant actors in the field of Industrial Cybersecurity, who have supported the Center during its 10 years of activities.

Javier Hidalgo, a Solutions Architect and Cybersecurity Expert in GMV's Industry sector, was a featured presenter at the event, and he gave a talk entitled "Cybersecurity in industrial environments: Lessons learned". He began by explaining the processes and aspects that should be taken into account when developing a cybersecurity policy: analyze the situation, establish objectives, compare existing controls with necessary controls, establish a security context for the business, create and implement a risk management plan, measure results, etc. He emphasized that in addition to the theoretical aspects that must be incorporated when developing industrial cybersecurity projects, it is also important to consider the actual experiences that occur when executing them, with a need to compare the two scenarios in order to fully understand the results.

Among his conclusions, Hidalgo stressed the importance of having a plan, understanding the context, assessing the risks, establishing controls, checking the security status, and encouraging continuous improvement.

First conference on data management at Vall d'Hebron Hospital

Under the title "Adding data, multiplying knowledge," clinical and technology specialists came together in May to examine the usefulness of processing and analyzing the data generated and used by professionals and healthcare management structures in clinical practice, namely for improving health outcomes, hospital management, and research. According to Dr. Yolima Cossio, director of Information Systems and Decision Support at Vall d'Hebron University Hospital, the conference was not only an opportunity to learn about Vall d'Hebron's data strategy, but also to "find out how it fits into the data strategy of the Catalan Health Service and the Catalan Health Institute (ICS)."

GMV took part in a workshop on the DataFabric data space, led by Pablo González, an AI and big data specialist who was also able to clear up the attending specialists' doubts about the developments the company is implementing to extract evidence from data. Speakers at the conference also included Pol Pérez, director of Information Systems of the Catalan Health Service and the ICS Data Strategy, and Pau López, head of the ICS Information Systems Technical Office. As explained at the event, Vall d'Hebron Hospital is on the way to becoming a data-driven institution, one that makes decisions through the exhaustive analysis of its own data and uses the GIBI portal to display them.

The various presentations and workshops served to reflect on the entire life cycle of healthcare data, take stock in order to improve its management, and analyze the challenges that lie ahead.

GMV contributes with its technology to disease prevention and adherence to a healthy lifestyle

The Medp-Big Data project, promoted by the Canary Islands and Valencia to offer personalized medicine to its citizens, has concluded

The health services of the Canary Islands and Valencia now have GMV technology, developed as part of the MedP–Big Data* project, to provide personalized and precision medicine using big data and artificial intelligence for healthcare and the promotion of healthy living. To mark the project's completion on 30 June, the Valencian Regional Ministry of Universal Healthcare and Public Health, together with the Canary Islands Health Service and the Barcelona Supercomputing Center, presented the results at an infoday on artificial intelligence, providing details about the tools developed and some of the use cases.

MedP–Big Data is a two-phase project carried out as part of the Europe 2020 Health and Social Welfare Strategy and the FID Salud program to promote innovation based on demand. It was tendered under an innovative public procurement model in 2019 by the Canary Islands Health Service and the Valencian Regional Ministry of Universal Healthcare and Public Health.

In the first phase of competitive dialogue, GMV worked with two other companies on the development of eight use cases. Three focused on analyzing the capabilities of predictive analytics, based on both natural language processing (NLP) and image and data processing. The other five centered on the promotion of healthy habits by means of an app called Cuidat-e, with the involvement of over 4,000 volunteers from the Canary Islands and the Valencian Community.

In phase two, now with GMV as sole winning bidder, the project continued with another ten new use cases. A number of cases from the previous phase were also expanded, including Cuidat-e, with the same goal in mind: to improve personalized care through the use of artificial intelligence and big data. Significant examples of innovative technologies and use cases in this second phase include the development of bots for pre-consultation or telephone follow-up with patients, support for patients with clinical prescriptions to reduce drug consumption, tools to speed up the pre-selection of candidates for studies or clinical rtials, and the transcription of consultations using an intelligent voice recorder.

Artificial intelligence, the key to democratizing ultrasound imaging

■ Ultrasound imaging is a safe, portable, flexible, and reliable technique. In addition to being non-invasive, it is inexpensive and allows almost any organ in the body to be examined in real time. However, this discipline is extremely challenging to master for a number of reasons, including its operator-dependent nature and the difficulty in discerning pathological signs in anatomical structures through images that are noisy, poorly contrasted, and full of artifacts. This is a major barrier for medical professionals, who require specialized training to use this technique to diagnose their patients.

The ALISSE consortium – made up of researchers from the Radiological Emergency Department at Madrid's La Paz University Hospital, together with GMV and the Nuclear Physics Group at the Complutense University of Madrid's Faculty of Physical Sciences – has managed to take a decisive step forward in the application of pioneering artificial intelligence (AI) techniques to democratize the use of this diagnostic imaging discipline. Part of the research results are described in a scientific paper recently published in Applied Sciences, in a special issue titled "Machine / Deep Learning: Applications, Technologies and Algorithms."

The authors of this paper have identified key developments in organ identification and standard clinical imaging, in order to improve scanning protocols with the help of artificial intelligence. The researchers argue that AI-assisted ultrasound technology will become a mainstream imaging approach, making it possible to replace the stethoscope with small ultrasound imaging systems in the near future.

Applied Sciences is a biweekly open access scientific journal covering all aspects of applied physics, applied chemistry, applied biology, engineering, the environment, and earth sciences. It has been endorsed by the scientific and academic community since 1996, when it was founded to encourage open scientific exchange across all forms and disciplines.

GMV presents the TARTAGLIA project at Foro Colabora event

Fora Colabora is a gathering organized by BIOVAL in collaboration with REDIT, with funding from the Valencian Innovation Agency (AVI). GMV recently participated at this event , represented by Rubén Villoria, GMV's Digital Health Project Manager for Secure e-Solutions, who gave a presentation on the TARTAGLIA project. This project, which serves as an excellent example of public-private technological collaboration between companies and technology institutes and clusters, is applying artificial intelligence to accelerate clinical and healthcare research in health systems. Mr. Villoria explained that thanks to the uTile solution designed by GMV, it is now possible to take advantage of information from the project's federated network with no need for that data to leave the hospitals of origin. According to this expert from GMV, "we are using mathematics and encryption to make the data available in a secure manner, with the aim of accelerating research in fields such as oncology. The information can be made available for scientific purposes while eliminating the risks associated with sharing patient medical records".

ToxHub, a key tool for drug toxicity screening

■ Prior to the eTRANSAFE project, pharmaceutical companies did not have shared access to data from animal research regarding the toxicity of thousands of compounds. Instead, most of those data remained in private silos and were not generally available. Against this backdrop, GMV launched the online biomedical data platform ToxHub. This tool increases the efficiency of drug safety assessment by replacing certain animal studies with retrospective analysis technology that harnesses accumulated evidence on the toxicity of certain compounds. The direct benefits of this platform are more efficient testing, shorter research times, and safer drugs.

As the system's technical lead, GMV developed a strategy for integrating, sharing, and exploiting preclinical and clinical data from the various sources involved, all supported by a leading-edge technological architecture.

To understand the scope of the ToxHub biomedical data platform, it is important to remember that assessing drug safety is a knowledge-intensive process, requiring advancements not only in the methods and tools used to manage and integrate data, but also in the approaches used for data analysis and predictive modeling. In turn, this requires the integration of information from a variety of public and proprietary sources of pertinent biomedical knowledge (preclinical studies, clinical trials, evidence from research, etc.).

As explained by Adrián Rodrigo, a Smart Health Business Solutions specialist at GMV, achieving the project's goal meant applying "data governance techniques to organize all of the information that the pharmaceutical companies had available, to make sharing of that data possible." According to the specialist, there was a need to "generate a sufficient amount of biomedical data so that big data technology and computational approaches could be used to extract conclusions, which is information that could not have been processed without these technologies."

The main challenge of the eTRANSAFE project, funded with almost €40 million from European funds and the European Federation of Pharmaceutical Industries and Associations, has been to join forces with partners in areas such as chemoinformatics, bioinformatics, experimental toxicology, and clinical drug safety in order to make the most of Europe's unique expertise in these fields.

Artificial intelligence as a driver of innovation

■ A debate entitled "Artificial intelligence as a driver of innovation" took place in May as part of the 2nd Technology Forum led by Europa Press. The gathering was opened by the Secretary of State for Digitalization and Artificial Intelligence, Carme Artigas, and was attended by GMV.

Artigas agreed with the event's moderator, the editor-in-chief of Europa Press' Portal-TIC, Sergio Alonso, in highlighting the possibilities offered by this technology to drive the so-called data economy. Speaking on the ability to tap into the possibilities of data, GMV's representative in the debate, AI and big data specialist Pablo González, noted that data owners "will have a hard time exploiting them with their own resources alone. The challenge lies in developing the data economy without putting their privacy or sovereignty at risk." For this, he said, technology offers answers using, for example, so-called privacy-enhancing technologies (PETs).

González also shared a success story in the health sector, referring to a use case developed using GMV technology as part of a Galician Health Service project, in which AI enabled major possibilities for detecting cases of rare diseases in patients. Pointing out that the health sector has a strong data culture, the GMV specialist acknowledged that data need to be processed in a way that ensures their security and complies with ethical AI criteria.

GMV helps improve rail transportation in Cairo

Under a contract with the company CAF, GMV is supplying the passenger information system, public address and intercom system, and video-surveillance system for Line 1 of the Egyptian capital's metro network

As part of its project to refurbish and upgrade 23 units currently operating on Line 1 of Cairo's metro network, the Spanish company CAF (*Construcciones y Auxiliar de Ferrocarriles*) has awarded a contract to GMV to supply a variety of intelligent transportation systems (ITS). That metro network currently has three lines in operation, with a fourth line now under construction. Line 1, which is the focus of this new project, covers a distance of 44 kilometers, with a total of 35 stations.

The ITS elements that GMV will be supplying are the passenger information system, public address and intercom system, and CCTV video-surveillance system.

Passenger information will be displayed on front and side LED panels, as well as on 17" LCD monitors and 28" stretch-type LCD monitors distributed throughout each train. The system's controller will generate service information and programmatic advertising content, which will improve the visual experience for passengers traveling on the metro.

The public address system is primarily digital, and is distributed throughout the nine train cars. The intercom system consists of a total of 18 IP intercom units on each train, installed near the doors, which will allow for immediate communication with the passengers in any emergency situation.

Finally, the video-surveillance system consists of 2 video recorder units on each train, which will record the output from 36 IP cameras in the cars, along with 2 front-facing cameras and 2 cameras in the driver's cabin. This system also includes a 10" monitor in the driver's cabin that can be used to view any camera's output in real time, so the driver can be aware of everything happening on board the train.

All of these systems will be integrated with the train's monitoring and control system, which receives the required control information and sends status updates and alarms.

GMV is also supplying control station tools that will allow for comprehensive management of the system. From this control station for the CCTV system, the operator will be able to view the output from the cameras in real time, and the recorded video can also be downloaded and analyzed. In addition, the control software for the passenger information system allows the routes and their associated contents to be managed, with the possibility of planning and configuring advertising campaigns as well.

GMV attends latest edition of the ITS European Congress

■ GMV recently participated in the 15th edition of the ITS European Congress, where it showcased its extensive experience and significant role in developing the future of urban mobility.

The ITS European Congress is a leading international gathering in the fields of smart mobility and transportation digitalization. Held this year from May 22–24 in Lisbon, Portugal, the event brought together the entire international intelligent transportation community, ranging from the most well known major companies to the industry's newest arrivals and influencers.

As a top company in the area of intelligent transportation systems, GMV had its own booth at the event to present its wide range of solutions, including those for smart and connected mobility and those for public transportation in general. Some highlights of the solutions presented by the company included:

■ **GMV GSharp®**: this is GMV's comprehensive precise positioning solution based on global navigation satellite (GNSS) technologies. This system includes the positioning engine and corrections service,

which are based on a precise and secure algorithmic solution for highly demanding autonomous driving (AD). This solution's flexible, highly configurable nature makes it compatible with the main automotive components as well as the specific needs of the clients. Another important feature is compliance with standards such as ISO 26262, ISO 21448 (SOTIF), and ISO 21434, which when applied in combination, establish a reliable position with the required level of data protection.

■ The Smart Mobility solutions, a range of products focused on smart and connected mobility. Smart Mobility HUB is the main unit from GMV's Smart Mobility Suite, and it is responsible for integrating all of the other components

by simultaneously compiling real-time data from multiple sources. This allows for a constant emphasis on safety, such as by generating alerts for mobility managers.

■ GMV's portfolio of intelligent solutions for public transportation covers the widest possible range of means of transportation, including everything from buses to trains to special fleets. In this area, the company emphasized its **ITS suite** which represents an ideal complement for the company's **GMV Planner** tool for planning the services offered and optimizing resources for fast, efficient transportation at the lowest cost possible; its ticketing systems; its eco driving solutions for efficient driving; and its solutions to improve passenger security (onboard CCTV).

29th National Urban and Metropolitan Transportation Congress

On June 5th and 6th, GMV participated as a sponsor at the 29th edition of the National Urban and Metropolitan Transportation Congress. This year's event, organized by the Public, Urban, and Metropolitan Transportation Association (ATUC), was held in Barcelona under the theme "The City of People".

This is a leading gathering that brings together Spain's major players in the area of urban and metropolitan transportation, with a significant presence of technology managers and directors from the most

important companies in the field of urban transportation. This year the event also served as a point of contact for top industry participants at the international level, who were able to take advantage of the simultaneous presence, in the same location, of the UITP 2023 summit organized by the International Association of Public Transport. Simultaneous presentation of the two events resulted in a gathering with global importance, to further advance the leading role played by public transportation in terms of mobility as a whole.

In addition to sponsoring the closing luncheon at the ATUC event, GMV had its own stand, where it was able to demonstrate all of its public transportation solutions.

This year, the ATUC Congress put its focus on public transportation as the backbone of urban mobility, with a special emphasis on how public transportation can help achieve more equitable distribution of public spaces and contribute to the decarbonization of cities.

Alstom relies upon GMV to supply onboard systems for metro trains in Turin

■ GMV will be supplying an integrated public address, passenger information, and onboard video-surveillance (CCTV) system, to be installed on 4 trains that Alstom is currently building for the metro system in Turin, Italy, as well as on the 58 trains already operating in that fleet, which Alstom is remodeling.

These trains will be running on Line 1 of Turin's metro system, which currently covers a distance of 15.1 km, and which is being expanded to 18.5 km to incorporate travel between Fermi and Cascine Vica.

The system supplied by GMV will improve the passenger experience by managing the information displayed on the passenger information panels and monitors installed throughout the train cars. These elements, also supplied by GMV, will display information such as line number and destination, next stop, list of transfer options at stops, videos of general interest, advertising, and information about incidents of any type.

In addition to that visual information, these systems supplied by GMV can also emit audio content over the train's public address system.

The onboard CCTV system will be designed to provide continuous monitoring of the passenger areas, with the main features allowing real-time viewing of the cameras' output, recording and playback of that output, and local or remote downloading of recordings from the control center.

All of the onboard systems will be able to communicate with another system at the control center, which will allow the operators to interact with the onboard equipment.

The elements being supplied by GMV also include the back-office applications necessary for content management, with functions for extracting, viewing, and analyzing the recordings and incident logs, configuring the system's parameters, and establishing the contents for texts, images, audio, and video that will be presented via the various onboard information channels.

© ALSTOM SA 2021, Design&Styling | METROPOLIS TM

GMV is expanding the onboard video-surveillance system for urban transportation in the city of Seville

■ The urban transportation authority for the Spanish city of Seville (Transportes Urbanos de Sevilla, or TUSSAM) has contracted with GMV to expand the onboard video-surveillance system (CCTV) that the company previously supplied for its entire fleet of buses (410 vehicles). This new contract will include provision of equipment and implementation of the CCTV system on 23 new articulated buses, to cover the operational needs of the city's new line, known as Tranvibus.

In 2019, TUSSAM selected GMV to install an onboard video-surveillance system (CCTV) on every bus included in its fleet (which had a total of 410 vehicles at that time, including standard buses, articulated buses, and microbuses). That contract was awarded based on a public tender process entitled "Supply, installation, and maintenance of an onboard video-surveillance system for the TUSSAM fleet". The full CCTV system, including the control center and the individual elements on board the fleet's vehicles, was put into operation during 2020 and 2021.

The recently contracted project to expand the CCTV system includes, on one hand, supply of the full set of equipment and hardware elements for the 23 new buses (consisting primarily of the onboard equipment with video recording capabilities, IP cameras, and switching elements), with the same installation criteria from the initial project being maintained; and on the other hand, addition and configuration of these elements at the system's control center, including on the server and at the CCTV monitoring station, while maintaining the same features that the current system makes available.

GMV showcases its public transportation solutions at UITP 2023

GMV had a notable presence at the latest edition of the Global Public Transport Summit, where it demonstrated its extensive experience in developing public transportation solutions.

Organized by the International Association of Public Transport (UITP) and held every two years, the Global Public Transport Summit includes a conference combined with a trade fair and exhibition, with participation by major companies and manufacturers from the industry. This is a very high-profile event, because it features attendance and participation by producers as well as by institutions and top-level policymakers. This year's edition was held in Barcelona from June 4 7, under the theme "Bright Light of the City".

GMV had its own booth at the event, where it offered personalized demonstrations of its global solutions for the transportation market, such as its computer-aided dispatch / automated vehicle location (CAD/AVL) systems for urban public transportation and railways, passenger information systems, and account-based ticketing (ABT) equipment and solutions.

GMV was also present at the booth run by Barcelona's Metropolitan Transportation Authority (ATM) , to jointly demonstrate the new multi-fleet CAD/AVL platform that the two entities are implementing in the Barcelona region. This platform will provide daily management support for 8 public transportation operators, with a combined fleet of around 1,000 vehicles.

GMV also offered two presentations at the event, and it demonstrated its *ITS Suite* transportation platform during the "Innovation Guided Tour", which was organized to showcase leading-edge innovations in the industry.

GMV and Itínere team up on proof of concept for GNSS-based road user charging

This system is one of the possible sources of revenue for developing and maintaining the road network

G MV and the Itínere Group, one of the largest infrastructure managers in Spain, are carrying out a project to develop a proof of concept for GNSS-based road user charging (RUC).

RUC is one of the possible sources of revenue for developing and maintaining the road network. Among the various technologies available for RUC management (including cash payments at traditional toll plazas, free-flow systems based on dedicated short-range communications, and license plate recognition), the use of GNSS-based

technologies is the option that provides the greatest flexibility and takes the least time to deploy, as it does not require the installation of dedicated infrastructure (gantries or barriers) on the roadway.

GNSS technology also makes it possible to charge different rates depending on the place, the vehicle, and the time of day, which in turn facilitates mobility management policies for cities and roads, such as those for mitigating traffic congestion in urban centers or encouraging the use of more sustainable vehicles.

To make this all possible, Itínere and GMV are working together on a proof of concept for a distance-based RUC system that harnesses the GNSS and communications capabilities of smartphones and simple onboard units.

The tests will be carried out in a controlled environment stretching across 65 km of motorway. The technical and user experience information they provide will then be analyzed to help identify the key aspects to consider when implementing a RUC system in real operation anywhere on the road network and, in the future, in connected vehicles themselves.

GMV shares its vision on key technologies for the cars of the future and new forms of mobility

■ On April 13th, the Future Mobility Challenges conference was held in the city of Valladolid, Spain. This is an event organized by the automotive cluster of the Castile and León Motorsports Federation (FaCyL), with the aim of showcasing the new forms of mobility being planned for the near future.

The conference brought together major companies, professionals, investors, public administrations, and institutions from throughout the automotive and mobility ecosystem. GMV, which has more than 30 years of experience in

global navigation satellite systems (GNSS), as well as a strong track record in the automotive industry as a supplier of software for more than 20 years, was invited to the event to share its vision in relation to connected autonomous vehicles.

The event's third block, Sustainability and People, featured participation by Sara Gutiérrez, manager of GMV's Automotive business unit. She participated in the roundtable discussion entitled "Challenges and opportunities for the connected

autonomous vehicle and intelligent infrastructure", along with representatives from IVECO, Indra, and the Spanish Highways Association.

During the roundtable, Gutiérrez emphasized the fundamental role being played by some of the key enabling technologies behind this new vehicle paradigm. These include the use of sensors – and particularly the contributions of secure and accurate GNSS and high-definition maps – and the concept of the software-defined vehicle (SDV). She explained that software has special importance because it will represent more than 90% of the future innovations for these vehicles. As explained by Gutiérrez, "the connected autonomous vehicle brings with it a series of associated challenges, which are very diverse in nature. For example, there is a need to incorporate cybersecurity as an essential part of the engineering processes for automotive products. At the same time, a wide range of opportunities are opening up, which are facilitating new business models thanks to the developments arising from extensive use of software. This is making it possible to incorporate on-demand and subscription-based features in these vehicles, among other.

ADAS & Autonomous Vehicle Technology Expo 2023

GMV recently participated in the latest edition of the ADAS & Autonomous Vehicle Technology Expo, which is Europe's most important event centered on innovation, research, and development in the field of autonomous vehicles and assisted driving.

This event, which took place from June 13-15 at the Messe Stuttgart convention center in Germany, provided an opportunity to showcase the latest trends and technological developments focused on comprehensive acceleration of

autonomous applications and advanced driver assistance systems (ADAS), including everything from testing tools to sensors and the use of artificial intelligence (AI). The Expo also featured an extensive program that included a variety of activities such as conferences, exhibitions, workshops, and product demos.

GMV had its own booth at the Expo, where it showcased its products and services related to connected autonomous

vehicles, as well as its cybersecurity services for automobiles. In addition, Carlos Busnadiego, GMV's Head of Automotive Products and Processes, gave a presentation entitled "Safe and precise GNSS positioning, a relevant input for AV". During this talk he explained the essential role that precise and secure global navigation satellite systems (GNSS) are playing in relation to autonomous driving, and he introduced the solution that GMV already has available on the market with some of the leading premium OEMs.

GMV presents *uPathWay*, the self-driving solution for outdoor robotics

This solution enables the autonomous driving of vehicles without additional modifications or installations in the environment

The Spanish industry is immersed in a digital transformation process where the future of productive sectors is unimaginable without the presence of mobile robots to automate daily tasks, making our businesses more efficient, safe, and sustainable. This scenario is more than a reality in sectors such as intralogistics or material distribution in large factories. However, in sectors such as agri-food, construction, or transportation, there is still a long way to go.

Unlike indoor navigation, which is mainly based on 3D model scanning to create a map of the work area, outdoor navigation cannot rely solely on these sensors since they are affected considerably by changing light conditions, the large spaces that fall outside the measurement range, and the widespread presence of environmental changes. Additionally, the cost of these sensors is significantly higher than the

LiDAR used indoors due to their greater measurement range and the need to adapt to changing environmental situations.

To overcome this disadvantage, available commercial solutions are based on installing fixed RTK antennas and numerous beacons, which considerably increase not only the costs and start-up time but also their deployment capacity.

In light of this situation, GMV has developed *uPathWay*, the outdoor robotics solution that enables the autonomous driving of vehicles without additional modifications or installations in the environment, thanks to the use of its worldwide coverage positioning service, *MagicPPP*. This service can determine the position and trajectory of the platforms with centimeter-level accuracy, based on the user's RINEX (Receiver Independent Exchange Format) measurements and new-generation precise and secure

positioning algorithms developed by GMV.

AN ADVANCED USER INTERFACE FOR EASY ROBOT CONTROL AND MANAGEMENT.

This new platform offers a comprehensive management interface accessible from any web browser. Through this interface, users can manage their fleet of vehicles, check their status and position, create and edit missions, review status records, interact with the marketplace to add new features to their equipment, and many more options that are continuously being added with each update.

uPathWay aims to revolutionize the outdoor robotics sector, demonstrating that autonomous driving outdoors is possible in a more accessible and efficient way, opening up new opportunities in key sectors of our economy such as agri-food, construction, and energy.

The need to reinvent the logistics and transportation sector

■ The logistics and transportation industry was the focus of a recent breakfast conference hosted by the enerTIC platform, entitled "Innovation and digitalization in the logistics and transportation industry: confronting the new energy challenge." This event featured participation by Magda Andrés Barrios, head of Business Development for GMV's Industry sector, as well as representatives from the Spanish Transportation Association (AET), the Spanish Logistics Center (CEL), and the companies Grupo SESE, LW Cretschmar Española, Scania, SEUR Now, and Verallia, among others.

Currently, the logistics and transportation industry represents about 10% of Spain's GDP, with annual revenues of more than €100 billion, 200,000 companies, and almost 1 million employees, according to data from Spain's public exporting and foreign investment company (ICEX). In other words, this is an industry that plays a very significant role in the Spanish economy. However, it continues to be a highly traditional industry. In addition, and as expressed during the colloquium, it is an industry that is now facing a series of structural challenges, which it will have to confront if it wants to lay the foundations for its future development.

The participants agreed on the need for a change of model in the sector. Of course, this change will have to be supported by technology, or to put it another way, technology must be the instrument that makes these new models possible. Fortunately, the first steps in the right direction are already being taken. For example, work is being performed on software that facilitates cargo planning and logistical optimization of routes.

Thanks to technologies such as cloud computing, big data, artificial intelligence, and virtual reality, technological solutions are allowing fleet operation costs to be reduced, while improving customer service and increasing delivery efficiency. Energy savings are also being achieved for logistics facilities and for vehicles. In addition, the industry is seeing the emergence of "digital native" companies that are starting to operate in a different way, with a shift from traditional management models to more innovative new ones.

APD and GMV publish the eBook "INNOVACIÓN [.ES]" to give an insight into the keys to innovation success

■ APD and GMV, with collaboration from CESIN–Universidad Complutense, have produced the eBook "INNOVACIÓN [.ES] Visión, Estrategia y Gestión en la empresa," which contains an analysis of the true meaning of innovation in Spain and the keys to a successful strategic approach to innovation and its management.

The book also features a series of panels of top professionals such as Luis Fernando Álvarez-Gascón (president of the Forum of Innovative Companies and CEO Secure eSolutions of GMV), Jesús Valero (CEO of Tecnalia), Víctor Cruz (director of FI Group service strategy), Pablo Montoliu (Chief Information & Innovation Officer at Aon), Paz López Conde (Open Innovation & Innovation Ecosystems Director at Barrabés), Adolfo Ramírez (Senior Advisor on Digital Transformation and Innovation), and Pepe Molero (director of the Chair of Innovation Studies CESIN (FEI/UCM).

Digital Europe visits GMV

■ In April, GMV's headquarters in Madrid welcomed representatives from AMETIC (the association representing the digital industry sector in Spain) and Digital Europe, a European organization that represents the digital technology industry.

The meeting served to analyze the opportunities of the digital industry during Spain's the European presidency, which will begin on July 1, and aims to achieve a resilient, connected, and competitive Europe in matters related to digital technology. Promoting a single market with a uniform regulatory system, driving sustainable technology, and enhancing

cybersecurity are some of the essential strategic pillars to be implemented during this presidency.

GMV, selected as an example of a technological company, hosted the group of representatives from both organizations to learn about the projects underway in cybersecurity, robotics, and space, sectors where GMV is an international reference.

The challenge of generating new value for the data economy

At the AMETIC Artificial Intelligence Summit held in April, José Carlos Baquero, GMV's Manager of Artificial Intelligence and Big Data, participated in a session entitled "The new value of the data economy," where he explained the benefits and key elements of combining data spaces and artificial intelligence (AI). The expert also discussed other subjects such as the associated regulations and mechanisms needed to ensure that data can flow with security and privacy, and some of the obstacles that will have to be overcome when implementing data spaces.

To put this in context, it is estimated that about 45 TB of data were needed just to train the ChatGPT 3 model. Much of that data is taken from information existing on the Internet, which in itself presents challenges in relation to safeguarding privacy and intellectual property. This is a fact that highlights the need for federated governance of data ecosystems, such as data spaces, to allow sharing of data in a secure and controlled manner. The aim is to grow the data economy in a sustainable way, in the context of increasing demands for data for Artificial Intelligence systems

and the challenges related to privacy and intellectual property.

GMV is aware that data spaces, together with AI, have the potential to drive the data economy, by allowing secure and controlled sharing of data. In turn, this will generate business opportunities and economic growth. Data spaces also facilitate data interoperability, including at the semantic level. This is done by adopting a standardized architecture model, which makes it easier to understand and use data in different contexts, for a variety of applications.

GMV, Committed to Sustainability and Corporate Responsibility

Foro Marketing Sevilla held in March its flagship event, known as Marketing Fighters, to discuss the concept of brands with a purpose and the importance of doing business based on values. As an inter-generational event designed for entrepreneurs, executives, professionals, business managers, professors, and students, it puts a focus on the world of business

from a perspective of social commitment.

As a way to convey these messages, the meeting brought together experts who were invited by the organization to talk about the exceptional examples their companies represent. Miguel Hormigo, Director of GMV's Secure e-Solutions Industry Sector, was one of the main figures on the agenda, setting

out various initiatives to demonstrate GMV's commitment to further progress in business sustainability and the company's activities in line with the Sustainable Development Goals (SDGs).

Hormigo also emphasized the company's projects related to the environment and sustainability for our planet, which are areas where GMV has been making a significant investment.

Green algorithms to drive sustainable transformation in industry

■ GMV took part in a round table discussion on industrial decarbonization at the "Industry Live" event, hosted by AMETIC in May. Ángel C. Lázaro, Head of Robotics and Automation of GMV's Secure e-Solutions Industry Sector, explained how digitalization is contributing to decarbonization by using advanced data-processing technologies and developing green algorithms that enable processes to be modeled using artificial intelligence.

The presentation of several projects that exemplified the successful integration of innovative technologies to improve efficiency and sustainability was one of the roundtable's highlights. For example, speakers discussed the AgrarIA project, led by GMV, which aims to make Spain's agrifood sector more technological, innovative, sustainable, and committed to energy efficiency and carbon footprint reduction. Among its activities, work is being carried out on the use of artificial intelligence to process and

generate agro-pesticides products, the optimization of electricity consumption in refrigeration chambers to reduce dependence on the grid and increase the use of sustainable energies based on predictions of entry and exit from the warehouse, the optimization of inputs in the field based on weather prediction models and digital twins of entire farms, etc.

AgrarIA is funded through the R&D Missions in Artificial Intelligence Program of the State Secretariat for Digitalization and Artificial Intelligence (SEDIA) of the Ministry of Economic Affairs and Digital Transformation, corresponding to the funds of the Recovery, Resilience and Transformation Plan.

The remainder of the discussion centered on the importance of embracing technological advances and energy innovation as critical drivers of decarbonization. Participants agreed that traditional industrial processes must undergo a transformative shift towards sustainable practices to effectively combat climate change with technologies, such as IoT and Artificial Intelligence, without forgetting interoperability.

Making the European Data Space a Reality

■ Between March 21 and 23 GMV took part as a key player in the "Data Spaces Symposium & Deep- Dive Day," sharing its knowledge thanks to the invitation from the International Data Spaces Association (IDSA), with GMV as a member. This event brought together a wide range of important actors involved in creating a digital future in Europe and worldwide, with the aim of ensuring that all participants can obtain full value from their data through equal access to secure and sovereign data exchanges among trusted partners.

Pablo González, GMV data scientist, took part in the panel "Data Spaces Business Value and Data Monetization" where he presented *uTile*, a GMV tool based on PET (Privacy Enhancing Technologies), applied in research and aimed at obtaining valuable information in different sectors, including tourism. The specialist described a use case where GMV's technology allowed calculation of average daily room rates based on a data space set up by various hotels, without the need to remove the data from each hotel's respective repository, and without

any of the hotels having access to the rates of their competitors.

Creation of the European data space is already in progress, it should be recalled that in October 2022, the International Data Space Association announced the launch of a project to set up and operate the Data Space Support Center. Funded by the European Commission under the Digital Europe Program, the Data Space Support Center will coordinate all relevant actions on sectoral data spaces in Europe.

GMV in the presentation of the Entrepreneurship and Innovation Strategy of the Junta de Castilla y León 2027

■ On March 27, the Minister of Economy and Finance of the Junta de Castilla y León, Carlos Fernández Carriedo, presented in Salamanca the Strategy for Entrepreneurship and Innovation of the autonomous community until 2027 (EEI 27), which aims to strengthen economic growth and job creation through specialization, innovation, and entrepreneurship.

GMV participated in the event, sharing the company's commitment in this field at the open innovation discussion table and reviewing some of the projects in which it has recently led, such as AgrarIA, or AGRARIA, promoted by SEDIA from the call for Artificial Intelligence missions, or CUCO, within the missions of the CDTI. As Patricia Tejado, director of Digital Public Services at GMV Secure e Solutions, explained, the company invests 5% of its profits in innovation and participates in emblematic projects applying the most revolutionary technologies such as artificial intelligence, big data, quantum computing, in addition to the development of solutions applied to the cybersecurity sector, key to the

development of the work of its early incident response center, located in the Boecillo Technology Park.

The Institute for Business Competitiveness of Castilla y León (*Instituto para la Competitividad Empresarial de Castilla y León*: ICE) is the agency taking the lead in EEI 27, and the collaboration with GMV goes back many years. As Tejado recalled, "a passion for challenges is found in our DNA, and we are just finishing one of the cybersecurity challenges promoted by ICE in collaboration with INCIBE, for domain detection. onion in the TOR network not indexed by public sources," a challenge

that seeks to discover new hidden illegal services to improve the monitoring service and to increase knowledge of the TOR network and its users.

For the GMV spokesperson, the main challenges to be addressed in open innovation based on the following aspects, problems–collaboration–people are: correctly identifying the problems on which to work collaboratively; the management of intellectual property and the collaboration and commitment of the members of the consortium; and the participation of professionals trained in new technologies and involved in innovation processes.

AI applications with economic and social impact

The first "Artificial Intelligence Applications" conference held by Universidad Carlos III de Madrid (UC3M) was attended by students and faculty from the Master's Degree in Applied Artificial Intelligence, as well as fellow members of the UC3M and other institutions and organizations. During the conference held in May, leading representatives of Spanish technology companies shared their varying points of view, painting a broad picture of the current artificial intelligence (AI) landscape.

José Carlos Baquero, manager of GMV's Artificial Intelligence and Big

Data division, spoke during the "AI Applications" session, which also featured participation by experts from Decide Soluciones, Industria de Turbo Propulsores, MÁSMÓVIL, and Vodafone.

This first block covered a selection of current AI applications in different fields such as industrial, aerospace, telecommunications, healthcare, education, governance, tourism, digital twins, and smart cities. In the second block, the trends and impact of artificial intelligence from a business point of view were presented.

During the conference, the exponential growth of opportunities and new applications emerged in the last year, current applications such as chatbots, intelligent assistants, predictive, recommendation and automation systems were presented, and the strong presence of recent generative AI tools, such as ChatGPT, was highlighted. Other aspects discussed included the impact of AI on jobs, binarization in the development of large foundation models within the reach of few companies, and difficulties in accessing certain private data.

GMV to fly higher with Alén Space

GMV and Alén Space, pioneering New Space startup based in Spain, has just entered into an acquisition agreement which will make Alén Space part of GMV's global business group

G MV and Alén Space, the pioneering New Space startup based in Spain, has entered into an acquisition agreement with the multinational tech firmwhich will make it part of GMV's global business. group

the transaction is taking place through GMV's acquisition of a majority stake in the company, in combination with a share capital increase. The goal is for Alén Space to increase its turnover tenfold in the next 5 years, to become a European and global leader in the small satellite market. Under this agreement,

Jesús B. Serrano
CEO of GMV

"This operation represents a unique opportunity for Alén Space, due to the excellent fit between the two companies, and GMV's strong positioning and a great reputation. In a context characterized by strong growth and heavy competition, it opens a new path for us, where anything is possible."

Guillermo Lamelas
CEO of Alén Space

"This is a long-term agreement between GMV and Alén Space of which we are very proud. Together we aim to lead the manufacturing of small satellites and related technologies at a European and global level."

Alén Space will continue to operate under its own brand, while its current management team will continue to lead the project.

Given the strategic nature of this operation, Spain's Center for Technological Industrial Development (CDTI), through its INVIERTE initiative, remains an investor in Alén Space and accompanies GMV in the corresponding capital increase.

For Alén Space, the agreement represents an opportunity to join a global technological group with a strong reputation in its market and a complementary technological and product portfolio. GMV also provides the capabilities and resources needed to consolidate and multiply the impressive growth trend Alén Space has been experiencing in recent years. All of this will reinforce the startup's position vis-a-vis its clients and competitors.

Alén Space was established in 2019, as a spinoff of the University of Vigo. Since then, the company has been working on the development of nanosatellites and its team has led missions of international importance, achieving significant milestones such as placing Xatcobeo, the first Spanish nanosatellite, into orbit. The company collaborates with major space agencies and international bodies and has achieved wide recognition worldwide.

For GMV, the agreement represents a significant increase in its commitment to the New Space, a field in which the company has been working for years. It also strengthens its position as a global leader in the space industry, consolidating the company as one of the main players in this market.

GMV receives a visit from the German-Spanish Chamber of Commerce

■ On June 1st, a group of companies belonging to the German-Spanish Chamber of Commerce and its Digital Transformation Circle visited GMV's head office in Tres Cantos, near Madrid. The purpose of their visit was to become familiar with the multinational engineering group's various areas of activity, with the event rounded out by a networking session.

GMV's president, Mónica Martínez Walter, welcomed the attendees, thanking them for their visit and reasserting her commitment to collaborating with the organization, which has the aim of fostering Spanish-German economic relations and representing the interests of its member companies such as GMV. She then gave the visitors a look at some of the latest projects GMV has been working on, in line with the company's commitment to competitiveness, innovation, and sustainability. The president also reminded those in attendance that GMV has accumulated a track record going back almost 40 years, from the time the company was first founded by a professor from the

Polytechnic Aerospace Engineering School, Juan José Martínez, in collaboration with a group of his former students.

Following her presentation, other experts from GMV further elaborated upon particular projects, where digital technologies such as artificial intelligence and advanced analytics are contributing to a diverse set of important goals like reducing space debris and advancing healthcare research.

In the current context where data has become so essential, the company's cybersecurity experts stressed the vital importance of ensuring protection for any organization, both in terms of the activities performed and the information being

stored. This is an area where GMV has been providing services for over 20 years to leading public and private clients, such as Spain's National Cybersecurity Institute (INCIBE), Red.es, and the Santillana publishing group.

In addition, Rafael Merinero, chair of the German-Spanish Chamber of Commerce's Digital Transformation Circle, thanked GMV for hosting the visit, and for the contributions it has made to the organization's various initiatives. He particularly emphasized GMV's participation in the chamber's excellence award competitions, in which some of GMV's products have been named as finalists, such as its intraoperative radiation therapy planner, *Radiance*.

How to protect yourself against a cyberattack and survive in the era of "fake news"

■ Cybersecurity has become a critical concern, not just for society in general but also for those working in the media, who play an important role in knowledge distribution and prevention of deceptive information. There are many media professionals who have decided to specialize in this area, to address the need for adequate reporting on subjects related to technology and information security. With a subject as complex as cybersecurity, journalists should be meeting certain criteria on

rigorous reporting, but news stories should also be written in a way that makes them understandable for readers, to help members of the public learn about important subjects such as data protection.

In this context, GMV and the Madrid Press Association (APM) jointly hosted their first workshops on cybersecurity for journalists on April 26th. This free event was organized for the benefit of the APM's members, and it featured

participation by Javier Zubieta, GMV's Marketing and Communication Manager for Secure e Solutions, and Paula González, GMV's Head of Cybersecurity & Digital Strategy for Business.

This event was also attended by Luis Fernandez Delgado and Jose de la Peña Muñoz, editor and director of the magazine SiC, who shared with the other participants the perspectives they have gained from working in the media.

GMV, pioneers in wellbeing

■ One result of the COVID 19 pandemic is that corporate wellbeing programs have now become a fundamental aspect of human resources policies. However, in 2019, the technology firm GMV had already decided to create its Wellbeing Program, as a way to formalize the various wellbeing actions it had implemented as part of its clear commitment to its personnel. The aim of that program has always been to improve the lives of the professionals working at the company, by offering them assistance with four fundamental aspects of their personal wellbeing: physical, emotional, social, and financial.

GMV's Wellbeing Program has now had an impact that includes both qualitative and quantitative results. For example, despite the effects of COVID 19 and an increasing number of employees at the company, data provided by the insurance company Adeslas shows that GMV has an insurance claim rate that is seven points below the average reported for its industry, with a decrease of five points in that index between 2019 and 2023. In addition, the annual report issued by Spanish insurance entity FREMAP places GMV as 40% below the average values for its industry in relation to indexes measuring temporary disability claims. Figures like

these demonstrate the positive effects that the company's talent management programs and policies are having, including its Wellbeing Program.

GMV's Wellbeing Program includes actions designed to ensure that the more than 3,000 professionals working for the company can benefit from a safe and healthy work environment, in all 12 countries where GMV operates. This is a basic necessity that the World Health Organization has been emphasizing in recent years.

The program is based on a complete system of annual planning that implements actions adapted for each country, which apply to each of the four basic aspects: emotional, physical, social, and financial. It also offers a catalog of tools and resources, which encourage healthy relationships within the company and the overall wellbeing of everyone who works there.

GMV puts an emphasis on continually updating its talent management policies, so that its employees and job candidates can always be offered the best conditions possible. The aim is to ensure that when assessing their options, they will choose GMV as the best place to develop a

long-term career plan. GMV is proud to maintain a relationship with its employees that is based on trust and respect, and formalized through a variety of corporate policies and programs such as the Wellbeing Program. Our human resources policies pursue the aim of creating work teams that are happy and healthy, and therefore also motivated and committed.

GMV has implemented a flexible workplace model, which has not only been kept in place after the pandemic, but strengthened as well: our employees can now work remotely for up to 60% of their working week, and each year they are also able to work remotely for eight full weeks from any location. In addition, GMV has other relevant policies and programs such as its "BE YOU" diversity and inclusion program, which is based on guaranteeing equal treatment for everyone, regardless of their age, cultural background, gender, sexual orientation, or disability, as a way of eliminating any discriminatory conduct within the organization.

Thanks to these policies that put people first, GMV has been given a notably high position in the 2022 ranking of Best Companies To Work For, published by the Spanish magazine *Actualidad Económica*.

GMV's commitment to technological vocational training

■ In March, GMV welcomed the arrival of 21 advanced-level vocational training students as interns at the company, as part of its Global Talent Internship program. This brought the total number of vocational training interns for 2023 to 41, who are now working at the company's facilities in Madrid, Valladolid, Barcelona, Valencia, and Seville.

These new colleagues were welcomed at a reception and presentation offered by the GMV Group at its head office in Tres Cantos near Madrid, where they were given an introduction to GMV's various business areas, its organizational structure, and various other aspects of interest, to help them make the most of their internship period.

These 21 students have now become part of the GMV team, as part of a grant-funded internship program, and they will be developing their knowledge in various areas at the organization, in a real working environment while contributing to leading-edge technological projects. Over a 3 month period, the student interns will complete their respective training in IT system administration, development of multi-platform applications, development of online applications, and electronic maintenance. GMV also offers real possibilities for joining the organization on a more permanent basis after these internships have ended, based on each student's performance.

GMV's Global Talent Internship program reflects the company's commitment to supporting high-quality training, while also enhancing employability. The number of vocational training students benefitting from these internship grants has been increasing year after year, as GMV continues to offer these excellent opportunities for technical training and specialization.

From the classroom to the workplace

■ As part of Madrid's regional program known as "High School + Workplace", GMV again welcomed a group of 10th-grade students to its facilities.

A total of 11 students from 7 high schools in Madrid took part in a 3 day visit to GMV, to learn more about the company's activities and about how it is structured as a variety of business sectors. They also had an opportunity to get an up close look at the work being performed in various technical departments, based upon their own interests.

The aim of the High School + Workplace program is to give students some first-hand experience in the working world, to help them make decisions about their future studies and careers. For GMV, participation in this program is another way of demonstrating its commitment to encouraging careers in science and technology, and the company was able to give the students a closer look at the wide range of professional opportunities available in the STEM disciplines.

UPM Racing and GMV: talent and teamwork

■ GMV has joined the UPM Racing team as a premium sponsor, as a way to support innovation, excellence, and a passion for challenges, teamwork, and above all, talent.

UPM Racing is a project developed by students at the Polytechnic University of Madrid (UPM), and for 10 years the university's team has been participating in the international SAE Formula Student (FS) competition, which is focused on engineering applied to the automotive industry.

As part of this collaboration, on May 10th members of the UPM Racing team visited GMV's central headquarters in Madrid, and they brought with them the single-seater racecar the students have designed and developed. The visit began with an introduction to the company, presented by managers from GMV's various divisions, with an

emphasis on some of the leading-edge projects now taking place in the areas of space, automotive, and cybersecurity.

The workshop also gave GMV's employees a chance to take a closer look at the most recent single-seater racecar prototype that the members of the UPM Racing team have entered in previous editions of the SAE FS competition. In addition, they were able to learn more about the academic program that covers all aspects related

to design, development, and driving of the team's Formula-style vehicle.

Through collaborations like this one, GMV is providing support for university students and encouraging them to continue developing their skills and knowledge in the fields of science and technology. These collaborations also represent a way to strengthen connections and communications between the worlds of academia and industry, which is an essential part of training and education for future talent.

GMV encourages STEM careers

■ Providing training to future talent boosts development. Mindful of this, GMV remains firmly committed to fostering interest in science and technology, especially in the field of education. Every year, the organization carries out various support initiatives to awaken and nurture the curiosity of young students in areas related to science, technology, engineering, and mathematics (STEM).

The activities in which GMV colleagues contribute their knowledge and passion for science and technology include training programs, congresses, educational talks, student initiatives, and academic competitions. In early May, GMV collaborated with the ASTI Foundation on its educational robotics competition, the ASTI Robotics Challenge. The foundation hosts this annual event for students of varying

ages, from 9th graders to university students. This 7th ASTI Robotics Challenge included GMV as part of the judging panel, which assessed the knowledge and skills in technology, programming, and robotics of the 39 teams taking part.

When it comes to fostering talent, GMV's commitment is clear. An example of this is the Invictus student team from Valencia, Spain, which received GMV's support to take part in the international phase of the 25th First Lego League. This year's event, entitled SuperPowered, revolved around the field of energy. In addition to designing and building an autonomous robot to compete with, the Invictus team developed a project that involves a wind energy generation system with an ergonomic design for the façade of urban buildings. The team came in

second place thanks to the performance of its robot and won third prize for the innovative nature of its project.

GMV also puts young people in touch with technology so that they can learn through experience. This is the case of the Nuestra Señora del Carmen nursery and elementary school in the town of Torre de la Reina in Seville, Spain, where GMV came to give a workshop on space robotics. Children from 3 to 12 years of age were able to see up close how a prototype space exploration rover works, in collaboration tasks with future astronauts.

This type of initiative helps to develop skills such as innovativeness, creativity, self-reliance, and logical thinking, which are essential not only for STEM education but also for the students' academic and professional future.

GMV reaches 3,000 employees

J uan José Martínez García founded GMV in 1984 with a small group of partners. It is hard to say whether he ever imagined that his business venture would become what GMV is today, almost 40 years later: a multinational group with more than 3,000 employees spread over 13 international offices.

GMV is the sum of contributions and experiences made by each and every person who has played a part in the company's history, including those who are doing their bit now, with a strong commitment to a job well done and

a passion for challenges, sharing and embracing values that they can be proud of. Together we have made great achievements and will undoubtedly continue to do so in the future, which is why we would like to thank all the members of GMV for their hard work, effort, and dedication.

Although there are as many stories as there are people working with us, we would like to feature three professionals in particular so that they can tell us what it was like at GMV in the early days, what they think about the present, and what they foresee for the future.

Jorge Potti
Corporate Director of Strategy

I came to work at GMV in the summer of 1986, just out of my aeronautical engineering degree. Back then GMV was a start-up with only 12 employees.

Throughout my extensive career at the company, I have held many positions: project engineer, including a two-year stint with a client in France, project manager, section manager, division manager, business unit manager for satellite control centers (1997), manager of the Commercial Department – GMV Space (2001), general manager of the Space sector (2009), and since October 2022 corporate director of Strategy. Over the years I have become increasingly involved in the sector. For example, I have been a member of the Board of Directors and Vice-President for Space of the Spanish Association of Defense, Security, Aeronautics, and Space Technology Companies (TEDAE) since 2014. I have also sat on the Eurospace Board and I am currently a member of the Governing Council of the recently created Spanish Space Agency.

In these 37 years I have had the good fortune to accompany GMV uninterruptedly in its extraordinary success story and to share my professional career with exceptional people. Naturally, GMV has grown (a lot) over the years in terms of its workforce, geographical expansion, project diversity and scope, work methods and approaches, operations complexity, positioning, and a long etcetera. There has always been a desire to improve, to grow, to reach new heights that would allow us to develop professionally, create jobs, and pursue a business project that truly meant something. In hindsight, I sincerely believe that what sets GMV apart from other companies is, above all, the professional and human quality of its staff.

Personally, I feel privileged to have always been surrounded by people with extraordinary talent, commitment, and ability, and who have always shown high-mindedness and tremendous team spirit. People with whom I have shared priceless moments and also had a great time. Thanks to them, and all of you, GMV's possibilities are limitless.

Fátima López Mateos
Project manager. Automotive

My first contact with GMV happened before I joined the job market, when I was a college student. Thanks to a program run by the University of Valladolid, we had the chance to earn a number of credits in companies at the Boecillo Technology Park, one of which was GMV, offering a course on GNSS technologies. Apart from gaining technical knowledge, this allowed me to get to know the company, the work environment, and the type of projects that were being developed there.

Fast-forward a few years to 2015, I now had some work experience under my belt and was eager to start something new. That was when I was offered a position at GMV in its Automotive Industry unit, which I gladly accepted. When I arrived, I was met by a very cohesive team that made me feel extremely welcome both personally and professionally. It was, and still is, a very technologically curious bunch of people with a passion for challenges and a drive to stay at the cutting edge. They worked in lockstep, giving their

knowledge and time to build innovative solutions with the quality required by GMV.

In my division, I have been able to take part in national and international projects linked to different areas of the automotive industry, collaborating with my colleagues in Spain and Portugal. It is a very rich work environment because we all exchange ideas and insights, genuinely want things to go well, and feel like an important part of the team. GMV has also trusted me to take on more responsibility and develop professionally.

The company is still growing today, allowing it to bring new people and new ideas into the team and not stagnate. The core values and the work environment are very much the same, though. We are a good team of people who are at GMV because we have a passion for technology. We are also doing something we enjoy, which makes it very easy to put our best into our work.

Rafael Uceda Gallegos
Project manager. Robotics and Automation

I came to GMV as an intern roughly three years ago and from day one I knew I belonged here. Despite my limited experience, they took me on board as one of their own, listened to all my ideas and contributions (the good and the not so good), and made me feel part of a fantastic team that works every day to take on as many challenges as possible. I am drawn to that "we can do anything" attitude that permeates the atmosphere and is passed on to each new recruit.

I arrived with only a vague idea of what GMV was and I'm still shaping that mental image today: colleagues who become close friends, work experiences that enrich you as a person, seemingly unattainable goals that are ultimately reached... As time goes by, I will continue to add details

and experiences to this list, which I hope will never stop growing.

At first as an intern, then as an engineer, and more recently as a project manager, I have felt unwavering support at every step I have taken and in every decision I have made. I don't know what it is like elsewhere, but here they definitely take your professional development plan seriously. My experience in this regard is unbeatable: a personalized path focused on my strengths and backed by an outstanding training plan.

One thing is clear: behind those three red letters is a huge team of people ready to contribute and lend a hand when needed. It is that human quality that invites you to come, stay, and belong to a much larger whole that actually feels like a close-knit family.

GMV in the world

SPAIN
Headquarters
Isaac Newton 11 P.T.M. Tres Cantos – 28760 Madrid
Tel.: +34 91 807 21 00 Fax: +34 91 807 21 99

Santiago Grisolía, 4 P.T.M. Tres Cantos – 28760 Madrid
Tel.: 91 807 21 00 Fax: 91 807 21 99

Juan de Herrera n.º 17 P.T.Boecillo – 47151 Valladolid
Tel.: +34 983 54 65 54 Fax: +34 983 54 65 53

Andrés Laguna, n.º 9-11. P.T.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
Calle 81 n.º 11-8. Planta 5, oficina 5-120. 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) 1156667200 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

www.gmv.com