Annual Report
2020

gmv®
INNOVATING SOLUTIONS

GMV business group believes that behind each new need, behind every new problem, there is a challenge and a chance to innovate. Technology is not an end in itself; it is the means to make something new or to make something old better. In GMV we draw on our existing range of products and services or, if need be, we develop completely new ones to meet the particular needs of each client, providing bespoke innovation and technology. We take on our clients' challenges as our own, spurring us on to new heights of innovation.

GMV goes beyond its clients' brief, exploring their real needs with a total readiness to find solutions. This allows us to come up with the right response, often imaginative, sometimes unique and always honest.

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Letter from the President

MÓNICA MARTÍNEZ

2020 was marked by the COVID-19 pandemic that wreaked havoc in our social life, closed down borders, shut off all non-essential activity and unleashed a worldwide slump of historic proportions. GMV has nonetheless managed to produce an annual report that is pretty similar to previous years, demonstrating our company's strong resilience. Many factors contribute to this resilience. Our technology prowess is paramount, enabling us to keep going despite the lockdowns and thus help to buoy up also the business of our clients. Our ongoing diversification into several hi-tech areas has enabled us to weigh off booming business areas like cybersecurity against those that have dipped like transport. Working jointly with our clients and our suppliers we have learned on the hoof to solve all sorts of problems remotely. Some of our flagship clients like the European Space Agency have been especially proactive in helping the space industry to weather this storm, introducing measures to keep up contracting levels, streamlining its procedures and guaranteeing punctual payments for each milestone. Together with our rock-solid financial position this has enabled us to see through this year with no great upsets. But the clinching factor is the ever-readiness of GMV's exceptional team, which has bent over backwards to pull off all its projects, adapting its way of working and communicating to all these new circumstances as they cropped up.

The net result is that we have been able to keep up our productive activity and contract new projects. Pride of place here goes to GMV's upfront role in the Future Combat Air System (FCAS) being developed jointly by Germany, France and Spain to phase out their current fighter aircraft as from 2040. FCAS comprises a new-generation fighter interconnected with swarms of drones, state-of-the-art sensors and sundry military platforms plus communication- and observation-satellites. GMV has reached an agreement with another two major sector firms to lead jointly Spain's participation in the Remote Carriers Technology Pillar, centering on the development of new technology for FCAS's set of unmanned vehicles.

On the strength of this and many other new projects described in this report we've managed to keep up our growth rate and boost our turnover by nearly 10%, generating new jobs even in the midst of the pandemic. At the same time we have continued to invest in GMV's future, developing new products and carrying out new services. This year we have made most of the hefty

outlay needed to develop the correction service for autonomous-car satellite positioning, including the rollout of a global network of GNSS stations. We have also continued to develop our new range of public-transport products and launched on the market new groundbreaking solutions based on artificial intelligence and cybersecurity technology.

Furthermore, despite the lockdown constraints, GMV managed this year to reach an agreement with Nottingham Scientific Limited (NSL), Britain's top satellite-navigation and critical-application company with which we have collaborated in several projects in the past, to become part of the GMV group through a merger with GMV's UK subsidiary. The resulting company GMV NSL has a staff of 80 top experts ready to tackle the challenges and opportunities posed by Britain's post-Brexit space market.

The investment level this year has thus been brisk. Together with the additional costs of dealing with the pandemic, this has inevitably eaten into our profits. In the coming years, however, this dip is more than likely to be offset handsomely, thanks to our in-house developments and the salutary lessons learned during such an exceptional year. The pandemic, in fact, has triggered us to explore new ways of working and collaborating, which will continue to be useful long after the pandemic is over. Well used they can help us to improve our work-live balance, boosting our employees' job satisfaction and the company's productivity.

This year has brought out the extraordinary importance of human relations in all ambits of our lives. To all those who have accompanied us this year in spite of the physical distance, our heartfelt thanks!

Mónica Martínez

Letter from the CEO

JESÚS B. SERRANO

"War came silently, nigh unannounced. Its entrée was an implosion; we collapsed in on ourselves. Life was hung up on a peg for later, ceasing to exist in time. Our own identity was swamped and blurred. Soon it was too late. Distance burst in like a spaceless flood. Uncertainty choked us amidst chary glances. We drifted lost among forced choices and pleas for it all to be over.

Like stringless puppets we floated in the inertia of all these tears. Sans guidance, sans rules, sans truce. We just drifted aimlessly.

Once washed ashore we realized from the undertow that spring had gone."

There is no better way to render a well-deserved tribute to healthcare workers than the words of a young doctor at the start of her career, who has suffered the pandemic at the coalface. We at GMV hail all health workers who have risked their own lives to save others, who have lived in the epicenter of the crisis, suffering daily with their patients and their relatives, as well as the great number of people who have helped keep essential services running.

The figures have been harrowing all year, peaking as we close the books: over eighty million COVID-19 cases and nearly two million deaths around the world. If the death of a single relative, a single friend or acquaintance is painful, how searing is the pain caused by the death of two million people? Not to mention the physical ordeal of the millions of people who have suffered the disease. Our heartfelt condolences go to any clients, employees, partners, collaborators and suppliers who have lost a loved one in this pandemic, and we offer up our support and best wishes for everyone who has suffered the disease and is still feeling its long-lingering aftereffects.

To mitigate the worst effects of the COVID-19 pandemic we triggered our crisis management protocol in late January 2020. The goals were to safeguard the health of our employees, stand by our clients and minimize the impacts on the company's activities as a whole.

In all our annual reports we have always paid homage to our clients' ongoing trust in us and the crucial part played in GMV's development by our staff, shareholders, partners and suppliers. This year the huge upsets of the pandemic make this homage even more pertinent and heartfelt: thanks to our staff for their effort and responsibility; to our suppliers for their own effort and our clients for their understanding, all between them helping us to fulfill our healthcare goals and keep our staff healthy. We have achieved this with nearly all our staff working from home, tapping into the company's telematic resources and IT infrastructure and keeping their traveling to a minimum during all the year's various mobility phases.

During such a difficult year our clients' huge efforts are especially laudable. Pandemic constraints permitting, they have always done all within their power to speed up and free up the activities and projects underway, run tenders for new developments with all the corresponding funding. Please accept our gratitude and recognition.

I'd like to wind up with a brief look at the company's figures and feats in the year now coming to a close. During 2020, despite the enormous hurdles thrown down by the pandemic, GMV still managed to consolidate its leadership in all the markets is trades in. Turnover, now topping €252 million, is 9% up on 2019. EBITDA and net profit have dropped by 9% and 34% respectively on 2019, due to three main reasons: firstly, the pandemic has hit our ITS business hard, especially in North America with big delays in scheduled rollouts; secondly, the pandemic has led to soaring costs in some of the company's business areas; lastly, despite these drawbacks, GMV has stuck to the spending levels it set at the start of the year in order to fulfill our strategic plans in the various markets and look firmly and confidently ahead to the future.

In the complicated situation that has fallen to our lot in 2020, we are particularly proud to say that we have chalked up the abovementioned figures without cutting staff; quite the contrary, we have increased our intake by 8%, reaching the figure of 2357 by the end of the financial year.

Despite the traveling constraints throughout the year, we have once more managed to up our commercial activity; our new contract rate matched annual sales, and the tenders still pending decision outnumber the new contract rate by a multiple of 2.3.

The company's fine results in ongoing programs and activities, plus the outstanding performance in the higher-risk projects (winning the corresponding congratulations from our clients) together with the positive commercial activity figures all bode well for the future, a particularly brilliant future in view of the trouble-strewn present we have lived through.

Jesús B. Serrano

Corporate structure

Grupo Tecnológico e Industrial GMV, SA

GMV Innovating Solutions, SL

GMV Aerospace and Defence, SAU / Aerospace and Defense Markets

Grupo Navegación por Satélite Sistemas y Servicios, SL / Galileo development and exploitation

GMV Soluciones Globales Internet, SAU / Telecommunications and e-business Markets

GMV Sistemas, SAU / ITS and Industry Markets

GMV Innovating Solutions, Inc / Aerospace, ITS and Telecommunications Markets of USA

GMVIS Skysoft, SA / Aerospace, Defense, ITS and Telecommunications Markets of PORTUGAL

GMV Seguridad Integral, SAU / Security Market

GMV GmbH / Aerospace, Defense, ITS and Telecommunications Markets of GERMANY

GMV Innovating Solutions, Sp.z o.o / Aerospace, Defense, ITS and Telecommunications Markets of POLAND

GMV Innovating Solutions, SRL / Aerospace, Defense, ITS and Telecommunications Markets of ROMANIA

GMV Innovating Solutions, SARL / Aerospace, Defense, ITS and Telecommunications Markets of FRANCE

GMV Innovating Solutions, SAS / Aerospace, Defense, ITS, and Telecommunications Markets of COLOMBIA

GMV Innovating Solutions, Sdn. Bhd / Aerospace, Defense, ITS and Telecommunications Markets of MALAYSIA

GMV NSL Limited / Aerospace, Defense, ITS and Telecommunications Markets of UNITED KINGDOM

GMV Syncromatics Corp / ITS Markets of USA

GMV Innovating Solutions, BV / Aerospace, Defense, ITS and Telecommunications Markets of THE NETHERLANDS

GMV Innovating Solutions, SRL / Aerospace, Defense, ITS and Telecommunications Markets of BELGIUM

Payload Aerospace, SL / Aerospace Market

Governing bodies

MÓNICA MARTÍNEZ WALTER

President

JESÚS B. SERRANO MARTÍNEZ

Chief Executive Officer

JAVIER LÓPEZ ESPAÑA

Member of the Board

SUSANA MARTÍNEZ WALTER

Member of the Board

FCO. JAVIER MARTÍNEZ CENDEJAS

Chief Finacial Officer

IGNACIO RAMOS GOROSTIOLA

Chief People Strategy & Infrastructure Officer

PEDRO J. SCHOCH

Director of Corporate Development, Marketing and Communication

RICARDO TÓRRON DURÁN

Member of the Board (GMV Aerospace and Defence, SAU)

JORGE POTTI CUERVO

General Manager Aerospace

MANUEL PÉREZ CORTÉS

General Manager Homeland Security & Defense

MIGUEL ÁNGEL MARTÍNEZ OLAGÜE

General Manager Intelligent Transportation Systems

LUIS FERNANDO ÁLVAREZ-GASCÓN PÉREZ

General Manager Secure e-Solutions

ALBERTO DE PEDRO CRESPO

Managing Director GMV in Portugal

Company history

GMV was born in 1984 from the business initiative of Professor Juan José Martínez García. At first GMV centered on the space and defense sectors, taking its initial steps in fields like mission analysis, flight dynamics, control centers, simulation or earth-observation and satellite-navigation, all areas in which GMV is nowadays a leading light worldwide. Starting out as a small group of engineers who won a contract from ESA's European Space Operations Centre (ESOC) in an open international tender, GMV then went from strength to strength, quickly growing into a solid firm running a 100-strong staff by the late eighties. It played a key role in ESA's first space missions and defense programs and provided highly specialized services for the major international satellite manufacturers and operators.

In a few short years the sheer quality of its work won GMV a cast-iron reputation in the European space sector. In 1988 it was declared to be a "Center of Excellence in Orbital Mechanics" by the European Space Agency (ESA).

In the early nineties GMV decided to branch out into other sectors by way of technology transfer. This engendered new business lines in the sectors of intelligent transportation systems, Cybersecurity and telecommunications, and in information-technology applications for the public and private sector. By breaking into these new markets GMV became a trailblazer in fields like internet solutions or satellite-navigation applications, still in their infancy in those days. In the transport field GMV became a pioneer in intelligent transportation systems, developing the first GPS-based fleet tracking and management systems. From the space sector the company thus began to transfer to other markets its knowhow and expertise in control centers, data processing, onboard software, geographic information systems (GISs), satellite navigation, telecommunications services and data networks.

It was also during the nineties that GMV found its feet in the defense and security sector, especially in the fields of command and control systems, simulation and military satellite applications (communications, Earth Observation and navigation).

By the end of the nineties GMV's diversification process had been successfully negotiated; its business structure was solid and its staff had built up to almost 300. Turnover now topped 20 million euros, about 50% of which came from sectors like intelligent transportation systems, Cybersecurity, telecommunications and information technologies.

In 2001 the founder and president of GMV, Professor Juan José Martínez García, passed away. This led to a change in the executive structure of business group GMV; the post of CEO was created while the presidency of the group was taken on by Dr. Mónica Martínez Walter.

In these years GMV embarked on a new stage with a dual objective: firstly to maintain its business independence and secondly to draw up a forward-looking plan that would guarantee ongoing profitable growth both in its traditional business areas and in other new ones. It therefore invested heavily in the development of new products, services and solutions in space, defense, intelligent transportation systems and information technology; the company also decided to break into new sectors and unfurled an ambitious program for internationalizing the longstanding business lines.

As a result of this international expansion policy GMV took a crucial step forward in 2004 with the creation of its US-based company, thus becoming a multinational trading on two continents. The new company focused on the US aerospace market with the aim of becoming a tried and trusted supplier in this sector.

In May 2005 business group GMV upped the stakes in its international growth and development strategy by buying a 58% holding in Skysoft, a Portuguese firm with very similar business lines and target markets to GMV's. In 2007 the operation was completed with the purchase of 100% of Skysoft, its operations then being knitted seamlessly into the rest of the business group.

GMV's new corporate identity was officially launched in September 2006, to bring its image into line with the actual situation of the multinational technology group GMV. The group had by now broken into many new sectors and expanded its business internationally. To make sure the corporate brand did not lag behind this new situation we decided to carry out a thoroughgoing overhaul of the group's identity, unifying all the corporate brands under a single denomination. As a result, all the subsidiaries took on the new GMV brand as a single corporate identity.

In June 2007, GMV purchased a 66% stake in Masisconvi, SA, a company specializing in the design, development, manufacture and marketing of advanced ticket-vending and fare-collection systems. This transaction allowed GMV to round out its range of passenger-transport telematics, traditionally founded on advanced fleet-management systems. In early 2011 GMV completed the 100% purchase of Masisconvi, S.A. and in 2012 it was wholly integrated into the group structure by means of a merger-based takeover.

In late 2007, giving a new kick to its worldwide expansion, GMV decided to internationalize those business lines that had attained number-one status in the Spanish market, such as the intelligent transportation business. This strategy soon came good; by 2009 the company had won its first contracts in Asia and Eastern Europe. Since then this process has thrived, important new contracts being won in Poland, Malaysia, Indonesia, Morocco, Sweden, Mexico, Chile, United Arab Emirates, Australia and Cyprus, etc.

From 2008 to 2015 GMV's growth slackened slightly but never ceased. Its strong suits of business specialization, unbeatable competitiveness and ongoing internationalization helped it to stave off the worst effects of the worldwide downturn. During this period important contracts were also won with new

clients, such as telecommunications satellite operators like Measat, Azersat, Nilesat and international agencies and organizations like GSA-Galileo-, EMSA, FRONTEX, the UN and EUMETSAT. The company also kicked on in growth areas where GMV had already built up a healthy client portfolio, such as physical security and Cybersecurity, healthcare, automotive software, robotics, big science facilities, Big Data, Internet of Things, testbeds and control and instrumentation.

In July 2015 GMV and the California-based technology firm Syncromatics Corp, a provider of Software as a Service (SaaS) solutions for the intelligent transportation systems (ITS) market, signed an agreement under which GMV made a strategic investment in Syncromatics Corp's capital. One year later GMV's investee company Syncromatics then bought 100% of Mobilitat Works Inc., a technology company specializing in the North American market of ITS-based demand-response public-transport systems and paratransit (special transport services for people with a disability or functional diversity). In 2018, as part of its ongoing strategy of investment and growth in the USA's ITS market, GMV completed its takeover of Syncromatics, which from that moment on began to trade under name GMV SYNCROMATICS. This latest outlay increases GMV's expansion capacity in the USA and consolidates its position in the worldwide ITS market.

In 2016 GMV GmbH, GMV's German aerospace subsidiary trading in the aerospace, defense, ICT and ITS markets, signed a merger agreement with INSYEN AG, a leading German space-missions firm. The resulting company, GMV-INSYEN AG (under the GMV INSYEN brand), was then fully integrated into the whole set of companies making up GMV Group. At the end of 2016 GMV also bought a stake in PLD Space, a young Spanish space startup that has now been working for some years on the design and testing of space launcher technology. In 2020 a merger agreement was signed between, on the one hand, GMV Innovating Solutions Limited, GMV's British aerospace company, trading also in the markets of defense, ITC and intelligent transportation systems, and, on the other, Nottingham Scientific Limited (NSL), Britain's top satellite-navigation and critical-application company. This agreement makes GMV NSL's sole shareholder and gives birth to the company GMV NSL, now to be knitted seamlessly into GMV's set of companies.

By the end of 2020, on the strength of this international expansion process initiated back in 2004 with the creation of the US company, GMV was running subsidiaries in Germany, Colombia, Spain, the USA, France, Malaysia, The Netherlands, Belgium, Poland, Portugal, the UK and Romania, plus permanent establishments or project offices in Morocco, Cyprus and Mexico, among others. GMV is a 2000-strong multinational group with a bulging international portfolio of clients from five continents. It trades in Europe, the Americas and Asia in several hi-tech sectors.

GMV in 2020 still looks to the future with undimmed, upbeat enthusiasm, maintaining its original aim of building up a strong knowledge-based company whose main resource is still the talent, far-sightedness and industriousness of its personnel.

2018

2019

2020

2021

2022

2023

GMV in 2020

Main figures

Total Income:	**262.01 M€**
EBITDA:	**12.93 M€**
Net profit:	**4.11 M€**
Number of employees:	**2,357**

Activity sectors

GMV provides turnkey systems and solutions, specialist hi-tech products and services. Its activities take in the whole life cycle, ranging from engineering and consultancy services, the design and development of software and hardware, to the integration of systems and subsystems, verification and testing, operational support and maintenance. Through its stable of subsidiaries this business is carried out in eight sectors: Aeronautics, Defense and Security, Space and major installations, Intelligent Transportation Systems, Cybersecurity, Information Technologies for the public and private sector, Telecommunications and Healthcare.

Assessment

GMV is co-leading Spain's participation in the Remote Carriers Technology Pillar of the Next Generation Weapon System (NGWS) of the Future Combat Air System (FCAS). This pillar focuses on the development of new technologies and assessment of new concepts, based on a set of unmanned vehicles, some with ISTAR observation capability. This project will generate a rich store of knowledge and benefits for Spanish firms, giving them the chance to develop cutting-edge products in both the civil and military spheres. It also ensures a maximum program return for Spain's industry and sovereignty over the technology developed by its firms.

During 2020 GMV stepped up even further its involvement in programs geared towards the use and management of drones, remotely piloted air systems (RPASs), unmanned aerial vehicles (UAVs) and unmanned aerial systems (UASs).

Worthy of special mention are all the following: the development of U-Space services in projects like DOMUS coordinated by Spain's air navigation services provider, ENAIRE; EDA's SAFETERM and AI-GNCAir projects; the joint carrying out with Aurea Avionics of the Seeker RPAS. The SUGUS project, too, will be presenting its results at the end of the year. Under the EU's R&D umbrella and carried out by a consortium co-primed by GMV and Everis, SUGUS's aim is to speed up the use of GNSS and Galileo in the UAV segment. Within this area GMV has developed the **Dronelocus®** family of products to come up with an answer to the current boom of this type of unmanned aerial systems.

GMV is also taking part in several projects of another major European aeronautics program, Clean Sky 2; all these projects made significant headway in 2020: EMAFLIGHT and VALEMA, in the field of electro-mechanical actuators and ECUs for flight control systems; vACCINE, for detection of intrusion in communications between the aircraft and air-traffic control systems; and UBBICK, to simplify cockpit utility management architectures.

Throughout 2020 GMV continued to work with the major European aeronautics subsectors. Teaming up with Airbus, it was likewise involved in the development and validation of onboard systems for the C-295 aircraft, collaborating in the A330 MRTT air tanker systems and simulation (landing gear simulation models, electrical system and communications systems) in the long range strategic transport aircraft and air tanker A400M. After a busy campaign of software certification and qualification tests, the Electronic Control Unit (ECU) of the A400M's crane system developed by GMV for CESA has now entered production phase and supply for aircraft.

New developments here included GMV's signing with EUROCONTROL of a three-year AUGUR service contract, the handover to ENAIRE of a new version of the APRESTA system. Finland's air navigation services provider, ANS Finland, reached an agreement with GMV for using its inhouse **MagicIFP**, thereby becoming the second user of this service after ENAIRE and the first outside Spain.
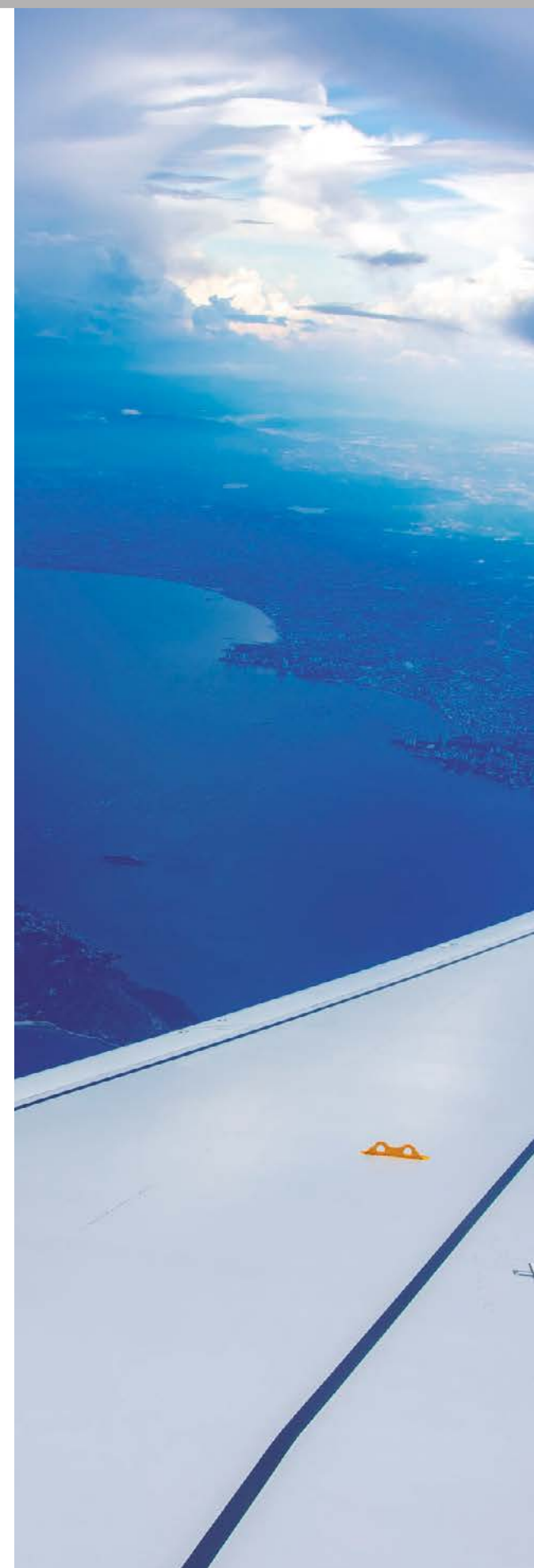
ACTIVITIES 2020
Aeronautics

GMV is a tried-and-tested supplier of products and services not only for leading aeronautical manufacturers such as Airbus but also for providers of air navigation services and for regulatory authorities such as Spain's airport and air-navigation authority ENAIRE, the International Civil Aviation Organization ICAO and Eurocontrol. GMV participates in the main aeronautics programs, providing engineering services and developing state-of-the-art aeronautical systems and software while always adhering to the highest quality standards. In particular GMV has spearheaded development of aeronautical approach- and landing-systems based on satellite navigation systems (GNSS) and is one of the few European companies with comprehensive knowledge of advanced avionics architectures, testbeds and verification systems and their associated regulations.

The most important areas of activity within the aeronautics sector are the following:

- Flight dynamics
- Development of safety critical software and hardware (DO-178 / DO-254)
- Avionics and equipment design
- Integrated Modular Avionics (IMA)
- Remotely Piloted Aircraft Systems (RPAS)
- Pilot- and operator-training and engineering simulators
- Testbeds
- Approach and landing procedures and systems
- GNSS technical assistance for air-navigation operators and authorities

Aeronautics. Main milestones

1 After Spain's joining of the Next Generation Weapon System/ Future Combat Air System (NGWS/ FCAS) project, GMV reaches an agreement with SENER Aeroespacial and TECNOBIT– GRUPO OESÍA to lead jointly Spain's participation in the remote carriers technology pillar. This pillar focuses on the development of new technology and assessment of new concepts, based on a set of unmanned vehicles, some with ISTAR observation capability. In this first phase, as well as participating in the Joint Concept Study (JCS), which aims to analyze possible FCAS architectures and capabilities as a step towards design tasks, GMV is also taking part in the Combat cloud pillar and sensor pillar of the Next Generation Fighter (NGF). This makes it one of the Spanish firms with the biggest FCAS participation.

2 Under the Spanish MoD's RAPAZ program the Spanish army and navy receive the first units of the RPAS Seeker. Seeker is a rapid-deployment intelligence, surveillance and reconnaissance system developed by Aurea Avionics and GMV. it is one of the most efficient of any RPAS, boasting 90-minute endurance, a 15-km range, and weighing in at 3.5 kg. It represents

a qualitative leap forwards for the armed forces, boosting its intelligence–, surveillance– and reconnaissance– capabilities, which are crucial to ensure tactical superiority and more efficient troop operations.

3 Finland's air navigation services provider, ANS Finland, reaches an agreement with GMV for using its inhouse *MagicIFP*, thereby becoming the second user of this service after ENAIRE and the first outside Spain. The development of this product, offered by GMV to its customers as a Software as a Service (SaaS), is fruit of GMV's ongoing COTS development strategy over recent years, in great demand in the air-navigation and airport markets. *MagicIFP* allows air navigation service providers (ANSPs) to carry out GNSS-based instrumental procedure validation tasks as recommended by the ICAO (International Civil Aviation Organization) in a rapid, efficient and affordable manner.

4 GMV signs a 3-year contract with EUROCONTROL for providing the AUGUR service for forecasting GPS/ RAIM unavailability and generating Notices to Airmen (NOTAMs) for aerodromes running GNSS-based

instrumental flight procedures. The system used in this service is based on GMV's inhouse *GNASSURE* product, which forecasts GNSS service provision for use in navigation and surveillance applications (e.g. ADS–B) in aviation. Also based on *GNASSURE*, GMV hands over to ENAIRE a new version of the APRESTA system for monitoring ADS-B surveillance service provision in Spain, under a contract awarded to GMV by ENAIRE in 2019 for development and maintenance of this system.


5 *Emil*, GMV's inhouse system for ground inspection of Instrument Landing System (ILS) and VHF Omnidirectional Radio Range (VOR) radio aids, swells its client portfolio in 2020. CORPAC S.A., Peru's air navigation services provider, contracts from Rohde&Schwarz and GMV the development of a portable and compact Emil version. Last but not least Saudi Arabia's air navigation services provider, SANS, acquires the complete system for fitting out one of its main international airports.

6 During this year GMV continues working on a new version of the U-space family of products, *Dronelocus®*, developed by GMV under the ENAIRE-coordinated DOMUS project. This new *Dronelocus®* version has enhanced emergency-management and monitoring capabilities, allowing it to ensure drone operators compliance with drone legislation and operational constraints and enabling specially authorized operators to carry out missions in restricted zones.

7 The European Defence Agency (EDA) awards GMV the AI-GNCAir project, the remit of which is to study the new guidance, navigation and control (GNC) technology for air–platform systems. A new phase of SAFETERM also kicks off, with the aim of weighing up the various technological and certification approaches for the development of autonomous solutions in order to ensure foreseeable but adaptable behavior of Remotely Piloted Aircraft Systems (RPAS) in the event of a flight-terminating emergency. Both initiatives form part of the implementation of EDA's strategic research agenda within CapTech GNC,

looking at how Artificial Intelligence technology might be integrated into GNC systems and the roadmaps needed for closing the corresponding technological gaps in the EU.
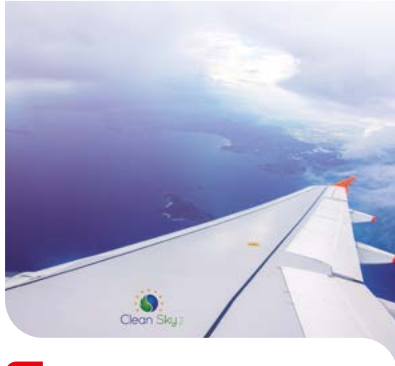

8 Under Europe's aeronautical research project, CleanSky 2, significant progress is made during 2020 in vACCINE and UBBICK. Aeronautical Cyber INtrusion dEtection mechanism (vACCINE) aims to design an onboard aircraft security filter to detect intrusion in communications between the aircraft and the air traffic control (ATC) systems. In 2020 research work is conducted in the areas of aeronautical communications, detection of anomalies and avionic system safety, phasing into the avionics systems state-of-the-art AI-based intrusion-detection technology. Utility Building Blocks Integration for Cockpit (UBBICK), which proposes a simplification of current cockpit utility management architectures, centers during 2020 on completing certification of GMV's real time operating system.

9 Also under the CleanSky2 umbrella this year, substantial progress is made in EMA4FLIGHT and VALEMA, projects that aim to develop and validate electro-mechanical actuators and ECUs for flight control systems to prove

the validity of electro-mechanical actuators for aviation purposes. The most eye-catching developments in 2020 are development and execution of unit tests and hardware/software integration tests, plus development and formal verification of low level requirements for ECU flap- and spoiler-software.

10 During 2020 GMV continues working on the SUGUS project (Solution for E-GNSS U-Space Service), which aims to speed up GNSS and Galileo takeup in the Unmanned Aerial Vehicle (UAV) segment. SUGUS, a European Union R&D project, is to be carried out by a GMV-led consortium involving also Everis Aeroespace, Defense and Security; VVA Brussels; ESSP; FADA-CATEC and Unifly. In December the main project results so far are presented, highlighting preliminary analysis and identification of the needs of the new E-GNSS drone performance forecasting and monitoring service, to be implemented and dry-run in 2021 in the project's corresponding application programming interface (API).
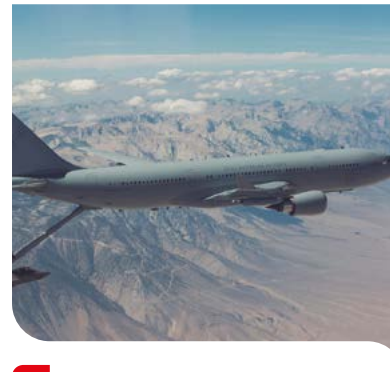
11 During 2020 GMV continues providing Airbus Defence and Space with engineering services. Worthy of particular note here is its collaboration in the A330 MRTT air tankers program, where GMV is taking part in many aspects of the flight refueling system (control laws, onboard boom-control software, onboard monitor software, system simulators, etc.) and also in the development of simulators. These activities are rounded out by participation in simulators for the C-295 aircraft under the Clean Sky2 aegis and simulation activities in the A400M aircraft, where GMV has participated in engineering simulators (especially landing-gear, electric-system and communication-system simulation models).
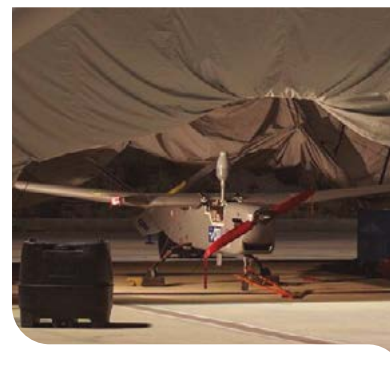
12 After a busy campaign of software certification and qualification tests, the Electronic Control Unit (ECU) of the A400M's crane system and Airbus's

long range strategic transport aircraft A400M has now entered production phase and supply for aircraft. Developed by GMV for the *Compañía Española de Sistemas Aeronáuticos* (CESA), the ECU has the function of controlling and braking the crane's two motors according to the operator's orders and the data furnished by system sensors (loading cells, proximity sensors fitted along the rails, inclination sensors of the crane cable, temperature and speed sensors of the engines, etc.).

13 COSMOS (DevOps para COmplex Cyber-phySical SysteMs Of Systems) kicks off in 2020. Carried out by a consortium led by the Open Group, COSMOS aims to bring in infrastructure and technology that enable an effective, harmonious and continuous development and upgrading of Cyber-Physical Systems of Systems (CPSoS). COSMOS will improve the overall quality of the delivered CPSoSs, limiting the number of defects, while at the same time improving the efficiency of development, maintenance, verification & validation and upgrading of CPSoS by reducing development effort and costs.

Assessment

In 2020 GMV chalks up all-time-high space numbers, fueled largely by bumper contracts like Galileo's Ground Control Segment (GCS), GMV's biggest ever contract awarded back in 2018. Similarly bountiful was its leadership in Galileo's future ground segment (control and mission) plus several Galileo centers (Service Centre, Reference Centre, Search & Rescue, TGVF, Commercial Service and High Accuracy Service). Other important developments came in the Public Regulated Service (PRS), the SBAS operational demonstrator and the high-precision, high-integrity products such as the one developed for BMW's new generation of autonomous vehicles.

In 2020 GMV's British aerospace company and Nottingham Scientific Limited (NSL), Britain's top satellite-navigation and critical-application company, signed a merger agreement whereby GMV became NSL's sole shareholder and the company GMV NSL was born, now to be knitted seamlessly into GMV's set of companies.

GMV reinforces its position as world number one in control centers with the commencement of operations of the OneWeb mega-constellation, major developments for EUMETSAT and responsibility for Galileo's control center. GMV is still world leader in control centers for SATCOM, with equally notable developments and operational engineering for ESOC, EUMETSAT, CNES and DLR. The number of clients in this area now totals over 40 operators, while new satellites this year are added to the roster of over 500 operational satellites controlled by GMV-developed systems.

Highlights in the space surveillance area are leadership in operations centers plus technological developments and service provision. During the year GMV continued to feature prominently in ESA's Space Situational Awareness (SSA) activities and also within the EU's Space Surveillance and Tracking (SST) consortium. Space-debris removal achievements include the kickoff of Near-Earth Object Modelling and Payloads for Protection (NEO-MAPP) within the European Commission's Horizon 2020 program and ESA's Space Reusable Integrated Demonstrator for Europe Return (RIDER) project.

Data processing, simulation and applications work included development of the MicroCarb (Carbon Dioxide Monitoring Mission) mission processor and a busy agenda too in instrument quality tools for the METEOSAT Third Generation (MTG) program. Furthermore, the EC's emergency and security framework contracts made us one of the mainstays of Europe's Copernicus program.

As for flight segments, GMV in 2020 went from strength to strength as provider of complete avionics systems, including GNC/AOCS subsystems, flight software and integration with flight equipment. The complete GNC developments for Hera are equally eye-catching, as well as major contracts in space exploration, robotics and launchers.

Space

GMV is one of the world's top suppliers working for space organizations and agencies and also for the major satellite manufacturers and operators.

With over 35 years of experience behind it and nearly 500 satellites carrying its technology, GMV can safely claim to be a technology partner of cast-iron dependability, capable of meeting the most stringent needs under the strictest quality standards. It has now achieved CMMI Level 5 certification, covering the whole range of activities and services within the space sector:

FLIGHT SEGMENT
- System-engineering and mission analysis
- Guidance, navigation and control (GNC) systems
- Autonomy and robotics
- Satellite and mission simulators
- Testbeds
- Onboard software and independent validation
- Data and satellite simulators for astronomy and earth observation instruments

NAVIGATION
- Engineering and algorithms of satellite navigation systems
- Major systems of processing and generation of Global Navigation Satellite System signals
- Precise positioning solutions and augmentation systems
- Accurate time management
- Augmentation systems
- Satellite-navigation service centers
- Galileo security centers, Galileo public regulated service, PRS

GROUND SEGMENT
- Design and integration of complete ground systems
- Satellite control centers
- Flight dynamics systems
- Mission planning systems
- Ground station control and tracking
- Security systems
- Networks and Cybersecurity
- Configuration, planning and payload-optimization systems for telecommunications missions
- Science mission operations centers

DATA PROCESSING
- Earth-observation and science-mission instrument processors
- Quality control and calibration systems
- Data archiving and dissemination
- Space applications, solutions and services

### OPERATIONAL SUPPORT FOR SPACE MISSIONS

Space. Main milestones

1 GMV maintains responsibility for priming the Galileo Control Segment (GCS) producing a new version v3.0, overhauling its infrastructure technology in Germany to prepare it for new LEOP launches. In 2020 this upgraded version is qualified and rolled out in the validation chains of both control centers in Germany and Italy. At the same time the design phase of the new v3.1 version begins with the integration of substantial operational enhancements. Also in 2020, GMV is confirmed as one of the three main contractors for designing the complete Galileo Second Generation (G2G) ground segment.

2 GMV's satellite navigation prowess was likewise to the fore in the development of the processing core of Galileo's Ground Mission Segment (GMS). Major headway this year was also made in the developments of the Galileo Reference Center (GRC), the Galileo Service Center (GSC), the Time and Geodetic Validation Facility (TGVF) and the Return Link Service Provider (RLSP), all of them led by GMV.

3 Other eye-catching developments this year came in the Public Regulated Service (PRS), the SBAS operational demonstrator, installed in Australia and New Zealand, as well as the high-precision and –integrity products being developed by GMV for BMW's new generation of autonomous vehicles. GMV also participated in various notable initiatives of the European Space Agency (ESA), the European GNSS Agency and the European Commission for improving high-precision tracking and positioning services for the development of new integrity applications and new navigation receivers.
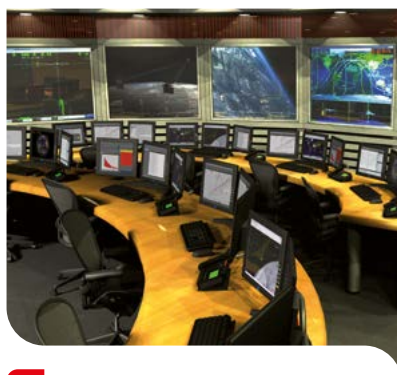
4 For yet another year GMV underscores its status as the world's number-one supplier of control centers for commercial telecommunications satellites. Marquee developments under this heading in 2020 are those for Eutelsat, Hispasat, OneWeb and Arabsat and Yahsat. Market share in 2020 remains buoyant at over 40% of telecommunication satellites launched in recent years. These satellites include three new launches of the Oneweb mega-constellation, which by the end of 2020 comprised 110 orbiting satellites. Their GMV-developed control center has been designed to cater for thousands of satellites at once. The number of clients in this area now adds up to over 40 operators with the incorporation of iSpace, Yashat and Es'hailSat, all of which in 2020 choose GMV as provider of the ground segment for their new generation of satellites. Solar Orbiter, Eutelsat Konnect, GK2B, Sentinel 6-A join the 500+ operating satellites controlled by GMV-developed systems.
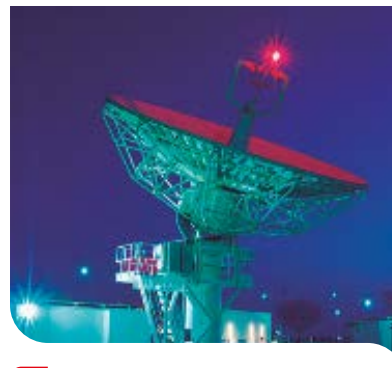

5 In the flight dynamics area GMV holds onto its worldwide leadership, carrying out important activities for ESOC, EUMETSAT, CNES and DLR. Notable work in 2020 includes migration of the flight dynamic system (FDS) of Yahsat's Al Yah 1 and Al Yah 2 satellites to a new state-of-the-art platform.

6 GMV likewise reinforces its position as main ground-segment contractor in earth-observation and scientific missions, especially in the second generation of EPS, the ground control segments of Copernicus, CHEOPS, PAZ and Ingenio, plus the third generation of Meteosat. Notable work in 2020 includes development of ESA's Juice mission control system and renewal of GMV's services for ESA and DLR in the framework of Columbus, laboratory of the International Space Station (ISS).
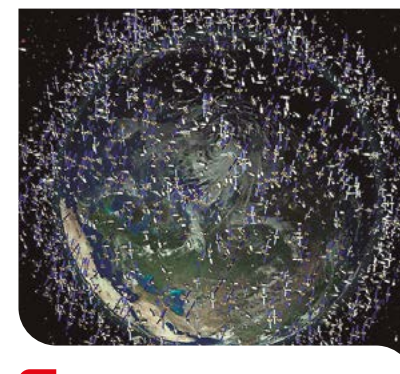
7 GMV is spearheading analysis of the space debris threat in Europe. Under ESA's Space Situational Awareness (SSA) program GMV in 2020 works on several projects designed to introduce space debris detection systems into the new generation of Galileo satellites. GMV this year becomes leader of Spain's contribution to the EU's Space Surveillance and Tracking (SST) program and reinforces the contribution from France and Romania with the award of several contracts. This year, too, the LIGHTCURVES project kicks off, carried out by the Britain's Defence Science and Technology Laboratory (DSTL) for characterization of space objects by application of AI techniques.

8 Some of the most important space debris removal activities of the year are, firstly, the kickoff of Near-Earth Object Modelling and Payloads for Protection (NEO-MAPP), a European Commission, Horizon-2020-funded project, and, secondly, ESA's Space Reusable Integrated Demonstrator for Europe Return (RIDER), where GMV, in collaboration with AVIO, is responsible for safety analysis of the mission's launch, orbital and reentry phases.

9 In 2020 GMV likewise cements its position in the area of data processing, simulation and applications. Highlights here are the kickoff of EOLAW, a project to bring earth-observation information within reach of law-enforcement agencies; HumMingBird, to improve our understanding of migratory flows;

AIRFARE, combining intelligence technology and earth observation data for surveillance of cultural heritage; and Blue Economy for a better management of Atlantic natural resources and organization of the maritime space. During this year GMV also renews the contract for satellite-based surveillance of the environment and infrastructure of an important Middle East oil & gas company and participates in initiatives like RACE (Rapid Action Coronavirus Earth observation) or the COVID-19 Space Hunting Platform, which aims to facilitate access to COVID-19 data from diverse sources.
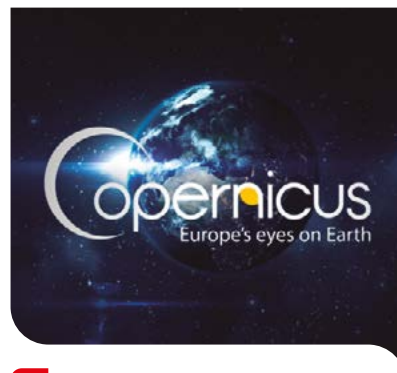
10 GMV is one of the stalwarts of the Global Monitoring for Environment and Security program called Copernicus. In 2020 GMV wins a contract for renewal of Copernicus' precise orbit determination (POD) service, run by GMV since 2014, when the constellation's first satellite was launched. GMV is leading the WEkEO consortium, Europe's fifth Data Information Access Services (DIAS) platform, which sets out to facilitate online access to Copernicus data; it also forms part of the consortium that in 2020 renews the *Rapid Mapping Component contract of Copernicus's emergency management service* (EMS).

11 In the flight-segment area GMV makes huge strides in 2020 as supplier of complete avionics systems, including GNC/AOCS subsystems, flight software and integration with flight equipment. In 2020 GMV leads ESA's World Soils project, the remit of which is to draw up global maps of the soil's organic carbon content. Another project that kicks off this year is the GMV-primed Multi-arm Installation Robot for Readying (MIRROR), which, as the name suggests, aims to develop a multi-arm installation robot for assembling orbiting space telescopes, while a new phase of Building BLocks for earth Observations (BIBLOS) begins. GMV is also continuing to collaborate in the development of the complete avionics of PLD Space's MIURA-1 microlauncher.

12 In September the European Space Agency (ESA) signs the contract for the operational phase of the HERA planetary defense mission. The contract takes in the complete design of the interplanetary probe, integration and tests, plus an advanced guidance, navigation and control (GNC) system that has been awarded to GMV as subcontractor of OHB. GMV also continues to participate this year in missions like Mars Sample Return, Heracles,

ExoMars or COMET. GMV in 2020 also reinforces its position as a leading firm in the development of technology in key areas of guidance, navigation and control (GNC), robotics, software engineering and microelectronics. This year too, following on from its leading role in the first and second phase of the H2020 strategic research cluster (SRC) in space robotics technology, GMV is now acting as strategic partner in all third-phase projects.

13 In 2020 GMV Innovating Solutions Limited, GMV's British aerospace company trading in the markets of aerospace, defense, ITC and intelligent transportation systems, and Nottingham Scientific Limited (NSL), Britain's top satellite-navigation and critical-application company, sign a merger agreement whereby GMV becomes NSL's sole shareholder and the company GMV NSL is born, now to be knitted seamlessly into GMV's set of companies.

Assessment

In 2020 GMV upped its international defense and security profile, becoming one of the main players of the sector. Witness the award of four of the sixteen projects selected by the European Defence Fund under the first call of the European Defence Industrial Development Programme (EDIDP).

Under the framework European Commission contract awarded to GMV in 2019 for maintenance and upgrading of the European Border Surveillance System, EUROSUR, where GMV has been responsible for its execution, management and supervision since 2014, GMV was chosen by FRONTEX to carry out an ambitious project to modernize and update the network's node infrastructure in over 30 countries.

Under the framework contract for development, maintenance, support and upgrading of EU's Command and Control System (EUCCIS), 2020 saw modernization of the system for its rollout in the new classified information procedure of the European External Action Service (EEAS). GMV is also playing a leading role in various R&D programs and projects of the European Defense Agency (EDA), and its experience in command and control communication and information systems (CIS) proved to be the deal clincher for the 2020 award of a framework contract for design and deployment of CISs for storage, processing and exchange of classified information for the next eight years.

In 2020 the NATO-CSD project entered its development and integration phase. Awarded to GMV back in 2019 by the NATO Communications and Information Agency (NCIA), the project aims to set up a CSD system for storage and dissemination of intelligence, surveillance and reconnaissance products.

After five years of work, the Driving Innovation in Crisis Management for European Resilience (DRIVER+) project was brought to completion this year. This European Commission, FP7-brokered project aimed to come up with an answer to the current and future challenges posed by the increasingly severe consequences of natural disasters and terrorist threats. As well as participating in all DRIVER+ subprojects, GMV helped to set up a pan-European test-bed for crisis management capability development.

2020 also saw continuing GMV involvement in the Generic Open Soldier System Reference Architecture (GOSSRA) project, funded by the EU under the umbrella PADR research program, where GMV also won the EXCEED project for development of a reprogrammable, flexible and secure SoC geared towards critical defense applications.

GMV continued to play a key role in R&D programs of the DGAM. In 2020 GMV signed a contract with the Spanish public corporation Navantia for development and supply of the SENDA navigation system for the future F-110 frigates. Elsewhere, the Navy Logistic Support Office (*Jefatura de Apoyo Logístico de la Armada*) awarded GMV a contract for enlargement of the adaptor to improve interoperability between the Common Information Sharing Environment (CISE) node and the Spanish navy's Maritime Surveillance Operations Center (*Centro de Operaciones de Vigilancia Marítima*: COVAM), the Fishery Monitoring Center (*Centro de Seguimiento Pesquero*: CSP) and the Operational Coordination Center (*Centro de Coordinación Operativa*: CECOP). And in October the Spanish MoD held operational demonstration exercises of the Dismounted Soldier System (*Sistema de Combatiente a Pie*: SISCAP).
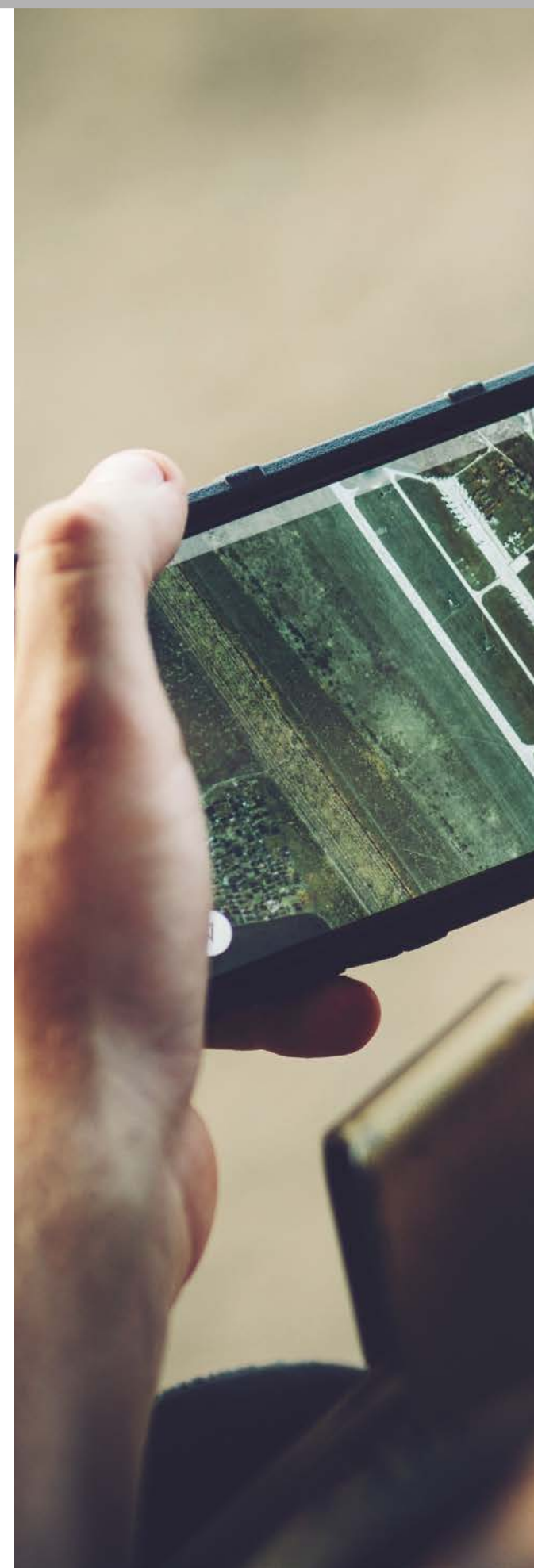
ACTIVITIES 2020
Defense and Security

GMV is a tried-and-tested supplier of the Spanish MoD and Interior Ministry as well as international defense and security organizations. Its activities in this field take in the engineering, design, development, integration, testing, verification and maintenance of defense and security systems covering their whole life cycle.

The products and services provided in the defense and security area cater for the most demanding needs and are developed under strict quality standards. They cover the following areas:

DEFENSE
- Engineering, development and integration of C4I systems
- Design, development, deployment and maintenance of JISR systems (STANAG 4559)
- Intelligence systems, signal and data processing and fusion
- Cyberdefense, artificial intelligence and big data
- Training, operational-research and R&D simulators
- Development of military navigation systems based on GPS, EGNOS and Galileo PRS
- Onboard equipment, military avionics software and testbeds
- Logistic and maintenance services for systems and software
- Military space applications

SECURITY
- Perimeter-surveillance and access-control systems
- Border protection and surveillance systems
- Advanced security systems incorporating new technologies
- Emergency and crisis management systems, 112, SOS centers
- Monitoring and management systems for vehicles and personnel of security forces
- Onboard video-surveillance and security systems

The company, its personnel and the various sites and facilities have all obtained the necessary security clearance for carrying out classified projects.

Defense and Security. Main milestones

1 In 2020 GMV ups its international defense and security profile, becoming one of the main players of the sector. Witness the award of four of the sixteen projects selected by the European Defence Fund under the first call of the European Defence Industrial Development Programme (EDIDP). The awarded projects focus on the development of capabilities in command and control, navigation, unmanned vehicles and cyberdefense. EDIDP sets out to boost the competitiveness of the EU's defense industry, thereby helping to build the EU's strategic autonomy.


2 The European Defense Agency (EDA) awards GMV an 8-year framework contract for design and rollout of communication and information systems (CIS) for storing, processing and interchanging classified information (EUCI) up to EU SECRET level. Under this contract GMV, as system integrator, will be the single point of contact; it will also be the company responsible for establishing and analyzing system- and user-requirements, assessing threats, vulnerabilities and risks, identifying the corresponding mitigation measures, drawing up the necessary documentation for the accreditation process and supporting its performance.
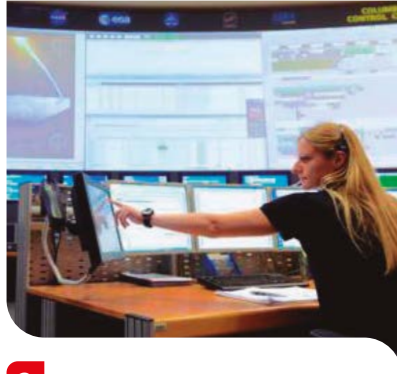

3 GMV also features prominently in various R&D projects and programs of the EDA. In 2020 GMV is awarded a study under the contract Cloud Intelligence for Decision Making Support and Analysis (CLAUDIA) contract for developing a dedicated Modular Software Analysis platform (SWAN) which, tapping into technology like cloud computing and storage, AI and big data, will look into the possibilities of supporting the analysis and assessment of military scenarios. GMV is also participating in various cyberdefense initiatives to determine cybersecurity needs in the supply-chain risk management process or centering on electromagnetic warfare (EMW) and cyberdefense convergence. This year also sees completion of the first phase of the two-year framework contract for development of a platform for managing medical support capabilities in European operations.

4 In 2020 under the framework European Commission contract awarded to GMV in 2019 for maintenance and upgrading of the European Border Surveillance System, EUROSUR, GMV is chosen by FRONTEX to carry out an ambitious project to modernize and update the network's node infrastructure in over 30 countries. These activities have to be carried out with all due guarantees of minimum service outage; this calls for painstaking planning

with each National Coordination Centre and FRONTEX. As part of the European Commission's European Border Surveillance System, EUROSUR establishes a cooperation and information-swapping mechanism, making sure member states are better prepared not only for preventing, detecting and combating illegal immigration but also for responding more quickly to save the lives of immigrants in danger on the sea, especially in the Mediterranean.
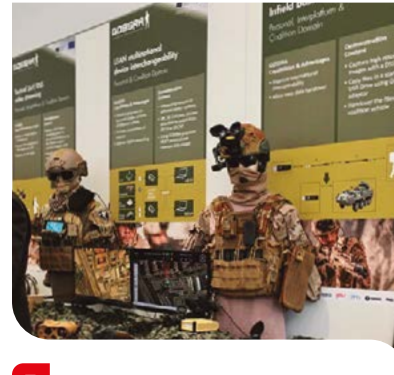
5 The beginning of the year sees presentation of the capabilities developed in the Generic Open Soldier System Reference Architecture (GOSSRA) project, in which GMV is participating. Led by Rheinmetall Electronics and funded by the European Union under the umbrella PADR R&D program, GOSSRA's remit, as its name suggests, is to develop a generic open soldier system reference architecture; this reference architecture will recommend specific approaches, guidelines, system structures and standards to be used in order to facilitate the development, integration and interoperability of systems based on this architecture, i.e., operating under the aegis of the EU or NATO. In the second PADR call GMV is awarded the EXCEED project for developing a reprogrammable, flexible and secure SoC geared towards critical defense applications.
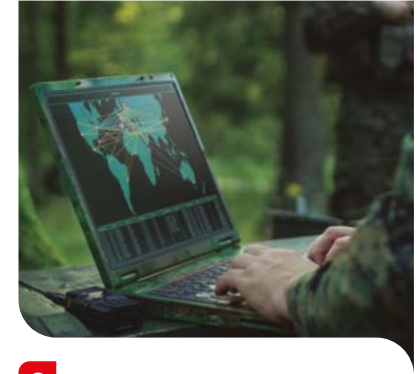
6 In 2020 the NATO-CSD project enters its development and integration phase. Awarded to GMV back in 2019 by the NATO Communications and Information Agency (NCIA), the project aims to set up a CSD system for storage and dissemination of intelligence, surveillance and reconnaissance products. This system, called "Coalition Shared Data (CSD) Services – Enduring Solution", to be integrated in NATO's system infrastructure, aims to specify, design, develop, test, deploy and support CSD capability based on the MAJIIC2 program (Multi-Intelligence All-Source Joint Intelligence Surveillance and Reconnaissance Interoperability Coalition).

7 Under the framework contract for development, maintenance, support and upgrading of EU's command and control system (EUCCIS), 2020 sees modernization of the system for its rollout in the new classified information procedure of the European External Action Service (EEAS). A portal is developed, too, including a content management system, as well as a chat service allowing the exchange of classified information and a component designed to carry out collaborative planning between system users.

8 At the end of the year, after ticking off various milestones during 2020, the project for development of a CORE-type mountable computer interface for cooperative Electronic Support Measure (ESM) operations enters its development and integration phase. The objective of this project is to supply a system for exploiting Link16 track information and information from the new electronic warfare pod of the Spanish air force's F-18, dubbed CORE (short in Spanish for "Electronic Recognition Operational Capability"). The system will be able to operate both from land and onboard a new aerial platform for a Signals Intelligence (SIGINT) mission, such as a C-295.

9 GMV signs a contract with the Spanish public corporation Navantia for development and supply of the SENDA navigation system for the future F-110 frigates, due to replace the current Santa María class frigates, which have been carrying out escort duties since the mid-eighties of last century. The design is the result of joint work between the Navantia shipyard and the Spanish navy. The future F-110 frigates represent a technological leap forward in platform systems and their combat system, incorporating Industry

4.0 technologies into their design to improve lifecycle-long system management.

10 The Navy Logistic Support Office (*Jefatura de Apoyo Logístico de la Armada*) awards GMV a contract for enlargement of the adaptor to improve interoperability between the Common Information Sharing Environment (CISE) node and the Spanish navy's Maritime Surveillance Operations Center (*Centro de Operaciones de Vigilancia Marítima*: COVAM), the Fishery Monitoring Center (*Centro de Seguimiento Pesquero*: CSP) and the Operational Coordination Center (*Centro de Coordinación Operativa*: CECOP). This project is an enlargement of the R&D services tendered under the EUCISE2020 program for creation of the EUCISE nodes for exchanging information between authorities of the various sectors. As well as expanding the current capabilities, this enlargement will provide for two-way information interchange with the maritime surveillance network MARSUR (involving military organizations from 20 countries) and connection with MAJIIC JISR standards, areas in which GMV boasts a wealth of experience thanks to the family of CSD products developed for the Spanish MoD.
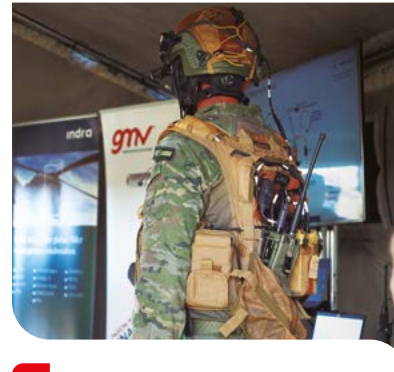
11 In October the operational demo of the Spanish MoD's Dismounted-Soldier System (*Sistema Combatiente a Pie*: SISCAP) was held. Overseen by the Directorate General of Armaments and Material (DGAM), SISCAP's remit is to develop and integrate technology that suitably equips soldiers for an efficient combat operation. This national program, kicking off in 2017, is broken down into 7 subsystems: Armaments and Munitions (*Armamento y Munición*); Fire Efficiency (*Eficacia de Fuego*: EFU); Communications and Information Subsystem (*Subsistema de Información y Comunicación*: SIC); Upkeep (*Sostenimiento*); Survival (*Supervivencia*); Power Source (*Fuente de Alimentación*: FAL); and Training (*Preparación*). GMV, in a joint venture with Indra, is responsible for integration of the abovementioned subsystems and developing the electronics and software of the soldier's main computer, responsible for command and control capabilities, connectivity with the devices carried by the soldier and power management, one of the most critical factors in the whole soldier system.

12 Spain's Seaports Authority (*Puertos del Estado*) turns to GMV for maintenance of the Automatic Identification System (AIS) receiving stations. The remit of *Puertos del*

Estado's AIS networks is to keep users informed of ship identification details, their position, bearing, speed, freight, destination port, ETA and other analog data in real time, phasing in various functions like added value. The overarching idea is to improve port operation and the management of navigation aids. All this information is stored, after which it can be mined for statistical purposes, investigation of any incidents or for conducting studies. The daily information received by Puertos del Estado's network, involving over 3000 ships in Spanish waters, is displayed in the GMV-developed **ShipLocus®** application.

13 After five years of work, the Driving Innovation in Crisis Management for European Resilience (DRIVER+) project is brought to completion. This European Commission, FP7-brokered project aimed to come up with an answer to the current and future challenges posed by the increasingly severe consequences of natural disasters and terrorist threats. As well as participating in all DRIVER+ subprojects, GMV helped to set up a pan-European test-bed for crisis management capability development. Furthermore, within the Portfolio of Solutions (PoS), tested during the scheduled trials, GMV included its complete command and control suite **Socrates**.

Assessment

During 2020 *Radiance™*, GMV's inhouse intraoperative radiotherapy planner, continued to be taken up by various top hospitals in Europe, the Americas and Asia. 2020 also marked the third anniversary of signing the collaboration agreement between GMV and IntraOp Medical Corporation for incorporation of *Radiance™* into their electron-beam linear accelerator. designed to deliver IORT, Mobetron®, installed this year in university hospitals like Freiburg and Salzburg.

Telemedicine is still one of GMV's healthcare strong suits. Its inhouse solutions like the telemedicine platform *Antari*, are now up and running around the world. In the COVID-19 lockdown situation in 2020 *Antari* was made available to health authorities. The *Antari*-based platform My Vision, together with the altruistic collaboration of some hospitals and clinics, also helped to lower the pressure on healthcare resources during the worst months of the pandemic.

GMV rolled out its telemedicine platform *Antari Home Care* in the European Commission's Horizon 2020 project Back-UP (Personalised Prognostic Models to Improve Well-being and Return to Work After Neck and Low Back Pain), which aims to develop a more efficient monitoring procedure of neck- and low-back-pain patients.

GMV continued in 2020 to push back the envelope of healthcare R&D, participating in the H2020 project RAINBOW, which aims to build up knowledge in specific areas of clinical simulation. GMV is inputting its experience in the development of the surgical simulator insight and the intraoperative radiotherapy planner *Radiance™* and is recognized as "Key Innovator" of the European Commission's innovation radar on the strength of its developments and research under this project. GMV likewise continued to take part in the European projects NAVIPHY and HARMONY.

The COVID-19 pandemic has highlighted the healthcare sector's special vulnerability to cybersecurity threats, largely due to the strict data privacy requirements. In view of this situation GMV drew up the report "*Ciberamenazas susceptibles de afectar al sistema sanitario español*" (Cyberthreats likely to affect Spain's health system), warning health service providers, pharmaceutical companies, insurers and health centers of the cyberattack risk.

GMV participated too in the development of other trailblazing healthcare solutions. During 2020 it completed a proof of concept under the ESA-brokered DALEM project, which seeks spinoff health applications of space technology; it obtained certification of the mapping of health data to the OMOP Common Data Model (CDM) granted by the European Health Data and Evidence Network (EHDEN); it was shortlisted as one of the three finalist projects in the Pfizer Foundation's fourth healthcare challenge called "*Desafío e Dea Salud 2020*"; last but not least it participated in the innovating healthcare provision project NAPO, which gives thousands of inhabitants living in scattered rural communities access to specialist, top-quality healthcare services.

Healthcare

Over twenty years ago now GMV decided to bring its proven R&D expertise to bear on the challenge of improving the world's health. Drawing on its knowledge built up in robotics and space simulation, and working in close collaboration with hospitals, healthcare research institutes, universities and flagship organizations like Innovative Medicine Initiative (IMI) and EIT Health, it has now developed trailblazing in-house products and services while spearheading cutting-edge projects.

GMV's healthcare portfolio is bulging. Its telemedicine products and services now range from specific applications for telepediactrics, teleophthalmology, telerehabilitation and the care of chronic patients through the mining of epidemiological and clinic data based on advanced analytics to the design of surgical simulators and intraoperative radiotherapy planners.

- Epidemiological- and clinical-data-mining solutions: Big Data and Smart Data
- Cybersecurity services and solutions
- ICT mobility solutions
- Medical-image management and processing solutions
- Remote healthcare systems (telemedicine) working on both a patient-physician and physician-physician basis: telepediactrics and teleophthalmology platforms
- Intraoperative surgery and radiotherapy planning and simulation systems
- Monitoring and follow-up systems for chronic, multi-pathology patients
- Telerehabilitation systems
- Mobility systems, humanitarian-aid-infrastructure and emergency-management systems
- Technology and process-optimization consultancy

Healthcare. Main milestones

1 This year the European Commission's innovation radar recognizes GMV as a "Key Innovator" on the strength of its developments in natural deformation and 3D handling of medical images under the H2020-funded RAINBOW project, which aims to harness the full potential of computational medicine and ICTs to develop user-friendly simulation tools for clinicians. GMV's input here is its expertise built up in the development of the surgical simulator insight and the intraoperative radiotherapy planner *Radiance™*, doing so within a consortium made up by five universities, one hospital and eight industrial partners from Denmark, Spain, Luxembourg, England, France and Germany.

2 Home care and primary healthcare have both played an important role in lightening the load on hospitals at peak moments of the epidemic. The same goes for telemedicine platforms for home monitoring of discharged COVID-19 patients and also chronic and frail patients who are particularly vulnerable to the virus's worst effects. For this reason GMV has made available to health authorities *Antari*, its inhouse suite of eHealth and telemedicine products and epidemiological solutions.

3 One of the worst effects of the Coronavirus SARS-CoV-2 pandemic is the knock-on delays in dealing with other pathologies, such as diabetes. Among the initiatives launched to solve this problem features the teleophthalmology platform for catching up on over three thousand diabetic patients who missed their checks during the March and April lockdown plus potential asymptomatic ocular pathology patients. Pressure on health centers during the worst lockdown months was significantly lowered by the *Antari*-based My Vision platform, backed up by the altruistic collaboration of 250 opticians and GMV's free cession of *Antari*. My Vision 360 was also used in the first wave of the pandemic to monitor certain cardiovascular processes in Coronavirus SARS-CoV-2 patients hospitalized in Fundación Jiménez Díaz.

4 GMV launches *uTile PET* (Privacy-Enhancing Technologies), a solution capable of carrying out secure private calculations on distributed data, without exposing it or moving it from one organization to another. It is also able to harness confidential data in order to improve machine learning algorithms and analytical models, complying at all times with organizational remits, data-privacy obligations and current law. Its application in sectors like healthcare, finance, insurance, services or industry represents an important advance in terms of designing machine-learning models.

5 GMV has come up with an idea for cutting down the rare-disease diagnosis time by up to 30%; this new system makes it to the final of Pfizer Foundation's fourth "e-DEA Health 2020 Challenge". This year's challenge was maximum optimization of the rare-disease diagnosis process, cutting down the time needed and providing the best information possible. Harnessing AI techniques, GMV's solution slashes by 30% the time needed by clinicians to reach a diagnosis and identify within health organization's e-medical records those persons suffering from rare diseases that have flown under the radar or been misdiagnosed.

6 In 2020 the COVID-19 pandemic brings health service providers, big pharma, insurers and health centers even more firmly into the crosshairs of hackers. GMV's Cyberthreat Intelligence Team, which permanently monitors malicious activity in various sectors, zoomed in on the health sector with the onset of COVID-19. The conclusions drawn from the April-to-December period are brought together in the report "*Ciberamenazas susceptibles de afectar al sistema sanitario español*" (Cyberthreats likely to affect Spain's health system), warning health service providers, pharmaceutical companies, insurers and health centers of the cyberattack risk.
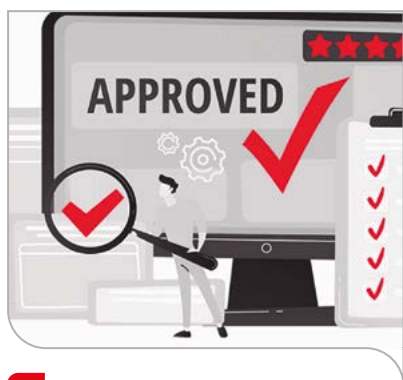
7 The European Health Data and Evidence Network (EHDEN) certifies GMV for the mapping of health data to the OMOP Common Data Model (CDM). Driven by the Innovative Medicines Initiative (IMI) this undertaking brings together various industrialists, academics, lawmakers, government representative and European NGOs. The OMOP Common Data Model allows for the systematic analysis of disparate observational databases. The concept lying behind this approach is to transform data contained within those databases into a common format (data model) as well as a common representation and then perform systematic analyses using a library of standard analytic routines that have been written based on the common format. This allows the extraction of priceless information that helps in the development of new drugs, therapies and treatments.

8 2020 sees completion of a proof of concept under the ESA-brokered DALEM project, which seeks spinoff healthcare applications of visual navigation technology used for landing spacecraft on asteroids. The specific target is identification and monitoring of pigmented lesions for early melanoma detection. Algorithms developed for the space project have now been successfully tried out in healthcare.

9 In 2020 nine new *Radiance™* licenses are issued and it is taken up by hospitals in Europe, the Americas and Asia, featuring the *Centre hospitalier de l'Université de Montréal* (CHUM), Universitätsklinikum Freiburg, Uniklinikum Salzburg, St John of God Hospital in Australia, Universitätsklinikum Bonn and Hospital Virgen de la Arrixaca. 2020 also marks the third anniversary of signing the contract between GMV and IntraOp Medical Corporation whereby IntraOp became the exclusive worldwide distributor of *Radiance™*. During this year university hospitals like those of Freiburg and Salzburg take up the linear accelerator for delivering electron-beam IORT, Mobetron® and GMV's new surgical navigation developments are built into electron-beam IORT accelerators.


10 GMV rolls out its telemedicine platform *Antari Home Care* in the European Commission's Horizon 2020 project Back-UP (Personalised Prognostic Models to Improve Well-being and Return to Work After Neck and Low Back Pain), which aims to develop a more efficient monitoring procedure of neck- and low-back-pain patients. Back-UP, coordinated in Spain by the Valencia Biomechanics Institute (*Instituto de Biomecánica de Valencia*), involves a total of 11 organizations, featuring GMV as industrial leader and technology partner. The platform developed by GMV under this project records the data of patients with neck- or low-back-pain, harmonizes it and offers clinicians conclusions for designing personalized treatment and monitoring the trend of the illness.

11 In 2020 GMV continues to work in the European NAVIPHY and HARMONY projects. NAVIPHY, short for "Navigation, physical simulation and imaging in intraoperative procedures", aims to improve soft-tissue navigation and planning. GMV is acting as technology partner and global coordinator of the project. During this year an inhouse deformation simulation system is successfully tried out in orthognathic surgery planning while the IORT surgical navigation system is improved and simulations are carried out in head- and neck-cancer brachytherapy and neurosurgery. HARMONY, where GMV is acting as technology leader, aims to find more effective blood-cancer treatment. Its second phase widens the trawl to take in patients with hematological tumors of all types from more than 15 European countries.

12 GMV also continues its activity in the H2020-funded RAINBOW project, which aims to harness the full potential of computational medicine and ICTs to develop user-friendly simulation tools for clinicians. During this year biomechanical simulation methods are upgraded to build demonstrators in the areas of application. GMV is inputting its experience in the development of the surgical simulator insight and the intraoperative radiotherapy planner *Radiance™* within a consortium made up by five universities, a hospital and eight industrial partners from Denmark, Spain, Luxembourg, England, France and Germany.
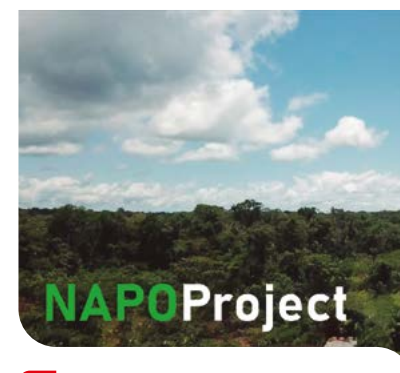
13 In 2020 the innovating healthcare provision service NAPO provides three thousand inhabitants of six far-flung communities of the NAPO River area of the Peruvian Amazon with a broadband mobile service and telemedicine services in thirteen rural health centers. Brokered by the Spanish foundation *Fundación EHAS* and the PUCP Rural Telecommunications Group, NAPO draws on GMV's inhouse telemedicine platform *Antari* to give over 21,000 people access to specialist, top-quality health services.

Assessment

GMV's wealth of cybersecurity experience proved to be the deal clincher in winning Galileo's Ground Control Segment (GCS) contract, bringing out yet again the synergies between GMV's cybersecurity and space technology. Under this European Space Agency (ESA) contract, GMV continued this year to lead and develop all the cybersecurity aspects, ranging from protection to detection, response and recovery.

In 2020 **Checker ATM Security®** strengthened its position as the go-to ATM-protection solution. This inhouse GMV solution has now been taken up by over 300,000 ATMs of 70 clients from over 20 countries that are especially prone to cyberattacks and cyberfraud; in 202 it swept the Asian market in particular. In 2020, too, GMV developed the new ATM security product **Checker XFS** Filtering, which complements and seamlessly interacts with the forerunner **Checker ATM Security®** to ensure the maximum possible level of ATM security.

In 2020 GMV carried out various legislation-compliance analyses and diagnoses, drawing up security plans to bring the security systems of several public and private organizations fully into line with Spain's own National Security Scheme (*Esquema Nacional de Seguridad*) and international counterparts. In 2020 GMV's own Computer Emergency Response Team (CERT) was recognized as a member of the Forum of Incident Response and Security Teams (FIRST). GMV's CERT keeps up a constant analysis of the global security state of networks and equipment, providing various cybersecurity-incident response services and offering advice and consultancy to a varied range of clients on security solutions and threats.

GMV has been handling the security arrangements of the banking group BBVA for 18 years now. In 2020 GMV continued to develop and upgrade the corporate security management product FARO Corporativo.

In 2020, due to the COVID-19-driven surge in teleworking, GMV launched an "Express Security Check" to give firms a rapid security check of remote-access systems (VPNs and VDIs) to flag up the most glaring vulnerabilities.

GMV has always been a trailblazer and staunch advocate of certifying systems under the strictest standards. In 2020 Spain's certification and standardization association, AENOR, handed over to GMV the first certification under the Privacy Information Management ISO 27701, a privacy management extension taking its cue from the Information Security Management standard ISO/IEC 27001 and the Information Security Controls Standard ISO/IEC 27002.

In 2020 GMV took part in all the following cybersecurity projects and initiatives: it joined the Madrid cybersecurity cluster; it signed a collaboration agreement with the Technological Hospitality Institute (*Instituto Tecnológico Hotelero*: ITH) under which it became a trusted cybersecurity-specializing technology partner; it was hailed in the third "Cybersecurity Market Radar" of the European Cyber Security Organisation (ECSO) as one of the foremost cybersecurity practitioners in Europe; it launched the **uTile PET** solution (Privacy-Enhancing Technologies), which strikes the right balance between strict data privacy and the possibility of harnessing it collaboratively to draw up learning models.
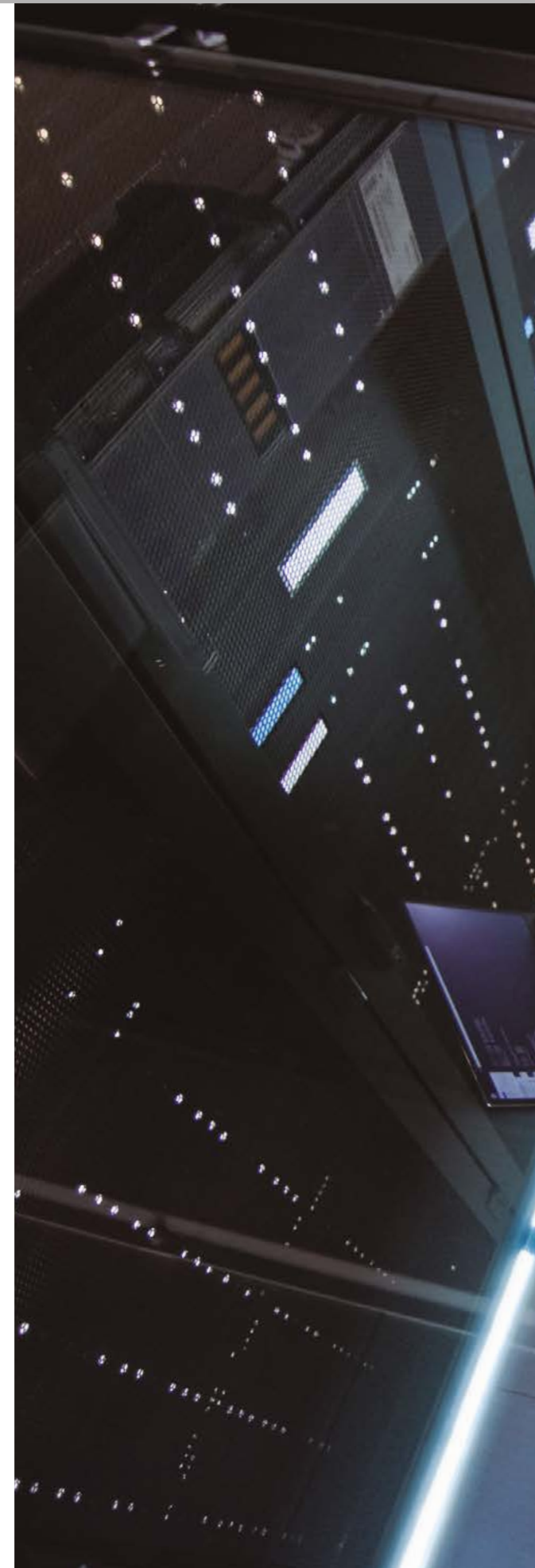
ACTIVITIES 2020
Cybersecurity

GMV has been leading the development of ICT security services and technologies in Spain for over 25 years now.

GMV provides services and solutions for analyzing any organization's level of cybersecurity, managing the technological infrastructure and governing the lifecycle-long cybersecurity process:

- Protection of critical infrastructure
- Engineering, security services and solutions
- Cybersecurity in industrial environments
- Definition and implementation of information security management systems and business continuity plans
- National Security Scheme compliance plans
- CERT Managed services

Cybersecurity. Main milestones

1 Back in 2018 GMV's wealth of cybersecurity experience proved to be the deal clincher in winning Galileo's Ground Control Segment (GCS) contract. Under this European Space Agency (ESA) contract, GMV continues in 2020 to lead and develop all the cybersecurity aspects, ranging from protection to detection, response and recovery. This activity is especially noteworthy because an essential part of the system to be maintained and developed is management of secure access to information from the Galileo constellation, as well as management of security keys governing access to the high-performance public regulated service.

2 In 2020 *Checker ATM Security®* strengthens its position as the go-to ATM-protection solution. After a 15-year track record this inhouse GMV solution has now been taken up by over 300,000 ATMs of 70 clients from over 20 countries, and is sweeping the Asian market in 2020, where *Checker ATM Security®* is now protecting over 80,000 ATMs of 10 different banks.

3 In 2020 the COVID-19 pandemic brings health service providers, big pharma, insurers and health centers even more firmly into the crosshairs of hackers. GMV's Cyberthreat Intelligence Team, which permanently monitors malicious activity, draws up the report "*Ciberamenazas susceptibles de afectar al sistema sanitario español*" (Cyberthreats likely to affect Spain's health system), and establishes a series of security recommendations to warn health service providers, pharmaceutical companies, insurers and health centers of the cyberattack risk.

4 In 2020 Spain's certification and standardization association, AENOR, hands over to GMV the first certification under the Privacy Information Management ISO/IEC 27701, a privacy-management extension that, taking its cue from the Information Security Management standard ISO/IEC 27001 and the Information Security Controls Standard ISO/IEC 27002, helps organizations to comply with the main data-protection and -privacy obligations laid down by the GDPR and Spain's own data protection legislation (RGPD and LOPDGDD).

5 GMV launches the *uTile PET* solution (Privacy-Enhancing Technologies), which strikes the right balance between strict data privacy and harnessing it collaboratively while complying with current legislation. *uTile PET* taps into advanced cryptographic methods to keep the data encrypted while all necessary calculations are made. This means that organizations' sensitive data is never exposed or transferred through departments, organizations or different countries.

6 GMV has been handling the security arrangements of the banking group BBVA for 18 years now. In 2020 GMV continues, jointly with the bank, to develop and upgrade the corporate security management product FARO Corporativo. The GMV-developed platform, with intellectual property of BBVA, has been designed with international organizations in mind, enabling them to manage through a single app the security of all offices and buildings in the various countries they trade in. During 2020 Faro is also successfully taken up by Latin American banks, confirming its utility for the worldwide banking sector.

7 GMV's Computer Emergency Response Team (CERT), dedicated to analyzing the overall security state of networks and equipment, is recognized as a new member of the Forum of Incident Response and Security Teams (FIRST). GMV-CERT, boasting the most demanding certifications, stands out for the personalization of its services to suit each particular client, as well as the measurability and traceability of all its activities. This recognition comes as a new badge of distinction for the team, as a member of this international community, which enables worldwide CERTs to share information and good response practices, guaranteeing a secure internet for one and all.

8 In 2020, due to the COVID-19-driven surge in teleworking, GMV launches an "Express Security Check" to give firms a rapid security check of remote-access systems (VPNs and VDIs) to flag up the most glaring vulnerabilities. This empowers companies to take proactive measures in order to minimize the attack risk.

9 Mariano J. Benito, CISO of GMV's Secure e-Solutions sector and Coordinator of the Operational Technical Committee of the Spanish Chapter of the Cloud Security Alliance, presents the conclusions of the 8th State-of-the-Art Cloud Security Study, an initiative of ISMS Forum and CSA Spain, doing so as one of the collaborating authors in the study.

10 The Technological Hospitality Institute (*Instituto Tecnológico Hotelero*: ITH) and GMV sign a collaboration agreement making GMV a trusted cybersecurity-specializing technology partner of ITH associates. By sharing its knowledge and experience GMV aims to help tourism stakeholders digitalize their business with cybersecurity as the cornerstone.

11 GMV is recognized as one of Europe's leading cybersecurity firms in the third Cybersecurity Market Radar of the European Cyber Security Organisation (ECSO). ECSO particularly hails GMV as a beacon European firm for identifying and detecting the nature and scope of cyberattacks, doing so by means of risk-management services and solutions, a security operations center (SOC), cyber threat intelligence and social media and brand monitoring.

12 GMV joins the Madrid Cybersecurity Cluster, an initiative of Madrid City Council with the collaboration of the Madrid Regional Authority and Spain's National Cybersecurity Institute (*Instituto Nacional de Ciberseguridad*), with the aim of bringing home to companies and the public at large the critical importance of cybersecurity. The idea is also to drive cybersecurity entrepreneurship, including the setting up of new firms and the nurturing of existing ones, helping to generate talent and boost employability, positioning Madrid and its region as a cybersecurity powerhouse.

13 GMV develops a new ATM security product *Checker XFS Filtering*, which complements and seamlessly interacts with the forerunner *Checker ATM Security* to ensure the maximum possible level of ATM security. At ATM XFS-level this new upgrade implements a complete ATM-security solution, combining ATM behavior analysis, anomaly detection and filtering of suspicious actions.

Assessment

GMV remains Spanish leader in the development and implementation of public-transport intelligent transportation systems and a shining light elsewhere. in 2020 GMV won and carried out projects for diverse public transport organizations like the Regional Authority of Galicia (*Xunta de Galicia*), ALSA and Vectalia, Arriva Galicia, Castellón's public transport, run by Accsa, ALSA and the Almeria Transport Consortium (*Consorcio de Transportes del Área de Almería*: CTAL), Metropolitan Transport Authority (*Autoridad de Transporte Metropolitana*: ATM), Mallorca Transport Consortium, *Guaguas Municipales*, the municipal transport company of *Las Palmas de Gran Canaria*, *Grupo Avanza* in Portillo, Transports Metropolitans de Barcelona (TMB), Madrid's Empresa Municipal de Transportes (EMT), Madrid's Regional Transport Consortium (*Consorcio Regional de Transportes de Madrid*: CRTM), the Agency for Technological Modernization of Galicia (*Axencia para a Modernización Tecnolóxica de Galicia*: AMTEGA), *Transportes Urbanos de Castelo Branco* (TUCAB), Cyprus's Ministry of Transport, Communications and Public Works, Cyprus Public Transport for its concessions of Nicosia and Larnaca, Grupo Ruiz in Cascais's public-transport network, Malta Public Transport (MPT); and lastly the transport authorities of the Polish cities of Warsaw, Szczecin, Gdansk, Gydinia, Bydgoszcz, Nowy Sącz and Toruń.

GMV likewise continued to increase its railway business, working for flagship clients like Spain's national operator, RENFE, which, in 2020, awarded GMV a contract for corrective and adaptive maintenance of the onboard communications platform set up by GMV on the whole fleet. GMV also remained Talgo's go-to supplier for its PA & Intercom and CCTV platforms, with new contracts to fit out trains in Egypt (ENR) and Uzbekistan. Elsewhere, Philippines National Railways (PNR)'s local commuter train line completed implementation of its GMV-developed management system.

Another railway highlight in 2020 was GMV's signing of a contract with CAF Signalling for fitting 160 cars of Jerusalem's light rail with an Automatic Vehicle Location System (AVLS) and Depot Management System (DMS), based on GMV's inhouse railway fleet-management system **SAE-R®**. Worthy of particular note too were all the following: renewal of the fleet-management system for Tram de Barcelona, contracted from GMV by Alstom; upgrading of the fleet-management system of Sydney's light rail system in Australia; and renewal of the maintenance contract of Zaragoza tramline's fleet management system. Turning to metros, Alstom awarded GMV contracts for Metro de Barcelona's onboard CCTV and Wi-Fi systems.

A 20 track-record makes GMV the doyen of demand-response transport systems in Spain and Portugal. In 2020 GMV continued to run and maintain Castilla y León's longstanding demand-response system while also seeing to Beira Baixa's in Portugal.

In 2020 GMV's technology company specializing in Software as a Service (SaaS) and cloud-hosted software, GMV SYNCROMATICS, won two big contracts from Charleston Area Regional Transportation Authority (CARTA) for the supply of digital signaling solutions and fleet management systems (CAD/AVL). Halfway through the year, furthermore, GMV SYNCROMATICS opened its new production center in Houston, Texas.

GMV's automotive business continued its upward trend. In 2020 GMV rolled out a global network of GNSS stations for providing a secure and precise GNSS correction service for the new generation of autonomous vehicles, such as the German carmaker BMW Group.

Intelligent Transportation Systems

GMV is a leading firm in the design, development, implementation and rollout of Intelligent Transportation Systems (ITSs) based on IoT, mobile communications and GNSS, guaranteeing compliance with sector standards such as GTFS, SIRI, NeTEx and CAN bus. GMV offers all-in, turnkey, ready-to-go solutions, taking on complete development of the project and incorporating its own inhouse hardware and software along the way.

GMV provides solutions for all the various means of transport and types of fleets (public transport, railway transport):

- Advanced passenger-transport fleet management systems
- Transport scheduling and planning systems
- Electronic fare collection systems enabling payment by contact smartcards, bankcards and mobile apps
- Ticket Vending Machines (TVMs) and point-of-sale management systems
- Demand-response transport management systems
- State-of-the-art passenger information systems: onboard, bus-stop, APPs, websites with real-time information and trip planners
- Ecodriving systems
- Advanced fleet-management systems for railway transport (SAE-R®)
- Onboard video-surveillance (CCTV) systems
- Onboard digital intercom and PA systems
- Special fleet-management systems: public services, emergencies, maintenance, distribution, logistics, etc.
- Advanced car telematics units
- Electronic tolling and information systems on toll-roads, highways and at bridges and tunnels
- Solutions for the connected car and autonomous vehicle: end-2-end software and services, Cybersecurity, advanced GNSS-based positioning technology
- Advanced mobility services: PAYD/UBI insurance, carsharing, carpooling, MaaS

# Intelligent Transportation Systems. Main milestones

1 GMV is Spanish leader in implementing EMV technology in the public transport sector. October sees inauguration of Mallorca Transport Consortium (*Consorcio de Transportes de Mallorca*)'s STI-R4 fare system. This consortium takes in the collective public transport of all the Balearic Islands (*Mallorca, Menorca, Ibiza and Formentera*) and allows across-the-board fare management of all the islands' collective means of transport (bus, train and metro). This project, trailblazing in Spain and a benchmark internationally, becomes possible when GMV wins the tender for supplying the technological components and three years of post-installation assistance.

2 In 2020 GMV holds onto its national leadership in public intelligent transportation systems for bus fleets, winning yet more contracts under this heading. ALSA and Vectalia, after winning public-transport concessions from the Regional Authority of Galicia, turn to GMV for the supply of their fleet management and ticketing systems. Arriva Galicia, for its part, awards GMV a contract for updating the control centers of its fleet-management and ticketing system. The list goes on: Kapsch TrafficCom Transportation awards GMV a contract for implementing the fleet management system of Castellón's public transport, run by Accsa. ALSA and the Almeria Transport Consortium (*Consorcio

de Transportes del Área de Almería*: CTAL) once more place their trust in GMV for updating the electronic fare collection system set up by GMV back in 2001. GMV is also to renew the fleet management equipment and will also take on maintenance of the passenger information panels of the Metropolitan Transport Authority (*Autoridad de Transporte Metropolitana*: ATM).

3 Under its overarching fleet-management renewal plan, *Guaguas Municipales*, the municipal transport company of *Las Palmas de Gran Canaria*, procures new state-of-the-art onboard equipment. GMV also wins the project for enlarging Grupo Avanza's eco-driving system to take in 180 additional vehicles of the Portillo fleet. *Transports Metropolitans de Barcelona* (TMB) once more turns to GMV's vast experience for upgrading the mobile material telemetry system of its metropolitan buses and its passenger information system, plus maintenance of the onboard passenger information systems. GMV also renews the fleet-management maintenance contracts for *Madrid's Empresa Municipal de Transportes* (EMT), pus the system of Madrid's Regional Transport Consortium (*Consorcio Regional de Transportes de Madrid*: CRTM) and the systems set up in TMB.
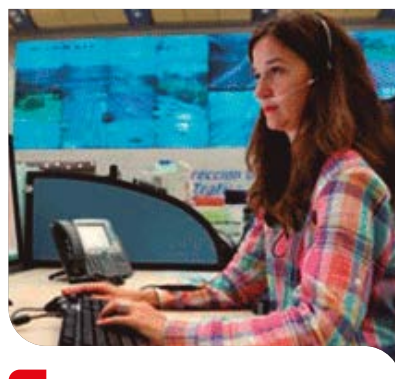

4 GMV continues to win new bus ITS contracts around the world. Cyprus's

Ministry of Transport, Communications and Public Works once more places its trust in GMV for setting up a new fare clearing system. On the same island Cyprus Public Transport, operator of the Nicosia and Larnaca concessions, turns to GMV for setting up a video-surveillance system and ticketing system for its new buses. In Portugal, Grupo Ruiz awards GMV a contract for setting up a turnkey fleet-management, passenger-information and CCTV system, including an eCall system for the fleet of its new concession in the public transport of Cascais. This is GMV's biggest ever project in Portugal and its first with Grupo Ruiz outside Spain. In Malta, GMV fits out Malta Public Transport's new buses with an onboard fleet-management, ticketing, passenger-information and CCTV system and renews the maintenance contract of these systems. Malta Public Transport, finally, entrusts GMV with the rollout of a cloud-hosted account-based ticketing (ABT) system.

5 GMV never rests on its laurels; it is always striving to improve and upgrade its stable of inhouse products. A good example of this ongoing effort is its ITS SUITE platform, a cloud computing-native solution that represents a state-of-the-art leap forward in fleet management systems. In 2020 the Agency for Technological Modernization of Galicia (*Axencia para a Modernización Tecnolóxica de Galicia*: AMTEGA) becomes the first client to take up GMV's newly upgraded fleet management system for the mobility of Galicia. In the Portuguese market GMV takes on a new fleet-management project for *Transportes Urbanos de Castelo Branco* (TUCAB) and a demand-response project for the region of Beira Baixa. The latter consolidates GMV's 20-year track record in demand response, the most experienced firm in Spain and Portugal, while also continuing with the maintenance of Castilla y

León's longstanding demand-response system.
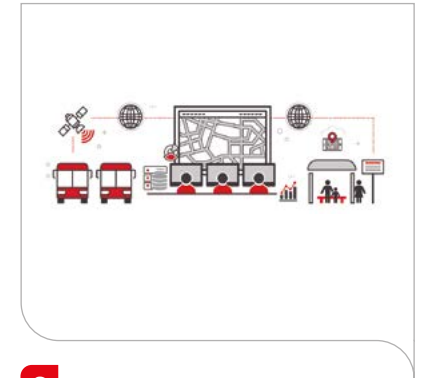
6 GMV has been trading in Poland since 2008, installing intelligent transportation systems in numerous Polish cities like Warsaw, Szczecin, Gdansk, Gydinia, Bydgoszcz and Toruń. In 2020 GMV wins the contract for maintenance of Szczecin's ITS, the most complete and wide-ranging ITS ever set up by GMV in Poland, including fleet-management, passenger-information, ticketing and CCTV. Bydgoszcz transport authority also turns to GMV for maintenance of its systems, awarding a new contract for maintenance of the fleet-management and passenger-information system of over 300 buses. Gdynia Public Transport Authority likewise awards GMV an ITS maintenance contract. GMV's activity in Poland is ongoing this year with diverse system enlargements and enhancements in cities like Nowy Sacz, Torun, Szczecin and Gdansk.

7 GMV's importance in the national and international railway sector is borne out in 2020 with more big contracts. In main line railways GMV sets up a corrective and adaptive maintenance system of the onboard communications platform throughout the whole fleet of the national operator RENFE. GMV also remains Talgo's go-to PA-, Intercom- and CCTV-supplier, winning new contracts

to equip trains in Egypt (ENR) and Uzbekistan. Elsewhere, implementation of the GMV-developed system for running the local commuter trains of Philippines National Railways (PNR) is completed.

8 In the tramline market GMV chalks up an important feat by signing a contract with CAF Signalling for fitting 160 cars of Jerusalem's light rail with an Automatic Vehicle Location System (AVLS) and Depot Management System (DMS), based on GMV's inhouse railway fleet-management system *SAE-R®*. As well as traditional functions the system will also feature the most advanced and groundbreaking upgrades for running and monitoring the service, managing movements of rolling stock and track occupancy in depots plus monitoring of signaling components. All the trains are to be fitted with onboard units designed and made by GMV as well as touch screens in both cabs plus driver HMI.

9 Another notable achievement in tram and metro was the fleet-management renewal project for Barcelona Tram, contracted from GMV by ALSTOM. This takes in Barcelona's Trambaix and Trambesòs tramlines, involving the fitting out of 41 tramcars with GMV's inhouse railway fleet-management system *SAE-R®* plus a groundbreaking speeding-control

system. In Australia, Sydney's light rail system is another one to upgrade its systems courtesy of GMV in 2020 while, back in Spain, Zaragoza tramline renews its fleet-management maintenance contract. Turning to metros, ALSTOM awards GMV contracts for Barcelona's onboard CCTV and Wi-Fi.

10 In 2020 GMV SYNCROMATICS wins two big contracts from Charleston Area Regional Transportation Authority (CARTA) for the supply of digital signaling solutions and fleet management systems (CAD/AVL). Midway through the year the company opens its new production center in Houston, Texas, featuring a tenfold increase in the production area, centralizing the various working lines in the same space and offering improved customer assistance for the various time zones. GMV SYNCROMATICS is now providing technological solutions to over 100 transport authorities throughout the USA. The flagship clients are Los Angeles Department of Transport (LADOT), Los Angeles County Metropolitan Transportation Authority (LA Metro) and Houston METRO.

11 In the automotive area GMV rolls out its information security management system and comes with flying colors through its

TISAX assessment for the goal "Connection to 3rd Parties with Very High Protection Level", vouching for the continued improvement in the processes supporting GMV's automotive projects. GMV also deploys a global network of GNSS stations for providing a secure and precise GNSS correction service for the new generation of autonomous vehicles, such as the German carmaker BMW Group. The new SATELISE® test phase also kicks off, a pioneering initiative of Cintra and GMV for cell-phone toll payment, drawing on information recorded by the DGT3.0 platform.
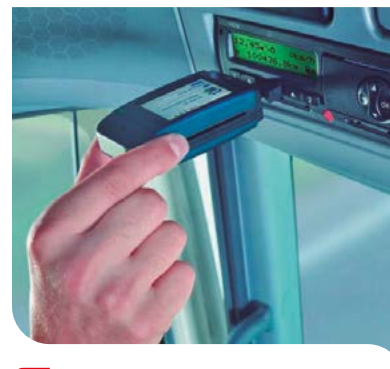
12 EC's Directorate General of Mobility and Transport (DG-MOVE) awards to a VVA-led consortium with upfront GMV presence a contract to study the feasibility and cost-effectiveness of using a certified smartphone app as tachograph. GMV supplies the onboard units of the pilot scheme launched by Lisbon council to allow emergency vehicles to automatically open green corridors in congested streets. GMV also continues to work on the C-STREETS project, following on from the cooperative intelligent transportation system (C-ITS), originally C-ROADS of Portugal. GMV embarked on the project in 2017 and is developing various smartphone apps on OBU V2X devices.

13 After 5 years of work the H2020 REMOURBAN project is completed. Its remit was to define and validate an urban regeneration model (URM) combining energy-, mobility- and ICT-activities to boost sustainability and the quality of life in European cities. GMV has participated in the design, implementation and monitoring of mobility actions, jointly with the City Council of Valladolid and Iberdrola. Urban Air also comes to an end in 2020. Forming part of the Interreg initiatives for cross-border cooperation between Spain and Portugal, its purpose was to carry out mobility ideas featuring shared bicycle use.

Assessment

GMV continued to cement its status as provider of Big Data solutions, where it boasts a highly skilled team of data scientists. During the year the company carried out Big Data projects in very diverse sectors, including AI-based bank fraud prevention, detection of cyberthreats and anomalies in data centers, monitoring and analysis of internet publicity campaigns, management of clinical and epidemiological data, evidence-based clinical rehabilitation, optimization of industrial processes, precision agriculture aided by earth observation, knowledge management, preventive maintenance of IT infrastructure, classification of documents, etc.

In 2020, too, GMV worked on projects involving the development, implementation and maintenance of industrial equipment and systems that record and process data using varied technology like artificial vision and artificial intelligence in order to streamline productive processes in the energy sector. In the automation and robotics field GMV worked on three lines of activity: collaborative, industrial and autonomy.

Drawing on its own experience and expertise, GMV launched **Covclear** in 2020, a mobile app to ensure a safer and more efficient return to work after the COVID-19 lockdown. The app is collaborative and relies on a principle of co-responsibility between the company and its employees to protect their own health and the health of their relatives and workmates.

One of GMV's strong suits is the development of groundbreaking business-improvement systems. In 2020 GMV developed all the following: **uSpot**, a solution that taps into robotics and AI technology to provide new ways of working and greater precision in manufacturing operations; **uQuery** which, based on language technology and also drawing on Deep Learning, Latent Dirichlet Allocation (LDA) and ontology learning, is able to render avalanches of documents into understandable and structured results, helping to enrich available information; lastly, **uTile PET**, which enables secure and private calculations to be made on distributed data, without exposing it to any threats or even moving it between organizations.

Throughout 2020 GMV supported its public-sector clients in strategic digital transformation projects, carrying out projects in the Spanish Home Ministry (*Ministerio del Interior*) and the Secretary General of the Treasury and Financial Policy (*Secretaría General del Tesoro y Política Financiera*) as experts in migration to the Cloud Native paradigm. EUMETSAT, the European Meteorological Satellite Organization, renewed its website with GMV's help, using the latest development trends and state-of-the-art cybersecurity services. GMV's intellectual property management software IDEAS, developed in collaboration with the *Universitat Autónoma de Barcelona* (UAB), continued to be taken up by new clients.

GMV is hailed as "Southern Europe Service Provider of year 2020" by Hewlett Packard Enterprise (HPE) in its 2020 award scheme HPE Partner Growth Summit, which recognizes the year's standout channel partners in terms of results and achievements, zeal and value-creation for their clients, with a focus on growth and innovation.
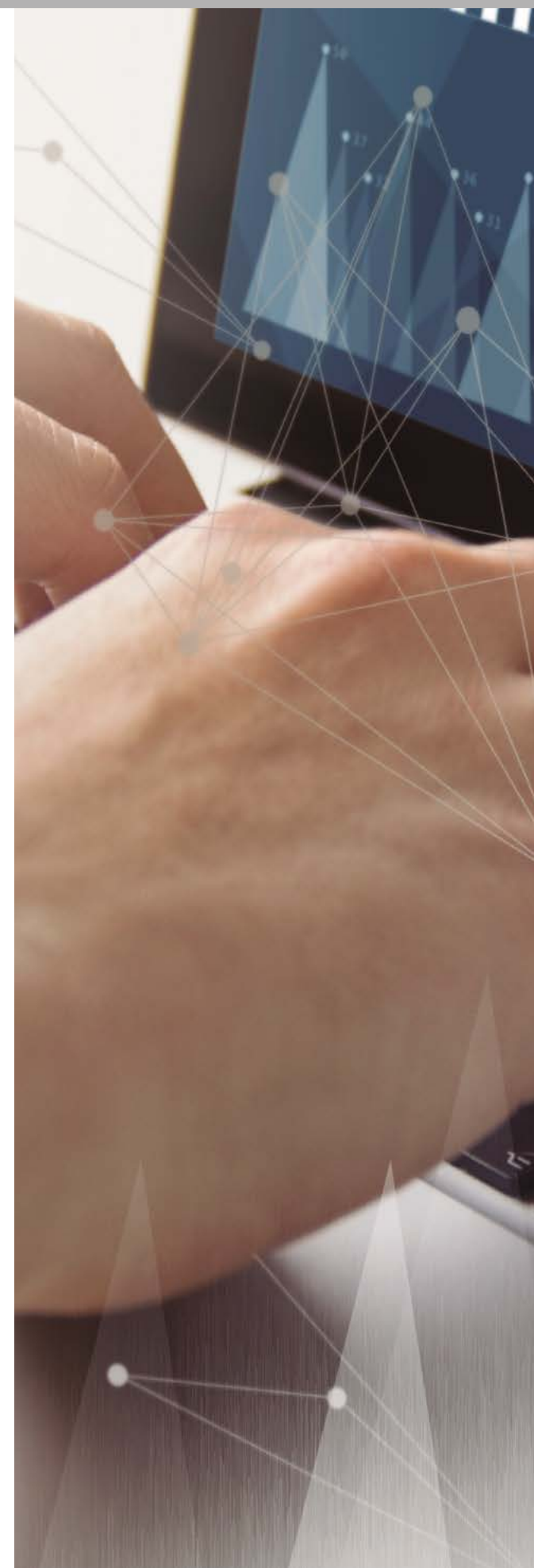
Telecommunications and Information Technologies

TELECOMMUNICATIONS

GMV works closely with the main operators and providers of telecommunication and media services, offering tailor-made solutions to meet their needs:

- Development and consultancy of value-added services
- Cloud solutions
- IoT solutions
- Online channel and mobile Apps
- Specialized Cybersecurity services for operators
- Advanced network services testing and deployment of global services
- Third-party integration and provisioning systems
- Big Data solutions: network anomaly detection, client segmentation
- Network performance management
- Capacity planning
- 24x7 operation and support services

INFORMATION TECHNOLOGY FOR THE PUBLIC AND PRIVATE SECTOR

GMV designs, develops and implements state-of-the-art ICT solutions to improve the processes of leading organizations, acting as long-term technology partner. GMV's proven ability to come up with secure solutions has won it the trust of both government authorities and major companies.

This sector is continually developing at breakneck speed and our range has to be made increasingly complete and groundbreaking to keep up with the pace, anticipating market needs on the strength of constant research and mastery of new technologies.

- Web portal platforms, Intranet, document management and contents management
- Cybersecurity services
- E-government solutions
- Online channel and mobile Apps
- IoT solutions
- Corporate email and agenda solutions and synchronization with mobile devices
- Open data platforms
- Cloud solutions
- Design, implementation and management of ICT infrastructure
- BI and Big Data solutions
- Messaging and mobility solutions
- User experience (UX) and usability consultancy
- 7x24 support and operation services
- Open Source developments

Telecommunications and Information Technologies. Main milestones

1 GMV develops **Covclear**, a mobile app to ensure a safer and more efficient return to work after the COVID-19 lockdown, and makes it available free of charge to any of its suppliers, clients or any other firm that might stand in need of it. **Covclear** integrates all the following in a single platform: a daily medical health check of all employees; recording of trips to restricted sites; contact tracing within the firm; control of office access by means of temperature readings; quarantine management; and control of site occupancy. It also publishes the company's healthcare crisis rules.

2 GMV is hailed as "Southern Europe Service Provider of year 2020" by Hewlett Packard Enterprise (HPE) in its 2020 award scheme HPE Partner Growth Summit. This award scheme, with a focus on growth and innovation, recognizes the year's standout channel partners in terms of results and achievements, zeal and value-creation for their clients. With this award HPE puts on record the close collaboration between both companies, a relation that has gone from strength to strength over the last 10 years or more. During this time GMV has used all types of HPE technology, including all HPE's top product lines (Synergy, Simplivity, 3PAR and Nimble), in some of its flagship projects.


3 GMV signs a contract with Atomian under which it becomes a new distributor and integrator of its cognitive computing technology, an artificial intelligence (AI) technique for more natural data mining. Thanks to the alliance between Atomian and GMV, clients like lawyers' offices, real estate appraisers and BPOs will be able to benefit from an 85% saving in processing time, a 40% cost-saving over manual processing and a 95% precision in the extraction of data insights and key document concepts, guaranteeing the trustworthiness of the data insights.

4 GMV develops **uSpot**, a solution that taps into robotics and AI technology to provide new ways of working and greater precision in manufacturing operations. Artificial vision is the most effective smart, automated method for acquiring, analyzing and processing images. This technology is capable of offering high precision, great consistency and adapts itself perfectly to an established production process. It also boasts a swathe of extraordinary functions within an industrial digitalization strategy. GMV's inhouse **uSpot** development provides more accurate site inspection to ensure manufacturing operations are working properly and the final products are flawless.

5 GMV signs a collaboration agreement with the Technological Hospitality Institute (*Instituto Tecnológico Hotelero*: ITH) under which it becomes a trusted cybersecurity-specializing technology partner. GMV's goal is to share its knowledge and experience to help all tourism stakeholders to digitalize their business with cybersecurity as the keystone.
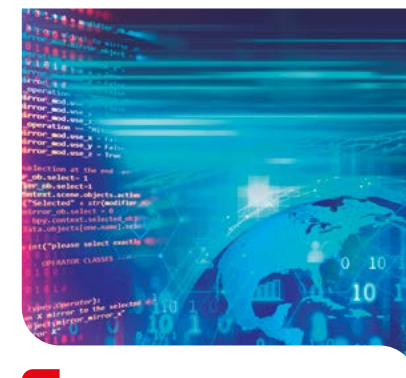
6 GMV develops **uQuery**, which, based on language technology, is able to render hordes of documents into understandable and structured results, helping to enrich available information. Drawing on Deep Learning, Latent Dirichlet Allocation (LDA) and ontology learning technology, **uQuery** offers a very intuitive interface that facilitates information-access and -analysis, drawing full value from data in less time. Among its functions

feature unsupervised and supervised document classification, identification of negations, gender management and management of spelling mistakes, word annotation, text summaries, reports and display of results.

7 EUMETSAT, the European Meteorological Satellite Organization, renews its website with GMV's collaboration, using the latest development trends and state-of-the-art cybersecurity services. The new website, as developed and commissioned by GMV, upgrades the old web portal architecture into a state-of-the-art contents manager and phases in significant improvements in terms of continuity, contingency, scalability and flexibility.


8 For yet another year GMV collaborates in the Smart Energy Reference Guide, the 9th in the series under the banner "Technology to boost energy efficiency" and the subtitle "Good practices, solutions, 100 fundamental suppliers and 2020's trends". Drawn up by the *Plataforma enerTIC*, the guide gives a revealing overview of technology's transformation potential in the field of energy efficiency and sustainability.

9 GMV develops **uTile PET**, a solution that carries out secure private calculations on distributed data, without exposing it or moving it from one organization to another. **uTile** harnesses confidential and private data in order to improve machine learning algorithms and analytical models, complying at all times with organizational remits, data-privacy obligations and current law. **uTile** means it is no longer necessary to make a mutually exclusive choice between ensuring data privacy and harnessing the data's full potential. Advanced cryptographic methods keep the data encrypted while all necessary calculations are made.

10 In 2020, too, GMV works on projects involving the development, implementation and maintenance of industrial equipment and systems that record and process data received from sensors, cells, cameras, field transmitters, using varied technology like artificial vision and artificial intelligence in order to streamline productive processes in the energy sector. In the automation and robotics field GMV works on three lines of activity: collaborative, industrial and autonomy.

11 In 2020 GMV's intellectual property management software IDEAS, developed in collaboration with the *Universitat Autónoma de Barcelona* (UAB), continues to be taken up by new clients. This year *Universidad de Santiago de Compostela* and *Universitat de Lleida* joined the roster of universities and research centers that rely on IDEAS to protect their researchers' intellectual property.
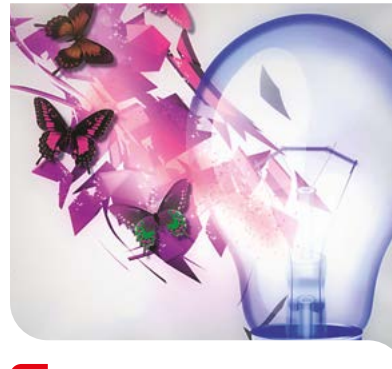
12 Throughout 2020 GMV supports its public-sector clients in strategic digital transformation projects, carrying out projects in the Spanish Home Ministry (*Ministerio del Interior)* and the Secretary General of the Treasury and Financial Policy (*Secretaría General del Tesoro y Política Financiera*) as experts in the migration to the Cloud Native paradigm. Governments are increasingly taking up elastic IT architectures to speed up new digital models and give greater flexibility and scalability to the services they provide for their subjects.

Social responsibility

Mindful of its responsibilities to the present and future society, GMV constantly strives to make a better use of its resources, improving its process efficiency by using state-of-the-art technology.

GMV's corporate social responsibility therefore includes a general set of long-term goals:

Act in a responsible and ethical way in all our activities and ensure that our employees, clients and suppliers do likewise with their stakeholders.

Reduce the environmental impact of our operations and carry out eco-friendly initiatives.

Contribute to the creation of a more sustainable society, providing groundbreaking solutions that improve the quality of life, helping people to integrate into society and join the working force.

Human capital

Right from the word go GMV has made its personnel policy one of the kingpins of its whole business project. We at GMV are convinced that a staff of top professionals is the best way to gain a competitive edge over the rest. GMV therefore aims to attract the best professionals and then ensure they stay with the company to pursue their careers and realize their full potential. GMV offers them a unique teamwork environment where their talent, imagination and mettle are continually challenged and stimulated.

In line with this overall policy GMV always applies a strategic human resources plan based on three mainstays: a painstaking personnel-selection policy, a stable environment in which to pursue their careers and continuous top-up training.

Attracting and nurturing top talent is a cumbersome and time-consuming business. The priority must therefore be to make good this investment by retaining our whole personnel. By dint of a long-sighted commitment to technology and innovation, diversification of the business into various sectors and breaking into new international markets, GMV has indeed managed to achieve this aim. This stands us in good stead for maintaining our economic growth into the future. GMV closed the year with a staff of 2,357, 83% of whom are university graduates.

GMV has always pursued a painstaking personnel-selection procedure; it has been equally determined to provide this pool of talent with a stable environment for developing their careers. This keynote policy has enabled it to maintain a high level of open-ended employment contracts, a rate of 95% in 2020. To meet our commitment to

our employees, our personnel policies guarantee equal treatment of all our staff and encourages diversity, from the job-selection process and then throughout their whole careers in the company. In fact 24% of GMV's staff are women, who also represent 18% of senior management. Our staff is a mix from 44 different nationalities and the average age comes out at about 35.

One of the main planks of the human resources policy is continuous training. This makes good sense because the company's business lines call for specialist and bang-up-to-date knowledge of the most cutting-edge technologies. To develop the professional skills of its employees GMV works with an integrated training model to pinpoint its employees' knowledge and skills. In all, 1,676 training courses were held in 2020 on both an individual and group basis, adding up to a sum total of 18,079 training hours.

GMV liaises permanently with more than 45 study centers and universities both at home and abroad, whether by way of temporary agreements, academic grants to help university students join the job market, or more permanent project-based collaboration agreements. This habitual liaison with universities has been reinforced by an increasing participation of GMV in various employment forums and encounters such as lectures, chats and workshops. This year GMV participated in 29 talent and employment encounters.

As part of its ongoing commitment to academia, GMV has been maintaining a collaboration agreement called the "Cátedra GMV" (GMV Chair) since 2004, in collaboration with the Higher Technical School of Aeronautical Engineers (*Escuela Técnica Superior*

de Ingenieros Aeronáuticos: ETSIA). Under this agreement the company collaborates in the training of experts in aerospace systems while also carrying out R&D in this area. GMV also collaborates closely with UPM's Higher School of IT Engineers (*Escuela de Ingenieros Informáticos*: ETSISI). A group of ETSISI students participate in GMV projects with the CESIN innovation studies chair. CESIN has been set up by the Forum of Innovating Firms (FEI in Spanish initials) together with the *Universidad Complutense de Madrid's* Innovation Policy and Economics Research Group (*Grupo de Investigación en Economía y Política de la Innovación*: GRINEI) to encourage innovation training on the strength of university-enterprise collaboration, as a key factor in the development of Spain's economy. GMV also runs an annual internship scheme, holding various initiatives throughout the whole of 2020. In this year 48 of the 117 interns eventually joined the company as fully-fledged employees.

GMV also collaborates in third-party initiatives to encourage quality training and wider access to the job market. It forms part, for example, of the *Alianza Formación Profesional Dual* (Dual Vocational Training Alliance), a state network in which businesses, academia and institutions join forces to boost employability by encouraging higher vocational studies. Its main aim is to meet the job market's real demand, narrowing the glaring training gap between the academic and professional sectors. In 2020 it also joined forces with the mentoring program of the Higher IT Engineering School (*Escuela Técnica Superior en Ingeniería Informática*) of the Universidad Rey Juan Carlos.

True to the company's university roots, GMV collaborates in various academic events and organizes

different activities with the academic world. The aim is always the same: stoke up a passion for the world of technology. During 2020 it collaborated in various chats in primary and secondary schools, forming part too of several awareness-raising events, like "*Espaço vai à escola*" (Space goes to school) of the Portuguese organization Ciência Viva or "*Enciérrate con la Ciencia*" (Lockdown Science) a podcast launched by the engineer and science popularizer Sara Robisco at the start of the coronavirus pandemic.

As part of its ongoing awareness-raising activity GMV held a total of 22 online science and technology events, focusing on various projects it is currently carrying out and inhouse developments it is working on. These webinars looked at technology for space missions, GNSS systems, autonomous and connected vehicles, cybersecurity, the digital revolution, big data and artificial intelligence, technological developments for defense and security, healthcare technology and industry 4.0 robotics projects. In 2020 GMV also joined in the project of building the first 3D model of the solar system, a cultural initiative of the Astróbiga association to teach science in an attractive way and widen its audience.

Always keen to nurture talent wherever it may be budding, GMV took part for yet another year in STEM Talent Girl, a Fundación Asti initiative to encourage female talent and help to strike a fairer gender balance in scientific-technological education and training. GMV also threw itself enthusiastically behind such official Days as the International Day of Women, Girls in Science and the International Day of Girls in ICTs, organizing events to give practical examples of its passion for science and technology.

Excellence management

Right from the start way back in 1984 GMV has always regarded excellence as one of the most important factors driving sound and sustainable development. Excellence has imbued all its lines of activity and processes throughout these years, taking the specific form of a company-wide delight in doing things well, a continual search for innovation and an attitude of constant improvement. This ongoing pledge to excellence and continual improvement works not only at an internal level, ensuring all the company's projects are carried out efficiently, but also outwardly towards the customer, making sure the products, systems and services delivered match or even exceed expectations.

All GMV's various management systems have been designed with this overall aim in mind. Either on its own initiative or in response to the requirements laid down in the various markets it trades in, all GMV's QMSs are designed in light of the international standards applicable directly to the company's several business lines.

The various management systems of the company's subsidiaries, including quality, information security and environmental commitment, are all certified under national and international standards of varied ilk and scope.

Furthermore, the sheer technological complexity of GMV's developments, as well as the disparate nature of each GMV company's particular market, means that each of these subsidiaries needs its own standards, improvement models and certifications to suit its particular areas of activity and specialization, as recorded below.

GMV is well aware that excellence is not achieved with a single certification or title but rather depends on the ongoing workmanship and involvement of the whole staff.

GMV Aerospace and Defence, SAU
- *CMMI Level 5*
- *UNE-EN ISO 9001:2015 Quality management*
- *PECAL/AQAP 2110, PECAL/AQAP 2210 & PECAL/ AQAP 2310 Specific for purposes of defense*
- *UNE-EN 9100:2018 Quality systems in the aerospace and defense sector*
- *UNE-EN ISO14001:2015 Environmental systems*
- *UNE-EN ISO 50001:2011 Energy management systems*

GMV GmbH
- *CMMI Level 5*
- *NRTL-C/US*
- *ISO 9001:2015 Quality management*

GMV Soluciones Globales Internet, SAU
- *ISO 27701: 2019 Privacy Information Management*
- *UNE-EN ISO 9001:2015 Quality management*

- *UNE-ISO/IEC 20000-1:2011 IT service management*
- *ISO 13485:2016 Health product quality management: intraoperative radiotherapy planning systems.*
- *ISO/IEC 27001:2014 Information security management*
- *ISO 22301:2012 Business continuity management. Resilience*
- *UNE 166002:2014 R&D management*
- *RD 3/2010 National Security Scheme (Esquema Nacional de Seguridad: ENS), Spain*
- *UNE-CEN/TS 16555-1:2013 Innovation Management*
- *UNE-EN ISO14001:2015 Environmental systems*
- *ISO 50001:2011 Energy management systems*

GMVIS Skysoft, SA
- *CMMI Level 5*

- *UNE-EN ISO 9001:2015 (ICT for Business Scope) Quality management*
- *UNE-EN ISO 9001:2015 (Space, Defense and Intelligent Transportation Systems Scope) Quality management*
- *ISO 14001:2015 Environmental systems*
- *ISO/IEC 27001:2014 Information Security management*
- *UNE-EN 9100:2018 Quality systems in the aerospace and defense sector*

GMV Innovating Solutions, Inc
- *CMMI Level 5*
- *UNE-EN ISO 9001:2015 Quality management*
- *UNE-EN ISO 14001:2015 Environmental management systems*
- *UNE-EN ISO 50001:2011 Energy management systems*

GMV Innovating Solutions, Sp.z o.o
- *CMMI Level 5*
- *UNE-EN ISO 9001:2015 Quality management*

GMV Innovating Solutions, SRL
- *CMMI Level 5*
- *UNE-EN ISO 9001:2015 Quality management*

GMV Sistemas, SAU
- *CMMI Level 5*
- *UNE-EN ISO 9001:2015 Quality management*
- *UNE-EN ISO14001:2015 Environmental systems*
- *UNE-EN ISO 50001:2011 Energy management systems*
- *UN/ECE Regulation 10: Type approval process*
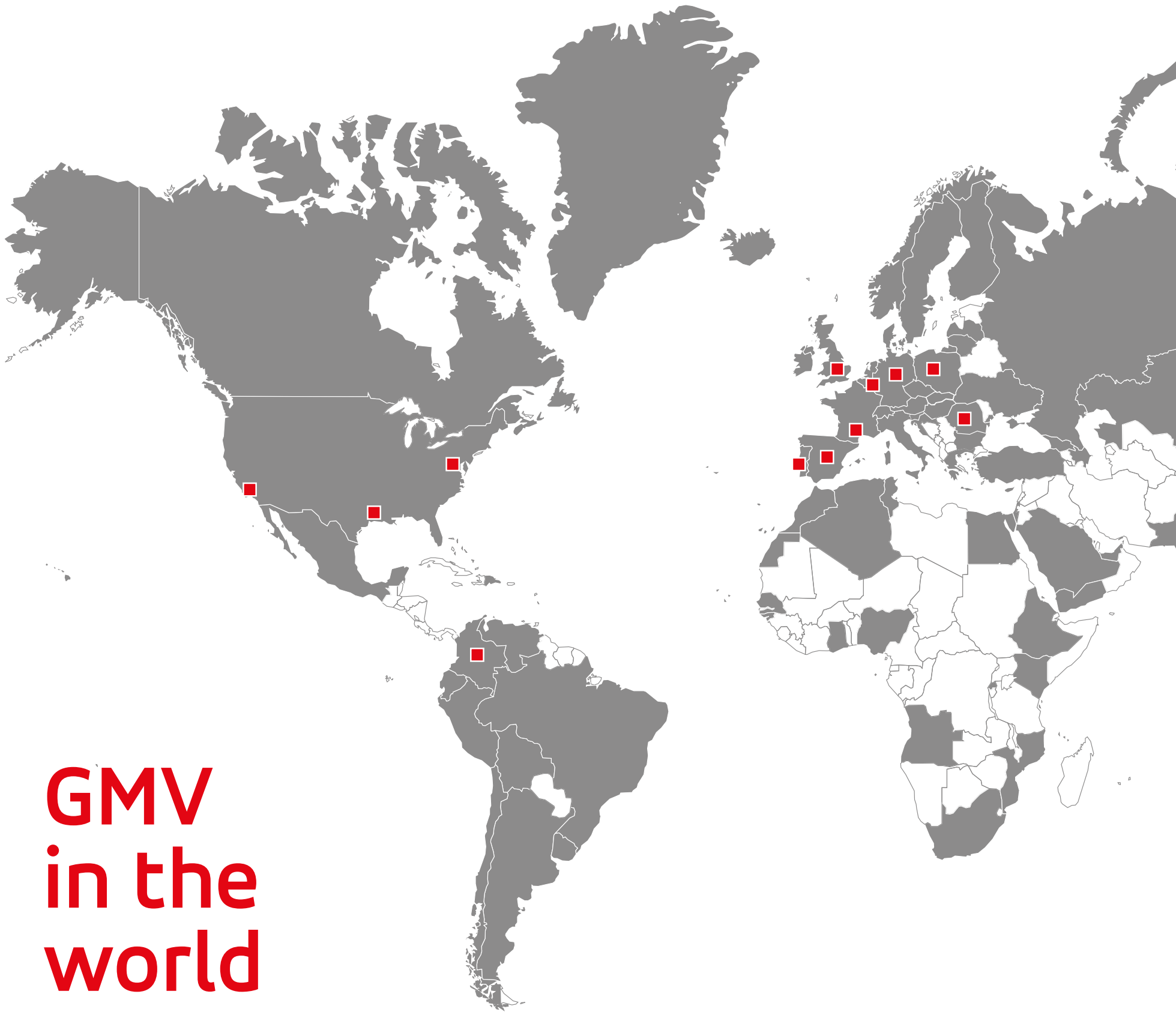
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Economic and financial results

FINANCIAL STATEMENTS 2020

BALANCE SHEET

ASSETS		2019	2020
Fixed assets		54.329.461,52	64.565.895,19
Total fixed assets		**54.329.461,52**	**64.565.895,19**
Inventories		24.958.016,35	24.248.901,87
Accounts receivable		24.054.120,34	18.819.910,95
	Trade debtors	*49.103.159,14*	*50.416.497,88*
	Trade services on account	*−31.045.569,93*	*−39.265.957,35*
	Other debtors	*5.996.531,13*	*7.669.370,42*
Cash		15.171.290,78	54.569.524,68
Total current assets		**64.183.427,47**	**97.638.337,50**
Total assets		**118.512.888,99**	**162.204.232,69**
Working capital		25.875.780,18	51.379.212,16
Working capital/Equity		32,26%	44,31%

LIABILITIES		2019	2020
Stockholders' equity		59.695.872,91	62.659.527,62
Capital grants		444.654,12	484.846,35
Minority interests		5.854.290,64	6.400.050,02
Long-term funding		14.210.424,03	46.400.683,36
	Interest free credits	*4.564.872,31*	*4.860.551,20*
	Long term funding	*9.645.551,72*	*41.540.132,16*
Total Long-term Funding		**80.205.241,70**	**115.945.107,35**
Short term liabilities		33.179.181,19	42.030.444,51
	Bank loans and overdrafts	*11.407.102,47*	*17.335.791,38*
	Non-trade payables	*21.772.078,72*	*24.694.653,13*
Deferred payments		5.128.466,10	4.228.680,83
Total short term liabilities		**38.307.647,29**	**46.259.125,34**
Total liabilities		**118.512.888,99**	**162.204.232,69**
Working balance		25.875.780,18	51.379.212,16
Working balance/fixed asset		47,63%	79,58%

PROFIT AND LOSS ACCOUNT

EXPENSES	2019	2020
Purchase of goods	77.920.393,16	91.155.043,83
Ancillary Services	17.629.924,61	20.276.708,03
Taxes	532.992,47	643.386,39
Employee Costs	124.567.254,15	136.601.639,30
Financial Expenses	719.777,12	832.224,14
Extraordinary Expenses	19.791,40	29.836,43
Period Depreciation and Amortization	6.041.046,27	6.907.884,01
Appropriations, transfer to Provisions	1.955.680,71	374.742,63
Total Expenses	**229.386.859,89**	**256.821.464,76**
Corporate income tax	1.154.995,28	1.082.040,27

INCOME	2019	2020
Turnover	231.405.457,14	252.035.900,60
Own expenses capitalized	4.729.756,80	9.152.004,15
Operating grants	324.802,56	605.143,95
Financial Income	275.743,26	155.039,06
Extraordinary Income	114.413,15	66.175,55
Total income	**236.850.172,91**	**262.014.263,31**
Pre-tax profit	**7.463.313,02**	**5.192.798,55**
Post-tax profit	**6.308.317,74**	**4.110.758,28**

CASH FLOW STATEMENT

OPERATING ACTIVITIES	2019	2020
Profit after tax	6.308.317,74	4.110.758,28
Depreciation and amortization	6.041.046,27	6.907.884,01
Operating Cash Flow	**12.349.364,01**	**11.018.642,29**
Net finance expense	719.777,12	832.224,14
Corporate income tax	1.154.995,28	1.082.040,27
EBITDA	**14.224.136,41**	**12.932.906,70**
(Increase) / decrease in trade and other receivables	–12.057.544,33	5.943.323,87
Increase / (decrease) in trade and other payables	5.008.987,38	2.922.574,41
(Decrease) / increase in provisions	318.705,88	-899.785,27
Deferred income (capital grants)	–324.802,56	–605.143,95
Cash flow generated from operationss	**7.169.482,78**	**20.293.875,76**
Tax paid	-1.154.995,28	-1.082.040,27
Net cash flow from operating activities	**6.014.487,50**	**19.211.835,49**

INVESTMENT ACTIVITIES	2019	2020
Purchase of subsidiary undertaking (Goodwill)	–1.189.236,32	–1.339.777,98
Capital expenditure – plant and equipment	–13.541.125,66	–4.249.378,59
Capital expenditure – intangible assets	–4.504.566,64	–11.555.161,11
Net cash flow from investing activities	**-19.234.928,62**	**-17.144.317,68**

FINANCING ACTIVITIES	2019	2020
Net new debt (debt increase + debt repayments)	6.454.471,45	38.118.948,24
Capital Grants and subsidies on capital	316.870,87	645.336,18
Interest paid	–719.777,12	–832.224,14
Dividends paid to equity shareholders	–1.151.299,10	0,00
Paid-in capital / Adjustments to the equity value	1.613.669,94	–199.385,05
Minority Interests	258.272,24	545.759,38
Results attributable to the Minority Interests	–1.610.120,16	–947.718,52
Net cash flow from financing activities	**5.162.088,12**	**37.330.716,09**
(Decrease) / increase in cash and cash equivalents	**-8.058.353,00**	**39.398.233,90**
Cash and cash equivalents at beginning of year	23.229.643,78	15.171.290,78
Cash and cash equivalents at end of year	**15.171.290,78**	**54.569.524,68**