gmv® INNOVATING SOLUTIONS NEWS

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THE CONNECTED AUTONOMOUS CAR: A REVOLUTION IN MOBILITY

INTERVIEW

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LETTER FROM THE PRESIDENT

GMV grew by over 10% in 2017. Our turnover, generated by a team of over 1,650 employees, now tops 160 million euros. At the same time we are investing heavily in the development of new products and solutions, focusing on several sectors that offer fine opportunities for a multi-sector company like GMV.

One of them is the intelligent transportation sector, currently revolutionizing the way we travel. And this revolution is only just kicking off. We have been working in this sector for a quarter of a century now, coming up with intelligent solutions first for public-transport operators and vehicle fleet managers, later for infrastructure operators and finally, for over a decade now, for carmakers too. At the moment we are overhauling our whole line of advanced fleet-management and electronic fare collection systems. This renewal is rounded out by the flexible suite of cloud fleet-management services developed by our Los Angeles ITS company.

But telematic units are no longer fitted just in vehicle fleets. Every day, increasing numbers of private cars are connecting up to communication networks and the internet; more than two million of them do so using embedded GMV software. These are only the first steps in a paradigm shift towards the autonomous and connected vehicle, along a new path chock-full with new needs and new challenges. GMV's technologies, developed to maturity in other sectors, offer solutions for some of these new needs and we have set ourselves the challenge of being the first to develop them.

Cordial greetings,

Mónica Martínez

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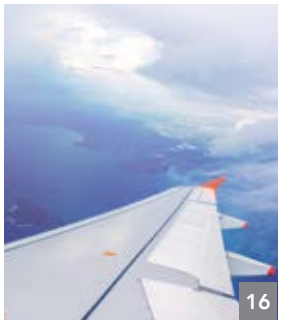
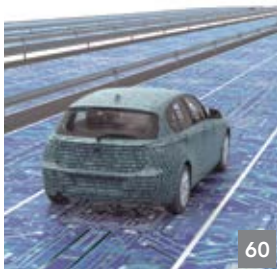
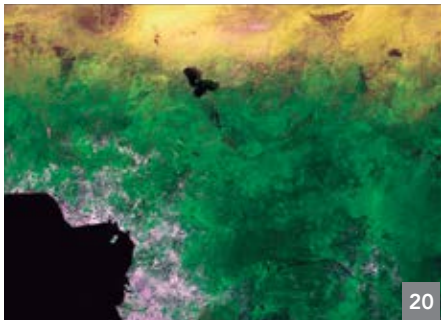
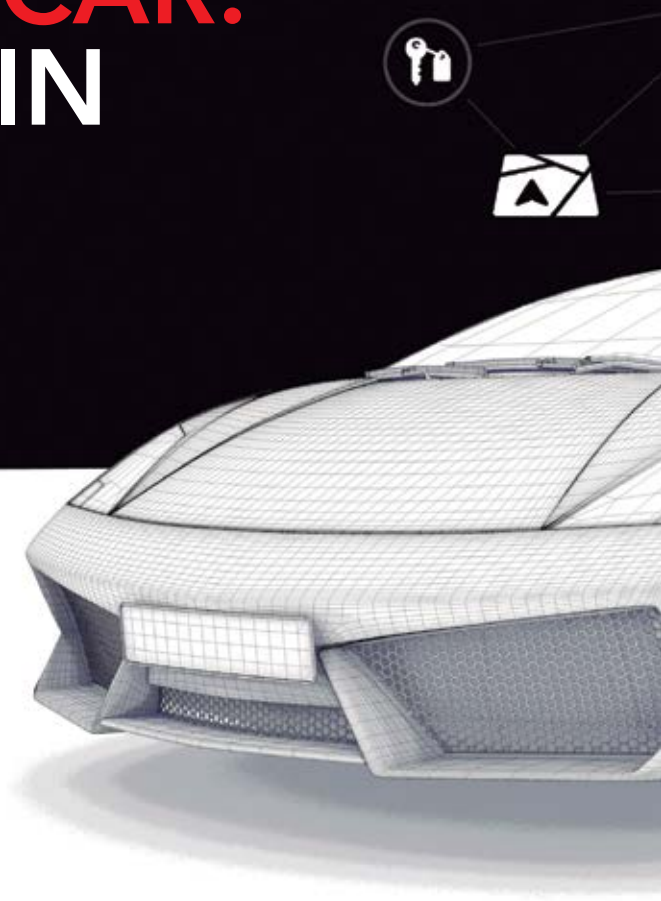






THE CONNECTED AUTONOMOUS CAR: A REVOLUTION IN MOBILITY



The time of the "Knight Rider" has arrived. The Internet of Things (IoT) is revolutionizing the automobile industry. Connected vehicles are turning into "connectivity devices with wheels"; at the same time carmakers and software companies are bending over backwards to bring us the autonomous vehicle in the very near future.

This implies the advent of new vehicle technologies but also spells a revolution in the automobile industry, which, to be competitive, has to be brought into line with new business models and adapt fleet-footedly to the transformation the sector is living through.

The essential factors to be taken into account in this ongoing process of change include the following:

- ✓ Software- and App-user experience now features as the heart of the business model.
- ✓ The data generated by connected and autonomous vehicles is enormously valuable and could be analyzed and mined with various purposes in view, all stakeholders benefiting from the experience.
- ✓ Continuous updates of onboard software have to be made available over the air (OTA).
- ✓ The risks and threats associated with this vehicle concept, such as vehicle cyberattacks, now need to be addressed and dealt with.
- ✓ The traditional automobile value chain is changing; by now we can speak of an automotive ecosystem in which it is crucial to set up strategic alliances between the various stakeholders to become competitive.
- ✓ Due consideration has to be given to the change whereby consumers are increasingly switching from products to services.

THE CONNECTED CAR: TECHNOLOGY AND SERVICES

The convergence between cars and Information and Communication Technologies (ICTs) has been ongoing over recent years. Beforehand they were two totally separate industries but now they are increasingly merging. The connected car as a concept refers mainly to the consideration of the car as one more device to be integrated into communication networks but this concept also stretches to the use of ICTs inside the vehicle, developing further to self-driving vehicles in the near future.

The trend is now towards achieving complete vehicle connectivity, tapping into various types of technology

such as Wi-Fi, Bluetooth and cellular technology (3G, C-V2X, 5G), enabling connection of any of the passengers and the vehicle to Internet, the use of streaming or the downloading of Apps not only for car-related matters but also any other aspects of interest to the travelers.

Many services can now be deployed inside a connectivity-enabled vehicle and the value of these services can be appreciated from many standpoints, including all the following: road safety (in the case of the eCall service); new business models (such as pay-per use insurance schemes like UBI and PAYD); infotainment services (dynamic information searches and others); satnavs; remote services (which enable some vehicle functions to be activated remotely, such as ignition or air-conditioning settings); electric-vehicle services for monitoring the battery charging process or notifying successful completion of the charging process; multiplatform services facilitating a great variety of services associated with the new forms of Mobility-as-a-Service (MaaS), including carsharing.

This list of services could be almost as long as we want, and it should also be borne in mind here that the introduction and rollout of many of them will be made easier by full implementation of the European eCall system, which is already with us. As from March 2018 all type-approved M1 and N1 vehicles will have to be equipped with this system. This will boost vehicle connectivity and speed up adoption of many of the abovementioned services. It will also speed up the development of new business models associated with this whole range of services.

In many aspects today's vehicles can already be considered to be connected vehicles. The watershed moment will come when vehicles are able to interact with each other and roadside infrastructure. This interaction is the characteristic feature of Cooperative ITSs (C-ITSs), which enable road users and traffic managers to share information and use it to coordinate their actions. This cooperative element – facilitated by the vehicles' digital connectivity with each other and with the transport infrastructure – will significantly improve road safety, transport efficiency and the driving experience, helping drivers to make decisions more in keeping with the traffic circumstances at each particular moment.

The vehicle's connectivity with its surroundings is based on various technologies. The current approach is geared towards a hybrid deployment, in which cellular technology (5G) will offer connectivity-favoring performance features that have to coexist with access based on IEEE

802.11 p (ITS G5). The role to be played by these technologies is now being fleshed out as we speak, but particular mention must be made of the likely pole position of telecommunications operators in connected and autonomous vehicles.

Communication between vehicles, infrastructure and other road users is crucial in terms of boosting the road-safety levels of future autonomous vehicles to ensure their complete integration in the worldwide transport system. Cooperation, connectivity and automation are complementary, mutually-reinforcing technologies that will end up merging over the years.

A REVOLUTION IN SAFETY, BUSINESS MODELS AND MOBILITY

The era of the connected and autonomous car is upon us. As consumers get used to increasingly accessible ADAS (Advanced Driver-Assistance Systems) functions and vehicles fully connected with their whole surroundings – whether other vehicles, roadside infrastructure, remote services, pedestrians or any type of device – market expectations are becoming increasingly demanding and discerning.

Human error has been identified as the main cause of 90% of road accidents. Safety is therefore one of the main driving forces behind advances in the autonomous vehicle. Some studies have shown that the number of road-accidents, -injuries and -deaths would be slashed if and when we are able to wipe out human error, doing so on the strength of sensor networks, cameras, radar, lidar, GNSS receivers, V2X connectivity modules and sophisticated Electronic Control Units (ECUs).

Drawing from thousands of instant calculations, a machine is able to react more quickly and take better decisions than a human being. Neither does a machine fall asleep at the wheel or drive with its brain scrambled by daily hassles.

Safety will become an even more critical factor in the future as the number of autonomous vehicles on the road increases. Handicapped or limited-mobility drivers will now be able to use the roads and other drivers will opt increasingly for private vehicles to make their journeys rather than other means of transport.

Another advantage expected from autonomous vehicles is an improvement in the use of road capacity. Vehicles will be able to drive faster with a shorter safety gap, translating into a net increase in road occupancy. This calls for a proper treatment of aspects related to infrastructure capacity and its safety.

IMPACTS OF SCA AND AUTONOMOUS DRIVING

Reduction of accidents

Reduced road-infrastructure maintenance and investment needs

Challenges in the management of generated data

New vehicle ownership models

¿MOBILITY-AS-A-SERVICE OR OWNED VEHICLE?

Firms like BMW are nowadays coming up with new visions of future transport use. BMW is still selling vehicles directly to consumers but it is also marketing the car-as a-service model, an arrangement under which consumers hire cars from a given fleet, request a car with driver and, in the future, a driverless, autonomous car. BMW believes that people will want to make different transport arrangements to suit the situation at each moment or place, and now aim to offer all available options from the same App.

Some companies, however, like Mazda, believe that drivers will always want to drive; they therefore create and sell vehicles that clients "love to drive". In any case the Mobility-as-a-Service (MaaS) or owned-vehicle modes are bound to undergo a radical change; everything now suggests that road users will opt for a demand-response transport model instead of owning their own vehicles. The sector is therefore girding its loins.

Increasing use of shared transport models is converting these companies into great multinationals. These firms can now plow back a large chunk of their earnings into the development of their inhouse technological platforms, thus speeding up the development of autonomous technology. This is an important factor for firms of this type, cutting costs by reducing the need for employing drivers to carry out their services. This is why mobility companies are now playing a role at least as important as carmakers in the development of the driverless car.

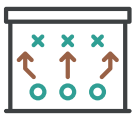
Carmakers will also gradually cotton on to the fact that their points of sale or dealer outlets no longer make sense as car retail sales fade out and fleet operators buy vehicles "in bulk" at a lower cost.

Another player likely to have an important role in this sector is the artificial-intelligence firm, which needs to be able to draw from human behavior patterns to "train"

Dependence on travel times

Productivity boost

Improvements in energy efficiency



New business models

Autonomous vehicle Apps will help to save lives, cut fuel consumption, emission levels and travel costs, while also allowing people who have hitherto had to use alternative travel arrangements to use our roads.

Convergence of safety systems based on sensors and connected vehicle technology will come into its own as the technology becomes more mature and widespread. The connected and autonomous vehicle is expected to have a clear market impact and usher in new business models.

NOT EVERYTHING IS TECHNOLOGY: LEGAL FRAMEWORK AND BARRIERS,

STANDARDIZATION, SOCIAL ACCEPTANCE AND CYBERSECURITY

Up to now legislation has focused on facilitating the testing of autonomous vehicles and providing development guidelines. Significant progress has been made, but there remains the risk of legislation loopholes and leaderless and chaotic development of ITSs.

Progress in EU legislation is slow. Adoption of the first slew of specifications has taken 5 years since application for the initial mandate. This cumbersome EU legislation will be hard put to keep up with the breathtaking pace of ITS services and provide any scheme of coordination and synchronization.

The "cross-border" use of the connected vehicle poses another stiff challenge. The ITS Directive focuses on the creation of interoperable technology but the fact is that each member state is free to roll out Apps and services within its own territory as it sees fit. This could give rise to situations in which car owners cannot use them beyond their own borders.

Interoperability is crucial. The example of the cell phone is a good yardstick here, in the interests of adopting standardized technology that guarantees communications between the vehicle and its surroundings. In the telecommunications sector standards are being negotiated between the various technology-developing stakeholders, which are being provided with a fair, reasonable and non-discriminatory (FRAND) licensing framework.

Autonomous vehicles also pose new liability-determining problems. The legal liability-determining base in road accidents is usually negligence. Any driver who fails to behave properly at the steering wheel can be accused of negligence and held liable for any ensuing losses. In any accident

and test its machines' self-learning processes. On the one hand connected cars generate a host of information and establish human driver-behavior patterns; on the other, the autonomous car will favor a huge input of information for trying out their IAs and self-learning schemes.

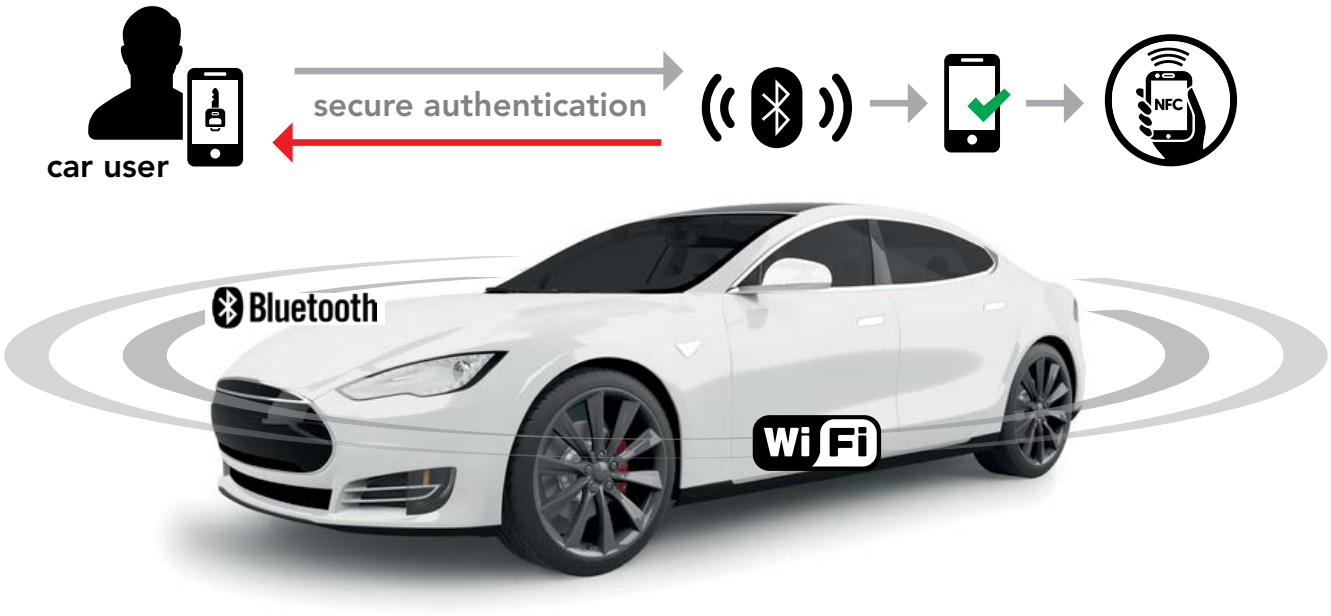
This situation begs a number of as yet unanswered questions to do with the ownership of the data generated by connected and autonomous vehicles, access to same, the associated rights and other data-privacy and -origin aspects. This could all mean a market niche of great interest to the sector.

The automobile sector includes actors like Uber, Lyft, Cabify and others that are likely to become key agents of the new business models associated with the connected and autonomous vehicle, capturing clients and then forging their ongoing loyalty.

Users sharing a vehicle will not be so fussed about the vehicle they travel in, since it is not their own. These companies' keenness to create autonomous-mobility business areas and self-driving systems for carmakers suggests that they are seeing this as a big chance to consolidate their position as market leaders against the traditional agents of the automotive value chain.

Indeed, to speak of a value chain in this sector has fallen out of fashion nowadays. The buzz word now is an "ecosystem" of connected and autonomous vehicles with new stakeholders that are completely reshuffling all the links in the traditional relationship between clients and automotive suppliers. Nonetheless, this industrial sector is still in its infancy and all stakeholders, ranging from automotive suppliers at different levels up to pure technology companies, are jostling for a strong position within this ecosystem.

A thrilling scene is now opening up before us. Those who are capable of forging a strong position in these early stages will then be empowered to invest more in research, marketing and out-innovate their competitors. They will also be in the best position to guide the industry in such aspects as taxation policies and, working in close liaison with national and international authorities, to remodel cities, the future of mobility and society.



involving two or more vehicles this aspect is particularly crucial.

Vehicle owners (or, according to the civil legislation in some countries, the drivers) are liable in the first instance for any consequences deriving from accidents caused by their vehicles. Vehicle owners are therefore required to take out insurance with at least third-party coverage.

Whenever an accident is the result of a vehicle defect, vehicle owners or drivers can then offload the liability onto other factors such as the manufacturer, the vehicle or some of its components. Pursuant to Directive 85/374/EEC of 25 July 1985, EU member states make the manufacturers of faulty products liable for any resulting damage.

Inevitably, the introduction of autonomous vehicles and ITSs add a new layer of complexity in terms of deciding on road-accident liability.

CYBERSECURITY – ONGOING THREATS TO THE CONNECTED VEHICLE AND ITS SERVICES

Internet connection of the vehicle and the increase in the use of onboard devices and electronic equipment now opens up the vehicle to cyberattacks as part of the Internet of Things (IoT). Any network of connected devices is vulnerable to attack. This becomes particularly worrying when the object of this attack is a vehicle, bearing in mind the obvious safety implications.

It is not just a question of data theft but leaving a loophole for wrongdoers to install malware in vehicle systems, with dire consequences. Ethical hackers have even proved the possibility of cybercriminals taking over remote control of vehicles for their own dastardly purposes.

This also poses the question of the manufacturers' responsibility for making their systems more robust by means of continuous after-sale software updates.

In countries like the UK some reports recommend the earmarking of a public cybersecurity budget and phasing cybersecurity into revisions of the regulatory framework of autonomous and connected vehicles.

Automobile companies have already flagged the data recorded by connected vehicles and owned vehicles as key targets for hackers and other cybercriminals with various purposes in mind. The soaring number of sophisticated cyberattacks is a hot topic at legislative, regulatory and commercial level. The automobile sector's tools to fend off these threats need to develop quickly to keep up with the pace of events.

SOCIAL ACCEPTANCE

Consumer influence, acceptance and confidence are crucial factors in the effective rollout of the autonomous and connected car. The trustworthiness of these vehicles is essential, from the lowest levels of automation right up to the highest autonomy levels.

There is still a long way to go in achieving this perceived trustworthiness of the autonomous and connected vehicle and finally putting paid to remnant skepticism. Conversely, there is also a highly positive attitude among those sectors of society that are most familiar with the potential benefits of this technology.

The way in which consumers use, own and acquire vehicles is changing; with the introduction of the connected and autonomous vehicle this rate of change will pick up even more. The business models of vehicle manufacturers and the automotive chain in general need to smarten up their act to be able to reflect these changes and adapt themselves to the challenges posed by management of the huge amount of data generated by this new vehicle concept and its inherent risks such as cybersecurity.

GMV AND THE CONNECTED AND AUTONOMOUS CAR

Within this sea of opportunities GMV prides itself on its years-long contribution to the enabling technology for the connected and autonomous car to become a reality.

GMV has now built up a wealth of experience in developing a wide range of projects and technology in this sector; there follows an account of the most important:

- **Software for end-to-end telematic services and telematic units:** For more than a decade now GMV has been developing embedded software for Telematic Control Units (TCUs): over 2 million vehicles worldwide are now equipped with onboard, GMV-developed, telematic-service-enabling software. Multiplatform service Apps can now be used worldwide by a host of vehicles thanks to inhouse GMV software; these include carsharing; electric-vehicle services such as monitoring the battery charging process or notifying successful completion of the charging process; remote services for starting up the car or carrying out certain maintenance activities; satnavs; infotainment (information and entertainment) services or safety & security services such as eCall, bCall or recovery of stolen vehicles.

- Another of the areas where GMV has been building up a cast-iron position over many years is the development of **advanced autonomous-vehicle positioning technology**. In an autonomous-driving scenario it is more than ever necessary to have high-precision positioning systems with the associated guarantee that this information is reliable and usable by critical road-safety Apps. Diverse GMV-developed Apps on which fine-tuning work is still underway fit perfectly into this paradigm; for that very reason GMV is working to incorporate them into advanced automotive products that bring out the full value and worth of GNSS in autonomous driving.

- One of the most promising business lines, one that is still stoking up great concern within the sector, is the **cybersecurity of the autonomous and connected vehicle**. Connected vehicles offer many advantages; the downside is a set of vulnerabilities to cyberattacks, always a forbidding prospect with any vehicle, whether autonomous or not. We at GMV decided to tap into existing synergies in two areas where we are leaders – cybersecurity and the automotive industry – and we are still working away to develop specific products for protecting the autonomous and connected vehicle from malicious attacks of this type. We are therefore able to offer the sector the services and solutions they need and allow them to become more competitive and win the trust of consumers.

«We are trying to favor the connectivity market with specific services. From the mobility and road-safety standpoint we believe we can offer high added-value services in association with the current satnav service providers and brands»

ANA BLANCO BERGARECHE

DEPUTY ASSISTANT DIRECTOR-GENERAL DIRECCIÓN GENERAL DE TRÁFICO (DGT)

Ana Blanco, graduated as a civil engineer from the *Universidad Politécnica de Madrid* (UPM) and then took a master's degree in Mobility Planning and Management at the *Universitat Politècnica de Barcelona* (UPB).

As Deputy Assistant Director-General of Traffic at the DGT her responsibilities take in all the following: the DGT's Coordination of Traffic Management Centers; running road-safety infrastructure maintenance and traffic management; running traffic-management systems and projects and coordination of European ITS projects. She is also co-president of the European eCall implementation platform.

None better, then, to tell us about mobility and its evolution, especially the connected and autonomous vehicle, cooperative systems, the DGT's roadmap for dealing with the latest innovations and also to give us her opinion on how technology might help to improve mobility, energy efficiency and road safety.

THE SPANISH ROAD TRAFFIC AUTHORITY (DIRECCIÓN GENERAL DE TRÁFICO: DGT) IS AN AUTONOMOUS BODY DEPENDENT ON SPAIN'S MINISTRY OF THE INTERIOR *(MINISTERIO DEL INTERIOR).* FOUNDED IN 1959, IT IS RESPONSIBLE FOR RUNNING SPAIN'S PUBLIC ROAD NETWORK AND FORMULATING ITS ROAD-TRAFFIC POLICY

«The upward trend of road-safety indicators shows that the across-the-board mobility measures, in combination with a more efficient distribution of resources, have all been conducive to an ongoing improvement in road efficiency»

IN RECENT YEARS THERE HAS BEEN AN ACROSS-THE-BOARD MOBILITY REVOLUTION THAT NOW SEEMS TO BE UNSTOPPABLE LOOKING AHEAD. HOW HAS THE DIRECCIÓN GENERAL DE TRÁFICO BEEN ADAPTING ITSELF TO DEAL WITH THIS?

The technological facet of the mobility revolution is being driven by the irruption of digitization and connectivity, making information transmission much more rapid and turning users and vehicles into information generators and receivers.

In terms of connectivity, the DGT is now working on its connected-vehicle platform, serving as the hub of information pooled from different sources. We are trying to favor the connectivity market with specific services. From the mobility and road-safety standpoint we believe we can offer high added-value services in association with the current satnav service providers and brands.

DO YOU BELIEVE THE SAME EFFORT HAS BEEN MADE IN DRIVER TRAINING AS IN CAR DEVELOPMENT, IMPROVEMENT OF ONBOARD EQUIPMENT, ROAD UPGRADING, THE PENALIZING SYSTEM...?

Road safety work in general has been brisk in Spain over recent years and road improvements have without any doubt helped to set up a solid 16,000 km network of safe dual carriageways catering for a huge number of long-distance journeys. As for the vehicles themselves, in recent years there has been a steady takeup of safety systems including driving aids. Lastly, as well as all the above, strategies of communication surveillance and highway-code enforcement have helped to place Spain at the head of international road-safety rankings.

The upward trend of road-safety indicators shows that the across-the-board mobility measures, in combination with a more efficient distribution of resources, have all been conducive to an ongoing improvement in road efficiency.

WHICH OF ALL THE VEHICLE TECHNOLOGIES WOULD YOU EXPECT TO BE MOST DEVELOPED IN COMING YEARS?

In recent years we have witnessed a development of Advanced Driver Assistance Systems (ADAS) based on various sensor technologies that are one of the mainstays of automatic driving. Other techniques like mapping and artificial intelligence also account for some of the most important breakthroughs in the automotive industry.

As far as connectivity goes, we confidently expect an ongoing development and takeup of 3G- and 4G-enabled cellular-communication-

based services with 5G to come in the near future. This new technological environment will enable us to push back the envelope of road safety use cases over and beyond the segments where traffic management systems have currently been rolled out, including conventional roads accounting for nearly 80% of road deaths.

WHAT ROLE CAN CONNECTED- AND AUTONOMOUS-VEHICLE TECHNOLOGIES PLAY IN MOBILITY, ENERGY EFFICIENCY AND ROAD SAFETY?

Bearing in mind the overriding importance of human error in road accidents and working from the Vision Zero principle, vehicle technologies are the best way of reducing error-caused accidents due to fatigue, carelessness sleepiness, wrong interpretation of the road environment, slack reflexes, etc.

New mobility concepts such as Mobility as a Service (MaaS) are now cropping up as well as new vehicle-use arrangements like carsharing and technology-enabled analysis capacities. These new possibilities have to be geared towards a more sustainable use of private vehicles and efficient management of freight fleets.

FOCUSING ON ECALL, BY MARCH 2018 ALL NEW CARS RUNNING ON EUROPEAN ROADS WILL HAVE TO BE FITTED WITH THE SYSTEM THAT AUTOMATICALLY CALLS 112 IN THE EVENT OF ANY ACCIDENT AND REPORTS THE SITE. DO YOU EXPECT THIS MEASURE TO SAVE MANY HUMAN LIVES?

Indeed, as from 31 March 2018 all new cars and vans type-approved in the European Union will have to be fitted with the onboard eCall system.

After the introduction of this system, accident-suffering vehicles will automatically make a free and priority call to 112 centers. The immediacy of the call and provision of additional information (the exact site, identification of the vehicle, propulsion system, etc.) will speed up post-accident attention, saving lives and reducing the seriousness of any injuries, especially on low-traffic rural roads. It is on these roads that the eCall system will really come into its own, automatically reporting the accident when the drivers and passengers are unable to do so.

Also worthy of note here is that experience under the HeERO project is helping to integrate the information systems of 112 centers with management centers of the *Dirección General de Tráfico*. This in turn will help to cut down the knock-on effect of the first accident.

BY WHICH YEAR WOULD YOU EXPECT TO SEE LEVEL-5 AUTONOMOUS CARS ON THE ROADS? WHEN WOULD YOU EXPECT THIS TAKEUP TO BECOME WIDESPREAD?

The proposed self-driving car introduction dates tend to vary throughout the automation sector, depending on the development strategy in each case. Level-5 cars are already running on the roads in some countries though widespread takeup in association with mobility services is still some way off. I hope we will see them soon in Spain; at the moment we are looking at a significant takeup in Spain as from 2030.

WHICH WOULD YOU EXPECT TO BE THE MAIN CHANGES USHERED IN BY NEW MOBILITY MODELS AND THE MAJOR CHALLENGES POSED BY THE AUTONOMOUS CAR IN PARTICULAR?

The new mobility models are likely to have an impact on the layout of the urban space, the makeup and sizing of vehicle fleets, vehicle availability arrangements, etc. This impact will be greater in big cities where environmental factors are more pressing, space is thinner on the ground and the demand for journeys and freight distribution is higher.

The DGT's approach to the autonomous vehicle is very positive. We trust that higher grades of automation will bring down accident rates as it has already done in other means of transport.

As part of this upbeat outlook, in 2015 the first step was taken toward setting up a stable framework for conducting autonomous-vehicles trials in Spain, to the benefit of the whole industry. Automation is always positive and the sure and safe introduction will bring along great benefits. One of the prime tasks now is to set up the necessary regulatory framework for the autonomous car, eschewing regulation overkill.

LASTLY, IS ANY PARTICULAR ROAD-SAFETY DREAM LIKELY TO COME TRUE IN THE NEXT DECADE?

In recent years we have seen how safer roads and vehicles have helped to haul down the accident rate. Some highly populous cities have pulled off the feat of 0 deaths; some vehicle makes have set themselves the same challenge. If this has already been achieved in one-off segments, I trust that in the future the 0 death road-accident challenge will be met in more varied environments and user types.

«The DGT's approach to the autonomous vehicle is very positive. We trust that higher grades of automation will bring down accident rates as it has already done in other means of transport»

The VALEMA project kicks off, another stride forward in the development of operational critical software

ON 11 OCTOBER 2017 THE KICK-OFF MEETING OF THE VALEMA PROJECT WAS HELD. UNDER THIS PROJECT, CO-FUNDED BY THE H2020 EUROPEAN CLEAN SKY 2 PROGRAM. GMV IS LEADING A CONSORTIUM MADE UP BY TECNALIA, RAMEM, SKYLIFE AND UMBRA

This project has received funding from the Clean Sky 2 Joint Undertaking under the European Union's Horizon 2020 research and innovation programme under grant agreement n° 755616.

Clean Sky 2

VALEMA (VALidation tests of ElectroMechanical Actuators and its dedicated control units at TRL 6 level) is closely bound up with the EMA4FLIGHT project, in which GMV is also participating with the same consortium. EMA4FLIGHT aims to develop electronic control units (ECUs) and electro-mechanic actuators (EMAs).

Within this project GMV is playing a key part in the development of ECU software of the main actuator (spoiler) to be integrated by CESA in the IADP regional aircraft (Innovative Aircraft Demonstrator Platforms), in this case the Flight Test Bed 2 (FTB#2) based on AIRBUS DS's C-295 aircraft.

The incorporation of electromechanical actuators is part of the overall attempt to make More Electric Aircraft (MEA). The aim is to test the feasibility of replacing traditional electromechanical actuators by electric actuators, significantly reducing aircraft weight. This all chimes in with the overarching objectives of the Clean Sky 2 program, which sets out to reduce aircrafts' emissions of CO_2, other gases and noise levels, doing so by an overall improvement in every one of the aircrafts' technological aspects: manufacture, materials, fuel consumption, streamlining, weight reduction and operation.

Given that EMA4FLIGHT developments will be flight tested, it will therefore be necessary to carry out a significant battery of qualification tests on the generated hardware, as well as a series of software certification activities designed to obtain flight permission, proving that the development abides by the guides DO-178B and DO-254 for a Level A system.

The remit of the VALEMA project is precisely to generate ECUs and EMAs to be then submitted to qualification tests, as well as generating these software certification activities on the code developed within the EMA4FLIGHT project.

The project is a further development of GMV's ongoing critical software and certification capabilities, honed over several years in diverse Airbus projects, building on the skills perfected in other projects such as diverse developments for the in-flight refueling program (MRTT/FSTA), development of RPAS ATLANTE's Flight Control Computer or development of the ECU of the Airbus A400M's crane system, in this case associated with the management of critical flight surfaces of a commercial aircraft.

GMV hosts EUROCAE's WG62 meeting

FROM 27 NOVEMBER TO 1 DECEMBER GMV HOSTED THE LATEST MEETING OF WORKING GROUP 62 OF THE EUROPEAN AVIATION-STANDARDIZATION ORGANIZATION (EUROCAE), CURRENTLY WORKING ON STANDARDIZATION OF GALILEO AND DUAL FREQUENCY AND MULTI CONSTELLATION SBAS

EUROCAE (European Organization for Civil Aviation Equipment) is a non-profit organization set up in Switzerland in 1963 to create standards for avionics electronics. Its members come from international aeronautics authorities, aircraft manufacturers, air-security service providers, airlines, airport operators and other stakeholders. The organization acts as the overarching framework in which several aeronautics working groups swap notes on the development of standards.

GMV hosted the week-long meeting of WG62, a Working Group it belongs to. It was created to draw up standards for next-generation receivers of Global Navigation Satellite Systems, GNSS. These new receivers will be able to process the signals of all the following: Galileo, Europe's worldwide satellite navigation system; the constellation of the global positioning system (GPS), as well as messages from augmentation systems such as the European Geostationary Navigation Overlay Service (EGNOS) or any other available satellite-based augmentation system (SBAS).

Meeting WG62 - GMV, Tres Cantos (Madrid)

These working meetings helped to flesh out the ARAIM concept (Advanced Receiver Autonomous Integrity Monitoring) while also working towards standardization of dual frequency and multi constellation SBAS for aviation.

To conclude the encounter GMV offered the attendees a run-through of the company's activities, especially in the space sector, courtesy of Pedro J. Schoch, Corporate Development Manager, and Miguel Ángel Molina, Executive Director or GMV's Programs and Business Development Manager, Aerospace.

GMV present at AED's annual encounter

ON 18, 19 AND 20 OCTOBER LISBON HOSTED AED DAYS 2017 PROMOTED BY THE PORTUGUESE CLUSTER OF THE AERONAUTICS, SPACE AND DEFENSE INDUSTRIES

AED Days represents the best chance not only of meeting up with the Portuguese aeronautics, space and defense communities but also of updating information on European funding programs, debating the upcoming challenges, making contact with the main national and international players, developing new business opportunities and improving participation in collaboration networks/partnerships, namely through the matchmaking event organized by Enterprise Europe Network.

This year's edition brought together over 300 participants from 11 different countries, representing many clusters, research and development centers. GMV was one of the companies present at this annual event. José Neves, Security and Defense Manager of GMV in Portugal, moderated the panel discussion dealing with "Industrial development and Internationalization. The perspectives of the Industry", in which several sector companies participated, including EMBRAER and Airbus.

Improvement of NAV Portugal's internal management processes

NAV PORTUGAL, THE ORGANIZATION RESPONSIBLE FOR MANAGEMENT OF PORTUGAL'S AIR TRAFFIC (AT), HAS CHOSEN GMV AS PROVIDER AND IMPLEMENTER OF A CONFIGURATION MANAGEMENT SYSTEM (CMS) WITH THE GOAL OF PERFORMING THE DEMATERIALIZATION OF INTERNAL PROCESSES

As Portugal's air traffic management (ATM) authority, NAV Portugal manages all necessary infrastructure in Portugal and also holds responsibility for application of ATM procedures in the country. Its remit is to ensure a safe and efficient provision of Air Navigation Services, contributing towards the creation of value and well-being for society, while assuming a key role in the aviation sector.

The current project will dematerialize internal project-management processes and all communications between NAV and external entities. This project will also involve digitalization of part of the current physical archive and replacement of the current application responsible for registering all the internal and external mailing. Although focusing initially on the "*Direção de Estudos e Projetos*" department, the project will then be phased into all the rest of NAV departments.

Performance-boosting breakthroughs in distributed integrated avionics platforms

IN A JOINT COOPERATION BETWEEN GMV AND EMBRAER A START HAS RECENTLY BEEN MADE ON THE SECOND PHASE OF THE DIMA PROJECT FOR DEVELOPMENT OF A DISTRIBUTED INTEGRATED MODULAR AVIONICS (DIMA) PLATFORM

A typical Distributed Integrated Modular Avionics (DIMA) platform comprises several avionic Core Processing Modules (CPMs), connected through an avionics platform network (for example AFDX) to each other and to Remote Data Concentrators (RDCs) that bridge legacy devices and data-buses. The DIMA platform is responsible for detecting the payload attached to the aircraft, identifying the configuration to be loaded and executing the reconfiguration procedures throughout the aircraft.

The DIMA1 project concerned the definition and development of an automatically reconfigurable Distributed Integrated Modular Avionics platform, where the reconfiguration trigger was a modification in the payloads attached to the avionics platform.

In the second phase of the project, DIMA2 will capitalize on the previous activity, promoting a platform with a higher technology readiness level, where processors more representative of the aeronautical domain replace the existing CPMs. It also features the integration of a COTS aeronautical component, demonstrating the capability of coexistence and cooperation with such a system.

As a proof of concept, the DIMA platform will be integrated in an Albatross UAV aircraft with a PX4 autopilot. This configuration features: a flight controller system, a payload with reconfiguration capabilities and the possibility of remote pilot control override, guaranteeing flight safety. Both configurations feature the use of a Software Defined Radio (SDR) solution to provide a data-link communication channel with a ground platform.

As a proof of concept, the DIMA platform will be integrated in an Albatross UAV aircraft with a PX4 autopilot

Earth-observation services for monitoring Africa's agricultural output

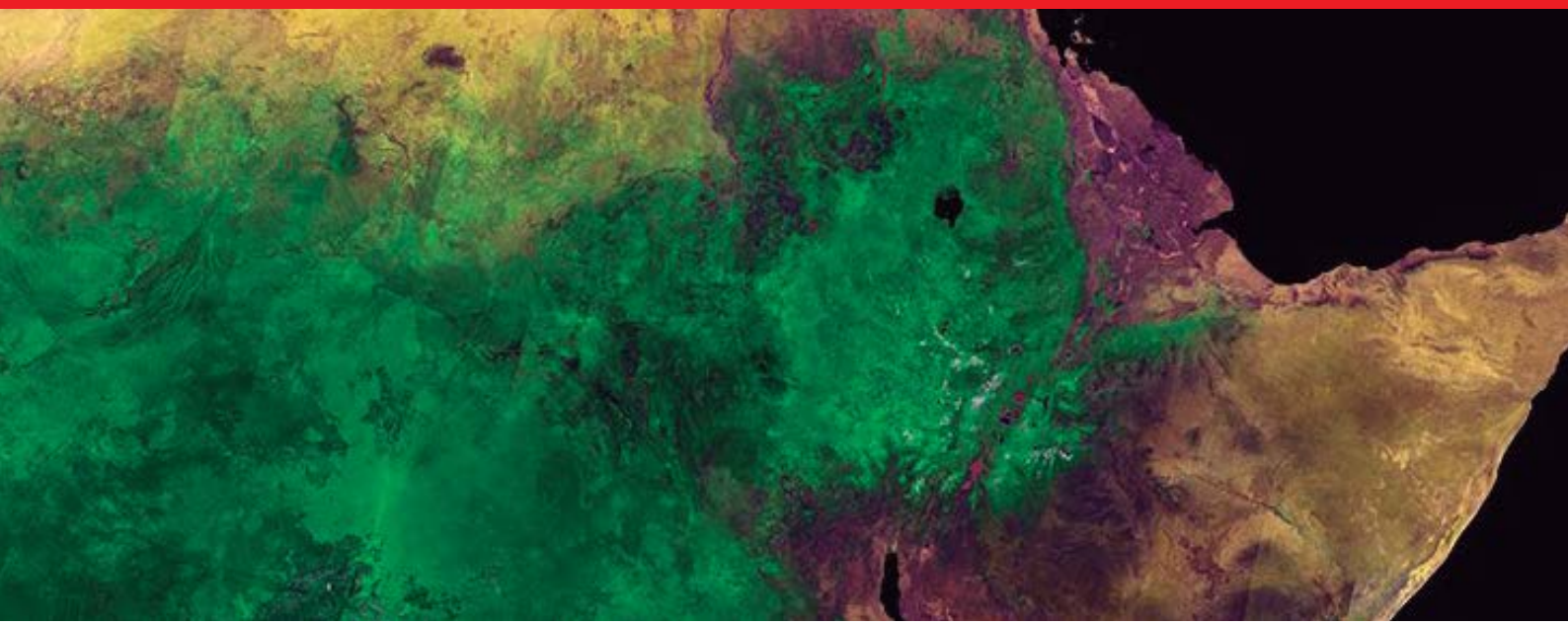
AT THE END OF NOVEMBER, THE AFRICULTURES (ENHANCING FOOD SECURITY IN AFRICAN AGRICULTURAL SYSTEMS WITH THE SUPPORT OF REMOTE SENSING) PROJECT WAS LAUNCHED. AFRICULTURES HAS RECEIVED FUNDING FROM THE EUROPEAN UNION'S FRAMEWORK PROGRAMME FOR RESEARCH AND INNOVATION HORIZON 2020 (H2020) UNDER GRANT AGREEMENT NO 774652

The challenge of AfriCultuReS is to improve food security in sub-Saharan Africa, where 35% of the population over 15 years of age suffered severe food shortages in 2016 (FAO - November 2017).

AfriCultuReS, coordinated by GMV, brings together seventeen prestigious African and European reference entities from various fields of specialization such as climatology, meteorology, crop monitoring and modelling, information technology, social sciences and earth observation. AfriCultuReS aims to design, implement and operationally validate an integrated monitoring, scenario analysis and early warning system as a tool for decision making in the field of food production assurance in Africa.

The project is expected to provide a wide range of climate, economic, biophysical and food production information for various regions of Africa. To this end, it will apply geospatial science for sustainable agricultural development, natural resource management, biodiversity conservation and poverty reduction in Africa.

Supported by a number of multilateral agencies GEO - Group of Earth Observations, African Development Bank (AfDB) and the African Union, AfriCultuReS, all major actors of AfriGEOSS, GEOGLAM, GMES & Africa and other major initiatives, as well as actors representing the diversity of African agricultural systems, will be involved in an effort to improve the services provided by existing systems,



with the innovative fusion of data from African agricultural systems.

Within the framework of the project, the African partners and collaborative networks will be essential to carry out the work of designing, training and promoting the use of project tools. In particular, they will use techniques and tools of social innovation to increase the number of participants and boost the flow of information in a simple and comfortable way. The ultimate goal will be to produce a web-based system that helps decision makers in the area of food production in Africa.

In addition to the overall scientific, technical and administrative coordination of the project, GMV is also responsible for the technical aspects of the communication, knowledge transfer and exploitation plan. GMV is also a leader in the task of analysing user requirements and assessing food safety risks. At the same time, GMV will manage the task focused sustainability and consequent exploitation of results beyond the financial support of the H2020 program.

For the inauguration of the project, all the participants met in Addis Ababa (Ethiopia) on 23 and 24 November for fruitful start-up days attended by the Ethiopian Minister of Irrigation and Electricity, Dr. Seleshi Bekele. The Minister stressed the importance of cooperating with the EU to achieve sustainable development objectives, stressing that "*with projects such as AfriCultuReS, this cooperation is entering a new phase*".

According to Dr. Tidiane Ouattara, Head of the African Union GMES & Africa Programme Unit, who also delivered a speech at the project's kick-off meeting. "*This project can make a difference by involving stakeholders and end-users of Earth Observation products from the outset*".

In turn, Dr. Franz Immler, Head of Climate Action at the European Commission, exceptionally displaced outside Europe for the occasion, highlighted "*the role of AfriCultuReS in the context of the Europe-Africa dialogue*" recently consolidated at the 5th African Union - EU Summit recently held in Abidjan, (Côte d'Ivoire, 29-30 November 2017).

AfriCultuReS is seen by the EU as one of the cornerstones of the European Commission's strategy to intensify cooperation with its African partners, contributing to the development of Europena Union-African Union policy, while promoting and supporting GEO activities and its flagship programmes (e.g. GEOGLAM), regional initiatives, EuroGEOSS and AfriGEOSS.

The event provided an opportunity to establish the framework for the coming years of activities and exchange with invited projects, also funded by the EU, initiatives and professional organisations, concrete opportunities for collaboration in the near future.

GMV participates in the European Space Agency's SET-FPDs Days

THE SET-FPDS ARE AN EVENT FOR EUROPEAN INDUSTRY AND ESA TECHNICAL EXPERTS TO SHOWCASE THEIR WORK IN DEVELOPING ADVANCED TECHNOLOGY FOR SPACE MISSIONS

Once again GMV participated in the Space Engineering and Technology Final Presentation Days (SET-FPDs) held in the European Space Agency's European Space Research and Technology Centre (ESTEC/ ESA),

Pedro Boto, GNSS Engineer (GMV) and Paul McManamon, Technology R&D Engineer (ESA)

presenting the major outcomes of recent space activities.

GMV, together with its partners, presented breakthrough, envelope-pushing developments that enable navigation in the harshest conditions, such as indoors, space environments and urban environments. GMV also looked at the robustness of carrier-phase tracking techniques that allow, for instance, identification and characterization of the ionospheric scintillations phenomena that mainly affect the Equatorial and Polar regions. The applications for these techniques are manifold and range from the scientific community to the aviation domain, where signal integrity is of paramount importance and these effects therefore need to be identified and overcome.

Analysis of the present and future of Spain's space engineering and space industry

The 2nd Space Engineering Congress, organized by the Professional Association of Aeronautics Engineers of Spain (*Colegio Oficial de Ingenieros Aeronáuticos de España*: COIAE) with the collaboration of Association of Aeronautics Engineers of Spain (*Asociación de Ingenieros Aeronáuticos de España*: AIAE) was held from 22 to 24 November in Madrid's Engineering Institute of Spain (Instituto de la Ingeniería de España).

The congress attracted a turnout of over 70 speakers from companies, universities and institutions within the space sector; GMV took an active part in different sections.

The issues addressed by GMV included many of today's hot topics such as Global Navigation Satellite Systems, augmentation systems, space monitoring and surveillance and command and control systems for major constellations.

Jorge Potti, General Manager of GMV's Aerospace sector speaking also as Vice-president of the Space Commission of the Spanish Association of Space, Aeronautics and Defense Technology Companies (*Asociación Española de Empresas Tecnológicas de Defensa, Aeronáutica y Espacio*: TEDAE), took part in the panel discussion on national strategy. GMV was also present in the panel discussion on Innovation, together with ESA's Director of Science, Álvaro Giménez Cañete, among others.

The young startup PLD Space, backed up by GMV's corporate support in its quest of "democratizing" space access, also input its experience and expertise at this event.

GMV renews its SHELL remote-sensing services contract

GMV HAS ACHIEVED A THREE-YEAR RENEWAL OF ITS SATELLITE-BASED INFRASTRUCTURE SURVEILLANCE CONTRACT FOR SHELL, ONE OF THE BIGGEST GAS AND OIL FIRMS TRADING IN THE MIDDLE EAST

The project aims to provide Near-Real Time satellite change analysis for Infrastructure, Land Use Land Cover and Pollution in the concession areas of this company, repeated on a monthly basis (30 days apart) and using both medium and high spatial resolution optical satellite imagery. The analysis should help the day-to-day management of Oil and Gas exploitation operations by providing situational awareness through monthly updated maps of the area of interest, together with geo-information reports highlighting the most important findings and also quantifying, measuring and classifying the changes. Examples of the type of changes being detected are: the identification of potential encroachment areas, new pipelines, new buildings, excavations or oil spills.

GMV is a leading provider of geospatial applications, systems and services using remote sensing data processing and exploitation. In combination with other converging technologies, this information provides user communities with a wide array of systems and services in very diverse industries.

New members brought into the Galileo family

ON 12 DECEMBER FOUR NEW GALILEO SATELLITES WERE SUCCESSFULLY LAUNCHED FROM THE KOUROU SPACEPORT (FRENCH GUIANA)

A sizeable percentage of Europe's economy is now calling for geolocation services. In the early years of 2000, in response to this demand, the European Union began to design and develop its own satellite navigation system, culminating years later in the Galileo program. This represents the first joint initiative of the European Space Agency and the European Commission, run from the GSA (European GNSS Agency) in Prague (Czech Republic) and financed by the European Union itself.

Information on traffic, emergency services, meteorology, agriculture and fishery applications are only some of the many Galileo-enabled uses. The European GPS, as some have dubbed it, has been capable of providing precise positioning and navigation information since 2016, so anyone with an enabled device has been able to benefit from its services.

Galileo currently works jointly with other navigation systems such as America's Global Positioning System (GPS), Russia's GNSS (GLONASS) and China's BeiDuo; and the constellation is scheduled for completion by 2020.

This satellite launch together with next year's launch of another quartet will bring the 24 satellite Galileo constellation to the point of completion, plus 6 orbital spares, in 3 orbital planes, providing four worldwide services: Open Service (OS) of positioning and timing; the Commercial Service (CS); the Public Regulated Service (PRS) for authorized users and the Search and Rescue Service (SAR), Europe's contribution to the LEOSAR configuration.

GMV IN GALILEO

GMV has primed the provision of timing and geodetic services as well as co-leading development of the European Union's GNSS Service Centre (GSC) and leading development of the demonstrator of Galileo's Commercial Service (CS), to vet the system capacity for providing commercial High-Accuracy (HA) services.

In the ground segment GMV has developed critical subsystems of the Ground Control Segment (GCS) and the Ground Mission Segment (GMS), such as the OSPF (Orbit & Synchronisation Processing Facility), IPF (Integrity Processing Facility), SPF (Service Product Facility), FDF (Flight Dynamics Facility) and MNE (MDDN Network equipment). It is taking part in complete system design and engineering tasks within the In-Orbit Validation phase (IOV) plus the Full Operational Capability (FOC) phase, which completes the ground and space infrastructure developed during the IOV phase.

The European Commission also awarded GMV the framework contract for developing the Galileo Reference Center (GRC) plus the framework contract for supply of the Return Link Service Provider (RLSP) and the program's Search and Rescue Service (SAR). Furthermore, 15 GMV employees are providing in-situ support for Galileo operations in Germany's aerospace control center (DLR).

GMV has likewise been working for years on GNSS service Apps, such as the precise point positioning (PPP) services or development of receivers for specific Apps like PRS or IoT.

ESA awards GMV the Mission Control System of the ExoMars Rover Surface Platform

THE DUAL-MISSION EXOMARS PROGRAM HAS BEEN DEVELOPED BY THE EUROPEAN SPACE AGENCY WITH THE AIM OF INVESTIGATING THE MARTIAN ENVIRONMENT AND TRIAL NEW TECHNOLOGIES PAVING THE WAY FOR A FUTURE MARS SAMPLE-RETURN MISSION IN THE 2020S

ExoMars will demonstrate key flight and in-situ enabling technologies in support of European ambitions for future exploration missions and will carry out fundamental scientific research.

The first ExoMars mission, consisting of the Trace Gas Orbiter and a demonstrator Entry and Descent Module, was launched in 2016. The second mission, scheduled for 2020, will consist of the ExoMars RSP mission. The launch configuration is the SCC (S/C Composite), comprising the Carrier Module (CM) and the Descent Module (DM). The CM is jettisoned upon arrival at Mars, and the DM will enter the Mars atmosphere and land. The DM carries inside it the two scientific elements: the Surface Platform (SP) and the Rover. The Carrier and Rover are being developed by ESA while the Descent Module and Surface Platform are being developed by Roscosmos with ESA contributions, drawing on some of the key technology developments and the demonstration performed with the 2016 ExoMars EDM.

The ExoMars RSP will be operated by ESA Operations Centre (ESOC) in Darmstadt (Germany) which has recently awarded GMV a contract for the development and subsequent maintenance of the Mission Control System (MCS), which is responsible for spacecraft monitoring and control functionality within the ground segment.

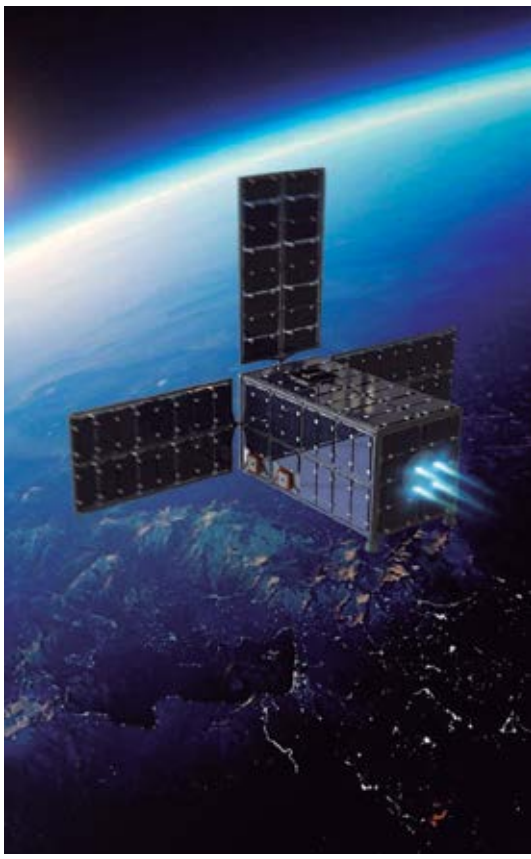
This contract reinforces the lead position of GMV in the provision of satellite MCSs not only for ESOC (where GMV is provider for most of ESA's Earth Observation missions and also of planetary exploration missions like Bepi-Colombo and Solar Orbiter), but also in the European institutional market (where GMV is also provider for the EUMETSAT Sentinel-3, MTG and EPS-SG missions). This predominant position in the institutional market complements GMV's prime position in satellite operators' commercial market worldwide.

The RSP MCS project adds to other important developments GMV is carrying out for the ExoMars 2020 mission, namely the Rover Operations Control Centre for the rover operator Altec, in Turin, as well as space segment projects like the application Software and its SW Verification Facility (SVF) of the onboard Guidance Navigation and Control, Power and Thermal subsystems, among others.

> The contract reinforces the lead position of GMV in the provision of satellite MCSs

GMV participates in the payload of the Infante satellite

GMV FORMS PART OF THE TEKEVER-PRIMED CONSORTIUM TO DESIGN AND BUILD INFANTE, A PORTUGUESE SATELLITE



Infante is an initiative comprising several Portuguese firms and organizations, co-funded by the EU and slated for a late-2020 launch.

The Infante's payload includes, notably, the GMV-developed AIR hypervisor, which will provide the satellite with a robust, safety-critical solution using the TSP (Time and Space Partitioning) paradigm.

The TSP paradigm allows multiple payload applications to be executed while ensuring their isolation, i.e. guaranteeing that any potential failure will not propagate and compromise the mission. AIR will implement this concept by containing each payload application in robust partitions while at the same time affording access to common resources such as the processor, memory and communication layers.

AIR is GMV's TSP solution for Space supporting the qualified version of RTEMS (Real-Time Executive for Multiprocessor Systems). It has been the fruit of a set of ESA activities to bring the TSP concept to the Space domain.

Successful launch of SENTINEL-5P

RIGHT ON TIME, ON 13 OCTOBER, SENTINEL-5P WAS SUCCESSFULLY BLASTED INTO SPACE ATOP A ROCKOT LAUNCHER FROM PLESETSK COSMODROME IN NORTHERN RUSSIA

The Sentinel program, which forms part of the Global Monitoring for Environment and Security program called Copernicus, comprises five satellite families: Sentinel-1, designed to ensure the continuity of ERS and Envisat radar data, Sentinel-2 and -3, dedicated to Earth and ocean monitoring; and Sentinel-4 and -5, dedicated to meteorology and climatology missions, based on a study of the composition of the Earth's atmosphere.

GMV is playing a key role in the Copernicus program, participating actively in various projects for both the ground and space segment. During launches it also provides support services for the mission planning and control systems.

For Sentinel-5P in particular GMV has set up the satellite control center as part of a wider-ranging project for the European Space Agency (ESA) and its European Space Operations Centre (ESOC).

GMV has also been responsible for development of the satellite's operational simulator used actively to vet the mission's flight-control procedures and for pre-launch training of spacecraft operators. As part of the abovementioned duties GMV's development team gave ESOC in-situ support during the pre-launch months; this support will run up to the end of the Launch and Early Orbit Phase (LEOP).

At the same time GMV's permanent ESOC team is contributing actively to development of the Flight Dynamics System (FDS) and operational support of the FDS.

Lastly, 2 GMV engineers have joined the Flight Control Team (FCT) of the satellite's overall operations team.

With this launch Sentinel-5P is continuing along the path already marked out by the other five Sentinel satellites now in orbit, offering a vast amount of information on our planet and a series of key services for a varied range of applications.

GMV has set up the satellite control center as part of a wider-ranging project for the European Space Agency (ESA)

GMV attends NewSpace Europe as part of the Portuguese delegation

GMV was one of the companies invited to join the Portuguese delegation to the NewSpace Europe conference held this November in Luxembourg. The Portuguese Minister of Science, Technology and Higher Education, Manuel Heitor, presented the Portuguese Strategy for Space as well as the installation of the AIR Center – Atlantic Interactions Research Center.

NewSpace Europe is the first space conference in Europe to focus solely on the newspace industry and it was centered on the theme "New Frontiers of Opportunity" highlighting the exponential growth of the space ecosystem, critical to creating a sustainable space economy across the world.

The conference was hosted in Luxembourg City by The Ministry of the Economy of the Grand Duchy of Luxembourg, which aims to establish Luxembourg as a space-resource exploration and utilization center.

GMV has been actively working on technologies such as guidance, navigation and control, as well as spacecraft asteroid approach operations to support planetary defense missions (e.g. deviating asteroids), study their characteristics (e.g. for scientific purposes and resource exploration) or asteroid landings (i.e. SRU and in-situ science).

ESA takes up GMV's mission planning system for the SOC of the Euclid mission

flexplan, GMV'S SOLUTION FOR MISSION PLANNING SYSTEMS, HAS BEEN TAKEN UP BY THE EUROPEAN SPACE AGENCY (ESA) TO FORM PART OF THE SCIENCE GROUND SEGMENT

Euclid, slated for a 2020 launch, is ESA's dark universe mapping mission. It comprises a telescope coupled up to two instruments: the Visual Imager (VIS) and the Near-Infrared Spectrometer and Photometer (NISP). Once launched, the spacecraft will slot into the second Langrian Point, L2, from where it will observe billions of distant galaxies and investigate the nature of matter and of dark energy, key components in the formation and evolution of the universe.

For Euclid, ***flexplan*** will not be used in its classic mission-planning function; rather will it take on the SOC Commanding System (SCS) function; this is a component of the Science Operating Center (SOC) in charge of very low-level checking (atomic tele-commands) of the plans received from the science planner. These plans will then serve as the basis for generating the instruments' telecommand package to be sent by the Mission Operations Center (MOC) to the spacecraft for subsequent execution onboard.

flexplan thus shows its use versatility in operating different sorts of missions and carrying out different functions within the ground segment, whether for operations planning or the precise checking of plans generated by third parties, offering ESA a versatile tool and a robust and complete product.

This is the first ***flexplan*** takeup of ESA's Science Operations Center in Villafranca del Castillo (ESA-ESAC), where Euclid's SOC will be deployed. This therefore represents a new feather in the cap of GMV's fleet planning solution.

Hispasat enlarges its communication-satellite network

ON 12 SEPTEMBER, RIGHT ON SCHEDULE, AMAZONAS 5 WAS SUCCESSFULLY LAUNCHED FROM THE BAIKONOUR COSMODROME (KAZAKHSTAN)

Built by Space Systems Loral (SSL) and with an estimated useful life of 15 years, Amazonas 5 is the eleventh satellite of the Hispasat fleet. Hispasat's Brazilian subsidiary, Hispamar, will be in charge of running the satellite.

Amazonas 5's huge technological capacity will enable it to offer a wide range of communication services, both in the Ku band and Ka band, providing half a million people in several countries of South- and Central-America with broadband connectivity and internet services. Amazonas 5 will also provide regional operators with transport or backhaul services to roll out their 3G and 4G or even 5G cellular networks.

GMV's input to this mission is supply of the satellite control center (***hifly®***) and flight dynamics system (***focusGEO***). The technology multinational is not the only Spanish participator; Spain's space industry has in fact made a crucial contribution to this mission.

GMV participates in GHAIA, a mathematics research exchange project

THE CONSORTIUM INCLUDING GMV WON THE GHAIA PROJECT (GEOMETRIC AND HARMONIC ANALYSIS WITH INTERDISCIPLINARY APPLICATIONS), FINANCED UNDER THE EUROPEAN UNION'S HORIZON 2020 FRAMEWORK RESEARCH AND INNOVATION PROGRAM, UNDER THE SUBSIDY AGREEMENT MARIE SKŁODOWSKA-CURIE (GA N° 777822)

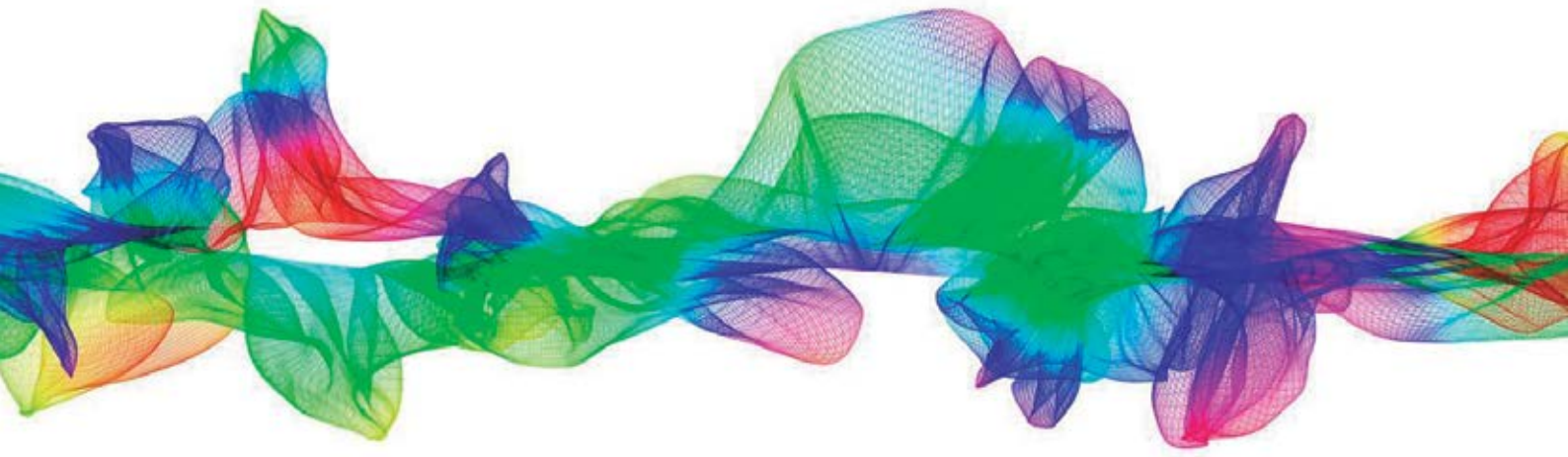
Coordinated by University of Bologna, GHAIA will promote excellence through mobility to the world leader Universities in pure and applied mathematical research: Princeton University, MIT, Yale, John Hopkins, the Universities of California, Texas, Houston, Pittsburgh, the Washington University (St. Louis), and the Worchester Polytechnical Institute, together with the Academia Sinica (Taiwan) and the University of Buenos Aires (Argentina), which have also joined the consortium. European researchers will have the extraordinary opportunity of working in their exciting environment as well as receiving visiting researchers from South America. Moreover two selected enterprises have joined the consortium, allowing intersectorial mobility: Marposs and GMV, leaders in the strategic sectors of EU industry of precision equipments for automatic inspection, and of satellite technologies.

Emerging technological problems call for the development of a new integrated framework of geometric and harmonic analysis, in the context of problems strongly influenced by symmetries and coming from different mathematical and technological fields. The exploitation of groups and supergroups invariances is one of the central goals of harmonic analysis. Achievements in these directions are strictly related to a good geometric analysis of the ambient space. With these instruments we will be able to contribute to some of the biggest challenges of this century: data analysis and models of brain functionality. The final goal will be to obtain new geometrical instruments of machine vision, to be applied to new products for measurement of industrial processes and for satellite guidance.

The international collaborations, through research and secondments, with the selected third-country institutions of the consortium, will provide very high level transfer of knowledge and will have a strong impact on the research capability of the EU sending institutions.

Within GHAIA, GMV will receive the visit of several PhD and post-doc students that will remain several months in the company sharing their knowledge and learning and performing shared development in the frame of Machine Vision for satellite navigation purposes.

The final goal will be to obtain new geometrical instruments of machine vision, to be applied to new products for measurement of industrial processes and for satellite guidance



GMV attends ESOC's fiftieth-anniversary celebration dinner

ESOC – THE EUROPEAN SPACE OPERATIONS CENTRE, IN DARMSTADT, GERMANY – HAS SERVED AS EUROPE'S 'GATEWAY TO SPACE' FOR HALF A CENTURY. IN 2017 ESOC IS CELEBRATING ITS 50TH ANNIVERSARY, HIGHLIGHTING A RICH HISTORY OF ACHIEVEMENT IN SPACE

To formally mark the anniversary of its inauguration, on 13 November, the centre hosted an exclusive dinner to celebrate the 50th anniversary of mission control at the European Space Operations Centre.

The guests at this exclusive event represented 5 decades of ESOC's history. The 100 dinner guests included German ministers and vice-ministers, members of the Directorate General of the European Space Agency as well as its present and past directors. Jorge Potti, General Manager of GMV's Aerospace sector, was one of the guests at this star event, which managed to capture both the warmth and spirit of ESOC, not only celebrating the organization's history but also bringing together everyone who has contributed to this impressive track record.

The solid and long-standing relation between GMV and ESOC dates back to 1985 when GMV won its first mission-analysis service contract for ESA's operations center. This was followed by many other projects, during which GMV worked its way up to the position of ESOC's number-one contractor for mission analysis, flight dynamics, navigation and mission control systems. Nowadays GMV is also ESOC's provider of simulators, space debris, ground-station software and operations, showing the strong bond between both organizations.

Since its inauguration on 8 September 1967, ESOC teams have operated 77 spacecraft, ranging from telecom, weather, Earth observation and climate monitoring satellites to spacecraft studying the Sun or peering deep into our Universe. Exploring our solar system, ESOC has flown missions to the Moon, Mars and Venus, as well as three epoch-making triumphs: Giotto's flyby of Halley's Comet in 1986, the Huygens landing on Titan in 2005 and Rosetta's delivery of Philae to comet 67P/Churyumov–Gerasimenko in 2014 – humanity's first-ever landing on a comet.

More recently, ESOC has launched satellites for Europe's flagship navigation fleet, Galileo, and the EU's new Copernicus programme, and today serves as a powerful catalyst for commercial and scientific growth for space industry across Europe and especially within the Frankfurt/Rhein-Main region and its host German State, Hessen.

The solid and long-standing relation between GMV and ESOC dates back to 1985 when GMV won its first Mission Analysis service contract for ESA's operations center

Credit photos ESA/J.Mai

Jorge Potti, General Manager of GMV's Aerospace sector and Juan Miró, Head of the Ground Systems Engineering Department (ESOC)

Farewell Cassini, Farewell....

AFTER CLOCKING UP NEARLY 13 YEARS ORBITING SATURN, ON 15 SEPTEMBER THE INTERNATIONAL SPACECRAFT CASSINI–HUYGENS PLUNGED INTO SATURN'S ATMOSPHERE AND BROKE UP, MARKING THE END OF THIS EXPLORATION AROUND THE SOLAR SYSTEM'S SIXTH BIGGEST PLANET, KNOWN TO ONE AND ALL FOR ITS SPECTACULAR RING SYSTEM, VISIBLE FROM EARTH

The Cassini-Huygens spacecraft was launched back in 1997. To get to Saturn the rocket performed several gravitational sling-shot maneuvers: two round Venus, one round the Earth, one round Jupiter and the last round Saturn's most distant moon, Phoebe. Seven years later, after visiting seven Saturn moons, like Phoebe and Enceladus, and performing over 44 Titan flybys, Huygens separated from its Cassini mothership. In the 292 completed orbits round the planet the mission collected detailed information on its magnetic field and rings, among other features, discovering hitherto unknown worlds in Titan and the gas giant's icy moons.

In recent months Cassini has been diving through the approximately 1200-mile-wide gap between Saturn and its rings. This 'Grand Finale' maximizes the mission's scientific return, as it skirts the inner and outer edges of the rings and the planet's small moons and skims the outer edges of Saturn's atmosphere.

Cassini-Huygens is a joint endeavor of NASA, ESA and the Italian Space Agency, plus other European academic and industrial collaborators. The spacecraft was built with the participation of 19 countries.

GMV has played a key role in this mission performing all the following: supporting definition of the JPL/ESOC data interface; developing the operational software tool for fine calculation of Huygens data-transmission antenna pointing; conducting various studies and analyses of different entry and descent scenarios plus mission analysis studies in support of the redesign of the Huygens-Cassini communication link; and carrying out the analysis of link budget statistics in entry, descent and surface phases plus analysis of the best antenna pointing to ensure establishment of a good link between Huygens and Cassini.

This end of mission brings to a close twenty years of Saturn study by hundreds of scientists from 17 countries belonging to two different generations. But its legacy lives on. Other missions are now underway to study the solar system's gas giant.

Illustration of Cassini breaking up in Saturn's atmosphere

This end of mission brings to a close twenty years of Saturn study, but its legacy lives on

GMV develops a particle accelerator simulator

Under the umbrella Strategic Program of National Business Research Consortia (*Programa Estratégico de Consorcios de Investigación Empresarial Nacional*: CIEN) of the Industrial Technology Development Center (*Centro para el Desarrollo Tecnológico Industrial*: CDTI), GMV is participating in a consortium with other Spanish companies in the project called Accelerators and Associated Technologies for Big Science Facilities (*Aceleradores y Tecnologías Asociadas para Grandes Instalaciones Científicas*: ACTECA). The purpose of the project is to build up a set of technologies to boost Spanish industry's participation in Big Science Facilities, doing so by developing and building critical, high-added-value components and systems.

GMV is responsible for developing the virtual plant model

The overriding industrial aim of the 7.5-million-euro ACTECA project is to develop the necessary technology to drive Spanish participation in the construction and operation of critical elements of DONES (DEMO-Oriented Neutron Source). DONES, currently under development as the first phase of the IFMIF (International Fusion Materials Irradiation Facility) project, aims to produce neutron flows of similar characteristics to those expected in a nuclear fusion plant, for testing and qualification of the materials to be used in these plants.

In particular, within the ACTECA project, GMV is responsible for developing the virtual plant model, doing so in close collaboration with the Technological-, Environmental- and Energy-Research Center (*Centro de Investigaciones Energéticas, Medioambientales y Tecnológicas*: CIEMAT), a public body for research into energy and environmental matters. There is currently a dearth of plant simulators for supporting both the design and

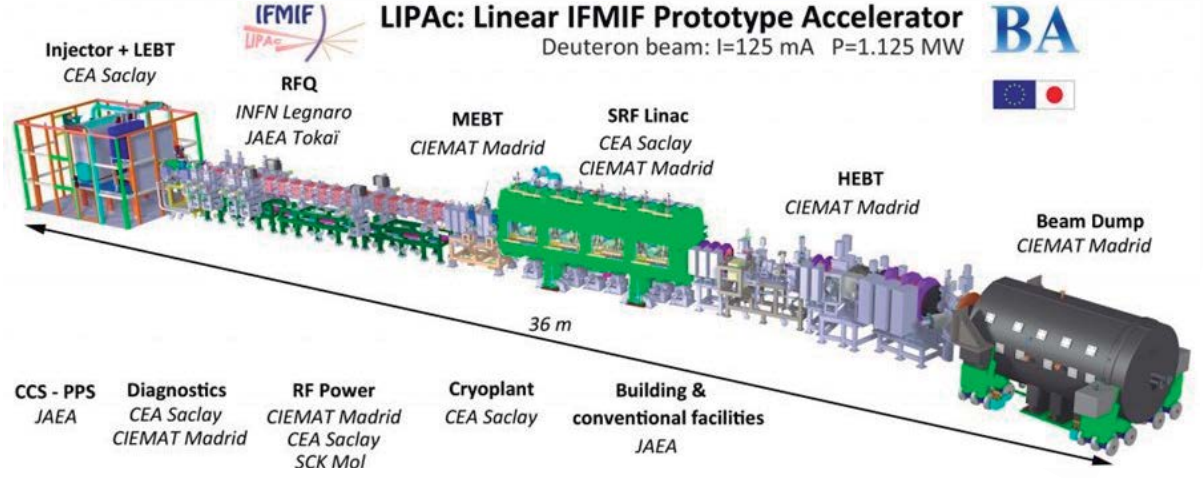


Photo: CIEMAT

operation of various components of particle accelerators and nuclear fusion. That being so, the current idea is to advance towards a generic plant simulator that could be used not only for the design of new systems based on particle accelerators but also to support integration of the plant with the rest of the associated science-plant components, such as the IFMIF-DONES, while also supporting definition and validation of operational and contingency procedures and operator training.

Particle accelerators are devices using electromagnetic fields and resonant cavities to accelerate and guide charged particles at high speeds with various purposes. Their number has soared since their original conception in the first quarter of the twentieth century. There are now estimated to be about 30,000 accelerators in operation around the world; about 85% of these are used for radiotherapy and irradiation applications or for ion implantation in the semiconductor industry. The accelerators targeted by ACTECA are those used for R&D purposes and high-energy physics applications, representing about 1% of the aforementioned total.

GMV's participation in this project chimes in with its ongoing commitment to R&D and advanced simulation applications. Moreover, its participation in the field of Big Science Facilities now dates back to the eighties with its first earth-observation, astronomy and space-exploration projects.

ACTECA project team

GMV participates in the creation of the AIR Center

IN NOVEMBER REPRESENTATIVES FROM SEVEN COUNTRIES SIGNED THE DECLARATION OF FLORIANOPOLIS, BRAZIL FOR IMPLEMENTATION OF THE INTERNATIONAL CENTER FOR ATLANTIC RESEARCH (AIR CENTER)

The document is a step forward in cooperation to create a multilateral organization in the Azores to research climate change, energy systems, space science and data in the Atlantic Ocean. The statement has more than twenty signatories, counting research associations and industry delegates, including GMV.

The center will allow the promotion or scientific collaboration of highly qualified human resources and integrated research on the Atlantic.

In addition to Brazil and Portugal, the other signatories to the memorandum were Angola, Cape Verde, Spain, Nigeria, Uruguay and the Autonomous Region of the Azores. The next high-level AIR Center meeting is scheduled for May next year in Cape Verde. The signatories of the memorandum of understanding agreed to form and appoint representatives to an Installation Committee to address topics such as governance and funding sources for the center.

GMV, represented by Alberto de Pedro, director of GMV in Portugal, also participated in the workshop "From deep sea to space, from space to deep sea" with a presentation on "Next steps towards Services and Applications".

GMV attends the European Commission's Space Robotics Cluster Meeting

Within the PERASPERA project, on 13 December a meeting for the 2nd call of the Space Robotics Cluster (SRC) was held in Brussels. The meeting focused on the presentation of the grants that compose the 2nd Call (the so-called "operational grants" or OG), OG7 to OG11, and also a presentation of the current status of the Operational Grants of the 1st call 2016.

In the frame of the first SRC call (OG1 a OG6), the effort was devoted towards the designing, manufacturing and testing of reliable and high-performance common robotic building blocks for operation in orbital or planetary space environments. In 2016 GMV was awarded three OGs (OG1, OG2 and OG6) out of the total six. GMV representatives of ESROCOS (OG1 devoted Robotic operating Systems), ERGO (OG2, focused on On-board Autonomy Framework design and development) and FACILITATORS (OG6 European Robotic Test Facilities for Orbital and Planetary scenarios) attended the December meeting and provided an overview of up-and-running project status and results.

This new call will tackle the following 6 areas: OG7 (Orbital Support Service), OG8 (Robotized Assembly Of Large Modular Orbital Structures), OG9 (Robotized Reconfiguration

PERASPERA is a proyect coordinated by the European Space Agency (ESA) and the partners are the Italian Space Agency (*Agenzia Spaziale Italiana*: ASI), Spain's Industrial Technology Development Center (*Centro para el Desarrollo Tecnológico Industrial*: CDTI), the French Space Studies Center (*Centre National d'Etudes Spatiales*: CNES), the German Aerospace Center (*Deutsches Zentrum für Luft- und Raumfahrt*: DLR) and the UK Space Agency (UKSA). Funded under the European Union's Framework Research and Innovation Program, Horizon 2020 (H2020), considered to be the most ambitious research and innovation program ever set in motion by the EU, the project's main aim is to develop and promote the main space robotics technologies ahead of future technology demonstration missions

Of Satellites), OG10 (Autonomous Decision Making in very long traverses) and OG11 (Exploring Robot-Robot Interaction in planetary exploration and exploitation).

The goal of this new call will be integration of the common building block output of the 2016 call into a context of well-defined on-ground demonstrators. Once again both planetary and orbital space robotic scenarios will be considered and demonstrated at first. Nevertheless, it is expected that the output will be also address terrestrial applications, such us underwater, nuclear, mining or automotive.

GMV stages a debate between the various educational robotics stakeholders

THE ISSUE OF A ROBOTICS SPECIAL BY THE JOURNAL REVISTA EDUCACIÓN Y PEDAGOGÍA SERVED AS THE MOTIVE FOR GMV TO HOST BY MID-NOVEMBER AN EVENT ORGANIZED BY THE SPANISH ROBOTICS TECHNOLOGY PLATFORM, HISPAROB. AS WELL AS PRESENTING THE ROBOTICS SPECIAL, THE EVENT ALSO STAGED A DEBATE FROM VARIOUS VIEWPOINTS ABOUT ROBOTICS, SOCIETY AND EDUCATION

The day kicked off with a presentation by GMV's business development manager, Juan Carlos Llorente, who stressed the importance of phasing technology into education from the very first stages as well as the new job opportunities that robotics technologies will generate.

This was followed by a panel discussion around the theme "The Present of Robotics and Education", which, from various points of view, weighed up developments since last year's European Robotics Week. Next came another panel discussion dealing with "The Future of Educational Robotics", which stressed the importance of instructing teachers about the best ways of phasing technology into the elementary-school syllabus.

In the last part of the day the companies of Hisparob's Educational Robotics Thematic Group gave a small sample of the materials they work with, displaying the vast potential of this material as adapted to different activities and educational levels. To round things off GMV took the visitors on a brief guided tour of its site, explaining the robotics projects currently underway.

This encounter revolved around a clear idea: the need of all robotics stakeholders to raise public awareness of the importance of robotics, stressing the new job opportunities driven by robotics technology.

GMV stressed the importance of phasing technology into education from the very first stages as well as the new job opportunities that robotics technologies will generate

Robdos wins silver in ERL Emergency Robots 2017

After a year of work the GMV-sponsored Robdos Team, with the collaboration of the land-robot team IMM and the flying-robot team from the Italian Higher Education Institute Piombiono CVP, won second place in the European Robotic League (ERL) Emergency 2017.

In late September the 13 members of the Robdos Team took their underwater robot called WASABI (Water-resistant Autonomous System for Assistance, Bathymetry and Inspection) to the Italian region of Tuscany. The team members, all from the Higher School of Naval Engineers (*Escuela Técnica Superior de Ingenieros Navales*) of Madrid Polytechnic University (*Universidad Politécnica de Madrid*), were working with two crucial competitive advantages that eventually won them their podium position. Firstly, the underwater robot's modular concept enabled them to adapt the platform to suit the specific mission being carried out, cutting down time considerably. Secondly, the robot's high degree of automation enabled them to reduce human interaction in relatively simple tasks, such as visual inspections or bathymetries.

This is the third time that the Robdos Team has competed in European Robotic League (ERL) Emergency, an event organized by the University of the West of England (Bristol) and brokered by the European Commission under the Horizon 2020 program.

GMV conducts the last trials of LUCID in Tenerife

IN MINAS DE SAN JOSÉ IN THE NATIONAL PARK OF TEIDE ON THE CANARY ISLAND OF TENERIFE, GMV IS CARRYING OUT THE FINAL PHASE OF SPACE-ROBOTICS TRIALS UNDER THE GMV-LED, ESA-FUNDED LUCID PROJECT (LUNAR SCENARIO CONCEPT VALIDATION AND DEMONSTRATION)

Throughout this year the prototype lunar rover LUCID has been put through its paces in Madrid and is now in the final trial phase in Tenerife, to check that all the rover's systems work properly. The National Park of Teide has been chosen as the testing site because it is the best match in terms of reproducing the lie of the land to be found by the rover on certain regions of the Moon or Mars.

The first rover tests were carried out in GMV's Tres Cantos site in Madrid, followed by outdoor tests in Dehesa de Navalvillar to the north of Madrid in Colmenar Viejo. Here an efficiency check was made of the all the rover's components, including optical cameras, stereovision systems, laser 3D terrain-reconstruction systems and night navigation systems. Last June GMV's team moved on to Teide to complete the first test phase in a lunar analog site.

From 2 to 16 October LUCID once again ran over the moonlike landscapes of Minas de San José in what was the last testing phase. Definitive sensor tests were conducted at sunset, while also vetting navigation techniques to provide the rover operating team with the best possible information. Other capabilities under test and validation were locomotion, illumination and capture of rover images, a fundamental factor in Moon exploration missions.

This series of tests is crucial as the best way of validating the human-machine interaction, i.e., assessing whether all the information supplied under real conditions is enough for the operator's purposes and whether this information is offered in the best possible way. The trials are equally essential in terms of increasing reliability and maturity after subjection of the system to the most realistic conditions possible.

The National Park of Teide has been chosen as the testing site because it is the best match in terms of reproducing the lie of the land to be found by the rover on certain regions of the Moon or Mars

DRIVER+ Innovation in Crisis Management for European Resilience

SEPTEMBER 2017 SAW THE START OF DRIVER+, THE SECOND PHASE OF DRIVER (DRIVING INNOVATION IN CRISIS MANAGEMENT FOR EUROPEAN RESILIENCE), AN FP7-FUNDED PROJECT BORN IN 2014 WITH THE AIM OF COPING WITH CURRENT AND FUTURE CHALLENGES DUE TO INCREASINGLY SEVERE CONSEQUENCES OF NATURAL DISASTERS AND TERRORIST THREATS

To inaugurate the start of this new phase of the project, all partners met up in Rotterdam on 25-27 September for a fruitful kick-off meeting. The event set the stage for activities over the coming years and enabled invited EU-funded projects, initiatives and practitioner organizations to swap notes on concrete collaboration opportunities in the near future.

DRIVER+ returns with some significant changes. The project's structure has been streamlined to ensure a clearer link between goals and results and a smoother path towards successful fulfilment of plans. In addition, the involvement of external stakeholders, crisis management experts, practitioners and solution providers has been significantly enhanced. DRIVER+ has been opened up wide to the outside world and its success now depends largely on its capacity to forge strong bonds with external collaborators.

DRIVER+ is committed to achieving the following long-term goals by April 2020 (end date of the project):

- **A pan-European Test-Bed for Crisis Management capability development** enabling practitioners to create a space in which stakeholders can collaborate in testing and evaluating new products, tools, processes or organizational solutions.
- **A Portfolio of Solutions (PoS)** in the form of a database-driven website that aims at documenting all DRIVER+ solutions. These will be tested via trials during the project lifetime. Ultimately, the Portfolio of Solutions will be opened up to any external organizations willing to share data and experiences of solutions.
- **A shared understanding in Crisis Management across Europe**, through the enhancement of the cooperation framework. This will be achieved, amongst other measures, by building a dedicated Community of Practice in Crisis Management (CoPCM), closely aligned to and supporting the Community of Users (CoU) initiative from DG HOME and the Disaster Risk Management Knowledge Centre (DRMKC).

As well as participating in all DRIVER+ projects, GMV will make a key contribution to the project's pan-European Test-Bed for Crisis Management capability development. Also, within the Portfolio of Solutions (PoS), which will be tested via trials during the project lifetime, GMV will include its complete SOCRATES control and command suite. Lastly, GMV will be acting as coordinator of all solutions to be included in the first test scheduled within the project.

This project has received funding from the European Union's 7th Framework Programme for Research, Technological Development and Demonstration under Grant Agreement (GA) N° #607798. The opinions expressed in this document reflect only the author's view and reflects in no way the European Commission's opinions. The European Commission is not responsible for any use that may be made of the information it contains.

Work begins on integration of the first shot detector in the VCR 8x8

GMV IS PARTICIPATING IN THE TECHNOLOGICAL PROGRAMS OF THE WHEELED COMBAT VEHICLE VCR 8X8, TAKING ON RESPONSIBILITY FOR DEVELOPMENT AND SUPPLY OF THE SHOT-DETECTION AND VEHICLE-NAVIGATION SUBSYSTEMS AND IMPLEMENTATION OF THE TALOS FIRE SUPPORT COMMAND AND CONTROL SYSTEM IN THE MISSION SYSTEM

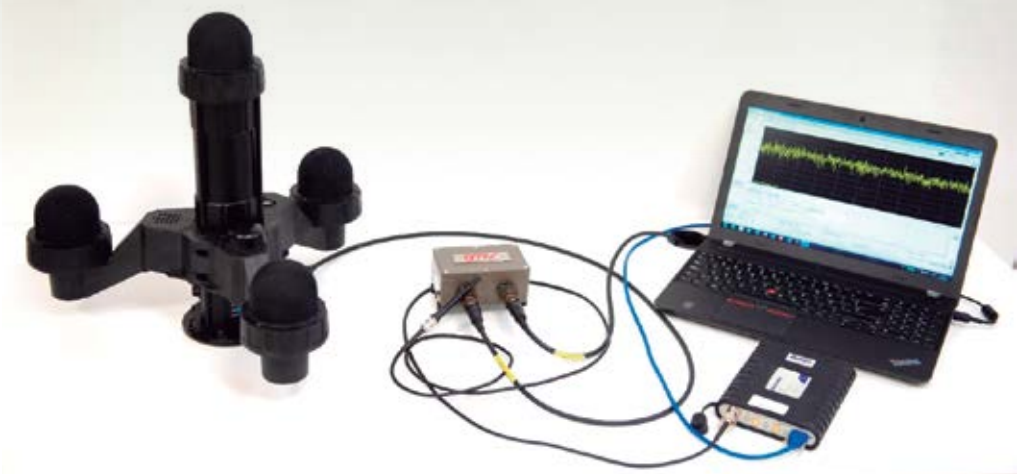
As part of its participation in the VCR8x8 technological programs, GMV delivered the first unit of the gunshot detector for its integration in the mission's testbed.

Within the project GMV has assessed several shot-detection technologies and has advised the program office in the choice of the system to be integrated into the vehicle's technological demos. The final choice fell on the PILAR V system, supplied by the French firm Metravib.

The PILAR V gunshot detection system, based on continuous 360° acoustic monitoring, provides a real-time shot-detection capacity. By comparing the gunshot's soundwaves and shockwaves, the system can tell where it is coming from and identify the caliber of the weapon being used. It provides a 360° continuous azimuth range and an elevation range of between 30° and 90°. It also detects shots not directly targeted at the vehicle but passing nearby. This function expands the protection zone of the personnel deployed around the VCR 8x8. In short, this subsystem provides the VCR 8x8 with an instant reaction capacity and enables the crew to decide on the top-priority threats.

Within the VCR 8X8 program GMV is providing support for integration of the shot detector and develops a component for bringing the sensor into line with the environmental and electrical characteristics required by the program office. GMV is also furnishing consultancy services for choosing the sensor site in the various vehicle configurations. This will involve acoustic appraisal of the demonstrators manufactured within the technological programs, with the purpose of obtaining an acoustic signature of the vehicles. This acoustic signature, together with the correct configuration of the detector is crucial in terms of obtaining the best performance and avoiding false alarms triggered by friendly or enemy fire.

The subsystem's operational units are currently in manufacturing phase and integration of the gunshot detector in the VCR 8x8 will culminate in delivery of the definitive units by the end of the year. Nonetheless, in 2018 work will continue to complete subsystem qualification tests against MIL-STD standards applicable to VCR 8x8 technological programs. Additionally, when the vehicles are available, GMV will carry out their acoustic characterization and support the program office in field tests.



PILAR V gunshot detector together with items developed by GMV in integration tests

GMV at the Security Data Intelligence Conference

BY MID-OCTOBER THE TECHNOLOGICAL SECURITY CENTER (*CENTRO TECNOLÓGICO DE SEGURIDAD*: CETSE) HOSTED THE SECURITY DATA INTELLIGENCE CONFERENCE (*JORNADA SOBRE INTELIGENCIA DE DATOS EN EL ÁMBITO DE LA SEGURIDAD*): "BIG DATA INTELLIGENCE", ORGANIZED BY THE CIRCLE OF DEFENSE AND SECURITY TECHNOLOGIES FOUNDATION (*FUNDACIÓN CÍRCULO DE TECNOLOGÍAS PARA LA DEFENSA Y LA SEGURIDAD*). GMV WAS INVITED TO DEBATE ON THE SOLUTION INTEGRATOR'S VIEW OF BIG DATA

With the aim of analyzing the pathway from data to intelligence in the Defense and Security areas and also to drive the exchange of different viewpoints among experts from security forces and researchers, companies and Big Data professionals, the conference comprised several lectures analyzing the state of the art of these technologies and various panel discussions, where companies and institutions described their development in Spain and their immediate future.

The session was opened by Enrique Belda Esplugues, Subdirector General of Security Communications and Information Systems of the Spanish Ministry of the Interior, and Vicente Ortega Castro, President of the foundation. One of the following speakers was Luis Manuel Cuesta Llorente, Manager of FRONTEX programs, who, under the moderation of the Brigade General of the Guardia Civil, Arturo Espejo Valero, discussed what data intelligence might input to border surveillance procedures, and the activities in this field being carried out by GMV in Europe, and in particular in FRONTEX, since 2010.

The conference was closed by Fernando Santafé Soler, Lieutenant General of the Guardia Civil accompanied by Marisol Martínez Tirado, Director General of the foundation.

GMV presents CLOSEYE results at SRE 2017

THE 2017 SECURITY RESEARCH EVENT (SRE) WAS HELD IN TALLINN AS PART OF THE SECURITY RESEARCH, INNOVATION AND EDUCATION EVENT, ORGANIZED BY THE EUROPEAN COMMISSION IN COOPERATION WITH THE ESTONIAN ACADEMY OF SECURITY SCIENCES (EASS) AND THE ESTONIAN MINISTRY OF THE INTERIOR

SRE is a content-rich Security Research Conference looking at EU's security research priorities over the coming years

SRE attracted a turnout of 400 varied security stakeholders, such as researchers, sector representatives, services and public-security professionals (i.e., firefighters, police, border guards, intelligence services, etc) plus politicians from the whole of Europe.

In a custom-built exhibition area GMV also presented the European Commission's FP7 CLOSEYE project, brought to completion in February 2017. Its aim was to enhance the maritime-surveillance capacities of the Spanish Guardia Civil and the Portuguese Guardia Nacional Republicana, obtaining previously unavailable information from groundbreaking sensors (acoustic and cell-phone detection) and also on the strength of a greater coordination and response capacity of the resources involved thanks to GMV's inhouse SOCRATES tools.

Under this project the system was rolled out and validated for three months during a real operation coordinated by FRONTEX in the Alboran Sea, involving resources from Spain and Portugal: speedboats, ocean-going ships, maritime-patrol aircraft plus national and regional maritime-surveillance centers.

GMV takes part in DSEI

MORE THAN 1550 FIRMS ATTENDED LONDON'S DEFENCE AND SECURITY EQUIPMENT INTERNATIONAL EXHIBITION, DSEI 2017, ONE OF THE WORLD'S LEADING DEFENSE AND SECURITY EVENTS. GMV WAS AMONG THEM, SHOWCASING ITS SOLUTIONS AND SYSTEMS FOR ARMED FORCES AND SECURITY CORPS

This year's exhibition, attracting a turnout of 34,000 visitors, served as an excellent international shop-window for displaying GMV's activities, generating new business opportunities.

The four-day event brought out GMV's notable experience in command and control and JISR (Joint, Intelligence, Surveillance and Reconnaissance). This activity is part and parcel of Spain's participation in NATO's MAJIIC project, where GMV is collaborating not only with diverse NATO organizations but also MoDs of NATO member countries on both sides of the Atlantic, offering its inhouse Mobile ISTAR Operating system (called SEISMO after its Spanish initials: Sistema de Explotación ISTAR Móvil), CSD (Coalition Shared Database), ATENEA (IRM&CM Tool) and COLLECTOR (ISR sensor simulator), which pools information from many different sources in different formats to provide intelligence analysts with the necessary tools for exchanging ISR information.

A delegation from the Directorate General of Armaments and Material (*Dirección General de Armamento y Material*), led by Army Division General Felipe de la Plaza Bringas (recently appointed Subdirector General of International Relations), visited GMV's stand, accompanied by Brigade General Luis Manuel López González (Chief of the External Support Office since 2013).

GMV participates in the foot-soldier program

GMV, in a joint venture with Indra, has been selected by the Spanish MoD for development of the Spanish Foot-Soldier System (*Sistema Combatiente a Pie*: SISCAP).

After a brief lull in the foot-soldier program, SISCAP has relaunched the MoD's R&D activity designed to modernize soldier technology, an activity that began with the Future Foot-Soldier Program (*Programa Combatiente Futuro*: COMFUT).

Under the SISCAP program GMV will be responsible for integration of the Communications and Information System (SIC) and the power supply system. Specifically, GMV will be developing the central power-distribution and processing unit *(Unidad Central de Proceso y distribución de Energía*: UCPE). The UCPE comprises the soldier's main computer connected up to the personal high-capacity data-transmission radio, the helmet-mounted visor and night-vision system, positioning system, target acquisition sensors and rifle-mounted optronic sensors. The UCPE also deals with power distribution to the various items of soldier equipment, drawing on state-of-the-art batteries chosen by GMV for the program.

The UCPE will be developed from GMV's inhouse ruggedized minicomputer LGB10. The LGB10 was developed after completion of the COMFUT program. As the company responsible for the communications and information system GMV identified the market lack of any equipment that pooled the necessary processing capacity and connectivity, while at the same time keeping down the size, weight and power (SWaP) consumption, all crucial aspects for equipment to be carried by any soldier.

The SISCAP SIC will be compatible with the reference architecture defined by GMV in the STASS project (STandard Architecture for Soldier Systems) for the European Defence Agency (EDA).

Participation in the SISCAP program broadens GMV's already considerable experience in the development of soldier systems, a GMV activity dating right back to 2007 and continuing uninterruptedly up to today

New activities under EUCCIS, EU's Command and Control Information System

AFTER ROLLOUT OF THE UPGRADES REQUIRED IN THE FIRST YEAR OF EXECUTION OF EU'S COMMAND AND CONTROL INFORMATION SYSTEM (EUCCIS), GMV HAS RECENTLY SIGNED A NEW CONTRACT WITH THE EUROPEAN EXTERNAL ACTION SERVICE (EEAS) FOR CARRYING OUT THE ACTIVITIES SCHEDULED FROM NOVEMBER 2017 TO SEPTEMBER 2018

The contract, worth more than the last, comes under the 7-year framework contract for maintenance, support and evolution of the EU's Command and Control Information System, awarded in 2016 to GMV as sole contractor.

EUCCIS (European Union's Command and Control information System) enables any operation commander to effectively plan, monitor and conduct EU-led crisis management operations in its ongoing quest for increasingly efficient collaboration between civilians and military personnel.

The main activities during the second year include transverse packages of corrective maintenance, support (help desk), training and consultancy services.

The contract also includes specific packages for improving communications between the various nodes deployed as well as interoperability with other external systems; migration of EUCCIS to the new infrastructure of EAAS's secure network; development of the first phase of the new tactical visor and support for the system's participation in the CWIX 2018 interoperability exercises.

GMV's experience in the field of communication and information systems (CIS) for command and control enables it to take on this whole range of activities, confirming the establishment of a long-term cooperation framework as a tried-and-trusted supplier of EEAS.

GMV at the new edition of MSPO

For the third time GMV has taken part in the International Defence Industry Exhibition, MSPO. This year GMV showcased its products in a stand run by the Polish Space Industry Association and the Polish Space Agency.

In this year's fair GMV showcased its latest avionics- and onboard-software developments, such as the onboard computer of the OPS-SAT satellite.

GMV now boasts the capacity of developing complete onboard systems including hardware and software. This includes system engineering, the development of real-time safety-critical software under stringent quality standards plus hardware and software integration.

The International Defence Industry Exhibition is one of the largest military trade fairs in the world. Last year, the 24th edition of the MSPO was attended by a record number of 614 companies from 30 countries.

Public CERTs better prepared for dealing with cyberattacks thanks to PROTECTIVE H2020

PROTECTIVE
PROACTIVE RISK MANAGEMENT

According to the European Network and Information Security Agency (ENISA) public CERT system protection needs are not currently catered for by the market. This is where the PROTECTIVE system comes in, a Horizon 2020 program that will help Computer Emergency Response Teams (CERTs) to be better prepared against cyberattacks, malware outbreaks and other security problems. They will also have the wherewithal to draw up prevention and response procedures.

GMV's input to the Horizon 2020 research and investigation project focuses on definition and development of alert-correlation models and threat-intelligence sharing modules for National Research & Education Networks (NRENs) and CERTS. It is also responsible for integration and testing of PROTECTIVE's various modules. In particular GMV is contributing its expertise and knowledge of correlation modules and intelligent sharing of security threats.

In the words of José María Legido, Northeast Region Manager of GMV's Secure e-Solutions sector, "*in the context of today's digital transformation, current critical-infrastructure cyberattacks are bound to be replicated on this new generation of means of production*". Industry 4.0 "*will involve an intensive use of software to control sensors, robots and a wide range of cyber-physical systems. Moreover, the integrity of this control software will become absolutely critical for guaranteeing the feasibility of this type of industry and the companies revolving around it*".

SPECIFIC SOLUTIONS

There are currently two main thrusts in the effort to achieve a better knowledge of the state of cybersecurity in Europe. The first involves working with Computer Security Incident Response Teams or Computer Emergency Response Teams (CSIRTs or CERTs) by means of an enhanced monitoring of security and a better exchange of cyberthreat intelligence between organizations. The second concerns critical alert prioritization in terms of the attack's potential damage on threatened assets and hence on the business of organizations.

For years now GMV has been investing in inhouse technology to protect its customers' critical infrastructure. This technology has now been robustly tried and tested against the new cyberthreats now hovering over the new forms of production.

How to protect critical infrastructure

ANY INFRASTRUCTURE PROVIDING THE PUBLIC WITH BASIC SERVICES SUCH AS WATER, ELECTRICITY, GAS, TELECOMMUNICATIONS SERVICES, PUBLIC HEALTH AND TRANSPORT, ETC, IS CLASSED AS CRITICAL

José María Legido, Northeast Region Manager of GMV's Secure e-Solutions sector

This infrastructure is becoming increasingly dependent on ICT systems to work properly. Any cyberattack, therefore, would jeopardize service provision, with the consequent adverse knock-on effect on the population as a whole.

The heart of any critical infrastructure is its control center. This is the habitual workplace of the system's operators and is also responsible for running the infrastructure-managing software.

Small wonder then, in an environment where this infrastructure is normally disconnected from any external elements, that all security has been based until very recently on a strict control of persons entering said control center. There has now been a paradigm switch; the growing interconnection of critical infrastructure with external ICT networks is substantially changing the type of threats it is exposed to, making it a potential target of cyberattacks.

One of the clear objectives of any cyberattack is to compromise the actual running of said control center, typically by installing some sort of malware that gives the hackers an element of control over the critical infrastructure. The ransomware attacks of recent months have hit, among others, certain hospitals of the British health service, thus serving as a clear example of the type of damage these cyberattacks might cause. And we are not talking here about economic damage; in the last instance even human lives might be threatened.

There is a host of ICT security measures, both at network and App level, that now need to be brought in to fend off these cyberattacks. And in each case, it stands to reason, a previous analysis is necessary to pinpoint the risks to be mitigated and the measures to be taken. That said, there is one standout, attack-preventing security measure that has hardly been taken up in today's systems: i.e., application whitelisting technology. This technology protects the integrity of both operational software and operating systems, ensuring that only duly authorized processes are run on them. Combined with an App-level firewall, this arrangement rules out malware infection, favors control of the various peripheries (keyboards, screens, USB, etc.) and prevents data tampering.

Cyberattacks are not going to stop and they are bound to become increasingly sophisticated. Only by innovating, investigating and collaborating with state organizations can the private sector continue to act as an essential ally in Spain's ongoing struggle against those who are trying to bring the country to its knees.

New agreements to market the leading ATM antimalware solution in India and the USA

GMV HAS RECENTLY SIGNED TWO IMPORTANT ***checker ATM Security*** MARKETING AGREEMENTS: WITH AGS TRANSACT TECHNOLOGIES LIMITED (AGSTTL) TO MARKET GMV'S INHOUSE ATM PROTECTION PRODUCT IN INDIA AND WITH SPL GROUP AMERICAS, LLC (SPL) TO MARKET IT IN THE USA

AGS Transact Technologies Limited (AGSTTL) is one of India's leading end-to-end payment solutions providers and will help GMV break into the Indian market and offer this country's ATMs a much higher level of protection against cyberattacks. In the words of Mahesh Patel, CTO and president of AGS Transact Technologies Limited Group: "*With growing cyber security threats worldwide, fraud-prevention technologies are the need of the hour. GMV's* ***checker ATM Security*** *solution meets our desired quality standards and will further our objective of providing a robust security solution along with a seamless service enabling Indian customers to opt for the most reliable solution to meet their security requirements without impacting on operations*".

For its part GMV will have the chance of selling its ***checker ATM Security*** software in the United States and other countries of the world, courtesy of SPL Group Americas, LLC, a multi-vendor ATM security and solutions provider specializing in logical and physical ATM protection. Bearing in mind the increase in ATM malware attacks and the breathtaking increase in logical threats in general, this alliance comes just at the right time to offer the latest protection against such ATM attacks. "*We are excited to become GMV's channel partner. It will give our international customer base access to GMV's checker ATM Security software. With our global presence and offices in Germany, USA, Nigeria and Mexico, SPL is well positioned to market and support GMV's* ***checker ATM Security*** *software,*" said Frank Baldwin, Co-Founder and President of SPL.

checker ATM Security continues its unstoppable worldwide advance, consolidating its leadership position forged on the strength of 10 years of research and product development. It has by now been taken up by 40 banks in 30 countries, protecting a total of over 150,000 ATMS

«Ransomware, the malware low-cost»

Increasingly numerous and sophisticated cyberthreats are nowadays sowing increasing panic among companies and users. The trade reviews Computing and Redes Telecom have therefore organized the First Ransomware Forum with the top cybersecurity experts to guide organizations about how best to safeguard themselves. GMV, as a benchmark cybersecurity firm, naturally gave its point of view. Javier Osuna, Head of the Consultancy, Security and Processes Division of GMV's Secure e-Solutions sector, took part in the panel discussion "Permanent battle against cybercrime".

One of the most headline-grabbing ransomware events of recent times was the WannaCry attack, even though, in terms of real impact, it ended up as little more than a "footnote".

"*As of today, ransomware is a profitable business but it is still the malware low-cost. The worst is yet to come and organizations need to get ready for it*" declared Javier Osuna. He added "*an organization's biggest problem nowadays is ignorance of the assets it possesses, what they are used for and who can use them*".

The most important factors at the moment are where this information and systems can be accessed from and their importance in business processes. In the words of Javier Osuna "*one of the worst things that might happen to any organization is unawareness that its critical infrastructure and systems have been jeopardized or similar blitheness of what moment its systems might fail or could be used for undesired purposes*".

From GMV's point of view there cannot be a single, one-size-fits-all security strategy. Concerns and solutions vary greatly in each case, depending on the particular organization's size, degree of maturity, budgets and the sector it trades in. "*While we gaze into our crystal ball to see what's coming, it is crucial to be prepared and make sure our homework's done beforehand*" argued the expert.

"*Obviously, anyone whose homework has fallen into arrears should now concentrate their efforts and resources on the most urgent matters, overriding the merely important. An emergency situation is no time for seat-of-the-pants strategies, raising user awareness, stocktaking, identifying responsible parties, determining what assets are used for or making new friends*", points out Osuna.

For those who have done their homework, their concerns and strategies should focus on the hotpoints: cloud protection; adoption of security right from the start of any organization's processes; continuous integration security; mobility strategies and solutions; security hardening and application of Big Data and Artificial Intelligence; optimization of existing resources to bring them into line with regulations, etc.

Mariano J. Benito, appointed AMETIC's Vice-president of the Cybersecurity and Confidence Commission

In the past month of June the Spanish Association of ICT Companies (*Asociación de Empresas de Electrónica, Tecnologías de la Información, Telecomunicaciones y Contenidos Digitales*: AMETIC) held an election to renew the managerial posts of the association's Digital-Confidence and Cybersecurity Commission (*Comisión de Ciberseguridad y Confianza Digital*). The winning ticket was David González, of GyD Iberica (Giesecke & Devrient), standing as president along with the vice-presidencies of José Helguero, Director of HELAS CONSULTORES, and Mariano J. Benito, CISO of GMV's Secure e-Solutions sector.

The remit of the Comisión de Ciberseguridad y Confianza Digital is to provide consultancy and technical advice on the secure use of ICTs and to encourage an attitude of prevention and proper management in the implementation of cybersecurity as a fundamental part of adding value to organizations. Its particular purposes include analysis of cybersecurity legislative initiatives affecting the sector and the necessary trust-generating reforms to be brought in.

GMV reinforces its Cybersecurity range with CyberArk

CYBERATTACKS ARE NOW REACHING SUCH A HIGH LEVEL OF SOPHISTICATION THAT THEY CAN ONLY BE REALISTICALLY COUNTERED IF FIRMS SPECIALIZING IN THE VARIOUS AREAS OF CYBERSECURITY FIGHT SHOULDER TO SHOULDER AGAINST THE SAME THREAT. A PERFECT EXAMPLE OF THIS COLLABORATION IS THE AGREEMENT SIGNED BETWEEN TWO MAJOR COMPANIES OF THE CYBERSECURITY SECTOR, GMV AND CYBERARK, WHICH FROM THIS YEAR ONWARDS WILL JOIN FORCES IN THE FIGHT AGAINST CYBERTHREATS.

In all organizations there must be users with privileged management rights; these are likely to become the target of attackers whose purpose is to seize those rights and materialize any threats. In this field GMV boasts a wealth of experience in providing specialized technical consultancy services on identity and access control, specifically including the management of privileged users.

CyberArk', for its part, has proven its leadership in the segment of security in privileged accounts, offering solutions that provide an overview of the activity and access of this type of users, monitoring and detecting suspicious behavior, keeping the necessary evidence to demonstrate past actions and even interacting with other solutions to prevent the propagation of the attack.

With this collaboration GMV reinforces its cybersecurity range by acquiring the necessary expertise to be able to deploy CyberArk's solutions. "*Thanks to CyberArk's solutions we can provide a comprehensive response to the problem of privileged user management, which starts with the advice and ends up by correctly implementing the necessary measures*", explains Javier Zubieta, Head of Cybersecurity Business Development in GMV's Secure e-Solutions sector.

GMV explains how to head off cybersecurity incidents by means of vulnerability management

THE ONGOING INCREASE OF WORLDWIDE CYBERATTACKS ON ORGANIZATIONS OF ALL TYPES IS AN UNDENIABLE FACT, LOOMING EVER LARGER IN THE AGENDAS OF ORGANIZATIONS AND THEIR EXECUTIVES, WHILE ALSO TROUBLING CYBERSECURITY EXPERTS

Many of these attacks feed on mass, organized exploitation of known security vulnerabilities. For this reason organizations are now applying specialized vulnerability-management techniques.

With this scenario in mind, GMV, with the support of Colombia's Association for Managerial Process (*Asociación para el Progreso de la Dirección*: APD), has held in Colombia a conference on the prevention of security incidents by means of technical-vulnerability management.

In the conference GMV spoke about vulnerability management, arguing that this classic problem can now be solved by means of an orderly and ongoing implementation of groundbreaking technological solutions.

A particularly worrying figure for cybersecurity experts: 95% of intrusions occurring today have preyed on known problems or vulnerabilities for which there are already solutions.

GMV has drawn on state-of-the-art vulnerability management expertise to produce its inhouse tool, ***gestvul***, covering all phases of this management, from discovery of the vulnerability, debugging and checking, deciding on corrective action and informing the victims.

ENISE: 11th International Information-Security Meeting

DURING "EUROPEAN CYBERSECURITY WEEK", SPAIN'S NATIONAL INSTITUTE OF COMMUNICATION TECHNOLOGIES (*INSTITUTO NACIONAL DE CIBERSEGURIDAD DE ESPAÑA*: INCIBE) ORGANIZED THE 11TH INTERNATIONAL INFORMATION-SECURITY MEETING (*ENCUENTRO INTERNACIONAL DE SEGURIDAD DE LA INFORMACIÓN*: ENISE)

Under the banner "Cybersecurity Challenges in a Connected World" this new edition of ENISE analyzed such aspects as the current state of cybersecurity in Spain and the international panorama; trends in the private sector, the evolution of cyberthreats and virtual currencies (Blockchain).

Invited by INCIBE, Javier Zubieta, Head of Cybersecurity Business Development in GMV's Secure e-Solutions sector, took part in a panel discussion on the present and future of cyber-intelligence in organizations, also investigating how companies are tackling this matter in their information systems, which tools exist, what problems are solved, the current development level of this market, etc. In the words of Javier Zubieta, "*we now have enough technology to second-guess future internet movements; the important thing is how we use it*". If the latest worldwide cyberattacks have shown anything, it is that organizations, however protected they may believe themselves to be, are in fact vulnerable. At any moment they might suffer a breach of their security. For this reason, argues the expert, "*it is paramount to preempt any threats in order to be ready for an IT attack of any nature. Cyber-intelligence always has to delve well beyond the obvious*" he affirmed.

«Cyber-intelligence has to delve well beyond the obvious»
Javier Zubieta

Action procedure for security incidents requiring notification

There is currently a growing trend for companies to be obliged to report any security incidents to the authorities that be. In 2018 the European General Data Protection Regulation (RGPD) will come into force, while Spain's implementation of the NIS (Network and Information Systems) Directive will also be published. These two pieces of legislation will be added to a swelling body of rules such as the Critical Infrastructure Protection Law or Spain's National Security Scheme, which already make it compulsory for affected companies to report any incidents. Thus, organizations of the public authorities, essential operators or operators of critical infrastructure as well as any firm managing personal data will all be affected by this new legislation.

Even so, the various regulations as yet lack any particular and specific terms and conditions about how this reporting is to be done: When? How much? How often? Reporting to whom? In which format? Organizations hence harbor serious doubts about how exactly to meet this particular reporting obligation. This is especially so whenever any given incident has to be simultaneously reported to several authorities.

Mindful of this grey area, the Quality and Security Working Group of the Spanish Association of Information-Society and Telecommunications Users (*Asociación Española de Usuarios de Telecomunicaciones y de la Sociedad de la Información*: AUTELSI) has drawn up the study "Action procedure for security incidents requiring notification". GMV, as a member of the working group, has collaborated in the preparation and writing of this report, with Mariano J. Benito, CISO of GMV's Secure e-Solutions sector, as the company's group representative.

The aim of the guide is to clarify and cross-check the legal requirements laid down by these regulations, helping information-security professionals, the various members of the crisis/security committee and security bosses to carry out their activity. This will ensure that all of them are notifying any cybersecurity incidents with uniform criteria, within the established deadlines and including all necessary authorities in the reporting procedure. The guide also aims to raise awareness and bring this problem home to the various managerial bodies of companies and public authorities.

The future of ATM malware

FOR YET ANOTHER YEAR GMV FEATURED IN LONDON'S ATM & CYBER SECURITY, CONSIDERED TO BE THE WORLD'S LEADING CONFERENCE ON PHYSICAL AND LOGICAL ATM SECURITY. THE ENCOUNTER TURNED OUT TO BE THE IDEAL SCENARIO FOR PRESENTING, TOGETHER WITH TREND MICRO'S RESEARCH DEPARTMENT, "THE FUTURE OF ATM MALWARE"

Juan Jesús León, Product and New Development Manager of GMV's Secure e-Solutions sector, and David Sancho, Anti-Malware Researcher of Trend Micro, set up a model of the current ATM malware scenario based on how each one of the various types of malware might attack, breaking them down into two clearly defined categories: on the one hand malware involved in network attacks, which tends to be relatively simple; on the other, malware with a physical component, which tends to be more complex and aims to further the cybercriminals' business plan.

In response to the question "What can we expect in the future in this burgeoning malware field?" GMV and Trend Micro came up with two possibilities:

1. The materialization at some point of a malware creation kit that would allow developers to 'customize' malware according to each attack. Such a kit would generate different malware versions, which could then be resold to other criminal gangs to suit their own individual needs depending on who the target bank might be. This would give a further boost to the increasing complexity of physical ATM malware.

2. The advent of an open-source malware-development tool that would-be bank hackers could add to their IT arsenal. Such an open-ended tool would be the final rung in the ladder of a bank's corporate network intrusion and could be used whenever the hackers have found a way to install malware on the ATMs. Why open source? We would argue that the sheer simplicity of the tool makes it a great way for criminals to fly under the radar. Since the tool would be publicly accessible, there would be no clues left behind in these very sensitive machines. The perfect crime.

GMV and Trend Micro have put a lot of thought into these predictions and, given both companies' shared experience in the field, they consider stakeholders in these projects should take them into account when protecting these environments.

GMV takes on the GDPR in Texas's ISC2

The (ISC)² Security Congress of 2017 has been held in the city of Austin (Texas), attracting a 1,500-strong turnout from the cybersecurity industry.

This is the first year GMV has attended this important event, where it was invited to share with the congress-goers its view of the General Data Protection Regulation (GDPR). Mariano J. Benito, CISO of GMV's Secure e-Solutions, in his participation in the panel discussion "GDPR - What You Need to Know", ran through the company's experience in bringing security systems into line with Europe's new General Data Protection Regulation, giving the European viewpoint in a congress with a US audience and fellow speakers.

The panel discussion considered practical aspects of regulation enforcement in companies, ranging from identification of activities that need to be taken on almost immediately to the exercising of the rights granted by the regulation to stakeholders and how to implement them. Other aspects dealt with were the processing and keeping of accounting records, audits or any other types of record, or the fines that might be imposed for any breach.

This being so, all companies and institutions are now bound to work towards compliance with this new regulation. GMV is looking firmly at the wider picture, sure in the knowledge that the new regulation will eventually have a worldwide effect and accordingly advising companies about the measures to be taken into account to ensure this compliance with the regulation's principles, rights and guarantees.

GMV, the Open University of Catalonia and Hospital San Pau drive the creation of a new App to improve the quality of life of Parkinson's sufferers

THE COMPUTER APP FOR HANDHELDS HAS BEEN DESIGNED BY COMPUTER SCIENTISTS, MUSIC-THERAPY EXPERTS AND PHYSICIANS, WITH THE COLLABORATION OF PATIENTS, CARERS AND MEMBERS OF THE CATALAN PARKINSON'S ASSOCIATION. THE APP WILL HELP TO IMPROVE PATIENTS' MOBILITY AND STATE OF MIND AND ALSO TO CARRY OUT MUSIC-BASED TREATMENT OF PATIENTS

Parkinsons is the prototype that has won a competition held by the collaborative Innovation Community called Open eHealth Parkinson, comprising GMV, the Hospital de San Pau Research Institute (*Instituto de Investigación del Hospital de Sant Pau*) and the Open University of Catalonia (*Universitat Oberta de Catalunya*). The App is now expected to be fully up-and-running within a year. During the pilot scheme GMV supervised the technical aspects; its involvement will be even greater in the second phase.

The application has been conceived to be used both individually or in collaboration with the carer, and for patients in all the various stages of the illness, with very different degrees of cognitive and motor deterioration, language impairment and mood swings.

International research has shown that musical activities such as dancing, singing or just listening to music are a good therapeutic reinforcement for Parkinson's sufferers. Music has beneficial effects on their motor capacity but above all on their cognitive and emotive capacity.

Medical researchers therefore hope that, with the previous consent of users, the data collected will foster further progress in research into Parkinson's Disease, which currently affects over 150,000 people in Spain.

GMV takes part in the 7th Healthcare ICT Governance Forum

The Spanish Healthcare IT Society (*Sociedad Española de Informática de la Salud*: SEIS) has organized the 7th Healthcare ICT Governance Forum (*VII Reunión del Foro para la Gobernanza de las TIC en Salud*). Carlos Royo, Healthcare Business Development Manager of GMV's Secure e-Solutions sector, presented the company's healthcare cybersecurity ideas in the panel discussion "Cybersecurity: Are we up for the digital security challenge?"

This event, held in Merida in 2017 came up with answers to questions like: What have we learned from May's worldwide cyberattacks? Can we consider this occurrence as a chance to become fully aware of our vulnerability and focus on working with higher guarantees and a bigger security budget?

EIT Health is supported by the EIT
a body of the European Union

Big Data for personalization of clinical treatment

GMV, WITHIN THE FRAMEWORK OF THIS EIT HEALTH-PROMOTED PROJECT, WILL HELP TO SET UP A SECURE PLATFORM APPLYING CUTTING-EDGE PREDICTIVE AND PRESCRIPTIVE ANALYTICAL TECHNOLOGY

GMV technology will be providing physicians with information on the behavior patterns of some of the commonest chronic illnesses and of those who suffer from them. Thus, on the strength of work carried out under the PAPHOS project, specialists will be able to personalize their treatment of chronic patients, cutting down overlapping prescriptions and tests, directly benefiting patients and favoring sustainability of the health system.

As a result of the PAPHOS project, the data obtained from the exchange of information between various hospitals and medical systems, applying data-mining techniques, will be collated and simplified, allowing specialists to make evidence-based decisions. Eighty percent of Spain's healthcare budget is spent on four chronic illnesses, namely high blood pressure, diabetes, chronic obstructive pulmonary disease (COPD) and heart failure. Working from this eyecatching figure, this project will not only improve the quality of life of chronic patients but also help to optimize resources.

DIGITAL TRANSFORMATION OF HEALTHCARE

The main technological data-analysis trends like automation, cybersecurity, intelligent communities, omni-channel communications and cloud computing are all here to stay; indeed, they are already changing the relationship between patients and health management. As mainstays of digital transformation within healthcare they all help to boost medical efficiency and improve collaboration between healthcare "clients" and their providers. Likewise, they encourage an active patient attitude, helping them to take their own evidence-based health decisions and accept responsibility for their own health.

PAPHOS, driving digital transformation in the processing of healthcare information, works with structured and unstructured data that, once processed, generates clinical decision-making evidence. Given the sensitive nature of such data, GMV complies with all current security and privacy legislation while working with it.

This ambitious project has been promoted by EIT Health, one of the world's biggest healthcare technology initiatives. GMV is one of EIT Health's members, and in the PAPHOS project it has participated not only with other firms but also research centers and universities like ATOS, Aventyn, Bull, Ceateach, Universidad Politécnica de Madrid, Université Grenoble Alpes, Université Pierre et Marie Curie (UPM) of Paris and the Royal Institute of Technology (*Kungliga Tekniska Högskolan*: KTH) of Stockholm.

CARLOS ILLANA.

Manager of *radiance*, the world's only intraoperative radiotherapy (IORT) planner

BACK IN 2007, WORKING FROM AN END-OF-DEGREE PROJECT, CARLOS ILLANA AND HIS TEAM TOOK ON THE CHALLENGE OF PRODUCING THE WORLD'S PIONEER INTRAOPERATIVE RADIOTHERAPY (IORT) PLANNER. THIS WAS FOLLOWED BY TEN YEARS OF RESEARCH, UNSTINTING EFFORT AND THRILLING WORK. CARLOS IS NOW GOING TO TALK US THROUGH THIS GRIPPING STORY OF PERSONAL ENDEAVOR AND CUTTING-EDGE HEALTHCARE RESEARCH

Where did your interest of working in the healthcare sector come from?
I began to work in healthcare in 2004, coinciding with the opening of GMV's healthcare section. Back then a group of colleagues led by GMV's general space manager set out to build up the company's healthcare business from scratch. Our travel mate in this thrilling adventure was the *Universidad Rey Juan Carlos*, with which university we participated in healthcare research projects.

The starting pistol was the 'insight' project, an arthroscopy surgery simulator that, back then, was the end-of-degree project of one of the university's students, as yet very far from being a real healthcare product. GMV's first inroad into this sector began in a market yet to be explored, namely surgery simulation.

A new sector, a non-existent market, a team yet to be formed and, hardest of all, a product to develop! A sterling challenge I took on with real zest. After all, the new project brought together two of my biggest professional interests: medicine and computer-aided teaching, an area where I began my PhD some years ago, specifically in intelligent tutoring systems.

What were your first steps in developing Radiance? What doors did you knock on and what was the response?
Radiance was born from the idea of developing the marriage of medical images and surgical training systems. We saw this as a promising area.

To that end we began to look for human resources to make up an expert and committed team like the one we have today and a research group to collaborate with. We contacted the "crème de la crème": the medical imaging group of the *Hospital General Universitario Gregorio Marañón*, which had been keeping a project simmering on the back boiler since 1997, when the planned development of an end-of-degree project stalled. Ten years later (2007) GMV and the Hospital General Universitario Gregorio Marañón jointly dusted off the project to produce the world's first intraoperative radiotherapy planner.

Who were and are your travel mates on this venture?
Since 2007 we have collaborated with many entities, public and private centers, both national and international. At the start we set up a working group in which up to 50 researchers participated. We whipped up subsidies from various state and regional sources and this seminal idea soon began to grow into today's radiance. The group as made up then comprised the companies Técnicas Radiofísicas and GMV; the universities of Granada, Valencia, Rey Juan Carlos, Politécnica de Madrid, Complutense de Madrid and Universidad Carlos III and Spanish and foreign hospitals. Other collaborators phased in later were the Hospital General Universitario Gregorio Marañón, Hospital Provincial de Castellón, Clínica La Luz, Hospital Ramón y Cajal, Hospital Universitario Doctor Negrín de Tenerife, Mannheim University Hospital, Cleveland Clinic (Ohio), New York's Weil Cornell Medical College, Toulouse's Hospital Oncopole, Heidelberg Hospital and Dusseldorf Hospital.

What's your take on how the physician/engineer tandem works?
The physician-technician collaboration is always complicated because they both have such different approaches. In the radiotherapy area, however, the technicians (radiation physicists) had been working for many years with physicians (radiation oncologists) helping to bridge the gap between them. This fact made this particular specialty a hotbed of technological innovation. This innovation has now ushered in huge advances in oncological therapy that would otherwise have been impossible.

How would you rate the input of each one?
In the particular world of radiotherapy the physician takes the patient's view, ensuring he or she gets the best

possible, most effective treatment, with lower morbidity, greater comfort, lower cost and with a better look to it.

The physicist, on the other hand, is looking for the best treatment from the point of view of accuracy, reliability, repetitiveness and availability, ensuring that processes are always carried out with the required level of quality.

What have you learned about team-working to develop quality-of-life improving products?

Nowadays, with an increasing level of complexity, team-working is essential across the board and especially in technological healthcare developments.

This project has allowed us to know the market mechanisms of healthcare products (legal and health requirements of each part of the world, among other things), as well as to associate commercially with important market references, such as Carl Zeiss Meditec AG and IntraOp Medical Corporation . These references will serve as the basis for future projects, products and services of GMV in the area of health.

Radiance version 4 is already being put through its paces by specialists. What are its strong suits?

This version, cleared for use in Europe and the USA and on the way to gaining clearance in other countries around the world, offers a greater capacity of integration with IORT application devices, user friendliness and calculation precision, all upgraded from previous versions. During these months the above-listed radiance-takeup hospitals have been joined by prestigious hospitals like New York's Mount Sinai and Montefiore. The new version couldn't have got off to a better start.

How technology is revolutionizing the healthcare sector

SPAIN'S NATIONAL HEALTH SYSTEM BEGAN ITS DIGITIZATION PROCESS BACK IN THE NINETIES BY COMPUTERIZING SOME OF ITS CLINICS AND HOSPITALS. BY NOW, THE SITUATION HAS REACHED THE FOLLOWING: 92% OF PATIENTS HAVE AN ELECTRONIC MEDICAL RECORD; 72% OF THEM CAN ACCESS THEIR DATA ONLINE AND 86% OF MEDICAMENTS ARE NOW DISPENSED BY WAY OF AN ELECTRONIC PRESCRIPTION

Technology and Healthcare together spell success. Healthcare is one of the sectors where the application of technology has the most upfront results. This is enabling healthcare resources to be managed more efficiently while also favoring patient-physician communication, improving the quality of healthcare, removing barriers and cutting costs, among other advantages. ICTs are bound to play a key role in today's and tomorrow's healthcare, defined in terms of such key concepts as sustainability, top-quality, personalization, patient-centeredness, ubiquity and evidence-based medicine. Thanks to digitization, there is now a paradigm switch in healthcare based on the 4Ps (Prediction, Prevention, Personalization and Participation).

The technology now up and running includes all the following: application of advanced analytical techniques, such as those being used by GMV on Big Data programs, developed in the framework of several European projects (Harmony for patients suffering from blood diseases and MOPEAD for Alzheimer's sufferers) and helping us to gain a better understanding of the diseases; patient trends and treatment efficiency; and the use of telemedicine platforms such as GMV's inhouse ***antari*** for chronic, multi-pathology patients.

Neither should it be forgotten here that cybersecurity is a sine qua non of this whole healthcare digital-transformation process. Solid protection measures are needed and high availability to guarantee the privacy of healthcare data, its availability and the integrity of healthcare equipment and information.

The Harmony Project features at the BIG/OPEN/SMALL DATA in Healthcare Conference

Under the European Harmony Project GMV is working to develop the Big Data platform to help physicians take evidence-based decisions in diagnosing and treating blood diseases. At the Big/Open/Small Data in Healthcare conference, organized by Valencia University, a presentation was given of the headway made during the first six months of work.

Inmaculada Pérez Garro, Head of healthcare Big Data projects of GMV's Secure e-Solutions sector and Esteban Morcillo Sánchez, hematologist and co-leader of project research, explained how the first project phase "*involved work on the design and implementation of a strategic communication plan to define priorities for designing the project's action plan and ensure everyone is singing from the same songsheet*". At the same time "*data has been collated from the diverse information sources while work has is also underway on ensuring data quality, standardization and abidance by a COMMON DATA MODEL*".

In the GMV manager's words "*we are only just starting and there is still some way to go. The project, after all, runs for five years and we aim to design an enduring platform that can keep up with the breakneck rate of technological change over that period*". In coming months "*thoroughgoing information will be compiled from thousands of anonymous patients and an identification will be made of the important information for evaluating the treatment of hematological malignancies*".

Harmony is a trailblazing project working under a new paradigm of across-the-board collaboration in the scientific world, driven by multidisciplinary participation of experts all inputting their own clinical, technological and legislative expertise… and with the participation too of the pharmaceutical industry.

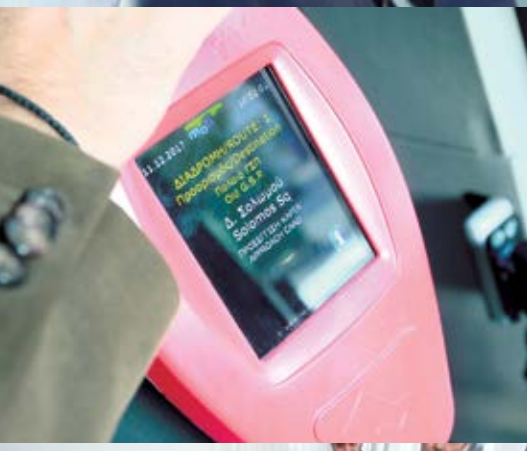
GMV is working to develop the Big Data platform to help physicians take decisions in diagnosing and treating blood diseases

GMV a representative of the Healthcare Sub-Working Group of the European Cyber Security Organization

The European Commission has set up a new public-private cybersecurity association, forming part of a battery of new initiatives designed to enhance Europe's protection from cyberattacks and reinforce competitiveness within its cybersecurity sector. Enter ECSO, the European Cyber Security Organization, which aims to drive cooperation between public and private stakeholders in the first stages of the research and innovation process. The idea is to give European citizens access to groundbreaking, trustworthy solutions (ICT software, services and products). One of the aspects to be taken into account when developing new solutions is the privacy of personal data, a right that really comes into its own when dealing with healthcare data.

To deal with this latter issue and address how digital technologies and the wider use of health data are changing our lives and the ways of healthcare, HIMSS Europe, the European arm of HIMSS, the world's largest health IT membership organization, put on in Tallinn the event "'Health in the Digital Society. Digital Society for Health". One of the participants was Julio Vivero, Head of the Cybersecurity Section of GMV's Secure e-Solutions sector in Barcelona.

Julio Vivero, chair of ECSO's healthcare sub-working group, talked about ECSO's work now underway. It also examined some of the challenges that still have to be met, including all the following: the increase of cyberattacks; the ageing of Europe's population and eHealth as a good option for providing healthcare services; cybersecurity in medical devices; and the advantages that Big Data might bring to the health world, always ensuring the safeguarding of data privacy. Lastly, another aspect investigated was how eHealth trustworthiness will be achieved and perceived by society only if it deals properly with aspects such as privacy, integrity and resilience of the services.



GMV´s technology onboard Cyprus's buses

ON 11 DECEMBER, ONBOARD A BUS IN NICOSIA, CYPRUS'S TRANSPORT AND COMMUNICATIONS MINISTER, MARIOS DEMETRIADIS, PERSONALLY CHECKED OUT THE ADVANCED FLEET-MANAGEMENT AND PASSENGER-INFORMATION SYSTEM CURRENTLY BEING FITTED BY GMV AS PART OF CYPRUS'S OVERALL PUBLIC-TRANSPORT MODERNIZATION SCHEME

During his visit the minster stressed the importance of this system for the country's public transport, implementing as it does telematics and the automatic fare-collection system. This system will be gradually phased in to every city, improving public-transport services for all Cyprus's citizens.

The system is now in an advanced phase. After several months of development and tests with a series of intermediate milestones, such as the closure of the technical specification or the installation of the laboratory buses, between July and August of 2017 GMV successfully passed the Factory Acceptance Test (FAT) and the Site Acceptance Test (SAT), both key project milestones.

Some of these tests were conducted in the offices of the Cypriot ministry.

Others were carried out on the buses themselves, verifying statically and on real routes that the actual operation meets project requirements.

The system came through all these tests with flying colors, winning approval from the Technical Committee assigned by Cyprus's Transport and Communications Ministry.

ONBOARD WITH THE LATEST TECHNOLOGY

GMV's modernization of the public-transport fleet includes the turnkey supply, installation and integration of all the technological equipment and

«The state is obliged to keep up, promote and improve public-transport services. Boosting the number of public-transport users is a crucial step in tackling the traffic problem»

Marios Demetriadis

the necessary software for Cyprus's public-transport bus fleet, including integrated payment systems as well as the fleet-management and passenger-information system.

The system also comprises a common central back-office, diverse onboard equipment to suit the particular vehicle type and use, and posts of various types throughout the whole country.

This GPS technology tells would-be passengers the current location of each bus while the bus's onboard computer keeps up permanent communications between the driver and control center. Information of all type can also be exchanged about any incidents, ETAs, personnel services, etc.

As for the new fare-payment system, this will allow the use of paper tickets, ultralight single-use cards to replace the traditional barcode or magnetic-strip cards. The MIFARE DESFire EV2 rechargeable smartcard will likewise help to ensure a swifter, easier and securer payment system.

These intelligent systems will tell would-be passengers the exact time of arrival at the bus-stop. This information will be given to 30 electronic signal panels installed in bus stations and the main bus-stops at the central points of the cities.

Other advantages of the new advanced fleet-management system are real-time fleet control and monitoring; the use of historical service-quality information; Ecodriving; and the supply of information to onboard passengers at bus-stop panels by means of an App and a web that will be ready by the first quarter of 2018.

GMV attends the latest Trako

FROM 26 TO 29 SEPTEMBER GDANSK HOSTED THE 2017 INTERNATIONAL RAILWAY FAIR TRAKO, THE LARGEST RAIL INDUSTRY MEETING IN POLAND AND THE SECOND BIGGEST IN EUROPE

During the event GMV showcased its whole range of inhouse public-transport solutions. Its stand displayed and demoed GMV's fare-collection system, the onboard systems used by Spain's national railway operator RENFE and a sample of its urban-transport onboard systems, including the video-surveillance system, the passenger information system, the vehicle computer and driver console.

Demos were also given of the railway and urban-transport vehicle-dispatch Apps plus the all-in planning and scheduling platform ***gmv planner*** powered by DPK, one of the newest features in GMV's ITS portfolio, which caters for management of the whole lifecycle of public-transport operations.

The fair gave GMV's team a chance to meet up with its current clients and make new contacts with the companies of Poland and other countries. These new contracts will doubtless bear fruit in the form of new projects to be displayed at future TRAKOs.

GMV applies state-of-the-art tracking technology for TMB's urban buses of Barcelona

FOLLOWING ON FROM THE ONBOARD PROJECTS DEVELOPED BY GMV IN THE PAST, TMB (TRANSPORTS MUNICIPALS BARCELONA) HAS ONCE MORE TURNED TO GMV TO UPGRADE THE FUNCTIONS OF THE DRIVER INTERFACE AND COMMUNICATIONS EQUIPMENT (CPUPPAL)

This new project, dubbed MIGRALOC, has the purpose of improving the current onboard tracking software and migrating it to the new onboard equipment, not only to graft it onto existing software but also ensure maintenance of the network's current functions and performance features.

This new equipment not only performs tracking duties but also caters for many additional functions, such as Barcelona city's WI-FI service, providing internet access from several roadside access points or other access points located in several pieces of local infrastructure.

The equipment also has an inbuilt GPS receiver with 3D ADR (Automotive Dead Reckoning) technology, the main features of which include concurrent reception of signals from different systems (GPS/QZSS, GLONASS, BeiDou and Galileo), management of the odometry signal and vehicle direction, plus additional sensors to provide 3D positioning; this could turn out be very handy for indoor tracking scenarios like multi-storey garages.

On the strength of these new technologies it is now possible to continue accurately estimating the vehicle's position for several kilometers even when the GPS is low or missing, with only a negligible positioning error. Another of the biggest advantages of GMV's solution is internet downloading of all satellite positioning information (almanac), notably speeding up the Time to First Fix (TTFF).

it is now possible to continue accurately estimating the vehicle's position for several kilometers even when the GPS is low or missing

In general, implementation of the GMV-developed tracking software together with integration of this state-of-the-art tracking technology have enabled TMB's 1,000-vehicle fleet, among other advantages, to achieve a useful tracking rate of nearly 100%, even within Barcelona's various tunnels.

New local services card in Valladolid

SPANISH CITIES, IN VIEW OF THEIR GEOGRAPHICAL, ARCHITECTURAL AND URBAN-DEVELOPMENT CHARACTERISTICS, HAVE ALWAYS TENDED TO EVOLVE TOWARDS COMPATIBILITY BETWEEN THE CITY DWELLER'S USE AND ENJOYMENT OF THEIR CITY AND MOBILITY-DRIVEN SUSTAINABILITY

As part of the "Smart City" strategy, Valladolid City Council (*Ayuntamiento*) has for some years been carrying out knowledge-, research- and innovation-based projects, seeking citizen involvement. The city is also the permanent headquarters of the Spanish Smart-City Network; as such, together with GMV, it has also come forward as a demonstration site for several groundbreaking mobility technology projects.

At the same time, the constant evolution not only of information and communication technologies but also intelligent transportation systems has prompted Valladolid City Council to look for suitable systems for managing one of any city's prime mobility variables, i.e. surface parking. In 2016 the council therefore invited bids for a public-thoroughfare parking contract, which was eventually awarded to EMPARK-DORNIER.

Under this contract, on the strength of GMV's wealth of experience in intelligent transportation systems and its expertise in contactless card technology, EMPARK-DORNIER has recently chosen GMV as supplier of Valladolid Council's local service card management system, to allow its use in the regulated surface-parking scheme as well as in other local services.

GMV's system will phase the Local Parking Regulation Scheme (*Ordenanza Reguladora de Aparcamiento*: ORA) into the local services card, allowing this card to be used as ID and means of payment, with top-ups at parking meters.

As a fundamental pillar in the city's Smart City strategy, GMV's system will enable the local services card to be extended later to other local public-transport services, underground parking, sports and cultural facilities and the payment of local fees, among other options.

GMV improves the passenger-information system of Toledo's urban buses

As part of Toledo's public-transport modernization plan, GMV has developed the Android- and iPhone-enabled mobile App "Toledo bus", which gives would-be passengers all necessary information for ensuring the most efficient use of Toledo's urban transport. This new App forms part of the advanced fleet-management and passenger-information system presented to the press in late June 2017 by GMV, Grupo Ruiz / Unauto and Toledo City Council (*ayuntamiento*).

After enablement of the handheld's geolocation permission, the App's main window tells users the various bus-lines and -stops around their present location or any other location entered manually. The "*Cómo llegar*" function then allows you to plan the shortest route between two locations by means of Google maps.

Additionally, the App shows all information on the various bus-lines, -routes and –stops making up the city's urban-transport system and gives real-time ETAs for each stop. This timing information will also be displayed on the 93 information panels to be supplied by GMV under this project. The siting of these panels is currently under discussion by Toledo council itself.

Additional information on the city is available and updated from Toledo council's website; this can be launched from the App's main window.

This new mobile app rounds out Toledo's public-transport system, providing it with cutting-edge passenger-information systems on the website, at bus-stops and onboard the bus

GMV presents its technological innovations at Rencontres

FROM 10 TO 12 OCTOBER GMV EXHIBITED ITS PRODUCTS AT RECONTRES NATIONALES DU TRANSPORT PUBLIC, FRANCE'S FLAGSHIP TRANSPORT TRADEFAIR, BRINGING TOGETHER PUBLIC AND PRIVATE TRANSPORT OPERATORS AND AUTHORITIES AS WELL AS TRAIN AND BUS MANUFACTURERS AND TECHNOLOGY PROVIDERS

The Rencontres tradefair, organized by GART, the French association of transport authorities, and UTP, the railway and public-transport union, was officially partnered by outstanding French industrial groups such as ALSTOM, RATP and TRANSDEV.

GMV showcased its range of urban and interurban fleet management systems and passenger-information systems. Particularly noteworthy was such groundbreaking technology as the ecodriving system, which allows each driver to improve his or her driving quality and offer a more comfortable experience to passengers.

GMV's stand also demoed the fleet-management system taken up by ALSTOM for Sydney's light-transit line in Australia, operated by another French multinational TRANSDEV. During its ongoing work with these marquee French firms GMV has built up a deep understanding of the French market and developed particular fleet-management functions to suit.

GMV also gave personalized demos of GMV's planning system ***gmv planner*** powered by DPK, a tool capable of managing and planning the whole lifecycle of any transport service.

First maintenance contract of Malta's ITS

GMV RECENTLY BEGAN WORK ON A MAINTENANCE CONTRACT FOR THE ADVANCED FLEET-MANAGEMENT SYSTEM, VIDEO SURVEILLANCE SYSTEM (CCTV) AND ELECTRONIC FARE-COLLECTION SYSTEM OF THE TRANSPORT NETWORK OF MALTA PUBLIC TRANSPORT (MPT)

This network is currently used by an average of 100,000 passengers a day, so a top quality maintenance service is essential.

This maintenance system is based on a set of preventive and corrective actions together with 7X24 attention to ensure complete coverage of all incidents and overall control by means of a maintenance management website, an App also supplied by GMV. GMV has also set up on the client's site a repair laboratory staffed by specialist technicians to ensure any incidents are always dealt with instantly.

The advanced fleet-management system, video surveillance system and electronic fare-collection system for which this maintenance system has now been formalized is GPS-, 3G- and WiFi-enabled with door sensors, connection to surveillance video cameras, ticket-vending machines with QR code reader and integration with Malta's "Tallinja card". This whole system is rounded out with a recharging network with 7 points of sale and customer attention points, plus a web portal for telematic recharging and checking remaining travel credits. This system caters for over 1800 telematic card top-ups daily (nearly 70% of total top-ups), which are then passed on in real time to the buses' onboard systems.

New contract-awards for *MOVILOC®*

PME AND CELLNEX WILL BOTH BE TAKING UP GMV'S FLEET MANAGEMENT SERVICE, ***MOVILOC®***

GMV has won a tender held by the State Vehicle Fleet (*Parque Móvil del Estado*: PME) for setting up a management system for its 400-vehicle fleet.

Depending directly on the Subsecretariat of Finance and Civil Service (*Subsecretaría de Hacienda y Función Pública*) the *Parque Móvil del Estado* is responsible for deciding on and meeting the vehicle needs of the central government, public bodies and other public-law bodies linked to or dependent on the central state government as well as the State Constitutional bodies. PME's fleet provides a service for the government presidency, ministries, directorates general, transport of VIPs, etc.

The *Parque Móvil del Estado* took up GMV's fleet tracking and management service for half its fleet back in 2006, discovering at first hand the advantages of onboard telemetry in terms of safety, fleet operation, cost saving and management of any driver payroll incidents. Despite PME's complete satisfaction with the ***MOVILOC®*** service and the time-proven robustness of the onboard equipment (still working correctly with minimum maintenance 11 years later), new needs have now cropped up (identification of drivers, engine alerts, accident alarms, etc.) that could no longer be met by equipment of this age, calling for an overhaul of the onboard technology.

MOVILOC® came through with flying colors on both the technical and economic side.

For their part, Retevisión and Tradia Telecom (two of the companies making up CELLNEX) are taking up the Alphabet Telematics service (the ***MOVILOC®*** version marketed for the Alphabet vehicle-hire firm, a partner of GMV) for their 270-vehicle fleet spread throughout the whole country.

CELLNEX is Europe's biggest independent operator of wireless telecommunications and broadcasting infrastructures. It also rolls out TETRA emergency and security networks for security forces. Its fleet is used for the installation, commissioning and maintenance of this infrastructure.

CELLNEX has contracted the onboard equipment U10D together with an RFID card reader to keep a constant, real-time and historical record of which employee is using each vehicle at each moment.

GMV improves the railway traffic management of ETS

THE BASQUE RAILWAY FLEET MANAGER EUSKAL TRENBIDE SAREA (ETS) HAS AWARDED GMV THE CONTRACT FOR PHASING UPGRADES INTO THE SERVICE GRAPH APPLICATION SUPPLIED BY THE COMPANY IN A PREVIOUS CONTRACT

This new project will introduce improvements in all the following: the scheduling stage, enabling, for example, planning of several consecutive days; the real-time stage, enlarging some service regulation actions; and also the analysis stage, with the addition of new historical reports.

The system, personalized by GMV on the basis of its inhouse railway fleet management system, ***sae-r®***, seeks to cover the multiple stages of railway traffic management. The first (scheduling) stage involves drawing up the operation plans to be used in the future; these plans contain all planned traffic of the railway network for a given day, and are sent on to the centralized traffic control (CTC) systems.

The next, real-time stage, involves daily monitoring of the train traffic. This stage taps into both planning traffic data and actual traffic data, obtained from the CTC. This facilitates monitoring of any deviations with application of the corresponding adjustments, such as modifying the stabling track, holding back a train, etc. As a result of all this, the service is twitched throughout the day and a series of external systems are kept updated, such as station LEDs, the traffic signaling centers, the Euskotren schedule website and the Tetra systems. Last but not least, in the final stage, past traffic is analyzed on the basis of a series of personalized reports.

Syncromatics showcases its transport breakthroughs at APTA Expo 2017

GMV'S ITS COMPANY IN NORTH AMERICA, SYNCROMATICS, TOOK PART AS AN EXHIBITOR AT INTERNATIONAL APTA EXPO 2017, WHICH TOOK PLACE FROM 9 TO 11 OCTOBER IN ATLANTA, GEORGIA

Ian Sephton
CEO of Syncromatics

We are excited to host friends and customers from around the world in Southern California for the next APTA EXPO. We've already begun planning and look forward to sharing the exciting future innovations we have in store

Held every three years in conjunction with the American Public Transportation Association's (APTA) Annual Meeting, EXPO is public transit's premier showcase of technology, products and services.

Syncromatics showcased its innovative, state-of-the-art technologies to help transit agencies keep buses running on schedule, capture ridership and performance metrics, and provide visibility in bus operations.

Visitors were able to step inside a "bus" and experience what their transit experience could be like in the future.

Syncromatics demoed its complete, integrated solution, with the Android-based OpenMDT at the heart. Guests got the chance to see the OpenMDT in action, along with peripherals such as Syncromatics's best-in-class annunciator system. Syncromatics also introduced its new infotainment solution and exhibited, for the first time ever, its real-time onboard arrival display. In addition to upcoming stops a particular bus will make, this onboard display leverages third party APIs and real-time data to show connection information and availability of multi-modal transport solutions such as bike share. Passengers onboard a bus can see very clearly if they wil make their connecting bus or train or how many bikes are available as they approach the stop. At APTA EXPO, Syncromatics was proud to display live data for Atlanta's MARTA Rail system.

In addition to its full suite of fixed-route products, Syncromatics prominently showcased its Easy Rides paratransit and demand-response solution, account-based fare payments, and real-time solar LED signage for bus stops and transit centers, making it clear that the GMV's Company in North America is a market leader in fully-integrated systems, covering all of a transit agency's needs.

Syncromatics showcased its innovative, state-of-the-art technologies to help transit agencies keep buses running on schedule, capture ridership and performance metrics, and provide visibility in bus operations

GMV joins Europe's C-ROADS project

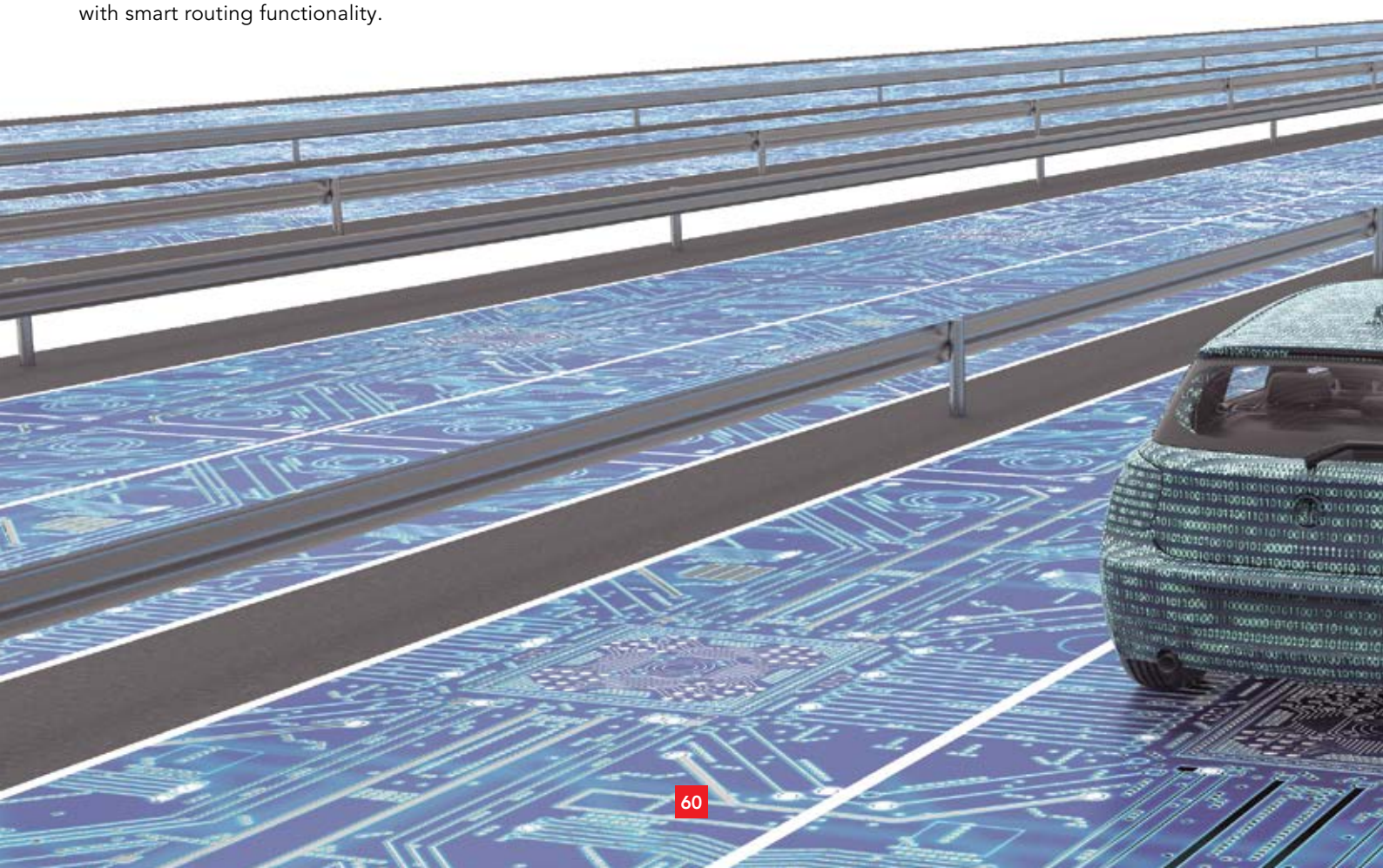
C-ROADS, A PROJECT DRIVEN AND CO-FUNDED BY THE EUROPEAN UNION IN COLLABORATION WITH THE INNOVATION AND NETWORKS EXECUTIVE AGENCY (INEA), AIMS TO LAY DOWN THE BASES FOR THE USE OF COOPERATIVE INTELLIGENT TRANSPORTATION SYSTEMS AND SELF-DRIVING SYSTEMS, INCLUDING THE AUTONOMOUS VEHICLE, GUARANTEEING THE INTEROPERABILITY OF THESE SYSTEMS ACROSS EUROPE WITH THE OVERARCHING GOAL OF BOOSTING ROAD SAFETY, IMPROVING TRAFFIC EFFICIENCY AND MAKING IT MORE ECO-FRIENDLY

Since the advent of ITS, this road technology has been improving road safety, efficiency and the environment, doing so by increasing authorities and drivers' awareness of the state of roads, by making travel faster and to a certain degree by reducing road congestion, and currently by means of mobile Apps with smart routing functionality.

Against this backdrop October 2016 saw the official kickoff of C-ROADS, one of Europe's most ambitious mobility and ITS-connectivity projects.

C-ROADS is bringing together member states to test, harmonize and implement C-ITS services across Europe. Each participating member state builds up a team of national industry partners, including technology providers, such as GMV, but also road operators, local authorities and public institutions related with road transport.

The C-ROADS Platform follows a holistic approach covering all dimensions linked with the deployment of C-ITS, as well as user acceptance. It



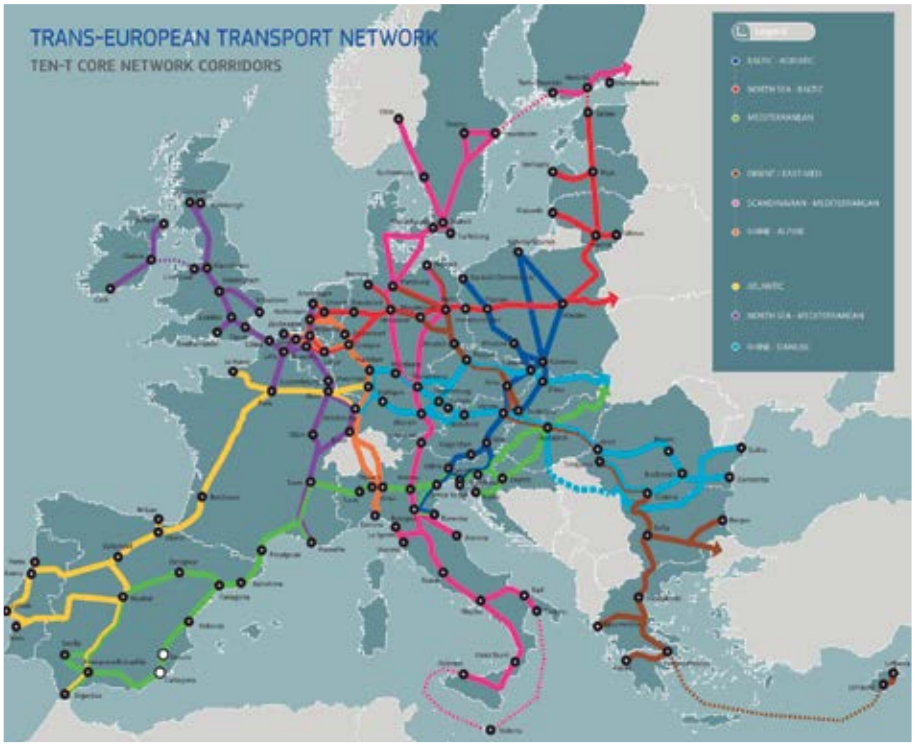
also follows a bottom-up approach that will include national pilots. The national pilot initiatives will move on to cross-site testing to assure transnational interoperability, harmonization being one of the core assets of C-ROADS Pilots deployment.

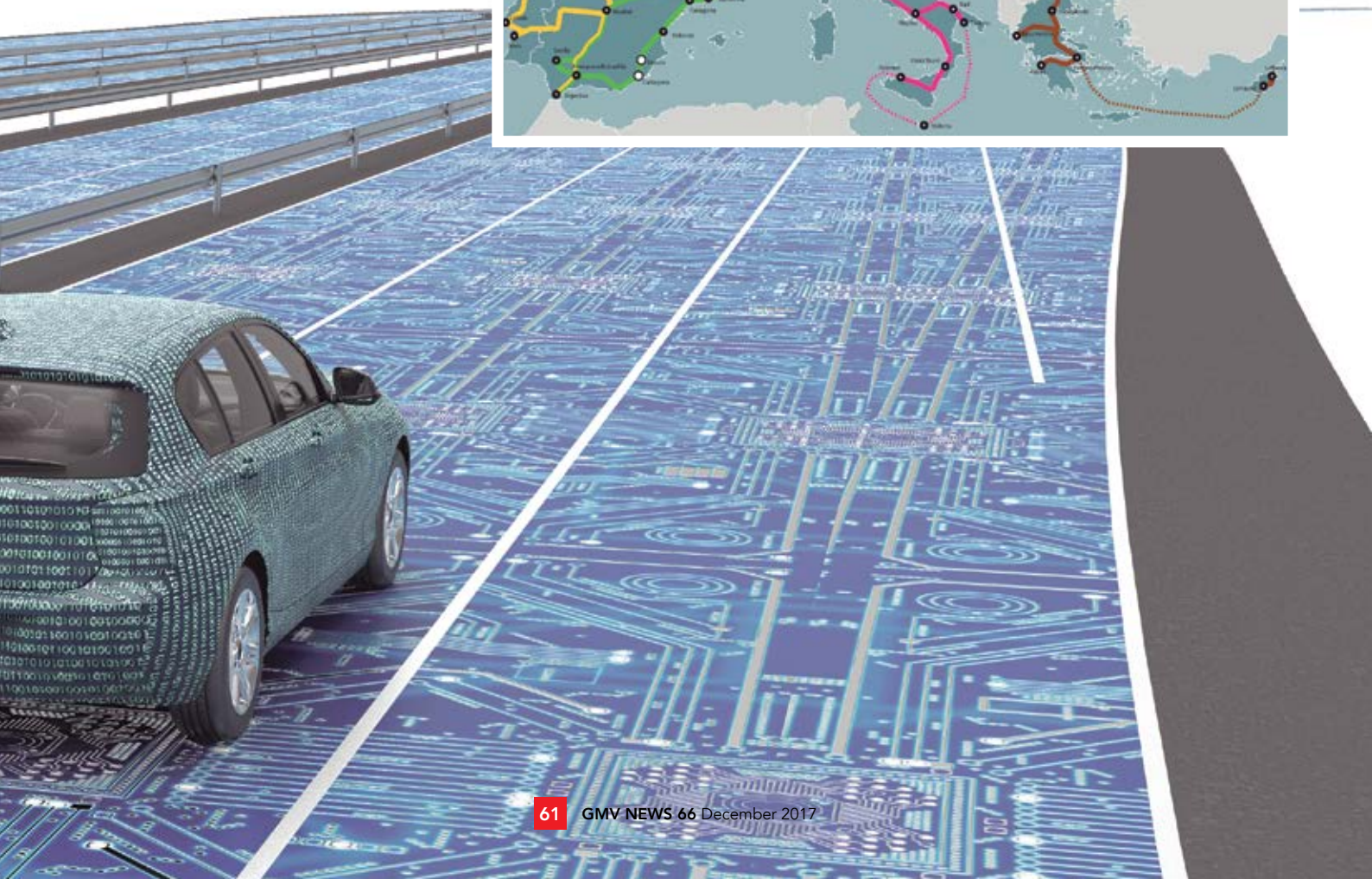
In November Spain and Portugal opted into the C-ROADS platform, and GMV's Portuguese and Spanish offices have been invited to take part.

In Portugal, GMV is participating along with other 30 national partners in the implementation of a total of 5 testbed pilot cases in the Atlantic Corridor in Portugal. From these, GMV will be working in 2, mainly deploying OBUs and RSUs with a set of services implemented, one focusing on highway traffic and another on urban traffic. The kick off was in November 2017 and the project will run until 2020, when it is expected that 964 Km of roads will be covered by C-ITS services, involving a total of 212 RSUs, and 180 OBUs.

In Spain GMV is participating along with 25 other partners in the implementation of a total of 5 local pilots covering roads belonging to the Mediterranean and the Atlantic Corridors. GMV is involved in the former Analysis phase lasting until March 2018, contributing to definition of the Key Performance Indicators (KPIs) that are used to harmonize the way all EU pilots are going to be evaluated in C-ROADS. In addition, GMV is also involved in the Madrid Calle-30 Spanish Pilot until 2020, deploying hybrid OBUs with V2X and Cellular enabled communications as one of the Spanish OBUs providers. GMV will also deliver an HMI App freely downloadable by end-users for connecting up to the DGT and Calle-30 C-ITS control center, presenting real-time information on the available services deployed in Calle-30.

Prime services being rolled out in Madrid Calle 30 are the approach of emergency vehicles, warning of roadworks, traffic and weather information and information on free places in a private parking lot run by one of the consortium partners.





The European sustainable mobility project Urban Air kicks off

IN OCTOBER THE URBAN AIR KICKOFF MEETING WAS HELD. THIS EUROPEAN PROJECT, COMING UNDER THE CROSS-BORDER COOPERATION PROGRAMME INTERREG V-A SPAIN-PORTUGAL (POCTEP), AIMS TO SET UP A GROUNDBREAKING, BICYCLE-BASED MOBILITY SYSTEM FOR MEMBERS OF UNIVERSITY COMMUNITY IN THE CITIES OF VALLADOLID AND COVILHÃ, AT THE SAME TIME MEASURING THE AIR QUALITY ALONG THE ROUTES

Coordinated by Valladolid University, Urban Air's aim is to apply viable trailblazing urban-mobility alternatives that exemplify universities as role models of sustainable mobility within their home cities. To do so the project includes two use cases, one hosted in the Universidad de Valladolid and another in the Universidade da Beira Interior.

The Valladolid university use case will set up an optimized, bicycle-based mobility 4.0 system incorporating a groundbreaking handheld-App bicycle-loan system. This will not only map the locations of available loan bikes but also gauge the city's main pollution gases on an as-you-go basis. The idea is to set up a whole network of such low-cost sensors to show air quality and the best routes for the cyclists to take.

The use case of the *Universidade da Beira Interior*, in the Portuguese city of Covilhã, will establish an e-bike loan system based on a photovoltaic recharging system, with the aim of furthering sustainable mobility in a hilly city that might otherwise prove a tough ask for unpowered bicycles.

Within this €1.5-million, 48-month project GMV is responsible for fitting the bicycle's air-sensor equipment while also developing the management platform and mobile Apps for booking, finding and using the shared bicycles.

GMV participates in HxGN LOCAL Lisbon 2017

HXGN LOCAL LISBON 2017, HEXAGON'S PORTUGUESE USERS' CONFERENCE, WAS HELD ON 10-11 OCTOBER, 2017

This event, which brought together trade professionals and specialists from various firms and public corporations, featured sessions, workshops, and roundtable discussions with industry leaders.

GMV was one of the participating firms in the eCall Workshop, where Bruno Gonçalves from GMV in Portugal spoke about the In-Vehicle System (IVS) and how it works, and the challenges this service will pose in the near future.

The event ended with an eCall simulation showing how this service works and how it will bring about substantial improvements in dealing with emergency calls.

The Regional Authority of Andalusia monitors the quality of its river water using IoT sensors

THE DIRECTORATE GENERAL OF PLANNING AND MANAGEMENT OF STATE-OWNED HYDROLOGICAL RESOURCES OF THE REGIONAL ENVIRONMENT AND LAND-USE MINISTRY OF ANDALUSIA (*CONSEJERÍA DE MEDIOAMBIENTE Y ORDENACIÓN DEL TERRITORIO DE LA JUNTA DE ANDALUCÍA*) HAS TURNED TO GMV FOR CARRYING OUT A PILOT SCHEME FOR MEASURING VARIOUS PARAMETERS OF THE WATER-QUALITY OF THE DAM COLLECTING THE GUADALETE RIVER AS IT FLOWS THROUGH THE CADIZ LOCALITY OF JEREZ DE LA FRONTERA

The IoT SEMS platform, deployed in the lab of GMV's Seville office, together with the water-quality sensors set up in the hydraulic infrastructure of the local municipality called El Portal, make up a sustainable water-quality-monitoring network for the waters of the Guadalete River, used to irrigate the arable land of northwest Cadiz.

In the words of Ángel Cristóbal Lázaro, GMV's product leader "*the reduced cost of the measuring equipment is a key feature of this platform, allowing technicians of the Directorate General of Planning and Management of State-Owned Hydrological Resources to monitor remotely the reservoir's water quality*".

Among the many challenges solved by GMV's engineers in this groundbreaking Internet-of-Things project, special mention must go to the device designed and mounted to reduce power consumption and communications for triggering the sensors only when the technician wishes to measure such parameters as pH, dissolved oxygen or conductivity. At the same time, GMV has come up with an answer for one of its client's top priorities: cut down the number of on-the-spot equipment-recalibration visits. Moreover, the use of the SIGFOX network has entailed validation of the project's UNB networks as a communications layer.

The technology used in this GMV-deployed pilot scheme will furnish the regional ministry (*Consejería*) with a water-quality measuring system tapping into a higher density of measuring points throughout the whole Andalusian territory. This translates in turn into a tighter control of the water network at a lower maintenance cost.

GMV's project as carried out for the Junta de Andalucía shows that technological breakthroughs like the Internet of Things provide alternative, lower-cost monitoring methods that match any other system in efficiency. This empowers the authorities-that-be to enlarge their network of devices, thereby ensuring compliance with the water-quality requirements laid down by the European Union's Water-Framework Directive.

GMV's project as carried out for the Junta de Andalucía shows that technological breakthroughs like the Internet of Things provide alternative, lower-cost monitoring methods that match any other system in efficiency

GMV participates in «The Digital Reality in Spain»

UNDER THE BANNER "THE DIGITAL REALITY IN SPAIN", THE SPANISH ASSOCIATION OF ICT COMPANIES (*ASOCIACIÓN DE EMPRESAS DE ELECTRÓNICA, TECNOLOGÍAS DE LA INFORMACIÓN, TELECOMUNICACIONES Y CONTENIDOS DIGITALES*: AMETIC), TOGETHER WITH THE UNIVERSIDAD MENÉNDEZ PELAYO AND BANCO DE SANTANDER, HAVE ORGANIZED THE 31ST TELECOMMUNICATIONS AND DIGITAL ECONOMY ENCOUNTER (*ENCUENTRO DE LA ECONOMÍA DIGITAL Y LAS TELECOMUNICACIONES*), BRINGING TOGETHER PRESTIGIOUS SPEAKERS, TOP REPRESENTATIVES FROM THE MAIN FIRMS OF THE VARIOUS PRODUCTIVE SECTORS, EXPONENTS OF THE ACROSS-THE-BOARD VISION OF WHAT HAS COME TO BE CALLED THE "FOURTH INDUSTRIAL REVOLUTION

Leading figures from the government and public institutions were equally keen to attend the congress. It was opened by the Minister of Energy, Tourism and the Digital Agenda, Álvaro Nadal. Other leading public figures present were Carmen Vela, Secretary of State of Research, Development and Innovation; Begoña Cristeto, Secretary General of Industry and SMEs and José María Lassalle, Secretary of State for the Information Society and Digital Agenda of Spain. The congress was then closed by the Director General of Red.es, Jose Manuel Leceta.

This yearly meeting is one of the ICT musts in Spain. GMV has now become one of the main sponsors while also presenting papers and taking part in discussion panels to share the company's ICT experience in its various lines of business.

Mateo Valero, Director of the Barcelona Supercomputing Center / Pedro Mier, President of AMETIC / Francisco Marín, Director of the Centro para el Desarrollo Tecnológico e Industrial (CDTI) / Luis Fernando Álvarez-Gascón, General Manager of GMV's Secure e-Solutions sector / Maria Teresa Gómez, Director General of AMETIC / Lluís Torner, Director of the Instituto de Ciencias Fotónicas (ICFO)

SCIENCE AND INDUSTRY IN SPAIN:
COLLABORATION EXPERIENCES

Luis Fernando Álvarez-Gascón, General Manager of GMV's Secure e-Solutions sector, took part in the panel discussion on "Science and Industry in Spain: collaboration experiences", moderated by the Director of the Industrial and Technological Development Center (Centro para el Desarrollo Tecnológico e Industrial: CDTI), Francisco Marín.

Luis Fernando tracked back 33 years to explain how today's firm of GMV was originally born from the farsightedness of a university professor and a group of young undergraduates, all of whom believed that their space R&D projects were worthy of an important business project. Today, GMV is a 1,600-strong technology multinational carrying out cutting-edge projects in areas as diverse as space, healthcare, intelligent transportation and cybersecurity.

Álvarez-Gascón argued that there was currently a certain "pessimism" in Spain's innovation ecosystem, due to the general belt-tightening in public R&D projects. But there are also another two factors to account for this downbeat attitude; firstly, "*the lackluster business contribution towards R&D funding*", which, he argued, should be doubled, and secondly "*the challenge of bringing Spain's R&D to wider notice and greater effect*".

He also argued that "*times of economic crisis bring out the best of some.*" Despite the pervading pessimism he believed that Spain "*could be perfectly competitive in any sector*". Álvarez-Gascón wound up by advocating an overhaul of the university sector to stress the importance of a science career and seek a greater socioeconomic impact.

Times of economic crisis bring out the best of some, Spain could be perfectly competitive in any sector

e-HEALTH:
THE EFFECT OF ICTS ON THE HEALTHCARE SECTOR

GMV's participation included moderation of an e-Health discussion panel, where Carlos Royo, speaking as Healthcare Business Manager of GMV's Secure e-Solutions sector, moderated an interesting debate on the effect of ICTs on this sector.

Carlos Royo came out with hard facts and figures on the current difficulties faced by the sector and the problems looming up in the near future. "*The first man to live 140 years has now been born*". With this attention-grabbing phrase Carlos Royo kicked off the e-Health debate, explaining that life expectancy is soaring and people are now reaching old age in tip-top condition. This wonderful news has a worrying downside: "*40% of public expenditure nowadays goes on healthcare; 80% of this expenditure is spent on 4 chronic illnesses: high blood pressure, diabetes, heart problems and breathing problems*". This all points to a grave sustainability challenge. In Royo's opinion "*the only way to guarantee future sustainability of Spain's health system is by using and harnessing the full potential of ICTs. Without ICTs there is no solution*".

"*In this country we have performed marvels with healthcare ICT, becoming an international benchmark, even though healthcare ICT investment accounts for only 1% of the total healthcare budget. This has got to change*", argued Doctor Royo.

The only way to guarantee future sustainability of Spain's health system is by using and harnessing the full potential of ICTs. Without ICTs there is no solution

GMV a finalist in the IBM Watson Build Challenge

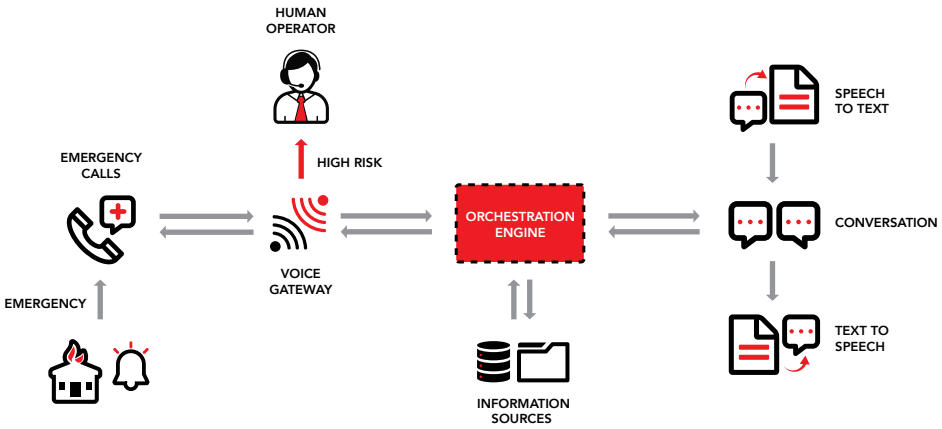
The cognitive computing market is booming. According to IDC, by 2018 half of all consumers will interact with services based on cognitive computing on a regular basis. IBM is investing heavily in solutions of this type. It has now developed a sophisticated system, called Watson, with an advanced data-processing capacity, including unstructured data, showing machines' capacity to make "intelligent" decisions based on real-time analysis of huge swathes of data in all types of environments.

As part of this ongoing quest IBM has set up the "IBM Watson Build Challenge", an international competition in which the New York company challenges participants to create their Apps with the aid of the IBM Bluemix platform and IBM Watson's cognitive technology.

GMV was invited by IBM to design, build and launch a commercially viable App based on cognitive technology. GMV's Big Data and Business Analytics team took up the challenge and designed HelpBot, an assistant capable of prioritizing emergency calls and giving the user a practically instant response with the help of IBM Watson's artificial intelligence computing system.

GMV's brainchild made its way through all the knock-out rounds to the final. Those lucky enough to get that far were able to work with IBM's tools and the support of its cognitive specialists for development of their prototype.

HelpBot is a chatbot App based on the IBM Watson solution. Its remit is to improve communications between emergency-service authorities and the victims of extreme situations



GMV present at IDC Directions

GMV Portugal ran a stand at the 20th IDC Directions, Portugal's main ICT and Digital Transformation event, attracting an all-time-high turnout this year of over 1,400.

The event, held in October, discussed the main guidelines of how national executives should be leading the Digital Transformation (DX) strategy in their own organizations, a breathtakingly-fast transformation that is expected to pick up even more speed in the coming years.

IDC Directions accomplished the purpose of sharing the main predictions and insights from IDC and the main industry players for the global and national market in terms of the next chapter of the third Technological Platform, Innovation Accelerators and DX in the period running from 2017 to 2020.

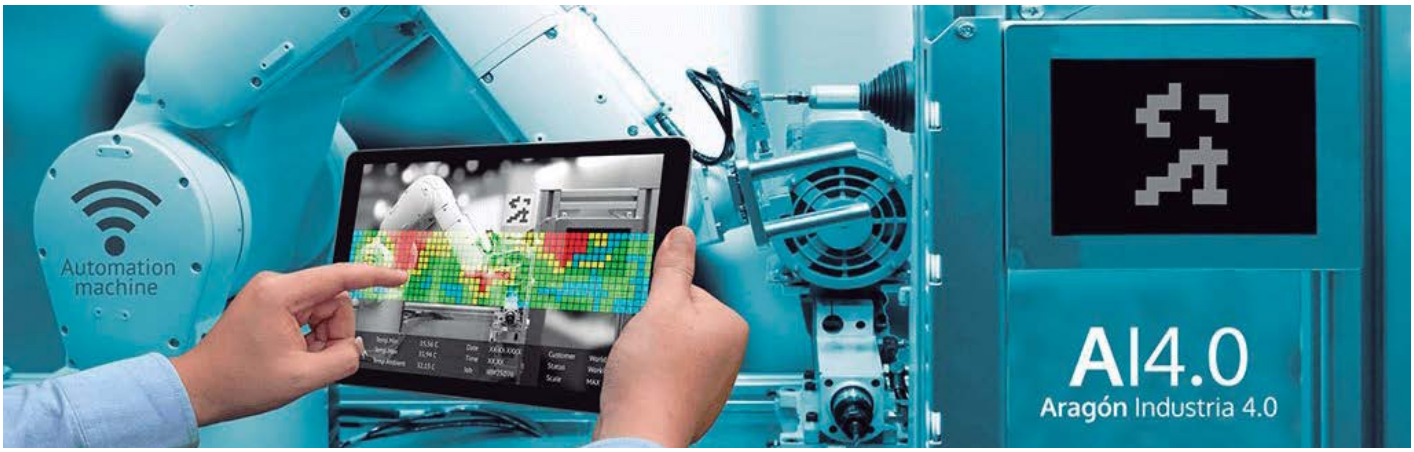
GMV drives the digital transformation of Aragon's companies

GMV BACKS THE ARAGON GOVERNMENT'S INITIATIVE TO DRIVE THE REGION'S DIGITAL TRANSFORMATION BY INPUTTING ITS EXPERTISE TO THE PORTAL ARAGON INDUSTRY 4.0

In the words of Ángel Gavín, Aragon Delegate of GMV's Secure e-Solutions sector, "*Aragon's productive fabric boasts innovating companies that have viewed the challenge of transforming their processes and procedures towards the digital world as an opportunity*". Along these lines the website "Aragón Industria 4.0" (Aragon Industry 4.0), driven by the Economics, Industry and Employment Department (*Departamento de Economía, Industria y Empleo*) and led by the Aragon Technology Institute (*Instituto Tecnológico de Aragón*: ITAINNOVA) "*represents an excellent platform for providers, government and companies to work jointly in favor of our region's contribution towards Spain's digital transformation*".

GMV's robotics and simulation experience and expertise was hard-wired into the company's very origins, since it was originally set up to lead aerospace projects. Throughout its 33-year history it has evolved and applied this expertise and other spinoff knowledge to areas such as Big Data, Cybersecurity, Advanced Analytics or Artificial Intelligence in new scenarios such as Industry 4.0.

GMV's solvency in this matter has been recognized by the regional government, which has included it as an enabling company in the "Aragón Industria 4.0" portal. GMV's aim is to share the company's knowledge not only in the areas where it has been working away for years but also in recent Industry 4.0 projects it is now leading such as Productio, designed to win Aragon's industry pole position in the new industrial model.



Industry 4.0 Sustainability and Energy-Efficiency

New technologies and innovation have driven digitization of factories and their productive models, benefiting organizations by improving their productivity, competitiveness and sustainability. We are now in a phase of immediate opportunities in terms of operational efficiency (justified by means of cost saving) but this is only the start of a promising future.

During the enerTIC-brokered Industry 4.0 Sustainability and Energy-Efficiency conference (*Eficiencia Energética y Sostenibilidad en la Industria 4.0*), GMV took part in a debating forum investigating how technology is driving the new industrial revolution, as well as the energy sector. Within this forum, Miguel Hormigo, Southern Region Manager and Industry 4.0 Team Leader of GMV's Secure e-Solutions sector, stressed that the new transformation stage calls for trade professionals with "*such skills as creativity, emotional intelligence, collaboration and critical thinking*".

Globalization, the sheer speed with which the changes are occurring, the social challenges we are facing and new technologies all call for immersion in a continuous innovation process. The technology "*driving the digital transformation or the so-called enabling technologies such as Big Data and artificial intelligence, cyber-physical systems, simulation and virtual reality, robotics and autonomous systems, additive manufacturing, cybersecurity, Cloud Computing, Internet of Things and other game-changing technologies emerging now or in the future will all help to streamline productive procedures and processes with a knock-on improvement in energy efficiency*" argued the expert.

PRISCILLA ILEANA VARGAS RODRÍGUEZ

«I took the plunge and discovered a new world full of thrilling changes that keep you constantly on your toes»

It was in 2015 when, out of left field, I got the chance to come from the Dominican Republic to Spain to take a master's degree in cybersecurity. For me this was a watershed moment; up to that time my career had followed the path of software analysis and development. I took the plunge, however, and discovered a new world full of thrilling changes that keep you constantly on your toes.

As part of the master's degree I attended several information-security conferences and forums. One of these conferences was CiberSeg 2016, held at Universidad Alcalá de Henares. It was at this university that I came across GMV, one of the event sponsors. At that moment I was keen to do an information-security internship and GMV struck me as a very attractive and innovating firm so I left my résumé with GMV's human-resources reps at the event.

At that moment the GMV internship did not pan out, but it always struck me as a firm I could identify with. Eight months later, after finishing my master's and its internships, I had to decide whether or not to continue my career in the world of information security; if so, the place I was most interested in working in was Madrid. It was then that GMV sprang to my mind, one of the leading information-security firms and also one I'd already made contact with in the past. So I

Nearly a year after joining GMV I was given the chance to lead the project I had been working on

checked out the various employment platforms to see if there were any GMV vacancies published there and found exactly what I was looking for: "Information Security Consultant". I slapped in my application this same week and had an interview in GMV's Madrid central office.

Shortly afterwards I joined this great family, posted to one of GMV's most important cybersecurity clients, Grupo BBVA, in a Compliance Project.

This project has given me the chance to collaborate with working teams from several different countries. I've also been able to collaborate with other GMV teams outside the security operations center. It is likewise an innovation-rich project from the information security point of view. After all, our team is working on an application that is in constant evolution, working to help various regions boost their cybersecurity compliance record.

Nearly a year after joining GMV I was given the chance to lead the project I had been working on, so I remain in the same project, taking on new challenges and responsibilities that allow me to develop my career and learn constantly on the job.

I've always felt very comfortable within GMV's working climate. We are all constantly collaborating with and supporting each other, even when our tasks are not directly related. It's always possible to find someone to help you selflessly, and this is a priceless asset.

JOB: Project Head / Information Security Consultant

UNIT: Consultancy, Secure e-Solutions - GMV (COS – SES)

NATIONALITY: Dominican Republic

DOB: 5/10/1992

EDUCATION: Telematics engineering – Pontificia Universidad Católica Madre y Maestra (PUCMM)
Master's degree in cybersecurity – Universidad de Lleida (UDL)

START DATE: 2/11/2016

OFFICE: Madrid. Posted to client

HOBBIES: Traveling, cooking, tennis.

DEFINES HERSELF AS: Innovator; I like challenges and constant learning.

GMV opens a new office to house its automotive center and a new CERT center

RIGHT FROM THE VERY START, BACK IN 1984, GMV HAS BASED ITS BUSINESS STRATEGY ON TWO MAINSTAYS: INNOVATION-DRIVEN DIVERSIFICATION AND SYSTEMATIC TERRITORIAL EXPANSION

The recent international office openings in Kuala Lumpur in Malaysia and Darmstadt in Germany, for example, reflect the company's hallmark internationalization drive. Back home, however, the company remains equally determined to cement its position too, especially in areas like Castilla y León, where so many of GMV's breakthroughs have been staged.

For this reason, on 27 November, GMV opened a new Valladolid office to house the new Cybersecurity Incident Response Center and the new automotive software development center.

For GMV's ICT and cybersecurity team the new site represents an enlargement of its facilities and the opening of a new Cybersecurity Incident Response Center to watch out for the overall security of networks and equipment, providing cybersecurity incident response services and offering consultancy and advice on system security threats and solutions.

The Cyber Security Incident Response Team (CSIRT) operating in this center has been accredited as a Computer Emergency Response Team (CERT) by the US university Carnegie Mellon, placing GMV in the vanguard of prevention, incident-solving and cybersecurity intelligence exchange, as one of Spain's few private firms that can boast this certification.

The region of Castilla y León, for its part, is a major and prolific technology hub of the automobile sector, where GMV's automotive team has been working for years, providing the software of the Telematic Control Units (TCUs) fitted on over two million Renault and Nissan vehicles. All this makes the technology group an international benchmark in telematic systems, cooperative ITSs, critical positioning technology and Apps for the connected and autonomous vehicle; areas in which it will be working in this newly opened site.

The decision to concentrate the supply of advanced automotive technology and cybersecurity in one site will enable the company to tap into the synergies between these sectors, where GMV already holds a leadership position, and build up a competitive edge over the rest.

GMV has clocked up a 32.4% contracting growth in the last five years. The new office, needing highly skilled personnel, will have a positive job-generating effect in the region.

CDTI, 40 YEARS OF SPANISH ENTREPRENEURIAL INNOVATION

SPAIN'S INDUSTRIAL TECHNOLOGY DEVELOPMENT CENTER (*CENTRO PARA EL DESARROLLO TECNOLÓGICO INDUSTRIAL*, CDTI) IS A MAINSTAY UNDERPINNING SPAIN'S ENTREPRENEURIAL SECTOR

Coming under the Ministry of Economics, Industry and Competitiveness (*Ministerio de Economía, Industria y Competitividad*), the CDTI acts as an economic lever, a consultancy and international-aid body for the corporations making up Spain's business fabric, driving public-private collaboration (CENIT and CIEN).

On 12 December 2017 a National Innovating Firms Encounter (*Encuentro Nacional de Empresas Innovadoras*) was held to coincide with CDTI's 40th anniversary. Madrid's National Music Auditorium was the venue and the leading figures were the Minister of Economics, Industry and Competitiveness, Luis de Guindos, who opened the event; the Secretary of State of Research, Development and Innovation, Carmen Vela, who closed it; the Secretary General of Science and Innovation, Juan María Vázquez; plus CDTI's Director General, Francisco Marín.

GMV was one of the seven companies cherry picked by CDTI as success stories to speak about entrepreneurial-R&D and their relation with CDTI. The speech given by GMV's CEO, Jesús Serrano, brought out CDTI's telling influence on GMV's career, helping to drive its internationalization process and win itself the position of the world's number-one supplier of commercial telecommunication satellite control centers as well as the leading developer of satellite navigation systems in Europe, up-and-running systems in Asia and pre-operational systems in South America and Oceania.

Representatives from 500 corporations shared this day, which helped to highlight the entrepreneurial innovation of Spain's economy.

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