



INTERVIEW



**RAÚL
TORRES**
CEO and
cofounder of
PLD Space

PLD SPACE
REUSABLE LAUNCH
VEHICLE TECHNOLOGY TO
SIMPLIFY AND CHEAPEN
SPACE ACCESS



FIAA 2017

Madrid (Spain) 23-26 may

GMV is taking part once more as exhibitor in this year's International Bus and Coach Trade Fair (Feria Internacional del Autobús y del Autocar: FIAA), to be held from 23 to 26 May in Madrid.

Under the slogan "Manufacturing mobility", FIAA 2017 will be focusing on groundbreaking road-transport solutions. The event will bring together authorities, politicians, distributors, manufacturers, installers and solution-providers.

GMV's stand 9B23 (Pavilion 9) will be showcasing its state-of-the-art technological systems, fruit of its ongoing quest for groundbreaking solutions to meet its clients' needs in different contexts (bus, trams, BRT, etc.) and in the company's various worldwide trading areas (Europe, Asia, Africa, America).

More information at:
http://www.ifema.es/fiaa_06



LETTER FROM THE PRESIDENT



"I started out with nothing, and I still have most of it left." This is the fate of most entrepreneurs. Mind you, nearly every big company was started by an entrepreneur, and GMV is no exception here.

A start-up is born with a business idea. The entrepreneur pinpoints a need she or he feels capable of filling. The real challenge comes afterwards with the task of turning the idea into a sustainable business.

Entrepreneurs need to fully believe in their idea, since they start out with nothing and risk ending up with even less. And start-ups that turn out to be successful excel with hard work and quick problem-solving, driven by the team's enthusiasm for the common goal.

As the start-up grows into a major firm the lessons learned have to be turned towards other qualities: efficient organization and procedures, thorough planning of increasingly large and

complex projects and flawless quality control. At the same time the main qualities of the start-up, the urge and ability to innovate and the team's enthusiasm for its work, are still crucial to keep the business going and to further improve it.

PLD is a promising start-up. The idea of building a reusable rocket to launch small satellites weighing up to 150 kg meets an increasingly glaring market need. A glance at PLD's website is enough to see the PLD team's creativeness and passion for the firm's project. PLD's enthusiasm has rubbed off on GMV, convincing us that it is well worthwhile to invest in their project and to chip in with our expertise and experience.

Mónica Martínez

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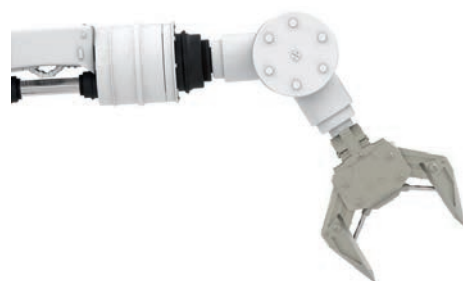
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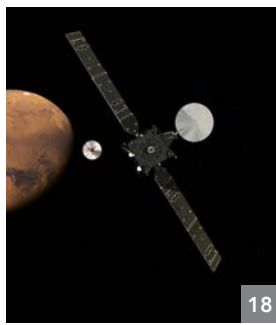
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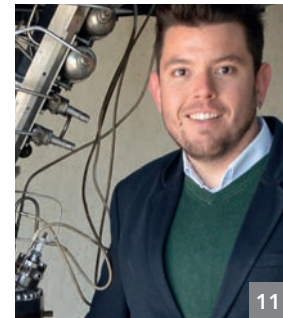
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Reusable launch vehicle technology to simplify and cheapen Space access

THIS IDEA IS CATCHING ON IN A BIG WAY IN THE USA WHERE PRIVATE FIRMS, HAVE SHOWN THIS TECHNOLOGY TO BE POSSIBLE. EUROPE DOES NOT WANT TO LAG BEHIND

The small satellite market, focusing on telecommunications and earth observation, is currently riding a boom on the strength of technology miniaturization. Over 50% of today's satellites sent into Space, in the 1 kg to >10,000 kg range, weigh less than 150 Kg; this clearly bears out the boom in these technologies. Current forecasts point to a market worth 7 billion dollars by 2020; it looks set to be the new technological revolution in the Space sector.

But it is not only worldwide Space agencies that are becoming increasingly interested in obtaining an efficient, cost-cheapening Space launch system. And here is where reusability comes in. Making rockets just as reusable as aircraft is crucial for any

private firms that wish to make Space tourism technically and economically viable. It is no less vital for companies and universities that, with cheaper launches, will be able to cost the launch of their own payloads for conducting experiments, testing or vetting technologies.

This idea is catching on in a big way in the USA where private firms like SpaceX, of the multimillionaire Elon Musk, or Blue Origin of the fellow magnate Jeff Bezos, have shown this technology to be possible, carrying out several successful trials. Europe does not want to lag behind and has pinned part of its hopes on the Liquid Propulsion Stage Recovery (LPSR) project, recently awarded to the Spanish firm PLD Space as part of the European Space Agency (ESA)'s future launcher program.



STRATEGIC AGREEMENT IN THE SMALL SPACE LAUNCHER MARKET

GMV has won pole position worldwide in the development of Guidance, Navigation and Control systems. At this top level GMV is capable of acting as subsystem provider or providing the complete system including analysis, design, development and validation of the GNC subsystem, plus the implementation of all onboard software needed for this purpose. Within this area GMV has been participating in launcher-related Space

developments for some years now, including activities on vehicles of the European Space Agency (ESA) such as the Advanced Generation European Vehicle, VEGA or the IXV reentry vehicle.

Equally noteworthy is GMV's capability of designing and implementing dynamic testbeds and specific validation and verification environments needed for certifying the GNC system before its operational use. Witness GMV's participation in launcher-avionics research projects, such as the European Commission's technology demonstrator SPARTAN (Space Exploration Research for Throttleable Advanced Engine) and the European Space Agency's New Generation Launcher and Space Transportation Advanced Avionics Testbed (NGT-ATB).

In early 2017, with the latest Space trends in mind and drawing on its past experience, GMV decided to back the project of PLD Space, a young Spanish start-up that has been working for several years on the design and testing of Space launcher technology, including a launcher reuse study. Right from the word go the firm has considered liquid propulsion to be the most critical technology for achieving the dream of developing an orbital small-satellite launcher.

GMV took a stake in this young, 22-strong firm. Under this agreement, GMV, as a worldwide Space benchmark, will input its 30 years of sector experience and knowhow to develop the complete avionics of ARION-1 and ARION-2, a core technological component of both rockets, including the guidance, navigation and control (GNC), telemetry and onboard software of both launchers. Additionally, GMV's team will also be participating, together with PLD Space, in the operations of launcher support, integration and qualification of ARION-1 and ARION-2 during the whole trial flight phase and commercial flights. These operations are scheduled to start in late 2018 with the maiden flight of the suborbital launcher ARION-1 from the Huelva launch base of El Arenosillo.

GMV's corporate backing of PLD Space has also freed up a total investment of 6.7 million euros, counting both private investment through an investment fund and a "family office", both hosted in Valencia Region, and public funding with contributions from CDTI, ENISA, SUMA Teruel and the European Commission's SME Instrument. In short, this is an agreement that will allow both firms to grow and win a strategically advantageous position in the small Space launcher market.

THE ACTION-PACKED CAREER

2011

In 2011 Raúl Torres and Raúl Verdú, two young entrepreneurs studying aerospace engineering and industrial engineering, respectively, founded PLD Space, establishing the head office in Elche, from where they set out to develop a new family of Space rockets.

2012

At the end of 2012 PLD Space won a NEOTEC program with Spain's Industrial and Technological Development Center (*Centro para el Desarrollo Tecnológico e Industrial: CDTI*) on the one-million-euro project for developing Spain's first ever reusable liquid fuel rocket and constructing the facilities for testing this technology in Spain.

By June 2013 PLD Space had managed to complete its first one-million-euro seed investment round with the participation of Seed Capital, the Spanish Ministry of Economics and Competitiveness, CDTI, La Caixa bank and the Valencia Finance Institute (*Institut Valencià de Finances: IVF*).

2013

2014

In 2014 PLD reached an agreement with Teruel airport, giving it an almost 4000 m² testbed site for running 4 years of tests and trials of its liquid propulsion engines. These testbeds will serve not only for pre-flight testing of the rocket engines but also static-fire testing of the fully integrated Space launch vehicle, a technique that ensures the reliability of each launch just before blast off.

Picture of the first full-power test of PLD Space's liquid-fuel reusable rocket engine.



THE ARION FAMILY, REUSABLE, LIQUID-FUELED ROCKET TECHNOLOGY

PLD Space was born with the goal of facilitating commercial and scientific access to Space for technological applications and scientific Space research. In pursuit of this overarching goal two rocket models are currently being developed, called ARION-1 and ARION-2 for the suborbital and orbital markets.

ARION-1

The rocket has been designed as a single-stage launcher able to lift 100 kg into a suborbital trajectory with a 220-kilometer ceiling

The aim is to carry out a first test with a suborbital ARION-1 rocket by the end of 2018. The launcher will blast off from the Huelva base of El Arenosillo, and 110 seconds later the engine will shut down. After peaking at 220 kilometers it will reenter the atmosphere to fall into the Atlantic Ocean. The small size of this launcher means that several types of parachutes can be used for the braking effect.

ARION-1 has a twofold purpose. On a commercial level the rocket will serve

OF A YOUNG SPANISH START-UP

2015

In early 2015, after a year and a half of engineering work, PLD Space completed construction of Europe's first liquid-fuel rocket engine testbed. During the first half of this year, the firm was preparing for a historic milestone: the first ever trial of a liquid-fuel rocket engine in Spain, pulling off this feat in June. This made it Europe's first private firm to develop a reusable liquid-fuel rocket for the small satellite market.

At the end of 2015 PLD Space won Spain's first contract for testing liquid-fuel rocket engines developed by the German Space Agency DLR as part of the European SMILE project (Small Innovative Launcher for Europe).

2016

In early 2016, ESA awarded PLD Space a contract for developing reusable launch vehicle technology under its Future Launchers Preparatory Program (FLPP). The project approved by ESA, called LPSR (Liquid Propulsion Stage Recovery), will allow PLD Space to retrieve the first stage of its launcher from Space, thus cutting Space-access costs for small satellites. Furthermore, the project has been designed and conceived to ensure that any technological developments will be applicable to other future launchers, both of PLD Space and ESA itself.

2017

The second milestone in the meteoric Space career of PLD Space will be reached at the end of this year with the static-fire testing of the first version of the launcher in Teruel, where PLD Space runs its rocket engine testbed. It will be then that they hoist into a vertical position something that now resembles a real rocket, to be run for the full mission time.

as a low-cost, frequent Space-access vehicle for technological development and scientific experimentation in Space conditions. On a technological level ARION-1 will be the forerunner and technology demonstrator of a much bigger and more ambitious vehicle, ARION-2, whose mission will be to place small satellites of up to 150 kg in earth orbit. ARION-1 will thus serve as a technology demonstrator of propulsion, structures and avionics, the most critical technology in the development of a Space launcher.



PLD Space's founders, Raúl Verdú & Raúl Torres with real-size ARION-1 mockup.

ARION-2

ARION-2, to be ready by late 2020, could become Europe's first reusable rocket. Its larger size will enable it to lift a payload of up to 150 kg into a 400-kilometer orbit and will use reverse thrust plus parachutes for a controlled descent. Two of the many challenges posed by this project are to make sure

the rocket does not sink on splashdown and to avoid seawater-induced rust. If all goes well the first flight tests should be held by late 2020.

And if all goes to plan in 2023 this 20-meter rocket will blast off for the moon from the Huelva launch site of

El Arenosillo in Mazagón,. It will be an upgraded version of ARION-2 and could become a milestone in Europe's astronomical history.

IN CLASSIC MYTHOLOGY ARION WAS A WINGED, BLACK-HOOFED HORSE COVETED BY GODS AND HEROES ALIKE. NOW, IN THE TWENTY-FIRST CENTURY, IN THE NEW FORM OF A ROCKET, ARION WILL FLY EVEN HIGHER AND SWIFTER TO CONQUER SPACE FOR PLD SPACE



ITS EMPLOYEES, PLD'S HEART AND SOUL

In June 2015 PLD Space became Europe's first start-up to develop a real-scale liquid-fuel rocket engine using liquid oxygen and kerosene. Its 4 employees at that time had an average age of 30.

Despite its "youth", PLD Space has received varied institutional and business support, serving as official recognition of its groundbreaking work in the design and commissioning

of liquid-fuel rocket engines. This support has come from such prestigious bodies as ESA, CDTI, the European Commission, ENISA, SUMA Teruel, IVF and several venture-capital investors, with GMV's corporate and technological support.

But PLD could not have got to where it is today without its personnel, the heart and soul of this start-up. PLD now boasts a staff of 22, a figure that is bound to grow this year. These are mostly highly-skilled young workers trained up in different disciplines (mainly industrial- and aeronautical-engineers), who put their talent, imagination and prowess to the test day after day.

Both the executive team and the rest of the firm's workers know PLD Space like the back of their hand and transmit this expertise, enthusiasm and motivation into everything they do. And no one like them to make a dream come true.

A portrait of Raúl Torres, CEO of PLD Space, smiling. He is wearing a black t-shirt with the PLD Space logo. The background is a stylized image of Earth from space, showing the horizon and clouds.

In 2011 a group of young entrepreneurs set up the company called PLD Space in Elche (Alicante). The aim was to develop a liquid-fuel rocket for launching small satellites into Space. In a little over six years, working with very few operators around the world, PLD Space managed to break into a market that has traditionally been restricted to the major business consortia. Raúl Torres, PLD's CEO, tells us the short but thrilling story of this business initiative in the Space sector.

PLD SPACE

RAÚL TORRES

CEO AND COFOUNDER OF PLD SPACE

WHAT PROMPTED YOU TO SET UP PLD SPACE?. WHAT WERE ITS FOUNDING REMITS?

We've always been crazy about rockets. At first it was a hobby; we spent hours and hours of our time trying to learn how to build small, amateur rockets. As the years went by, however, we began to see that we could up our sights. As often seems to occur in history, this eureka moment happened to coincide with an era that began to call itself the new Space revolution, usually shortened to "New Space". The New Space concept referred to all the new technologies that were making Space much more accessible and affordable in comparison to traditional methods. These technologies include the use of small satellites, right down to the size of a shoe box. Thanks to the miniaturization of electronics these tiny satellites can now replace traditional large satellites for some applications. They can also be mass built, meaning they can cover the whole earth's surface daily.

We soon cottoned on to the growing need at that time for a small-satellite launcher and set out to develop one. Judging by the microsatellite companies' current problems in finding launch possibilities, it seems we made the right decision!

WHAT DOES PLD'S SMALL ROCKET OFFER IN COMPARISON TO OTHERS?

One of the key points in our opinion is that the choice of liquid fuel is closely bound up with the concept of reusability. All associated hardware can be tested pre-launch and then be used again once the rocket has been recovered. This is not the case with solid rockets and would be very difficult with a solid-fuel rocket.

Moreover, ARION-1, the first rocket we are developing, is suborbital. This means we can offer our clients a rocket with relatively low g-forces if they wish to experiment with and check out microgravity technologies. Rockets up to now have been largely derived from missiles based on solid propellant technology, producing g-forces over 10gs*. We can offer

ONE OF THE KEY POINTS IN OUR OPINION IS THAT THE CHOICE OF LIQUID FUEL IS CLOSELY BOUND UP WITH THE CONCEPT OF REUSABILITY

a "relatively" smooth rise, not exceeding 6gs. The upshot is that clients now don't need to devote such mass to reinforce their experiment and protect it structurally, allowing them to focus their attention on the experiment itself.

Lastly, liquid fuel is a propellant known since the very start of the Space race, so the use risks are less. The liquid oxygen and kerosene used by both ARION-1 and 2 is fairly easy and cheap to come by.

As for the reusability aspect, we see this as the path to follow. We've always said that it would make no sense to send an aircraft to the breaker's yard as useless scrap after every flight. In the world of launchers we are not yet at the reusability level of planes or cars. But this doesn't mean this is not the way ahead. With its last launch SpaceX showed for the first time in history that it is possible to launch, land, relaunch and re-land the same rocket (in this case the first stage). With time this will gradually become the norm for Space launchers.

WHAT HAS GMV'S BACKING MEANT FOR PLD SPACE?. WHAT WERE THE MASTER LINES OF THE AGREEMENT?

It has meant many things and, in truth, all very good. To start with it represented a huge vote of confidence from a major Space stakeholder. Many people have now changed their minds about us; they no longer see

us as a bunch of brats trying to launch something into Space but a serious firm trying to change, or help to change, the very paradigm of the Space sector. Full marks to GMV for its vote of confidence in such a young firm.

GMV's support also represents a technological leg-up, speeding up our development greatly. On the strength of this agreement we can now reach the market at the right time, boosted by GMV's hallmark excellence.

Under this agreement GMV takes a stake in PLD Space and an important role in its board of directors. As I've already pointed out, GMV also becomes a technological partner of PLD Space, taking on responsibility for avionics, telecommunication systems as well as flight software of our rockets.

WHAT DOES THIS GMV-PLD COLLABORATION CONSIST OF TECHNICALLY?

As we've just mentioned, under this agreement GMV becomes a technological partner of PLD

* A g-force of 1 is generally considered to be equal to standard gravity, i.e. 9.80665 meters per second squared (m/s²).

Space, in charge of avionics and the telecommunication systems of PLD Space's rockets. This gives an added value to PLD Space's rockets thanks to the vast know-how and expertise that GMV has built up in this market.

GMV will take charge of developing and integrating, under PLD Space's requirements, all hardware and software bound up with avionics, guidance and control of PLD Space's launchers, as well as its telemetry and telecommand systems. Together with PLD Space, GMV will also take on responsibility for pre-launch trials and testing of all hardware and software to make sure everything works properly beforehand.

WHAT'S THE CURRENT STATE OF LAUNCHER DEVELOPMENT?

Right now, after having taken on over 12 new members of staff as soon as we signed the agreement (the staff now stands at 22), PLD Space is in the process of designing its first launcher, ARION-1, and expects to finish this stage by the end of the year. This means advancing not only in the design but also the qualification of the

regenerative engine and the whole structural, avionics and recuperation system so a start can be made on the various tests by the end of the year.

THE PROSPECT OF BEING ABLE TO LAUNCH SATELLITES WITH MUCH MORE AFFORDABLE ROCKETS IS WITHOUT ANY SHADOW OF A DOUBT VERY ATTRACTIVE. WHO WILL BE THE MAIN BENEFICIARIES? WHO ARE THE POTENTIAL CLIENTS OF THIS TECHNOLOGY?

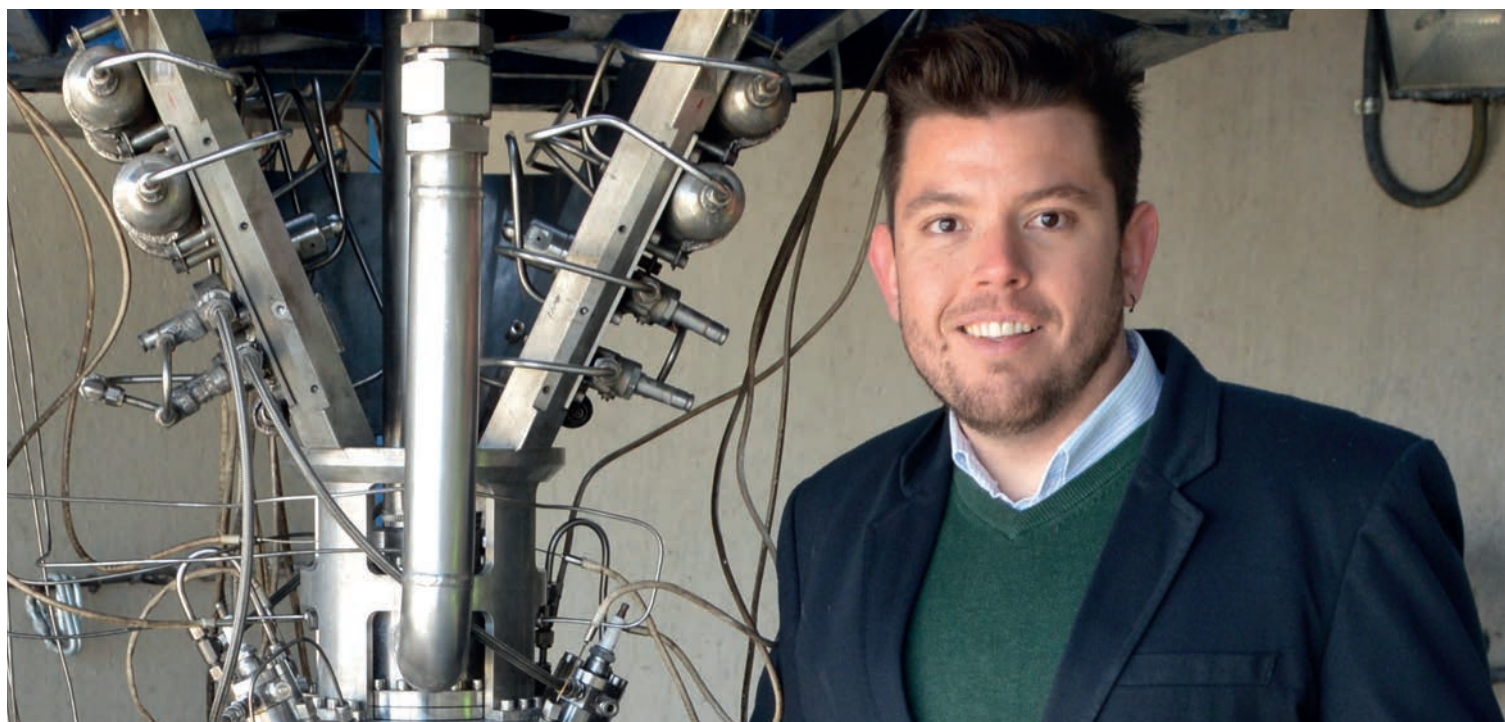
As far as the main beneficiaries go, I could mention two: first of all, ourselves. With the flight of ARION-1 we will have shown that PLD Space, with GMV's aid, is capable of developing a liquid-propellant, reusable rocket. This will vouch for our technological expertise ahead of ARION-2 and prove our trustworthiness to potential investors.

Secondly, the availability on the commercial market of a launcher at such a potentially attractive cost will help out companies and universities as well as national Space agencies and institutions. Up to now they have depended on sometimes very slow programs but now they will no longer have to wait years to be able to carry out their microgravity experiments or launch small satellites into orbit. Instead they'll be able to afford their own payload launch costs. They'll be the main beneficiaries.

IS THERE A DATE YET FOR THE FIRST LAUNCH OR IS IT STILL TOO EARLY TO FIX A SPECIFIC DATE?

Dead right there is. We want the maiden launch and trial flight of ARION-1 to be performed by the end of 2018, in all likelihood between November and December. All being well, we would have the maiden commercial flight during Q1 of 2019.

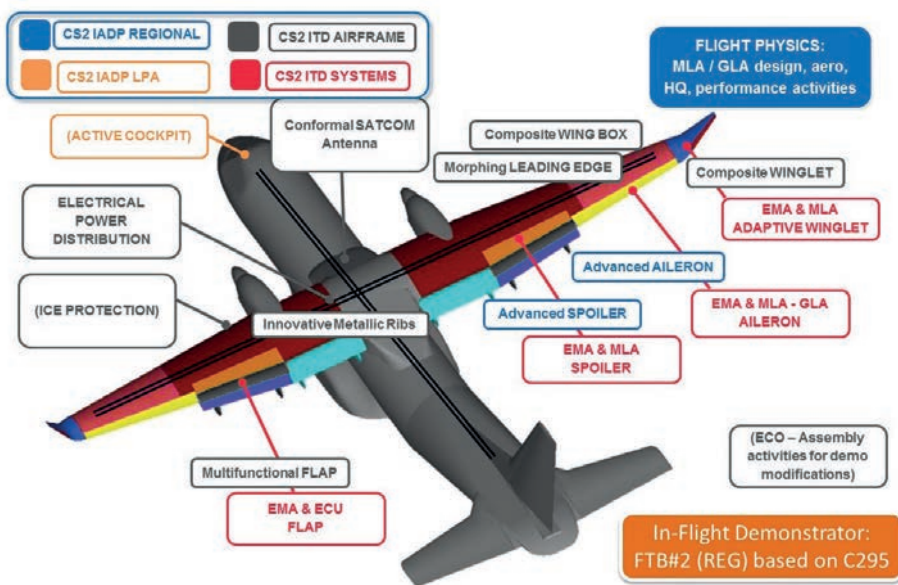
ON THE STRENGTH OF THIS AGREEMENT WE CAN NOW REACH THE MARKET AT THE RIGHT TIME, BOOSTED BY GMV'S HALLMARK EXCELLENCE



CLEAN SKY 2

GMV helps to reduce the environmental impact of aeronautical technology

THE FOUR-BILLION-EURO CLEAN SKY 2 PROJECT, PART OF THE UMBRELLA H2020 PROGRAM, REPRESENTS EUROPE'S BIGGEST EFFORT TO REDUCE AIRCRAFTS' EMISSIONS OF CO₂, OTHER GASES AND NOISE LEVELS



The remit is to bring about improvements in every one of the aircrafts' technological aspects: manufacture, materials, fuel consumption, streamlining, weight reduction, operation, etc. so there are many technological innovations under study.

Clean Sky 2 has a complex structure, involving as it does both public and private financing. At a first level it is organized around the needs of leading sector firms like Airbus, Alenia Aermacchi, AgustaWestland, Airbus Helicopters, Dassault Aviation, Airbus DS-CASA, Saab, MTU Aero Engines, Rolls-Royce, Safran, Liebherr Aerospace, Thales, Evktor, Piaggio Aero Industries, Faunhofer Gessellshaft, DLR). It also has demo platforms or technology demonstrators: IADPs or Innovative Aircraft Demonstrator Platforms and ITDs or Integrated Technology Demonstrators).

Different technologies involved in the multi-mission regional aircraft demonstrator (FTB#2) based on the C-295 (image courtesy of AIRBUS DS)



The project also includes two transverse activities: small air transport and eco design, plus a technology evaluator with monitoring functions, carried out by the German Aerospace Agency (DLR).

Within each technological aspect to be optimized (topic) the leading firms look for core partners and jointly launch bids to be carried out by other firms.

Under Clean Sky 2 GMV has won important projects and has a much bigger participation than in Clean Sky 1, forming part of a consortium as a Core Partner.

Within a consortium of firms GMV has also recently won two tenders:

EMA4FLIGHT, coordinated by TECNALIA; and VALEMA, coordinated by GMV; both primed by CESA and AIRBUS DS, they focus on electronic control units (ECUs) and electro-mechanic actuators (EMAs) within the system ITD, to be tested in the regional aircraft IADP with the multi-mission regional aircraft (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.

Under these contracts GMV is going to develop the ECU software of one of the main commands (aileron/spoiler) which has to be carried out pursuant to the strict aeronautic requirements DO-178C and DO-254 with level DAL-A, and which will then be flight tested by AIRBUS DS to check technological feasibility.

Clean Sky 2 is a further development of GMV's ongoing critical software and certification capabilities built up in projects such as the Flight Control Computer (FCC) of the RPAS ALANTE or the Airbus A400M's crane system. The project also represents a stiff challenge, taking into account its tight deadlines and the planned inflight testing of the developed system at the end of the project



A400M

EDA lays down the bases for a drone regulation framework

■ No one doubts the need for a regulatory framework for the remote control of drones or Remotely Piloted Aircraft Systems (RPASs), ranging from mini drones to large platforms, so they can be safely used for both civil and military purposes in Europe. Mindful of this pressing need, the European Defence Agency (EDA) has now awarded an RPS-STANDARD study to an Airbus-led team including GMV to pave the way for regulation of the remote pilot stations of European Aviation Safety Agency (EASA)-certified RPASs.

The most important aspects brought out by this study include integration of current RPAS IFR traffic into non-segregated controlled airspace and standardization of the necessary RPAS air traffic insertion, allowing inclusion of elements common to any type of RPAS in the certified category.

The project goals also take in a series of actions to consolidate EDA's objectives, such as the creation of a stakeholder community; the creation of an appropriate forum within the European Organization for Civil Aviation Equipment (EUROCAE) to establish a structured EDA-compliant working method; promotion of stakeholder communication to exchange information on technical matters, risks and opportunities; raising awareness of the crucial importance of safety for RPASs; establishment of a pragmatic approach for tackling the most complex scenarios, always doing so in a cost-effective way.

GMV helps to design more efficient aeronautical systems

THE EUROPEAN COMMISSION'S FP7 ICT PROJECT CONTREX (DESIGN OF EMBEDDED MIXED-CRITICALITY CONTROL SYSTEMS UNDER CONSIDERATION OF EXTRA-FUNCTIONAL PROPERTIES) HAS BEEN BROUGHT TO A SUCCESSFUL CONCLUSION



Contrex-End-of-project debriefing meeting

■ The project's aim was to develop a methodology and tools for enabling energy-efficient and cost-aware design in mixed criticality systems. The CONTREX consortium consisted of fifteen partners from six countries, comprising academic institutions, industrial-tool or technology providers, and three industrial demonstrator application providers.

The project included three use cases within automotive, telecommunications and aeronautical fields, the aim of which was to effectively assess the CONTREX-developed techniques and tools. GMV participated in the project as industrial partner and leader of the aeronautics use case, developing for that purpose a demonstrator that served as a prototype to evaluate the methodology and tools developed by

the other partners with requirements laid down in light of GMV's experience in the design and development of mixed criticality systems.

The demonstrator was based on a flight computer for a medium-sized drone, where energy optimization was a crucial factor. By means of this demonstrator GMV conducted an evaluation of CONTREX's capability for exploring a set of alternative designs to find the best solution to minimize consumption and temperature without compromising system safety and performance.

CONTREX has also produced a complete framework taking in all the various phases of the system design cycle: modeling, simulation and validation.



GMV, Inmarsat and Lockheed roll out a new-generation SBAS in Australia

■ GMV has just started a two-year collaborative project with Geoscience Australia (GA) and the Australia and New Zealand Cooperative Research Centre for Spatial Information (CRCSI) for the deployment of a satellite positioning augmentation system. The objective of the project is to show the potential benefits of satellite navigation technologies in Australia, including integrity and high precision applications.

Current Satellite Based Augmentation Systems (SBAS) improve the positioning accuracy and integrity of GPS satellites. SBAS have already been rolled out in the United States (WAAS), the European Union (EGNOS), India (GAGAN) and Japan (MSAS), with similar initiatives also underway in other countries.

Early this year, the Australian Government formally announced a 12 million–Australian-Dollar investment over two years, and organizations from a number of different industries including agriculture, construction, mining and transport among others will be called to participate in the exploitation phase of the satellite augmentation system.

As far as the infrastructure within the collaborative project is concerned,



Group photo of the members of the SBAS testbed team meeting up on Thursday 9 March in Geoscience Australia

Geoscience Australia (GA) has selected GMV for the provision of the processing facilities in charge of the augmentation system, Lockheed Martin (NYSE: LMT) for the signal uplink to the GEO satellite, and Inmarsat (LSE: ISAT) for the SBAS payload in the 4F1 satellite. The participants will reuse all the experience and background expertise and apply their proprietary, cutting-edge technology to ensure the complete success of the project.

GMV has carried out several SBAS technology promotion projects. In 2010 GMV conducted a SBAS feasibility study and set-up an SBAS demonstration system in the Caribbean, Central America and South America (SACCSA) region. In addition, in May 2016 GMV completed the first stage of the SBAS-Africa project, which provided an SBAS testbed for Southern Africa. GMV is currently taking part in SBAS profile-raising projects in various parts of the world.

GMV presents its latest satellite-based air-navigation developments at the World ATM Congress

FROM 7 TO 9 MARCH MADRID HOSTED THE FIFTH WORLD ATM CONGRESS 2017

One of the main systems developed by GMV to support precision approach is **emil**, an automatic system for ground inspection of instrument landing systems (ILS) and VHF omnidirectional range (VOR) systems; these are radio-aid systems helping aircraft during the landing and en-route flight phases, respectively. Among the support tools for performance-based navigation, GMV displayed **magicGEMINI**, a software tool for analyzing and monitoring the performance of GNSS-based navigation services, **magicIFP**, a web application providing ground and inflight validation of approach procedures based on a Space Based Augmentation System (SBAS), and the **magicLPV** system for carrying out flight tests to demonstrate these benefits to pilots and airline companies. Last but not least **srx-10i** is an interference detector (including deliberate interference), enabling any airport to ensure the approach reliability and safety of any GNSS-based aircraft.

EXOMARS

Green light for one of the most ambitious Mars missions



T

he last Ministerial Council of the European Space Agency (ESA), held in December,

proved to be huge leg-up for ExoMars, the joint mission of the European Space Agency (ESA) and its Russian counterpart, Roscosmos. ExoMars aims to investigate the Mars environment and try out new technologies that pave the way for a future Mars sample return mission.

In pursuit of this purpose, ExoMars was designed as a twofold mission: the first part is made up by a Trace Gas Orbiter (TGO) plus an entry, descent and landing demonstrator module (EDM),

launched back in 2016, and the second by a Mars rover and surface platform to be launched in 2020.

The Trace Gas Orbiter (TGO) will conduct a detailed inventory of the red planet's atmospheric gases, especially the infrequent gases like methane, which, for such a short-lived gas, would also imply an active, current source. Its aim is to measure methane's geographical and seasonal distribution to ascertain whether it comes from a

geological or biological source. ESA Ministerial Council's 400-million-euro Exomars-funding decision will now allow the second rover-deployment mission to go ahead.

In 2020 a Roscosmos lander will take the ExoMars rover to the planet's surface, where it will look for the existence of life on Mars, present or past, in a part of the planet that abounded in water at one moment of its history.

Scientists believe that there might have been life on Mars about 3.6 billion years ago, when conditions were much more humid. Finding out if there has ever been life on the planet is one of the main scientific quandaries of our time. Will ExoMars come up with a definitive answer to this question? It's certainly likely to give us a much better idea.

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GMV ON THE MISSION

GMV developed key technologies for the 2016 ExoMars mission. It designed and developed the onboard software of the guidance, navigation and control (GNC) system of Exomars's Schiaparelli entry and descent module.

In close collaboration with Thales Alenia Space Italy, GMV also played a key role in the design of GNC interfaces with the rest of the onboard software, the design of the GNC-parameter database plus the testing and validation process. In the second mission, to be launched in 2020, GMV is set to make a much greater contribution to the mission in this area.

Lastly, as part of the activities carried out within the framework contract of support for ESA's European Space Operations Centre (ESOC), GMV is playing a key role in ExoMars's flight dynamics operations. In particular, a GMV engineer is the mission's Flight Dynamics Manager, which might be likened to its "pilot" in charge of guiding the satellite along its flightpath.



Robert Guilanyá Jané FLIGHT DYNAMICS MANAGER



What are ESOC's main ExoMars-16 flight-dynamics activities?

The flight-dynamics work starts years before mission launch. The flight-dynamics team takes part not only in mission definition but also the satellite-design review.

During the launch and the first days of operation (LEOP, Launch and Early Orbit Phase) the team was on hand round the clock to detect any satellite anomalies and act as quickly as possible in the event of any contingency.

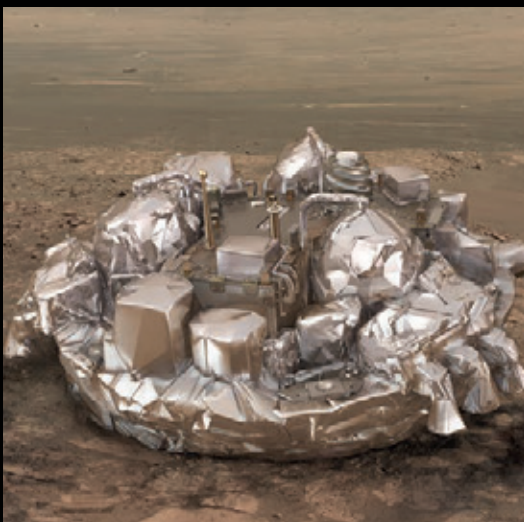
LEOP then gave way to the cruise phase, in which the satellite leaves the earth to head for Mars. This period lasted 7 months and the flight-dynamics team's activity was constant throughout. All satellite sensors and subsystems were tested and calibrated. All necessary maneuvers were also carried out to ensure the satellite got to Mars under the best possible conditions for entering the established orbit and landing the descent module.

Once the satellite was orbiting Mars, the flight-dynamics team took charge of all necessary maneuvers for reaching the target orbit. Within this whole process the most complex part is the phase we are in right now, the aerobraking procedure. This involves inserting the satellite into the higher layers of the Martian atmosphere to lower the orbit. The duration of the aerobraking phase is likely to be long, about 1 year, and risky. The braking process might damage the satellite in high-atmosphere layers or layers of very high density. Indeed, this is the first time in Europe that a satellite is using aerobraking for such a purpose.

Finally, in the routine operations phase, the team will take on responsibility for maintaining the target orbit and controlling satellite attitude to aim it at the scientists' goals.

What is GMVs' role in these activities?

GMV is playing a key role within Exomars's flight-dynamics team at various levels.



First of all we are taking part in the "Orbit Determination" team. This team processes ground-station data and satellite telemetry to determine the satellite position and orbit.

We are also playing an upfront role in the Maneuver Optimization team, calculating necessary maneuvers for obtaining the right position and optimum satellite flightpath.

We are also present in the Command Generation team, which prepares all flight-dynamics orders, typically the necessary orbit-control maneuvers.

Finally, we are also contributing to the various Test and Validation teams, responsible for validating both calculated orbits and commands sent onboard.

What makes ExoMars-16 special in comparison to former missions?

ExoMars-16 is a unique mission in Europe; it is the first one ever to use aerobraking to reach the "science orbit".

The science orbit is an almost circular orbit at a height of about 400 km. Reaching such an orbit around Mars requires a huge satellite braking effort. If this was a powered effort it would use up a great amount of fuel, about 650kg. Mission design rules this out. So

the only way of achieving our goal here is to harness the drag of the Martian atmosphere.

Even though Europe does have a certain experience in aerobraking with the Venus Express mission, this is the first time a complete aerobraking phase will be carried out. The satellite will switch from an orbital period of one day to 2 hours.

Aerobraking poses a certain risk to the satellite, due to our relative ignorance of the Martian atmosphere. This makes behavior hard to predict beforehand. This in turn means that both the satellite itself and its trajectory need to be sufficiently robust to withstand sudden atmospheric changes.

What are the main orbital-control challenges for ExoMars-16?

Navigation during the cruise and Mars-approach phase has been especially critical in terms of meeting mission requirements. In fact, working with an initial remit of landing within a 50 x 7.5 km area, we managed to bring this down to an area of less than 5km. A lot of the credit for this feat must go to the expertise of the flight-dynamics team.

Moreover, in the aerobraking phase orbital control has to be robust enough to prevent the satellite

from encountering regions of high atmospheric density and high aerodynamic resistance that might severely damage it. On the other hand, we also have to guarantee that the satellite finds enough atmospheric density for the greatest possible braking effect.

What new technologies are being phased in to meet these challenges?

In order to carry out the aerobraking maneuver properly, the TGO needs a considerable amount of onboard autonomy. From the operational point of view we have to adapt our procedures and tools to be able to work with a satellite of this type. For example, the TGO is capable of carrying out autonomous maneuvers whenever it detects that atmospheric density exceeds a set value or when the satellite goes into safe mode.

The satellite is even capable of modifying commands received from Earth to bring them into line with the actual atmospheric conditions it meets in the descent trajectory. For example, the satellite can measure the deceleration it receives while passing through the atmosphere, calculate how much the orbital period has changed with respect to our predictions and adapt the execution of commands received to suit.





CNES turns again to GMV's experience

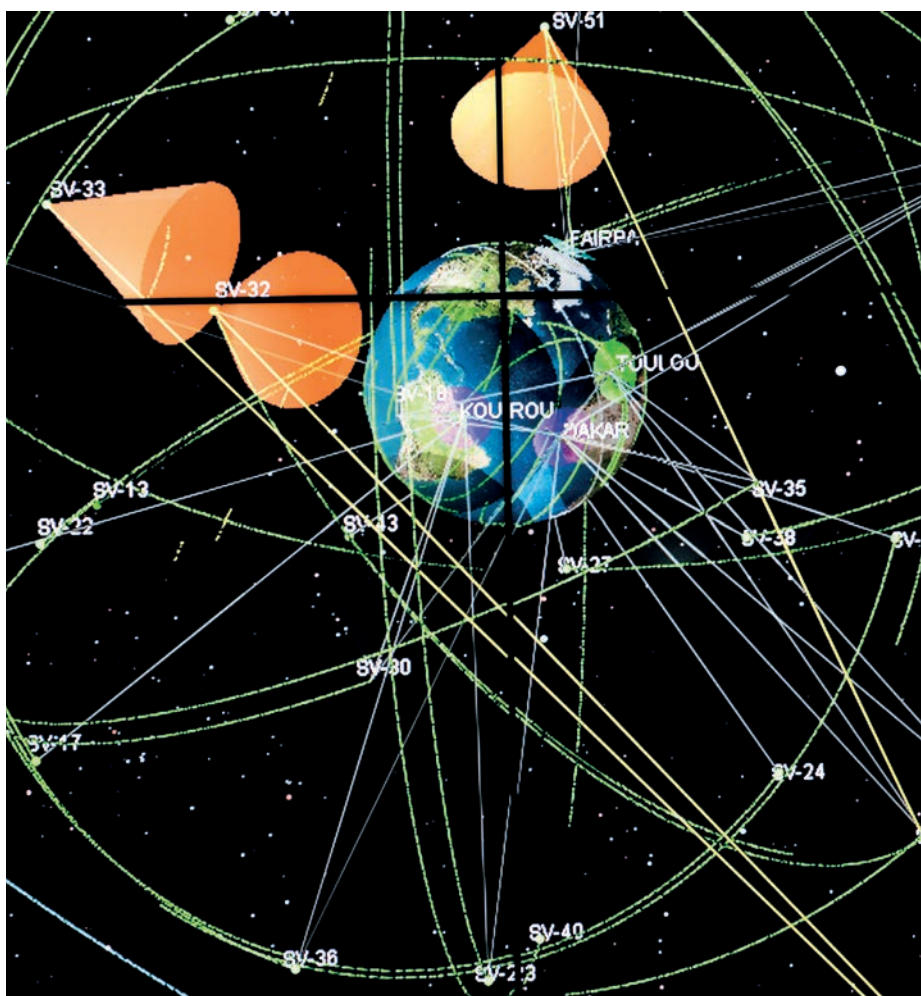
COLLABORATION BETWEEN GMV AND FRANCE'S NATIONAL CENTER FOR SPACE STUDIES (CENTRE NATIONAL D'ÉTUDES SPATIALES: CNES) DATES RIGHT BACK TO 2011

■ For over 5 years now GMV has been collaborating with France's National Centre for Space Studies (Centre national d'études spatiales: CNES) in all the following tasks: mission simulators and analysis; algorithm libraries; mission centers and spacecraft control centers; science-data and image processing; operational flight dynamics. This collaboration has been carried out within the framework contracts ACCIBS and ACIS that GMV signed with CNES in 2011.

Each framework contract, pooling a set of Space areas or themes, is the instrument used by CNES "services" or departments to launch restricted calls for tenders for those activities that need the collaboration of private firms to complete the mission concerned. A framework contract entitles the holder to be included in CNES's continuous consultation process for a set period of time.

CNES has recently invited tenders for the renewal of both framework contracts and has also launched a consultation for new activities, covering not only software development and maintenance but also technical assistance. After this consultation, in which GMV has competed with the main Space firms, CNES has once more turned to GMV for renewal of the framework contracts now called ACCIOME-S1 and ACSIS and has also awarded the firm a new framework contract, ACCIOME-S3.

After this renewal GMV will be priming ACCIOME-S1 and acting as subcontractor in ACSIS. Apart from mission analysis, ACCIOME-S1 has added on new mission-programming tasks. Within ACCIOME-S3 GMV will also be able to opt for onboard software development, command and control and operations in control



centers both in flight dynamics operations (FDS) and payload and satellite platform.

The renewal of the framework contracts ACCIOME-S1 and ACSIS is key for the continuation of work being carried out by the flight-dynamics unit for CNES and will not only allow GMV to maintain the projects underway, currently involving a score of engineers, but will also give it a chance to win new contracts in this area. Winning the ACCIOME-S3 contract also represents an important landmark, giving GMV access to the development of onboard software for instruments.

Worthy of particular note here is the role played by GMV France not only in winning these three framework contracts but also providing a springboard for breaking into other activities within the competitive French Space market

KARI acquires GMV's mission-planning system for its first moon mission

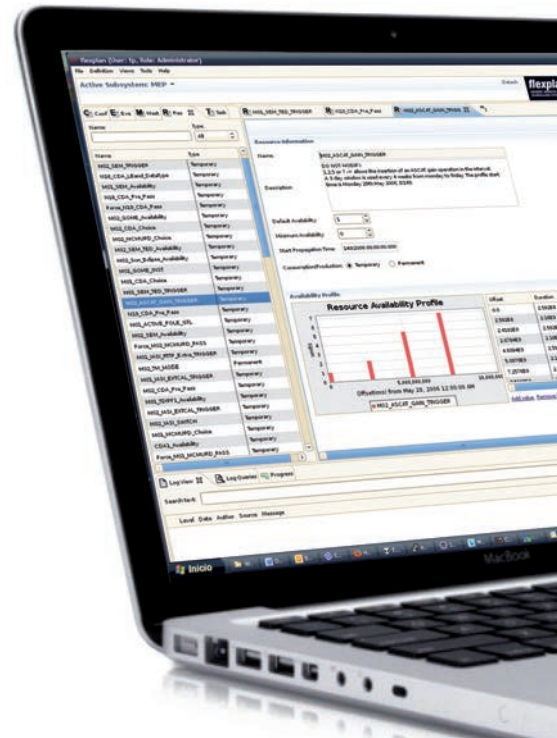
■ GMV's inhouse mission-planning solution, **flexplan**, has been taken up by the (South) Korea Aerospace Research Institute (KARI) to be evaluated as the mission planning system for its KPLO moon mission.

KPLO (Korea Pathfinder Lunar Orbiter), set underway in the 2010s, will be the Korean Space program's first lunar mission. After its launch, scheduled for late 2020, KARI aims to attain mastery of the necessary technologies for carrying out scientific research on the moon's topography and resources. Once placed in orbit, KARI's ambitious lunar program will then move on towards a second phase of landing a Rover carrying instruments for on-the-spot scientific analyses.

flexplan will provide KARI with continuous support not only for

critical mission functions but also for mission support functions such as non-conflicting ground and Space segment scheduling, automation of ground pass scripts, building of stored command codes, onboard memory modeling, generation of activities reports and slew maneuver planning.

GMV's solution support any complex mission. **flexplan** is now operating missions for the European Space Agency (ESA), the European Organization for the Exploitation of Meteorological Satellites (EUMETSAT), NASA Goddard Space and Flight Center and the United States Geological Survey (USGS) as well as the commercial operator Yahsat, to mention only a few.



GMV accompanies Portugal's Minister of Science, Technology and Higher Education on his ITER visit



Research centers, companies and organizations on their visit to the international nuclear-fusion experimental reactor ITER

■ GMV was part of a group of about 20 research institutes, industry and technological entities that visited the International Thermonuclear Experimental Reactor (ITER) in Saint-Paul-les-Durance in France on 6 February in an official visit of the Portuguese Minister of Science, Technology and Higher Education, Manuel Heitor.

GMV works in Big Science in many disciplines, also in custom HW/SW development, system integration, RAMS analysis, autonomous robotics, physical security solutions, simulators, instrument processing monitoring and calibration as well as processing frameworks.

GMV is collaborating in ITER for the design, manufacture, qualification and installation of the Nuclear Safety Control System, providing support for remote handling engineering and in the Nominal Device Support Core Software for the CODAC Core System.



GMV present at Poland's Space debris surveillance and tracking activities

GMV IS A WORLDWIDE BENCHMARK IN SPACE-OBJECT MONITORING AND SURVEILLANCE SYSTEMS AND OPERATION CENTERS

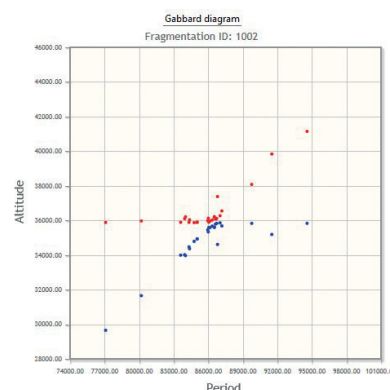
■ Since the nineties GMV has developed the lion's share of the European Space Agency (ESA)'s software systems run for this purpose. At the moment the company has over 20 engineers working on this matter in 5 different countries.

Given GMV's SST experience and expertise, and as part of the company's international expansion, GMV Poland has been leading ESA's Space fragmentations detection and analysis service. This service examines the evolution over time of a catalogue of in-orbit objects to detect any explosions or collisions that might have occurred, identify the objects involved and forecast the future evolution of the resulting cloud of fragments (typically through a Gabbard diagram as shown in the figure).

As a follow-up, GMV Poland is also now participating in the maintenance, integration and validation of ESA's datacenter under the leadership of GMV Spain. GMV Poland is leading all SST services within this activity.

Last but not least, GMV Poland is currently part of the consortium leading the feasibility study of a future Polish Space Situational Awareness (SSA) service, supporting the definition of this system's SST segment. GMV's activities take in the analysis and definition of system requirements, system design including possible reuse of existing infrastructure plus the definition of interfaces, products and services.

GMV Poland is currently participating in the maintenance, integration and validation of ESA's datacenter



The world's leading Space firms come together at Satellite 2017



FROM 6 TO 9 MARCH GMV RAN A LARGE STAND AT SATELLITE 2017 SHOWCASING ITS COMPLETE CONTROL-CENTER RANGE

The roster of products and services on show included the monitoring and control system, **hifly**[®], the ground-station monitoring product, magnet, as well as the orbit-control product line **focussuite** (**autofocus**, **focusgeo**, among others), for determining satellite position and orientation. Last but not least, the **smartsuite** product range for payload-management, -reconfiguration and -optimization.

The Walter E. Washington Convention Center received proposals from over 150 countries of the communication-satellite sector. Carlos Espinos (CEO, Hispasat), Gwynne Shotwell (SpaceX), Rodolphe Belmer (CEO, Eutelsat) were some of the speakers who took part in the 80 lectures of the thirty-sixth Satellite week.

SENTINEL 2B

Blasts off successfully

■ Sentinel-2B will form a constellation with its twin brother, Sentinel-2A, launched back in June 2015. Although launched separately, both satellites will fly in tandem in the same orbit, at an altitude of 786 kilometers and with a separation of 180 degrees.

The Sentinel-2 satellites' remit is to provide data on the management of the environment and farming areas. They can also be used for monitoring deforestation or desertification of certain areas and studying the impact of climate change, for example analyzing the rate of glacier retreat. The satellites will also give information on the pollution of lakes and coastal waters; moreover, their images of floods, volcanic eruptions and landslides will help to map natural disasters and speed up humanitarian aid.

President of FCT and the Head of Portugal's ESA delegation visits GMV

■ On 21 February the president of the Portuguese Fundação Ciência e Tecnologia (FCT) and the Head of Portugal's ESA delegation, Prof. Paulo Ferrão, visited GMV's Lisbon premises. During the visit GMV presented its main ongoing Space activities and the plans in Portugal for this strategic area.

The visit included a demonstration of the test bench for the steering mechanism of a launcher (Thruster Vector Control),

The new satellite will also carry an advanced Multi Spectral Instrument (MSI) with an image width of 290 kilometers. Together with its twin Sentinel-2A, it will give thoroughgoing and global data on the earth's surface, the biggest islands and coastal and continental waters – between the latitudes 56 degrees south and 84 degrees north - doing so with a five-day frequency. The Control Center is set in Darmstadt (Germany) and all Sentinel data will be received in Matera (Italy), Maspalomas (Spain) and Svalbard (Norway).

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 provides support services for the mission planning and control systems.

that GMV was hosting in the laboratory within the context of the NGT-ATB (New Generation Launcher and Space Transportation Advanced Avionics Testbed), ESA project led from Portugal.

In the coming months GMV will integrate the TVC and remaining elements in the European Space Agency's avionics test bench, which is used to test launchers' flight software in a real onboard computer.

Successful launch of the new Hispasat satellite 36W-1

AT 01.03 GMT ON 28. JANUARY HISPASAT'S 36W-1 SATELLITE SUCCESSFULLY BLASTED OFF ONBOARD A SOYUZ ROCKET FROM EUROPE'S SPACEPORT IN FRENCH GUIANA

■ Hispasat 36W-1 is based on the geostationary platform SmallGEO, Europe's response to the market demand for more flexible and modular telecommunications platforms developed as part of the ARTES (Advanced Research in Telecommunications Systems) program of the European Space Agency (ESA).

As well as the new platform's maiden mission, the satellite also features the innovative RedSAT regenerative payload along with an antenna equipped with a processor that allows onboard beam reconfiguration. These upgrades improve signal quality and flexibility and allow the satellite to offer better telecommunications services.

The 240-million-euro project has been funded by Spain's Industrial Technology Development Center (Centro para el Desarrollo Tecnológico Industrial: CDTI) and involves a major participation by Spain's satellite industry. GMV has provided the flight dynamics system, developed from the **focusGEO** product and used as a benchmark for the orbital operations of the rest of Hispasat's fleet; the satellite control and monitoring system using the **hifly**® product, GMV's commercial solution for real-time satellite management; plus the payload management system, based on **smartrings** and management of the onboard antenna pointing system, by means of **smartbeams**.



GMV leads the development of the Galileo's GRC

THE EUROPEAN GNSS AGENCY (GSA), AN AGENCY OF THE EUROPEAN COMMISSION, HAS AWARDED THE TECHNOLOGY MULTINATIONAL GMV A FRAMEWORK CONTRACT FOR DEVELOPMENT OF THE REFERENCE CENTRE OF EUROPE'S GALILEO SATELLITE NAVIGATION PROGRAM (GRC)

■ The maximum budget of the four-year framework contract, including hosting infrastructure development and provision and support to the centre's operation, is 21 M€.

The GMV-led consortium, also comprising Fore Installatie Adviseurs B.V., the Universitat Politècnica de Catalunya, Veripos Ltd., Fox Crypto B.V, The Physikalisch-Technische Bundesanstalt (PTB), the Royal Observatory of Belgium (Observatoire royal de Belgique), CELIS S.L., Eutelsat S.A. and QASCOM s.r.l., will be responsible for development, validation and implementation of the centre as well as subsequent support to operation and maintenance, and hosting service provision.

The GRC's main building, currently under construction, is located in the Netherlands municipality of Noordwijk. The GRC's main remit will be independent performance monitoring of the Galileoservices. The GRC will also provide the GSA, responsible for running

the Galileo system, with an independent satellite-signal quality assessment system, while also keeping a quality check on the service provided by the Galileo Service Operator (GSOp).

Although the GRC will have its own autonomous working capacity, it is designed to allow collaboration with diverse organizations of the various member states of the European Union, Norway and Switzerland. These external organizations will be able to contribute towards centre operation, providing, for example, additional monitoring and reference products and data. This will help to make the centre more robust and improve its performance, while also furnishing it with specialized technical resources like antennae or specific technical consultancy. Collaboration with these organizations might be either on a continuous basis or ad hoc to suit specific campaigns.

GMV IN GALILEO

This contract is now to be added to the growing roster of GMV's Galileo contracts, including the supply of several operational systems of the system's ground segment such as OSPF (Orbit & Synchronisation Processing Facility), IPF (Integrity Processing Facility), SPF (Service Product Facility), FDF (Flight Dynamics Facility) and MNE (MDDN Network equipment). GMV is also currently the main contractor for providing Galileo's essential Geodetic Reference Service Provider (GRSP) and Time Service provider (TSP) services; it is co-leading development of the European GNSS Service Centre (GSC) and is leading the development of the Return Link Service Provider (RLSP) of the program's Search and Rescue Service (SAR) and the development of Galileo's commercial service (CS). GMV is also making a big contribution to the Galileo Control Center operating equipment



GMV takes part in the General Assembly of the Spanish Aerospace Technology Platform

■ On 3 February 2017 GMV's General Manager of Aerospace, Jorge Potti, took part in the General Assembly of the Spanish Aerospace Technology Platform (Asamblea General de la Plataforma Tecnológica Aeroespacial Española: PAE), inaugurated by its president, Plácido Márquez, and the

As a member of PAE, GMV also forms part of its Management Board (Consejo Gestor)

International Programs Director of the Industrial Technology Development Center (Centro de Desarrollo Tecnológico Industrial: CDTI), Juan Carlos Cortés.

The assembly addressed the industrial targets of the aeronautics and Space sectors and the main lines of research and development, both of universities and the technology centers represented on the platform's Management Board. PAE is currently made up by eighteen universities, twenty-eight Spanish Space- and aeronautics-companies, fourteen research and technology centers plus the CDTI and the State

Research Agency (Agencia Estatal de Investigación: AEI). As a member of PAE, GMV also forms part of its Management Board (Consejo Gestor).

The Spanish Aerospace Technology Platform is a consultancy advising the various national and international research and development bodies. One of its main objectives is to provide a Spanish R&D meeting point. One of the platform's top priorities is also definition of a Spanish Aerospace Research Strategy Agenda and aerospace surveillance and forward planning, proposing action plans and an early demand map in Spain.

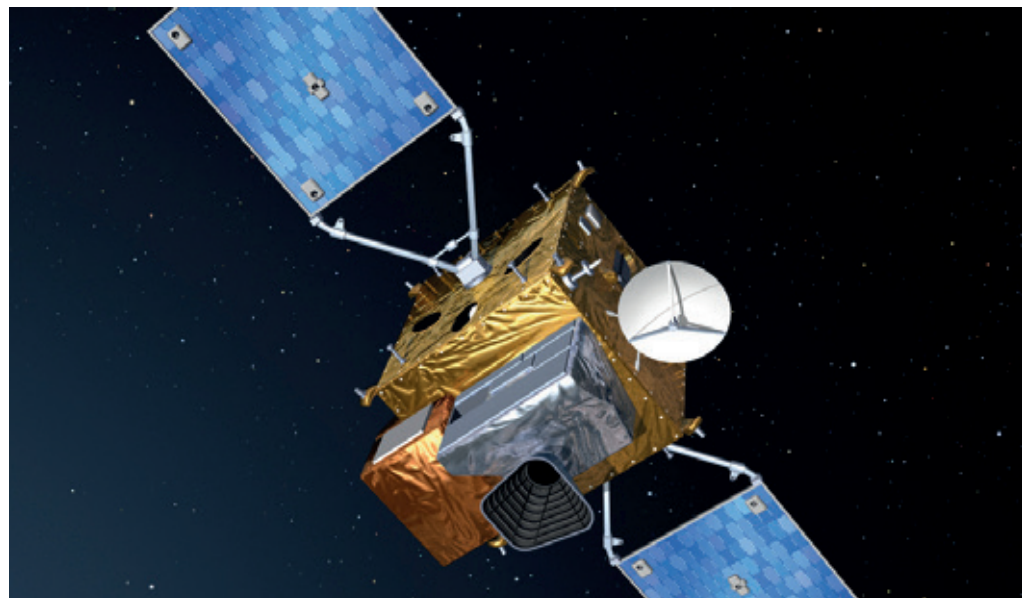
GMV broadens its participation in Meteosat Third Generation products and applications

■ The Meteosat Third Generation (MTG) system is being established through cooperation between the European Space Agency (ESA) and EUMETSAT, the European consortium for operating meteorological satellites. As such it represents a broadening of the global- and regional weather forecasting and atmospheric-monitoring capabilities of its forerunner Meteosat Second Generation (MSG).

GMV is currently contributing to the MTG mission with the design, development and validation of the prototype processing for MTG imaging satellites, and the integration of the MTG sounding satellites prototype, to enable processing within a common framework.

The new MTG series will include six satellites installed on two different platforms, MTG-I and MTG-S. The first prototype is due to be launched in late 2017 and the second in mid 2019.

Thales Alenia Space France and EUMETSAT have once more turned



to GMV's expertise in operational processing awarding it the development of the MTG Instrument Navigation and Registration (INR) operational processor for the sounding satellites (MTG-S) under the MTG mission.

The purpose of GMV's activities is to provide the operational processors for

the Lightning Imager (LI) instrument. LI is an optical payload with onboard data processing for detection of lightning optical pulses. LI will detect and locate lightning over almost the whole Earth disk (geostationary orbit) operating in any illumination condition (day and night).



GMV designs the onboard and ground components of future flight-control systems for space exploration missions

GMV'S WILL DEPLOY ITS LEADERSHIP IN FLIGHT-DYNAMICS SYSTEMS (FDS), GROUND OPERATIONS AND AUTOMATIC GUIDANCE, NAVIGATION AND CONTROL (GNC) SYSTEMS IN THE FCS-ATOMIC PLATFORM

■ This contract, awarded by the European Space Agency's (ESA) Space Research and Technology Centre (ESTEC) to a GMV Spain, GMV Poland, GMV Portugal and the consultancy of GMV staff in the European Space Operations Center (ESOC), has the goal of developing a framework that integrates and defines the FDS and GNC systems (which together make up the Flight Control System or FCS) and the respective interfaces.

The recent hugely successful ESA interplanetary missions - Rosetta and Exomars - have in great part been possible due to the high achievement standards of the ground segments' FDS. Its ESOC teams are manned by GMV specialists, and it is responsible for controlling a wide range of aspects of spacecraft motion.

A higher level of automatic Guidance, Navigation and Control components in the spacecraft (Space segment) will lighten the FDS burden: more autonomous operations will cut costs; while the lower reliance on long round-trip-time communication links, particularly for missions to distant bodies, will allow safer and more precise (thus more ambitious) maneuvers.

Only autonomous GNC permits the maneuvering accuracies required for precise landing and close observation. At the same time, the GNC system cannot run completely independently from the ground and requires some level of interaction between the FDS and the GNC.

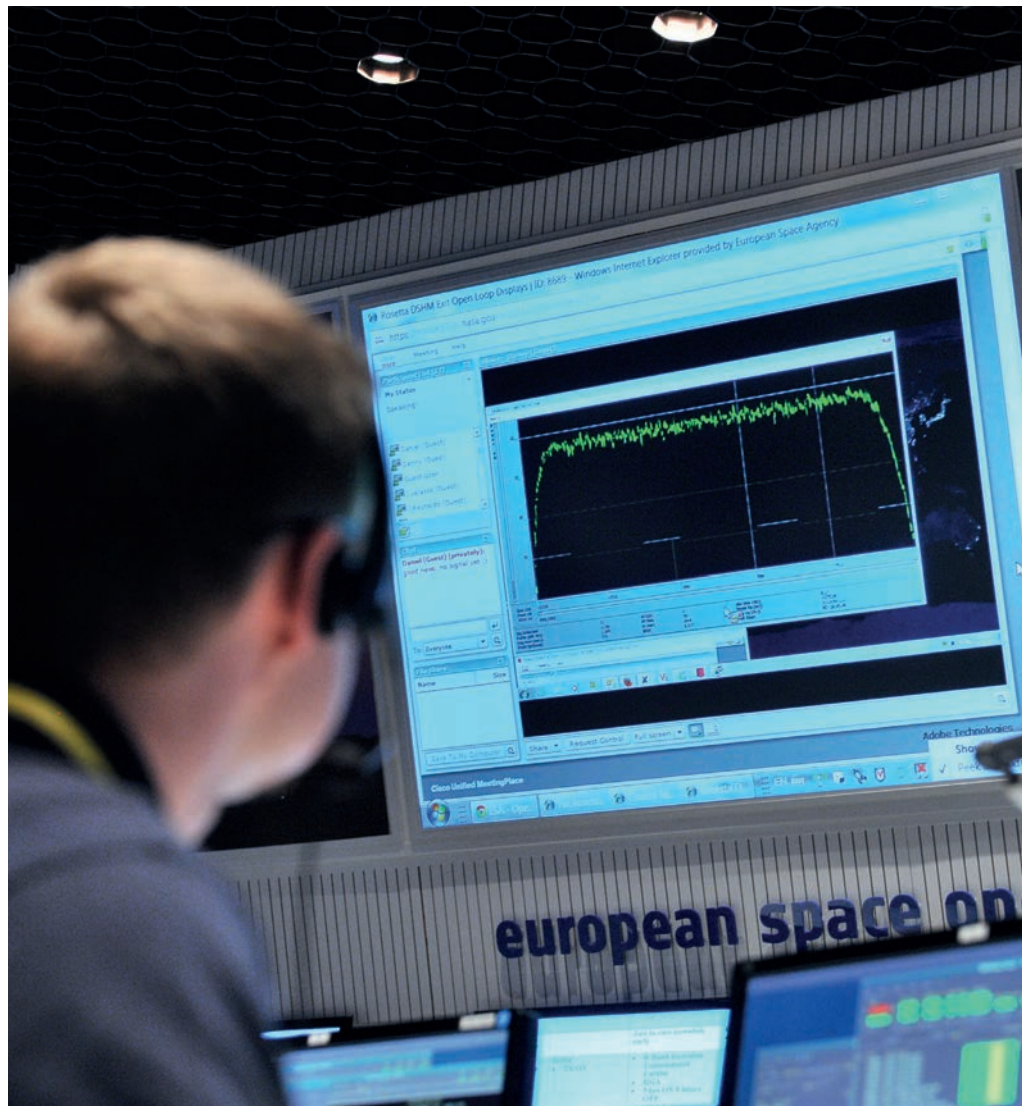
The hybridization study, the sharing of authority as well as the optimal interface point between the two systems have so far been performed on the basis of very preliminary assumptions, with no solid navigation analysis, leading to sub-optimal

strategy choices on which system design relies.

The present activity will allow the study of the implications of hybridization, authority sharing, between the two systems by developing a framework that will simulate both the systems, which together make the Flight Control System (FCS). The framework will allow performance of the trade-off of different strategies in early mission phases; this will prove mission

feasibility or will improve mission performance or reduce costs.

Once validated, the platform will be used for evaluating a possible mission scenario to a Near Earth Object (NEO), similar to AIM, and the electric propulsion orbit, raising (G2G) FDS mission strategies. For this mission, the analysis will be based on realistic assumptions arising from ESA's and the industry's experience in recent and future missions.





GMV plays a key role in Copernicus's user requirement design

GMV IS PLAYING A KEY ROLE IN THE COPERNICUS GLOBAL MONITORING FOR ENVIRONMENT AND SECURITY PROGRAM, PARTICIPATING ACTIVELY IN VARIOUS PROJECTS FOR BOTH THE GROUND AND SPACE SEGMENT

■ The program is organized around a Space component and a service component to aid management and decision-making in six thematic domains: climate change, atmosphere monitoring, marine monitoring, land monitoring, emergency response and services for security applications. The satellites currently up and running under this program are Sentinel-1A and 1B for radar observations, Sentinel-2A for high-resolution optical observations and Sentinel-3A for atmosphere monitoring. Meantime work is underway for the launch of Sentinel-4 and Sentinel-5 for monitoring atmospheric quality indicators.

The program as a whole represents a milestone in the use of Space data for environmental applications, broken down into atmosphere, marine environments, climate change and continental environments, security and emergencies.

In 2015, within the Space segment, the European Commission established a framework contract with a GMV-led consortium, including the Belgium firm Spactec Partner and the French firms FDC and Noveltis, with the remit of recording user requirements for the program's future generation of satellites. Late 2016 saw completion of the first phase of compiling over 3000 service and earth-observation requirements furnished by European and international users.

This consortium has recently signed the third specific contract with the



Commission to advance in three crucial aspects towards the design of the next generation of the Copernicus program's Space component: prioritization of user requirements in terms of social, economic, political and technical aspects; the characteristics of future data, as necessary for realizing the products sought by the earth-observation user community; and lastly, appraisal of the technology and developing it as necessary to ensure that future Copernicus observation missions develop as required for each service.

The above mentioned process represents a milestone in support for the European Commission in the Copernicus decision-making process. Member

states are now regularly informed of results through the Copernicus User Forum, a consultation body for consolidation of the earth observation program in each European country; other participants are the delegated entities, the European Environmental Agency (EEA), the Joint Research Centre (JRC), the European Center for Medium range Weather Forecasting (ECMWF), the European Maritime Safety Agency (EMSA), FRONTEX and the EU Satellite Centre (SatCen).

Under this new contract GMV is managing the integrity and traceability of the database architecture, data analysis for future service chains and also vetting of the most suitable technology for achieving future challenges.



PERASPERA

GMV hosts the experts meeting of the EC's Space Robotic Cluster

On 1 and 2 February GMV has hosted the biggest ever meeting of Space robotics experts as part of the European Commission's Strategic Research Cluster which is coordinated by project PERASPERA (Latin meaning "Through hardships to the stars").

The project is being 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.

In the first phases of the Cluster, working with an estimated budget of 22 M€ for the 2015-2018 period, about 30 European institutions employing about one hundred Space-robotics experts and technicians will develop six technology building blocks to serve as

the basis for future orbital and surface missions. Four of them are being led by Spanish firms and three by GMV, thus confirming its status as a worldwide expert in the development and ground validation of Space-robotics technologies.

GMV will specifically be taking on responsibility for the European Space Robotics Control and Operating System (ESROCOS project); the European Robotic Goal-Oriented Autonomous Controller (ERGO project); plus the Facilities for Testing Orbital and Surface Robotics Building Blocks (FACILITATORS project), which will

validate the developed technologies in highly representative Space environments.

One of the main milestones in this first stage of the Program is the revision of the requirements of the six technology building blocks, addressed in a meeting of over 60 Space-robotics experts in GMV's head office.

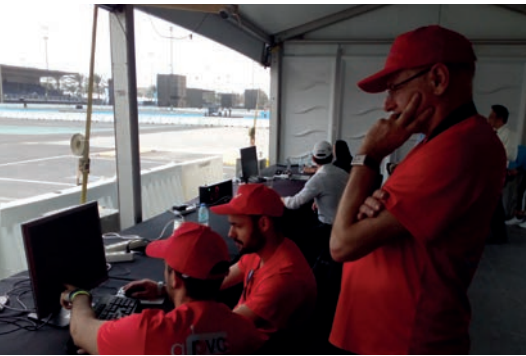
In 2018 the objective of the PERASPERA roadmap is to make a start on integration of the technologies developed in the first phase, doing so in a series of activities applied to planetary and orbital scenarios.



GMV-organized meeting of Space robotics experts under the PERASPERA project, held on 1 and 2 February



GMV completes its mobile manipulation platform for the first Mohamed Bin Zayed International Robotics Challenge (MBZIRC)



THE FIRST MOHAMED BIN ZAYED INTERNATIONAL ROBOTICS CHALLENGE (MBZIRC) WAS HELD FROM 16 TO 18 MARCH. THIS IS ONE OF THE WORLD'S MAJOR AIR- AND GROUND-ROBOTICS COMPETITIONS

■ MBZIRC is a new robotics competition brokered by the United Arab Emirates and organized by Khalifa University. Held every two years, it aims to showcase the latest scientific and technological advances in this field, while encouraging yet more research for the future. This involves the participation of teams of researchers and scientists from all around the world, who have to take on several challenges involving autonomous air- and ground-robots.

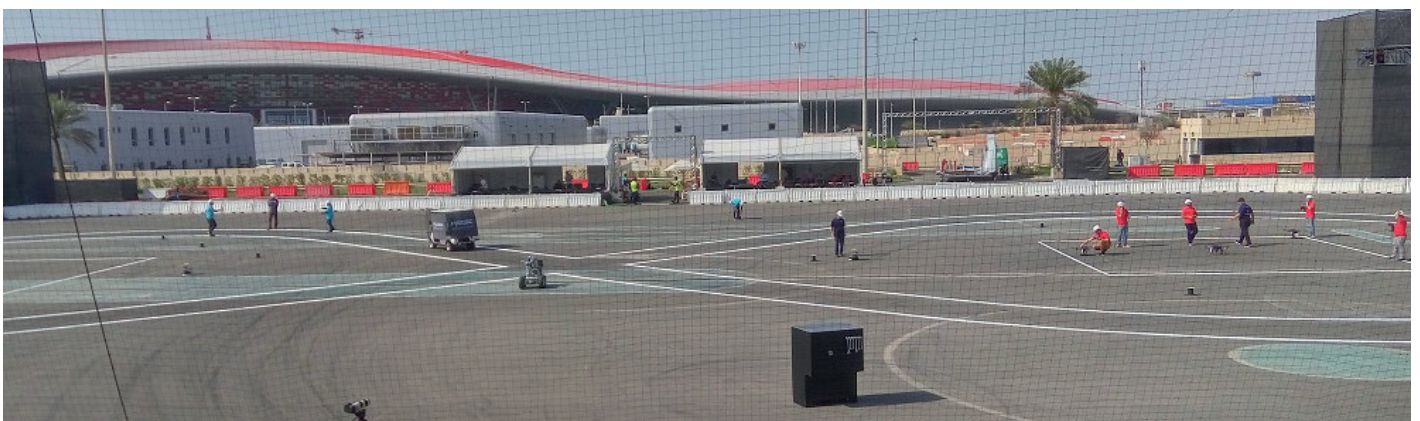
The AI-Robotics team, led by Seville University with the collaboration of GMV and FADA-CATEC, successfully negotiated the first round of challenges, involving the totally autonomous landing of a drone on a moving vehicle (from takeoff to vehicle detection and landing), without knowing where the

moving vehicle was at the start and working in an outdoor environment of strong winds. The second challenge was to use an unmanned ground vehicle (UGV) to locate a working area and carry out maintenance tasks with a robotic arm, doing so completely autonomously. Challenge 3 required three drones to collaborate in order to search for, locate, track, pick up and place a set of static and moving objects in a specific site. GMV has worked mainly on the first challenge's relative location of a moving vehicle and development of a mobile manipulator for the second challenge, working in conjunction with UPM-CAR (Centre for Automation and Robotics).

The competition brought together a total of 25 teams, most of them from the main world's main robotics centers,

universities and technological institutes. This short list had been whittled down from a total of 143 applications from 35 countries, competing for the \$5 million prize. On 20 March, after the competition itself, Khalifa University organized a results-giving ceremony together with the kickoff of activities ahead of the next MBZIRC in 2019.

GMV has worked mainly on the first challenge's relative location of a moving vehicle





Recognition of GMV's capabilities in soldier systems

THIS PROJECT REAFFIRMS AND WIDENS GMV'S EXPERIENCE IN SETTING UP COMBAT SYSTEMS

The European Defence Agency (EDA)'s STASS Phase 2 (Standard Architecture for Soldier Systems) project has recently kicked off. Awarded to a GMV-led consortium of firms, the project also involves the participation of some of Europe's leading firms in this field: Rheinmetall Defence (Germany), Larimart (Leonardo, Italy) and TNO (Netherlands).

The main aim of this study is to develop a generic, open reference architecture to favor the development and interoperability of member states' soldier systems. This architecture has to promote standardization of equipment, connectors and interfaces; it also

has to have a modular design to maximize the system's operational efficiency, facilitate the phasing in of new technology and help to cut the complete system lifecycle cost.

The previous phase to this study made a start on the definition of soldier system architecture but centering on aspects of the power supply. To be able to set up a complete soldier architecture, the phase 1 result had to be rounded out with a detailed analysis of data management aspects and also management support infrastructure.

In January Tres Cantos (Madrid) hosted a meeting with subcontractors to establish a common starting point. March then saw a successful governmental workshop in which national EDA representatives plus representatives from European MoDs were invited to find out the state of the project and revise and input requirements from an operational point of view.

GMV is the only European company that has taken part in two of EDA's soldier systems, the CEDS FSP and STASS itself. This represents recognition of GMV's technological prowess in this sector





After study completion the EDA will be able to work with a first version of synchronized architecture, with similar work being carried out in parallel in several countries and in NATO. It will also be possible to use the study as a roadmap in future procurement programs or necessary updating to make sure soldier systems are compatible with this architecture.

This project reaffirms and widens GMV's experience in setting up

combat systems. This experience dates right back to 2007 when GMV took on responsibility for the communications and information system of the Spanish MoD's Future Combat System (Combatiente Futuro: COMFUT). Later on, in 2013, GMV led one of the seven studies of the EDA's Combat Equipment for Dismounted Soldier Feasibility Study Programme (CEDS FSP) initiative, focusing on specification of an open architecture for armament-mounted electronic

systems including grenade-launching ballistic computers and sensors. GMV is currently participating in the MoD's technology program VCR 8X8, where it is developing the soldier's command and control software.

GMV has developed the Communications and Information System of the Spanish MoD's Future Combat Program (Combatiente Futuro: COMFUT)



STASS project phase 2 meeting held in GMV



GMV showcases its latest Security technology

AS A KEY SUPPLIER OF THE SPANISH INTERIOR MINISTRY AND A RECOGNIZED SECURITY EXPERT, GMV TOOK PART IN THE LATEST JORNADAS INTERNACIONALES DE SEGURIDAD, AN INTERNATIONAL SECURITY CONFERENCE ORGANIZED BY THE DIRECTORATE GENERAL OF POLICE AND THE GUARDIA CIVIL, IN COLLABORATION WITH THE SPANISH ASSOCIATION OF SPACE, AERONAUTICS AND DEFENSE TECHNOLOGY COMPANIES AND THE SUPPORT OF THE INTELLIGENCE CENTER AGAINST ORGANIZED CRIME



GMV took part in the latest International Security Conference

■ The theme of this year's conference was "International Terrorism. Threats and Responses" and its aim was to show how the industry's latest technological breakthroughs might help to solve the current challenges faced by state security corps and forces.

To do so the conference was organized round a series of panel discussions in which experts spoke about key aspects of today's multi-front fight against international terrorism (cyberspace, border control, infrastructure protection, etc). José Prieto, business development manager of GMV Homeland Security & Defense, took part in the panel discussion "The anti-terrorist fight outside our borders: Deployments of the state security corps

and forces", sharing with the audience GMV's viewpoint as prime contractor for development of the command and control system of the European External Actions Service and of FRONTEX's EUROSUR network.

The country's leading security firms also showcased their state-of-the-art security technologies in a special exhibition area. GMV displayed its **socrates** suite of command and control products for security corps and forces.

The event, which was a resounding success, attracted a turnout of over 120 representatives from security corps and forces from various countries plus national and foreign security experts from EUROPOL, the National Critical

Infrastructure Protection Center (Centro Nacional para la Protección de las Infraestructuras Críticas: CNPIC), the Intelligence Center against Terrorism and Organized Crime (Centro de Inteligencia Contra el Terrorismo y el Crimen Organizado: CITCO) and the Interior Ministry and the Foreign Affairs and Cooperation Ministry, plus members of Spain's security industry.

GMV displayed its socrates suite of command and control products for security corps and forces

Incorporation of the Federated Mission Networking concept in EU-led operations and missions

■ The European External Action Service (EEAS), the European Union's institution with the remit of coordinating EU's security and external policies, has awarded GMV the RAMNET study, the aim of which is to define the context in which any purely European Federated Mission Network (FMN) has to operate.

The Federated Mission Network (FMN) concept has been developed by NATO to ensure interoperability of command and control systems of different countries participating in the same mission. This interoperability has to be phased into the systems before the mission goes ahead, ensuring plug-and-play interoperability from the word go.

FMN is a network interconnecting the C2 systems of the various coalition nations and NATO itself. Given that the coalition countries are not necessarily all NATO members, any nation that wishes to, whether NATO member or

not, can "affiliate" to FMN and adapt its systems to interoperate with NATO. It can then participate, capability permitting, in the FMN organization like any other affiliated nation.

Diverse (NATO and non-NATO) countries are carrying out a spiral development to incorporate capabilities into the command and control systems of participating nations. As well as ensuring implementation of the basic communication systems between persons (voice, mail, video, etc.) the "Mission Threads" are defined as sets of necessary functions for fulfilling a specific type of mission. This Mission Thread implementation process is as yet in its infancy.

The EU carries out external missions and operations with various purposes, as laid down in the EU Treaty. Given that most EU nations are NATO members and FMN NATO partners, it stands to reason that available FMN capabilities should be used in

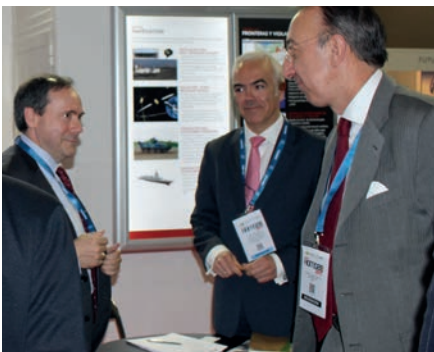
EU missions and operations to boost mission efficacy. It is quite on the cards, however, for the EU to define missions differently from NATO, calling for national command and control systems to be enabled for Mission Threads that NATO does not allow for.

Hence the fact that the study will also define a reference architecture that could serve for definition and implementation of specific systems to meet the needs of non-NATO, EU-defined Mission Threads.

GMV's aim is to define the context in which a purely European FMN should operate

GMV showcases its defense and security solutions at the latest HOMSEC

FROM 14 TO 16 MARCH GMV TOOK PART IN THE SIXTH INTERNATIONAL DEFENSE AND SECURITY TRADEFAIR, HOMSEC 2017, HELD IN MADRID'S JUAN CARLOS I TRADEFAIR SITE (IFEMA).



Jorge Domecq, Chief Executive of the European Defence Agency, alongside Manuel Pérez Cortés and José Prieto of GMV

■ GMV was running a stand displaying its systems and solutions for state security and armed forces: C4ISTAR systems, border surveillance systems, crisis management and monitoring systems, navigation systems and aeronautics systems.

Within the Joint Intelligence, Surveillance and Reconnaissance (JISR) area, as part of Spain's participation in NATO's MAJIC project (Multisensor Aerospace /Ground Joint ISR - Intelligence, Surveillance and Reconnaissance - Interoperability Coalition), GMV showcased its information analysis and compilation systems. GMV also presented several of its navigation developments, such as the Flight Control Computer (FCC) of the RPAS ATLANTE, the pre-operational receiver PRESENCE for Galileo's public regulated service (PRS) signal and the multi-sensor navigation systems designed for adverse environments, presented in the armaments programs VCR 8X8 and F110.

GMV also highlighted the **socrates** system, a complete border-protection and maritime-surveillance command-and-control system. Within the simulation area GMV displayed L3 WESCAM's electro-optic and infrared (EO/IR) imaging turret and within the aeronautics field, GMV's stand featured the control unit developed for the loading system of the A 400M aircraft.



Training and innovation as a response to today's Cyberdefense challenges

■ Cyberdefense consists of the implementation of security measures to ward off and react to cyberattacks against communications and command and control systems infrastructure. It calls for arrangements and strategies to prepare for, prevent, respond to and recover from any attacks that might jeopardize confidentiality, integrity and availability of information and auxiliary systems and services and also carry out a forensic analysis of these attacks to learn from them. Recent studies have shown that a credible Cyberdefense capability means a balanced set of the following: technology, cyber awareness and savvy personnel and the right processes that bring technology and people together in the most effective way.

To guarantee the best possible training-syllabus information, the European Defence Agency (EDA) has set up two initiatives, both backed up by the private sector: the CDTEXP project and the DePoCyTE project (Demand Pooling for the Cyber Defense Training and Exercise).

CDTEXP (Cyber Defense Training and Exercise, coordination and support Platform), currently being carried out by GMV, will provide the central point of access to available training information and infrastructure. To feed the CDTEXP with updated training there must be a constant flow of information with the most up-to-date content according to the latest Cyberdefense techniques. There's

where the DePoCyTE project, recently awarded to GMV, comes into its own.

DePoCyTE's main aim is to improve EDA-participant member states' affordable access to Cyberdefense courses provided by the private sector.

As for the private sector it aims to provide cost-effective and sustainable private sector support for developing, organizing, executing and evaluating national or multinational Cyberdefense

exercises along a common model and common standards (e.g. based on strategic Cybersecurity decision-making exercises).

Lastly, DePoCyTE aims to support the development of a European Cyberdefense Culture through an increasing number of opportunities for information and knowledge shared through a swelling portfolio of EU level/multinational courses and exercises.



Technological Conference: The current state of Electronic Warfare

On 19 January GMV took part in the conference "The Current state of Electronic Warfare", organized by the Subdirectorate General of Planning, Technology and Innovation (Subdirección General de Planificación, Tecnología e Innovación: SDG PLATIN).

The aim of the conference was to give an overview of the development and current state of electronic warfare in Spain. It did so by showing current trends and future technologies with the collaboration of all national stakeholders: the armed forces, the industry, technological centers and universities.

Manuel Pérez Cortés, GMV's Director of Defense and Security, spoke about the processing and mining of SIGINT data.



Ready for the new general Data Protection Regulation?



Javier Zubieta, GMV secure e-solutions'
BDM for Security



I would argue that in this case we Spanish don't need to have an inferiority complex; quite the contrary. As far as compliance with the new legislation is concerned, we match or outperform the best countries

■ The coming into force of the EU's new General Data Protection Regulation (GDPR), to be binding by May 2018, involves a series of far-reaching changes that European organizations now have to live up to.

The GDPR scenario is pretty familiar to companies like GMV. It is not the first (neither will it be the last) law and regulation to be tackled, both on our own account and to help our clients. The Spanish Data Protection Act (Ley Orgánica de Protección de Datos: LOPD), the Critical Infrastructure Protection Law (PIC), the National Security Scheme (Esquema Nacional de Seguridad: ENS), PCI (Payment Card Industry), NERC, etc. are examples of totally consolidated laws and regulations for which we have helped to set up plans to bring current legislation into line, implement the required Cybersecurity measures and demonstrate compliance afterwards.

The new regulation not only acknowledges the by-now classic rights of access, rectification, cancellation and objection but also brings in two

brand-new rights: the so-called "right to oblivion", as a de facto right of abolition, and the right to data portability. The GDPR calls for the appointment of a Data Protection Officer (DPO), who is bound to take on a review of the organization's current data-protection arrangements, set up a compliance roadmap, drive Cybersecurity projects, flag incidents and manage activity on a daily basis, etc. Then there are the new fines. In the Spanish case it seems that the maximum €600,000 fine for a breach of the Spanish Data Protection Act (LOPD) has not been "daunting" enough to deter breaches, at least for big organizations. Now, however, the GDPR weighs in with a massive fine of up to €20 million or 4% of the turnover, whichever is the greater, aimed precisely at the major organizations. Anyone who takes this too lightly is likely to be in for a big shock in the form of a swingeing fine.

The changes are sweeping and time is short. The good news is that Spain, along with Germany, is one of the best prepared countries so less work remains to be done.



checker[®]

ATM SECURITY

THE KEY TO CHECKER'S SUCCESS IS SIMPLE: "PROTECTION WITHOUT INTERFERENCE". **Checker** IS CAPABLE OF EXERTING CAST-IRON CONTROL OVER THE SYSTEM WHILE CONSUMING HARDLY ANY RESOURCES AND WITHOUT FORFEITING SYSTEM AVAILABILITY. IT IS ALSO MULTI-VENDOR SOFTWARE, INSTALLABLE IN THE WHOLE RANGE OF EQUIPMENT MADE BY THE VARIOUS VENDORS

More than a decade leading ATM security

A bout a decade ago GMV was given a stiff challenge: to create software to protect ATMs from the cyberattacks that were just beginning to crop up back then. No market solution at that time offered banks protection from hackers, who found ATMs a sitting duck for their criminal activities. GMV was bold enough to invest money, time and knowhow in a solution.

The first logical ATM attacks were detected in Russia in 2008. It was in 2013 in Mexico when they began to be massive and coordinated, reaching Western Europe a year later. GMV,

jointly with Dynasty Technology Group, quickly cottoned on to this threat and spearheaded research into ATM protection even before ATMs became one of the hackers' pet targets over the next ten years. Innovation has always been hard-wired into GMV, and rising to challenges is the company's driving force.

This groundbreaking research and collaboration gave birth to checker ATM Security, the custom-built ATM solution, which sold its first license 10 years ago and by now is protecting over 122,000 ATMs of 40 different banks in more than 33 countries. It is by now unquestionably

the world's leading ATM cyberattack protection system.

checker ATM Security,
complete and effective
ATM protection



GMV as ambassador of Spanish Cybersecurity at RSA San Francisco

■ The RSA CONFERENCE is the world's flagship Cybersecurity event. In this year's event, GMV was chosen by Spain's Foreign Trade Institute (Instituto de Comercio Exterior: ICEX) as one of the firms to represent Spanish technology at the fair.

This year's conference attracted a turnout of 43,000 Cybersecurity professionals and leaders from all around the world. Over 550 companies and organizations offered a comprehensive educative and awareness-raising program with speeches, chats, panel discussions, tutorials and keynotes by international experts.

In the words of Jonás Porcar, Business Development Manager North America: *"The Cybersecurity industry is coming to boiling point worldwide with a dizzying growth and innovation rate. GMV's upfront participation in RSA allows us to chat face-to-face not only with the world's main manufacturers but also the most groundbreaking start-up, to find out at first hand the most innovative technologies and phase them into our range as integrator."* For his part, Juan Antonio Abánades, Head of GMV's Cybersecurity Technology Section pointed out that *"the star themes in this year's conference have been application of artificial-intelligence and machine-learning technologies in the detection*

of threats and intrusions, the new-generation endpoint protection systems and security-hardening of the Internet of Things and its relation with aspects of industrial Cybersecurity".

GMV was chosen by Spain's Foreign Trade Institute (Instituto de Comercio Exterior: ICEX) as one of the firms to represent Spanish technology



Jonás Porcar and Juan Antonio Abánades

Big Data and security: A new challenge for Space?

GMV ATTENDED THE 3RD THE INTERNATIONAL SECURITY SYMPOSIUM OF THE EUROPEAN SPACE AGENCY (ESA) TO TALK ABOUT THE SPACE WARP CONCEPT

→ **BIG DATA AND SECURITY: A NEW CHALLENGE FOR "SPACE"?**



The Warning Advice and Reporting Point (WARP) is a means of ensuring a trustworthy environment in which community members can swap notes on information-security to improve their intelligence and protection capabilities. This was the definition given in the paper of Julio Vivero, Head of the Consultancy and Infrastructure Section of GMV Secure e-Solutions in Barcelona, during the ESA-brokered event in the Italian capital.

This symposium, which brought together about 150 national and international security experts from the Space sector, focused on how Big Data security challenges affect the activities and security of international and national organizations.

Vivero, for his part, stressed the growth of Cybersecurity awareness within the Space sector. Few are the organizations today that lack specialized resources. This contrasts sharply, however, with the curbs placed on the exchange of information security.

This reticence is due to two main causes: firstly, the confidentiality of the data itself and, secondly, the profit drawn from this exchange. GMV, however, tabled measures for bridging this gap in the form of *"automatic tools for exchanging Cybersecurity, standard protocols, anonymity solutions and, above all, Big Data, as a method for obtaining the maximum benefit from the shared information"*.



GMV-CERT Participates in the 50th TF-CSIRT congress in Valencia

GMV HAS BEEN PRIVILEGED TO BE ONE OF THE FEW SPANISH FIRMS PARTICIPATING IN THE 50TH TF-CSIRT CONGRESS, A PRESTIGIOUS INTERNATIONAL EVENT RESERVED FOR THE WORLD'S OFFICIAL CERTS

■ A Computer Emergency Response Team (CERT), also known as a Computer Security Incident Response Team (CSIRT), as the name suggests, is a team of experts responsible for coming up with a response to any information-system threats and incidents. The Software Engineering Institute (SEI) of the US university Carnegie Mellon has been working on Cybersecurity issues for nearly 30 years now and is in charge of accrediting security-incident response centers like GMV's, one of the few Spanish centers boasting this distinction.



endorsement by *FIRST and TF-CSIRT of the work now being carried out by Spain's CERTs*", claimed Roberto López, Head of the Managed Services Division and manager of GMV-CERT.

The congress, attended by representatives of the most important Cybersecurity protection centers from 78 countries, dealt with the main threats and incidents currently lurking for private companies and public organizations. Top experts set out the Cybersecurity sector's main challenges, the good practices to follow and common action protocols to give earlier warning of any risks.

GMV-CERT now has a wealth of experience and boasts a group of experts responsible for preventive and reactive measures to any information-system security threats of both national and international clients. It studies the global state of network and computer

security, comes up with a response to any network attacks, gives out alerts and warnings about threats and vulnerabilities and offers all sorts of information to help improve the security of these systems. In short, GMV is actively dealing with Cybersecurity incidents and exchanging intelligence to help deal with them more effectively.

At the moment only 19 centers have been awarded the CERT distinction in Spain

This event, organized by the Forum of Incident Response and Security Teams (FIRST), is one of the world's biggest Cybersecurity encounters. Each year it is held in a different city around the world; the venue for this year's congress was Valencia. *"The fact that Spain is now hosting this conference is an*

GMV contributes to cloud computing security

SPAIN HAS HOSTED THE CSA-EMEA CONGRESS, AN INTERNATIONAL CYBERSECURITY EVENT

■ GMV has taken part in the CSA-EMEA (Europe, Middle East and Africa) Congress on Cloud Computing Security.

The Cloud Security Alliance (CSA), the instigator of this event, is the world's leading organization dedicated to defining and raising awareness of best practices to help ensure a secure and trustworthy cloud computing environment.

This latest annual congress was held with the participation of international

speakers who dealt with the latest cloud security trends, GDPR and online regulatory frameworks, among other matters.

One of the keynote speakers of day one was Mariano J. Benito, CISO of GMV Secure e-Solutions and Coordinator of the Operative Technical Committee of the Spanish chapter of CSA, who presented the results of the fourth State-of-the-Art Cloud Security Study, carried out in 2016 with the participation of Spain, Peru and Argentina.

One of the study features brought out by Mariano J. Benito was the fact that *"after several years offering their market services, cloud service providers are still in general failing to meet their clients' security expectations. The bigger the client, moreover, and the more resources they have, the bigger is this sense of dissatisfaction. Incidents in their cloud services are cropping up more frequently and with a bigger impact than those they find in their local services"*.



HARMONY





GMV will develop Big Data platform to improve the treatment of blood diseases

The 40-million-euro, 5-year Harmony project has now kicked off as part of the European IMI2 initiative.

This project will help doctors' decision-making processes in their diagnosis and treatment of blood diseases such as chronic lymphocytic leukemia (CLL), non-Hodgkin lymphoma (NHL), Myelodysplastic syndromes (MDS) and blood disorders in babies and children. It will also come up with answers for researchers looking into new, more efficient drugs for more personalized treatment.

GMV's input to the project is the design and development of the Big Data platform for mass processing of information from anonymous patients provided by the consortium members. On the strength of Big Data technology, GMV will deal with this huge volume of clinical, genetic and molecular data, process it, harmonize it and extract valuable information for answering questions posed by scientists and specialist users of the platform.

Harmony is one of Europe's biggest public-private initiatives seeking more efficient treatment for blood diseases on the basis of clinical, genomic and molecular information from anonymous patients. The project brings together key stakeholders in the clinical, academic, patient, HTA (health technology assessment), regulatory, economical, ethical and pharmaceutical field.

GMV is the only private technology firm participating in the project, together with another 50 partners from 11 European countries, including hospitals, research centers, universities, patient organizations and pharmaceutical companies

GMV's head office hosts the first *radiance* Workshop

■ Intraoperative radiotherapy experts have met up in GMV's Tres Cantos head office to review the present and future of IORT planning and improve application procedures of the world's only intraoperative radiotherapy planner, **radiance**.

In the 1st **radiance** workshop, held in GMV's Tres Cantos head office, radiophysicists, engineers and physicians from various European hospitals, research centers and

universities like Mannheim University Hospital (Germany), the University Cancer Institute of Toulouse Oncopole (Institut universitaire du cancer de Toulouse Oncopole), the University Hospital of Gran Canaria Doctor Negrín and the Physical Science Faculty of the Universidad Complutense de Madrid have all swapped notes, compared proposals and the conclusions drawn from their work in applying intraoperative radiation therapy to tumors of the skin, breast, brain,

stomach, intestine and backbone. Their inputs and insights have helped to design the technology that will allow us to upgrade the technology's therapeutic possibilities and ensure its safe application.

Stéphane Giaconia
Global Product Manager en Carl
Zeiss Meditec AG



radiance represents the future of intraoperative radiotherapy. This revolutionary planner allows specialists to apply the exact radiotherapy dose against the tumor, in order to eradicate it and build up a historical record that will be vital if the disease ever comes back after the operation



GMV is a member of the Human Brain Project

THE HUMAN BRAIN PROJECT (HBP) IS AN EU-FUNDED MEDICO-SCIENTIFIC AND TECHNOLOGICAL INITIATIVE

■ In February Madrid hosted the 1st Forum of The Human Brain Project (HBP) and its Impact on Spanish industry, organized by TecNALIA, with the support of the Spanish Industry Ministry and Spain's Industrial Technology Development Center (Centro para el Desarrollo Tecnológico Industrial: CDTI).

GMV forms part of the group aiming to reproduce technologically the characteristics of the human brain

With a turnout of 112 institutions from 24 countries, this event showcased the latest breakthroughs in human-brain research and its impact on the diagnosis and treatment of neurological diseases. It also looked at the field of artificial intelligence and ICTs in general.

The platforms of Medical Informatics, Brain Simulation, High Performance Analytics and Computing are those in which GMV "will apply the across-the-board knowledge that we have been building up in the various fields we work in, such as aerospace, defense, mobility solutions, ICT or e-Health", explained Rafael Navajo, GMV's Health Business Development Manager.

Rafael Navajo also spoke about the origins of healthcare ICTs, over twenty years ago with the advent of digital radiology in the eighties. Since then there have been game-changing advances, such as implementation of the electronic medical record, adaptation to an inter-hospital interoperability scheme or the electronic prescription.

But there are still many other possibilities to be taken up, not only in healthcare management but also medical practice. To do so, "we need to overcome political, regulatory and organizational barriers", because "technology is no longer an inhibiting factor but an enabler to this end", claimed Navajo.



The Spanish Drugs Agency guarantees the trustworthiness of its veterinary drugs database

■ Every single day nearly 44,000 dictionary terms and 24,000 medicinal products from three databases of Spain's Medicinal and Healthcare Products Agency (Agencia Española de Medicamentos y Productos Sanitarios: AEMPS) are processed. The associated information, recorded as an Anatomical Therapeutic Chemical (ATC) classification code, active ingredients and excipients, containers or administration vectors, is reformatted, cleared and uploaded to the European Medicines Agency (EMA)'s systems.

AEMPS, as a state agency under the aegis of the Ministry of Health, Social Services and Equality, is responsible for endorsing society's trust in the quality, safety, efficacy and accuracy of healthcare and medicinal products as a public service, from original research right through to final use, in the interests of protecting and promoting human health, animal health and the environment.

The agency has turned to GMV for the purpose of ensuring the perfect working of the IT application with which it reports on veterinary drugs authorized for use within the European Union, recorded in turn in the European Medicinal Product Database EudraPharm.

EudraPharm, for its part, is intended to be a source of information on all medicinal products for human or veterinary use that have been authorized in the European Union (EU) and the European Economic Area (EEA) and information on clinical trials of medicinal products including products with or without a marketing authorization.

GMV has undertaken the evolutive- and adaptive-maintenance of the data-uploading process in keeping with the quality requirements laid down in the standard UNE/EN ISO 9001 and CMMI level 5.

AEMPS has turned to GMV for ensuring the IT app works perfectly



Modernization of Toledo's public passenger transport system

GMV has been awarded a contract for complete updating of the technological platform of its 52-bus fleet with an all-in advanced fleet-management system



ne of Spain's flagship passenger-transport groups, Grupo Ruiz, has recently turned to GMV

for technological modernization of its UNAUTO fleet, in its new stage of running Toledo's transport system.

As a result of this confidence GMV has been awarded a contract for complete updating of the technological platform of its 52-bus fleet with an all-in advanced fleet-management system including all the following features: a fleet-wide occupancy control system; an onboard video surveillance (CCTV) system; an onboard multimedia passenger-information system and a bus-stop passenger-information with 93 panels covering a large percentage

of the city of Toledo, including a bus-stop announcement system with activation of a cyber-pass system for the visually impaired.

The contract also includes development of an Android and IOS mobile app for static and dynamic information of the public passenger-transport system; an advanced fare-collection system with state-of-the-art ETC-606i ticket-vending machines for issuing and write-reading current farecards with an internet-charging facility; a ticket-inspection system using handhelds plus three TVM10 automatic farecard recharging machines in the street with payment options by magnetic EMV bank card or contact card.





The fleet management-CCTV system is made up by GMV's onboard GPS- and 3G-enabled SAE-CCTV-SIU REC30 units, equipped with door sensors, connected up to 4 IP digital surveillance cameras with video recorder and online streaming for downloading and playing audio and video files of a certain weight. There is also an emergency system based on an emergency pedal, facilitating voice and messenger communication between the control center and the bus plus a powerful passenger-information system with broadcasting of visual and audio next-stop announcements inside and outside the bus with activation of the cyber-pass system. The system is rounded out with PEV15 TFT bus-stop panels. The central fleet-management application supplies a series of web services (WS) for publication of passenger information under the standards SIRI and GTFS.

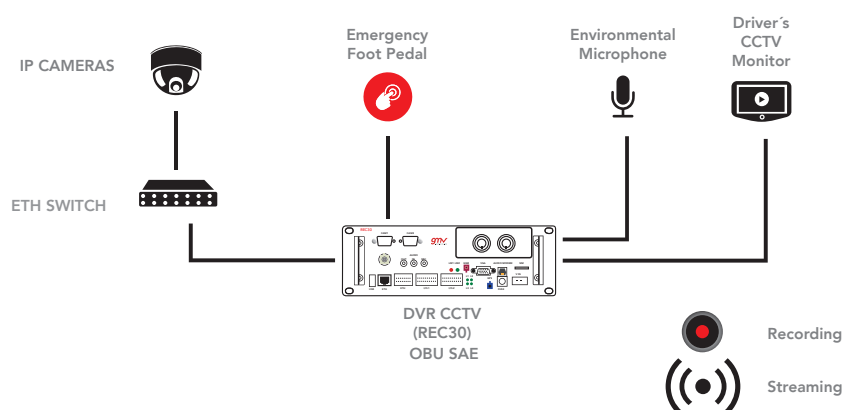
The ticketing system, based on GMV's onboard ETC-606I unit, doubles up as vending machine and recharger and validator of Toledo's current farecards. It also provides message console functions for the fleet-management equipment and for communication with the bus's inside and outside information panels.

Users can recharge their cards and check their remaining travel credits on the web page. These online recharging requests are then passed on to the buses for automatic updating when the card is brought close to the onboard vending machine/validator.

Handhelds have been supplied for inspection tasks, reading contactless cards and issuing onboard fines.

The fleet management-CCTV system is made up by GMV's onboard GPS- and 3G-enabled SAE-CCTV-SIU REC30 units

cctv SISTEMA DE VÍDEO – VIGILANCIA



GMV renews Alcalá de Henares's urban transport service

■ GMV has now started work on the renewal of its oldest installed fleet-management system. This renewal plan has been offered to several operators and has now been taken up by Alcalá de Henares's urban transport service, AlcalaBus.

AlcalaBus fleet-management system was installed back in 2005. This equipment has now fulfilled its useful working life and will be replaced with GMV's state-of-the-art equipment. This renewal takes in the 40-bus installation of the advanced REC30 equipment, providing not only a fleet-management system

but also an onboard video surveillance and passenger information system with multimedia capacities. These extended functions will be implemented in the future. The equipment also includes a data-update facility by Wi-Fi connection with AlcalaBus garages.

Apart from the onboard equipment the renewal also takes in a series of peripheral equipment to maintain current fleet-management functions such as audio systems, connection to the electronic fare-collection system (in this case GMV's ETC606 ticket-vending equipment), etc.

This is expected to be the first step in a renewal plan to upgrade GMV's ITS technology installed in many of Spain's transport operators.

AlcalaBus fleet-management system was installed back in 2005. This equipment has now fulfilled its useful working life and will be replaced with GMV's state-of-the-art equipment

ONCF

once more turns to GMV for enlargement of its fleet management system

■ ONCF (Office National des Chemins de Fer), Morocco's public railway transport operator, has once more turned to GMV, awarding it the contract for enlargement of its fleet management and tracking system.

Back in 2014 ONCF awarded GMV a first fleet management system, now in maintenance phase; this involved fitting the company's inhouse railway fleet-management system (SAE-r) to a total of 300 trains at that time.

This contract enlargement now phases in new equipment and functions. Three new extensions have been provided for in the contract, to be brought on line during the current year.

First of all GMV will take on enlargement of the onboard tracking system for the

fleet of switch engines (95 shunters of this type). The features of the equipment to be fitted on these engines will be identical to the equipment already fitted on the complete fleet of ONCF locomotives. The operation of these new engines will be monitored from the control center set up under the original project.

A mobile safety application will also be developed, to generate alarms whenever trains are running close to the shunting equipment. This extension also includes the issue of 200 handhelds for operation with the abovementioned application. On the basis of the GPS positioning information reported by the mobile application to the control center, the latter will then carry out a twofold function: mapping the shunting equipment and also sending warning

messages with various levels of urgency depending on the distance of any approaching train.

Thirdly, a web page will be developed for informing ONCF passengers of train timetables, real time tracking of all trains, estimation of train ETAs and departures plus the calculation of the route to the nearest station, among other information. The system will be rounded out with recordings of web-page use statistics for analysis by ONCF.

This new contract will upgrade the system, phasing in new equipment and functions





Train of the 130 series

Train speed monitoring system for RENFE

GMV HAS BEEN CHOSEN BY SPAIN'S NATIONAL RAILWAY OPERATOR RENFE TO SUPPLY THE INSTANT, REAL-TIME, TRAIN SPEED MONITORING SYSTEM, WARNING THE DRIVER IF THE TRAIN IS BREAKING CURRENT OR UPCOMING TRACK-SECTION SPEED LIMITS

■ The project, conceived after the fatal train accident at Angrois in July 2013, is a development of the first pilot scheme run by GMV on the Madrid–Albacete line.

This system, working from such factors as instant speed, type of train and its braking curve, is capable of calculating the braking distance required by the train for bringing its speed down to the limit for the next running section.

To calculate the train's current track position the system takes information from a built-in, high-sensitivity GPS

receiver in combination with the train's odometer, ensuring unbroken service in tunnels and in areas without GPS coverage. The system comprises one of GMV's standard OBUs (R-M20 unit), connected up to a touchscreen on the driving desk showing the train driver all route information and the journey plan while also displaying warnings with enough notice whenever the train needs to reduce its speed.

The system also includes a loudspeaker that will give an acoustic warning in the driving cab depending on the level of emergency. The system is rounded

out by a maintenance module with downloadable recordings of such factors as broken speed limits; this entire information can then be analyzed in detail afterwards.

The project's current scope takes in 44 trains of RENFE's 130- and 730-series trains running on the Albacete–Alicante line, although it is scheduled to be phased into other RENFE lines and trains in the future.

GMV will manage San Sebastián's Municipal Tow-truck Service

GMV'S INHOUSE *hegeo*® SOLUTION HAS ONCE MORE TURNED OUT TO BE THE HI-TECH CHOICE OF THE ALICANTE COMPANY VECTALIA FOR THE MUNICIPAL TOW-TRUCK MANAGEMENT SYSTEM. THE CITY IN THIS PARTICULAR CASE IS SAN SEBASTIÁN



■ Grupo Vectalia, known above all for its Subús bus division, has become the Basque Country's biggest municipal tow-truck operator, winning the contracts for its two biggest cities: Bilbao and San Sebastián. Vectalia is also currently running the municipal tow-truck service or municipal parking scheme in the cities of Mérida, Alicante, Valencia and Benidorm,

relying on GMV's technological expertise.

GMV's solution in this case involves the rollout of a fleet of PDAs to tow-truck drivers and several apps for the police, the local depot for towed-away cars and service administration. This system allows all vehicle tow-away information to be processed together

with the freeing of the vehicle after payment of the corresponding fee. The local policeforce can now use a HEGEO post for remote vetting of all reported vehicles, ensuring they are dealt with correctly according to the law. The local depot app deals with all incoming and outgoing vehicles and fine payments. Also available is a series of reports and stats for control and administration of the local tow-truck service.

GMV's inhouse *hegeo*® solution provides a complete technological platform for service management. It increases the tow-truck drivers' working efficiency, dealing with reported vehicles quickly and allowing police to vet and process them remotely. This information also ensures complete traceability of the whole tow-away and return service.

GMV's inhouse *hegeo*® solution provides a complete technological platform for service management

AVANZA turns to GMV for renewal of the fleet-management and ticketing systems of its operators Etasa and Alacuber

■ GMV increases its portfolio of operators equipped with its systems in the Madrid Region Transport Consortium (Consortio Regional de Transportes de Madrid: CRTM). It has now supplied its fleet-management system and electronic fare-collection system to the operators Etasa and Alacuber, both acquired by Grupo Avanza, one of GMV's standout transport clients.

Both operators' systems, which already included the CRTM's fleet-management system and electronic fare-collection system, are now going to be renewed and replaced by the corresponding GMV systems. The operator Etasa will fit 80

buses with GMV's fleet-management system and the ETC-606i ticket vending machine plus 5 more fitted with a video-surveillance CCTV system based on IP cameras. Alacuber, for its part, will fit 6 buses with the fleet-management system and electronic fare-collection system plus 2 more with video surveillance.

Both firms will be integrated into Avanza's common fleet-management server with the addition of an operator post for each one. As for the ticketing backoffice, each one will operate with its independent applications and database but integrated into CRTM's fare system. This project poses the complex

challenge of reusing part of the existing components of both operators' previous fleet-management system while integrating the whole system with third-party equipment.



video-surveillance CCTV system



ESCAPE is born, Europe's automated driving response

THE PROJECT WILL COORDINATE SOME OF THE MOST RELEVANT INDUSTRIAL AND RESEARCH INSTITUTIONS IN EUROPE TO CREATE A POSITIONING ENGINE FOR SAFETY-CRITICAL APPLICATIONS ON THE ROAD

■ The future of the autonomous driving is "made-in-Europe". The European Agency for the global navigation satellite systems (GSA) has kicked-off ESCAPE (European Safety Critical Applications Positioning Engine), a three-year and 5.4 M€ project to exploit the services offered by Galileo, the European satellite navigation system, in the field of the automated driving.

ESCAPE will coordinate some of the most relevant industrial and research institutions in Europe to create a positioning engine for safety-critical applications on the road, namely the applications involving highly automated driving.

ESCAPE is led by the Spanish company FICOSA in collaboration with partners from across Europe: GMV, Renault, IFSTTAR, STMicroelectronics and Istituto Superiore Mario Boella. All partners are important stakeholders of the value chain in the domain of

safety-critical applications for road transportation. By 2019, the ESCAPE consortium will finish the development of an innovative positioning engine tailored to meet the safety requirements expressed by those road transport applications that will involve automation and have the potential to harm or damage people and goods.

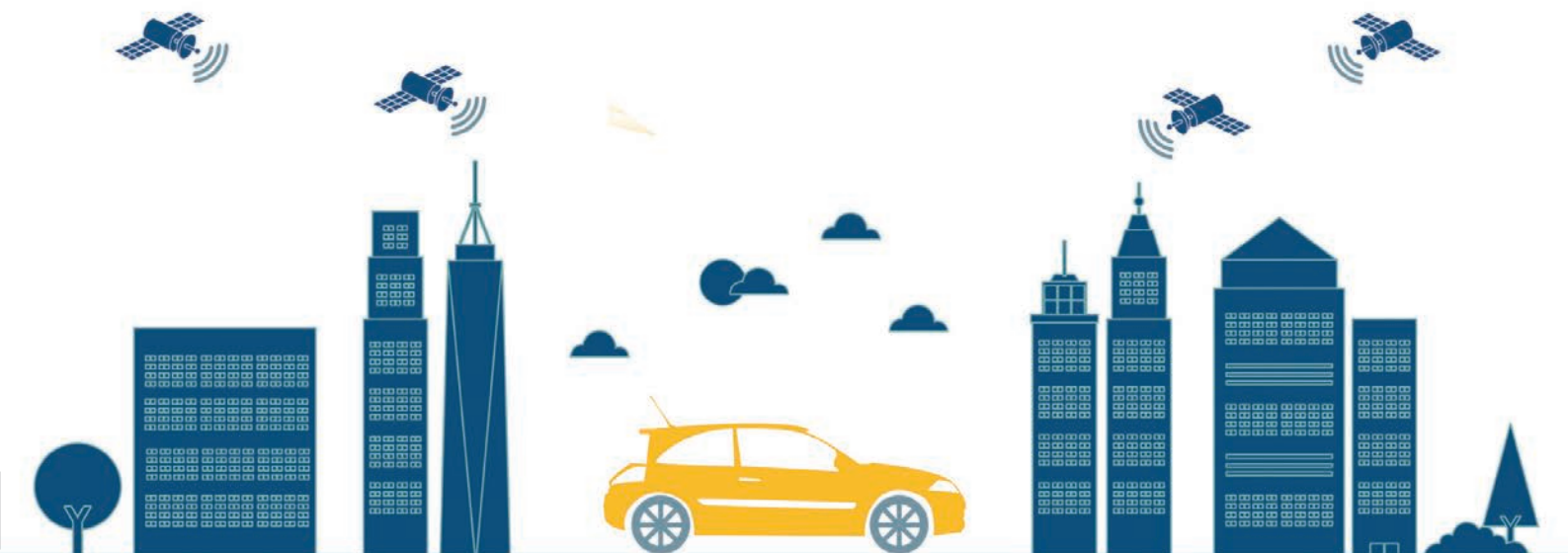
GMV has a major technical role in the ESCAPE project. As well as taking on responsibility for technical project management, within development of the ESCAPE GNSS Engine (EGE), GMV will also be producing the algorithms that will process the measurements from the vehicle sensors, the cameras and the GNSS receiver to provide the positioning service along with the integrity required by the connected autonomous vehicle. GMV will also be supplying the intermediate fusion layer that will be in charge of binding all the communication components together into a synchronized, well-oiled system.

ESCAPE will set a new paradigm among and across the technologies enabling road vehicle automation,

following the vision of the companies that joined the project.

ESCAPE has been funded under the Fundamental Elements programme of the GSA, a new EU R&D funding mechanism supporting the development of EGNSS-enabled chipsets, receivers and antennas, with the major objectives of facilitating the adoption of the European GNSS Systems and improving the competitiveness of the EU industry, by addressing specific user needs in priority market segments.

GMV will also be producing the algorithms that will process the measurements from the vehicle sensors, the cameras and the GNSS receiver



GMV supports the Governance of Information Systems in Government Authorities

■ In February, with the remit of encouraging the take-up of ICTs by decision-making bodies, ASTIC held the "Information-system Governance in Government Authorities" conference.

This event involved the collaboration of the Spanish Chapter of the Information Systems Governance European Club (CEGSI in original French initials). Luis Fernando Álvarez Gascón, President of CEGSI in Spain and CEO of GMV Secure e-Solutions, kicked things off by recalling the origins of the Club, which was born "in a Paris meeting held in 2008, attended by French and Portuguese founder members from the IT consultancy and teaching world". All of them were united by a shared concern: the absence of any real information-system governance due to disinterest or ignorance in the higher spheres of organization governance.

The aim of this first encounter between

CEGSI and ASTIC, held in Madrid, was to "to share, reflect on and jointly learn about IT governance in Spain and help to set it at its corresponding level". Álvarez-Gascón offered several opinions about the various messages recorded in the manifesto, stressing the evidence that "technology investments designed to serve a good business or service model, providing they are properly led and managed, are a fundamental support for productivity and competitiveness". He also argued strongly that "digitalization, computerization, has to go hand in hand with a change in processes and persons". He pointed out too that "the digital transformation will not revolve exclusively around technologies" and that proper IS governance "is a key element in this transformation".

Last but not least Álvarez-Gascón quoted some of the conclusions reached in Club research such as the fact that "companies with a high degree of governance

generate two or three times more profit from their IT investments than those that lack such governance". He also acknowledged that IT governance in Spain had made significant headway in recent years.

For his part, Carlos Royo, GMV's healthcare business development manager, shared his professional experience as CIO in several IS-management jobs in such sites as the Health Service of Castilla la Mancha (SESCAM) or the Spanish MoD.

This event was attended by a wide-ranging representation of civil servants belonging to the Professional Association of Higher Corps of Systems and Technologies of Public Authorities (Asociación Profesional de los Cuerpos Superiores de Sistemas y Tecnologías de las Administraciones Públicas: ASTIC), all of them ICT managers at local-, regional- or central-government level.

Luis Fernando Álvarez-Gascón appointed a member of the Scientific and Technical Committee of the AEI

THE GOVERNING BOARD OF THE STATE RESEARCH AGENCY (AGENCIA ESTATAL DE INVESTIGACIÓN) HAS APPOINTED LUIS FERNANDO ÁLVAREZ-GASCÓN PÉREZ, CEO OF GMV SECURE E-SOLUTIONS AS ONE OF THE 12 MEMBERS OF THE SCIENTIFIC AND TECHNICAL COMMITTEE, THE AGENCY'S MAIN CONSULTANT BODY



■ Luis Fernando Álvarez-Gascón, together with the rest of the committee members, will be responsible for advising the agency on the annual activity plan and the agency's governing scientific and technical assessment practices, principles and methodologies, incorporating international standards. He will also be in charge of giving

advice on monitoring, results and impact of the agency's activities or on the definition of collaborator- and expert-selection criteria.

The Agencia Estatal de Investigación is an instrument for the management of public R&D funds. Its remit is to ensure proper rendering of accounts,

improve and extend activity monitoring, rationalize the management of available funds, reduce administrative loads and simplify and standardize procedures. This new management model has to allow a substantial improvement in performance planning and endow calls with the stability needed for research activities.



Cloud smartphone technology

Isabel Hormigo
CTA's technical ICT head



It represents a clear progress in terms of virtualization, in this case of the cell phone, thus bringing its advantages to mobile operating systems.

One of the biggest IT-architecture advances in recent years is virtualization, which has by now built up a significant level of maturity in terms of servers, networks and even storage virtualization (software-defined storage).

G GMV has presented **ubic Virtual Mobile Infrastructure**, an inhouse development that enables a virtual Android to be fitted in any smartphone, with all the consequent advantages such as security management and versatility. **ubic** is the result of an R&D project carried out with the collaboration of the Andalusian Technology Corporation (Corporación Tecnológica de Andalucía CTA) and Seville University (Universidad de Sevilla).

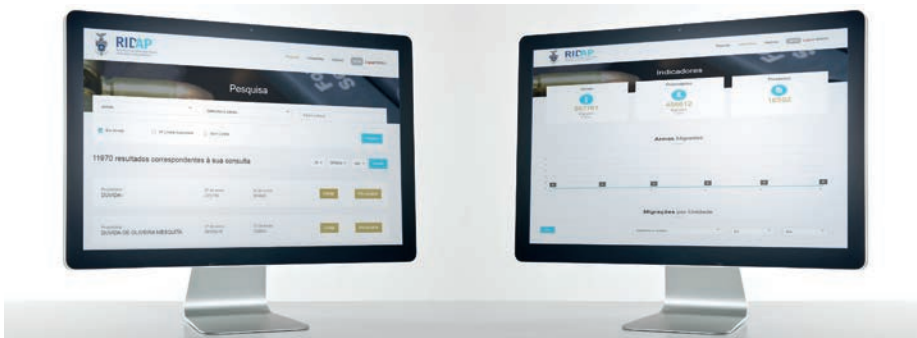
As for security, **ubic** provides a cell-phone information-protection system (no data remains stored in the smartphone), also guarding against data breaches and phishing. From the management point of view, **ubic** allows mass management of virtual smartphones, since it is deployed in a hardware- and software-optimizing cloud architecture using and allowing diverse smartphone configurations in terms of memory, performance and functions. As regards versatility, **ubic** makes it possible to develop and test

apps, install and uninstall as many times as we wish, run different versions of Android, etc. All these performance features make **ubic** the ideal ally for developers.

The technology as developed means no data is kept in the user's smartphone, while all the phone's sensors (gyroscope, GPS, Bluetooth camera, etc.) work normally and the smartphone's storage capacity and power are as large as might be desired.

The technology developed by GMV comes in especially handy for the management of company smartphones, improving security and privacy. Likewise, it cuts down consumption of physical mobile resources and allows application-management and –installation to be administered. All this without the need for any physical contact with the users' handhelds, which might even be of their own property rather than provided by the firm, as with Bring Your Own Device (BYOD) schemes.

GMV provides Portugal's police with a centralized digital arms archive



■ In coordination with the Information Systems Cabinet (Gabinete de Sistemas de Informação: GSI) GMV has implemented the project called Digital Information Repository on Weapons and Owners (Repositório de Informação Digital sobre Armas e Proprietários: RIDAP) for the Public Security Police (Polícia de Segurança Pública: PSP), in particular for the Arms and Explosives Department (Departamento de Armas e Explosivos: DAE)

PSP runs an archive that contains more than one million paper files with

information on the cadaster of weapons and owners. This information, although often searched for, wasn't previously available using the current Integrated Arms and Explosives Management System (Sistema Integrado de Gestão de Armas e Explosivos: SIGAE).

With the RIDAP project PSP managed to address the main objective of having this archive indexed in a digital format, accessible not only through a simple but effective web interface, but also through an API that allows a straightforward

integration with other existing information systems.

This new functionality brings the PSP into line with the best practices at European level, allowing not only a much more efficient contribution to citizen safety, but also an effective approach to international cooperation. The project also constitutes a change in Portugal's paradigm. Dealing with both illegal weapons and licensed weapons in Portugal is an exclusive PSP competence. All this information is now being kept in PSP's central Information system, with all the corresponding guarantees regarding monitoring, supervision and police-force intervention.

Project implementation consisted of two main phases: digitalization and indexing of the paper files on weapons and owners; software development, where both the web interface and the API were implemented. An Agile approach was used as the project management methodology.

How can we ensure the success of Big Data projects?

JOSÉ CARLOS BAQUERO, HEAD OF THE DEVELOPMENT AND SOFTWARE ENGINEERING DIVISION AT GMV SECURE E-SOLUTIONS, WAS ONE OF THE SPEAKERS AT MADRID'S T3CHFEST

■ For yet another year the Higher Polytechnic School (Escuela Politécnica Superior) of Madrid's Universidad Carlos III (UC3M) hosted the Computer Science and New Technologies Fair called T3CHFEST. The aim of this UC3M-brokered fair is to spread technological knowledge further afield, giving the public at large a much better idea of technology and engineering, their infinite applications and the daily use we all make of them.

GMV, aware of this valuable spadework, was keen to collaborate in this project as sponsor and also by sharing its experience in the sector. José Carlos

Baquero, Head of the Development and Software-Engineering Division at GMV Secure e-Solutions, gave a paper on the keys to success in Big Data projects. He also talked about some of GMV's most important ongoing projects in this field: security and threat detection, fraud prevention, satellite image processing and agro-climatic sensors, epidemiology, optimization of industrial crude-oil processing, etc.

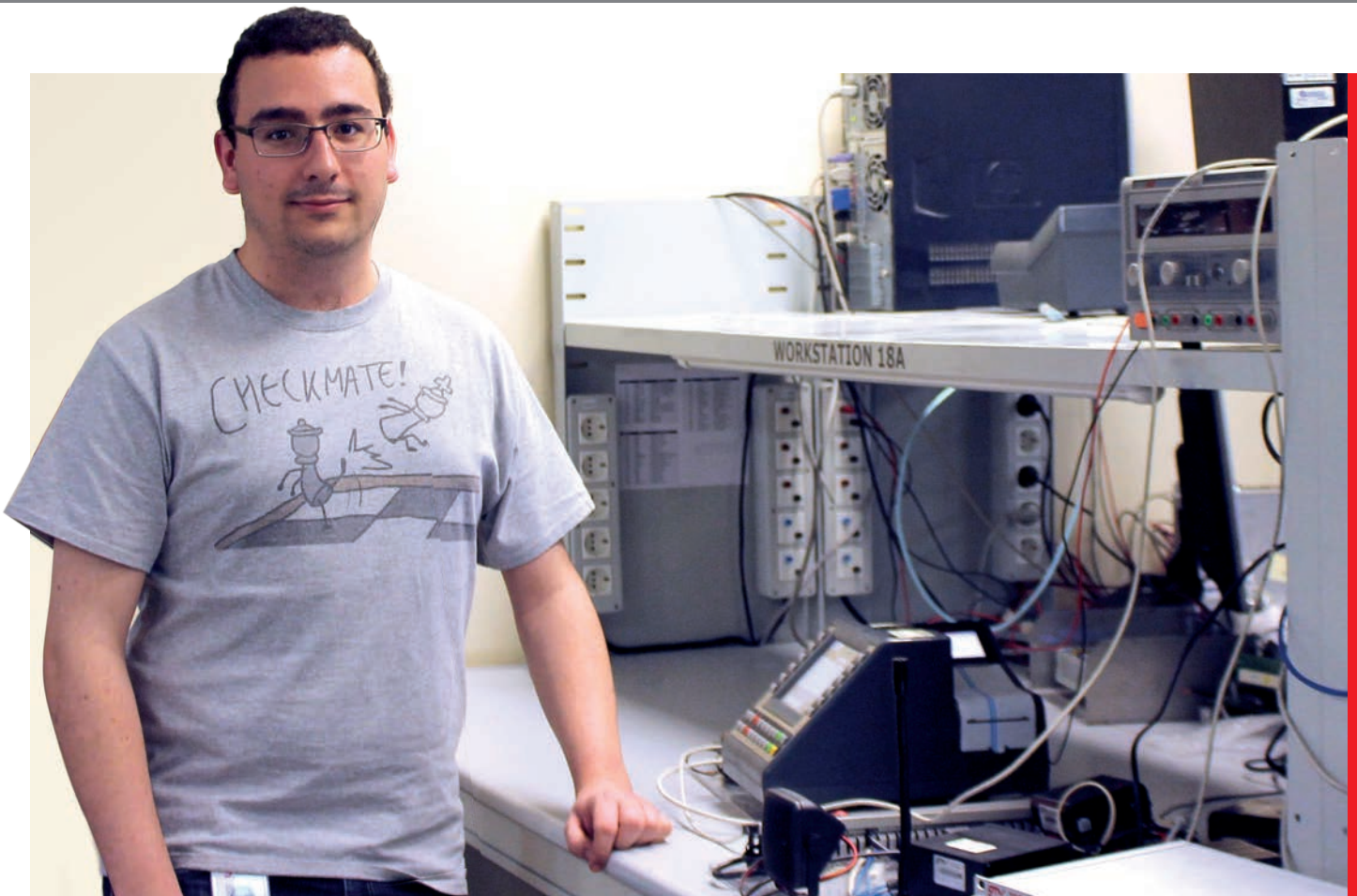
T3CHDEST wound up with a 48-hour programming competition and the "Hackathon", a competition to carry out a collaborative development with an application.



José Carlos Baquero



The key point is to understand exactly what the project is all about, the particular problem posed, and from there on work with the best technique to solve it. Once understood, the Open Source initiative and the cloud are useful and fundamental tools



EDUARDO CÁCERES

"How my participation in First Lego League brought me to GMV"

It all began back in 2010, when a technology professor decided to enter her tenth-grade class in a robotics competition called First Lego League (FLL). FLL is an international competition for building and programming a robot to carry out set tasks autonomously on a competition table common to all participating teams. There is also a parallel "scientific project" on a different theme for each year's competition.

In our case what began as a high-school activity slowly but surely became much more. By the time the day of the competition came around the robot had turned into our very own project for some of us, the first of many that would then follow afterwards.

After the FLL Valladolid 2010 prize-giving ceremony, I remember having a chat with the representative of the competition's main sponsor, GMV, who encouraged us to keep participating in

events of this kind. He also told us that nothing would delight him more than welcoming such inventive minds as ours into the GMV fold one day. Back then this seemed a distant prospect but the name GMV stayed in my mind.

The next year came around and a small group of pupils decided to take part in FLL again, this time on a voluntary basis. This forged a group that is still up and running today, though many different generations have passed through it in



DATE OF BIRTH

21/04/1995

EDUCATION

Industrial Electronics and
Automation Engineering
Universidad de Valladolid

START DATE

13-02-2017

WORKSITE

Boecillo (Valladolid)

HOBBIES

Chess, poker, fronton, etc.,
teaching chess, traveling...

DEFINES HIMSELF AS

A simple person who is
nonetheless incapable of sitting
still: always with one project on
the go and another one brewing
in the mind.

the meantime, since the participation
age is capped at 16.

Thanks to my experience in the First
Lego League, when the time came
to make major career-focused study
decisions, I was certain I wanted to
do something related to robots or
their programming. This panned out
as a decision to take a degree in
Industrial Electronics and Automation
Engineering.

When I moved to Valladolid in 2013,
I noticed with a pleasant surprise that
the bus access-control equipment
sported the logotype of GMV, the
company of that engineer I had met
years back.

Three years later (i.e., a few months
ago), with the degree course well
underway, I decided it might be a good
idea to apply my academic learning in
a real life situation as my studies drew
to a close. And what better place for

that than the firm I had heard so much
about during my FLL experience and
which turned out to be present in so
many more aspects of the robotics
world?

And this is where this story comes
bang up to date. In mid-February
I was lucky enough to join GMV in
Valladolid, working as intern engineer
in the software development team
for intelligent transportation systems
or ITS. I take great pride in joining
this family, kicking off for me a new
stage in which I can steep myself in
new knowledge and chip in as far as
possible with my own contributions
to improve and drive onwards and
upwards my new house, GMV.

THANKS TO MY EXPERIENCE IN THE FIRST LEGO LEAGUE, WHEN THE
TIME CAME TO MAKE MAJOR CAREER-FOCUSED STUDY DECISIONS,
I WAS CERTAIN I WANTED TO DO SOMETHING RELATED TO ROBOTS OR
THEIR PROGRAMMING



10

CONTROL MULTIVENDOR
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HARD DISK ENCRYPTION

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SECURITY DASHBOARD
KEYBOARD SHA256
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SIGNATURE
BLOCK VPN
FIREWALL
PROTECTION
SERVER
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