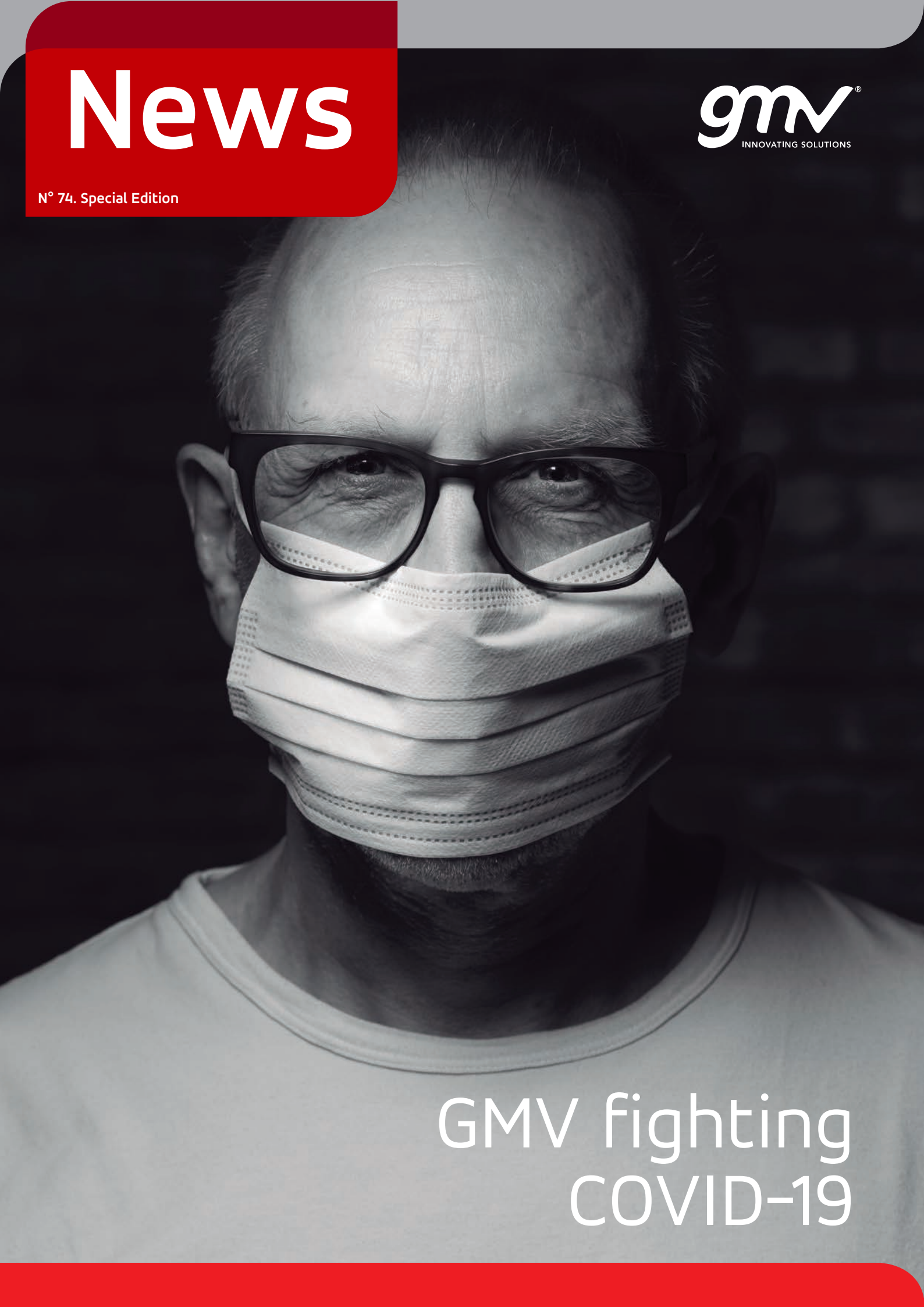# News

gmv
INNOVATING SOLUTIONS

GMV fighting COVID-19

Covclear

Covclear, to ensure a safer return to work

Covclear is a mobile control app created and developed by GMV to make sure offices will be a safe workplace while minimizing the risk posed to the health of employees or other persons who are working in open workplaces in an environment of maximum safety and protection.

Born originally from the company's own need and developed in collaboration with medical- and privacy-experts, **Covclear** is fruit of GMV's previous experience and expertise in the development of mobile apps and technology.

To find out more: **marketing.global@gmv.com**

gmv.com

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Special Edition

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JESÚS B. SERRANO

"The war slipped in silently, without knocking first. Its greeting was an implosion and we collapsed. Life, bypassing time, was hung up on a peg. Our identity floated off into a white sea. Then we were always behindhand. Distance irrupted, inundating all, leaving no space. Uncertainty choked us while onlookers gawped. And we got lost in a swamp of imposed choices and begging for it all to stop. We were left floating every day in the inertia of all these tears. Like puppets. There was no pattern, no rules or truce. We simply floated. Drifting. When we got to the other shore the undertow told us spring had gone."

What better way of rendering a well-deserved tribute to healthcare professionals than the worlds of a young doctor at the start of her career, who has suffered the pandemic in the front line? In the name of GMV we would like to hail all healthcare personnel who have risked their own lives to save others and have lived in the maelstrom of the pandemic, suffering daily in empathy with their patients at work and their relatives at home.

Last day of June 2020. The figures are harrowing: over ten million COVID-19 cases and over half a million deaths worldwide. If the death of a single relative, a single friend or acquaintance is painful, how much pain must have been generated by the death of over five hundred thousand people? Not to mention the pain and suffering of the millions of people who have suffered the disease. My heartfelt condolences go out to all clients, employees, partners, collaborators and suppliers who have lost a loved one in this pandemic and my wishes for a quick recovery for everyone who has suffered from the illness and is still getting over it.

We at GMV are well aware of our huge responsibility towards our clientele and the public at large. Prioritizing the health of our staff, we have managed to stifle the pandemic's impact on our operations. Teleworking has been set up for practically the whole staff, except for essential services in our offices. This was made possible by the commitment and responsibility of each and every one of GMV's personnel, as well as the flexibility and understanding of our clients where mobility restrictions did inevitably impinge on our operations.

It's possible that in the distant future everything will be virtual with no personal interactions at all. In the short term, however, although there will be a before and after of this pandemic, I'm sure personal interaction will still be crucial in our personal and professional lives. We'll therefore have to live with the virus, carrying out our personal and professional activities with due application of necessary protection measures to reduce the risk of contagion for ourselves, our relatives, friends and workmates.

We at GMV will be more than ever determined to spearhead the development of hi-tech innovation, deeply proud of what we do, because situations like this bring out the huge importance of working towards a knowledge-based society.

Jesús B. Serrano

MÓNICA MARTÍNEZ

The COVID-19 pandemic poses an unprecedented challenge that can be overcome only with a responsible attitude from the whole society. A new and therefore unknown illness that can be slight or even asymptomatic in some cases and lethal in others has forced us all to take drastic measures. We've had to accept curtailment of basic freedoms in our personal and professional lives, while economic activity has ground to a halt.

GMV is not immune to this situation, but we've managed to get over this first stage without too many problems and have even been able to continue growing as a firm and take on new staff. This success is due to a host of factors. Our IT prowess enabled us to broaden existing teleworking arrangements and roll them out for the whole staff. Early preparation owing to our risk management culture, together with an unflagging effort by our IT team enabled us to get these systems up and running even before the lockdown hit. This same culture has pushed us to uphold a solid financial position that now enables us to manage delays in cash-flow, partly due to travel restrictions making it impossible to complete certain project milestones, partly due to the difficulties some of our clients are going through.

But the main factor that has been key to our success in weathering the storm is the determination of GMV's exceptional team to keep their projects going, adapting their ways of working and communicating to suit.

Once the prime goal of reducing the crippling strain on health resources is achieved to enable optimal treatment of all patients, be it of COVID-19 or of other illnesses, the next challenge is to recover our lost freedoms, pick up all of our activities and restore those human interactions that are impossible online, doing so without causing another coronavirus spike.

The solution to the pandemic lies in science, with an unparalleled amount of resources now being spent worldwide to speed up development of a vaccine and treatment for the disease. Technology, well used, is the solution to limit the damage until then and to come out of this crisis all the stronger.

Mónica Martínez
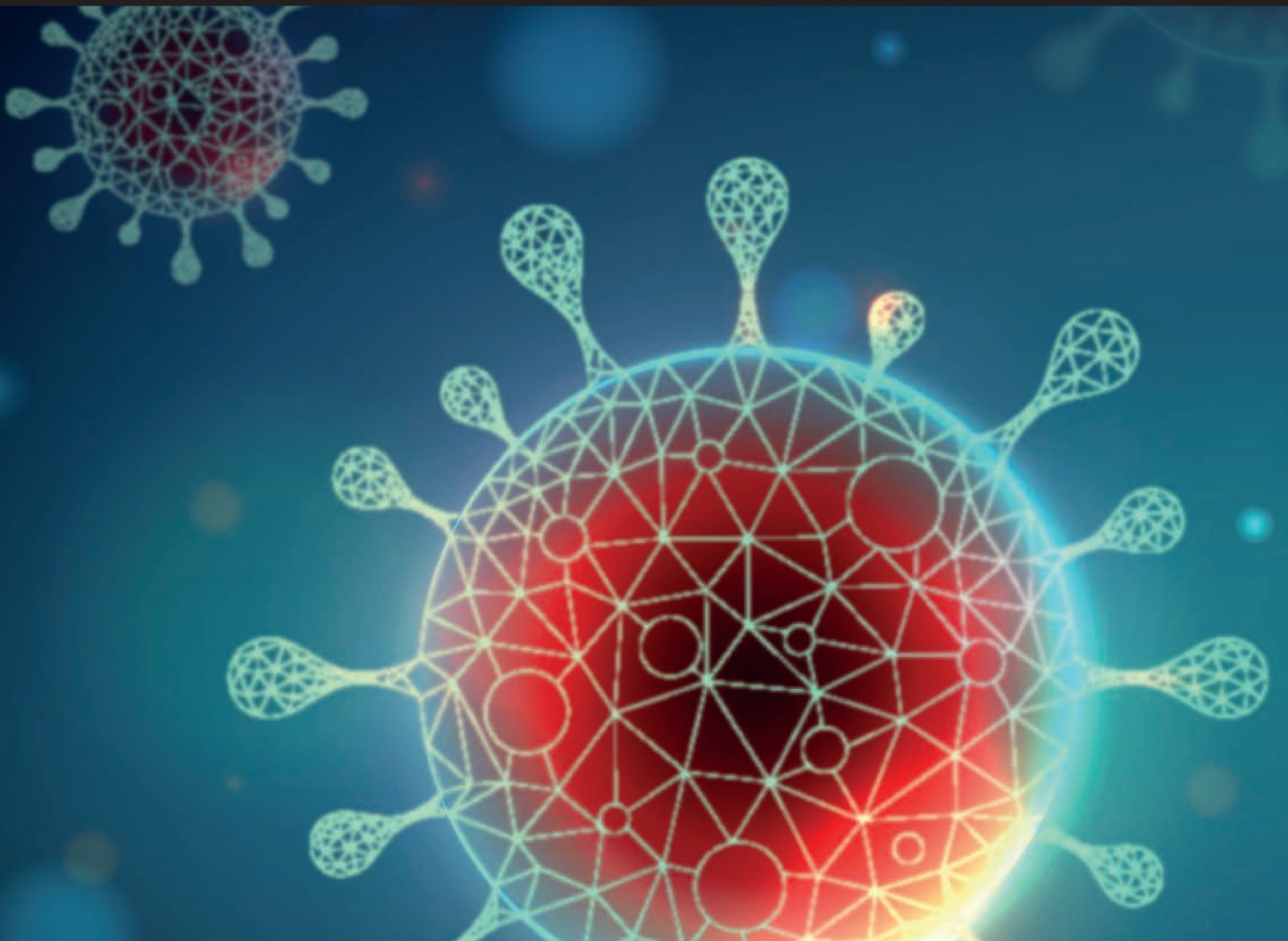
Last December a local SARS-CoV-2 outbreak in the Chinese city of Wuhan proved to be the start of a worldwide epidemic and healthcare crisis affecting all five continents, taking a terrible death toll and bringing the world's economy to a grinding halt. Current forecasts, moreover, are continually lengthening the likely recovery time once the pandemic is over.

Disbelief and consternation, hospitals teetering on the brink of collapse, shortage of stocks and respirators, inefficient testing systems, shaky epidemiology models and studies, healthcare personnel and front-line employees affected, balcony applause, purblind politicians, rampant fake news, researchers rushed off their feet, vaccines promised in record time, lockdown, social distancing, the importance of wearing facemasks, teleworking, reconciliation of home and working lives, online education. The COVID-19 pandemic has temporarily changed our lives and made us think hard about the future. And even though the situation is now less frenetic, until a vaccine or effective virus treatment is available, we are still a long way from the end.

HOW IT ALL BEGAN; WHAT WE KNOW ABOUT THE VIRUS

Sars-CoV-2 (COVID-19) was first detected in the Chinese city of Wuhan on 1 December 2019. It bears at least a 70% resemblance to the Severe Acute Respiratory Syndrome (SARS) epidemic in 2002-2003. On 9 January 2020 the first COVID-19 death occurred in Wuhan; by 19 January 201 cases had been detected in three countries: China, Thailand and Japan. Cases came to light in Europe in late January with deaths in Europe by mid-February. By the end of February over 85,000 cases had been detected and the virus was now present in all continents. On 11 March the World Health Organization declared the outbreak to be a pandemic; on 14 March Spain, taking its cue from other countries, enforced a national lockdown. By the end of June the worldwide toll was over 10,450,628 cases and more than 510,632 deaths in 193 countries.

The coronavirus pandemic: a watershed in mankind's C21st lifestyle

There are still many unanswered questions about COVID-19. The incidence and death-rate picture is so patchy that the scientific community has not been able to reach a reliable consensus.

As of late June the most severely affected country in the world was the United States, with over 2.6 million cases and more than 127,000 deaths, followed by Brazil, which has topped one million cases and 58,000 deaths, and Russia, with nearly 646,000 cases and a relatively low death figure of 9300.

Next in line come India with over 566,000 cases and the UK, with over 314,000. Peru, Spain, Chile and Italy have all recorded about 250,000 cases, while Iran, Germany, Turkey, Pakistan and Mexico are approaching the 200,000 threshold. Below the 100,000 threshold are France, Saudi Arabia,

Bangladesh, Canada and South Africa, while China, the original epicenter of the pandemic back in December 2019, has officially recorded over 83,000 cases.

Attempts to solve the undercounting of cases are still hit and miss, varying as records are updated and the illness continues to evolve, especially outside western countries. This patchiness is even worse if we factor in the asymptomatic or almost unnoticeable infections.

Bearing in mind the virus's main transmission vectors, its spread depends heavily on certain factors such as population density and travel flows with areas that have developed high rates. This would account for the lower incidence in low-population-density, less-connected countries and the higher rate in large conurbations with high dwelling occupancy, crowded

public transport and much traveling abroad.

The age structure seems to be another important factor in COVID-19 incidence, as well as the particular sociability mores of each country: some cultures tend to keep a greater distance while others favor closer physical contact of hands, faces and bodies.

Bearing all this in mind, the most affected countries should be the ones with the highest age profiles, large built-up areas with high population density, high mobility levels and a tendency to physical closeness. This does tally with Spain and other western European countries but it doesn't always prove a perfect fit elsewhere. Japan, for example, the country with the oldest population, high population density and interconnections with China, the eye of the storm, has recorded very few deaths.

And although social-distancing, the widespread wearing of facemasks and use of mobile Apps have all served as protection measures, it is highly likely that there are other salient factors too. The first scientific studies have been putting forward explanations such as different virus strains or genetic traits rendering the population more vulnerable.

Another crucial element, of course, is the public health response and healthcare capacities. A lack of experience in dealing with pandemics, belated social distancing or mobility-constraint measures and poorly equipped hospitals are other key factors.

African countries have recorded low virus death rates. This could be due to a more favorable blend of the abovementioned factors plus other variables that might also be important here (climate, population levels, genetics) or, conversely, to the fact that the illness is still spreading. Other possible explanations are greater experience in dealing with epidemics or simply faulty recording of cases.

Amidst all this uncertainty governments are basing their policies on lessons learnt from their own and others' experience, so, in a way, all are learning from each other in a continual feedback of experiences, successes and failures.

ECONOMIC IMPACT

Assessing the impact of a crisis is no easy matter. There is little previous information to go on and the geographical spread and timing is not clear yet.

Now that, hopefully, the most critical pandemic phase is over, most of the pundits' economic predictions are distinctly downbeat.

The International Monetary Fund (IMF) has recently published its World Economic Outlook, downgrading its April forecasts when it was predicting, for example, that Spain's GDP would dip by 8% this year as a result of the COVID-19 crisis, rebounding by 4.3% in 2021.

Now IMF is predicting for Spain the world's biggest shrinkage, plummeting 12.8% this year. According to this IMF report, only Italy would suffer a similar fall: 12.8% this year to pick up by 6.3% the following year. France is close behind these two, with a 12.5% slide and subsequent 7.3% recovery; Mexico, with a 10.5% drop and 3.3% recovery afterwards; the UK with a 10.2% fall to claw back 6.3%; or Brazil, with a 9.1% downturn and subsequent 3.6% rise.

For Germany the IMF is predicting a smaller fall of 7.8% and a subsequent bounce back of 5.4% the following year; the US is looking at an 8% shrinkage and 4.5% growth in 2021 and Japan is thought likely to suffer a 5.8% dip followed by 2.4% growth. In all IMF is forecasting a worldwide contraction of 4.9%, much higher than last April's prediction of a 3% fall and a whopping 5.4% rebound the following year.

The COVID-19 pandemic has therefore had a much more adverse effect than originally expected in the first half of 2020, so IMF is now downgrading the pickup scenarios. It is now warning that the impact on low-income households could be particularly acute, undermining the steady progress made since the nineties in reducing extreme poverty and inequality around the world.

Although acknowledging that some countries, especially in Europe, have managed to rein in the consequences

by setting up an effective gig economy, IMF is nonetheless pointing out that the hours lost in Q1 were tantamount to 130 million jobs, according to figures of the International Labor Organization (ILO), expecting this figure to top 300 million in Q2.

The IMF in fact is continually updating its predictions, always with the caveat that COVID-19's trend cannot be second-guessed. Countries still fighting to control virus spread will need to keep lockdown conditions in force longer, with an inevitable additional cost to their economic activity.

As for countries with falling infection rates, IMF explains its more pessimistic outlook in terms of the following factors: a slower pickup than originally envisaged as social distancing measures are maintained, activity hit harder than expected in Q1 and Q2 of 2020 and an additional brake on productivity as companies that have weathered the storm increase their workplace health and safety protocols.

IMF is also urging all countries, including those that have ostensibly passed the peak infection rate, to make sure their healthcare systems have the necessary wherewithal to deal with any second wave, while also asking richer countries to help others with fewer healthcare resources, even with cash handouts if necessary.

And just important as the depth of the dip is its duration in time. This, in turn, will depend on the duration of the epidemic itself, the contagion rate, herd immunity levels and the alacrity in developing vaccines or effective treatment.

TRANSFORMATION OF PRODUCTIVE MODELS

The world has now seen a digital acceleration that was unthinkable only three months back, and some fleet-footedness has been called for adapt to this new situation.

Even before the COVID-19 pandemic, pundits were flagging up problems in countries' productive models. If we now factor in the pandemic's effects, therefore, these shortfalls need to be urgently addressed, turning this new situation, if possible, into a transformation opportunity.

Many sectors have suddenly had to take up digital tools to keep their businesses going, so across-the-board digitization (including digital health technologies, which have come in really handy during the pandemic for monitoring, identifying and guiding citizens' health) would now seem to be essential in these new times. Furthermore, technology like robotics, artificial intelligence and big data now needs to be taken up by all sectors, with cybersecurity to the fore as a guarantee of trustworthiness. The so-called "new normality" is here to stay for a while and the demand for digital working schemes is soaring.

Countries' recovery will have to be underpinned by a new reliance on strategic and forward-looking sectors, knitting together the industrial fabric and generating quality jobs. Specific plans will have to be implemented, factoring in the new features of digitization, mobility and sustainability.

THE AFTERMATH AND SUSTAINABILITY

Environmental concerns are looming large in this crisis. There seems to be a general consensus that this pandemic is closely bound up with the ongoing destruction of ecosystems, illegal trafficking of animals and globalization.

world where natural catastrophes seldom occur. Sars-CoV-2 (COVID-19) has therefore come as a harsh reality check, betraying the underlying vulnerability of today's societies. For the first time in many generations a real threat has been hovering over us on a daily basis. We need to become aware of the economic, social and healthcare challenge that is still awaiting us.

We are dealing here with an unprecedented situation and the psychological scars it might leave are hard to predict. Post traumatic stress disorder would seem most likely for those who have been hardest hit by the pandemic but no one is immune. Factor in too the high number of deaths of loved ones and the impossibility on many occasions of bidding them farewell properly, and post-pandemic depression scenarios seem even likelier.

Of course we've learnt a lot from this crisis. The experience has been harrowing but there is reason for optimism too. The scientific community is making an unprecedented effort to decipher the virus and find out the best way of combating it. Probably never before in the history of humankind has so much information been shared between teams from different countries or such a huge collective effort been made. This is good news because the long-term solution can come only from shared knowledge and concerted effort.

In the future maybe other pandemics await us. Other challenges, health-based or otherwise, might also lie in store for us. Without the support of science and technology we are unlikely to be able to cope with them. And the carrying out of hi-tech, forward-looking initiatives is precisely GMV's strong suit.

Ironically, one of the most striking effects of the economic slowdown, with the concomitant fall in activity, energy demand and travel, has been an upturn in many environmental indices. Nature seems to be on the mend; toxic emissions and GHG emissions have both dropped; noise levels have fallen too, with beneficial effects for human health and urban ecosystems. Although desirable, however, this flash-in-the-pan effect has been achieved at a heavy cost for a society already hit hard by a health crisis.

Conversely, one of the lockdown effects has been a relegation of environmental concerns due to the healthcare emergency. The surge in single-use plastic, moreover, could act as a further drag in the fight against pollution.

The economic downturn sparked off by the pandemic is starving the UN's Agenda 2030 Sustainable Development Goals of resources. At the same time many voices are being raised urging us to take advantage of the transformation opportunities offered by the "new normality".

Special mention here must go to the contribution made by environment-monitoring space infrastructure. The Copernicus program, for example, led by the European Commission, in collaboration with the European Space Agency, is now inputting environmental data and tools of vital importance for making further headway in COVID-19 research and monitoring the atmosphere of virus-affected areas. The information given by such systems is in general precise, timely and easily accessible in the ongoing effort to improve environmental management, mitigate climate change and guarantee safety.

FUTURE

Wars, nowadays, tend to happen well beyond our borders; we are also lucky enough to live in a part of the

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Sources: Johns Hopkins Center for Systems Science and Engineering, official health ministries, World Health Organization, IMF, Elcano Royal Institute for International and Strategic Studies (Real Instituto Elcano de Estudios Internacionales y Estratégicos), KPMG.

Jorge Potti
General Manager Space

Showing the space sector's solidity and strategic importance

The space sector, albeit less exposed than other industrial sectors, has hardly come unscathed through these months of pandemic. Some programs have fallen behind schedule; some launch bases and factories have been shut down; production has run into difficulties; supply chains have been broken; events have been cancelled; payments have fallen into arrears and financial markets have creaked at the seams. GMV has faced up to this situation with great resilience and responsibility. Our number-one priority – the safety of our staff and society as a whole permitting – has been to keep our operations going, our products on delivery and our services running.

We have got through these months with the support of our clients, particularly the special industry support measures set up by ESA, the European Commission and EUMETSAT, among others. Add to that our teams' technological savviness, boundless creativity, upbeat commitment and unflagging endeavor. Over 90% of our staff are now working from their homes but we have nonetheless managed to keep up our normal rate of production, hitting project deadlines while carrying out a brisk commercial activity. And we have never stopped recruiting; GMV has continued to grow throughout this whole period.

We at GMV are ever mindful of the responsibility that goes with our leadership and specific weight in the whole set of Spain and Europe's space industry. We currently have 1,300 people working in the space sector, representing 3% of the European industry's upstream workforce. This makes us Europe's 6th biggest industrial group, behind only the great French, Italian and German groups. In Spain 1 out of every 4 engineers working in the space sector does so in GMV.

The widespread shock and worldwide crisis sparked off by COVID-19 should not have a negative impact on the space sector in the medium or long term. Quite the contrary. This crisis has brought out the strategic importance of the space sector, underlining its essential role in the provision of services such as communications, the environment, geo-information, transport, healthcare and security. All the world's great economies have unanimously reaffirmed the strategic value of the space sector. Its ongoing contribution to society, its innovativeness and value-creation capacity all bode well for the future.

For GMV the space programs of the European Union and the ESA are crucial. We look to them as a benchmark and they inspire us to our greatest feats of technological development. At the end of 2019 Seville hosted the ESA's Council at Ministerial Level. It turned out to be a notable success, chalking up record subscription levels for the whole set of member states and many of the countries where GMV does business. At the moment we are eagerly awaiting EU's ratification of a space program of equal stature for the 2021-27 period. This would establish a comforting window of certainty for us to create cutting-edge technology, swell our value chain, break into international markets and up our investment level to suit.

We at GMV reaffirm our unflinching commitment to our employees and our society. We will continue spearheading technological development to help Spain's companies create new jobs, wealth and nurture the welfare and security of all our fellow citizens.

Space still has a brilliant future ahead of it.

Manuel Pérez Cortés

General Manager of Defense and Security

The strategic importance of aeronautics-, defense- and security- activities

Staff-wide teleworking in a company like GMV, at first brought in due to external circumstances, has turned out to be a hugely potent and efficient way of continuing our activity. The technological resources made available by GMV have guaranteed business continuity in the areas of aeronautics, defense and security plus continual online contact between all staff members, clients and partners.

Clients and government authorities have also risen to the challenge, tackling the constraints we have all had to tussle with. They have pulled out all the stops in order to offer instant support and recognize the force-majeure justification of any breaches to signed contracts. The Ministry of Defense, from the word go and from the very top level, offered GMV help in meeting any of its needs in this extraordinary situation. Equally noteworthy was the flexibility of international aeronautics and defense-and-security agencies we traditionally work with, like FRONTEX, EDA, the European External Action service (EEAS) and the NATO Communications and Information Agency (NCIA).

Up to now GMV's aeronautics, defense and security activities have suffered no great disruption. Even so, if the lockdown-exiting strategy fails to reinforce these sectors, the effects might be irreparable. In the specific case of defense, it would also imply a loss of national sovereignty. These are strategically important industrial sectors; their exporting and innovation capacity also galvanize the whole economy.

Essential measures include continuance of the major defense programs such as the F-110 frigates, already underway, or the VCR 8x8 vehicle, as well as the aeronautics trainer or the decided commitment to the FCAS/NGWS project. These programs are not only necessary for armed forces' operation; they also have a huge knock-on effect and job-generating capacity. This has to go hand in hand with a reinforcement of defense R&D.

Another key factor in this reactivation process is the European Development Fund (EDF), which the European Commission's has trimmed back for the coming years. Fundamental here is the Ministry of Defense's support for the participation of Spanish companies in these funds as well as the increase in the money earmarked for this participation. Especially gratifying here is the fact that, according to the recently announced results of the EDIDP 2019 program, GMV is one of the few European firms selected to work in 4 projects.

It's hard to read the future. But there is no doubt that the aeronautics, defense and security industries will not be immune to the economic crisis sparked off by the coronavirus pandemic. Some effects are already evident in the supply chain, production centers and exportation. GMV, however, has been investing for decades in R&D and the development of various technological skills; this has enabled it to win pole position in these sectors and build up a worldwide trade around them.

Miguel Ángel Martínez Olagüe

General Manager Intelligent Transportation Systems

The Intelligent Transportation Systems (ITS) sector in times of COVID-19

Due to the type of ITS activities GMV carries out, the pandemic lockdown had a bigger impact on our department's operations. True it is that some activities like software development or electronics design, for example, lend themselves perfectly well to teleworking mode. Other activities, however, like integration, production- or laboratory-testing or equipment repair call for on-site presence of workers; these have been affected at times or even shut down completely. Also severely constrained were our activities carried out on clients' sites, like delivery, installation and testing of in-vehicle onboard equipment. The only face-to-face activity deemed to be an essential service and never interrupted at any time was the maintenance of our public-transport smart systems. Despite all these constraints, thanks to the effort and inventiveness of our staff, we have managed to keep up to schedule in most of our projects and services.

In the short term the ITS industry has not been especially badly affected. These are development, implementation or system-maintenance projects, sometimes involving multiannual contracts that have not been cancelled due to the COVID lockdown, though they may have suffered temporary delays. Nonetheless, the clients of the two main markets we work in, public transport and the automotive industry, have been severely affected by the pandemic, some of them seeing a 95% revenue drop. The impact on many of our clients is also likely to be long-lasting, well beyond the health crisis itself, since pre- COVID-19 mobility levels will be difficult to recover. Some changes like teleworking or videoconferencing have been more widely taken up and are now here to stay, reducing the future mobility demand. On the other hand, the severe economic crisis is going to hit this demand hard worldwide.

The medium- to long-term impact of this shrinking mobility demand on the ITS industry in general and on GMV in particular is very hard to predict at the moment. The truth is that we are now witnessing a big slump in our clients' new initiatives; if this lasts throughout the rest of the year, the 2021 effect will be big. It is obvious that our clients currently have bigger things to think about than modernization and phasing in new systems, but these routine activities should pick up once the pandemic has passed. Our range of products and services, moreover, is necessary for their ongoing operations, cost reduction and even confronting the pandemic itself with greater security. Take the case of our public-transport fare payment systems, which are cutting out the use of cash and thus reducing the risk of virus-spread by coins and notes; another good example would be ecodriving systems, which reduce both running costs and the ecological footprint. Likewise, in a different area, city access control systems, which are going to be necessary to manage the private vehicle's mobility demand.

Luis Fernando Álvarez-Gascón

General Manager of Secure e-Solutions

Towards a more innovative, digital and sustainable recovery

We're still pinching ourselves to see if the difficult weeks we've just lived through and the uncertain time now looming are not all just a bad dream after watching some science-fiction film. Our generation is facing a crisis of unprecedented proportions. Other generations, much worse off than us in terms of the arsenal of knowledge and collective discernment at their disposal, had their own challenges to confront and came through OK. For that reason I believe we should look to the future with some confidence.

This experience raises a number of immediate issues: the value of science, the importance of industry and essential services, the potential of information as a basic problem-solving asset... and the importance of risk

management. All these are factored into our business project.

GMV has come through the first round of the pandemic with flying colors. The two basic pillars have been the behavior of our team and the performance of our client-centered business-continuity strategies. Neither one nor the other is the result of improvisation. The short-term impact on the business of Secure eSolutions has been marginal, impinging only on operations involving international journeys.

Imagining the future is difficult amidst a systemic crisis that will pan out one way or another depending on decisions taken at various levels. I make bold to suggest that the major political initiatives, particularly Europe's, are well thought out. The technological

sector, ICT in particular, will not be the worst affected. The demand for telecommunications services has soared by over 50%, largely bound up with the massive takeup of teleworking (over 80% of companies, according to some pundits), with a strong boost to collaboration and cybersecurity services. The sector, however, will not be immune to the economic difficulties of its clients. Over 40% of ICT companies have issued downbeat expectations for this year, while global forecasts point to a slump in demand, albeit less than in the economy as a whole. The devil is in the detail; there are bound to be losers and some big winners.

In any case I would argue that the economy as a whole will take up technology more intensively in groundbreaking applications and business models adapted to a new context. Digitization and sustainability are the main thrusts of companies for the future. All sectors will be moving towards greater automation and a transformation of employment. Artificial intelligence, the cloud, 3D printing, IoT, together with other sustainability-related technologies, all taken up more intensively, are going to enjoy a huge leg-up, with cybersecurity and privacy to the fore. Governments will have a crucial role here, not only in terms of the modernization of public services but also by launching major public-private transformation initiatives in line with the pursuit of great social objectives like Agenda 2030.

All sectors will now experience an accelerated digital transformation but healthcare in particular must be prompted by this pandemic to advance decidedly towards a concept that GMV has been pursuing and developing for some time now, namely telemedicine and intensive use of data and artificial intelligence for the development of cutting-edge therapies. A promising future beckons for GMV.

The healthcare sector up against the coronavirus crisis

The SARS-CoV-2 (COVID-19) pandemic is not the first of its sort we have had to cope with, but it is one of a kind. The concentration of people in built-up areas and the need to travel have spread the virus practically around the world in no time at all.

In this special edition GMV is lucky enough to be able to quiz five standout healthcare experts, to mine their thoughts about the various aspects of this virus and the unprecedented healthcare crisis.

Such wide ranging themes as worldwide healthcare management; the countries' various responses to the pandemic; the behavior of the virus itself; vaccine-testing, -research and -availability; the role of technology in the fight against the pandemic; the challenges and improvement opportunities of the health system, and the lessons learnt for dealing with any future pandemics were analyzed by this illustrious panel, made up by María Neira, Director of the Public Health, Environment and Social Determinants of Health Department of the World Health Organization; Carlos Castillo-Salgado, Professor of Epidemiology and Director of the Global Public Health Observatory of Johns Hopkins University; Julio García Pondal, Medical Director and acting manager of the Hospital Universitario Puerta de Hierro Majadahonda; Juan José Pérez Blanco, General manager of the concessionaire company Hospital Majadahonda, S.A. and director of operations of the IFEMA COVID-19 Hospital; and Humberto Arnés, CEO of Farmaindustria.

María Neira

Director of the Public Health, Environment and Social Determinants of Health Department of the World Health Organization (WHO)

María P. Neira graduated in Medicine and Surgery from Oviedo University. She then specialized in endocrinology and metabolic diseases at the Université René Déscartes in Paris, France and subsequently in human nutrition from the Université Pierre et Marie Curie, in Paris, France. She also holds the international diploma in Emergency Preparedness and Crisis Management granted by the University of Geneva in Switzerland. In her early career Doctor Neira was the medical coordinator with Médecins Sans Frontières (Doctors without Borders) in refugee camps in Salvador and Honduras. She later joined the World Health Organization, holding the posts of Director of the Communicable Diseases Program and Coordinator of the Global Task Force on Cholera Control. In 2002 she moved to Madrid to take up the post of President of the Spanish Agency of Food Security (Agencia Española de Seguridad Alimentaria) of Spain's Ministry of Health and Consumer Affairs (Ministerio de Sanidad y Consumo de España). She held an undersecretary portfolio, holding responsibility for drawing up and enforcing national food and nutrition plans. A few years later she returned to Geneva to continue her work with WHO; in 2005 she was appointed Director of the Public Health, Environment and Social Determinants of Health Department.

What are the main activities of WHO's Public Health, Environment and Social Determinants of Health Department? As director, your remit includes controlling, monitoring and reporting on various diseases on a worldwide level. How is this task carried out and through which channels?

We (ourselves) like to classify ourselves as the "armed wing of WHO's primary prevention", since the department's main activity is identifying which are the environmental determinants of good health or, on the contrary, the unleashing of a disease. We therefore focus on water quality, hygiene, sanitation, air quality, pollution or chemical risk factors, ranging from pesticides to chemical substances of daily use. We likewise keep a close eye on both ionizing and non-ionizing radiation, workplace health-determining factors, occupational health factors, the climate change, etc. In short, we look at all health-determining factors across the board and try to promote the most favorable. As for instruments and tools, global public health is such a wide-ranging concept that it is necessary to work with all available instruments, such as legal or regulatory instruments, looking for the chance to change a law in a given

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country and ascertaining the outcome of this recommendation. Science also plays a crucial role here; we liaise permanently with a huge number of scientists and experts, including organizations like NASA and ESA, whose data help us, for example, to determine and detect a city or zone's air quality. We use digital, awareness-raising tools and basic communication tools. In sum, instruments and tools to influence governments and exploit our leverage by bringing together various international experts to make recommendations, turn them into public-health recommendations and, where possible, make them legally enforceable.

After decades fighting against lead in gasoline, pesticides, high sugar-content in processed food and various illnesses, how does WHO now tackle pandemics? What health alerts have WHO issued?
Health alerts cannot be taken lightly. They act as a last-ditch call-of-attention to extraordinary events deemed to pose a health risk to the public health of several nations, and calling for a concerted international response. In WHO we fight on three main fronts. Firstly, there are interventions to ensure a healthy population and well-being, including all health determinants and how these can be reinforced to pre-empt people falling ill. The second front is universal health coverage, healthcare itself and all the health systems, etc. And the third takes in the whole gamut of emergency- and epidemic-response or international health regulations, including not only biological agents but also chemical and radio-nuclear agents. We have to work on all three fronts; one cannot stand in for the other. In all, WHO has issued six health alerts; when dealing with pandemics, although we try to continue working on each one, most of our activity involves contention. This pandemic is also going to require us to try to pinpoint the factors that have led us this juncture. A lot of work will therefore need to be done in order to prepare for a healthier future and analyze the current infectious-

disease control and prevention systems. It will also be necessary to encourage healthier lifestyles, identify vulnerabilities and build walls and barriers against the spread of infectious diseases.

In light of results, has most governments' response to the sars-CoV-2 (COVID-19) pandemic recommendations been worse in comparison to past alerts?
Every virus has its own story to tell. I personally have experienced several in recent years and each one has its own special connotations. The variations are manifold: the historical moment, the geopolitical moment and even the media response. This pandemic has been very different for several reasons. First and foremost, due to the role played by social media, which now exert an unprecedented

influence. Another major difference has been the proliferation of fake news, or even the broadcasting of information with good intentions but on a shaky scientific basis. In this pandemic there is a permanent state of alert, and information is proving crucial, for good or ill. Secondly, we are now at a juncture where the leaders of certain political or geopolitical blocs, such as China-USA, are politically conditioning the response and management of the health crisis.

Just as there is a Court of Justice of the European Union or the International Court of Justice of the United Nations, both with binding rulings, should there not also be an organization with enforceably

binding rulings for health crises like the current one? Are mere recommendations really enough?
When this crisis is over, I think it will then be necessary to look back and decide which global healthcare architecture we want. WHO is currently made up by 194 countries and has considerable scientific status but little legal clout. We do have two instruments with a certain legal purchase, namely, the International Health Regulations and the Framework Convention on Tobacco Control, albeit with certain limitations in the latter case. In this new global health architecture I believe we will have to reinforce some of WHO's mandates, such as the case of inspection. For example, when a false medicament market is detected, WHO can issue an alert but can exert no legal authority over the matter. Or in

«Health alerts act as a last-ditch call-of-attention to extraordinary events deemed to pose a health risk to the public health of several nations, and calling for a concerted international response»

the specific case we are dealing with here, pandemics, these are a matter of international health security, so WHO could form part of the United Nations Security Council with the role, in these particular cases, of proposing a series of measures. This look back would also have to take in the opposite case. There are some countries, and not especially small ones, that are looking to stop paying their WHO contributions. This would completely dilute WHO's role, putting an end to globally organized response to questions that, prima facie, it makes no sense to confine within geographical or administrative borders. As I say, these are all questions that will need to be properly analyzed after the pandemic is over.

On 30 January, one month after the first alert about this new illness, launched by China, WHO declared a Public Health Emergency of International Concern for the outbreak of the coronavirus sars-CoV-2 (COVID-19) in the Chinese city of Wuhan. Why this delay in launching a worldwide alert? Is it possible that the magnitude of the pandemic was underestimated?

On 30 January, when the Public Health Emergency of International Concern (PHEIC) was declared, the number of confirmed cases outside China amounted to 82 with no deaths. Issuing an international alert of this magnitude can never be taken lightly; it is based on a decision taken by a committee of experts, which only a week earlier had been very divided in its opinions. Things always need to be placed in their context; with the information to hand at that time it was difficult to be certain about what was going to happen. Even so, on 30 January the PHEIC was declared, warning that this virus was different, a coronavirus, and that China was issuing alerts about the problem. Working on the information to hand at this time the arrangements made were logical and consistent with established procedure.

What about the response of other countries?

As for the reaction of other countries, I think this aspect needs to be placed in context too. It is true that during January we all saw news footage every night of what was happening in Wuhan: how a hospital was built in a few day: people wearing space suits and PPE fumigating the streets, border closures, etc. The general reaction was to think this couldn't happen in Europe; this is a very human reaction. It was looked at as something happening far away in a state with a given type of political regime. Only months later, however, countries that had never previously considered taking measures of this type began to follow suit, aping China's arrangements exactly. In recent years such lockdown measures, paralyzing half

the planet, had never been taken. This was an unprecedented step. The most highly developed and wealthy economies, facing a grave problem of mental health, knock-on socioeconomic problems and health systems buckling under a terrible strain. This was certainly no bagatelle. Such arrangements call for highly cogent and well thought-out political responses. Personally, I wouldn't like to have been in the shoes of any of the heads of government who had to bring in these lockdowns. The decision must have been daunting.

Given the very different figures in confirmed cases and deaths reported in the north and south of Europe, would you say that the south European countries have been caught napping? Do you believe that the application of advanced digital analysis technology, data science, AI, Apps, etc, by the least-affected countries has been a crucial factor in containing the spread?

It is difficult to know now what tools Lombardy, for instance, had to hand when the number of cases began to rise. In medicine, if the public health system is not able to cope, the stress is then laid on the patient. This patient-centered approach cannot possibly deal with a public health crisis of this size. Of course patients need to be treated, but a

importance in this pandemic. WHO has always been backed and supported by major technology firms in the development, for example, of information Apps and channels for combating fake news. Mention must also be made of virtual platforms for holding meetings or press conferences. Technology, therefore, has been fundamental for us and of course we believe in it. Hindsight now tells us that a tracking App at the start of the outbreak would have been a huge help. As is only logical, however, the original emergency response focused on the most urgent aspects.

Until now a public-health reaction had never been necessary in Europe and pandemics and infectious illnesses were thought to be impossible. Our epidemics were the chronic illnesses, the misnamed "epidemics" of diabetes or obesity. An epidemic of an infectious disease seemed unthinkable in Europe. In Africa or other countries, maybe, but not in Europe.

Are we now prepared for the next epidemic or health crisis?

There would have to be many changes in our lifestyles. First and foremost our relationship with ecosystems. Climate change, the loss of biodiversity, environmental

> «Until now a public-health reaction had never been necessary in Europe and pandemics and infectious illnesses were thought to be impossible»

series of more general measures also needs to be brought in, like isolation, quarantines, massive testing and contact tracing, etc. So I think it was a mistake to center on the illness and its treatment. In Italy, for that very reason, the response of Veneto is always quoted, where they focused on public health. As for technology, there can be no doubting its crucial

matters, etc, are no longer a concern of four geeky environmentalists or Greenpeace. It's now a health question. If we really want to be better protected and less vulnerable we have to shore up these human-wildlife barriers and restore our healthy relationship with ecosystems. Most of these epidemics come from animals. The human-animal barrier

has broken down and ecosystems have become modified. The population-density problem also needs to be solved. We can't just keep on building these huge conurbations where millions of people are packed into a few square meters. This population density is a hotbed for the spread of any infectious agent. Lifestyles favoring obesity and sedentary habits also need to be changed; we now know they lead to diabetes and high blood pressure and it is also been proven that such individuals are more prone to any virus-based illness. From the other side, better epidemic-response and healthcare-preparation systems also need to be set up, while digital-transformation work obviously needs to be kept up.

How is information now being passed on to countries where the virus hasn't peaked yet or that have fewer recourses, so that they can benefit from other country's experience and thus recover more quickly and efficiently? What role is technology playing in the knowledge transfer process and data handling between so many different countries?

Meetings that once took months to organize and had to be held in major convention centers have now been replaced by video conferences, webinars or virtual meetings between a huge number of varied experts. These hardly require any previous organization so the information pass-on is practically instant. Another notable advance is the consolidation of teleworking. As for how this experience and these advances might benefit other countries, this depends more on the human factor than technology itself. One thing is to pass on information; quite another is to assimilate it properly. The different situation in each country also has to be factored in. In Africa, for instance, stay-at-home campaigns just wouldn't work; in many rural areas there are not even any houses and rather than families there are community clusters. And in some areas of India hand-washing instructions would make little sense when they have no soap and hardly any water. In these different circumstances technology could obviously be a big help in terms of passing on information but deeper-lying problems still need to be solved. It could be said that we are dealing here with two different worlds, one from the "Middle Ages" and another developed and sophisticated world, so technology savviness needs to be taken into account and governments need to be advised about the aspects to be tackled or priorities to be set in different countries.

Carlos
Castillo-Salgado

Professor of Epidemiology and Director of the Global Public Health Observatory of Johns Hopkins University

Dr. Carlos Castillo-Salgado is chair-holding professor in epidemiology in the Epidemiology Department; he is affiliated also to the departments of Population, Family and Reproductive Health, Health Policy and Management and the School of Medicine of Johns Hopkins University. He is currently director of the Global Public Health Observatory.

He graduated in law from Guadalajara university, qualified as surgeon at Mexico National University and took a Master and PhD of Public Health in Johns Hopkins University.

For over 20 years he was epidemiology expert and director of the PanAmerican Health Organization. He was a pioneer in the development of the new epidemiology and innovations in global public-health surveillance. His scientific contributions include global public health surveillance, measurement of health inequalities, GISs in healthcare and the development of new health metrics.

He has received many prizes and awards and is epidemiology member of the Medicine Academy of Mexico.

It is said that history's great murderers are invisible. Despite this, have we overlooked the power of viruses?
Scientists and epidemiologists have paid close attention to the new viruses that generated the major epidemics of the 20th and 21st centuries. They crop up every 4 or 5 years on a world level: HIV-AIDS; SARS, Influenza, Ebola, MERS-Cov, Nipah virus, Dengue, Chikunguña, Lassa Fever, Rift Valley F, as well as those of measles, typhoid fever, cholera, hepatitis, polio virus and many more. A huge advance of historical proportions is the virus genomic mapping capacity, facilitating the development of vaccines and effective treatment. World leaders, however, are a different story. It is mainly them who have downplayed their importance and brought in public health cuts.

The first step is clearly understanding what these viruses are, how they are transmitted, how they behave and affect people. But what do we really know about the Sars-CoV-2 (COVID-19) virus? What makes it especially dangerous in comparison to others better known to the public at large?
Viruses leaping from an animal species (zoonosis) to humans, with person-to-person contagion, pose a huge danger to global public health. Human beings have no immunological

memory of these new viruses, so everyone is prone to infection. The virus is highly contagious, and although the majority of suffers have only slight symptoms, these then become asymptomatic carriers unwittingly

have been collaborating closely with Chinese scientists in the whole process required for generating the natural history of COVID-19 and have jointly published the results. Generation of the natural history of the HIV-AIDS

low, so the risk of pandemic spread is high. Which do you see as the most suitable pandemic-contention measures without going back to lockdown?

Until a vaccine and effective treatment are available and proven in practice, the only suitable strategy is social distancing, the wearing of facemasks and hygiene measures. The opening up of economies should not mislead us into thinking that the contagion risk has been eliminated. The contagion risks are still there and may yet increase if the social-distancing measures are not properly enforced. This is already occurring in areas, cities and countries that have opened up too soon, with new waves of contagion springing up in groups that have broken social distancing rules.

«Climate change and pollution are important co-factors in the rise or resurgence of these new viruses»

infecting many others. There are high risk groups within the population such as the elderly and people with chronic conditions that would have a higher risk of dying if infected unless they receive immediate ICU treatment. Other viruses might be even more virulent but effective vaccines mean their effect is lower than a new virus like COVID-19.

This is in many aspects an unknown virus. Do we know yet which factors affect its development and trend? Are weather, geographical area, pollution and age important variables?
These viruses have been affecting animals for many years, producing zoonosis (animal illnesses). But to make the leap to humans there is usually a need for a complicated transfer between three species, usually a bird species to a porcine species and then on to humans. This is possible only with a massive simultaneous interchange between these three species. In the past this transfer from zoonosis to human infection would have taken 100 years. Due to globalization and production processes and close intermingling of millions of humans with these two species, this transformation can now occur in 4-5 years. Climate change and pollution are important co-factors in the rise or resurgence of these new viruses.

Do you think that if western doctors had been able to study this virus in its place of origin, China, they would have been better prepared for preventing its worldwide spread?
Western doctors and scientists

virus took several years; COVID-19, only weeks. This has enabled us to ascertain the main infection-risk factors or the death risk posed by this virus in view of the largely unprepared health systems and laggard response by most countries around the world.

Which technological tools are you using to study the evolution, development and spread of epidemics and pandemics like COVID? In the USA, is the mining of clinical and epidemiological data with artificial intelligence and big data now standard practice to generate scientific evidence and aid decision-making?

There are now excellent epidemiological surveillance tools and methods for early detection and warning in real time. The International Health Regulations of 2005 overhauled the way surveillance is carried out and opened up new opportunities for the introduction of new tools and the use of artificial intelligence and real-time distribution networks of epidemiological information. The main problem was the downplaying of this epidemic by politicians and limitation of the active and continuous participation of epidemiology and pandemic experts, especially during the early stages, as well as starving these new systems and tools of funding.

After a lockdown period of varying severity from country to country, reining in the exponential virus spread, these measures are now being eased off. There is as yet no efficient treatment and the vaccine is still a long way off while herd immunity is

Some firms like ours have been able to keep up much of our activity by means of teleworking. Even so, many of our operations have been affected by social distancing measures and traveling restrictions. How long should we expect to live in this "new normality"? What awaits us in relation to this and other possible pandemics?
Teleworking, social distancing, wearing facemasks and hygiene measures are likely to be with us for some time, even when vaccine(s) and effective treatment are available. A recent survey of the American population showed that 30% of respondents would not have the vaccine even when it becomes available. This will balk the generation of herd immunity. For some time to come yet the control and prevention of this pandemic will depend on the zeitgeist behavior, prejudices and false news. Recommended reading here is: *https://www.pewresearch. org/fact-tank/2020/05/21/most- americans-expect-a-covid-19-vaccine- within-a-year-72-say-they-would-get- vaccinated/*
Equally enlightening is this account of Republican voters' view of the COVID-19 vaccine when available: *https://www.cnet.com/news/over-40- of-republicans-wrongly-believe-bill- gates-will-use-covid-19-vaccines-to- implant-microchips-in-them/*

Julio García Pondal

Medical Director and acting manager of the *Hospital Universitario Puerta de Hierro Majadahonda*

Dr. Julio García Pondal is currently Medical Director and acting manager of the *Hospital Universitario Puerta de Hierro Majadahonda*.

He graduated in medicine and surgery from the *Universidad Complutense de Madrid* (UCM) before taking a master's degree in health administration from the National Healthcare School (*Escuela Nacional de Sanidad*), a master's degree in the Management of Healthcare Infrastructure from the *Centro Universitario de Salud Pública* of the *Universidad Autónoma de Madrid* (UAM) and a master's degree in Industrial Economics from *Universidad Carlos III*.

In 2015 he joined the management team of the Hospital *Universitario Puerta de Hierro Majadahonda* as medical director. He had previously held the post of director of the continuity of healthcare and medical subdirector in the *Hospital Universitario de Getafe* and medical subdirector of the Medical Urgency Service of the Regional Authority of Madrid (SUMMA 112).

As medical director and acting manager of the *Hospital Universitario Puerta de Hierro Majadahonda*, what has been your experience of this health crisis professionally? What have you found most surprising about this sars–CoV–2 (COVID–19) coronavirus? What arrangements has your hospital made to combat the virus?
The Sars–CoV–2 pandemic has posed a previously unimaginable challenge for everyone making up the health system, both at management and bedside level. Its personal and social effects have clearly been devastating while the management challenge has really tested our mettle.

Probably what has most surprised us about this virus has been the transmission speed and its aggressiveness in the first phases of the epidemic. We professionals making up today's health systems have never before had any experience comparable to COVID–19.

It's been an arduous task. Not only have our hospitals had to adapt in order to cope with the avalanche of virus sufferers in the first few weeks but our clinics have had to learn how to deal with this virus at breakneck speed. As has often been pointed out, it was a completely unknown virus until a few months ago; we had

very little to go on at first and it has turned out in time to become much more complex than we thought.

At the Hospital Puerta de Hierro many initiatives were set in motion to enable the hospital to deal with the sheer number of patients arriving at our A&E doors.

Weeks before the lockdown was enforced in Spain we had set up

it could hardly be otherwise. I believe we are now better prepared to confront any other crisis like the one just lived through, either due to a new wave of COVID or another similar virus.

In health centers we have learnt a lot and I believe the public at large is now well aware of the importance of the individual acts of each and every one of us. Putting paid to this virus is

dealing with illnesses of this type, have played a key role in treating sufferers.

We've also learned how to be flexible, to take onboard the fact that decisions cannot be written in stone when dealing with situations as complex and variable as this one. We now know how to tune in with what happens every day or even every hour, adapting our patient treatment to suit.

«We need to work with reliable forecasting models that enable us to steal a march on events»

a steering committee made up by hospital managers and many clinicians responsible for each and every one of the hospital's key areas: preventive medicine, A&E, internal medicine, pneumology, intensive care, microbiology, pharmacy, etc. This steering committee took charge of coordinating all our hospital's crisis-management measures.

The architectural makeup of the hospital also allowed us to increase our patient-treatment capacity fairly quickly. We were running 613 individual wards pre-pandemic but with the capacity to fit an extra bed in each one. We were thus able to double our capacity in no time. This represented a huge effort for our staff, including the new recruits as from March and April.

In other words the anticipation, coordination and responsiveness both of the steering committee and our whole staff plus the elasticity of our infrastructure meant the hospital was able to cope with the terrible rush in March and April.

Although we still haven't overcome this pandemic and the virus is still little understood, do you believe that any lessons have been learnt at personal and societal level as well as the healthcare model and the politicians' point of view?
Of course lessons have been learnt;

the responsibility of all of us, not just healthcare workers.

How do you see hospitals' readiness now in the event of having to cope with a new wave of the virus either now or in the future?
These last months have put us all through all our paces. Now is the time to take stock and analyze everything that has happened, think about what we did well but, above all, correct any decisions that have turned out with hindsight to be wrong.

The path has been marked out. If we had to go back to square one, we now know the path to take: how to organize our A&E, to double ward- and ICU-beds, and we even have on standby, if need be, a hospital annex with nearly 100 ward beds and 20 ICU beds.

We have a stock of at least one month's PPEs, respirators to enlarge UCI facilities, hospital beds, diagnostic reagents, etc.

We also now have a host of procedures and protocols our professionals have been working very hard on, telling us how to act in the face of situations as complicated as the one just lived through.

The multidisciplinary COVID teams, always coordinated by an expert in

Where do you think the key lies for dealing with a healthcare crisis of this scope? In a coordinated interregional healthcare management under the aegis of a national pandemic-combatting body? In the provision of specific, pandemic-dimensioned material? In the application of technology like big data or artificial intelligence to ensure better epidemiological surveillance?
Effective interregional healthcare management is crucial for dealing with situations of this type. The incidence of this virus has been very patchy from one region to another. Countries like France and Italy ferried patients from one region to another to ensure proper healthcare of each one. This should be taken on board in Spain.

Keeping a stock of material is vital too. This is something we have learned and corrected in our hospital and the whole region of Madrid. It would seem to be necessary to set up an essential healthcare material industry in each country or tap into EU coordination of factories distributed evenly within EU territory. The response to any crisis would then be more nimble, backed up by the guarantee of proper certification. In any case an alliance between Spain and Portugal looks very promising, making intra-EU solidarity more feasible.

Provisioning should be geared towards solving the first weeks of the crisis but with the necessary rotation to avoid shortages.

And without any doubt technology in general and big data in particular

are a huge help in dealing with these situations. Working with reliable forecasting models would help us to steal a march on events. Big data feeds off records, so we need to make sure the procedures for defining and collecting these records are consistent. This will make the data more powerful and useful.

«Technology is basic in communication between professionals, always providing it takes information protection and security into account»

Are there tools enabling a coordinated management of resources and data between hospitals and primary healthcare? Do you see this as an area where technology could play an important role?

Liaison between both healthcare levels is already in place but by no means perfect as yet. Technology is a crucial ally in this whole process.

Technology plays a basic role in communication between healthcare professionals, while always paying due heed to information protection and security, both of patients and clinicians. We need to work towards secure and encrypted communications.

Telemedicine initiatives will come into their own, allowing primary healthcare clinicians to help the patient in situ by online consultation with specialists. The latter will benefit from being called into action only when there are good chances of improving the patient's health. The number of targeted patients will thus cease to be diluted in complex circuits but will rather become the central concern of the best doctor for their particular pathology.

Do you see telemedicine as a good option for tracking discharged COVID–19 patients and frail and chronic patients?

Without any doubt. We've been working on this system for a year now but there's still a long way to go. As things stand it is a very useful way of cutting out unnecessary journeys to hospitals and clinics.

Telemedicine is still nascent at the moment. We need to nurture it towards full maturity to make sure all the past effort pays off and achieves its main aim of improving the quality of life of our patients despite the dearth of resources.

Juan José Pérez Blanco

General manager of the concessionaire company *Hospital Majadahonda, S.A.* and director of operations of the IFEMA COVID-19 Hospital

Graduate in industrial engineering from Vigo University and honored by the Professional Association of Industrial Engineers of Madrid (*Colegio de Ingenieros Industriales de Madrid*: COIIM) as Industrial Engineer of the Year in 2018. He has been manager of *Hospital Universitario La Paz*, of *Hospital Universitario Central de Asturias*, in Oviedo and of the *Complejo Hospitalario de Ourense*. He is a member of the Medical Engineering and Healthcare Committee of COIIM and the Madrid Association of Industrial Engineers (*Asociación de Ingenieros Industriales de Madrid*): AIIM.

As director of operations of the IFEMA COVID-19 Hospital, you were in charge of running the construction work for setting up the country's biggest ever field hospital in the Madrid tradefair site IFEMA, an unprecedented project in Spain. What were the main challenges and what conclusions did you draw from this project?

When we began working on IFEMA's site the remit was to set up a 1,346-bed hospital in a tradefair site. A stiffer challenge could hardly be imagined. Add to that, however, the fact that almost none of the huge team working there, to tackle the biggest professional challenge of our lives, knew each other. This broke the mold of traditional team working and leadership. The biggest success, and for me the prime lesson, is that this previous acquaintance is not necessary if everyone is pulling together in the same direction. All of us arrived at IFEMA already sharing these values, in all likelihood because the persons responsible for choosing us shared them

themselves and looked for them in us. In Spain when we work with clear goals and under the pressure of such a crisis, our capacity of response is remarkable. Among other reasons because a sense of fellow feeling is strong among us. We are surrounded by magnificent professionals and excellent people.

Drawing on your experience and knowledge from setting up the IFEMA COVID-19 hospital, a field hospital was then set up in the *Hospital Universitario Puerta de Hierro* in Majadahonda, where you work. Why was this decision taken?

In fact the COVID-19 hospital extension in *Hospital Universitario Puerta de Hierro*, opened on Monday 23 March, if I remember rightly. Construction work began some 2 or 3 days before IFEMA kicked in. Indeed, some of the ideas put into practice in our hospital were then taken up by IFEMA: nursing support, bed layout and type of partition walls, waist high to give better visibility of patients and reduce possible contagion surfaces.

The decision to do so was taken in hospital management, on the basis too of the reaction times they expected from us, the concessionaire firm. In this phase of the pandemic the number of patients reporting to A&E was huge and still on an upward trend. This extension meant there was never any patient waiting in A&E for admission and a hospital bed. There was never a full takeup of all the beds we installed.

How do you see hospitals fixed now if they had to tackle a new increase of virus sufferers?

Any new spike would undoubtedly have a totally different reception in hospitals now. First and foremost, all the purchased equipment and wherewithal is already available, as well as the extensions built. Then there is the experience and expertise built up across the board. Any hospital now, moreover, is very unlikely to undervalue the importance of PPEs. Mental or even physical weariness of first-line personnel would worry me: doctors, nurses, nursing auxiliaries, porters, cleaning staff, maintenance staff, administrative auxiliaries and many more healthcare personnel. They've really had it tough. Some have fallen by the wayside. I believe that, despite all the balcony applause, the Princess of Asturias or all the best-intentioned words, the public at large is not really aware of just how proud they should be of Spain's healthcare sector. And I mean the whole sector. It's been a historical example and a real privilege to work with them.

Humberto Arnés

CEO of Farmaindustria

Graduated as industrial engineer from Barcelona's Higher School of Industrial Engineers (*Escuela Técnica Superior de Ingenieros Industriales*). He joined the Spanish civil service in 1978 in the state industrial engineer corps.

From 1983 to 2001 he successively took on diverse executive posts in the Spanish government, first as subdirector general of pharmaceutical industries, then as General Manager of the Industrial Technology Development Center (*Centro para el Desarrollo Tecnológico Industrial*: CDTI) and finally as general manager of Regional Public Works Institute of Asturias (*Instituto de Fomento Regional del Principado de Asturias*: IFR).

He has been Spanish representative in the European Space Agency (ESA), the European Organization for Nuclear Research (CERN) and director of diverse companies.

In 2001 he was appointed CEO of Farmaindustria, a post he holds to date.

What role is Spain's pharmaceutical industry playing in this context? Also, as a member of the European Federation of Pharmaceutical Industries and Associations (EFPIA) can you tell us how EFPIA is working to coordinate research efforts in the design of new drugs?

As is only to be expected, the pharmaceutical industry has been playing an upfront role since the onset of the pandemic. The two main challenges we faced were to come up with an effective treatment against the coronavirus as soon as possible and make sure the 25 million Spaniards taking some sort of daily medication could continue to do so without any problem.

Today we can safely claim to have ensured the drug supply, despite the strain on the supply-chain inside and outside Spain. We can also say a lot of ground has now been covered in the research field, with Spain to the fore: we are the first European country to run clinical trials against the coronavirus.

We have also been busily working in another area of the utmost importance for patients: the clinical medicine trials already underway. In this extraordinary situation, with hospitals snowed under and a great risk of contagion for participating patients, it was vital to try to normalize the situation as

soon as possible without endangering researchers and patients. With the support of the Spanish Medicine Agency (*Agencia Española de Medicamentos*) and the involvement of researchers and hospitals, we are gradually getting back to normal.

In the European context coordinated and collaborative work is underway, as in other projects, to ensure the supply of medicines and also speed up the development of a possible vaccine. At the start of the crisis EFPIA, to which Farmaindustria belongs, mustered its companies for them to identify treatment already used or in the pipeline that might be effective against the virus and then put all their heads together. This was the previous step for channeling all the advances made by laboratories under the European public–private collaboration called "Innovative Medicines Initiative" (IMI). Over a dozen companies are collaborating with public organizations to try to cut down the research time. This form of working recently came good in Ebola research.

How has the pharmaceutical industry's R&D evolved in recent years? What role is being played by digitization, artificial intelligence (AI) or big data in the development of new medicines?
Biomedical research in recent decades has fed on the technological advance and knowledge built up in areas like genomics and proteomics. These have spawned innovative medicines that have pushed back the healthcare envelope by finding cures for hitherto incurable diseases, based on an increasingly specific approach (e.g. hepatitis C or AIDS).

Digitization is now being phased in while big data is being increasingly taken up in the new medicine research process. Taken together with the development of more personalized and directed medicine, this is fueling significant progress in the search for solutions for more complex diseases or diseases with as yet no therapy. This new research, geared towards more specific patient profiles, is finding it hard, for example, to bring a large number of patients in the clinical–trial trawl, but it is pulling off great feats elsewhere.

Likewise, this new technology will help us become more efficient. The medicine-development and -research process is longwinded, complex and costly. The times involved are usually at least 10–12 years with a mean outlay of 2.5 billion dollars. The application of artificial intelligence or big data and the like might cut down these times and cheapen the processes, to the benefit of the final patient. We are now seeing with coronavirus that a process that would take years in a traditional laboratory is being reduced to weeks, on the strength of the supercomputers now being used by Spain's research centers to analyze the COVID-19 response of hundreds of drugs.

Which do you see as the new methodologies and action mechanisms that should be taken up by industry to raise the success rate in dealing with hitherto incurable diseases and meeting the growing healthcare demand and crises of the type we are living through now?
The most important thing about the coronavirus crisis is that we are witnessing an unprecedented mobilization and a tremendous example of collaboration, not only between different pharmaceutical companies but also between these companies and

this collaborative research method must be added the digitization of processes and the use of artificial intelligence, as mentioned before, and there is no doubt that pharmaceutical companies will be able to continue coming up with responses to uncovered healthcare needs by developing increasingly secure and efficient treatment.

To find treatment for diseases as yet without a cure there is a need for a critical mass of patients to be able to study. What initiatives are now being levered at European level to share the member states' patient data?
Much work is underway at European level, of a very diverse type and with very good results. Three years ago IMI launched the Harmony project, which is due to be completed at the end of next year. Under this far-reaching project member states are sharing the healthcare data of patients with blood cancer tumors. This is boosting the efficiency of R&D processes by pinpointing the most efficient treatment, while always guaranteeing the security and confidentiality of patients' data.

Amidst the pandemic people are also joining forces around the world. The European Clinical Research Infrastructure Network (ECRIN) has set up a clinical

«The medicine-development and -research process is longwinded, complex and costly and the application of artificial intelligence, big data and the like can help to shrink times and cheapen processes»

the government and public research centers. The upshot is that in three short months nearly a thousand clinical trials of this illness have been held; about 130 medicines or combination of medicines are now in test phase and as many vaccine projects are now under study.

So I wouldn't say we are dealing here with new research methodologies so much but rather the need and opportunity of setting up R&D models based on public-private collaboration. To

research metadata repository to enhance clinical testing and improve study designs.

For its part, the European Medicines Agency (EMA) is working on a document of questions and answers for subsequent use of pandemic healthcare, always, as already pointed out, with maximum guarantees of ethics, rigor and data confidentiality. This modus operandi has undoubtedly come to stay.

There has been much talk lately about treatments, international research, clinical vaccine-vetting phases and even deadline availability dates. When do you think a coronavirus – sars-CoV-2 (COVID-19) vaccine will be available? Can you talk us through the necessary steps and procedures for obtaining a vaccine?

In a best-case scenario, experts expect a vaccine to be ready by the end of this year and marketable in Q1 of next year. But I repeat, this is a best-case scenario, dependent on one or several of the vaccines now in clinical phase turning out to be safe and efficient.

The good news here is that there are many companies and public institutions working against the clock and research is advancing apace. This will shorten the development period as never before. Some have already begun clinical trials at international level, and some have even announced their intention to begin manufacturing before clearance (with the consequent risk of this outlay coming to naught if approval is not finally obtained). The idea here is to speed up the availability of millions of shots in the very moment of vaccine clearance, to gain as much time as possible. Furthermore the worldwide pharmaceutical company association, IFPMA, to which Farmaindustria belongs, has pledged to make the eventual vaccine fairly and affordably available around the world.

It is important to remember here that pharmaceutical companies and health authorities are facing a twofold challenge. It is not only a question of finding a safe and efficient vaccine but also – an even stiffer challenge – being able to produce it on a mass scale in order to provide governments with millions of shots. We also need to bear in mind that only pharmaceutical companies with a long research and vaccine-manufacturing track record can cope with a challenge of this size.

All in all, we have to remain upbeat and hope that one or several vaccines reach the finishing line, reducing this ten-year deadline to little more than one. It will be a great feat for all involved.

Thinking now about not only COVID-19 but also any other pandemic that might crop up in the future, which actions do you think should be driven by the pharmaceutical industry to check them? Should governments be encouraged to create a future National Epidemiological Surveillance Plan and another one at European level?

One lesson we can draw from this crisis is that we need to protect our healthcare professionals and strengthen our health system. The health system has revealed both its strength and its weaknesses. We now need to consider how to endow health systems, both regional and national, with enough funds to cope with future healthcare crises. We should not forget that we earmark only 6% of our GDP to the health system, fully one percentage point below comparable countries.

A second lesson is the value of innovation. Where would we be now if we had to hand an efficient coronavirus treatment? But without even stretching it so far, a modern health system can no longer be conceived without research. Spain has made a lot of progress and we are now an international benchmark in clinical research; witness our leadership in coronavirus trials. We have to lever this privileged situation and define a suitable strategy for reinforcing Spain's leadership in biomedical research too, which is now going through a boom, as pointed out before.

And maybe a third lesson to be drawn from this pandemic is the chance to bring back to Spain the manufacturing of main healthcare assets and medicines, a business that in recent years had slipped to Asian countries. This dependence is by no means ideal in such a delicate area as medicine, and the pharmaceutic sectors should feature in any country as one of the strategically-important sectors in order to guarantee local production of goods and assets for a quick reaction capacity to any crisis.

Recovering the manufacture of essential medicines is positive from the healthcare point of view but it also makes sense from the economic and social point of view, given the undoubted knock-on effect on production, exports, jobs and throughout our society in general.

Talent in the times of COVID-19

Right from the word go GMV has made its personnel policy one of the kingpins of its whole business project. Throughout the COVID-19 pandemic its overriding concern has been to safeguard its staff's health and safety, trusting in the company's talent as the best way to ensure business continuity.

Ignacio Ramos, GMV's Chief People Strategy & Infrastructure Officer, talks about the different fronts being worked on during these times of uncertainty, the tools made available to personnel to enable them to continue with their projects, the challenges the company has had to confront and the plans to phase in a return to onsite working.

Moreover, it is the readiness, commitment and professional attitude of team GMV that remains the best response to any challenge. Several of them will talk us through their personal experiences of this situation, how they have adapted it to it, teleworking, the role of technology, flexi-time systems to help reconcile working and family life and even what it was like to join GMV smack in the middle of this healthcare crisis.

A chance to look back and learn lessons for the future

Ignacio Ramos Gorostiola

Chief People Strategy & Infrastructure Officer

Society has had to confront a crisis with no real precedent in recent history, in terms of its sheer size and the consternation sown throughout society. Everything happened at breakneck speed; in a matter of days we had to cope with a lockdown situation in which all personal, professional and economic activity was severely curtailed.

From the word go it was clear that the two overriding thrusts of our response had to be, firstly, safeguarding the health and security of all GMV's staff and, secondly, guaranteeing business continuity and keeping up the company's talent levels. This whole time has been a nonstop whirlpool of changes that have posed a huge challenge for GMV on several fronts:

- **The need of stealing a march on events.** The monitoring initiated very early, upon the first signs of the problem, and the identification of the possible scenarios we might have to cope with, such as closed worksites, meant we had everything prepared even before the lockdown was enforced.

- **Quick decision making.** Right from the start of the crisis the situation has been changing at dizzying

speed, with a lot at stake in terms of keeping up GMV's activity. We needed to be fleet-footed enough to react day by day to situations of wildly different natures.

- **Communication as one of the essential thrusts of the action** not only at an individual level, taking into account the persons directly affected by the illness (which, luckily, given que size of the company's staff, have been few with only brief hospital stays) and also those indirectly affected, suffering the loss of family relatives. Communication was one of our main priorities throughout, giving regular updates on the impact of the illness on the staff, the ongoing trend of the company's situation and the measures taken. This continual liaison, despite the physical distances involved, has brought us even more closely into line behind GMV's common goal.

- **Adaptation of processes to the new situation.** With the lion's share of personnel now working from home, the widespread use of collaborative working systems and videoconferencing has come into its own, keeping up communication and liaison levels. Diverse channels of stable communication have also been set up, favoring smoother liaison and online meetings.

- **Search for solutions and material to ensure conditions of onsite working.** The PPE shortage when the crisis broke posed a problem that has been solved by dint of superhuman effort and imaginative solutions.

Now that the lockdown is being eased and mobility being phased back in, the next challenge is to ensure a safe and progressive return to work. During this whole time the staff's level of commitment and performance has been exemplary, all pulling behind the same objective of making sure this magnificent project of GMV did not stall. There are, however, some inevitable negatives in this situation,

such as the absence of personal and direct contact with colleagues, clients, partners and providers. This becomes more noticeable as time goes on. There are also signs of lockdown fatigue, with many people anxious to return to normal living and career conditions. The challenge now, therefore, is to phase in an orderly return to work, based on safety at all times and with this lockdown fatigue in mind and a clear idea of where we are going. It is not a case of returning to the starting

conclusions and come out better. Now we have the chance to look back and learn lessons for the future.

At a personal level it has been really hard, with a clutch of problems cropping up continually and the need to take tough decisions that are bound to impinge on individuals and the whole organization. On the other hand, the exhilaration of seeing how the company has come out stronger than ever, the collaboration with a galvanized team

> «During this whole time the staff's level of commitment and performance has been exemplary, all pulling behind the same objective of making sure this magnificent project of GMV did not stall»

point but rather setting an objective that blends the best of before with the lockdown lessons learnt.

We have all experienced difficult situations in our personal lives and careers; from all of them we draw

working as one person towards a common goal plus the great number of acknowledgements and thanks received throughout this whole period mean the final feeling is one of tremendous satisfaction and pride at belong to this fine firm.

Enrique Crespo Antolín
## Galileo Ground Control Segment Cybersecurity department

The circumstances have called for an across-the-board effort to make sure GMV did not shut down or falter. There is a general will to keep things going and understand that the ongoing adaptation needs to show empathy with the particular circumstances of each person involved. In the restricted access zone (RAZ) we have had to redistribute the space, limiting the number of people per office. We have got used to wearing facemasks and more strictly enforced hygiene rules. Some, however, are in urgent need of a haircut. We have also seen some things we will take some time to forget.

The new working routine calls for greater coordination to abide by social distancing rules and the needs of physical RAZ access. In this new routine the setting up of RAZ-access rotations, better organization of activities and the need of getting on with the work are all undoubtedly a positive lesson to be drawn from this.

This situation will impose new rules in terms of physical office access, daily organization of work-teams and team-working optimization tools.
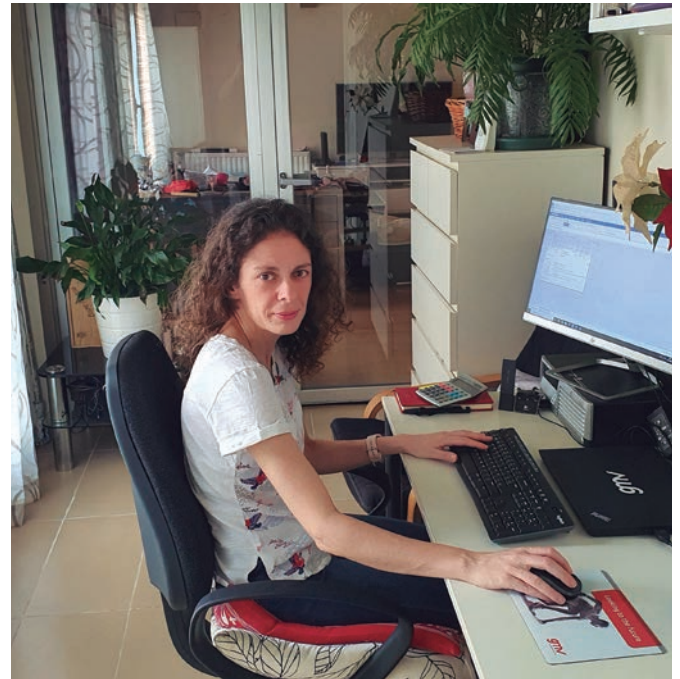
Teleworking implies specific activity-enabling processes and tools. It is not just a matter of sending emails, answering the phone and writing a document on the laptop from home.

Many things have been done well while others will call for a rethink, but thanks to all of you there has been no shutdown, and that is crucial.
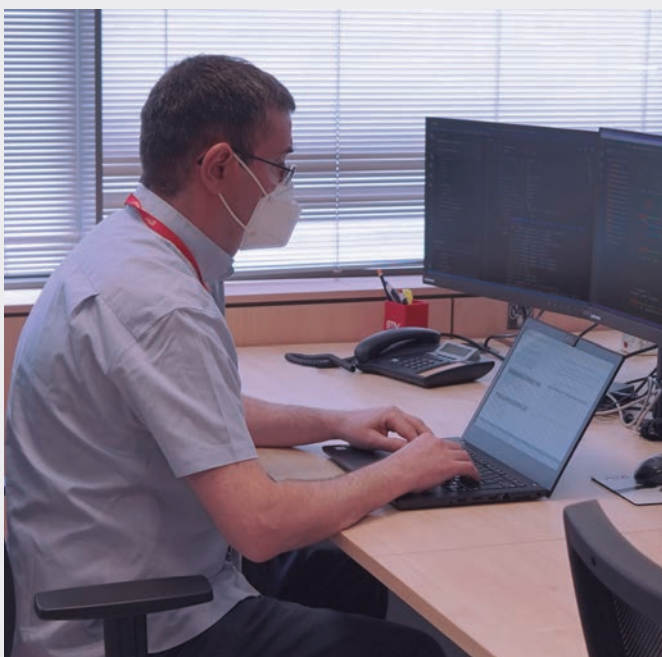
Leticia Rodríguez de la Peña
Travel department

The new situation sparked off by this crisis has spelled a change in my personal and professional life. The members of my family have been converted into 24-hour-a-day workmates and this has called for a big effort, since there are rather a lot of us.

Teleworking is a splendid option for extraordinary situations like the one we are currently living through. It helps to reconcile our home and working lives, cutting down the stress level and solving the timetable problem. In my case, however, my home internet connection is not as good as my office one, and I miss above all the interpersonal relation with my workmates.
The working routine has been a stiff challenge. All events and meetings began to be cancelled and suddenly the real driving force of our work, traveling, was shut down completely. Arranging cancellations and reimbursements involved a lot of red tape.

The frenetic rate of our department has been reined back considerably. Any trip is now exceptional and calls for much more dedication and control than beforehand. The general chaos reigning in airline companies didn't help, stoking up consternation and confusion among would-be passengers and we sector professionals who received contradictory information.

During this time we have learned to accept this exceptional situation with the best grace possible. No matter how traumatic it got, we just kept thinking about getting back to our normal routine, albeit with new sociability norms and protection measures.

Cristina Hernández Tomás
People Strategy & Culture department

One of the things this pandemic has shown us is humankind's adaptability. The first lockdown weeks were hard but we soon got used to it. The biggest challenge for me was the blurring of borders between the personal and professional life, previously so clearly demarcated in space and time.

Professionally speaking, there were already many remote-working options. We at the People Strategy & Culture department have continued to bring in budding talent on the basis of our "candidate experience" strategy, i.e., a stress on warmth and flexibility throughout the selection and induction process, making candidates feel safe and secure.

The lessons I take from this stage are the importance of communication based on transparency and immediacy and nimble decision-making, two essential elements that have enabled us to adapt to the circumstances.

The lockdown has also changed our way of looking at teleworking. For that reason I now see feasible a mix of remote and on-site workers. This has enabled us to be more competitive and strike the right balance between professional and personal lives.

What this experience has taught us, in my view, that that what really unites us is not physical proximity but the will to stay in contact.

Carlos Jesús Moreno Robledano
IT department

As for most people this whole situation was new for me and I'm still getting used to it. I've got three kids and reconciling working life with home life is difficult but working as a family team underpins the whole thing.

As for my career, from early March GMV's IT team has been working nonstop against the clock. One thing might be to set up teleworking for a staff of 200 but 2,000 is quite another picture. The day-to-day situation has changed radically. GMV is running a huge variety of projects with a wide range of different requirements. Finding solutions for each one is a real daily challenge. But, once more, team working has won the day.

Let's look at the positives. Now I have more contact with people outside my department than before the pandemic. The widespread use of Microsoft Teams has brought us all closer together from the distance. On a personal level I've been able to spend more time with my kids and we hold daily video calls with my family.

I sincerely believe that teleworking is here to stay. It's too soon to venture a guess about how this crisis will pan out but the spadework has been done and we'll have to adapt ourselves to more changes in the future. It's not all black and white and I see us as all living in the "gray" area, some days a bit blacker, others a bit whiter.

Marco Donadio
Automotive department

Adapting to this new situation was not easy at first due to the lockdown circumstances themselves, but in my case it was a bit easier because I take part in volunteer projects and this gave me a justified reason for leaving the house.

On a personal level this situation has been really tough. I work in Barcelona but I'm Italian, so I've been permanently worried about the healthcare-emergency news from my country. Fortunately, all my relatives, friends and acquaintances are fine. The most eagerly awaited moments of the day were the video-calls with my wife's family from Japan in the mornings and my family from Italy in the afternoons.

GMV's response to the crisis was swift and efficient; a business-continuity plan was set up right from the start, so the change to teleworking was practically seamless.

Although I miss my GMV workmates, I maintain daily contact and I'm sure we'll soon be able to see each other face to face.

We've learnt a lot from this new experience, mainly because teleworking has turned out to be so efficient, offering greater flexibility in our personal lives. It even represents a positive opportunity for disabled persons who find it harder to get to work physically.

I believe teleworking to be a going trend for the future, because it has shown itself to be such a valuable option both for the firm itself and its workers.

Mar Andrés López
Information Systems and Communications department of Homeland Security & Defense
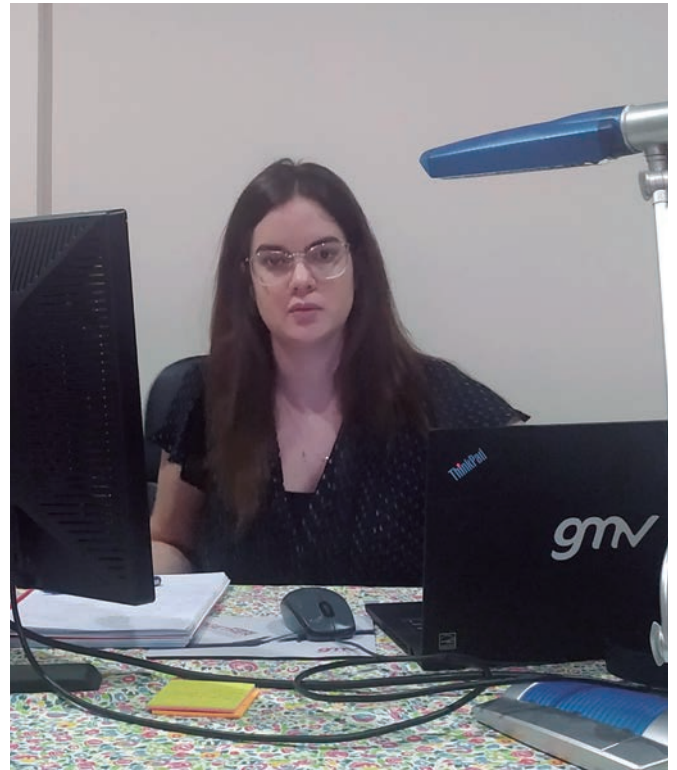
I've only just recently joined GMV's GMV-SED/SCIS/ISTAR department. I rate very highly GMV's effort to keep on taking in new recruits in such a complicated situation.

My first working day was Monday 16 March, which I believe to be the first day that teleworking was brought in by the company. It was a strange situation. The offices were empty. My line boss was there to receive me, however and give me the first crucial instructions for starting on my tasks and setting up remote contact with my new workmates.

In the first week I was able to hold project induction talks with my line boss and some experienced colleagues. We had clear daily goals and held periodical meetings, making it possible for me to express any doubts and make any suggestions.

As for the future working trend, I'm sure that new methodologies have been forged in this period and are here to stay once normality returns.

To sum up, teleworking has shown itself to be a valuable option when necessary and for any other emergency that might happen in the future, hopefully not as exceptional as this one.

Roberto García López
Cybersecurity Incident Response Center of Secure e-Solutions

I've adapted pretty easily to this new situation we are all living through. Despite the difficulties, I've tried to turn the situation to good account, carrying out activities I don't usually have time for, like reading, studying, signing up for courses, etc. Without doubt the biggest complication was living far from family and friends, although, thanks to the new technology, we've managed to keep in touch daily.

In our case client communications have remained very good. The empathy and mutual concern generated throughout the lockdown have kept up our professional communications with clients and even added a personal touch.
In all this lockdown period the performance of the systems department has been paramount as well as all those departments and persons that, in record time, managed to set up homeworking for a huge number of workers.

The most positive feature for me has been the ability to continue my professional activity as normal. The adaptation capacity shown by GMV and its workers to a situation strewn with difficulties has been fundamental and will remain so in the future.

In my opinion teleworking and the new technologies are going to be increasingly taken up from here on. In this new scenario information security will have to play a key role in companies and the workers will have to get ready to use new tools with all due guarantees.

Jonás Gómez Suárez
Customer Support & Maintenance department of Intelligent Transportation Systems
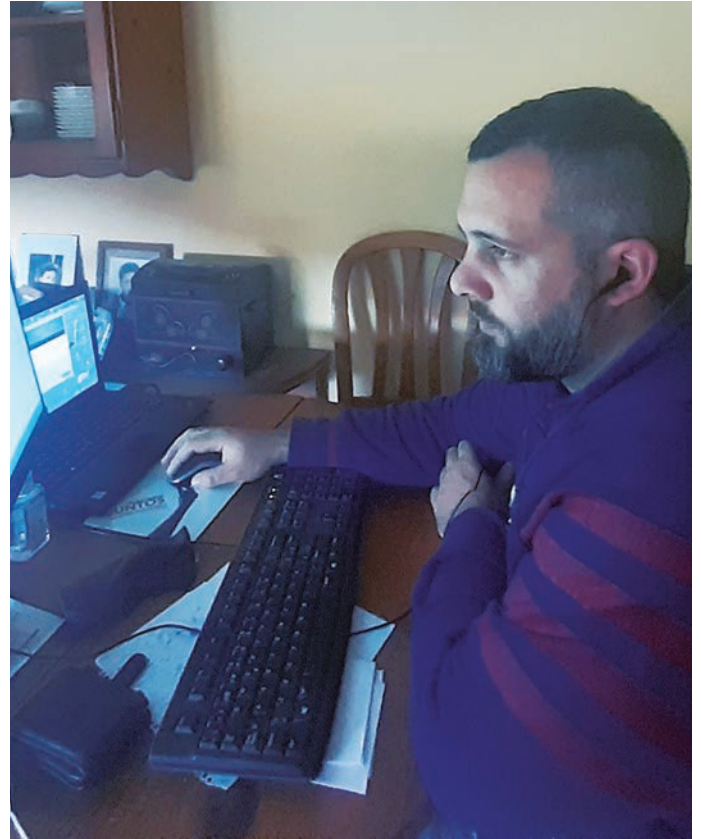
Weeks before the lockdown was enforced, forewarned by events in other countries, we had been trying out the system to prepare for home working. In my case, and other colleagues who had traveled a lot, it posed no great problem, accustomed as we are to teleworking from hotels or the client's premises.

All the tools we already used in GMV were honed during the lockdown to ensure due protection of client platforms remotely accessed from our homes. Some colleagues have even gone so far as to set up a lab in a room of their home, probably with quite a few difficulties in some cases. But despite all these problems the possibility of meeting up quickly without having to be physically close enabled us to solve all daily issues as they came up. Communication with all my colleagues is a crucial part of customer attention in our team and this proved to be no impediment.

In this new stage I have learned to carry out my work without having to commute to GMV every day, something I've never done before. The healthcare crisis has been incredibly trying but it has shown us that distance is no impediment to efficient working. Even so, contact with colleagues, however it may be achieved, is essential.

Pedro González Gancedo
Projects department of Intelligent Transportation Systems

Life is an action-packed adventure, and I'm lucky enough to be able to share it with the person I most admire, my wife Cristina, and with our six children (ages ranging from nine months to nine years). My wife's full-time dedication to the family has made it easy for me to reconcile the job with my home and children. Even so, daily problems do crop up, giving us the chance to decide what really matters and forget about the chaff. In other words, to live simply.

It has also been a splendid time for us to live our Catholic faith and explain to our children the value of working as a team for the family's common good over and above individual interests.

Teleworking has actually been a pleasant surprise for me. My own impression is that we are more concise in meetings. There are fewer spontaneous interruptions, which seemed beforehand to be inevitable. The speed with which a teleworking team for so many people at once has been set up impressed me no end; it works pretty well and problems are solved quickly. That said, I do miss going for a coffee with my workmates; now going for a coffee means blundering into a school lesson. It's hard to get used to.

But apart from all this, if this telework-favoring situation should continue, I foresee various consequences: these would range from prioritizing task-based instead of time-based working to relocation of the relations between companies and employees.

Kevin Grant
Software Engineering department at GMV SYNCROMATICS

Adapting to this situation has been tough. At first it was difficult to work with all the uncertainty and fear surrounding this global situation. Now I find learning how to stay focused while not letting work take over personal time has been my main challenge.

In Los Angeles we have had a stay-at-home order since about the middle of March. GMV SYNCROMATICS was already working from home a couple of weeks prior to this. The team here is good at communicating. We have weekly social video calls that really help everyone keep in touch.

One challenge during this time was troubleshooting a large LED sign model we install at bus stops. Due to limited supply, few developers have these devices with them at home. Our team came up with a quick solution for debugging the software and monitoring the sign remotely from our office by webcam.

The major positives during this time have been strengthening our team's ability to work remotely and communicate asynchronously as well as enjoying more personal time with family. My partner works night shifts as a nurse and has had COVID-positive patients for two months now. Having the work flexibility has helped me cope with her situation.

Through this situation I feel that working from home will be more widely accepted. I enjoy seeing my colleagues in person though. At GMV SYNCROMATICS we have a great Office Reopening Advisory Committee that is currently trying to define our "new normal".

Pedro Fernandes
Global Navigation Satellite Systems department of Aerospace

Nobody prepared us for this situation; no procedure whatsoever. In the end, however, a common-sense approach of safeguarding all of us while maintaining the ability to work was guideline enough. Fending off chaos, each and every single one in GMV managed to strike that fine balance to ward off a potentially troublesome situation, but we couldn't have done so without the full support of the company.

Of course this has put the work/life balance at risk, with these two competing in the same space. For sure, all of us have come up with different arrangements to solve this situation but in the end, it requires sacrifice and resilience to essentially live with it. But for some of us this also brought the possibility of family meals, the sorely-missed after-dinner chats and no traffic jams (thank you Corona).

But even if we are, as I heard from one of our colleagues, "becoming attached to our pyjamas" we have kept up our commitment, our professionalism, whether a at home or in the office, because we take pleasure from what we do and this is why all the teams, and particularly the one that I belong to, gave short shrift to this challenge.

The future will pose challenges and I'm sure GMV will be up to it, since GMV starts with the person working right next to us, and even if we're not "here" at the moment... we are ready for it.

Rachel Jenkins
Satellite Control and Mission Planning department of Aerospace

It's definitely strange not to be in an office environment every day but other than that the work load has carried on as normal; this has helped me to maintain some sort of routine at home, so the adaption to this new way of working hasn't been too difficult.

The measures adopted in the UK to deal with the COVID-19 pandemic have been quite similar to other European counties. GMV took the appropriate measures for dealing with it right from the start. Employees of the UK office were instructed to work from home in the week before the UK government issued the same advice to companies here to do so.

It is quite impressive how quickly GMV's IT department was able to roll out the tools to facilitate remote working. Having the telework option has been an integral part of continuing to operate as a successful company during this time.

I think when we finally come out of this pandemic some of the guidelines issued during this time will be continued in the long-run. One of the possible outcomes is that a lot more companies will be open to remote working. Potentially we'll see a move towards less air travel for work as well with so many in-person meetings, successfully conducted via a videoconference During this time a lot of the international conferences were cancelled and with some moving online as an alternative, so that might be also a continued trend.

GMV business (almost) as usual

Even though COVID-19 has hogged the headlines during these troubled times, most of GMV's products and services have continued to be successfully delivered to their customers.

With its eyes firmly set on the safety of its staff and its ongoing commitment and responsibility to its clientele, GMV has managed to keep its projects going and hit the deadlines along the way. Whether by remote working or with in situ support and assistance, some projects are running to schedule while others have even been brought to successful completion. GMV has also continued to win new contracts while commissioning and marketing new services precisely to meet new pandemic-induced needs.

Aeronautics

ANS Finland swells the *MagicIFP* client portfolio

■ Finland's air navigation services provider (ANS Finland) has contracted from GMV a 15-month use license of *MagicIFP*, thus becoming, after ENAIRE, the second user of this service and the first one abroad.

The development of this product, offered by GMV to its customers as a Software as a Service (SaaS), is fruit of GMV's ongoing COTS development strategy over recent years, in great demand in the air-navigation and airport markets.

The *MagicIFP* service allows air navigation service providers (ANSPs) to carry out GNSS-based instrumental procedure validation tasks as recommended by the ICAO (International Civil Aviation Organization) in a rapid, efficient and affordable manner.

In the case of ANS Finland, the use of *MagicIFP* enables it to carry out the validation of up to fifty EGNOS-based approach procedures for implementation in Finland and also offer this service to their own clients in other countries.

After the first weeks of using *MagicIFP*, ANS Finland has hailed its user

friendliness, the cutting down of validation times, detailed knowledge of models and calculations made and the capacity of generating reports automatically.

After this first international sale GMV continues to upgrade this service and contact other ANSPs to boost its user community.

Aeronautics

GMV helps Peru's air navigation provider to inspect its radio-aid systems

■ CORPAC S.A., Peru's air navigation services provider, has recently procured calibration equipment with *Emil*, GMV's inhouse system for ground inspection of ILS and VOR radio aids.

To guarantee correct calibration of the Instrument Landing System (ILS) and VHF Omnidirectional Radio Range (VOR), CORPAC needs to carry out far field ground testing procedures as laid down in ICAO Document 8071 (MANUAL ON TESTING OF RADIO NAVIGATION AIDS). To facilitate these ground calibration activities, CORPAC has bought from Rohde&Schwarz compact portable equipment with processing software based on GMV's *Emil* solution.

GMV's solution is capable of automating ILS and VOR reading configuration and processing tasks, cutting down the calibration time and reducing the operator's workload. Additionally, *Emil* enables systematic processing of readings, automatically reporting results. Furthermore, to be able to guarantee repeatability of calibration activities, this solution provides the operator with waypoints on a ground map. This comes into its own when maintenance activities are nocturnal.

GMV helps to integrate drones into the airspace

■ Together with Everis Aeroespacial, GMV is co-leading the SUGUS project (Solution for E-GNSS U-space Service), which aims to speed up the takeup of GNSS and Galileo by Unmanned Aerial Vehicles (UAVs).

SUGUS will help to develop services geared towards the effective integration of drones in the airspace. A series of trials will be held to show the benefits of E-GNSS for drone operators as well as their approval by aviation authorities.

To be able to develop these drone-integration services, SUGUS will center on the Open and Specific flight categories.

Once the results of all prior E-GNSS projects have been reviewed, SUGUS will identify operators and providers' needs and define a new E-GNSS-based Application Programming Interface (API). The project is also scheduled to carry out several flight tests in complex environments. The overarching idea is to raise awareness and contribute towards drone standardization and regulation in order to maximize the chances of the proposed services being implemented as a U-space service.

SUGUS, within the European Union's R&D program, has a 485,000 euro budget and will be carried out over 18 months by a consortium also involving VVA Brussels, ESSP, FADA-CATEC and Unifly.

Space

GMV to provide the satellite control system of the Egyptian operator Nilesat

■ Thales Alenia Space, serving as prime contractor for the satellites, has awarded GMV a contract for development and supply of the operations center for Nilesat's N201 and N301 satellites.

Nilesat is a Cairo-based Egyptian company that operates many communications satellites, including N201, already controlled with GMV software.

For the updating of N201's control center, and the phasing in of support for N301, GMV will develop and install all the following: the real-time telemetry and command processing system based on *Hifly®*; the flight dynamics system based on *FocusSuite* plus the ground equipment control and monitoring system, *Magnet*. Other inhouse GMV systems to be provided under this contract are *Flyplan*, for

operations planning and automation; *CentralLog*, pooling the events of the various subsystems; *FlexPlan* for mission planning; *Smart Rings*, the payload reconfiguration management system and *SmartHz*, the link budget computing and capacity management system.

To meet these new technological challenges, Nilesat has turned once more to GMV and its advanced technological solution, which will help them personalize their satellite operations with the highest degree of dependability, security and automation.

The geostationary satellite N301, based on the Spacebus-4000B2 platform and scheduled for launch in 2022, will provide direct-to-home television, radio and data-transmission services for the Middle East and North Africa.

Image courtesy of ESA

GEOKOMPSAT-2B reaches its GEO orbit thanks to *FocusSuite* and GMV's support

■ Bang on schedule, on 18 February, the South Korean Aerospace Research Institute, KARI, successfully launched its new satellite GEOKOMPSAT-2B (GK2B). Just as with the companion mission GK2A, GMV has provided for GK2B the flight dynamics system for the Launch and Early Operations Phase (LEOP), based on its inhouse *FocusSuite* product. GMV has also supplied operational support engineers.

There is, however, a significant difference between the support for GK2A, launched back in 2018, and the GK2B support, which ran up to mid-March. At the moment of the launch South Korea had only a few COVID-19 cases but the whole population was on alert. The number of cases began to soar just when the mission kicked off, although the main focus of infection was a long way from the zone housing KARI's operations center.

As well as social-distancing and hygiene measures, KARI set up thoroughgoing operations-center access-control and registering measures. On-site working hours were trimmed to the bone, and part of the posted GMV personnel's in situ support was rendered from the hotel they were staying in. Even so, thanks to the protection measures and the painstaking approach of the KARI operations colleagues, plus the ongoing support and monitoring of team GMV from Tres Cantos, the work was successfully completed on time.

Space

ESA awards GMV the Juice mission-control-system contract

■ ESA's European Space Operations Centre (ESOC) in Darmstadt, Germany, has signed a contract with GMV for development and subsequent maintenance of the Juice Mission Control System (MCS), taking on responsibility for tracking the spacecraft and control operations within the ground segment.

The European Space Agency (ESA)'s Juice mission is due for launch on an Ariane 5 rocket from the European Spaceport in French Guiana in 2022. It will reach Jupiter in 2030, carrying out a 3-year stint of planet and satellite observations.

This contract reinforces GMV's number-one position as satellite control system supplier not only for ESA (for which GMV is supplier for most of its earth observation missions, as well as planetary exploration missions like Bepi-Colombo and Solar Orbiter) but in general within Europe's institutional market (where GMV is

also supplier of the Galileo control center for the European Commission and of Sentinel-3, MTG and EPS-SG for EUMETSAT). This leadership in the institutional market matches GMV number-one position in the worldwide market of commercial satellite operators.

Es'hailSat to take control of the Es'hail-1 communications satellite using GMV technology

■ Es'hailSat has awarded GMV a contract for operations control of the communications satellite Es'hail-1 from multiple sites operated by Es'hailSat.

The satellite, launched back in 2013 as fruit of collaboration between Eutelsat and the Qatar company ictQATAR, is currently being controlled by Eutelsat also using GMV technology. Built by the US company Space Systems/Loral on a 6000 Kg LS-1300 platform, the satellite is equipped with 32 Ku-band transponders and 14 Ka-band transponders.

Under this contract GMV will be responsible for all the following: supplying the satellite control center; developing and implementing the real-time telemetry and command

processing system, based on *Hifly®* and also the flight dynamics system, based on *FocusSuite*. GMV will also be supplying *Flyplan*, for operation automation and planning, *CentralLog*, which pools all the events from the various subsystems and

Smart Rings, the payload reconfiguration management system.

With a useful life of 15 years the satellite offers TV broadcasting services, business communications and data on the Middle East, North Africa and Central Asia.

Space

Satellite surveillance, tracking and monitoring during COVID-19

■ Since 2016 GMV has been running Spain's Space Surveillance and Tracking Operations Center (S3TOC), rendering a service to dozens of EU satellite operators in redundancy with a similar center in France. Right up to the time of writing, the service has managed to keep up the same level of quality thanks to the use of secure S3TOC access networks for remote operations, showing the center's high degree of robustness.

Since 2014 GMV has also been running the precise orbit determination service for the Sentinel satellites of the Copernicus program. The service is hosted in the GIGAS cloud, meaning it can be run from anywhere; since mid-March GMV's team has been carrying out its activity in teleworking mode. A new improved-performance version of the system has even been rolled out recently, since when the latest developments, cloud validation and subsequent operational deployment

have all been carried out by teleworking. Since the start of the crisis GMV has also kept up normal running of Focusoc, the satellite conjunction detection service and the extended space catalog of man-made objects of the 18th Space Control Squadron (18 SPCS), which GMV has been offering since 2018. The system is completely automated; the few manual tweaks the system has needed since March (generally due to problems with entry orbit formats) have been easily performed remotely.
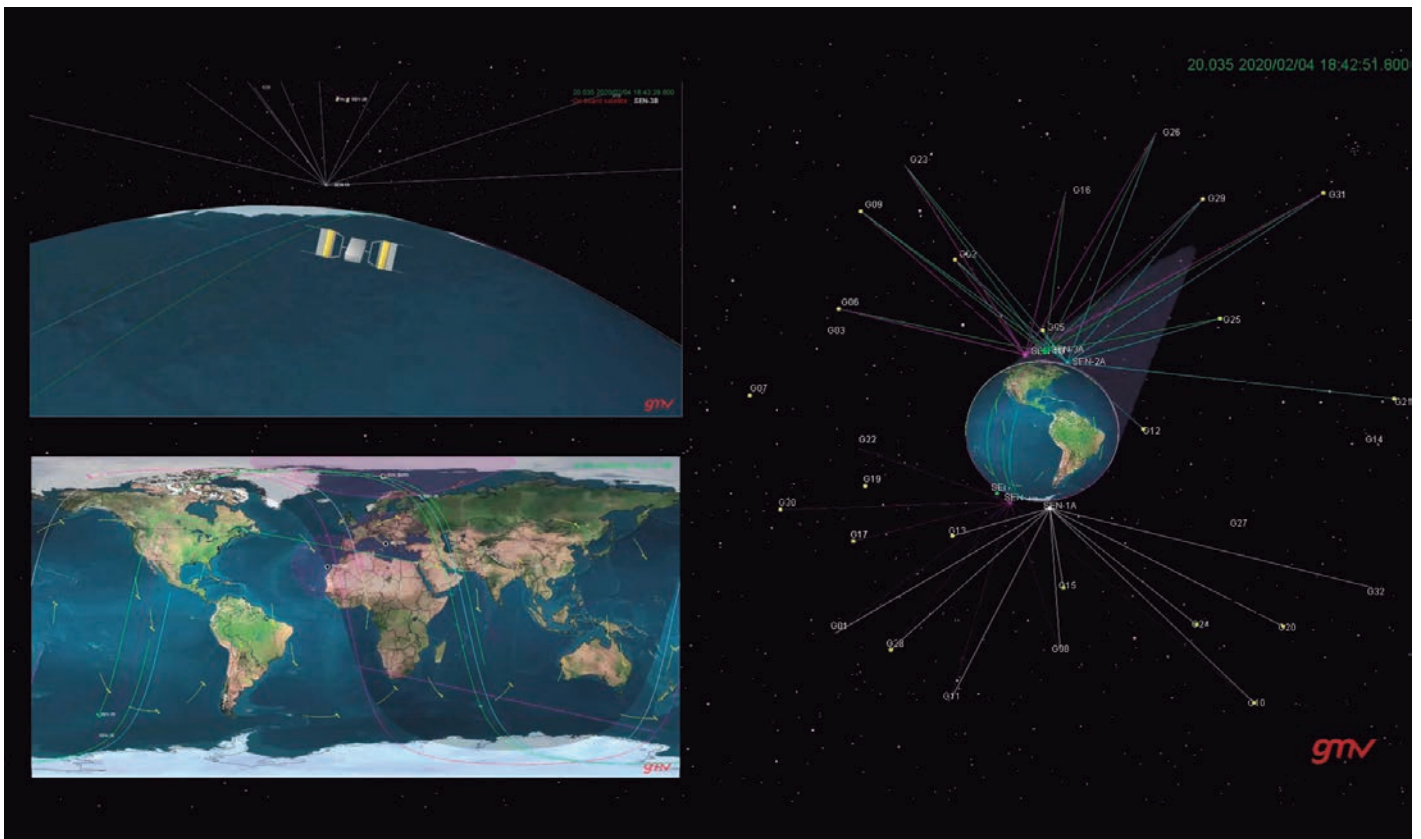
GMV moderates one of ESA's Asteroid-Day sessions

■ On 30 June 1908 a 40-meter-diameter asteroid hit the Russian region of Tunguska, felling trees over an area of 2100 square kilometers. It was the twentieth century's biggest asteroid impact.

The UN-brokered Asteroid Day, now held every year on this date to mark the event, aims to raise public awareness

of asteroid strikes and the threat they represent to the Earth, and talk about the current asteroid-monitoring programs.

This year the European Space Agency (ESA) organized specific Asteroid-Day sessions in various countries. Mariella Graziano, director of GMV's Space Systems and Robotics Department, moderated the Spanish session held on 26 June.

Guest speakers from both Spain and Europe included popularizers, scientists, astronomers and experts studying the fascinating science of asteroids and meteorites and trying to gauge the risks they pose. An astronaut was on hand too to explain why we should be more aware of the potential hazard of Earth-orbiting asteroids.

Space

GMV leads Spain's contribution to the EU's SST program

■ As part of Spain's Space Surveillance and Tracking (SST) program the Industrial and Technological Development Center (*Centro para el Desarrollo Tecnológico e Industrial*: CDTI), dependent on the Ministry of Economics and Competitiveness and responsible for representing Spain in Europe's SST program, has awarded GMV several contracts that take in activities of varying types within the program.

The first activity consists of a study of advanced orbit propagation methods for future implementation in Spain's Space Surveillance and Tracking Operations Center (S3TOC). A second activity seeks to enhance S3TOC's security procedures, both physical and logical. The third activity involves the development of S3TOC product and data-visualization and analysis tools.
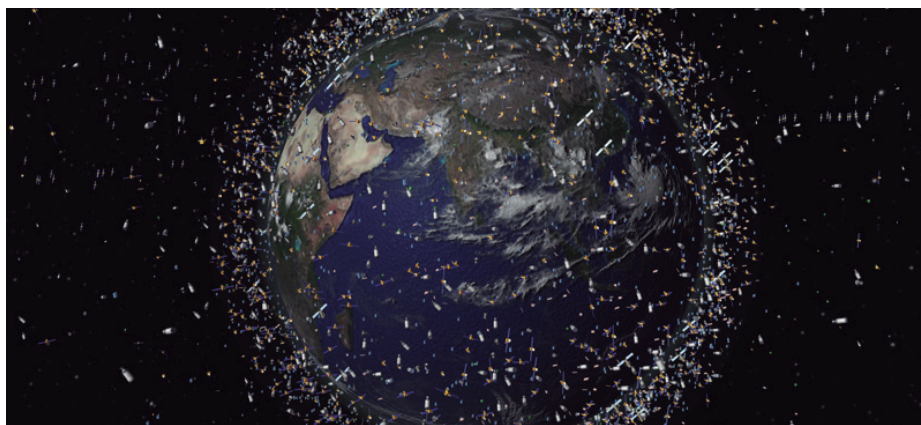
A fourth activity looks at advanced collision-risk assessment methods, analyzing hundreds of thousands of space-debris objects posing a risk now or well into the future. Finally, a fifth activity sets out to develop a passive ranging system for tracking operational satellites by processing the payload of a network of stations situated on earth.

All these activities, together with the S3TOC operations that GMV has been leading for several years now, win the company pole position in Europe's SST program.

GMV generates Galileo's high-accuracy corrections

■ Under the Galileo program the European GNSS Agency (GSA) has awarded GMV a contract for supplying the High-Accuracy Data Generator (HADG). The award came right in the middle of the COVID-19 lockdown, so the kickoff meeting was a teleconference held with the participation of more than 30 stakeholders from all EGNSS' institutions.

The High Accuracy Service (HAS) is an important step forward for Galileo, bringing another key differentiator to the GNSS table. The purpose of this particular contract is to design and implement the HADG processing facility, with the objective of supporting the first phase of the Galileo HAS. GMV will again be the key player, with responsibility for development of the new core element of a new service part of the Galileo portfolio.

As HADG Prime Contractor, GMV will be responsible for overall project

management, as well as for the key technical aspects of development and validation, including the core high-accuracy positioning algorithms

that will generate the HAS data to be broadcast through the Galileo constellation to the final users.

Space

GNSS Signal Quality Monitoring Solution for New Integrity Applications

■ In collaboration with the Telecommunications Institute (*Instituto de Telecomunicações*: IT), GMV has started to work on an ESA-cofunded GNSS signal-quality monitoring project for development of new integrity applications.

Signal Quality Monitors (SQMs) are usually implemented in GNSS integrity systems to monitor and detect the presence of signal deformations, the so called "evil waveforms (EWF)". EWFs are one of the usual satellite-related hazards that appear in safety analysis for GNSS integrity systems. Even though this aspect is very well covered for the aviation domain (e.g. EGNOS), there is still room for research in order to apply it to other sectors, and this activity will focus on the autonomous-driving use case, highly complementary to ongoing GMV activities.

To accomplish this objective, a platform will be developed to support the definition, study and performance assessment of SQM against EWF tailored to different use cases like autonomous driving, allowing the demonstration of its capabilities in exploring innovative, cost-efficient and flexible solutions for SQM. The objective of this development is then to cover the full process of SQM definition for the different use cases, including characterization of the problem, design and implementation of a prototype solution ahead of the development of novel products and services.

GMV participates in the development of a GNSS receiver for much more remote navigation

■ The European Space Agency (ESA) has awarded GMV the contract for study and development of a high sensitivity receiver, the goal of which is to provide the EU space community with a new GNSS receiver suitable for operation beyond the Space Service Volume (SSV) of GNSS constellations, i.e. outside of the ideal "shell" of space where the orbits of most of the GNSS satellites are confined.

This application poses formidable difficulties because any receiver placed on a space vehicle outside the SSV can exploit only marginally the capabilities of the GNSS constellation, whose satellites aim their beams mainly towards Earth. The receiver will therefore have to work on extremely low-level signals derived from secondary lobes of the GNSS SVs' antennas, and most often broadcast from satellites orbiting over the opposite face of the Earth but not falling in its geometrical shadow. These contrived conditions, dramatically reducing the number of available signals, have hampered hitherto the development of a suitable GNSS unit.

Under this project a system study will be conducted on the use of multi-constellation GNSS signals for Earth-Moon missions completing previous studies, confirming feasibility, assessing achievable performances and identifying a preliminary architecture with possible enhancements/augmentation to existing GNSS constellations. It will also involve the development and testing of a space-borne GNSS receiver (target TRL5) that might be used in future demonstrations missions to gather data and support further system activities.

Image courtesy of ESA
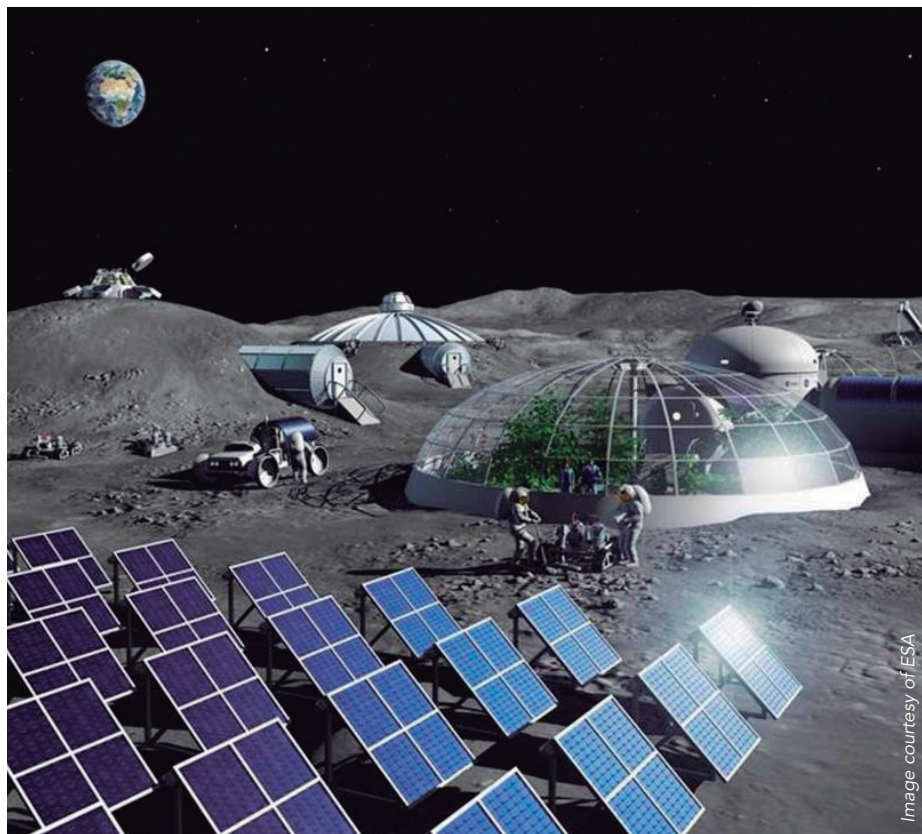
Space

GMV carries out the safety analysis of all phases of the Space RIDER mission

■ In collaboration with Avio, GMV has carried out the analyses of launch safety, orbital phase and atmospheric reentry of the European Space Agency (ESA)'s Space RIDER (Space Reusable Integrated Demonstrator for Europe Return) mission.

Space RIDER is a spacecraft whose first phase coincides with a stage of VEGA-C-like launchers. After carrying out its operations in orbit it will perform a controlled atmospheric reentry.

From the safety point of view the Space RIDER mission represents a stiff challenge for ESA. This is the first ever mission in which a spacecraft has to perform a controlled reentry for reuse in at least 5 subsequent launches. Some very strict requirements have therefore been established.

As well as the intrinsic risks of any launch vehicle, such as activation

of the pyrotechnic systems in the vicinity of the control center, several critical risks have been established for Space RIDER, from the point of view not only of the threat to human life but also to the environment.

Mitigation and contingency actions have been established for the identified risks to ensure a successful launch, its space mission, recovery on earth and reuse for the next launch.

Image courtesy of ESA
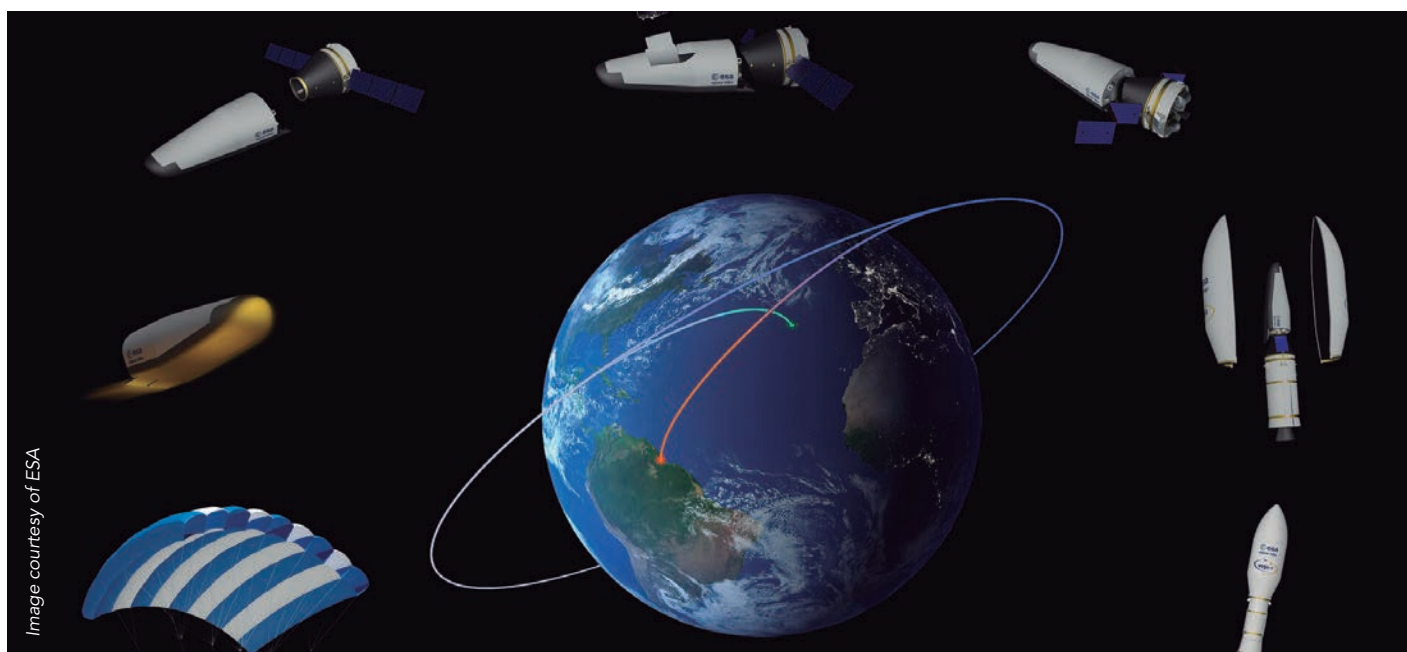
GMV applies artificial intelligence techniques to the characterization of space objects

■ GMV is carrying out the LIGHTCURVES project for the British Defence Science and Technology Laboratory (DSTL), involving the processing of space object's light curves using artificial intelligence techniques.

Light curves are graphs that show the brightness of an object over a period of time. They are used by optical telescopes to record luminosity variations in stars or asteroids as a way of discovering new planets. The idea in

this case is to use light curves coming from artificial space objects to detect patterns that help to identify and characterize them, ranging from their ATTI mode to their structure and the orientation of the various components, such as solar panels and antennae.

The project's main challenge is the shortage of correctly characterized training data, a sine qua non of techniques of this type. The solution opted for in this project is to develop

a simulator capable of generating light curves on the basis of a completely characterized satellite, just as a telescope would do. This simulator will generate a sufficiently broad training dataset for training up the artificial intelligence algorithms. To validate the process GMV is working with the consultancy firm Beechleaf and the Space Insight telescope. The last phase of the project will consist of a demo of how the algorithms work in an operational configuration.

Space

GMV studies the viability of applying AI to autonomous navigation systems

■ The European Space Agency (ESA) has awarded to a GMV-led consortium a study that aims to provide an autonomous navigation system for space exploration based on artificial intelligence (AI) algorithms.

The AI algorithms pose different challenges of processing performance and capacity, especially for electronic systems that have to withstand such a hostile environment as open space. The high-frequency algorithms necessary for autonomous landing on another planet or the moon, critical in character, add a further difficulty to the mix.

This project will analyze and assess the applicability of AI to avionics, focusing on the relative visual navigation system with image processing in very low lighting conditions. The study will look at applicable AI techniques in the field of guidance, navigation and control and shortlist the most promising ones for a relative visual navigation system applicable to different use cases. The project will also develop a COTS-based hardware demonstrator to reach a TRL4 maturity level.

As subcontractor GMV will be working in this project with the collaboration of the Irish firm Ubotica Technologies and the UK's City University of London.

Sustainable development driven by GMV's geolocation and remote-sensing technology

■ On 13 May 2020 the first workshop was held of the Measuring, Reporting and Verification for Cocoa agroforests (MRV4C) project, an online encounter with local users attended by several organizations of the Dominican Republic plus representatives from ESA, the World Bank and GMV.

MRV4C, funded by the European Space Agency's Centre for Earth Observation (ESA-ESRIN), is a GMV initiative in favor of sustainable development. Its remit is to design a monitoring system capable of assessing several different parameters to enhance the cocoa sector's value chain, helping to achieve the "zero deforestation" goal in the Dominican Republic.

GMV's work focuses on meeting stakeholders' needs by designing, developing and demonstrating a solution based on satellite- and ground-data, using geolocation systems, remote sensing technology and machine learning.

The project is expected not only to drive socioeconomic development around the Dominican Republic's payment-by-results program but also to help in the fight against climate change, in line with the REDD+ program (reducing emissions from deforestation and forest degradation), which promotes the creation of a national forest monitoring system on the basis of Monitoring and Measuring, Reporting and Verification (M&MRV) tasks.

MRV4C is supported by the World Bank, the Environment and Natural-Resources Ministry of the Dominican Republic, the Agriculture Ministry and DR Cocoa Foundation.

Space

Oil&Gas: monitoring infrastructure and pollution from Space

■ For the fifth year running GMV has been awarded renewal of the satellite-based infrastructure and environment surveillance service for an important oil and gas company trading in the Middle East.

Medium and high spatial resolution optical satellite imagery is used by this service, which provides near-real time satellite change analysis for infrastructure, land use, land cover and pollution with a repeat frequency of 30 days.. This enables users to give better information to fire emergency responders: Early detection allows for early reaction.

The analysis should help the day-to-day management of Oil and Gas operations by providing situational awareness through monthly updated maps of the area of interest, together with geoinformation reports highlighting the most important findings and also quantifying, measuring and classifying the changes. Examples of the type of changes being detected are: the identification of potential encroachment areas, new pipelines, new buildings, excavations, oil spills, etc.

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

ADE passes its Critical Design Review (CDR)

■ On 18 May, in videoconference mode, the ADE Critical Design Review (CDR) was carried out. The purpose of this review was to set out the detailed project design, take stock of its current state and the state of the software in the pipeline plus prototypes. The work

carried out in the final project phase was also included in the review, as well as the final design document and final definition of testing scenarios.

The ADE OG10 project, led by GMV and involving 14 European partners, is one of the 5 projects selected for European-Commission funding in the second phase of the space robotics Strategic Research Cluster (SRC), the European Commission's biggest H2020 robotics program. This project aims to develop and test a rover capable of obtaining opportunistic scientific data and

performing long-range journeys (building up to 1 km in under 6 hours).

The videoconference was attended by consortium partners of each project as well as the European Commission's technical expert and PSA representative to weigh up the final result.

After passing this review the project moves on to the next development phase, which will see the start of implementation and integration of all developed technology, leading on in turn to the Test Readiness Review (TRR).

Defense & Security

EDA and GMV sign a Framework Contract for the provision of "Cyber Defence Capability Development Services"

■ GMV, in a Consortium with CINAMIL (the Research Centre of the Portuguese Military Academy) and VEDETTE, have initiated a series of challenging Cyber Defense activities to support the Agency in the concept development and requirements formalization for projects and other EDA initiatives.

The first activity involves the establishment of Cybersecurity requirements in the defense supply chain risk management process. This task will be complemented by the development of a dashboard that will demonstrate the risk management approach.

The second activity tackles Electronic-Magnetic Warfare (EMW) and Cyber Defense Convergence. In fact, some military authorities now consider EMW and Cyber Operations to be so closely aligned and synergistic as to merit the coining of a new term: Cyber-Electromagnetic Activities (CEMA). The activity sets out to review and analyze 'state of the art' research outputs and industry offerings to establish a technology baseline and propose suitable technical requirements.

Cyber range exercises fall into the serious games category, where the main goal is to train individuals in how to protect a simulated computer infrastructure. The use of AI in Cyber Defense exercises constitutes an advanced topic that is being analyzed in commercial and military areas; this will result in more realistic and effective exercise sessions.

Addressing this groundbreaking area, the last activity will define a set of requirements for an optimal used of AI in Cyber Defense exercises, as well as to provide a set of recommendations to improve the way Cyber Ranges can execute AI-based exercises in future work.

A new intelligence, surveillance and reconnaissance milestone

■ In mid-May the Critical Design Review (CDR) was held of the project for development of a CORE-type mountable computer interface for cooperative Electronic Support Measure (ESM) operations.
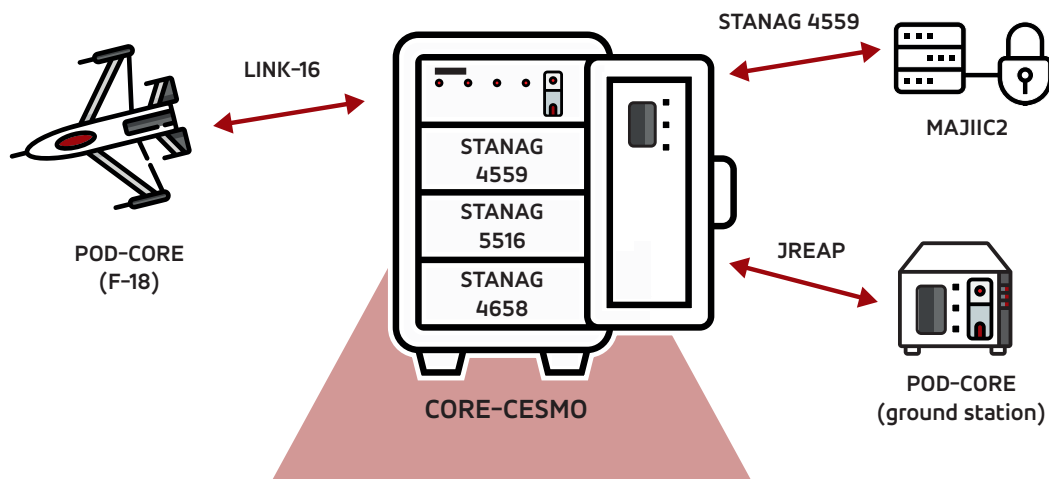
The objective of this project is to supply a system for exploiting Link16 track information and information from the new electronic warfare pod of the Spanish airforce's F-18, dubbed CORE (short in Spanish for "Electronic Recognition Operational Capability").

The system will be able to operate both from land and onboard a new aerial platform for a Signals Intelligence (SIGINT) mission, such as a C-295.

This milestone event ushers the project into the system-component development and integration phase. The development phase in turn will culminate with the qualification tests to be held in CLAEX. Here it will be put through its paces to check, among other functions, the correct integration of the system with the communication

components of the F-18, the ground station of POD-CORE and a MAJIIC2 network.

GMV's system will pick up ESM tracks from different sources, then performing fusion processes and generating messages for Cooperative ESM Operations (CESMO) under the interoperability standard STANAG 4658. Thanks to the use of this standard the MoD's systems can be integrated into multinational missions with sensors and processing nodes of allied countries.

LINK-16 — POD-CORE (F-18)

STANAG 4559 — MAJIIC2

STANAG 4559
STANAG 5516
STANAG 4658

CORE-CESMO

JREAP — POD-CORE (ground station)

Defense & Security

Further progress in implementation of Spain's industrial strategy for the NGWS/FCAS program

■ On 16 June GMV took part in the signing of the General Action Protocol between the Ministry of Defense and the companies delegated to lead the various technology pillars of the Next Generation Weapon System (NGWS) project, included within the concept of the Future Combat Air System (FCAS). GMV is co-leader in Spain of the remote operators technology pillar.

The remote operators technology pillar focuses on the development of new technologies and assessment of new concepts, doing so in coordination with NGWS/FCAS's new manned combat aircraft, based on a set of unmanned vehicles, some of them with ISTAR observation capability.

The signing of this Protocol with the Ministry of Defense represents a new step forward in the implementation of Spain's industrial NGWS/FCAS strategy, aiming at becoming a full member bearing the same weight as Germany and France.

The ceremony, presided over by the former Secretary of State for Defense, Ángel Olivares, was attended by the Airforce Chief of Staff, General Javier Salto; the President of the State Society of Industrial Participations (*Sociedad Estatal de Participaciones Industriales*: SEPI), Bartolomé Lora Tora; the Secretary General for Industry and SMEs, Raúl Blanco Díaz and the Secretary General for Innovation of the Ministry of Science and Innovation, Teresa Riesgo Alcaide.

For GMV the document was rubber stamped by Jesús B. Serrano, its CEO.

The NATO-CSD project enters its development and integration phase

■ Last December the NATO-CSD project successfully passed its Critical Design Review (CDR). This milestone completes the design phase and takes the project into the development and integration phase.

The NATO-CSD project, awarded to GMV in March 2019, consists of the design, development and deployment of NATO's intelligence dissemination system. All the deadlines to date have been hit bang on schedule. During this current phase two incremental versions have been shared through the agile methodology, plus associated technical documentation.

Scheduled for June is completion of the development of the CIPL (CSD ISR Product Library) and CISS (CSD ISR Streaming Services) components with the proposal too of a Candidate Product Baseline (CPB), which will be put through several tests: factory tests (FT), integration (SIT), security (SecT), acceptance (SAT) and finally NATO's independent verification and validation (IVV) tests.

Once the software has successfully come through its tests it will generate the approved, NATO-authorized Product Baseline for rollout in various sites of its command structure, scheduled for early 2021.

Defense & Security

DRIVER+ project. Response to Europe's current and future crisis-management challenges

■ After more than five years of work, DRIVER+ project comes to a successful end in June 2020. Moreover, sustainability being one of its main objectives, it has also achieved a number of important results for the future use by the Crisis Management community.

DRIVER+ is an ambitious pan-European project tasked with supporting the capability development of Crisis Management (CM) organisations, promoting and testing new, science-based improvements in Crisis Management. The project's scope includes:

- The promotion and trialing of advanced technologies and other CM solutions in realistic scenarios; the development of a scientifically-based evaluation methodology (The Trial Guidance Methodology supported by the Test-bed Technical Infrastructure).
- The development of the Portfolio of Solutions.
- The building of a broad, cooperative information-sharing practice community

(Crisis Management Innovation Network Europe – CMINE).
- The establishment of a network of Centres of Expertise to sustain the project's outcomes.

At a number of Trials staged throughout Europe, specialist Crisis Management teams have trialed a diverse range of different solutions under realistic conditions. A key requirement for Crisis Management solutions is the capability of creating and sharing a clear, integrated, dynamically-updated Common Operational Picture, doing so under the pressure

of multiple incidents, communications disruption and multi-national deployments and using resources with maximum effectiveness.

The lessons learned from these Trials, held in Poland, France, the Netherlands and Austria, are helping Crisis Managers identify innovative life-saving and community-protecting technologies and approaches.

Among other project tasks, GMV has been involved with the Trial 1 solutions (Poland) and the Final Demonstration.

Cybersecurity

Cyberthreats likely to affect Spain's health system during COVID-19

■ Phishing is on the rise in Spain, especially attacks exploiting the COVID-19 pandemic. GMV's cyberthreats intelligence team, which is on the constant lookout for any malicious activity, warns that "between 60% and 70% of threats use

social engineering as their entry vector, taking advantage of human weakness and inquisitiveness, need of information, fear of COVID-19 or an altruistic urge to help out."

Spain's health system is a very attractive target for cybercriminals. Health-service providers, pharmaceutical and insurance companies and health centers all hold between them a huge amount of data on people's health, plus information on the development of new drugs. If stolen, this data could impinge directly on patient care, the privacy of clinical test participants, industrial propriety or even reveal the professional-association

membership number of a medicine-prescribing doctor.

For this reason, Juan Ramón Gutiérrez, threat intelligence manager of GMV's secure e-Solutions sector, argues that "if the main aim of all healthcare personnel is patient-protecting asepsis, taking in both persons and healthcare material, then in any globalized and totally digitized society, there would also be an obvious concomitant need for asepsis too in the healthcare information systems". This is especially the case, he goes on, "in the current moments of healthcare crisis that increase the vulnerability to attacks of various types".

Cybersecurity

GMV provides an Express Forensic Check for remote access systems

■ Cybersecurity incidents are on the rise. Spain, according to recent reports, sits sixth in the listing of countries that have suffered most coronavirus-related attacks. Cybercriminals are exploiting the increase of our online personal and professional activities.

The COVID-19 pandemic has forced many firms to set up remote access for their employees to guarantee business continuity. There is a risk that this hasty rollout might have introduced some vulnerabilities into the remote-access systems.

To cope with this new situation GMV is now offering an express security check (*Diagnóstico Exprés de Seguridad*) with the aim of providing security experts with a rapid security check (reporting back in only 5 days) of remote-access systems. It focuses on an identification of the most important vulnerabilities, particularly VPNs and Virtual Desktop Infrastructure (VDI).

Two reports are delivered by the system: firstly, a mid-check report to speed up the remedy of any detected vulnerabilities plus a final report including all vulnerabilities found and giving improvement recommendations.

Cyberattacks have a worldwide cost of 600 billion dollars a year. Any prevention measures, such as a security check, serve as a barrier to possible input vectors and help firms prepare better for the future.

Cybersecurity: risks and strategies in the hospitality sector

■ The hospitality sector is one of those most severely affected by the lockdown. To find out the current situation and come up with solutions and strategies for galvanizing its activity again, the Hospitality Technology Institute (*Instituto Tecnológico Hotelero*: ITH) has held the webinar "Cybersecurity: risks and strategies in the hospitality sector".

During his speech at this event Joan Antoni Malonda, Tourism Business Developer of GMV´s secure e-Solutions sector, pointed out that, even though

the healthcare sector had registered the greatest increase in cyberattacks up to now, cybercriminals are only waiting for the hospitality sector to reopen its doors to launch new attacks exploiting tourism marketing campaigns.

GMV's advice, in this juncture, is to have a good digital security strategy in place, guaranteeing protection of the company's infrastructure and systems through measures such as pentesting, secure Wi-Fi, perimeter security, data protection, secure cloud access and design-up security "SecDevOps".

Furthermore, this "new normality" has forced many organizations to set up teleworking systems, with the concomitant risk of introducing vulnerabilities into the remote-access systems, particularly in VPNs and VDIs, making it necessary to carry out security checks to flag up any threats.

Lastly, Malonda agreed with the rest of the participants in the importance of employees' cybersecurity training and awareness-raising, in view of the fact that employees are often the weak link in the security chain.

The radiotherapy planner, a great step forward in the IORT-based treatment of colorectal cancer

■ Colorectal cancer is one of the most frequent tumors, its prevalence and incidence growing continually both inside and outside Spain. Prevention measures based on early diagnosis and control of onset risk factors are crucial. Once diagnosed, surgery accompanied with chemotherapy or external or intraoperative radiotherapy is the best way of tackling it.

Mayo Clinic boasts unmatchable experience in dealing with both the primary colorectal cancer and the advanced recurrent carcinoma. This worldwide benchmark clinic has shown that application of intraoperative radiation therapy (IORT) outperforms external radiotherapy in terms of local control at 3 years and the global survival rate over this same period of time for patients with locally advanced tumors.

Moreover, if the radiation oncologist can plan the dose to be administered with an IORT planner like **Radiance™**, then he or she can provide personalized treatment, adjusting the precise radiotherapy dose to suit each patient. GMV's inhouse planner, in the words of Professor Pedro Lara, chair-holding oncology professor at the Universidad Fernando Pessoa and director of the Canary Cancer Research Institute (*Instituto Canario de Investigación del Cánce*r), offers two main advantages: firstly, "the extreme precision in treatment administration, and secondly, the possibility of reliably recording the administered treatment, which might be extremely useful in the future".

**Radiance™** is a unique and groundbreaking IORT planner with features developed by GMV.

Artificial intelligence for the treatment of neck- and low-back pain

■ As industrial leader and technology partner, GMV has taken part in the webinar "Artificial intelligence in Healthcare", promoted as part of the awareness-raising activities of the European project "Personalised Prognostic Models to Improve Well-being and Return to Work After Neck and Low Back Pain (Back UP)", coordinated in Spain by the Valencia Biomechanics Institute (*Instituto de Biomecánica de Valencia*).

Javier Téllez, Smart Health specialist of GMV's Secure e-Solutions sector, offered a paper explaining the contribution of the **Antari Home Care** telemedicine platform to the Back UP Project, which sets out to design a prognostic model to improve the treatment of neck- or low-back pain. This model will be based on the digital representation of multidimensional clinical information, and in-silico assessments of possible interventions (simulations, modelling, experiments or analyses carried out with computational prediction and simulation algorithms). Machine learning will also be applied to obtain data-based evidence from clinical information of a varied nature arising from different sources.

Low-back pain, according to a 188-country study published in the British medical review The Lancet, is the leading cause of incapacity worldwide, defined as the pain that prevents most people from carrying out their daily.
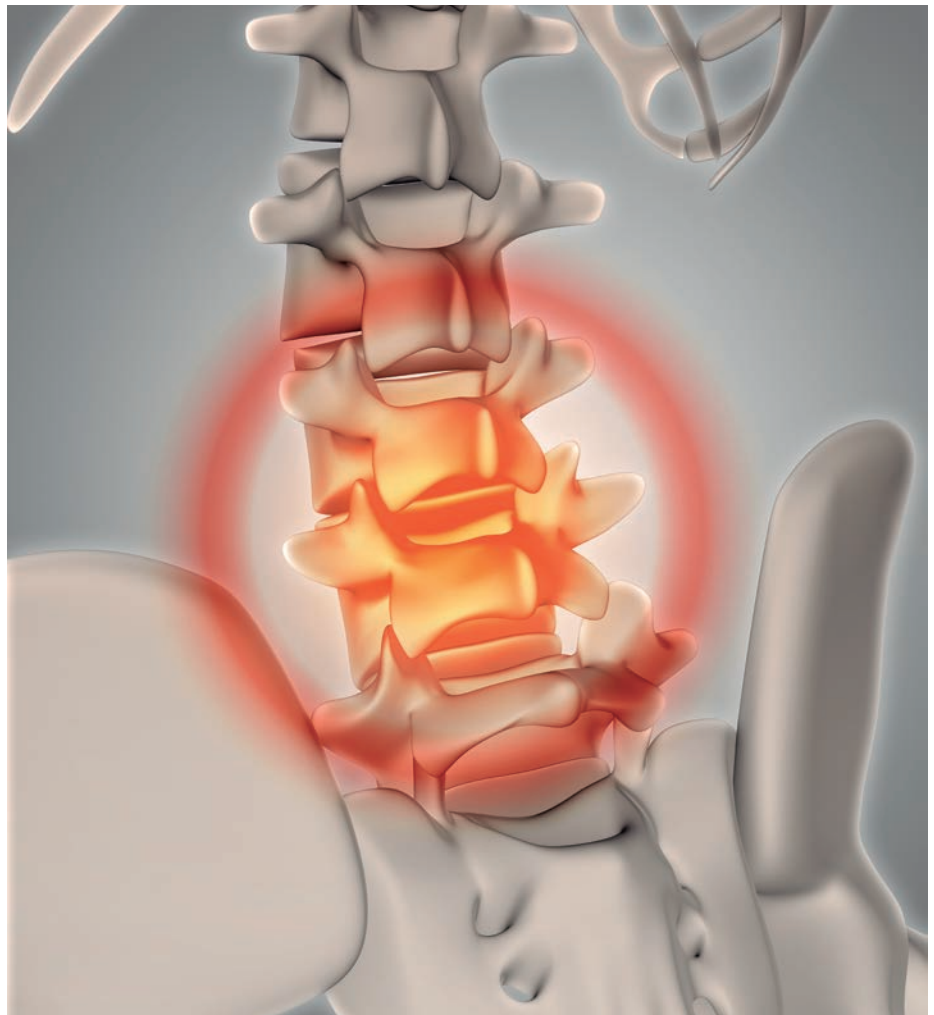
Healthcare

GMV's *Antari* platform helps in the fight against COVID-19

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

Antari Home Care and *Professional* blends conventional primary-healthcare practice with specialized remote medicine and home healthcare. GMV's platform also facilitates organizational aspects such as resource management and tracking, healthcare planning and appointment management. This whole package facilitates remote diagnoses and the sharing and management of clinical information in a responsive and intuitive way.
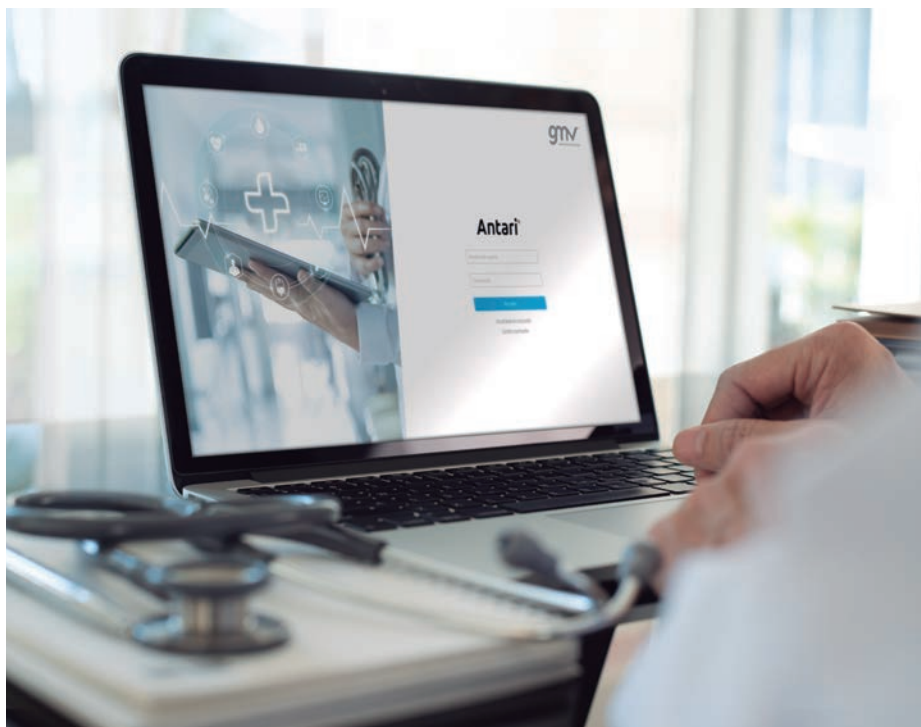
With *Antari Evidence*, moreover, GMV provides healthcare authorities with a clinical- and epidemiological-data-mining platform to help pre-empt future spikes of the virus. It also offers specialists a fund of information to improve diagnoses and decision-making on the strength of a wide range of AI-exploiting data.

ITS

GMV renews Zaragoza tramline's fleet management contract

Zaragoza's tramline (*Tranvía de Zaragoza*) has renewed GMV's maintenance contract of its fleet management system.

Supply of this system, equipping 21 URBOS tram units of the rolling-stock manufacturer CAF, was initially awarded to GMV back in 2009 and had been fully and successfully rolled out for the tram-operating company by 2011.

This fleet management system is made up by two onboard units connected up to an information terminal in each cab, acting as human-machine interface. The fleet management system feeds off various positioning systems (GPS, odometer readings and trackside balise readings), affording both precision and reliability for daily control of the tramline.

The fleet management system also interacts with other onboard systems, such as the passenger information system, the ridership counting systems, the route requesting system, the onboard diagnosis system, among others. The fleet management system obtains information from these systems in real time for control-center display, thus providing vital running information.

After initial rollout *Tranvía de Zaragoza* had no hesitation in turning to GMV again for maintenance, with two-yearly renewal thereafter. Under this contract preventive in situ maintenance tasks will be carried on the trams to ensure smooth running and carry out any corrective maintenance that may prove necessary.

ITS

Renewal of the all-in maintenance contract of GMV's CRTM systems for Avanza

■ GMV provides maintenance of the onboard fleet-management and ticketing systems of Madrid region's transport vehicles. The all-in maintenance contract for Avanza's fleets within the Madrid Regional Transport Consortium (*Consorcio Regional de Transportes de Madrid*: CRTM) has now been renewed.

The maintenance is based on daily in situ corrective maintenance in all the bus garages of Getafe, Coslada, Pozuelo and Collado Villalba to deal with all incidents recorded by control center operators on

GMV's maintenance website, as well as preventive tasks or checks on all fleet vehicles.

Avanza's control center is located in Getafe, from where the whole fleet is controlled.

The fleet management system is made up by a real-time positioning system, a passenger information system by means of a panel with recorded announcements, voice communications and a video surveillance system.

This system is also integrated with GMV's ticketing system for uploading configuration data, downloading onboard sales info, automatic bus-stop passing time recording and sending messages back and forth from the control center.

Both the sales data and the vehicle positioning data are recorded by a central server to generate reports presented by the operator to the *Consorcio de Transportes de Madrid* for processing.

GMV wins in Poland the maintenance contracts of the fleet-management and passenger-information systems

■ In March 2020 GMV won the tender held by the Gdynia Public Transport Authority for the post-warranty maintenance services of the urban-transport fleet-management system and the dynamic passenger information system.

GMV will take on maintenance of the central fleet-management software plus the auxiliary applications of the onboard equipment in 340 public transport vehicles. Each onboard set includes the

M20 onboard industrial computer, driver's TFT touch screen console and TLP (Traffic Light Priority) radio.

Together with the twin system operating in Gdańsk, the company is responsible for the efficient operation of Tri-City's integrated fleet-management systems, as well as sets of onboard equipment in public transport vehicles and displays at the stops. GMV will be responsible for maintaining the system until the end of 2021.

Under an agreement concluded with Warsaw Trams, the country's biggest tram carrier, GMV is responsible for maintenance of onboard geolocators in 530 trams plus the provision of vehicle GPS to the purchaser's control centers.

The company has also signed with the Municipal Transport Company in Nowy Sącz (MPK Nowy Sącz)a one-year post-warranty control-center maintenance contract, also taking in the onboard equipment for the public-transport buses.

ITS

GMV is awarded a new ecodriving project for Grupo Avanza's Portillo fleet

■ GMV has won the project for enlarging Grupo Avanza's ecodriving system to take in 180 additional vehicles of the Portillo fleet, bringing a total of 700 Avanza vehicles under the same system.

The project is part of the company's ongoing quest to cut CO_2 and NO_2 emissions. It also seeks fuel savings on the strength of eco driving and higher passenger satisfaction.

ITS use also allows monitoring of driver behavior on the basis of certain key indicators. This data is obtained from connection with the can bus and the sensors built into the onboard equipment.

At first GMV fitted the ecodriving system in Grupo Avanza's Portillo fleet. After the fine results chalked up by the training and monitoring model, in

which GMV actively collaborated, Grupo Avanza decided to expand the model to the fleets of Madrid's Regional Transport Consortium.

One of the upgrades phased into the Portillo model was a new graphic interface showing drivers their real-time evaluation. As an additional complexity the project adds on the number of client departments involved.

GMV to supply Castellón de la Plana's urban transport fleet management system

■ The company Kapsch TrafficCom Transportation S.A.U., contract holder for maintenance of the traffic light systems, of the urban mobility control center and renewal of the urban public transport fleet management system of the city of Castellón de la Plana, has just signed a contract with GMV for the company to set up a fleet management system for the 41 buses run by the city-transport operator ACCSA (*Autrotransportes Colectivos Castellonenses S.A*).

The whole system will be made up by the following components:

- Onboard REC30 devices for sending the vehicle's position, voice- and message-communications between the driver and control center and presenting the driver with regulation information.

- TFT screens and onboard PA indicating the vehicle's progress along its route and broadcasting selected messages from the control center and publicity images.

- Control center for managing services and correcting any service irregularities.

- Information to waiting passengers, calculated and published by the

control center, shown to the waiting passengers by:
- Bus-stop information panels. Adaptation of the 28 existing panels and supply of 10 new ones, to be carried out by KAPSCH.

- City council smartphone APP.

- City council SMS server.

- Web application supplied by GMV.

The project, which kicked off during the COVID-19 lockdown, is due to come on line by the end of September.

ITS

Contract award for fitting ITS equipment to CMC XXI's new 50-bus fleet in Malta

■ The company CMCXXI, through its subsidiary Malta Public Transport, has recently ordered 50 buses from the manufacturer Turco Otokar, due to arrive in Malta in late June.

GMV will fit these buses with an onboard fleet-management system, a fare-collection system, a passenger information system and a CCTV system. All these systems will be digital and state-of-the-art, thus renewing part of Malta's Public Transport's fleet.

GMV's fleet management system gives users timetable information and informs the firm of any incidents that might crop up during the service.

The ticketing system has a dual function of ticket vender/validator. It both prints and reads QR code paper tickets, recharges and validates contactless cards, acts as message console for the fleet-management system and organizes the buses' inside and outside information panels.

This modernization process has also phased in new farecard functions such as credit traveling and the intelligent wallet, capping the daily, weekly or monthly fare depending on the user profile. Lastly, inspectors have been issued with 15 handhelds for reading contactless farecards and giving out onboard fines for any infractions.

Trains of the Egyptian company ENR to run with several GMV systems

■ Talgo has awarded GMV the contract for the development and supply of several of the systems to be fitted in the Talgo trains to be supplied to its Egyptian client ENR, with a total of six 15-car self-propelled units.

On these trains GMV will be setting up the PA and intercom systems, the video surveillance and the specific diagnosis capture system for Talgo.

Talgo is drawing on GMV's experience in projects like Haramain (Mecca–Medina), where the company has also supplied these systems with interfaces in Arabic.

The PA and intercom system is based on digital technology with analog redundancy by means of a UIC bus. The system supplied comprises public-address systems to be fitted with individual loudspeakers in each car; the voice-input points enabling the crew to make passenger announcements plus an intercom between onboard personnel and help-request devices set up strategically throughout the whole train.

The video surveillance system or CCTV is designed to supervise events occurring on the train. It is made up by a digital video recorder (DVR) that records all images of onboard cameras, plus a monitoring station and system interface with onboard personnel for real-time display of any camera at any time.

The last system supplied, called Mobile Communication Gateway (MCG), will capture diagnosis information and transfer it to ground for supervision by maintenance personnel.

ITS

GMV renews for 3 years the fleet management contract for Madrid's towing trucks

■ The towing-truck fleet of the Madrid Municipal Transport Firm (*Empresa Municipal de Transportes de Madrid:* EMT) has renewed for three years GMV's maintenance contract for the fleet management system.

EMT not only provides the service of removing vehicles from the public thoroughfare, at the behest of the competent authorities, but also takes them to municipal depots where their owners then have to make due arrangements for picking them up. This dual service is offered under a fleet management system set up by GMV, containing cutting-edge hardware and software components that require regular maintenance to work smoothly. EMT has therefore decided to turn again to GMV for the maintenance of its fleet management system up to 2022.

The 78-vehicle towing-truck fleet works from four sites or bases and a control center where all resources are centrally managed.

The maintenance agreement involves both hardware and software. Hardware maintenance is a three-monthly preventive system with specialists carrying out corrective work in EMT's Madrid sites as necessary. Software

maintenance, also preventive and quarterly, deals with all incidents on a priority basis.

Maintenance also includes a yearly pool of hours for engineering upgrades.

GMV participates in the upgrading of Transports Metropolitans de Barcelona (TMB)'s telemetry system

■ In early 2020 the Barcelona Metropolitan Transport (*Transports Metropolitans de Barcelona*: TMB) company, keen to upgrade the mobile material telemetry system of its metropolitan buses, once more placed its trust in GMV's great experience. The main goal of this telemetry system is monitoring the bus's energy and mechanical information (engine, gearbox, air conditioning, suspension, steering, batteries, etc), thus allowing TMB to improve system

operation processes and fleet maintenance.

GMV has recently run a telemetry pilot scheme for TMB's nine electric buses, which served as a trial run for this system. This allows information to be obtained directly from the vehicles' onboard automotive systems, by means of a connection to the vehicles' Can bus. The information thus obtained can be stored, processed and sent to the rest of the systems using the onboard

bus network now fitted on all fleet buses.

The onboard bus network is made up by diverse onboard information systems, including several developed by GMV in previous collaborations with TMB to cater for certain onboard bus functions.

This new collaboration corresponds to the second phase of the telemetry system's onboard development roadmap, taking in an extra 200 buses.

ITS

Cyprus Public Transport chooses GMV as its main ITS supplier

■ The company Cyprus Public Transport has been awarded by the Ministry of Transport, Communications and Public Works of the Republic of Cyprus two of the most important bus-operating concessions: namely, those of the districts of Nicosia and Larnaca.

Cyprus Public Transport has turned to GMV as the main supplier of onboard technology for the new buses to be run under these concessions.

The upgrades for this 300-bus fleet include an onboard video-surveillance system on every bus. For this purpose

the buses will be fitted with an onboard video recorder and at least four IP cameras. The recorded images will be stored for the maximum 15-day period allowed under Cyprian law. It will also be possible to mark videos when an alarm button is pressed. These videos can then be downloaded by Wi-Fi upon arriving at the bus garage or through the GSM network when the download is more pressing. A two-way ridership counting system will also be fitted on all bus doors so that Cyprus Public Transport can check on correct use of the fare collection system and preempt any fraud, while also obtaining more accurate demand information.

Cyprus Public Transport is a company made up by a consortium whose only international partner is Grupo CMC XXI.

Automotive & Mobility

The H2020 REMOURBAN project finishes after 5 years' work

■ The European REMOURBAN project's remit is to define and validate an urban regeneration model (URM) combining energy-, mobility- and ICT-activities to boost sustainability and the quality of life in European cities. The project's monitoring period has now been brought to completion and it has entered its conclusion phase.

As proof of concept various sustainability-boosting actions have been rolled out in Nottingham (UK), Valladolid (Spain) and Tepebasi (Turkey). The experience recorded was then drawn on to design replication actions in Miskolc (Hungary) and Seraing (Belgium).

GMV has participated in the design, implementation and monitoring of mobility actions, jointly with the City Council of Valladolid and Iberdrola. Electric and hybrid public-transport, last-mile distribution and professional

vehicles have been deployed in the Low Emissions Zone in the city center. The recharging infrastructure has been improved and renewed.

During this concluding phase the data recorded over the two years of monitoring in the three cities has been analyzed. These analyses show that the

hybrid and electric vehicles have clocked up a total of 2.5 million kms, achieving a net CO_2 emission saving of over 1000 tons and a reduction of necessary energy of nearly 2500 MWh.

The project will present the final conclusions in late June before an EC review in September.

Tourism in times of uncertainty
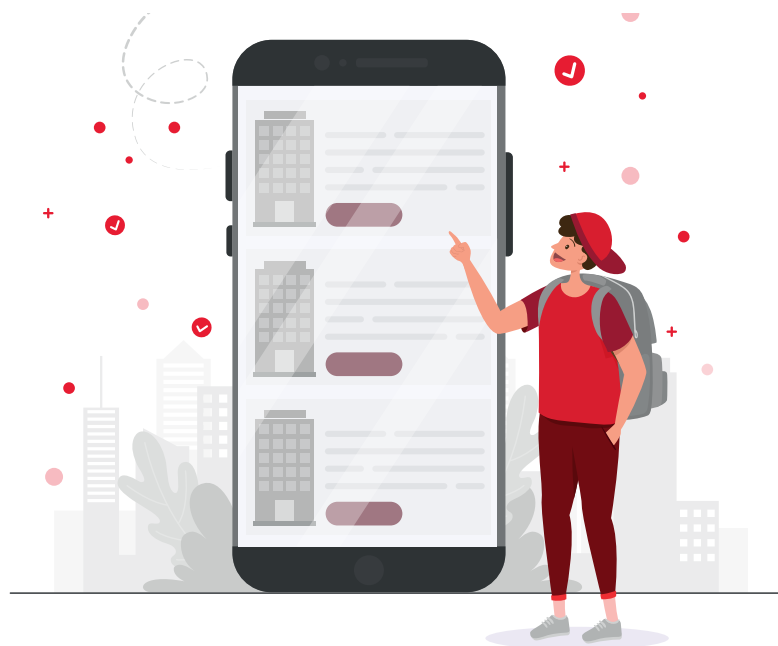
■ Tourism, one of the sectors hardest hit by the COVID-19 pandemic, is normally one of the main drivers of Spain's economy, accounting for 12% of the GDP and 13% of jobs. It is therefore now vital for it to pick up its previous activity as soon as possible.

To address the challenges now faced by tourism in these times of uncertainty, Digit-A has put on a series of webinars called DIGITurismo, with GMV's participation in the technology block.

There is no doubt that digitization and innovation are sterling allies in the pursuit of safe and secure hotels, where guests feel protected during their stay and have full confidence in the accommodation. During his participation in the debate, Joan Antoni Malonda, Tourism Business Developer of GMV's Secure e-Solutions sector, spoke about the need of working with touchless technologies that minimize guests' exposure to the virus, such as online check-in/check-out or automatic door opening. A key role here is bound to be played by big data and artificial intelligence applications, such as artificial vision for personal identification. Together with indoor positioning systems these could then offer a hot map for finding out who has been in a certain spot of the hotel, thus indicating the zones that need to be cleaned, which people have shared rooms and helping to keep occupancy to the new limits.

GMV and PIQL consortium, finalist in the ARCHIVER project Design Phase

■ Many research projects are currently struggling to preserve their data and associated products (metadata, software, documentation, etc), as the current archiving and preservation capabilities fall short of expectations for a number of research communities, while data stewardship costs are frequently underestimated during the planning phase.

The GMV and PIQL consortium, supported by AWS and Safespring, has been selected among 15 consortia to participate in the ARCHIVER Design Phase. ARCHIVER, co-financed by the European Commission and run by European Organization for Nuclear Research (CERN), has been specifically designed to fill this gap.

The consortium's solution, working with petabytes of data, will provide features for multi-cloud deployment (private, public, hybrid, community and special-purpose clouds), where final users will be able to choose the cloud provider best suited to their needs. The PIQL preservation layer built on top of Archivematica will also be enhanced.

Information preservation services will be provided too, while access and permission management against repositories and various collections will be supported by the Federated Identity and Access Management schemes. Finally, the advanced services capabilities will be obtained by reproduction of experiments and use of artificial intelligence based on machine-learning techniques for document-search and -classification tasks.

ICT

Open Innovation in times of crisis

■ Luis Fernando Álvarez-Gascón, President of the Innovating Companies Forum (*Foro de Empresas Innovadoras*: FEI), and CEO of GMV's Secure e-Solutions sector, moderated the online debate "Innovation in times of crisis" organized by FEI to swap notes and receive proposals and thoughts about the application of open innovation in the current context.

Open innovation proposes a model in which companies innovate not only with their own resources but also in collaboration with external agents. Witness the three schemes that various FEI members brokered in record time in the first moments of this healthcare crisis.

One of these is the coronavirus UCM project, which has succeeded in getting the necessary daily disinfection products to over 50 care homes and conduct 500 diagnostic tests (PCRs) a day. Another successful example of public-private collaboration was set up by two SMEs, Hersill and Escribano, together with various agents such as the Ministry of Industry, AMETIC and Grupo PREMO, which managed to increase the output of respirators tenfold. The Regional Authority of Madrid, in collaboration with organizations of Madrid's university, research and innovation system, set up the virtual Hackathon "Madrid beats the virus", achieving a hundred up-and-running projects with another 20 in the pipeline" to continue driving Madrid region's economy in agile mode in a life-saving endeavor.

uSpot, Automated Visual Inspection to streamline industrial processes

■ The Industry 4.0 paradigm is alive and kicking; the intelligent-manufacturing-enabling technologies are still evolving. In this context artificial vision is the most effective and groundbreaking smart and automated method for acquiring, analyzing and processing images. This technology is capable of offering high precision, great consistency and adapts perfectly to an already established production process, plus a whole range of extraordinary functions within an industrial digitization strategy. The GMV-developed *uSpot* solution provides more accurate site inspection to ensure manufacturing operations are working properly and the final products are flawless.

In any production plant there are many surface-transforming processes likely to contain defects or anomalies. As a solution to this challenge, *uSpot* analyzes products dynamically as they come along the line to carry out control checks and pinpoint any faulty components. *uSpot* facilitates an automatic analysis of the state of all types of mechanisms and systems to be used in production processes for detecting any faults or even anticipating them predictively. It doesn't stop with inspection tasks, however; it also uses context information to increase the precision and stability of the whole process.

Another of *uSpot*'s use scenarios is classification tasks, from raw materials to the finished product, to determine type and quality.

Our heartfelt thanks to all those who have been fighting in the front line against this pandemic, to all those who make us feel safer, to our clients, suppliers and those whose daily effort helps to bring this crisis closer to its end.

To all of you, many thanks for your work, effort, commitment and empathy!

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