

SPEKTRUM

SHARPER FOCUS ON INTERNAL AND EXTERNAL SECURITY

visAIRion – ADVANCED
LASER SAFETY GLASSES
FOR THE BUNDESWEHR

ESG AMONGST THE TOP 1 %
OF LEADING EMPLOYERS 2021



EDITORIAL

Spectrum I 2021

Stay focussed, seize your chances and shape a safer future: these are very good ways to describe what has made our company over the past decades – you could even say they are in ESG's DNA. Based on this business culture, we have been pretty successful in facing up to and overcoming the recurrent social, technological and competitive challenges that have rained down on us with ever increasing speed. This was, and still is one of our strengths in the face of the continuing pandemic. Which is why we continue to trust in our corporate strategy that is geared to sustainable, profitable growth and to resolutely sharpen our focus on the fields of internal/public and external security. Organisational changes, such as the acquisition of our subsidiary ESG Mobility by the Cognizant Group that took place on June 1, have been accompanied by the calculated

STILL ON COURSE FOR FURTHER GROWTH

We welcome reinforcements!

expansion of our service portfolio – for example for cyber security and IT security – in the aviation sector as a "commercial operator", as a "continuing airworthiness management organisation" or as a "training organisation" as well as the constant strengthening of our innovative strength and capabilities. Various examples of the outstanding potential, expertise and passion for technology of our employees, who have welcomed new members on their teams in the course of our growth process, can be found in this edition of our corporate magazine Spektrum.

We would like to wish you an interesting read and above all: stay healthy!

Your Christoph Otten and Dr. Mihaela Seidl
Management Team of the ESG



Christoph Otten
CEO of ESG Elektroniksystem- und Logistik-GmbH

Dr. Mihaela Seidl
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P-8A POSEIDON FLEET

ESG, Boeing and Lufthansa on course for cooperation

The contract has been signed: the German Navy will be strengthened by 5 maritime patrol aircraft of the type P-8A Poseidon from the USA. This means that when the P-3C Orion are decommissioned in 2025, long-range maritime reconnaissance will be safe up until 2035.

The contract concluded by the German Minister of Defence Annegret Kramp-Karrenbauer with her American partners includes the purchase of the aircraft including the necessary mission and communication equipment, the initial spare parts as well as accessories, ground testing equipment and special tools, a mission support system as well as technical-logistical support services.

Boeing, ESG and Lufthansa Technik had already given a green light for a cooperation agreement in June 2021 for potential support for the German fleet of P-8A Poseidon: they signed a memorandum of understanding (MOU) to develop opportunities for cooperation in the fields of system integration, training, maintenance and overhauls.

The signed MOU forms the basis for further negotiations on the goal-driven cooperation between the companies in connection with the procurement of the P-8A Poseidons for the Navy.

"Together with ESG and Lufthansa Technik, we will offer indigenous and cost-effective support, training and maintenance solutions that will bring the highest operational availability to the German Navy to fulfill their missions," said Dr. Michael Haidinger, the President of Boeing Germany, Central and Eastern Europe, Benelux and Nordics. "Our partnership with ESG and Lufthansa Technik is another testimony to who we are and how we operate in Germany. We are shaping meaningful and long-term industry partnerships that impact the local economy."

Boeing, ESG and Lufthansa Technik have identified opportunities to collaborate in a number of areas and will explore these in more detail, including training and simulation, cyber security, systems integration, certification, environmental compliance, communications systems, electronic attack and electronic protect systems, aircraft and engine sustainment, component support services, predictive maintenance analysis and logistics services.

"This cooperation agreement underlines once again that we take our responsibility as a company seriously when it comes to ensuring urgently needed capabilities," said Christoph Otten, CEO ESG. "As Boeing's strategic partner for the P-8A Poseidon fleet, we are pleased to be able to make the German Army a viable offer characterized by effectiveness, efficiency and the reliable delivery of services. As a long-standing partner of the German Army and Navy aviators, ESG stands ready with its proven core competencies, solutions, services and products, particularly in the areas of systems integration, aviation certification, and secure communication systems."

Lufthansa Technik has a long history in technical support of Boeing aircraft around the world. In addition, under Boeing's Performance-Based Logistics program, Lufthansa Technik also provides hardware support to the Italian fleet of Boeing KC-767A tankers and has facilitated outstanding aircraft availability for the Italian Air Force.

"Lufthansa and Lufthansa Technik have been partners with Boeing for more than 60 years. The companies know and value each other. This partnership is an excellent starting point for us to provide technical support at the highest level for this new aircraft for our long-standing customer, the German Army," said Michael von Puttkamer, Head of Special Aircraft Services, Lufthansa Technik.

The P-8A Poseidon is a unique multi-mission aircraft that can track down, and if necessary engage, the latest threat systems. An open architecture and digital interfaces allow the fast and low-cost integration of future technologies to meet the full range of constantly evolving mission requirements. The P-8A offers all of this with full interoperability with NATO's most advanced systems. Additionally, the P-8A offers significant capability to meet Germany's collective defence obligations as part of Germany's NATO membership and commitment to EU defence and security, including the maritime domain.



THE P3-C CREWS ARE READY FOR ACTION

Successful start of training for the German Navy



Ready for the next training sessions for
the German Navy in Florida



At the beginning of November last year, the American Department of the Navy commissioned the ESG subsidiary ESG Aerosystems Inc. to carry out pilot training for the German Navy under an international government agreement. Things got under way just one month later.

ESG Aerosystems Inc. is located in Starke in the state of Florida. Together with its strong partner MHD ROCKLAND Services, ESG Aerosystems Inc. has been performing the highly demanding task of ensuring that the flight crew of the maritime patrol aircraft are ready for action since last December.

Training includes both extensive theory units as well as intensive practical sessions, with the help of simulators and in the cockpit of the P-3C, so that all of the basic principles needed to issue the type rating necessary for the pilots are fulfilled in accordance with the stipulations of the German Military Aviation Authority. All of the teaching materials as well as the training content and procedures have been developed from scratch for the project in close consultation with the navy pilots as essential users, the relevant aviation authorities and the responsible clients according to the latest methods and standards.

EFFICIENCY AND EFFECTIVENESS are the hallmarks of the training

The German Navy currently has eight maritime patrol aircraft (MPA), stationed in the Naval Air Wing 3 "Graf Zeppelin" in Nordholz, Wurster Nordseeküste, Lower Saxony. Fitted with a number of sensors, the P-3C Orion is a powerful weapons system that can provide long-range reconnaissance and management support during armed service and alliance missions. In addition, they can be used for classic tasks such as maritime surveillance and against underwater targets. As things stand, the P-3C Orion will only be used for the various national and international deployment obligations up until 2025, when the P-8A Poseidon can be introduced as a suitable interim successor model for the German Navy, and until such time as a follow-up weapons system has been developed and is ready for use under the joint German-French cooperation project Maritime Airborne Warfare System, MAWS.

The ESG Group has once again taken charge of this special international cooperation project, which is aimed at efficiency and effectiveness, as a reliable partner for the German Navy, thus contributing to the successful accomplishment of its mission. Although official global restrictions resulting from the fight against the coronavirus pandemic have meant additional, unforeseeable obstacles for the project team on both sides of the Atlantic, the first crews have already completed their training and the next navy pilots have started training in Florida.

- 1 Joint success: the team of trainers and training participants
- 2 Leaving their mark: affixing the crew sticker
- 3 Formal handover of the training certificates

visAIRion

Advanced laser safety glasses for the Bundeswehr

With its development of laser safety glasses for the protection of aircrews, ESG underlines its performance as an innovation partner of the Bundeswehr

On behalf of the Federal Office of Bundeswehr Equipment, Information Technology and In-Service Support (BAAINBw), ESG has developed advanced laser safety glasses for military pilots and aircrews and has now received an order for series production.

In view of the increasing threat to flight safety worldwide in recent years due to the attacks of civil and military aircraft with so-called "laser pointers", there is an urgent need for action to effectively protect pilots and flight crew from laser radiation.

This applies in particular to helicopter crews, as they operate at relatively low altitudes and comparatively slow speeds. Powerful laser pointers, which can be purchased freely and cheaply on online marketplaces, pose a growing threat to air traffic both nationally and during missions abroad. The glare from a laser beam can not only cause organic damage to the eye, but also restrict the pilot's perception to such an extent that life-threatening flight conditions arise. This applies all the more to particularly challenging operations close to the ground, e.g. in low-level flight or during take-off and landing manoeuvres.

Laser safety glasses currently available on the market usually only protect against one or two wavelengths and display a strongly colour falsified image, which severely restricts their use in the cockpit or, under certain circumstances, makes them impossible to use. The limited light transmission of the available glasses does not allow flying in poor visibility or twilight. Furthermore, these glasses are not designed for use with helmets and helmet vision systems such as night vision devices.

From the very beginning, ESG developed the new laser safety glasses in close cooperation with the German Institute of Aerospace Medicine, the Bundeswehr Technical Center for Aircraft and Aeronautical Equipment (Wehrtechnische Dienststelle 61) and Helicopter Command, Operational Test Group KHT. They are currently undergoing final tests so that the newly developed safety glasses will be available in the coming year.

In this context, the following challenges had to be met by the ESG development team:

- » Ensuring broadband protection in several wavelength ranges while at the same time guaranteeing sufficient transmission for external vision in bad weather or night vision conditions
- » Ensuring permanent wearing comfort under the helmet with tight-fitting hearing protection

- » Enabling individualization or personalization through different frame variants with different frame sizes, temple lengths, shapes and materials (96 variants)
- » Ensuring optional upgrade with corrective lenses for spectacle wearers

The first laser safety glasses for combat helicopter KH Tiger crews will now be delivered at the end of the second quarter of 2022. In addition, the procurement of glasses for the crews of other aircraft types is currently being examined. Furthermore, the ESG team is taking into account the changing threat situation due to the possible attacks with ever new laser pointer models by continuously reviewing the protection spectrum and the optical properties of the laser safety glasses and, if necessary, developing them further in a targeted manner.



RADIO BASED COMBAT IDENTIFICATION (RBCI)

ESG experimental helicopter convincing during Timber Express 2021

ESG once again demonstrated its technical competence during the multi-national Timber Express 2021 exercise at the Tactical Air Wing 51 "Immelmann" in Schleswig.

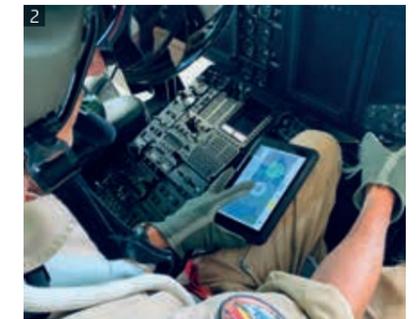


The performance demonstration in the Radio Based Combat Identification (RBCI) project focussed on not just other airborne and ground-based platforms but also the airborne demonstrator that ESG operates on behalf of the Germany Army together with the Bundeswehr Technical Center for Aircraft and Aeronautical Equipment (WTD 61) for research and technology projects, such as for advance developments or tests to accompany the developments. The Mission Avionics Test Helicopter (MAT) of ESG is used, amongst other things, to test complex systems – “hardware and software in the loop”. Infra-red camera systems that support aircraft management and sensor fusion in connection with display concepts as well as next-generation helmet vision systems, for example, are tested under operational conditions. The flight tests are carried out by test pilots and flight test engineers from WTD 61 and ESG.

During on Timber Express 2021, RBCI components were integrated into the modular test equipment of the MAT and successfully tested on the ground and in the air together with special German Army forces, who were also equipped with the RBCI system.

RBCI is an international, tactical, direct and radio-based search of a target area, including the effective range of a weapon directly before its use so as to avoid combating one's own troops. RBCI can also be used as a modular capability of armed forces for Digitally-aided Close Air Support (DaCAS) and "Future Soldiers". Within the scope of the concept study commissioned by Air Force Command, the MAT operated as a simulated combat helicopter, a GFD Lear jet as a fighter bomber and Special Forces Command (KSK) operatives with an H145M LUH SOF helicopter together with infantrymen from the German Army on the ground. The missions under near-operational conditions covered range tests, right through to coordinated Combat-Search-and-Rescue (CSAR) and Close-Combat-Attack (CCA) missions.

Apart from the successful demonstration of their performance, further ideas and concepts, particularly in connection with the many possible uses of the "Flying Test Bed MAT" could be discussed with national and international representatives of the armed forces involved during the exercise.



- 1 Part of the Timber Express 2021 exercise: ESG's Mission Avionics Test Helicopter (MAT)
- 2 Interoperability: communication from the cockpit
- 3 Comprehensive situational picture of the ground troops deployed

The high-ranking participants in Timber Express 2021, such as the Inspector of the Air Force, Lieutenant General Ingo Gerhartz, or his deputy, Lieutenant General Dr. Ansgar Rieks, listened to the suggestions tabled by ESG with great interest.

The next step to demonstrate the performance of the RBCI will be taken in November of this year on an extended international level during the BOLD QUEST 2021 exercise in the USA. The MAT was already in use in a subsequent flight campaign, during which the laser safety glasses for German Army helicopter crews developed by ESG were tested.

ESG DELIVER SEA FALCON TO THE NAVY

UAS for the K130 corvettes

The Federal Office of Bundeswehr Equipment, Information Technology and In-Service Support (BAAINBw) has concluded a contract with ESG as the main contractor for the procurement of three Unmanned Aircraft Systems (UAS), introduced in the Bundeswehr under the name "Sea Falcon", for the K130 corvettes of the German Navy.



With the implementation of the project "Reconnaissance and Identification in the Maritime Operational Area (AlmEG)", the corvettes' capabilities for imaging reconnaissance will be significantly expanded: in future, objects can be detected and identified with the Sea Falcon far beyond the on-board sensor system.

One UAS consists of two Skeldar V-200 unmanned aerial vehicles, a ground control station integrated on the corvette from which the aircraft is controlled, and equipment with tools and spare parts.

The Sea Falcon is based on the type Skeldar V-200 from the Swedish manufacturer UMS Skeldar AB and can operate for up to 5 hours with a maximum take-off weight of 235kg, a maximum speed of 75 knots and a payload of up to 40kg. It can take off and land automatically on the deck of the corvette in a wind speed of up to 20 knots and "Sea State 3". An integrated sensor transmits real time optical and infra-red images to the ground control station.

A special feature within the scope of the adaptation developments is the extension of the so-called "safety critical chain" with further functionalities, which will be concluded with a military approval. The safety-critical chain ensures that the aircraft cannot leave an intended area of operation.

In the AlmEG project, ESG assumes overall responsibility on the industry side as general contractor and in-service support company. The overall service is provided in cooperation with three of ESG's highly committed industrial partners: UMS Skeldar AB as manufacturer and supplier of the aircraft, NVL B.V. & Co. KG (formerly Fr. Lürssen Werft GmbH & Co. KG) as the manufacturer of the corvette and UAS integrator, and CUONICS GmbH as the aviation electronics parts developer and manufacturer.



THE CONTRACTED AIMEG PROJECT WILL RUN FOR A PERIOD OF 4 YEARS AND COMPRISES

- » in the pilot phase, the development and certification with regard to the adaptation requirements of the German Armed Forces; the delivery of one UAS including integration into a corvette; initial training of the German Armed Forces personnel as well as comprehensive logistic services;
- » in the series production phase, the delivery of two further systems, one of which will also be integrated into a corvette and the other used for land-based training. In addition, three armament sets will be delivered for the future pre-fitting of further corvettes to accommodate a UAS.

MODERNISATION OF GERMAN F123 FRIGATES

ESG is the logistics partner for Saab

Saab was recently awarded the contract to supply and integrate new naval radar and fire control systems for and in the Brandenburg class (F123) frigates of the German Navy. The contract comprises a new guidance and weapon deployment system (FüWES), which will completely overhaul the system currently in use on the F123, to allow the low-risk integration of the new naval radars and fire control capabilities.

The project is divided up into a delivery phase and subsequent Performance-Based-Logistics Phase (PBL phase). The delivery phase will be used to extend, install and integrate the radar systems and FüWES on the frigates. The PBL phase is aimed at improving the availability of the tactical radar and fire control systems in their further use up to decommissioning. A key element is the establishment of the reliable supply of spare and replacement parts based on a just-in-time delivery. ESG was chosen by Saab as a reliable technology partner for the successful implementation of the extensive service-oriented logistics package to support the operational capabilities in the long-term.

ESG will help Saab to create the logistical supply maturity in the delivery phase. ESG will prepare the technical documentation according to the S100D and S2000M standards together with Saab and transfer this to SASPF. Furthermore, ESG will help with the logistic support analysis, the compilation of environmental compatibility analyses and hazard assessment in the course of this integrated logistic support. In addition, ESG will make important contributions to the IT security concept for the new radar and gun control box components and advise Saab on shielding.

In the PBL phase, ESG will continue with its integrated logistic support and amendments to the technical documentation. Amongst other things, it will establish a central spare parts store and take care of stocking the Navy's requirements. ESG will also provide first-level support in the form of a service desk, offer preventive maintenance by specialists for radars systems as well as training of the Army's of maintenance staff.

"We are delighted about the future collaboration with Saab in this oh-so important modernisation program for our Navy and the Armed Forces overall that will significantly improve their deployment capability. This order underlines our proficiency in the field of maritime systems too – a proficiency which we will continue to expand strategically. We are convinced that the two companies will complement each other perfectly in the F123 project – to the benefit of both the German Navy as well as its soldiers," said Christoph Otten on the occasion of the signing of the contract.

In September, Mats Wicksell, Head of the Combat Systems Division at Saab, and Christoph Otten, CEO of ESG, signed a contract for extensive Logistics services in the course of the modernisation of German F123 frigates, for which Saab is responsible as the Bundeswehr's primary contractor.

STRATEGIC COOPERATION FOR THE NAVY

ESG and Saab on course together



In September, Christoph Otten, CEO of ESG, and Anders Sjöberg, Managing Director of Saab Deutschland GmbH, signed an agreement on a strategic cooperation between both companies for equipment projects and development programs for the German Navy. Together, they aim to purposefully exploit potentials for distinctly integral solutions, products and services for the German Navy.

So as to be able to guarantee the urgently needed capabilities for the successful accomplishment of the German Navy's missions in the face of an increasingly complex and challenging security policy situation, what is needed is a ready-to-use, rugged and resilient marine system with high-tech solutions and extensive technical-logistical support throughout its entire service life.

"Now, more than ever before, we need an altogether operational Navy that is ready for action to fulfil our security policy responsibility towards ourselves and our partners around the world. We are convinced that as the national, independent technology and innovation partner of the German Armed Forces, and together with Saab, we can develop integral approached, concepts and solutions for the Navy in which the respective high-tech expertise and far-reaching experience and domain knowledge of both companies can be synergetically combined in the best possible sense of the word," says Christoph Otten at the signing of the MoU.

"Together, Saab and ESG can offer the German Navy the whole spectrum of capabilities for the integration of guidance and weapon deployment systems, from the operative requirements right through to the management of the system-related complexity. The goal of the strategic collaboration between Saab and ESG is to ensure that the Navy's sea and air systems continue to have the technology, equipment and services at its command that it needs for its long-term and sustainable operation. In this way we want to support the operational availability of the Navy in the long term," added Anders Sjöberg.

Sealed with a firm handshake: to identify and exploit opportunities for future-oriented cooperation – to the benefit of the German Navy

ESG AS APPROVED AVIATION ORGANISATION

Additional certificates extend the range of services of the ESG Group as an aeronautical partner: AOC, ATO, CAMO



For decades, ESG has been a reliable national technology and innovation partner for the civil, police and military aviation sector as an aeronautical development, production and maintenance organisation. Its portfolio of services has now been further extended.

Through the successful realisation of a further important M&A project of the ESG Group, the acquisition of PTL Luftfahrt GmbH, ESG has now expanded its portfolio of services as an approved aviation organisation to include certification as a commercial air transport operator (Air Operator

Certificate – AOC), Continuing Airworthiness Management Organisation (CAMO) and as a pilot training and instruction organisation (Approved Training Organisation – ATO).

As a 100% subsidiary of ESG and part of the ESG Group, the acquired PTL Luftfahrt GmbH will continue to pursue its activities without interruption in the aeronautical operations of ESG. This means that in future, ESG will stand by its customers and partners as an all-embracing and capable aeronautical systems house that can face up to their specific challenges and capability needs with bespoke, innovative and reliable solutions, products and services.



Ready for take-off with valuable services as part of the ESG Group: PTL Luftfahrt GmbH

UPGRADE FOR GUARDION

Smart counter-UAS software ELYSION

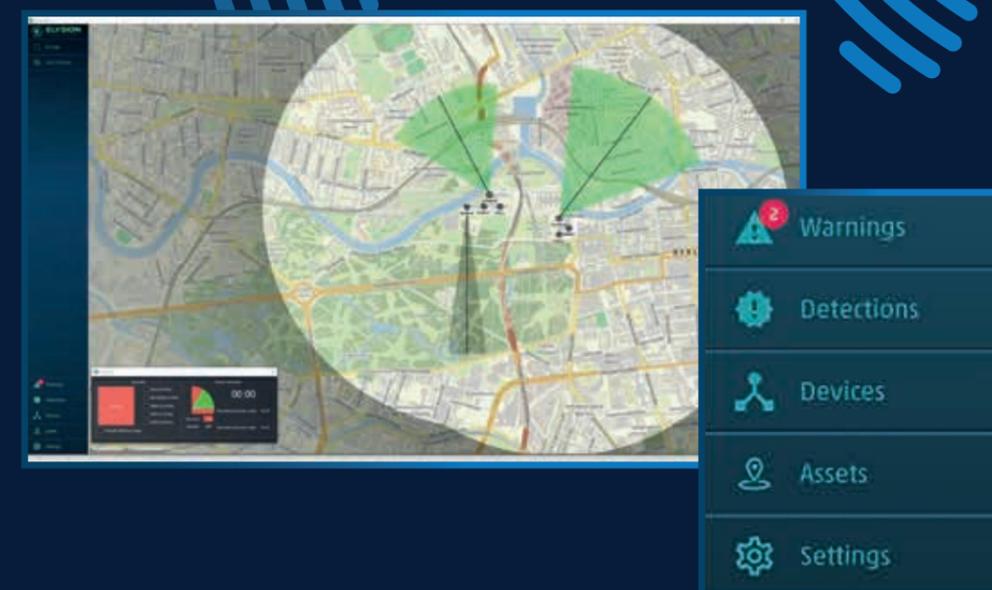
In response to the increasing and ever more complex challenges in the successful detection of and defence against the threat from drones, ESG has further improved the heart of its long-established and mission-proven counter-UAS system GUARDION: with ELYSION, ESG now offers a completely new and highly-specialised kind of counter-UAS C3I software for its multi-sensor, multi-effector drone defence system.

Drones pose a serious security risk, not least because of the large number of systems that are sold and their universal use: for both military units, authorities and organisations with security tasks as well as safety-critical infrastructures, though also for facilities such as airports, power stations, major industrial plants or penal institutions. In the event of an unauthorised drone flyover or a targeted attack, security staff – operators in control centres – have to detect a (threatening) situation in a split second and take suitably appropriate decisions.

ELYSION is a comprehensive further development of the GUARDION software core consisting of processing core intelligence and highly-networked, map-based situational display. The extensive operational experience of and feedback from various civil, police and military customers and users has been fed directly into the ELYSION software so that they reflect the various, highly-complex operational requirements in the best possible way.

During development, the particular focus was on the fields of intuitive usability, automation and high-performance data processing. Consequently, ELYSION now offers a correspondingly attractively designed user interface with integrated camera feed, a high-performance sensor data fusion as well as further assistance functions such as the smart prioritisation of multiple targets or suggestions for appropriate retaliatory actions.

ELYSION is interoperable with previous sensor and effector systems as well as higher-level guidance systems and offers the modular and open-interface architecture already known from GUARDION to that further innovative technologies can also be integrated in future.



SMART DRONE RESCUE SYSTEM

Smart security solutions for BVLOS missions

Unmanned Aircraft Systems (UAS) from the categories "Specific" and "Certified" are increasingly being used in Germany for commercial and industrial purposes that perform a wide variety of tasks beyond visual line of sight (BVLOS) of the pilot. ESG has now developed an automated emergency landing procedure using a tried and tested parachute technology for UAS operations to rule out any risk for persons on the ground in the event of a malfunction or even crash in the best possible way.

A further safety function in addition to that of the autopilot has been realised with the trigger module of the Smart Drone Rescue System: this guarantees the automatic detection of flight emergencies and triggering of the parachute system. This can also be triggered by further input transducers, such as the autopilot or according to your own criteria, such as deviation from the planned route, altitude above ground lower than planned, if a geo-cage/geo-fence cannot be adhered to, or manual triggering by the operator at the ground station.

RELIABLE IMPLEMENTATION for rotary wing aircraft

The Smart Drone Rescue System meets the current strict safety requirements of the European Union Aviation Safety Agency (EASA). Flying with a rescue system – in particular over populated areas – is, according to the new EASA regulations, mandatory following a respective risk assessment.

The technical challenge for the ESG team lay in the realisation of an intelligent, reliable and at the same time extremely light rescue system for UAS in the "Specific" category. The reliable implementation for rotary wing aircraft, in single rotor design, is specifically implemented by a line guide around the main rotor – that continues to rotate in the event of a crash – which always triggers reliably.

Depending on the risk assessment of the respective UAS mission, economic considerations also arise as a result of the reduction of the potential payload against the increase in safety through an additional rescue system. At the same time, minimum triggering altitudes, adapted to UAV operation, were implemented and tested in order to ensure safe regular operation of highly automated or autonomous UASs beyond the visual line of sight in populated areas.

ADVANTAGES AT A GLANCE:

Reliability

- » Approval of the rescue system acc. to LTF (RG-UL) NfL 2-366-17
- » Developed on the basis of the ASTM F2316-12 industrial standard
- » Optional ASTM F3322-18 industrial standard

Retrofitting capability

- » The lightest rescue system in its class
- » Self-contained power supply
- » No electrical interference with UAS components
- » No aerodynamic interference with the UAS

Scalability

- » Modular architecture
- » Upgradable on various unmanned aircraft systems, rotary and fixed-wing VTOL with an UAS MTOW from 25 to 500kg

The combination of new, innovative unmanned aerial vehicles on the one hand and approved, proven rescue systems on the other, promotes the acceptance of automated UAS flights in lower airspace and thus open up different, very promising possible uses for unmanned aircraft systems in the first place.

With its Smart Drone Rescue System, ESG once again underlines its innovative strength and its extensive performance as an aviation organisation and as a technology partner for future topics.

GERMAN MISSION NETWORK BLOCK 1

ESG and Atos develop a new platform for the Bundeswehr

ESG and Atos together have won the public tendering procedure of the Federal Office of Bundeswehr Equipment, Information Technology and In-Service Support (BAAINBw) to develop the German Mission Network Block 1 (GMN 1). The syndicate consisting of ESG and Atos thus prevailed over the competition and secured the "GMN 1 Model" project.

The goal of the German Mission Network Block 1 is the quantitative and qualitative expansion of the harmonisation of the management information systems. It aims to improve interoperability during national and multi-national missions. This is to be achieved by the further consolidation of today's spatially isolated IT tactical systems into a uniform physical, logical and interoperable system.

What's more, the GMN will be fully compatible with the NATO Federated Mission Networking (FMN) and offer a service-oriented, common platform for all armed forces. Once the GMN has been fully implemented, it will be used as a common platform for all armed forces. This is order-based, sustainable and guarantees the exchange of information across all levels.

GMN will hereby be used in missions, during training and exercises as well as to integrate international partners. The particular protection of sensitive information is hereby ensured. The "GMN 1 Model" will be a representative solution in the first stage and form the basis for a later planned serial production of the GMN 1.

FULLY COMPATIBLE with the NATO Federated Mission Networking (FMN)

Christoph Otten, CEO of ESG, underlines the special motivation behind this important project to digitise the German Army: "All of ESG's projects focus on the people who guarantee the protection and safety of our country, day in, day out, in terms of both their basic operation and deployment. What we have to do is provide them with exactly what they need to success-

fully complete their mission - with the best possible protection. This is why we will bring the GMN project to a successful conclusion through our passion and engineering know-how together with our partners - to the benefit of our soldiers - to the benefit of our client the German Army."

Günter Koinegg, Head of Public Sector & Defense Atos Central Europe, emphasises the service orientation of Atos and ESG: "I am delighted that the Bundeswehr

has entrusted us to realise this important project. The Bundeswehr is a very important strategic client for Atos in Germany. Our contribution to the development of the German Mission Network is our expertise and many years of experience in the defence sector, as well as innovative ideas and experiences from other industries. With our capabilities and the great motivation of our teams, we will realise this important component in the German Mission Network and make it a success."



DEPLOYABLE COMMUNICATION NETWORKS

Digital modernisation of the Bundeswehr

The Bundeswehr has commissioned Motorola Solutions to digitise its deployable radio network. ESG will be taking care of the integration of the overall systems.

Digitisation is one of the Bundeswehr's most important projects. The German military will thus not only be ready to face the future, but at the same time will increase the efficiency and safety of its soldiers as well as civil personnel. Safe and reliable voice communication as well as access to data guarantee more efficient procedures and standby capability. The digitised communication infrastructure plays a key role here – forming the basis for successful missions.

In crisis and disaster situations in particular, multi-agency communication is also a prerequisite for a successful cooperation between different teams. In the course of the digitisation of land-based operations, and to guarantee fast communication in various areas of deployment, the Bundeswehr is procuring deployable networks (deployable cellular networks, DCN), which will be available in two versions, mobile and stationary. This modernisation marks an important milestone in the Bundeswehr's digitisation strategy.

Motorola Solutions announced that it has received an order from the Federal Office of Bundeswehr Equipment, Information Technology and In-Service Support (BAAINBw) for the modernisation and establishment of a deployable, digital communication network within the coming four years. Up to 120 radio systems will be provided in the course of the project. These will be designed in two versions – one of these will integrate the components for larger numbers of users and coverages/ranges in a 20-foot ISO container (40 systems), the other system version will see the components integrated in operational, transport and storage containers (80 systems) so as to guarantee flexibility, faster readiness and greater deployability.

As a subcontractor of Motorola Solutions, ESG will be responsible for the integration of the overall systems for both versions in containers and portable operational, transport and storage containers within the scope of this highly complex project for the digitisation of land-based operations (D-LBO). What's more, ESG will prepare the accompanying logistical documentation and logistical analyses.

The Bundeswehr has a wide variety of assignments – and the use of communication solutions is crucial for the success of their missions. The Armed Forces often have to face numerous challenges in remote regions during their work, including handling complex situations in dangerous surroundings, or the analysis of large amounts of data. Safe and reliable voice and data solutions are vital, particularly in critical situations, so as to guarantee the safety of both the soldiers and the general public.

The new deployable, safety-critical networks combine a TETRA (Terrestrial Trunked Radio) solution with an LTE solution to transmit data as well as the delivery of 12,500 hand-held radio sets and 4,000 vehicle and stationary radio devices. In addition, the new system is interoperable with the digital radio networks of German authorities as well as emergency and rescue services, NATO and the EU. This guarantees their successful cooperation in crises or during catastrophes, where multi-agency communication is presumed.

SIMULATION MODEL OF THE FUTURE

Take data-based, predictive decisions with ESG

Predict consequences, trade off options and ultimately reach a decision: this is the challenge that responsible officers working in internal and external security face every single day. Complex procedures, heavily networked processes and uncertain parameters make it increasingly hard to keep track of things. Modern digital solutions and products can help here: no more trusting your gut instinct, decisions should be based on reliable data! This is where ESG's expertise in the field of simulation comes in, helping decision-makers with individual, bespoke tools.

OUR TOOLS FOR DECISION-MAKERS: SIMULATION

A simulation is usually understood as being a copy of a real system. A model is developed that represents the real relationships with a lower level of detail and is suitable for experiments. The data and results obtained from the model calculations allow conclusions to be drawn that can then be transferred to the real system. Experiments offer an opportunity to monitor the model in different scenarios, including ones that have been artificially created, and to investigate its behaviour. The knowledge gained in this way can then be evaluated, analysed and transferred to the real world.

Simulation are put to successful use in a variety of different industries. Well-known examples include weather and climate calculations, flight simulators or medical simulations, such as current prognosis models on the spread of the COVID-19 virus or the availability of intensive care capacities. Simulations are also used in logistics, be this to plan and operate production plants and assembly lines, in fleet systems or storage facilities, as well as when planning transportation and capacities. In fact, there are hardly any limits to the use of simulations. Almost every procedure or any process can be modelled and reproduced with the right method. Their use is expedient for highly complex problems in particular.

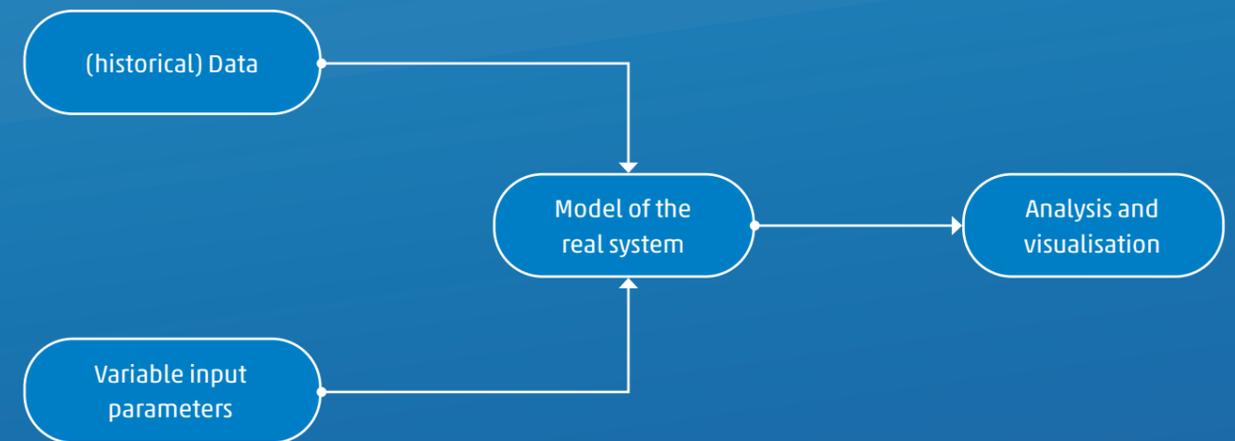


Figure: components of a simulation

TAKING DECISION WITH THE HELP OF SIMULATIONS

What we first and foremost have to understand is that it is not the simulation itself that can take decisions. Simulations are only helpful tools so that we can take proactive decisions on the basis of information. They can be used to make statements on the behaviour of a real system. A qualitative assessment of the result of a simulation always has to be carried out by the decision-maker. They also have to interpret the results of the simulation and prioritise alternative actions and optional decisions using the insights gained before they take the final decision. Simulations can help decision-makers precisely where they come up against their limitations, namely when it comes to illustrating trends and predicting future developments on the basis of historical data, taking into account real processes and considering random events. Simulations grant decision-makers insights into relationships, trends and interactions that would otherwise be impossible without technical assistance. Nevertheless, at the end of the day it is always the human who takes the decision.

ONE MAJOR LIMITATION AND NUMEROUS OPTIONS AND POSSIBILITIES OFFERED BY SIMULATIONS

If simulations are used sensibly and purposefully, they can not only help save costs and time whilst reducing the risks, but may also offer the following advantages:

- » Early identification of weak spots in a system as well as the definition, evaluation and implementation of appropriate corrective action
- » Experiments with a powerful model instead of trials with real systems, and thus a "playful" generation, testing and evaluation of options as well as a check of numerous different, optional decisions
- » Revelation and analysis of relationships and synergy effects between individual course of action, which cannot readily be recognised by humans
- » Creation of new points of view and insights through an intense examination of the real system and the collaboration between different experts lead to new points of view and insights when developing a simulation model (which would not have come to light)

"All models are wrong, but some are useful" (G. Box, statistician). No matter how flexible and sensible the use of simulations may be, one should always be aware of their limitations as regards their validity, and the associated risks. Models are and always will be an abstracted representation of reality and reduce its complexity to the bare necessities. What's more, the quality of the available data and assumptions limit the strength of the results of any simulation. These limitations increase the risk of misinterpretations and users of simulations have to be aware of this at all times.

THE WAY TO A SIMULATION IS USUALLY SHORTER THAN YOU THINK!

The procedure for developing simulation models follows a very structured process. There is always a close cooperation between the development team and the user throughout the entire development process. ESG helps its clients with its knowledge of methods, processes and its expertise, and accompanies them throughout the entire development process. Simulations can be a useful decision tool, but can

never take their own decisions or replace the actual decision-maker. If the interaction between data availability, model development and simulation as well as their analysis and interpretation on the basis of specific problems proves successful, it

becomes easier to reach an expedient decision by taking a look into the future. ESG understands this process as being an iterative procedure to jointly obtain a reliable and valid model with analytical interfaces that are tailored specifically to the client's needs and expectations. ESG with its know-how in the simulation and digitisation fields is an ideal partner for the analysis, processing and interpretation of the results of the simulation too.

REAL ADDED-VALUE FOR DECISION-MAKERS

Simulation solutions, data processing and analysis by ESG

SIMULATION-BASED TRAINING

For real progress in medical services



Together with its partner VirtaMed, ESG was given the opportunity to provide the Medical Services Command of the Bundeswehr in Fürstenfeldbruck with an insight into their joint work. Selected ideas, customised and virtual reality-based simulation solutions for doctors and medical service specialists were presented.

The solutions ranged from "Procedures and actions trainer – crew resource management" and "Special simulators for minimally-invasive interventions" right down to "Simulation systems for the aeronautical pre-selection of helicopter pilots."

Simulators and simulation environments allow the Armed Forces to train various tactical-military deployment scenarios for medical specialists, from CCP via Role 1 under combat conditions through to Role 4.

Through these capabilities and services, ESG and VirtaMed contribute to not only maintaining but also permanently improving the operational readiness, and thus protecting the military and civilian forces.



Working closely together for pioneering simulation-based solutions for the medical services sector – ESG and VirtaMed

BARÜ IS COMING

ESG deliver new mobile radar systems for the Bundeswehr

ESG underlines its performance as a technology and innovation partner for the Bundeswehr when it comes to reconnaissance and intelligence retrieval within the scope of joint tactical fire support in the BARÜ (Ground-based Reconnaissance and Surveillance System) project.

The Federal Office of Bundeswehr Equipment, Information Technology and In-Service Support (BAAINBw) has commissioned ESG as general contractor to manufacture and deliver a total of 69 mobile radar systems. The project will be implemented with the firm of ELTA Systems Ltd. as a subcontractor. The first radar systems are scheduled for delivery in 2022, the last deliveries will take place in 2024. Training courses, training materials and the initial supply of spare parts were also agreed at the contract signing.

The new BARÜ (Ground-based Reconnaissance and Surveillance System) radar system will replace the old systems of tank reconnaissance radar (PARA), artillery observation radar (ABRA), light battlefield reconnaissance radar (LEGAR 1) and ground monitoring radar devices 550 (BOR-A 550) in the Bundeswehr. You could call it a "generation change."

BARÜ should ensure the extensive and needs-based retrieval of intelligence for all command levels to identify potential threats, the situation in deployment zones as well as the situation in possible conflict areas and areas of interest. The system can be used in almost any weather, day and night, and allows the permanent reconnaissance and monitoring of large spaces with few forces. In a network it enables "joint fire support" (STF), whilst also permits the target tracking of identified enemy forces, therefore contributing to correcting artillery fire and damage assessment.



KEEP ON THE SAFE SIDE WITH ESG

BSI-certified IT-baseline protection consultant

In view of the special importance of IT security, ESG is still one of the few consulting companies that has a BSI-certified IT-baseline protection consultant. V. Hafner from the IT security team at ESG is a certified IT baseline protection consultant and provides an insight into his field of work:



V. Hafner: highly-motivated, certified IT baseline protection consultant working for ESG's clients

Question: what does IT baseline protection actually mean?

→ The greatest possible information security is the key challenge in connection with the successful digitisation that pervades all areas of our life. Without disparaging the private sector, managing information security has the highest priority for us as a company with clients and partners from the field of internal/public and external security. This applies equally for our internal processes, just as much as it is an important element of the wide variety of services we offer. The Federal Office for Information Security (BSI) as the supreme national cyber security authority in Germany describes IT baseline protection as follows: "Information security is the prerequisite for successful digitisation, IT baseline protection hereby provides a sound technical foundation and a comprehensive tool. It is a method, guide, recommendation and aid for self-help for government authorities, companies and institutions of every size that want to learn more about safeguarding their data, systems and information. IT baseline protection takes a holistic approach to information

INFORMATION SECURITY IS THE PREREQUISITE for successful digitisation

security, considering not just technical aspects but also infrastructural, organisational and personnel topics. As a result of its systematic approach, the necessary security measures can be identified and implemented. BSI standards hereby provided tried and tested procedures, the IT-Grundschutz Compendium specific requirements."

The application of standards for information security, in this case IT baseline protection, is always individual and is only achieved following the implementation of measures as well as a check of the efficacy of these measures in a continuous cycle. What use is it to a company if things look great on paper, but it no longer has any command over its inventions, patents and ideas or its systems? In real life, system data sometimes does not always disappear completely, someone else – the opposite party – still has a copy. Standards for information security can help preserve one's own data intact for processing. In a much larger context, this can also be seen as an expression of preternatural, inalienable rights, such as the freedom to be able to determine the extent of ownership oneself.

Today's digital challenges are polymorphous and assail us from all sides, which is why it is sensible to have a 360°-view when dealing with information security. One pioneer in this direction is not just the BSI, but also the team in the Bavarian Cyber-Alliance-Centre (CAZ). This "all-round principle" to successfully cope with digital challenges reflects the intention of IT baseline protection in a particular way so that we at ESG can also act accordingly.

What is a BSI-certified IT-baseline protection consultant?

→ IT baseline protection consultants assist and accompany authorities and companies with the following tasks, amongst others, on the basis of their exacting training:

- » Introduction of an Information Security Management Systems (ISMS)
- » Development of security concepts
- » Definition and implementation of suitable measures, and
- » Expert advice during the introduction of processes. An IT baseline protection consultant can also help prepare an ISO 27001 audit based on IT baseline protection.
- » Performance of and assistance with internal information security audits

Could you name a concrete example of your work as a BSI-certified IT-baseline protection consultant?

→ ESG is the national technology and innovation partner of the Bundeswehr as well as government authorities and organisations with security-related tasks and companies in the field of critical infrastructure as both a system integrator and as an aviation organisation. Bearing this in mind, you can imagine that we have to do everything humanly (and technologically) possible in our projects to guarantee the highest level of IT security. This means that even during the development of a (manned or unmanned) aircraft, it is crucial to work out a corresponding concept for information security and that this be taken into account during its realisation. For example, the avionics, in other words the flight control, as well as the networking of the aircraft with other (command) centres has to be rugged and resilient to external (cyber) attacks, and remain so. The same sort of thing applies for platforms on land or water, or for military combat, police and industrial control rooms, for instance. This means that we can talk of eco-systems and the information security used.

A further topic that will become important in the next decade will be the development and successful implementation of those information security standards needed for projects or platforms in space or that are related to space.

And where exactly does the added value lie for your clients?

→ With this new, extremely comprehensive and sophisticated personal certification, BSI attests that the expert is able to soundly and competently implement the recommendations and measures from the IT baseline protection compendium. Which in turn means that our clients can rely on the fact that we comply with and implement the highest quality standards in terms of IT security in our projects: you are "on the safe side" with us, as it were!

REAL ADDED-VALUE FOR CLIENTS

Certified IT baseline protection consultant at ESG

Furthermore, this kind of certification is increasingly being demanded as a given before companies can take part in tendering procedures for contracts on a state or national level.

Against this background, we decided very early on to qualify for BSI certification. We want to give our partners and clients a sign, one which is also clearly visible through the list published by BSI, and underline our position as a highly competent, future-oriented and modern company in this oh-so important field. But of course, this is also an important part of professional development for me personally, as well as my colleagues who are also training as BSI-certified IT-baseline protection consultant or auditors, in the fantastic Information Security Team at ESG.

THE BACKBONE OF JOINT SUCCESS

ESG's corporate culture



Expert for commercial and contract law:
Sabine Uhlmann

Open to new ideas, questioning what is known, living diversity, the targeted promotion of talent and extensive training and development: ESG's successful actions are based on a refreshing interplay in the corporate culture.

For many years, ESG's path has been marked by sustainable and profitable growth. Alongside excellent technological expertise and the reliable performance of services in projects, its corporate culture is also a key factor in its success. Challenges are seen as genuine opportunities and evolutionary, entrepreneurial transformation is embraced gladly and willingly with ESG's characteristic passion for technology.

Thus, ESG is consistently developing and improving how, when, with what and where the individual teams collaborate and how the interdisciplinary central and service departments can provide elementary support for the project work of the various divisions, from acquisition through to delivery, as factors that are

critical for success. Of course, this also means that not only do long-standing employees have to constantly question their valuable experience and deep-seated domain knowledge, their methodical and process know-how in view of new developments, but also that new colleagues for their part challenge this with creative ideas and innovative approaches, as a kind of disruption of old ways.

One of these new colleagues in the legal team at ESG is the lawyer Sabine Uhlmann. She has been a member of the team in the field of commercial and contract law since October, where she actively contributes her outstanding international experience and expertise in business law and technology topics. Spektrum asked Ms Uhlmann to describe her first steps and initial experience in the ESG team:

"An open mind for new ideas, resolutely accept new challenges and grow with these. These are attributes I can really identify with.

And they reflect my career to date. After studying law and working as a lawyer, I wanted a fresh outlook, wanted to systematically broaden my horizon and studied commercial law at the University of Cape Town. After graduating as a Master of Law, I then wanted to take the next step and contribute my know-how and my 'penchant for IT' to innovative future projects. During initial talks with ESG, I was very impressed by the variety of different, by all means very complex projects and the culture of cooperation described. It quickly became clear to me that I could expect not only some exciting, challenging, but above all some very varied tasks at ESG. What's more, ESG offers a wide range of further training and development programs that are tailored to the individual needs of colleagues. Stay on the ball, question what you know – this is the only way to keep up with changes and, as one

example from my field of work, cultivate successful contractual relationships and pursue active legal risk management.

AN OPEN MIND FOR NEW IDEAS, resolutely accept new challenges and grow with these

Following the settling-in period, I can now say that I genuinely feel at home – I enjoy the best possible support from my superiors and my team as well as the 'teams behind them', not

least when it comes to the technical equipment too. Even though the current pandemic has forced us to work a lot for home, I can still feel a very positive spirit, almost like a spirit of optimism. And yes, most of the work that is put on my desk is in fact challenging – but to tell the truth: that's not just what I expected, but also hoped for. Which is why I am really looking forward to delving even deeper into the world of ESG, getting to know the numerous innovative colleagues behind the different projects personally and doing my bit for the common success of the ESG team."

THE NEXT AWARD ESG is top4women!

For the sixth year in a row, our company has been awarded the quality mark top4women.



ESG has had itself certified in the course of the top4women seal of quality since 2016. As a result of this regular “view from the outside” during the assessment and the accompanying interviews, relevant recommended courses of action to support women and families that are adapted to changes on the markets and in society are repeatedly identified and translated into concrete measures. As a result, there have been a wide variety of activities over the years, such as holiday activities for our employees’ children, mentoring and coaching programs, participation in job fairs for women, scholarships for female students of MINT subjects or the Women@ESG community.

Since 2017, Women@ESG has been encouraging the close networking of colleagues, and therefore strengthening a professional exchange and interdisciplinary collaboration. The common goal of the community and the management is to help women in ESG to become even more successful and to develop in line with their capabilities and ideas. Motivation and contentment amongst our female colleagues is actively promoted in this way. What’s more, the company also becomes more attractive for female applicants, who are particularly important and more than welcome in view of ESG’ expansion course.

Future priorities of Women@ESG will include the extensive exploitation of the numerous opportunities offered by “Diversity and differences” in a team. This will include training offers on resilience, communication and diversity, podcasts and interviews with women at ESG who have managerial responsibilities as well as talks and discussions.

The success of this and similar activities in the company is reflected by the growing percentage of women at ESG – something from which the entire team profits: ESG is top4women!



top4women! Dr. Mihaela Seidl, CFO of ESG (7th from the left), together with the HR Manager Axel Repetzki (centre) and members of the women@ESG team

LEADING EMPLOYER 2021 ESG among the top 1 %

A healthy work-life balance, team work and value-bound camaraderie are typical for the corporate culture and the basis for our common success! ESG was once again honoured as a “LEADING EMPLOYER” – one of the top 1 % of employers in Germany – in 2021.

This is verified by the independent study “LEADING EMPLOYERS”, which scientifically analysed more than eight million data sets regarding employer quality and employee attractiveness in employee services, employee satisfaction, prosperity, corporate values, HR expertise and image. Only 1 % of the around 100,000 companies of different sizes and from different fields that were included in the survey received this prestigious award this year.

In its meta-study format, LEADING EMPLOYERS is the world’s most comprehensive study on employer qualities. It translates a wide spectrum of criteria into a holistic assessment to develop a comprehensive picture of the employer.

The assessment focuses on several key factors that make companies attractive to employees: these include job security based on economic and innovative strength, sustainability, flexible models for working hours, additional services like company sport or canteens, opportunities for connection, recommendations by third parties, equality and respect, and individually tailored services for work-life balance.

These are areas that have been the particular focus of ESG for many years as key elements of its corporate culture. The firm commitment of the high-tech company for its employees is correspondingly large and diverse.

This is the basis on which ESG develops innovations that create genuine added value for its clients and partners, creating a little piece of the future every single day.



**ONLY 1 % OF
COMPANIES
received the
award this year**

