PRESS RELEASE

Leonardo accelerates the digitalization of the Aerospace Defence and Security sector.
Genoa is the national industrial competence Hub

High Performance Computing (HPC), cloud, big data, artificial intelligence, cyber security and cyber resilience, urgent computing, robotics: these are the main areas of the Leonardo Hub dedicated to the digitalization of industry

The data, to be processed, enhanced and protected along the entire digital supply chain, is the foundations of Leonardo's competiveness

The activities of the Leonardo industrial digitalization Hub are central to the achievement of the SDGs objectives, through the creation and enhancement of new skills in STEM and the development of sustainable technologies

Genoa, 01/12/2021 – Leonardo accelerates the digital transformation of the Aerospace, Defence and Security (AD&S) industry through its **national competence Hub in Genoa** from which to develop the Group's main programs and processes. The goal is to increase Leonardo's technological and product competitiveness by focusing on the data-driven economy and the **data enhancement** to strengthen the company's core activities and implement digital transformation.

Leonardo's drive towards digitalization – in line with the company's ***Be Tomorrow 2030*** strategic plan – is based on, and developed from, the synergy between its key skills and infrastructures. This starts with the HPC **davinci-1**, which is equipped with an architecture that integrates the flexibility of the cloud with supercomputing capabilities and cyber security technologies. These strategic assets are at the heart of the **Leonardo Labs**, the long-term Research & Development network with strong innovative content, which are focused on **eight research areas** and involve about **60 young researchers**.

Today the **frontier of digitalization** for the Aerospace, Defence and Security (AD&S) industry is represented through the creation of **digital twins** of its platforms and technologies, which, in, turn, accelerates the design, improves performance, optimizes maintenance in a predictive key, increases simulation potential (up to the possibility of certification by simulation in the aerospace sector), and virtualize training.

The **behaviour modelling** of products such as aircraft, fixed-wing, and rotary-wing, through big data, numerical simulation and A.I. are at the most advanced point in this direction. The ability to process and correlate information from products in use and simulations in a virtual environment is allowing Leonardo **to accelerate design and innovation of materials** (lightness and strength), **performance** (aerodynamics and energy saving) and on **customer care** (augmented reality maintenance and pilot training).

The use of these techniques in flight data analysis has made it possible, for example, to develop advanced applications for **the management of helicopter fleets** (about 5,000 units worldwide) that optimize performance and maintenance activities. Maintenance takes a decisive step towards **predictive maintenance** and remote support capabilities through collaborative digital platforms based on augmented reality devices. **For fixed-wing aircraft**, predictive analysis through sensors and precision electronic systems is expanding to the dynamic evaluation of the individual components of the aircraft. The goal is to accelerate the so-called "digital transformation" of the activities and technical processes of logistical support and to offer the infrastructure suitable for the progressive implementation

of artificial intelligence tools, which are aimed at continuously improving the efficiency and effectiveness of maintenance operations.

The **simulation of the simultaneous take-off and landing of multiple helicopters** on aircraft carriers and the predictive models of ice formation on the wings are two of the most significant examples of applications developed in the context of **virtual models**. These skillsets are the developmental basis of the new generation of aircraft conceived as a "system of systems" capable of high interconnection with other systems and interoperability with unmanned platforms.

Numerical simulation combined with data analysis in the perspective of the digital twin also affects the production chains. In this direction, Leonardo is carrying out a project for the digitalisation and interconnection of the design and production processes of the production line of the ATR aircraft at the company's Pomigliano d'Arco (Naples) plant.

Guaranteeing cyber security is essential to extract all the value contained in the data, ensuring operational continuity. Genoa is one of the key nodes of Leonardo's network of **cyber security** centres, in addition to Rome, Chieti, Florence, Milan and Bristol; these centres design and develop solutions aimed at **protecting both corporate information assets and strategic infrastructures and institutions from multidomain threats, contributing to secure digitalization**. There are over 5,000 networks and 70,000 users cyber-protected by Leonardo in 130 countries. Just in Italy, around 90,000 security events are monitored per second and over 1,500 alarms are managed per day. In this context, digital twin technologies are used to **virtualize the IT infrastructures to be protected** and to test products and solutions to respond to cyber attacks.

Data management, an essential element for improving the efficiency of processes, is **at the heart of Leonardo's offer and an integral part of its products**. An example is the X-2030 platform, created precisely to enhance the data in support of the resilience of critical infrastructures. X-2030 enables the integration and correlation of a huge amount of information from heterogeneous sources – from aerial platforms to satellite data, field sensors to databases, social media and open sources – thanks to cloud computing, supercomputing and artificial intelligence. This solution is the basis of **Global Monitoring and Situational Awareness**, i.e. the control and monitoring of the territory, allowing informed decisions even in cases of emergency for hydrogeological protection and for increasing citizens' safety, also in a preventive key. This application in the emergency field – urgent computing – allows an objective evaluation and a rapid response in the event of extraordinary events, of natural or anthropogenic origin.

Another example is the OCEAN software, developed in Genoa, to dynamically and quickly configure test and training systems for operators who have to interact with digital monitoring and control systems.

A prospective frontier is linked to the research activities on robotics and quantum computing of the **Leonardo Labs**. In particular, the latter constitutes a technological accelerator and a key element for business development in several domains: from cyber security to defence electronics up to space.

In robotics, the projects in progress in Genoa – in collaboration with the Italian Institute of Technology and the University of Genoa – concern the construction of **adaptive robots** to be used in complex production environments, with the aim of improving the safety of operators, the flexibility of uses in unstructured environments, unforeseen situations and critical environmental conditions, and the ability to act independently. The main applications are in the aerospace, civil protection, security and defence sectors.

As for **quantum technologies**, the projects cover a broad spectrum of applications. The most pioneering involves the use of the davinci-1 HPC to simulate a quantum processor in a supercomputing environment, a fundamental prerequisite for working with real quantum computers. Leonardo's

quantum simulators, once optimized on the davinci-1, are used to develop programs in quantum logic, avoiding the problems of today's real quantum computers, and compared with the latter to judge their effectiveness in terms of performance, identifying where there may be a prevalence on digital computers (quantum supremacy). Thanks to these skills, Leonardo is the first player in AD&S that is starting research on the application of quantum technologies in the radar field. The "Quantum Sensing Radar", which is capable of overcoming the current limits of traditional radars and is able to increase the range of recognisable objects and expand the reconnaissance spectrum, thanks to the use of photon beams able to "overcome" obstacles.

For Leonardo, HPC, data, artificial intelligence and cyber resilience are strategic assets at the basis of the current **digital industrial revolution**. These are necessary to invest and bring together an increasingly broad ecosystem of public-private subjects, with the aim of overseeing the enhancement of this critical phase of development, a key element for growth that is sustainable from an environmental, economic, and social point of view.

These assets, when enriched with new skills, can also be decisive in new industrial and application fields, including healthcare, given the need for shared and secure data (electronic health record), telemedicine applications (rehabilitation and surgical robotics), predictive and epidemiological analyses (epidemic management, precision medicine, genomics). A sector that in Genoa sees one of the most specialised and fertile areas of development. In this context, Leonardo actively participates in projects, that are result of specific agreements, including the collaboration with Dompé Farmaceutici for the construction of the first nucleus of national digital health security infrastructure with cloud architecture, with Movendo Technology, a biomedical company and, finally, with IT at the Human technologies laboratories, as well as participating in European research projects in the Digital Health field.

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