



# Innovation at Applus+

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► 2023

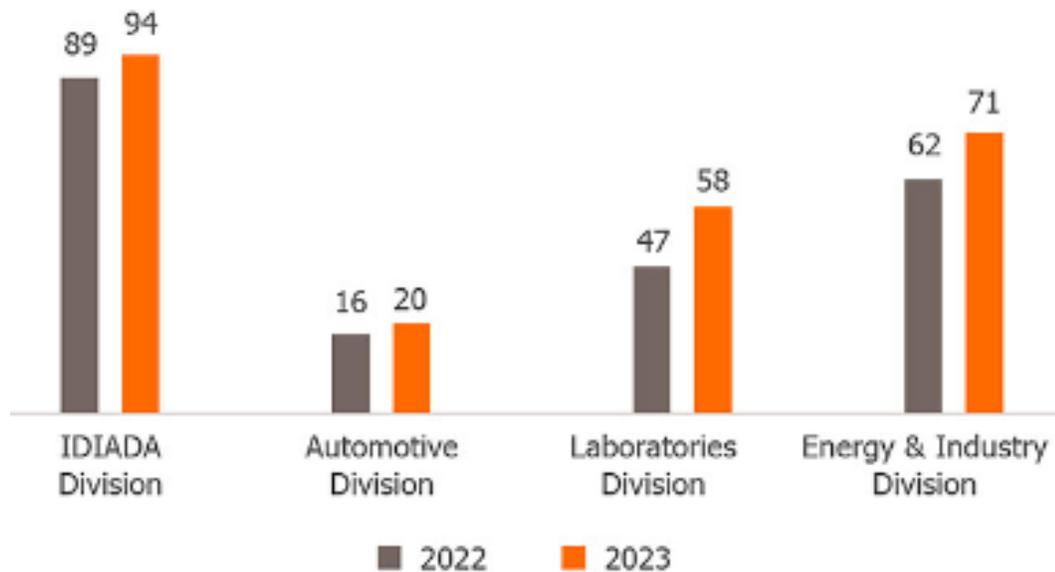


Innovation is key in an environment that is evolving rapidly due to **digital transformation** and the **growing demand for sustainability** in all the sectors in which we operate. We have invested in increasing our capabilities and are devoting more resources to **researching, learning, and implementing** new solutions into strategic markets.

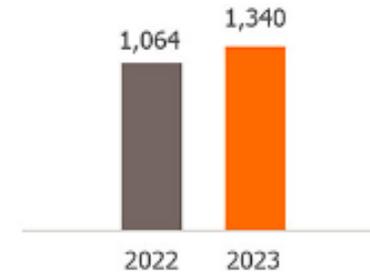
"**Innovation and technology**" is one of the three pillars of our 2022-2024 Strategic Plan.

- **1,340** people have been involved in and contributed to innovation projects, dedicating **482,921** hours.
- Our teams have worked on **243** research, development, and innovation projects.
- We have an intellectual property portfolio with **166** active patents and **33** active patent families. In 2023, we increased the number of patents by 24 across 7 different families.

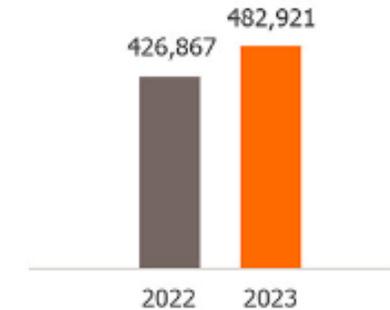
Number of innovation projects per year and per division



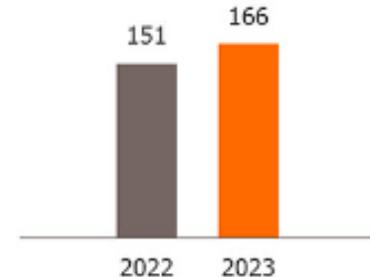
Employees involved  
(not full-time dedicated)



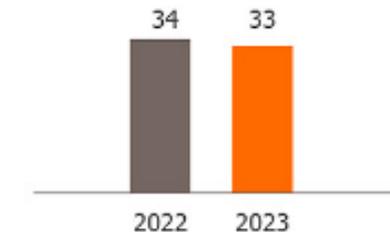
Hours worked on innovation projects



Patents granted



Patent families



Relationships with other companies provide us with **new opportunities** and **complement our competencies**. Our experts support various sectorial and standardization organisations by contributing to the development of documents and in the framework of their working groups, as well as organizing events and presentations.

- We have established **100** agreements with external entities, delivered **111** presentations at technical events, published **27** technical papers, and conducted **74** training sessions.

### 2023 HIGHLIGHTS



We have been speakers at the event "Electric vehicles and statutory automotive inspection. A practical approach", held in Brussels.

Applus+ represented CITA at the "Rethinking Mobility" event in Uruguay.

### 2023 HIGHLIGHTS



Our experts have contributed, through their participation in WG 6 and WG 8, to the generation of the **new cybersecurity standards** for the European radio equipment directive (RED), under the European Commission's standardisation request M585.

### ENERGY TRANSITION-COLLABORATIONS WITH COMPANIES

Intelligent Energy (IEL), a UK-based fuel cell specialist, is collaborating with Applus+ to develop predictive hydrogen fuel cell and balance of plant models.

### WIRELESS AND ELECTROMAGNETIC COMPATIBILITY (EMC) CERTIFICATIONS-ORGANISATIONS

We attend meetings of the bodies that host certification schemes around the world, for which we are recognised or accredited: MIC, in Japan (Registered Certification Body [RCB] 220); FCC, in the United States (Telecommunication Certification Body [TCB] ES0002); ISED, in Canada (Foreign Certification Body [FCB] ES0001), UKRER and EMCR, in the United Kingdom (Approved Body [AB]-8508) and REDCA, in the European Union (Notified Body [NB] 0370).



### AGREEMENT WITH ALERION TO INSPECT WIND TURBINES THROUGH AI



In 2023, we entered into an agreement with the start-up Alerion to **inspect wind turbines using artificial intelligence**. Autonomous drones equipped with infrared or LiDAR (Laser Imaging Detection and Ranging) cameras are used to provide this service.

In September 2023, the FISITA World Congress 2023 - Technology of Mobility Conference & Exhibition was held in Barcelona, the world's largest automotive congress where executives from leading international companies and more than 2,100 automotive experts exchanged knowledge and experiences over three days.

Applus+ was a sponsor of the event and participated in the organisation together with the Society of Automotive Technicians (STA). The services provided by Applus+ for the automotive sector attracted the interest of the attendees, receiving numerous visits to our stand.

In the plenary sessions, **our CEO, Joan Amigó**, gave a speech in which he highlighted the importance of the European projects DOMUS and HEADSTART, led by Applus+ in collaboration with OEMs, component manufacturers and leading technology and academic centres. **José Manuel Barrios**, from the IDIADA Division, participated in the opening conference as Chairman of the STA.

The meeting was an excellent opportunity to present and discuss the different points of view of industry experts in a pre-competitive manner.

Applus+ engages in **hydrogen** projects, crucial in **energy transition** and **decarbonisation**, particularly for **aerospace** and **automotive** sectors. Additionally, Applus+ supports the increasing production of **renewable electricity** with specialized services in **solar and wind energy**. We have developed services for **vehicle electrification**, **autonomous driving** and new mobility models, researching technologies and enhancing electric vehicle safety. **Digitalisation**, with a special focus on **artificial intelligence**, has transformed our services and created **new business models**.

### BOOSTING HYDROGEN AS AN ALTERNATIVE ENERGY

We have developed projects in **aerospace** and **automotive** sectors, conducted tests on **H2 tanks**, collaborated in the development of **hydrogen fuel cells**, and adapted our inspection services to **ensure the safety** of hydrogen infrastructure.

*Case study:*  
**Industrial test methods** for the hydrogen sector



### SERVICES FOR THE RENEWABLE ENERGY INDUSTRY

We have driven projects for the **wind and solar industry**, conducted tests for wind turbines, inspections using **drones and AI**, and comprehensive services in wind farms. Additionally, we offer quality control in photovoltaic plants and participate in research projects like **PVBifacial**.

*Case study:*  
**Photovoltaic management** with IA-based tools



### SERVICES CONTRIBUTING TO THE NEW MOBILITY

We support the development of **electric and connected vehicles** with new **testing equipment, battery and charging system** research, architectures for electric vehicles, and **automation** for autonomous mobility. We evaluate **future regulations** for electric vehicle inspections.

*Case study:*  
**SAFE-UP**, proactive safety systems and tools for a constantly upgrading road environment





### CYBERSECURITY EVALUATION SERVICES

Applus+ Laboratories is the first European organization accredited to certify **cybersecurity requirements in wireless-connected devices**. Additionally, we are a leading provider in **Common Criteria** evaluations at our accredited laboratories in Spain, the USA, and Canada.

*Case study:*

Cybersecurity across the **vehicle supply chain**



### ADVANCED DIGITALISATION

We have undergone a significant digital transformation, adopting technologies such as **artificial intelligence** and remote inspection with **drones** combined with **3D models and digital twins** to optimize various processes. Additionally, we have implemented digital tools to enhance **communication with our clients**.

*Case study:*

Generating **value and services from data**



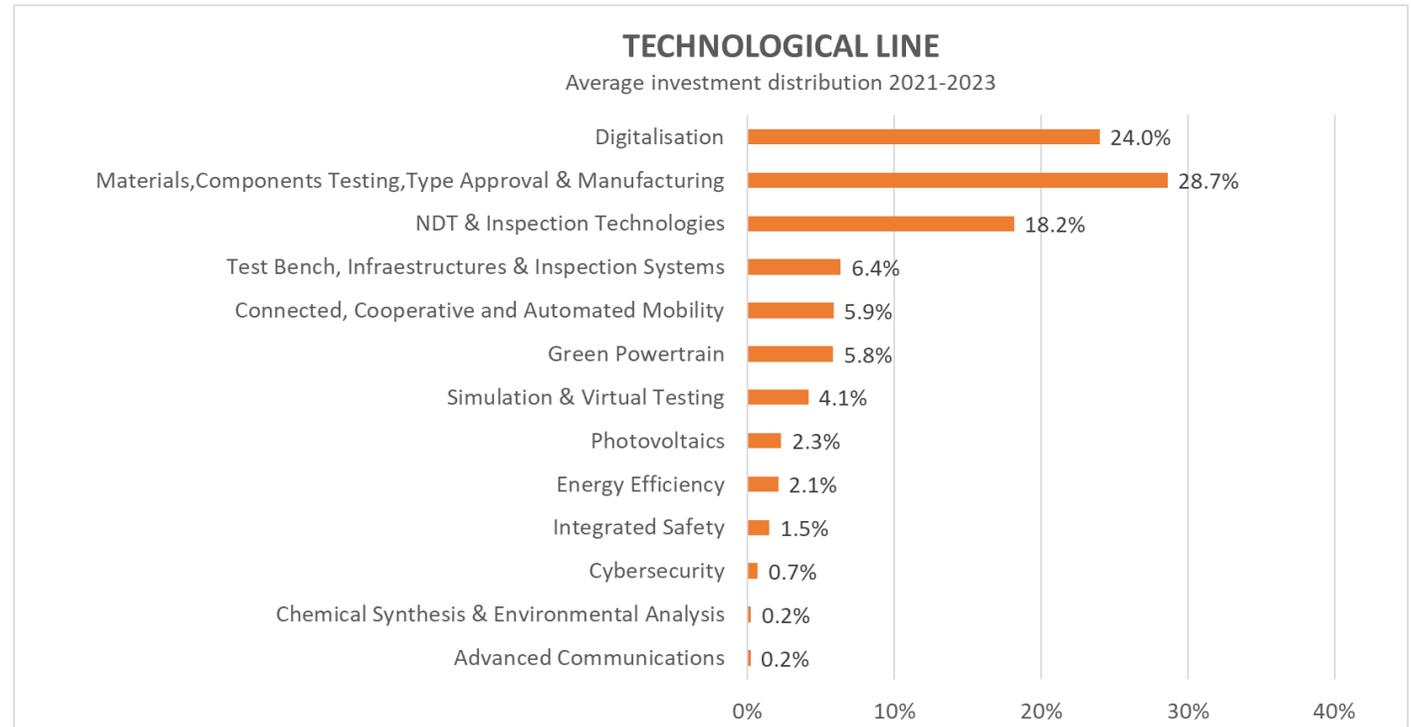
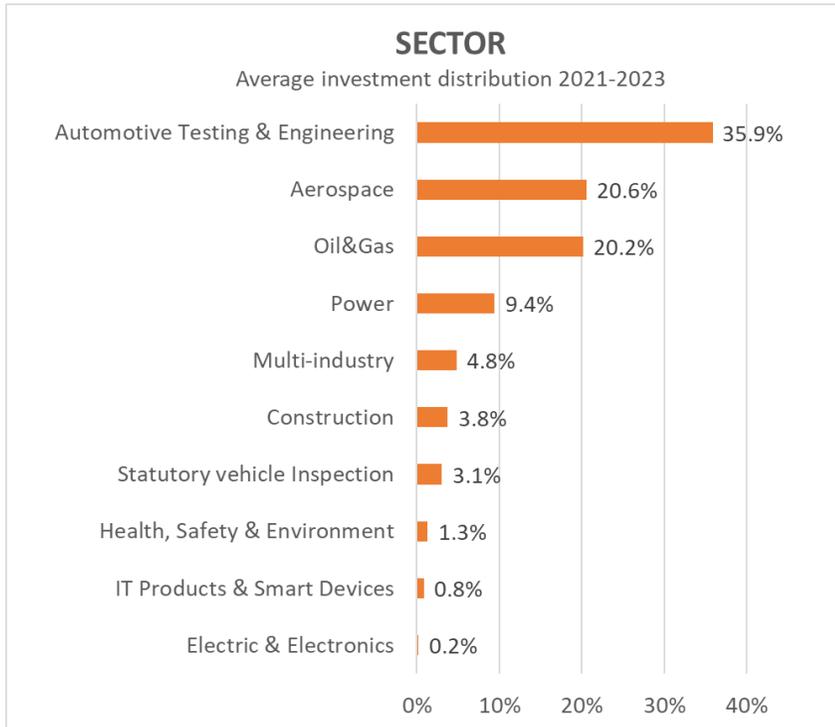
### CORPORATE VENTURING

Applus+ Ventures **collaborates with startups** in key areas such as energy transition and disruptive technology. In 2023, we signed an agreement with Alerion for **wind turbine inspection** and explored innovative solutions related to **infrastructure** inspection, **automotive** testing, **CO2 emission reduction**, and **sustainability**.

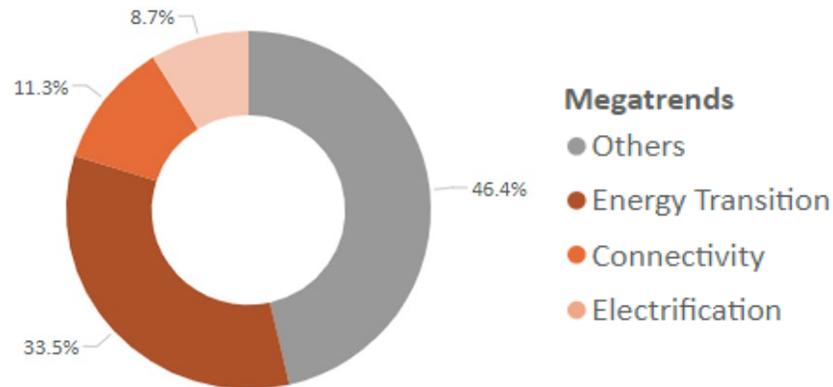
*Case study:*

Agreement with Alerion to **inspect wind turbines through AI**





Investment in Innovation by megatrends Projects 2023



In 2023, in addition to the digitalisation of our services, **54%** of the investment in innovation is aligned with the strategic megatrends: **Energy Transition, Electrification, and Connectivity.**

We participate in innovation support programs aligned with our strategy.

## ENERGY TRANSITION

**LONG RUN**  
**LEON-T**  
**PV BIFACIAL**  
**VEH<sub>2</sub>DEM**  
**DEMONSTRATE**  
**SOFIA**  
**FASTER**  
**HELIOS**  
**Optimus**

TANGO  
 Digital Technologies Acting as a Gatekeeper to information and data flows  
 Financiado por la Unión Europea NextGenerationEU  
 Financiado por la Unión Europea NextGenerationEU Plan de Recuperación, Transformación y Resiliencia  
 INNOVATION Project ZERO  
 CLEAN AVIATION Co-funded by the European Union  
 Financiado por la Unión Europea NextGenerationEU Plan de Recuperación, Transformación y Resiliencia

## CONNECTIVITY

**SHOW**  
**SAFE-UP**  
**Althena**  
**co ibri**

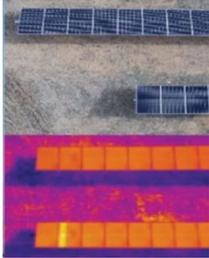
**SELFY**  
 AUTOMATED URBAN MOBILITY  
**TARGET-X**  
 Financiado por la Unión Europea NextGenerationEU Plan de Recuperación, Transformación y Resiliencia

## ELECTRIFICATION

**ECHARGE 4DRIVERS**  
**XLCONNECT**  
**URBANIZED**  
**COBRA**  
**ZEFES**  
**MARBEL**  
**REFLECTIVE**  
**NEXIBAT**  
**HERWINGT**  
**PERTE**  
 Para el Vehículo Eléctrico y Conectado.  
**Alma**

Financiado por la Unión Europea NextGenerationEU Plan de Recuperación, Transformación y Resiliencia  
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## RENEWABLES



**PVBifacial** – bifacial module technologies

**Smart PV Inspection Tool (SPI)** – defects analysis in solar panels

**APAA** – Advanced Performance Application Tool

## HYDROGEN AND FUEL CELL



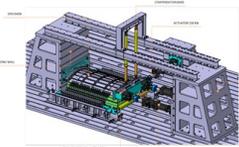
**SelbsttragenderLiner, K2H2 & Swat** – high pressure gas H2 tanks

**FASTERH2 y H2ELIOS** – liquid H2 tanks for aviation

**ZEFES** – FCEV in long distance freight transport

**VEH2DEM** – hydrogen vehicle demonstrator

## EMISSIONS REDUCTION



**LEON-T** – particulate and noise emissions from tires

**LONGRUN** – heavy duty trucks and coaches

**DEMONSTRATE, SOFIA y OPTIMUS** – new composite aerostructures

## CONNECTED VEHICLE



**SHOW** – SHared automation Operating models for Worldwide adoption. For deployment of electrified, connected, cooperative and shared fleets.

**SAFE-UP** – Safety tools for a connected mobility environment

## ELECTRIC VEHICLE



**eCharge4Drivers** – improvement of charging experience

**URBANIZED** – modular architectures for EV

**HUB-DCO2** – creation of battery testing laboratories

**NEXTBAT** – new generation of batteries

## ARTIFICIAL INTELLIGENCE



**AITHENA** – AI based CCAM

**IA for drone inspection** – wind mills and photovoltaic

**IA for vehicle inspection** – streamline and improve inspection

**Chatbot** – for technical vehicle inspection service

**IA for inspections automation** – Pipeline wall thickness –digital radiography

## e-DELIVERY / e-COMMERCE



**eReformas** – portal for inspection of vehicle refurbishment service

**Live testing** – remote follow-up of tests in real time and with augmented reality

**e-Commerce** – for automotive testing

## INSPECTION AUTOMATION



**Remote Inspection** – drones, 3D models and digital twins

**PORTABLE IWEX** – new design IWEX UT device

**IWEX & DTI automation** – algorithms and machine learning

*Thanks!*

**Applus<sup>+</sup>**

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