3

DIGITAL INNOVATION AND TRANSFORMATION

3.1
Innovation
Activities

Isdefe is firmly committed to innovation. Competitiveness and positioning in strategic areas are improved through the planning and execution of innovation activities. The result of the innovation activities provides Isdefe with first-hand knowledge that allows the company to anticipate the future and predict the opportunities and challenges that the Administration will have to face.

Innovation at Isdefe

Isdefe, as the in-house technical services provider of the General State Administration (GSA), promotes various innovation activities with the aim of gaining knowledge, anticipating the needs of the administration and improving engineering and consulting services in the company's areas of activity.

Innovation allows Isdefe to support the Public Administration in the challenges and opportunities it will face in the future.

We are committed to innovation activities as a tool to identify and determine what technologies await in the coming years, especially in the field of Defence and Security.

In terms of sustainability, investing in innovation allows Isdefe to engage in technology foresight and monitoring, as well as to participate in projects in this area that develop proof of concept, prototypes, methodologies, and more. This investment results in the improved quality of the consulting and engineering services that Isdefe provides to the public administration, as well as to society in general.

The dissemination and exploitation of the innovation activities provides first-hand knowledge that allows us to anticipate the future and predict the opportunities and challenges that the Administration will have to face.

The Directorate of Business Development and, within it, the **Department of Innovation, Processes and Digital Transformation**, is responsible for preparing, supervising and coordinating the implementation of innovation activities.

Innovation at Isdefe is planned and implemented around four areas of activity:

- Technology foresight and monitoring.
- Reinforcement of positioning.
- Promotion of a culture of innovation.
- Dissemination and exploitation of innovation results.

Technology foresight and monitoring

Horizons Network

The Horizons Network is the programme around which technology foresight and monitoring activities at Isdefe are structured. Its primary goal is to identify future trends in Isdefe's areas of activity in order to train the company's staff sufficiently far in advance to respond quickly to the new challenges facing the GSA.

The Horizons Network:

» Identifies and exploits the existing sources of knowledge in the innovation ecosystem, lays out a range of areas of activity focused on both the workforce and the organisations of the AGE, and makes available to the organisation tools to promote a corporate culture of innovation.

» Develops technology foresight and monitoring activities in areas of strategic interest to Isdefe, mainly using the partnership between academia and Isdefe that is structured around technology observatories.

Horizons Network Observatories

- Defence and Security
- Air traffic management
- Cybersecurity
- ITC and digital progress
- Space
- Energy transition
- Systems engineering, logistics and program management

The Network feeds on knowledge from academia, its employees, the organisations for which it works, and national and international partners and collaborators. The Network also exploits information from open sources.

Horizons Network Observatories

Isdefe's Horizons Network has developed a University-Business collaboration model and has built up a network of experts at the national and international levels that enhances the existing knowledge in the organisation, academia and the Administration.

In 2021, the Horizons Network comprised a set of observatories:

Defence and Security Observatory

POLYTECHNIC UNIVERSITY OF MADRID (UPM)

This observatory is the result of the work carried out under the Isdefe-UPM Chair in Defence and Security with the Advanced School of Telecommunications Engineers (ETSIS). The observatory conducts foresight exercises in the detection and neutralisation of drones, on on-board sensors and in data science and Big Data for defence and security.

The main areas of research of the Defence and Security Observatory in 2021 were the characterisation of cameras embarked on UAVs with motion modeling, the evaluation of digital algorithms for unblurring images captured by UAVs, and an experimental analysis of the vulnerability of commercial drones to targeted energy attacks.

Air Traffic Management Observatory

POLYTECHNIC UNIVERSITY OF MADRID (UPM)

This observatory is the result of the work carried out under the Isdefe-UPM Chair in Air Traffic Management with the Advanced School of Aeronautical Engineers (ETSIA). The observatory conducts foresight exercises on the integration of drones in airspace and urban air mobility.

The main areas of research of the Air Traffic Management Observatory in 2021 were the generation of scenarios of interest with the ATC SkySim simulation platform, the integration of RPAS into the air control of airports, and the characterisation of an Urban Air Mobility operations in the Barcelona metropolitan area.

Cybersecurity Observatory

ALCALÁ DE HENARES UNIVERSITY (UAH)

This observatory is the result of the work carried out under the Isdefe-UAH Chair in Cybersecurity, ICT and Digital Progress in the Department of Computer Sciences of the Advanced School of Computer Engineering at the University of Alcalá. The observatory conducts foresight exercises in legal cybersecurity, cloud cybersecurity and data science, in the dark web and in cybersecurity on mobile devices.

The Cybersecurity Observatory's main areas of research in 2021 were blockchain and its underlying technologies, continuous authentication for both military users and devices, homomorphic cryptography, lightweight cryptography, and IoT security.

ICT and Digital Progress Observatory

ALCALÁ DE HENARES UNIVERSITY (UAH)

This observatory is also part of the Isdefe-UAH Chair in Cybersecurity, ICT and Digital Progress in the Department of Computer Sciences of the Advanced School of Computer Engineering at the University of Alcalá. The observatory conducts foresight exercises in 5G technologies, Artificial Intelligence and Soft Computing for defence applications.

The main areas of research of the ICT and Digital Progress Observatory in 2021 were Artificial Intelligence applied to Natural Language Processing (NLP), 5G propagation models and automatic planning of logistics centres based on Soft Computing.

Space Observatory

CARLOS III UNIVERSITY IN MADRID (UC3M)

This observatory is the result of the work carried out as part of the Isdefe-UC3M Chair in Space with the Department of Aerospace Bioengineering at the Advanced Polytechnic School. The observatory conducts foresight exercises in quantum technologies applied to the space sector, space monitoring and ground observation.

The main areas of research of the Space Observatory in 2021 were optical communications and quantum cryptography.

Energy Transition Observatory

UNIVERSITY OF ZARAGOZA (UZAR)

This observatory is the result of the work carried out in collaboration with the Department of Electrical Engineering at the University of Zaragoza.

The main areas of research of the Energy Transition Observatory in 2021 were the development of a methodology to evaluate the technical/economic aspects of the implementation of renewable energies, and a pilot project to develop a tool to automatically collect energy consumption data for buildings.

Systems Engineering, Logistics and Programme Management Observatory

This observatory is wide-ranging and methodological in nature, so it carries out its activity in permanent or specific collaborations with various universities and international organisations.

In the field of Systems Engineering, the observatory is part of the Advisory Board of INCOSE, the International Council on Systems Engineering, and its Spanish chapter, AEIS.

In the field of logistics, in 2021 the observatory collaborated with the University of A Coruña and the Spanish Navy (Cartagena Naval Base) to conduct a study using machine learning and multi-criteria analysis techniques of a new system for managing spare parts on board military vessels.

■ Reinforce the position of Isdefe through innovation

Isdefe's participation in innovation projects and in activities related to systems engineering allows the company to strengthen its positioning as a state-owned company based on innovation.

Participation in European innovation projects

Isdefe continues to consolidate its participation in European programmes, such as Horizon 2020, SESAR and EUSPA. In 2021, Isdefe was involved in the innovation projects shown below:

Projects financed by *SESAR JOINT UNDERTAKING (SESA-JU)*

USEPE – U-space separation management service

» **January 2021 – December 2022.**
» **Role: Isdefe leader of the consortium.**

The goal of the project is to study the separation of drones in U-Space and to support the addendum to the ATM Master Plan related to U-Space in terms of automation and the use of new technologies, such as Artificial Intelligence and Machine Learning.

INVIRCAT – IFR RPAS Control in Airports and TMA

» July 2020 – December 2022.

» Role: Isdefe member of the consortium.

The project is developing an operational concept to efficiently and safely integrate remotely piloted aircraft systems (RPAS) into the terminal control areas of airports, based on simulation assessments and recommendations, for use by legislators and standardisation bodies.

IMHOTEP – Integrated Multimodal Airport Operations for Efficient Passenger Flow Management

» July 2020 – November 2022.

» Role: Isdefe member of the consortium.

The project develops a conceptual framework of operations and a set of data analysis methods and tools to share information, create common situational awareness and make real-time collaborative decisions between airports and ground transportation stakeholders. Case studies are being carried out at Palma de Mallorca and London City airports to test the methods and tools developed.

PJ04 W2 TAM – PJ04 W2 Total Airport Management

» **December 2019 – December 2022.**

» **Role: Isdefe, partner entity of ENAIRE.**

The project aims to improve the integration of airports and large and medium/regional airport networks, improve the integration of airports in the area of operations and on the ground, and conduct further research on how environmental aspects could be monitored and managed in routine airport operations.

PJ13 W2 ERICA – Enable RPAS, Insertion In Controlled Airspace

» **December 2019 – December 2022.**

» **Role: Isdefe, partner entity of ENAIRE.**

The project analyses the operational and technical opportunities that would allow RPAS to operate safely in controlled airspace, both in nominal conditions and during emergencies. It also creates test solutions without a negative impact on air traffic. The objective is to develop accredited European operations with RPAS in non-segregated airspaces, in order to enable civilian and military RPAS to operate with air traffic management systems inside and outside Europe.

Projects funded by the European Commission (Horizons 2020)

COPKIT - Technology, training and knowledge for Early-Warning / Early-Action led policing in fighting Organised Crime and Terrorism

» June 2018 – December 2021.

» Role: Isdefe leader of the consortium.

The project addresses the challenge of analysing, preventing, investigating and mitigating the use of new information and communication technologies by organised crime and terrorist groups. This is a key challenge for policymakers and for law enforcement agencies due to the complexity of the phenomenon and the number of factors and actors involved. Its goal it to develop an early warning system based on intelligence at both the strategic and operational level.

MEDEA - Mediterranean practitioners' network capacity building for effective response to emerging security challenges

» June 2018 – May 2023.

» Role: Isdefe member of the consortium.

The project establishes and operates the MEDEA network, a multidisciplinary network of security professionals; engages participants in forward-looking governance on new security challenges; promotes the joint creation of security technology innovations and capabilities between professionals and innovation providers; and establishes and annually updates the Mediterranean Security Research and Innovation Agenda (MSRIA).

PROMENADE - Improved maritime awareness by means of AI and BD methods

» October 2021 – March 2023.

» Role: Isdefe member of the consortium.

The project seeks to improve knowledge of maritime environments by providing more accurate, robust and early anomaly detection. In addition, the project aims to shorten the time to market and the adoption of related technologies and solutions by Coast Guard and Border authorities. To do to, it studies technologies and solutions that have the potential to be used in different European border scenarios.

NESTOR - An enhanced pre-frontier intelligence picture to safeguard European borders

> » October 2021 – March 2023.
>
> » Role: Isdefe member of the consortium.

The project aims to showcase solutions applied to long-range automated surveillance and protection beyond maritime and land borders by detecting, classifying and tracking moving targets (e.g. people, cars, drones, etc.) using state-of-the-art artificial intelligence techniques in order to provide comprehensive surveillance capabilities, timely pre-frontier situational awareness in order to protect and safeguard European borders.

Projects funded by the European Space Agency (EUSPA)

PETRUS-PRS JTA-MS: PRS JOINT TEST ACTION

> » November 2017 – June 2022.
>
> » Role: Isdefe member of the consortium.

The project provides test data and results to the programme in support of the validation of the Galileo PRS service, with the aim of assessing its suitability to meet the needs of potential users. The project presents the lessons learned on different characteristics of the PRS service - quality and safety of the PRS service, performance, operational concept and definition of use cases - and engages in activities to raise awareness of the actions and use involving PRS.

Programme to gather and manage innovation ideas

In 2021, the seventh edition of the Programme to Gather and Manage Innovation Ideas was held, allowing all Isdefe employees to participate in the process of generating ideas in order to transform them into research, development and innovation projects with internal applications and for our customers.

The programme promotes a corporate culture of innovation and was instituted with the aim of engaging and raising awareness throughout the organisation about the importance of innovation and its prominent role in the process of generating value for the company.

In the 2021 edition, 23 ideas were presented in the areas of defence and security, transport, public administration, ICT and energy.

Winning projects in the 2021 edition:

PSEPIA – Secure Platform for Processing Classified Data Using Artificial Intelligence

Objective:

To design a secure virtual environment in Isdefe, with tools and applications, to enable every Isdefe operational directorate to do proof of concept tests with Artificial Intelligence using classified data.

CL-VCON – Clustering in connected vehicles to detect anomalies and breakdowns in military vehicles

Objective:

To apply clustering algorithms to time series data from certain connected military vehicles in order to detect anomalies, anticipate faults, detect misuse, etc.

Congress of Systems Engineering Applied to Defence

On 25 November 2021, the Congress of Systems Engineering Applied to Defence was held in the facilities of the Advanced Centre for National Defence Studies (CESEDEN). The conference was broadcast live and is available on CESEDEN's YouTube channel.

Organised by Isdefe and the Spanish Association of Systems Engineering (AEIS), its purpose is to disseminate in Spain the discipline of systems engineering and its application among Defence and Security professionals in the Public Administration, academia and industry.

The congress is biannual, with its next edition scheduled for November 2023.

3.2
Digital transformation in the company

Today, the digital transformation is present in our work, in our companies and in our lives. The new demands are giving rise to specific resource and knowledge needs in emerging areas and in the field of disruptive technologies, which requires us, as an instrumental means created to serve the Ministry of Defence, to respond to this demand.

ISDEFE is committed to this change, which is why it has also designed and is developing its own Digital Transformation by implementing a Transformation Plan.

This plan includes the actions identified in the short, medium and long term to see through the aforementioned transformation, whose ultimate goal is to provide people with the necessary capacities to face current and future management needs, ensure the interoperability of systems and create a technological environment that allows the staff of Isdefe to carry out their activity in any physical setting.

Digital transformation in the company

During this period, Isdefe's **Strategic Digital Transformation Plan (PTD)** for 2022-2025 has been defined under the strategic objective "Company Management". The purpose is to further the Digital Transformation through an effective and interoperable technological infrastructure with agile and efficient processes while protecting critical information at the Company, and to develop a digital acquisition strategy and a flexible and adaptable work environment in keeping with its function as an in-house service provider.

The development of the Digital Transformation:

» Improves competitiveness.
» Provides high value-added services in technological and strategic areas.
» Positions the company as a benchmark in the Public Business Sector.

The new PTD provides continuity to the actions included in the previous plan, and is structured into four groups of activities:

» **Deployment of technological infrastructure.**
Update and modernise the technological infrastructure to meet current and future management needs.

» **Process analysis, simplification and automation.**
Once the key processes at Isdefe have been mapped out, the objective is to have agile and efficient processes by automating those that are open to automation.

» **Digital acquisition strategy.**
Prepare a procedure to carry out the company 's digital acquisitions.

» **Digital Workplace.**
Develop the objective to let all employees do their work from anywhere, with full connectivity and using the appropriate devices.

Initiatives

During the year 2021, the following initiatives were undertaken:

» **Operation of the new service to settle employee expenses** through a mobile app.

» Migration **to collaborative tools initiated** in order to create, access, and share documents and information in real time anytime, anywhere through the cloud.

» **Migration of corporate mail to a new, modern, efficient and secure multi-device platform**, with large storage mailboxes and hosted on the web.

New, more effective, collaborative and mobile way of working in the company.
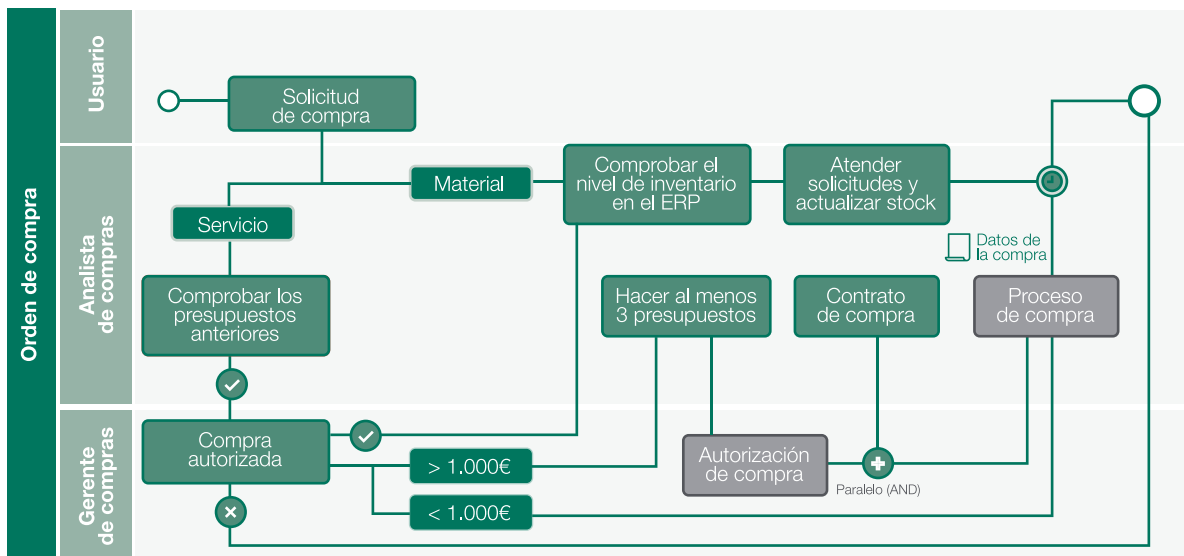
» **Formal documentation of the processes** identified within each functional area through a unique methodology, for subsequent analysis, optimisation and automation, in order to constantly improve said processes.

» **Improvement, optimisation and enhancement of the company's integrated management tool** (hours, billing, projects, etc.), eliminating manual operations and avoiding duplicate or contradictory data, automatically enhancing the performance of certain functions.
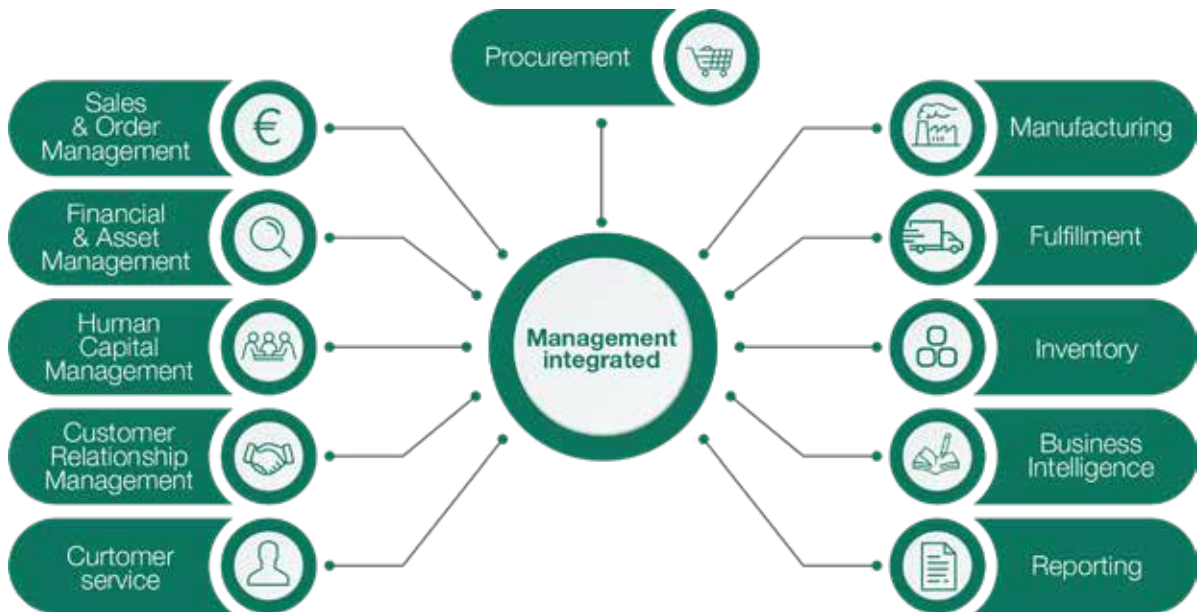
» **Continued issuance of certificates to employees**, while extending the use of Electronic Signatures as a means to sign documents electronically.

» **Change Management Framework**, in this context it is essential to encourage activities to properly inform and train employees; in short, to guide them in order to make the change easier and simpler. In 2021, a project was initiated to develop a methodology to optimise how the changes and initiatives that are undertaken are managed and reported.