

Terms of participation



# Air Traffic Management technological challenges contest 2024

Call open until April 30, 2024



PENINSULA  
CORPORATE INNOVATION

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# 1. The Organization

ENAIRe is the company of the Ministry of Transport, Mobility and Urban Agenda that manages air navigation in Spain. It provides aerodrome control services at 21 airports, including those with the highest traffic, and en-route and approach control through five control centers: Barcelona, Madrid, Gran Canaria, Palma and Seville. In addition, 45 air traffic control towers receive communication, navigation and surveillance services from ENAIRe.

CRIDA (a Spanish acronym referring to the Research, Development and Innovation Reference Center ATM A.I.E.) has the mission of improving the efficiency and performance of the Spanish air traffic management system through the development of ideas and R&D&I projects that provide measurable solutions through system performance indicators, all considering the Spanish system as an integral part of a global system.

CRIDA is a fundamental support for ENAIRe's R&D&I activities and one of the activities it has delegated is to promote open innovation as a means of solving the future challenges posed by the evolution of the ATM (Air Traffic Management) system. CRIDA and ENAIRe are committed to open innovation as a fundamental lever to maintain its position as an international benchmark.

Being aware that the business of providing air navigation and air transport services is not known by the general public, it is necessary to manage different initiatives including this ideas contest.

For the execution of this ideas contest, CRIDA has the support of Peninsula Corporate Innovation, SL, a company specialized in carrying out entrepreneurship programs<sup>1</sup>.

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<sup>1</sup> Peninsula Corporate Innovation SL is the company awarded the "Open Innovation Support Technical and Administrative Specifications" published on the Public Sector Contracting Platform on March 6 2022 with File Number 2022-01.

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## 2. The Contest

ENAIRe launches this year the 3rd edition of the **Air Traffic Management technological challenges contest**.

This contest, held annually, aims to find solutions to technological challenges in the field of air transport in the medium and long term. The contest is open to university research groups or any other type of group.

We accept technological solutions applicable to any sector of activity, as long as they are focused on the provision of air traffic/air transport services.

This contest will award a cash prize to the winning solution, which will be developed through a research agreement funded by ENAIRe/CRIDA.

## 3. Challenges

Technological challenges within the framework of open innovation in ATM are defined as those challenges that can be solved **with technologies coming from other fields** different from ATM. Therefore, the technological challenges defined in this competition have a **transversal nature** and seek to take advantage of the knowledge and experience acquired in other technological areas for their use in the air traffic management environment. The technological challenge seeks to attract **innovative solutions** that are not already being researched in this environment.

We are looking for total or partial solutions to any of the following 6 challenges.

### CHALLENGE #1. Intelligent air binomial: development of a proactive digital assistant for air traffic controllers

The challenge focuses on the development of a digital assistant dedicated to air traffic controllers, whose main function is the proactive management of aircraft separation. We are looking for a system that, from the beginning of its training, learns and understands how controllers deal with the complexities of air traffic control routines and practices.

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The assistant should accompany the controller on a daily basis, from the beginning of their training, offering customized options for resolving air separation conflicts based on their common learning and the specific style of the air traffic controller. In the last phase of training, the assistant is expected to autonomously propose and resolve potential conflicts, always under the controller's supervision.

The challenge drives the creation of a highly personalized Human-Assistant pairing, specialized in the efficient and safe management of aircraft separation. The assistant's ability to anticipate and resolve separation losses, thus optimizing safety and efficiency in the airspace, will be especially valued.

The digital assistant would be able to identify when the controller's execution of tasks degrades and therefore refresher training is necessary.

The development of a digital assistant for air traffic controllers involves considering various aspects and challenges specific to this critical environment. It will be positively considered to explain which technology or combination of technologies is the most suitable to address the different challenges (generative AI, deep learning, optimization algorithms, Natural Language Processing (NLP), others).

## CHALLENGE #2. Exploring the quantum frontier: redefining efficiency in European airspace resource planning

This challenge focuses on the revolutionary application of quantum computing to improve the efficiency and accuracy of resource planning in European airspace, where thousands of aircraft move daily. The goal is to explore how quantum computing can transform the ability to analyze multiple operational scenarios simultaneously and efficiently.

Currently, uncertainty in factors such as inaccurate weather events or takeoff delays lead to conservative planning, with oversized systems and buffers limiting airspace capacity.

Participants must devise quantum solutions that leverage the ability to simulate infinite scenarios to accurately forecast future events. The goal is to eliminate inefficiencies arising from the lack of certainty in operational events and enable more accurate and adaptive resource planning.

Creativity and efficiency in the application of quantum computing to address this problem will be valued, thus offering an innovative approach that could transform the way resources are planned and managed in air navigation control in Europe.

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## CHALLENGE #3. Proactive prevention of air incidents

The challenge is to develop an advanced technological solution to anticipate and prevent air traffic incidents in the field of Air Traffic Management (ATM). Unlike traditional approaches that focus on detecting a single causal factor, the objective is to interrupt the error chain by identifying and correcting any intermediate errors before they trigger an incident.

Participants must propose an intelligent system that, based on available information, actively analyzes operations and detects patterns of anomalous behavior. The solution must be able to identify possible intermediate errors in the chain before they evolve into critical situations.

The effectiveness of the system in anticipating and preventing incidents will be assessed, as well as its ability to integrate harmoniously into the ATM environment. The proposed solution must be proactive, adaptive and capable of working in real time to significantly improve airspace safety and reduce the possibility of air incidents.

## CHALLENGE #4. Optimization and efficient certification of artificial intelligence (AI) models in air traffic management.

In the field of Air Traffic Management (ATM), one of the most significant challenges is how to certify and keep Artificial Intelligence (AI) models up to date in an efficient and safe manner, according to the European Union Aviation Safety Agency (EASA) regulations.

In particular, according to EASA, adaptive learning processes, so commonly used in social networks, where AI systems adjust their behavior and response based on the experience and feedback received by the user in real time, present a greater challenge in such a critical environment as air traffic control. Certification involves demonstrating that such a trained system is predictable, understandable and capable of operating safely in a variety of situations.

To this end, solutions to the challenge could focus on designing strategies so that AI models can always be updated within the limits of their original "Operational Design Domain" (ODD). This means that models must be able to adapt to new conditions or data without going outside the parameters for which they were initially designed and certified. This requires a balance between continuous model improvement and compliance with aviation safety regulations.

The challenge is to find solutions in critical environments other than ATM that can adapt and keep AI models in the aviation domain safe, reliable and up to date, while respecting current regulations and ensuring safety at all times.

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## CHALLENGE #5. Predictive modeling for behaviors in ATM environments without precedents or historical data

This challenge focuses on exploring artificial intelligence in situations without historical data, common in the field of air navigation control. Unlike conventional models that rely on historical data, the objective is to investigate how to use artificial intelligence to predict behaviors in "new" scenarios, where no prior data is available for conventional model training.

Participants should propose innovative approaches for building predictive models that can adapt to significant changes in the air navigation system, even when there is no relevant data history, such as the use of reinforcement and simulation learning, generative models or transfer of learning in related situations. The ability to simulate and identify effects prior to implementation of system changes will be critical to the success of the proposed solutions.

An example occurred during the pandemic where a similar situation had not occurred previously and predicting traffic demand was needed for proper planning of control resources.

Creativity in the application of artificial intelligence techniques in the prediction of behavior in non-historical situations will be especially valued, thus offering advanced tools for air navigation control in dynamic and changing environments.

## CHALLENGE #6. Innovation for sustainable air traffic

The challenge poses the fundamental question: Can we innovate more in air traffic management to reduce the environmental impact of aviation? Despite current advances, such as the implementation of satellite navigation systems and trajectory optimization algorithms, the challenge is to inspire new ideas that go beyond existing practices.

Currently, strategies in air traffic management include the adoption of advanced technologies such as RNAV/RNP for more efficient routing and continuous trajectory optimization algorithms for real-time adjustments. The introduction of Free Route Airspace, the modernization of ATM systems or collaborative flight planning systems also contribute to overall system efficiency. However, the challenge is to explore bolder and more creative approaches that can radically transform air traffic management and further reduce its environmental footprint.

Participants are invited to propose innovations in air traffic management that consider environmental, economic and operational factors, encouraging collaboration between

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airlines and controllers to optimize routes and processes. The goal is to drive disruptive ideas that not only optimize air traffic management, but also boost the sustainability and environmental efficiency of air transport into the future.

## 4. Conditions of participation

Participation is open to university or any other type of research groups that meet the following requirements:

- Accept the commitment to participate in the 18-month research agreement, which represents the prize of this competition.
- Demonstrate proven ability in the field described in the challenge.
- Complete the information required in the registration form within the deadline established in these terms of participation.
- Submit an original project that does not infringe industrial or intellectual property rights of third parties and that does not transmit or disseminate illegal, defamatory or offensive content, or content that violates the values and dignity of people.
- Not being an employee of CRIDA or ENAIRe.

Each contestant is responsible for the veracity of the data provided and will be solely legally responsible for any dispute that may arise due to non-compliance of law regarding intellectual and/or industrial property rights.

The contestants grant the necessary rights to film, photograph the presentations, use the images of the contestants and the presentations for communication purposes. They also authorize the use of the material presented and obtained during the contest for the preparation and dissemination of newsletters, press releases, social networks, blogs, etc., for promotional and communication purposes.

The organization of the Air Traffic Management technological challenges contest reserves the right to exclude from the contest any application that do not comply with the requirements established in these rules, provide false or incomplete data, or without the corresponding authorization, in particular, discarding those ideas that have no potential application in the field of air traffic/air transport service provisions.



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## 5. Documentation to be submitted

Each contestant must complete the form available emphasizing the description of the proposed solution on the contest website, where contestants will be asked questions about their solution to one of the technological challenges proposed in section 3 of these terms of participation.

## 6. Evaluation criteria

The solutions submitted will be evaluated according to the quality of the information provided in the application form based on the following evaluation criteria, which can be classified into three groups:

### 6.1. Technical (maximum 60 points)

ADAPTABILITY TO THE CHALLENGE (20 points): The degree of adaptation and effectiveness of the solution to solve any of the proposed challenges will be evaluated.

APPLICABILITY (5 points): The degree of applicability of the proposal will be evaluated.

FEASIBILITY (15 points): The technical, time and economic ease of deployment of the solution after the research phase will be evaluated.

DEGREE OF INNOVATION (10 points): The degree of disruption of the technology will be evaluated.

OPERATIONAL IMPACT (10 points): The benefits provided by the solution will be evaluated. The organization may consider the disqualification of a contestant if it obtains a total score lower than 40 points in this block.

### 6.2. About the research group (maximum 30 points)

TEAM COMPOSITION (15 points): The profiles of each of the team members that will participate in the research phase, their areas of knowledge, as well as other available profiles that may add value will be valued.

PROJECTS IMPLEMENTED BY THE TEAM MEMBERS (15 points): Projects carried out by a member of the team related to the challenge and the solution will be valued.

The organization may consider the disqualification of a contestant if he/she obtains a total score lower than 15 points in this block.

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## 6.3. Final presentation (maximum 10 points)

**FINAL PRESENTATION (10 points):** Criterion only applicable to the finalist solutions that have obtained the highest score in the criteria described in sections 6.1 and 6.2 of these terms of participation. The clarity of the explanation in the presentation of the solution, as well as in the answers provided to the doubts that the Selection Committee may have, will be evaluated. Additionally, it should be mentioned that, after the clarifications obtained in the presentation, the Jury may reevaluate some of the previous scores.

The organization may consider the disqualification of a contestant if he/she obtains a zero score in any of the blocks or a total score lower than 50 points.

The evaluation will be confidential and will not be shared with the contestants.

## 7. Selection Committee and Jury Selection

**Selection Committee:** is made up of a group of innovation consultants from the Peninsula Corporate Innovation SL team, who have extensive experience carrying out programs to promote entrepreneurship and who integrate profiles from the areas of strategy, business, innovation and technology.

**Jury:** It is made up of professionals from the fields of entrepreneurship and innovation in the air navigation sector, both from Peninsula Corporate Innovation SL and CRIDA/ENAIRe.

## 8. Phases of the contest

### 8.1 Submission of proposed solutions

Contestants must submit their applications through the form available on the contest website [retos.enaireopeninnovation.com](https://retos.enaireopeninnovation.com).

The deadline for completing the form is **April 30, 2024 at 23:59h CET (UTC+1)** (the organization reserves the right to extend the deadline).

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## 8.2 Evaluation of proposed solutions

The Selection Committee will analyze all the applications received and will select at least 3 finalists according to the evaluation criteria described in section 6 of these terms of participation.

The evaluation of the proposals will end on **May 22, 2024**.

## 8.3 Presentation of the finalist proposals

Once the finalist solutions have been selected, a final event will be held within 7 calendar days (May 29, 2024) in which the finalist research groups will have the opportunity to present the proposed solution and the Jury will evaluate them and may ask questions to clarify any point that needs further explanation.

The duration of the presentation and clarifications to the doubts presented by the Jury will be one hour per proposal on **May 29, 2024 from 10:00h CET (UTC+1)**.

## 8.4 Selection, notification and acceptance of the challenge

On **June 12, 2024**, the winning research group will be informed of the above-mentioned condition through the e-mail address provided in the registration form.

After the selection of the winning solution, the winning research group will have five (5) working days to contact the organization through [info@enaireopeninnovation.com](mailto:info@enaireopeninnovation.com) and expressly state their willingness to accept the challenge.

## 8.5 Investigation phase of the winning solution and follow up

From the date of acceptance of the challenge, the winning research group will sign a research agreement to begin the work, which will last 18 months.

At the beginning, the winning research group must generate a report detailing the specific scope of the activities, the planning of the activity and the resources initially involved. All reports must be expressly accepted by the parties and signed.

Regular follow-up meetings will be held (at least quarterly) and, additionally, when agreed between both parties. The winning research group will keep a record of the action items agreed in all these meetings, as well as their status.

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These meetings will address both management and technical follow-up aspects of the activities being carried out to ensure that the action plans are proceeding as planned.

Close collaboration activities are foreseen to ensure proper monitoring of the project. Any proposal to carry out these activities will be positively valued (elaboration of reports of technical results achieved -periodically or not-, face-to-face or telematic meetings, e-mails...).

At the end of the research phase, the winning research group will present the final result of the research, which, according to its proposed solution, should consist of a feasibility study of the possible solution and/or presentation of a prototype.

## 9. Award

The winning research group will sign a research agreement for a period of 18 months and will have at its disposal an amount of 60,000 € (VAT not included), of which 40,000 € will be delivered in 2024 as an early installment and 20,000 € in 2025 after the end of the activities. The objective is to develop the proposed solution to demonstrate its suitability and technical and economic feasibility.

All payments will be liquidated by Peninsula Corporate Innovation SL in the bank account indicated by the winner and will be subject to the legally established withholding (if applicable), against the presentation of an initial report of the activities and expected results as an advance payment (2024) and a closing report detailing the results achieved (2025). Once the reports are accepted by the organization, the corresponding payments will be made.

In addition, periodic reports prepared by the winning research group detailing the expected scope and results achieved in each task are expected to be available.

If the winner rejects its prize, the prize may be offered to the contestant that has been ranked directly below it in the evaluation phase.

The prize may be void if the Jury so decides.

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## 10. Acceptance of the terms

The contestants, by their mere participation, declare that they are aware of and fully accept these terms. All contestants expressly waive any right of challenging any of the decisions of the Selection Committee and the Jury.

The submission of applications is free and voluntary. Participation in this call for proposals implies full acceptance of these terms of participation and the explicit waiver of any subsequent claim, for which contestants are obliged to strictly comply with them at all times.

Failure by any contestant to comply with these Rules will result in the automatic cancellation of such participation.

CRIDA/ENAIRe reserves the right to modify these rules. Likewise, it reserves the right to modify the mechanics of participation, as well as the reward to the winning research group.

These modifications will be made with criteria of total impartiality and CRIDA/ENAIRe will communicate them sufficiently in advance to the contestants by means of notification through their contact e-mail. In the event that the contestant does not indicate his/her wish to withdraw from the competition, it will be understood that he/she accepts the new rules.

## 11. Intellectual Property

Contestants will be responsible for their solution and will maintain the intellectual or industrial property of their submitted solutions at all times.

## 12. Duty of information: data protection

In accordance with the RGPD and the LOPDGDD, Peninsula Corporate Innovation SL will process the data provided in order to be able to manage the registration and participation in the Contest. Your data will only be used by Peninsula Corporate Innovation SL and will not be passed on to third parties, except for the fulfillment of legally established obligations. However, the identification of the finalists and also the winners will be published on the website of the Competition, Peninsula and CRIDA and its subsidiaries or partners, and on their respective social networks in accordance with transparency legislation. Your image and

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voice may also be published with your consent. Your data will be retained for the duration of the competition and for as long as any legal liabilities may arise from it.

The consent of the concerned person may be withdrawn at any time. In any case, the interested parties may exercise their rights of access, rectification, deletion and others recognized by law, by sending their request in writing to the email address [info@peninsula.co](mailto:info@peninsula.co), or by post to the address Pier01, Tech Barcelona – Office SA1 Plaça de Pau Vila, 1 – 08003 Barcelona.

In case of requests for rights, the data controller will carry out the appropriate and necessary inquiries to verify and ensure your identity.

If you believe your privacy rights have been violated regarding the use of your personal data, you can file a complaint with the competent Data Protection Control Authority (Spanish Data Protection Agency), through its website: [www.aepd.es](http://www.aepd.es). You can request more information about the procedures of your personal data, to the email [info@peninsula.co](mailto:info@peninsula.co). For more information, access the privacy policy available on the Contest website.