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E-CONTRAIL

D6.1 Communication, Disemmination and Explotation Plan

Deliverable ID:	**D6.1**
Project Acronym:	**E-CONTRAIL**
Grant:	**101114795**
Call:	**HORIZON-SESAR-2022-DES-ER-01**
Topic:	**HORIZON-SESAR-2022-DES-ER-01-WA1-6**
Consortium Coordinator:	**Universidad Carlos III de Madrid**
Edition date:	**14 September 2023**
Edition:	**01.00**
Status:	**Draft**
Classification:	**PU**

Abstract

The present deliverable conforms the Communication, Dissemination and Exploitation Plan for E-CONTRAIL Project. It identifies a focal contact for communication purposes. The deliverable includes the project key messages and introductory description. It states the communication and dissemination goals, disaggregated by target audiences, and describes the intended communication, dissemination, and exploitation strategy to reach the established goals. This strategy includes the communication and dissemination means (including the project's website, the social media, targeted conferences and scientific journals), the open-access strategy and the strategy to engage different stakeholders. Finally, a detailed communication and dissemination plan of activities is presented, including a schedule and metrics to measure its impact and effectiveness.

E-CONTRAIL

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BIRA	04/09/2023
KTH	07/09/2023
RMI	07/09/2023

Rejected by[2]

Organisation name	Date

Document History

Edition	Date	Status	Company Author	Justification
00.01	08/08/2023	Not reviewed	UC3M	Draft
00.02	04/09/2023	Reviewed	UC3M	Draft
01.00	14/09/2023	Submitted	UC3M	Submitted to SJU3

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E-CONTRAIL

ARTIFICIAL NEURAL NETWORKS FOR THE PREDICTION OF CONTRAILS AND AVIATION INDUCED CLOUDINESS

E-CONTRAIL

This document is part of a project that has received funding from the SESAR 3 Joint Undertaking under grant agreement No 101114795 under European Union's Horizon Europe research and innovation programme.

We provide now a high-level summary of the project E-CONTRAIL:

Contrails and aviation-induced cloudiness effects on climate change show large uncertainties since they are subject to meteorological, regional, and seasonal variations. Indeed, under some specific circumstances, aircraft can generate anthropogenic cirrus with cooling. Thus, the need for research into contrails and aviation-induced cloudiness and its associated uncertainties to be considered in aviation climate mitigation actions becomes unquestionable.

We will blend cutting-edge AI techniques (deep learning) and climate science with application to the aviation domain, aiming at closing (at least partially) the existing gap in terms of understanding aviation-induced climate impact.

The overall purpose of E-CONTRAIL project is to develop artificial neural networks (leveraging remote sensing detection methods) for the prediction of the climate impact derived from contrails and aviation-induced cloudiness, contributing, thus, to a better understanding of the non-CO2 impact of aviation on global warming and reducing their associated uncertainties as essential steps towards green aviation.

Specifically, the objectives of E-CONTRAIL are:

- O-1 to develop remote sensing algorithms for the detection of contrails and aviation-induced cloudiness.
- O-2 to quantify the radiative forcing of ice clouds based on remote sensing and radiative transfer methods.
- O-3 to use of deep learning architectures to generate AI models capable of predicting the radiative forcing of contrails based on data- archive numerical weather forecasts and historical traffic.

O-4 to assess the climate impact and develop a visualization tool in a dashboard.

E-CONTRAIL

Table of Contents

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List of Figures

List of Tables

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1 Introduction

The present deliverable details the communication, dissemination and exploitation plan for E-CONTRAIL. It details the communication goals, high-level messages and a short description to be broadcasted in different media with the aim of making the project understandable at a first glance.

The communication means include the project's website, the social media and other relevant means. The deliverable also details the strategy the project will follow to make use of or disseminate the project's results, as a plan of activities including a schedule and metrics to measure its impact and effectiveness.

The exploitation charter explains the project's approach and strategy to make the best use of the project results.

1.1 Definitions

Before getting started, it is important to note the difference between communications and dissemination - see Figure 1.

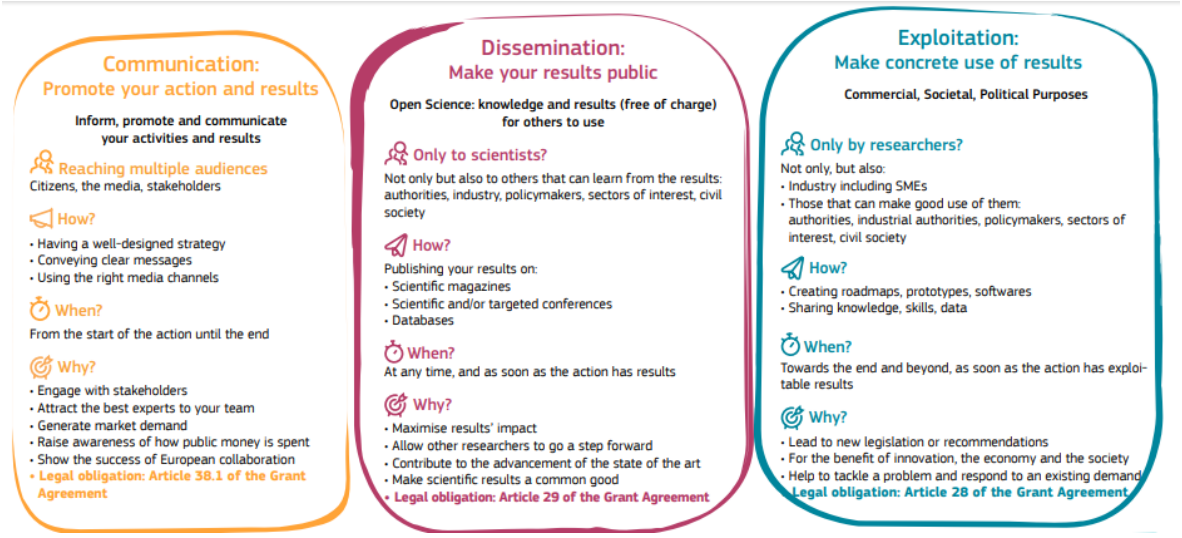

Figure 1: Definitions of communication, dissemination and exploitation in Horizon Europe

1.2 Applicable reference material

The communication, dissemination and exploitation plan of the project will be fully compliant with the latest version of the SESAR 3 JU Program Library. It is also compliant with the SJU slides used for the KoM. The communication and dissemination plan satisfies the content and activities identified in theSESAR 3 Joint Undertaking Project Handbook [1], the article 17 and 18 of the Grant Agreement [2] concerning communication, dissemination and visibility of the project, and the instructions provided in the Horizon Europe Communication Guide with regard to the communication strategy. It is also compliant with the Horizon Europe guidelines on open access to research data. This plan satisfies the content and activities identified in the Article 16 of the Grant Agreement [2] concerning the exploitation of results.

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2 Project introduction

2.1 "About" project text

Contrails and aviation-induced cloudiness effects on climate change show large uncertainties since they are subject to meteorological, regional, and seasonal variations. Indeed, under some specific circumstances, aircraft can generate anthropogenic cirrus with cooling. Thus, the need for research into contrails and aviation-induced cloudiness and its associated uncertainties to be considered in aviation climate mitigation actions becomes unquestionable. We will blend cutting-edge AI techniques (deep learning) and climate science with application to the aviation domain, aiming at closing (at least partially) the existing gap in terms of understanding aviation-induced climate impact.

The overall purpose of the E-CONTRAIL project is to develop artificial neural networks (leveraging remote sensing detection methods) for the prediction of the climate impact derived from contrails and aviation-induced cloudiness, contributing, thus, to a better understanding of the non-CO_2 impact of aviation on global warming and reducing their associated uncertainties as essential steps towards green aviation.

2.2 Project key messages

# Key message id	Communication	Dissemination
1	E-CONTRAIL will create an algorithm capable of identifying condensation trails (contrails) and aviation-induced cloudiness, and able to distinguish clouds created by aircraft from natural clouds (or those caused by other activities, such as military operations).	E-CONTRAIL aims to develop a multispectral algorithm to detect the existence of contrails and aviation-induced cloudiness. While the detection of clouds using satellite imaginary is a rather developed field, the discrimination between aviation-induced clouds and natural clouds (or clouds induced by other activities, e.g., military operations) is still an open problem.
2	E-CONTRAIL will combine the latest technology of satellite images and models to better understand how aviation-generated ice clouds affect the Earth's climate change throughout the day.	E-CONTRAIL will bring together state of the art multispectral geostationary imagery and radiative transfer models for an accurate quantification of the ice clouds RF and ERF all along the diurnal cycle.
3	The goal of E-CONTRAIL is to develop for the first time deep learning algorithms capable of predicting when and how contrails and aviation-induced cloudiness form. We aim to find out in which parts of the airspace they can cause the largest weather impact, covering the North Atlantic and Europe during all four seasons.	The goal of E-CONTRAIL goal is to develop for the first time deep-learning algorithms to identify and predict the mechanisms and relevant sources of data for the forcing of contrails and aviation-induced cloudiness. We ambition to predict the volumes of airspace where a large climate impact is expected, covering half of the North Atlantic and Europe and all four seasonal patterns.

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4	E-CONTRAIL will implement a user-friendly dashboard that will change how we understand the effects of airplane-made clouds and contrails on the climate. For the first time, it will be possible to visualise detected contrails and aviation-induced cloudiness, along with their climate impact measurements like Radiative Forcing, Average Temperature Response, and Global Warming Potential. Moreover, we will see AI-driven forecasts that pinpoint areas in the sky where these clouds might have significant climate impacts.	E-CONTRAIL will implement a user-friendly visualization tool dashboard showing for the first time: 1) the detected contrails and aviation-induced cloudiness and their quantitative climate impact (in terms of RF and other metrics, such as Average Temperature Response or Global Warming Potential), and 2) the AI-driven forecast of those volumes of airspace where large climate impact due to contrails and aviation-induced cloudiness is expected.

2.3 Keywords

These keywords will be used as metadata on the SESAR 3 JU and E-CONTRAIL website and as hashtags on relevant social media messaging.

Key Word	*Definition*
Climate change	Long-term shifts in global or regional climate patterns, often associated with rising temperatures, altered weather conditions, and changes in ecosystems due to human activities such as burning fossil fuels and deforestation.
Aviation impact	The effects of aviation activities on the environment, including emissions of greenhouse gases and other pollutants, which can contribute to climate change and other environmental challenges.
Contrail prediction	Contrail is short for "condensation trails," these are visible lines of cloud-like ice crystals that form behind aircraft flying at high altitudes. E-CONTRAIL will predict how they impact the Earth's radiation balance and contribute to climate change.
Artificial Intelligence	The simulation of human intelligence processes by computer systems. AI techniques can be used to analyse complex data and make predictions in fields such as climate science and aviation.

2.4 Focal point for communications, dissemination and exploitation.

Name	Role	Email address
Virginia Villaplana Fernández	Communications officer (UC3M)	vvillapl@pa.uc3m.es

Table 1: Focal points of contact

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2.5 Stakeholders identification

Stakeholder	Content
Aviation community	Showcase E-CONTRAIL ambitions and findings about the prediction of aviation-induced impact on climate change. Organise feedback loops with airline users, and fine tune/further train the AI model to improve the prediction accuracy of the contrails to reach 80-90%, and thereby the ability to undertake mitigatory actions and reduce emissions.
Project partners	Provide progress and updates of the project through website and social media. Create engagement to enhance the visibility of E-CONTRAIL.
Policy makers and regulators	Present evidence of how E-CONTRAIL findings can be of help to regulate the aviation policies related to effective climate mitigation.
Scientific community	Organize knowledge-sharing sessions to foster collaboration and promote the use of E-CONTRAIL results for the future research activities and to support strategic research policy decisions.
EEN and innovators	Create awareness on how the E-CONTRAIL's contrail prediction system can have a positive impact on the environmental footprint (55% reduction in aviation induced climate impact by 2030 and climate neutrality by 2050).
General public	Organise public awareness campaigns highlighting the positive impact of the E-CONTRAIL project insights on reaching a greener aviation.

Table 2: Stakeholders

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3 Communication

The aim of communications is to raise the visibility of the project's activities among audiences beyond the project's own stakeholder community. E-CONTRAIL communications activities aim to convey the benefits of research for European citizens and the economy, and demonstrate how EU funding contributes to tackling societal challenges.

3.1 Communications objectives and strategy

The main objectives of the E-CONTRAIL Communication, Dissemination and Exploitation Plan are to:

- Inform the aviation community about the project activities and goals.
- Provide the European aviation community with a common pan-European vision on the specific project outcomes (contrail detection, AI models for assessing the impact of radiative forcing, a real time dashboard).
- Promote the use of E-CONTRAIL results for the future research activities and to support strategic research policy decisions.

Per expected outcome, dissemination, and exploitation strategies towards achieving the targets defined for the project are explained below:

Outcome 1: **Environment - achievement of the objectives of a 55% reduction in greenhouse gas emissions by 2030 and net-zero greenhouse gas emissions by 2050, from a gate-to-gate perspective, by introducing new concepts enabling proper modelling of non-CO_2 emissions and their impact on optimum green trajectories, taking into account the expected interoperability with new entrants (i.e. U-space flights).**

- **Strategic measure 1:** Validate the performance of E-CONTRAIL's contrail prediction system in the user environment (airlines) and its positive impact on the environmental footprint (55% reduction in aviation induced climate impact by 2030 and climate neutrality by 2050). For this validation exercise, UC3M will leverage its existing collaboration (including joint projects and an industrial PhD co-supervision) with FlightKeys, a software company from Vienna that has 30+ years of experience in flight planning systems.
- **Strategic measure 2:** Organise feedback loops with airline users, and fine tune/further train the AI model to improve the prediction accuracy of the contrails to reach 80-90%, and thereby the ability to undertake mitigatory actions and reduce emissions. The E-CONTRAIL partners will perform a mapping exercise and establish a stakeholder board, to actively engage our target stakeholders right from developing a Communication and Dissemination Plan (CDP) to its execution. At the operational level, the stakeholder board will pass on relevant recommendations to the respective task leaders, ensuring an iterative process in solution development.

Outcome 2: **Capacity - Project results are expected to contribute also to the issue of sector capacity by taking into account the same new entrants (e.g., U-space flights).**

- Strategic Measure 1: The prediction contrails system will act as a met enabler for the Network Managers and Air Navigation Service Providers, and the E-CONTRAIL partners will actively engage or even closely work with them in interface development.

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3.2 Communication target audiences

Target	Main channel	Message	Activities
Aviation community	Events, social media	E-CONTRAIL's innovative approach will improve understanding of aviation's climate impact.	Videos about the E-CONTRAIL outcome and impact, presentations
Project partners	Website, internal meetings	The outcomes of E-CONTRAIL will provide valuable insights to project partners and advisory board members.	Board meetings and news items to be followed on the website and social media.
Policy makers and regulators	Working groups, LinkedIn, event participation	E-CONTRAIL's findings will aid in informed policy decisions for climate-friendly aviation practices.	Content oriented to talk about the benefits of the project
Scientific community	Conferences, sector specific magazines, LinkedIn, website	E-CONTRAIL employs advanced AI and data analysis techniques for relevant scientific goals open to collaboration opportunities and career prospects.	E-CONTRAIL workshop, participation in other events and sharing career and collaboration opportunities.
EEN and innovators	Conferences, LinkedIn	E-CONTRAIL's results will have a positive environmental footprint	Presentations and content oriented towards the future applications of the E-CONTRAIL results
General public	Social media, education institutions	Through the E-CONTRAIL solution, aviation industry can actively contribute to environmental sustainability	Public awareness campaigns based on explanatory video content to be broadcasted in media, education institutions, etc.

Table 3: Communications target audiences

3.3 Branding and acknowledgements

The E-CONTRAIL project logo is provided in the Figure 2.

E-CONTRAIL

Figure 2: Project logo

In CDE material, the project logo should be accompanied by the SESAR Joint Undertaking's and EU support acknowledgements, including the following logos and text:

Co-funded by the European Union

SUPPORTED BY sesar JOINT UNDERTAKING

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"This project has received funding from the SESAR Joint Undertaking (JU) under grant agreement No 101114795. The JU receives support from the European Union's Horizon Europe research and innovation programme and the SESAR JU members other than the Union."

Communication activities (including media relations, conferences, seminars, information material, such as brochures, leaflets, posters, presentations, etc., in electronic form, via traditional or social media, etc.), dissemination activities and any infrastructure, equipment, vehicles, supplies or major result funded by the grant must acknowledge EU support and display the European flag (emblem) and funding statement (translated into local languages, where appropriate).

3.4 Communication channels

The communication channels are chosen to ensure that research and innovation activities are made known to the professional as well as the society at large. The E-CONTRAIL project will focus its efforts on several strategic channels for the dissemination of the project, the main ones being a dedicated website, three social media profiles (LinkedIn, X and YouTube), press and media, and communication events.

3.4.1 Website

A dedicated standalone website has been created to promote the E-CONTRAIL project and its research activities, under the following domain: *www.econtrail.com.* Its static pages will be updated every time a relevant change occurs, and the news section will show monthly updates to reflect the progress of the project, communicate the participation in events, and report on new journal and conference papers and on the achievement of the project milestones.

Figure 3: Homepage header view of the E-CONTRAIL standalone website

The website is divided into five different pages that structure the information about the project:

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Homepage

The homepage summarizes the most relevant contents of the project in a single page. The header section displays the project logo and the EU and SESAR 3 JU logos and acknowledgements at the top of the page, followed by the project tagline and the project abstract. After the header, the home page displays the consortium logos, followed by a section where the project ambitions are explained.

Figure 4: 'Project ambitions' section at the homepage of the E-CONTRAIL website

This section is followed by the overview of most recent project activities and the milestones of the project.

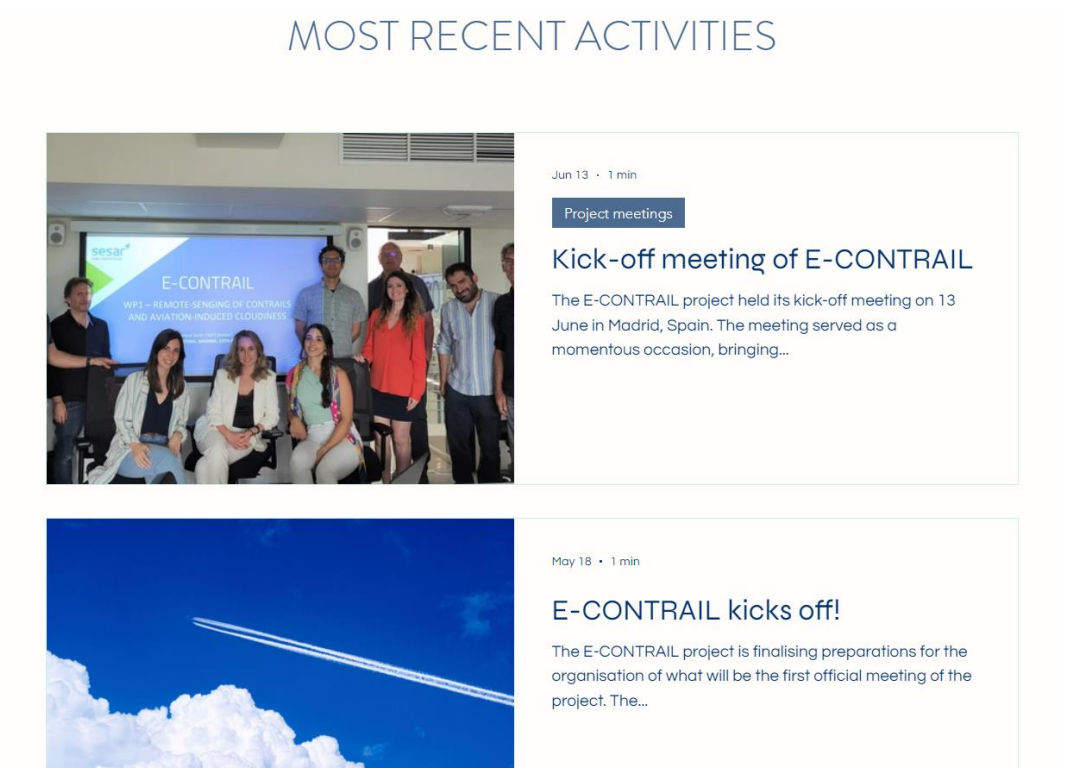

Figure 5: View of the latest news items of the E-CONTRAIL

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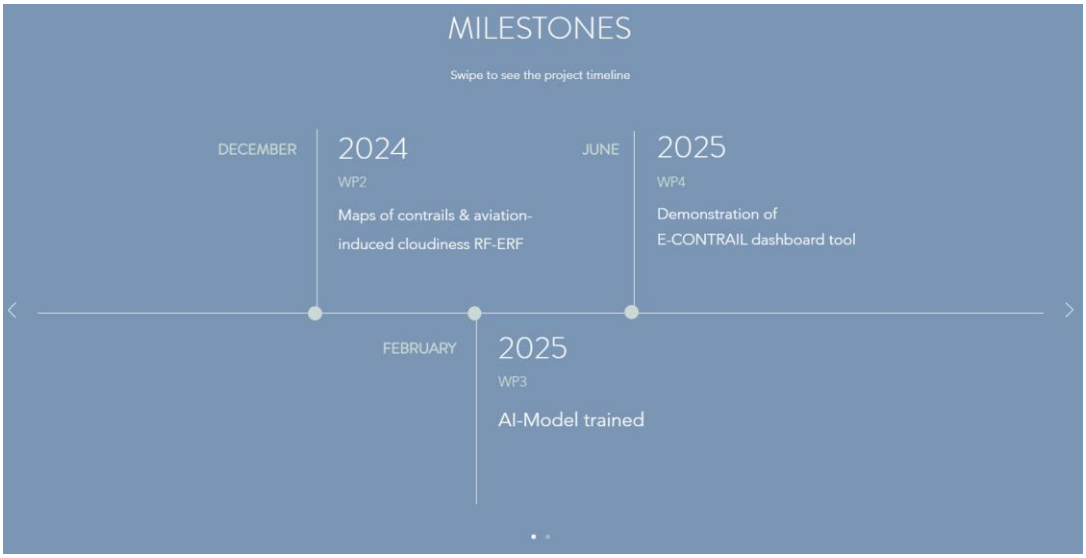

Figure 6: View of the E-CONTRAIL project milestones

To conclude, the social media and the contact section can be seen before the footer, which highlights once again the acknowledgements of the E-CONTRAIL project.

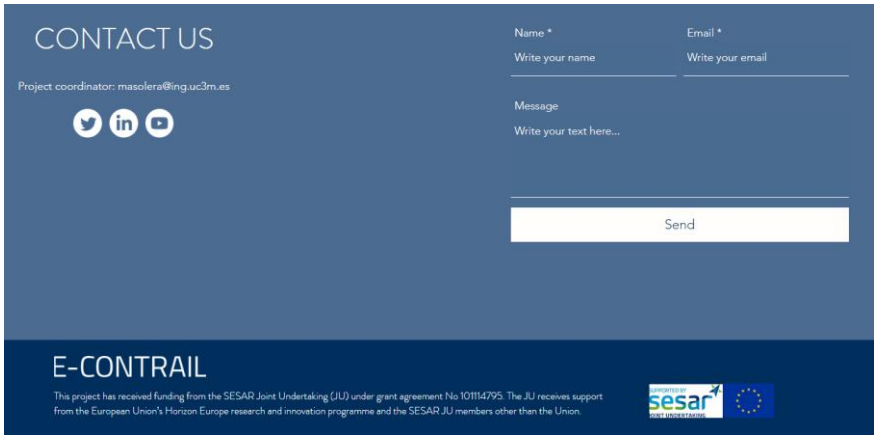

Figure 7: E-CONTRAIL website footer

About

The "About" page (https://www.econtrail.com/about) explains what E-CONTRAIL consists of, outlining the context and rationale for the project, the main objectives and ambition.

Members

The "Members" page (https://www.econtrail.com/members) provides with a list of the project partners, including the official logos of the organisations accompanied by a short description that can be expanded to get to know the team members of each organisation and their role in the E-CONTRAIL project.

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Deliverables

The "Deliverables" page (https://www.econtrail.com/deliverables) lists the E-CONTRAIL project deliverables and it will include the link to the final versions of the public ones.

Outreach

The "Outreach" page (https://www.econtrail.com/outreach) will be the dynamic showcase for the latest events and research progress, providing monthly posts about the project.

Project webpage on SESAR 3 JU website

This webpage has been created under the link https://www.sesarju.eu/projects/e-contrail. A banner, a customised text about the project will be shared with the SESAR 3 JU via STELLAR, accompanied with the list of beneficiaries in alphabetical order and the link to the project website.

Videos, relevant news and other future communications material are expected to be added into this webpage in order to offer a multichannel and homogeneous view of the E-CONTRAIL project to the public.

3.4.2 Press and media

E-CONTRAIL will publish a press release on its website, on social media, and in specialised media in all partner countries. All partners are required to publish the press release on their respective websites and social media accounts in their respective languages. The main purpose of the press releases is to gain publicity and raise public awareness.

The press release will be sent to the following media outlets, which are listed below according to each partner's contribution.

Media activity	Date	Link
	Forecasted contribution	
Responsible partner: Universidad Carlos III de Madrid		
TV Interview broadcasted on several national European and American TV channels participating in the ATEI	2024	https://noticiasncc.com/
Press release on Alpha Galileo via Universidad Carlos III de Madrid - Oficina de Información Científica	End of the project	https://www.alphagalileo.org/
Press release on the news portal Madr+d of Community of Madrid	End of the project	http://www.madrimasd.org/
Press release on Dicyt news	End of the project	https://www.dicyt.com/noticias
Press release on EurekAlert	End of the project	https://www.eurekalert.org/

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Responsible partner: BIRA		
News about the project on BIRA web-site	End of the project	https://www.aeronomie.be
Responsible partner: KTH		
Press release on Swedavia	End of the project	https://www.swedavia.se/arlanda/
Press release on LFV	End of the project	https://www.lfv.se/en
Press release on Trafikverket	End of the project	https://www.trafikverket.se/
Press release on SVT	End of the project	https://www.svt.se/
Press release on DN	End of the project	https://www.dn.se/
Press release on Transportstyrelsen	End of the project	https://www.transportstyrelsen.se/en/aviation/
Responsible partner: RMI		
To be completed in further versions of this document	*To be completed in further versions of this document*	*To be completed in further versions of this document*

Table 4: Contribution to external media.

3.4.3 Social media

Project activities will be promoted throughout the duration of the grant, aiming to create engaging content that shows the benefit of the E-CONTRAIL research to the different targeted audiences. To this end, the following social media channels have been selected.

LinkedIn and Twitter (X)

The LinkedIn page (@e-contrail-project) was recently created and so far, has gained a total of 28 followers and more than 600 impressions. The E-CONTRAIL page (@e_contrail) on Twitter (X) currently has 7 followers and 200 impressions. The goal is to publish one post per week to maintain a continuous communication flow and keep the audience engaged without saturating them. This approach will help us prioritize producing higher quality content overall.

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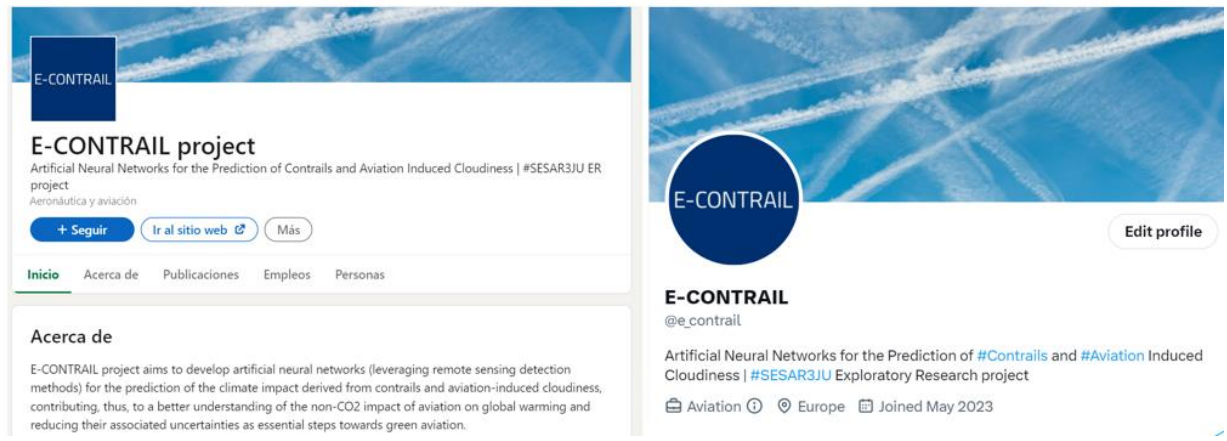

Figure 8: Overview of the E-CONTRAIL LinkedIn and Twitter (X) page

Specifically, the LinkedIn and Twitter (X) posts cover the following activities:

- News and updates on the E-CONTRAIL activities and progression of project tasks and deliverables
- Papers and presentations originating from workshops, conferences, journals, etc.
- Project use cases
- Publications in articles, online sources, newspapers…
- Upcoming events prompting stakeholders for papers and events participation
- Videos and photos
- Promotion of newsletter issues (SESAR e-News)
- Relevant articles and news on topics related to sustainable aviation, climate change, contrails, etc.
- Surveys for target engagement and knowledge

3.4.4 Communication events

The communication events serve as platforms to share project updates, research findings, and innovations related to the E-CONTRAIL project, helping to engage stakeholders, raise awareness, and foster collaboration within the aviation and meteorology sectors.

Event	Date	Place	Information to be shared	Importance for the project
E-CONTRAIL Workshop	End of project	Madrid, Spain	Presentation of the Climate Hotspot Prediction Service	Highlighting the final project outcomes
SESAR Innovation Days 2023	27/11/2023	Seville, Spain	Oral presentation about the status of the project	Sharing progress and engaging with the European aviation community
International Conference on Research in Air Transportation (ICRAT).	24/06/2024	Singapore	Research findings related to the mitigation of aviation-induced climate impact	Contributing to the research community and expanding project visibility

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US/Europe ATM Seminar. (ATM Seminar)	TBD	TBD	Relevant project updates and insights	Networking with key players in the ATM field
European Geosciences Union (EGU) general assembly	14–19/04/2024	Vienna, Austria	Presenting E-CONTRAIL Climate Hotspot Prediction Service	Engaging with the geosciences aviation community
American Geophysical Union (AGU) Fall Meeting	11-15/12/2023	San Francisco, CA	Highlighting findings on mitigation of aviation-induced climate impact	Increasing project awareness among the aviation industry
Engage 2 activities	TBD	TBD	Research findings related to the mitigation of aviation-induced climate impact	Contributing to the research community and expanding project visibility
SESAR Innovation Days 2024	30/11/2024	TBD	Oral presentation describing the status of the project	Showcasing project outcome to the European aviation community

Table 5: Events

3.4.5 Publications and newsletters

E-CONTRAIL will develop publications, printed material and newsletters referencing the SESAR 3 JU and EU funding. The goal is to achieve with them a broader communication impact.

Publications/newsletters/printed material	Description	Date	Link
Flyer/ poster 1	SID 2023	27-30/11/23	
Flyer/poster 2	SID 2024	30/11/24	
1 publication in sector-specific magazines	Aviation and/or climate-related magazines	TBD	
SESAR outreach (newsletter) 1		after KoM	SESAR publication pending
SESAR outreach (newsletter) 2		at the end of the project	

Table 4: Publications, printed material and newsletters

3.4.6 Videos

E-CONTRAIL will prioritise video over static content, with the goal of leveraging visual storytelling and engaging content to effectively convey the significance the project in society and capture the attention of a wider audience.

The SESAR 3 JU and the EU logos will always be included, and the logos of the participating partners will also be part of the created videos.

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Videos	Description	Planning	Link
Video 1	E-CONTRAIL teaser video	KoM	https://www.youtube.com/watch?v=6fy0144g0SQ
Video 2	Interview about the project outcome	2025	

Table 5: Videos

Figure 9: capture of the E-CONTRAIL teaser video

3.5 Communication key performance indicators (KPIs) and success criteria

Action	KPIs	Success criteria	Currently achieved	Last update	Annual growth
Web presence	# of visitors to the website # of posts in website 'News' section. # of referrals in external websites	> 1000 visitors 30 news items > 10 referrals in external websites	265 visitors 3 news items 1 referral	13/06	Not applicable

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Press and media	# of videos # of flyers/posters # of publications in sector-specific magazines	4 videos 2 flyers/ posters >1 publication in sector-specific magazines	1 video	13/06	Not applicable
Social Media	# followers per social network # posts (per year and social network) # of engagements/posts # total views of videos # of mentions #responses from influential ENV channels	>100 followers per social network 50 posts (per year and social network) 5 average engagements/post > 1000 total views of videos. 30 mentions 3 engagement responses from influential ENV channels (+500 followers)	30 followers in LinkedIn and 7 in X 8 posts and 10 tweets 12 average engagements/post in LinkedIn and 7 in X 200 total views of videos. 11 mentions 0 responses	04/08	Not applicable
Events	# of organised events # of webinars # of conferences # of attendees	> 5 events and 1 webinar 1 E-CONTRAIL workshop > 30 attendees from +5 nationalities	1 KoM with 20 attendees from +5 nationalities	06/07	Not applicable

Table 6: Communication KPIs and success criteria

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4 Dissemination

4.1 Dissemination objectives and strategy

In order to maximize the impact of the E-CONTRAIL project results, the consortium will focus on assuring that the knowledge obtained in this research is properly disseminated in the wider scientific and aviation community. This will be achieved through the following objectives:

1. Conducting excellent science on the climate impact of aviation.
2. Fostering high-talented individuals to follow scientific careers.
3. Providing free-of-charge, online access to scientific information.
4. Providing open access to research data.

The E-CONTRAIL project will achieve these dissemination goals by:

1. Definition of dissemination activities and their KPIs (as defined in this document)
2. Measurement of impacts based on KPIs (as defined in this document)
3. Active contribution by all WPs to guarantee optimal communication in all partner countries and at the EU level
4. Easy, fast, and open access to information, results, and news about the project through its website, which will also make use of social media channels for a wider dissemination.
5. Transmission of relevant information by involving target users/ stakeholders in the design and development of dissemination material.
6. Use of existing channels (national and EU levels), ensuring wider reach and long-term availability of materials.
7. Exchange activities with other relevant projects at the national, European, and international level to create synergies.

4.2 Dissemination channels

Channel	Objective	Tools	Link	Information to be shared
Journals	Publication in top-ranked journals	scientific publications, technical publications	See table 8	Research findings, innovative methodologies
Conferences and events	Publication at scientific conferences	Posters, conference papers	See table 9	Research outcomes
Website	Creation of an active and	videos, presentations, documents,	https://www.econtrail.com/	Project overview, publications,

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	enticing website	scientific publications,	deliverables, updates
Social networks	Provision of quality content on social media, at specified intervals	videos, presentations, scientific publications, upcoming events	Engaging project updates, research insights

Table 7: Dissemination channels

1.1.1 Open access to scientific publications

Appropriate open science practices have been implemented as an integral part of the E-CONTRAIL methodology. They have been adapted to the nature of the work to increase the chances of the project delivering on its objectives. We have made sure to implement open science as early and widely as possible in the process, as an approach based on open cooperative work and systematic sharing of knowledge and tools. On the other hand, have considered that it is essential to ensure that IP generated during this project is adequately protected so that exploitation of the project results can be enabled. For example, care will be taken to ensure that publication of scientific results and IPR protection are implemented, so that future exploitation is not impaired (e.g., by early publication). The following specific open science practices have been included:

- **Early and open sharing of research** (for example through preregistration, registered reports, pre-prints, or crowdsourcing) The academic partners all maintain suitable institutional repositories, which will allow public and early access to research papers produced in the course of the project. E-CONTRAIL will publish pre-prints on ArXIV/ResearchGate platform upon submission, updating the version along the review process, until its final publication. This will contribute to peer review and help visibility, as well as providing feedback on the concept and implemented methodology for the modules to be developed according to O-1, O-2, O-3, O-4.

- **Research output management** will be performed to ensure E-CONTRAIL adherence to Open Research Data Pilot, basing its policy on the FAIR (Findable, Accessible, Interoperable and Reusable) scheme for data.

- **Ensuring reproducibility of research outputs**: We will make sure to provide access to input files and codes, by making such files available as part of our manuscripts. We aim to be transparent about exactly what was done in an experiment and what the results were by making methods and protocols descriptive and complete. Data analysis will be automated as much as possible using quantitative measurements or analyses over qualitative whenever possible and avoiding steps that involve manually processing the data and write coding scripts and macros for processing data to avoid these problems. We will ensure to publish all code, scripts, and macros used to analyse and process data as this will allow someone else to inspect precisely how results were obtained and perform code annotation. All input data will be published for public access using relevant data repository websites.

- **Providing open access to research outputs** (such as publications, data, software, models, algorithms, and workflows)

- **Participation in open peer-review**: The project results will be shared via peer-reviewed, high impact scientific journals, adopting the ‘gold’ or ‘green’ model, and will, where feasible, be published in open access media. If the impact of the scientific journal is similar, preference will be given to ‘gold’ open access (direct free on-line access by the publisher). Each consortium partner has allocated budget to cover open-access publication fees. When publishing a scientific publication, we will first upload the pre-print (which will be updated along the review process). The pre-print will be published together

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with the data, library/software, and the instructions/documentation needed to reproduce the examples included in the publication.

- **Involving all relevant knowledge actors in the co-creation of R&I content.** The aviation industry is the key stakeholder and end user of the E-CONTRAIL project results. The aviation expert Klaus Sievers has been involved in the co-creation of the R&I content as a consultant, providing his input on the research approach and expected impact description from the viewpoint of the end user (pilots, airlines). Klaus Sievers has 36 years of experience as an airline pilot (1979-2016) and is active in the ICAO Meteorology Panel since its creation in 2015 until present time. He is a member of the German Airline Pilots Association, Vereinigung Cockpit. Exploiting synergies with the partners of other research projects, either already closed (e.g., ALARM and FLyATM4E) or on-going (e.g., REFMAP, BECON). Citizens and civil society have been involved through contacts of the main applicants with the Dirección General de Aviación Civil (DGAC), a division of Spain's Ministry of Public Works, discussing the research activities.

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Scientific papers/ presentations	Link	Information to be shared
Nature Climate change	www.nature.com/nclimate/	Project findings, Scientific Methods, Scientific Algorithms, results
Atmospheric Chemistry and Physics	www.atmospheric-chemistry-and-physics.net/	
Atmospheric Measurement Techniques	www.atmospheric-measurement-techniques.net/	
Atmospheric Research	www.journals.elsevier.com/atmospheric-research	
Geophysics Model Development	www.geoscientific-model-development.net/	
Remote Sensing of Environment	www.journals.elsevier.com/remote-sensing-of-environment	
Conference papers and posters	See table 9	

Table 8: Scientific papers, publications and presentations

1.1.2 Dissemination events

Event	Date	Place	Information to be shared	Importance for the project
E-CONTRAIL Workshop	End of project	Madrid, Spain	Presentation of the project solution	Highlighting the final project outcomes
SESAR Innovation Days 2023	27/11/2023	Seville, Spain	Poster describing the status of the project	Sharing progress and engaging with the aviation innovation community

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International Conference on Research in Air Transportation (ICRAT)	24/06/2024	Singapore	Conference paper	Contributing to the research community and expanding project visibility
US/Europe ATM Seminar. (ATM Seminar)	TBD	TBD	Conference paper	Networking with key players in the ATM field
European Geosciences Union (EGU) general assembly	14–19/04/2024	Vienna, Austria	Conference paper	Engaging with the geosciences and meteorology community
American Geophysical Union (AGU) Fall Meeting	11-15/12/2023	San Francisco, CA	Conference paper	Increasing project awareness among the aviation industry
Post-Engage activities	TBD	TBD	Research findings related to the mitigation of aviation-induced climate impact	Contributing to the research community and expanding project visibility
SESAR Innovation Days 2024	30/11/2024	TBD	Poster describing the status of the project.	Providing updates to the European aviation community

Table 9: Dissemination conferences and workshops

1.1.3 E-CONTRAIL workshop for dissemination purposes

As a final step in the dissemination plan, the E-CONTRAIL consortium will organize a workshop dedicated to the project, and to the topic of aviation and climate change mitigation. We believe that bringing together researchers on this particular topic is of major interest towards building a network, acquiring visibility, and potentially build up further collaborations.

This workshop will be hosted by UC3M and will have two major components:

1) a technical part, which will include the communications by the participants,

2) a demonstration part, where E-CONTRAIL will showcase its readiness to smoothly progress from TRL1 to TRL2. Key participants such as the assigned Project Officer (together with members of SESAR), partners in Engage KTN and other SJU ER related projects, members of the Advisory board, relevant stakeholders (e.g., the NM, ANSPs, Airlines), and members of international bodies (e.g., ICAO, IPCC, WMO) will be invited. The workshop proceedings will be published.

4.3 Dissemination target audiences

Target	Channel	Benefits from the project	Objectives and expected feedback

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Research and scientific community	Conferences, Scientific publications	Access to project's results in publications	Maximize the dissemination, including other scientific disciplines; enhance excellence and scientific reputation; find follow-up ideas and collaborations.
Stakeholders	Website, social media, conferences and events	Access to project's results in demo tools	Anticipate which results could be protected and how to do it; attract the interest of the industry; find potential partners for other European/National Projects; find potential clients for existing products/services and/or potential new products/services to be developed.
Institutions	Conferences, Scientific publications	Make the results and the follow up ideas visible to their groups of interest.	Draw the attention of different institutions, e.g., European Commission and SESAR, National Regulators on Aviation matters, international institutions (IPPC, ICAO, EASA), to make them aware of E-CONTRAIL results and make them visible to their agendas. This will facilitate the allocation of more funding and the revision/modification of standards

Table 10: Dissemination target audiences

4.4 Dissemination KPIs and success criteria

Action	KPIs	Success criteria	Currently achieved	Last update	Annual growth
Academic publications	# of published scientific publications. # of white papers. # of abstracts	>3 journal papers (1 to be Nature) 2 State-of-the-art white papers 2 practice abstracts	*To be completed in further iterations of this document*	*To be completed in further iterations of this document*	*To be completed in further iterations of this document*
Events	# of attended events # of organised workshops # of conferences # of conference papers # of attendees	> 8 events 4 conference papers 1 E-CONTRAIL workshop with > 30 attendees from +5 nationalities	KoM with 20 attendees from >5 nationalities	13/07/23	*To be completed in further iterations of this document*

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Print materials	# of flyers/posters # of publications in sector-specific magazines # policy briefs	2 flyers/ posters >1 publication in sector-specific magazines 1 policy brief	*To be completed in further iterations of this document*	*To be completed in further iterations of this document*	*To be completed in further iterations of this document*
Website	# of visitors to the website # of posts in website 'News' section. # of referrals in external websites	> 1000 visitors 30 news items > 10 referrals in external websites	265 visitors 3 news items 1 referral	13/07/23	*To be completed in further iterations of this document*
Innovative video content	# of videos	2 videos >2 practical videos 1 ready-to use training material	1 teaser video	13/06/23	*To be completed in further iterations of this document*
Social media	# followers per social network # posts (per year and social network) # of engagements/posts # total views of videos # of mentions	>100 followers per social network 50 posts (per year and social network) 5 average engagements/post > 2000 total views of videos. 30 mentions	52 followers in LinkedIn and 8 in X 4 posts and 4 tweets 29 average engagements/post in LinkedIn and 18 in X 1143 total views of videos. 0 mentions	05/08/23	*To be completed in further iterations of this document*

Table 11: Dissemination KPIs and success criteria

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5 Exploitation

At the end of the project, the first prototype of the contrail prediction system would have been developed. UC3M will lead the exploitation efforts of the prediction system through their existing spin off company Applied Innovative Methods (AI Methods), which aims to enable smart aviation through AI, by turning weather predictions into right decisions. Carlos III University of Madrid (UC3M) is engaging AI Methods to exploit the results of their earlier project, ISOBAR.

To successfully integrate the contrail prediction system with the airline flight planning systems, and to enable the airlines in their MRV (monitoring, reporting and verification) of environmental impact, the partners will work on user friendly interfaces and dashboards, respectively. This exploitation measure will involve tailored measures per user (airline), to introduce protocols for information access and interchange between all providers and users of ATM information and services (System Wide Information Management (SWIM) Technical infrastructure yellow profile).

Other below listed exploitable products will either be individually or jointly exploited by the concerned partners:

- Remote sensing algorithms for the detection of contrails and aviation-induced cloudiness
- Remote sensing algorithm to measure the radiative forcing of clouds.

5.1 Project exploitable results

- Advanced deep learning architecture to generate AI models for predicting radiative forcing of contrails and aviation-induced cloudiness
- A first of its kind contrail prediction system that is interoperable with the flight planning systems by creating user friendly interfaces.
- New knowledge on impact visualization (dashboards) using quantifiable indicators such as costs, flight delays, timings, operational challenges, etc.

5.2 Exploitation strategy and objectives

The E-CONTRAIL project will combine strategic dissemination measures with an exploitation strategy to transform the outcomes expected by 2026 to larger impacts by the year 2030 (see Figure 10). This exploitation strategy aims to:

- Take the prediction system to further use through the Universidad Carlos III de Madrid and its spin off company, AI Methods.
- Integrate user friendly interfaces with airline systems and dashboards with MRV.

The expected wider impacts to be reached by 2030 with this combined strategy would be 1) demonstrating a higher potential contribution to establishing Europe as the most environmentally friendly region to fly in the world; and 2) demonstrating a significant contribution to the realisation of the Digital European Sky vision.

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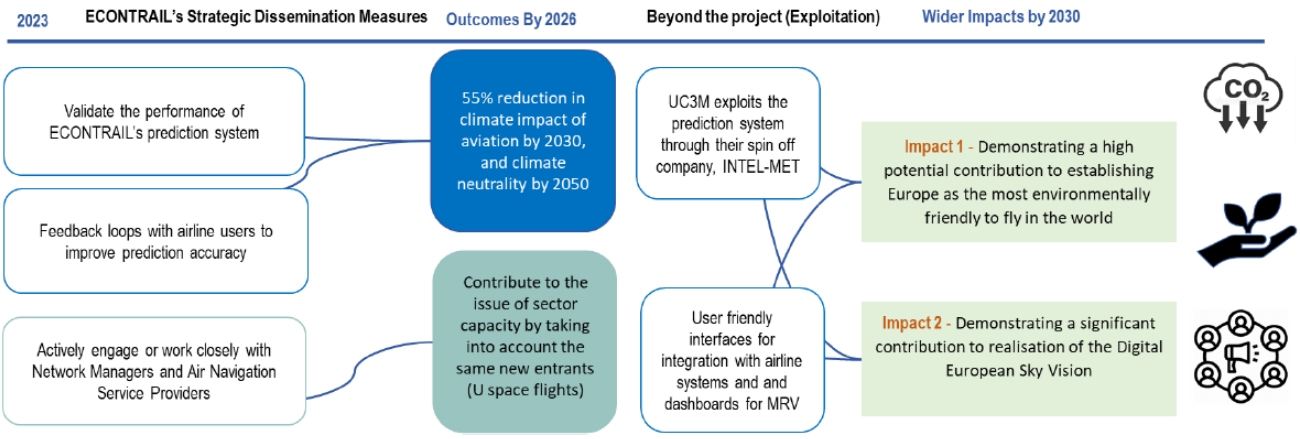

Figure 10: E-CONTRAIL strategic dissemination and exploitation measures

5.3 Exploitation of results

Project outputs	Area impacted	Action	Outcomes	When
AI-driven Climate Service for Aviation Stakeholders	AREA Of Environment. User groups affected are airlines, ANSPs, and the NM.	Further research, market validation, and product commercialisation will be needed. The initial idea would be to licence it on an open-source basis.	Empowering climate ATM for both airlines and airspace managers	2026-2027

Table 12: Project internal exploitation of results

Project outputs	Area impacted	Action	Outcomes	When
Advanced deep learning architecture to generate AI models for predicting radiative forcing of contrails and aviation-induced cloudiness	Climate impact assessment, Aviation operations	Providing evidence-based inputs and recommendations for informed policy development related to radiative forcing from non-CO2 emissions.	Influence regulations and policies that drive sustainable aviation practices in Europe and globally.	2025
A first of its kind contrail prediction system that is interoperable with the flight planning	Aviation operations, Flight planning	Enhancing capacities of airlines and Air Navigation Service Providers	Optimize air operations based on climate impact indicators.	2025

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systems by creating user friendly interfaces.				
New knowledge on impact visualization (dashboards) using quantifiable indicators such as costs, flight delays, timings, operational challenges, etc.	Aviation management, Decision making	Collaborating with airlines and aviation stakeholders to create innovative green aviation solutions	Reduce aviation industry contrail emissions by 20-50%, aligning with global climate goals and enhancing its reputation as a responsible sector.	2025

Table 13: Project external exploitation of results

5.4 Data protection strategy

The data protection strategy will be included in the Data Management Plan of the project [CITE], including data sharing, data storage, and data preservation.

5.5 IPR management

The E-CONTRAIL CA includes all provisions related to the management of IPRs, including ownership; protection and publication of knowledge; access rights to knowledge and pre-existing IPRs; confidentiality and dispute settlement.
In particular:

- Each partner shall promptly disclose in confidence to the other partners any knowledge generated in the E-CONTRAIL project to ensure that valuable IP is identified and appropriately protected at an early stage.
- Each partner shall own the knowledge it has generated in the E-CONTRAIL project.
- Jointly generated knowledge shall be jointly owned by partners in accordance with the inventive contribution made by each partner to such knowledge.
- New IPR concerning a specific partner's expertise developed during the program shall be filed and paid for by the partner that created it, or jointly if more partners were involved.
- Each partner will be responsible for the successful exploitation of its own knowledge.
  In the event any partner wishes to commercially exploit any knowledge resulting from the E-CONTRAIL project, that partner shall pay to the other consortium partners a royalty and/or other appropriate forms of remuneration which is fair and reasonable as laid down in the consortium agreement.

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6 Overview of communication and dissemination activities

Activity	Channel	Tool	Objective	Target audience	KPIs	Success criteria	Frequency/ date
Press release on project outcomes	Partners' outreach channels	Press Release	Share project achievements and outcomes after the E-CONTRAIL Workshop	General public, Research community	# references in external websites and media	Broadcasted in > 5 partner channels	End of the project
Publication in specialised press	Top-ranked journals	Article	Reach aviation community and increase the project prestige	Aviation industry	# publications	>1 publication	TBD
Scientific publications	Peer reviewed journals	Journal paper	Reach scientific community and increase the project prestige	Research community	#papers	>3 journal papers, 2 state-of-the-art white paper	Before the end of the project
E-CONTRAIL Workshop	Event	Video and presentation	Present project solution	Aviation industry	Attendance, participant feedback	> 30 attendees from +5 nationalities	End of Project
SESAR Innovation Days 2023	Conference	Oral Presentation and poster	Share project status	Aviation industry	Interaction	Meaningful engagement and networking	27/11/23
SESAR Innovation Days 2023	Conference	Conference paper	Share project outcomes	Aviation industry	Interaction	Knowledge contribution and expanded visibility	27/11/23

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Participation in post-Engage KTN activities	Event	Visual material	Share project outcomes	Aviation industry	Interaction	Meaningful engagement and networking	TBD
ICRAT, US/Europe ATM Seminar, EGU, AGU, etc.	Conference	Conference Paper	Contribute research findings	Research community and aviation industry	Paper acceptance, audience response	At least 3 conference papers published	TBD
SESAR Innovation Days 2024	Conference	Oral Presentation and poster	Share project status	Aviation industry	Interaction	Meaningful engagement and networking	Nov-24
SESAR Innovation Days 2024	Conference	Conference paper	Share project outcomes	Aviation industry	Interaction	Knowledge contribution and expanded visibility	Nov-24
Newsletter issue 1	SESAR e-News	Newsletter	Present the project	SESAR 3 JU aviation community	Publication	Broader visibility	T0+1/TO+3
Newsletter issue 2	SESAR e-News	Newsletter	Share project outcomes	SESAR 3 JU aviation community	Publication	Broader visibility	End of the project
Video 1	Social media & web	Teaser Video	Introduce the project	All target audiences	Video views, engagement	>250 views	KoM
Video 2	Social media & web	Interview Video	Share project outcomes	All target audiences	Video views, feedback	>250 views	End of the project
Social media outreach	LinkedIn and X	Posts, images & video	Generate project awareness and community engagement	All target audiences	Followers overall/social network, # posts/year and social network, # average engagements/ post, and # responses	>100 followers. 50 posts. 5 average engagement responses. 3 engagement responses from	By weekly updates

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					from ENV accounts (with +500 followers)	influential ENV channels	
Website	econtrail.com	web	Creation and sharing of key project information and updates	All target audiences	Visitors, posts, referrals in external websites	> 1000 visitors, 30 news items, >10 referrals	By monthly updates
Training materials	Events	Abstract, video	Dissemination materials	Research community and aviation industry	# materials created	1 practice abstract/facts heet, 1 practical video	Before the end of the project

Table 14: Overview of communication and dissemination Activities

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7 List of acronyms

Acronym	Description
AGU	American Geophysical Union
AI	Artificial Intelligence
ATM	Air Traffic Management
CDE	Communication, Dissemination, and Exploitation
CDP	Communication and Dissemination Plan
CO_2	Carbon Dioxide
DOI	Digital Object Identifier
EEN	Enterprise Europe Network
EGU	European Geosciences Union
ER	Exploratory Research
EU	European Union
FAIR	Findable, Accessible, Interoperable, Reusable
HRP	Horizon Results Platform
ICRAT	International Conference on Research in Air Transportation
IPR	Intellectual Property Rights
JU	Joint Undertaking
KoM	Kick-off Meeting
KPIs	Key Performance Indicators
MRV	Monitoring, Reporting and Verification
SESAR	Single European Sky ATM Research
SJU	SESAR Joint Undertaking
SWIM	System Wide Information Management
TBD	To Be Determined
UC3M	Universidad Carlos III de Madrid
US	United States

Table 15: List of acronyms

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8 Guidelines for acknowledgment of funding

8.1 Indication of funding

In line with the Grant Agreement, in all the communication and dissemination activities, the project will:

- Use the EU emblem, which we have download from https://europa.eu/european-union/about-eu/symbols/flag_en
- Use the "Supported by SESAR 3 Joint Undertaking" logo, which we have download from: https://www.sesarju.eu/node/3406#sesar-logos7694
- When displayed together with another logo, the SESAR 3 JU logo and the EU emblem will have appropriate prominence.

- Use the following reference in all communications, dissemination and exploitation material:

  "This project has received funding from the SESAR 3 Joint Undertaking (JU) under grant agreement No 101114795. The JU receives support from the European Union's Horizon Europe research and innovation programme and the SESAR 3 JU members other than the Union."

8.2 Disclaimer excluding SESAR 3 JU responsibility

In addition, in all the communication and dissemination activities, the project will:

- always indicate that it reflects only the author's view and that the SESAR 3 JU is not responsible for any use that may be made of the information it contains.

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9 References

[1] SESAR 3 Joint Undertaking (2022*). Digital European Sky Project Handbook: Programme Execution Framework. 11th April 2022. Edition 1*. 2022.

[2] E-CONTRAIL Grant Agreement Number 101114795 (2023). Sesar 3 Joint Undertaking*. Version 1.1, 02 June 2023.*

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