Communication and Dissemination Plan

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FLYATM4E

FLYING AIR TRAFFIC MANAGEMENT FOR THE BENEFIT OF ENVIRONMENT AND CLIMATE

Abstract

The present deliverable details the communication and dissemination plan, including exploitation matters, for FlyATM4E project. It identifies a focal contact for communication purposes. The deliverable includes 4 high-level messages and a short description to be broadcasted in different media with the aim at making the project understandable at a first glance. It states the communication and dissemination goals, which have been disaggregated by target audiences. The deliverable also 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 (including software management 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.

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1 Introduction

The goal of this Communication and Dissemination Plan is to disseminate and promote the project objectives, achievements and its results. For this purpose, the plan presented in this deliverable defines clear objectives and sets out a concrete strategic planning for the communication and dissemination activities in an effective manner.

The plan includes a focal point, a description and key take-home messages (Section 2), the objectives targeted by audience (Section 3), the strategy (Section 4), and a calendar with intended communication and dissemination activities (Section 5) and their associated metrics to monitor the impact (Section 6).

1.1 Applicable Reference material

This plan satisfies the content and activities identified in Section 3.10 of the Exploratory Research (ER) Project Execution Guidelines document [1], the article 38.1 of the Grant Agreement concerning the communication activities of the partners, and the instructions provided in the H2020 Communication Guide with regard to the communication strategy [2] and during the Kick Off Meeting through the project management guidance [3].

1.2 Focal Communication Contact

The communications point of contact of this project is the WP4 Leader, Manuel Soler. He will be in direct contact with the Project Coordinator (PC):

> Dr. Sigrun Matthes, DLR, Institute of Atmospheric Physics, Germany
> Tel: +49 8153 28 2524
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His contact details are the following:

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1.3 Information on funding

Any communication or dissemination of results (in any form, including electronic) will display the SJU logo and the EU emblem, and will include the following text:

"This project has received funding from the SESAR Joint Undertaking under grant agreement No 891317 under European Union's Horizon 2020 research and innovation programme".

When displayed together with another logo, the SJU logo and the EU emblem will have appropriate prominence.

1.4 Disclaimer excluding SJU responsibility

The communication activity related to the action will indicate that it reflects only the author's view and that the SJU is not responsible for any use that may be made of the information it contains.

1.5 Acronyms and Terminology

Non-exhaustive list of acronyms used across the text.

Acronym	Description
ACARE	Advisory Council for Aeronautics Research in Europe
ACI	Airports Council International
AET	Association for European Transport
ANSP	Air Navigation Service Provider
ATM	Air Traffic Management
CA	Consortium Agreement
CAA,	Civil Aviation Authority
CCAA	Canadian Council for Aviation & Aerospace
EASA	European Union Aviation Safety Agency
ECAC	European Civil Aviation Conference
EEA	European Environment Agency
ER	Exploratory Research
EREA	Association of European Research Establishments in Aeronautics
EU	European Union
GA	Grant Agreement
ICAO	International Civil Aviation Organization
ICRAT	International Conference on Research in Air Transportation
IPCC	Intergovernmental Panel on Climate Change
JCR	Journal of Citations Report
JU	Joint Undertaking
OECD	Organisation for Economic Co-operation and Development
PC	Project Coordinator
SC	Steering Committee
SESAR	Single European Sky ATM Research Programme
SIDs	SESAR Innovation Days

SJU	SESAR Joint Undertaking
TBO	Trajectory Based Operations
USFAA	United State Federal Aviation Authority
WP	Work Package
WMO	World Meteorological Organization

Table 1: Acronyms

FlyATM4E Consortium

Acronym	Description
DLR	DEUTSCHES ZENTRUM FUER LUFT - UND RAUMFAHRT EV
TUD	TECHNISCHE UNIVERSITEIT DELFT
TUHH	TECHNISCHE UNIVERSITAT HAMBURG
UC3M	UNIVERSIDAD CARLOS III DE MADRID

Table 2: FlyATM4E consortium acronyms

2 FlyATM4E High-Level Messages and Description

2.1 High level messages about the project

The benefits that the project is expected to bring can be expressed in the following messages:

- *FlyATM4E will develop advanced concepts to assess the climate impact of ATM operations.*

- *FlyATM4E will investigate aviation's climate impact mitigation potential.*

- *FlyATM4E will identify eco-efficient aircraft trajectories and related weather situations.*

- *FlyATM4E will provide recommendations for target stakeholders on policy actions and supporting measures to implement eco-efficient aircraft trajectories.*

Once the project is finished, these messages will be updated with the results obtained.

2.2 Short project description

Next, a short description of the project in language suitable for non-experts is provided:

"The main objective of the FlyATM4E project is to assess climate impact of aviation, including its associated uncertainties, and develop methods for the optimization of aircraft trajectories in order to identify promising climate-impact mitigation options. Overall, seeking to reduce the climate impact of aircraft operations.

FlyATM4E will develop a concept to identify climate-optimised aircraft trajectories which enable a robust (in the sense of behaving stable when facing uncertainties) reduction in aviation's climate impact. Climate optimization will take into account CO2 and non-CO2 effects, such as contrails and contrail-cirrus, water vapour, NOx and particulate emissions. FlyATM4E will characterise those atmospheric situations that lead to climate impact despite uncertainties in atmospheric behaviour, which can be captured by ensemble probabilistic forecasts. It will further identify those aircraft trajectories in which there is a large potential to reduce the climate impact with only little or even no cost changes ("Cherry-Picking") and those situations where both, climate impact and costs can be reduced ("Win-Win"). As a synthesis, FlyATM4E will deepen in the understanding of ATM possibilities to reduce aviation's climate impact, but moreover how to implement such eco-efficient trajectories. To this end, the FlyATM4E consortium builds on its expertise covering the whole spectrum from atmospheric science and climate research to aviation operations research and aircraft trajectory optimisation."

3 Communication and Dissemination Objectives

Communication, dissemination, and exploitation activities are framed within FlyATM4E's WP4 (see Figure 1). Thus, WP4 is gathering the research activities conducted within the technical WPs, namely WP1, WP2, and WP3, with the aim at:

- Evaluating the project's results in relation to other ATM and MET related enablers and constraints, which includes a hindcast analysis. See Figure 2.

- Delivering recommendations for implementation of environmental-assessment of aircraft trajectories (environmental-optimization) jointly with stakeholders. See also Figure 2

- Disseminating of project results at scientific conferences, in journal papers, to general stakeholders, especially industry, and general public.
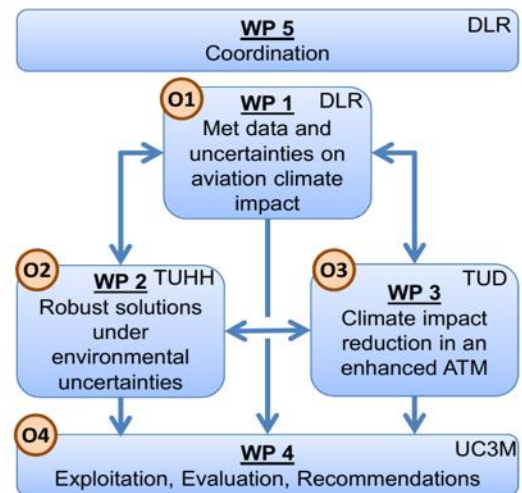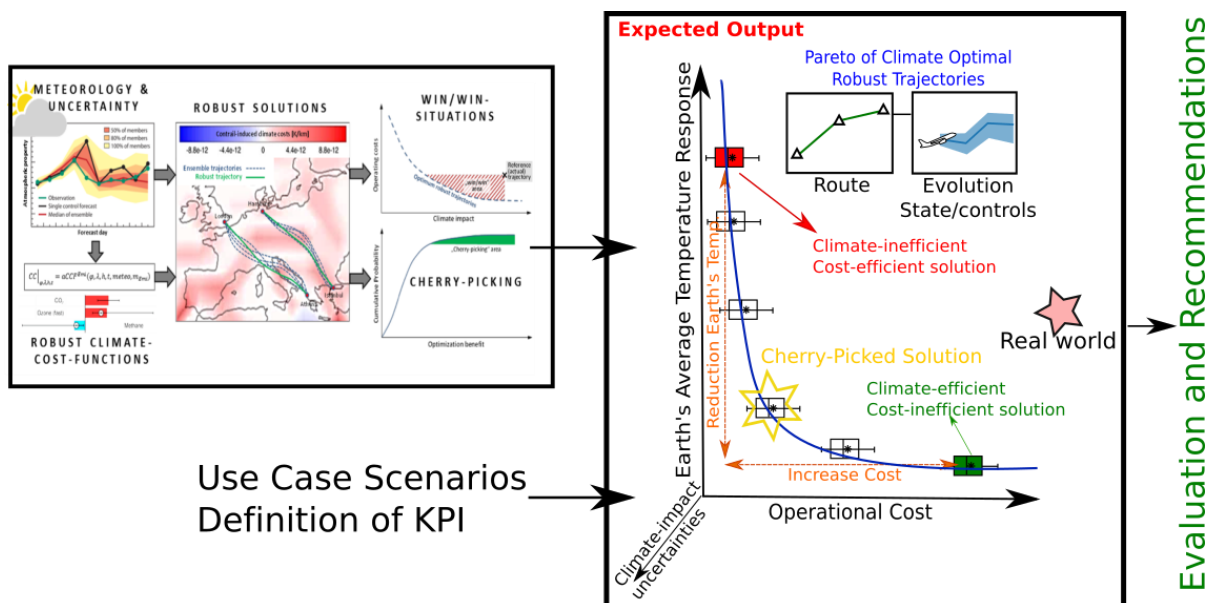

Figure 1: FlyATM4E WP structure

Figure 2: FlyATM4E evaluation and recommendations

3.1 Identification of target audiences

The FlyATM4E partnership will efficiently share research efforts, results, and impact with:

1. the scientific community, which includes the individuals (Undergraduate and Graduate student that might pursue a scientific career, PhD students, PostDocs, and Principal Investigators) and its institutions (universities, research centres).

2. Stakeholders (aeronautical industry, regulatory community, airlines, etc.) and

3. the general public

Impact maximisation of FlyATM4E is based on a strategic approach for the communication, dissemination, and exploitation of project activities, results, and outcomes. This approach will support the highest possible impact of transitional, intermediary, and outcomes and ensure that benefits are accrued within scientific, regulatory, industrial and societal stakeholder groups. An initial stakeholder portfolio analysis (see Table 3) provides information on the stakeholders. This identifies and prioritises the key stakeholder groups

High Influence – High Interest: Key Players	
Group	Stakeholders
Regulators	EASA, ICAO, EEA
OEM	Engine manufacturers, aircraft manufacturers.
Aligned EU and other projects	e.g. Eco2Fly, Engage, PJ18 4DTM, ACACIA, ClimOp, DYNCAT, FMPMET, CREATE, SINOPTICA
Eurocontrol	The Network Manager and its Environment Division
European Organisations	e.g. ECAC, ACARE
Internat. civil aviation bodies	e.g. USFAA, CCAA, CAA
High Influence - Moderate Interest: Stakeholders requiring attention	
Group	Stakeholders
Aircraft operators	Airlines, e.g. Lufthansa
Air Navigation Service Prov.	National ANSPs
Airports	airport industry bodies, e.g. ACI
National authorities	National agencies, e.g. German ministry of environment, BMU
Moderate Influence – High Interest: Stakeholders requiring attention	
Group	Stakeholders
International structures and interest groups	E.g., working groups from IPCC, and WMO, OECD
EU Interest groups (organ.).	E.g., EREA, AET
Manufacturing and consulting organisations	Software developers, carbon trading organisations
Provider of Avionics	E.g., Selex, Thales
Universities/Research Establishments	Individual universities and research centres
Moderate Influence - Moderate Interest: Stakeholders requiring moderate effort	
Group	Stakeholders
Specialised media	Trade magazines (Aviation Week Network, Green Aviation)
General media	National media including news agencies and e-media.
Consultants	Individuals, e.g. CE Delft

Table 3: Stakeholder portfolio analysis according to (high-low) influence and (high-low) interest.

3.2 Objectives by target audiences

The goals of FlyATM4E communication strategy are different for each audience:

1. **The goal of communication and dissemination activities targeted to the Scientific Community** is to maximize the dissemination of scientific research, including other scientific disciplines. This will enhance excellence and scientific reputation. It will also help in finding follow-up ideas and collaborations via discussions in scientific forums.

2. **The goals of communication and dissemination activities targeted to aviation Stakeholders are two-fold:**

   a. First, to attract the interest of the industry towards making aviation climate-efficient;

   b. Second, to draw the attention of different institutions, e.g., European Commission and SESAR, National Governments, Regional Governments, National Regulators on Aviation matters, International institutions (ICAO, EASA) and/or groups within them (ICAO's TBO group), to make them aware of FlyATM4E results and make them visible to their agendas. This will facilitate the allocation of more funding and the revision/modification of standards, including the establishment of market-based mechanisms to incentivize greener aviation.

3. **The goal of communication and dissemination activities targeted to the General Public is to** ensure that the research activities on aviation and climate impact are made known to society in such a way that they can be understood by non-specialists, thereby improving the public's understanding of science and technology. In addition, FlyATM4E purses to establish a concern on how European collaboration and funding contributes to society via greener aviation.

4 Communication, dissemination, and exploitation strategy

4.1 Communication Strategy

FlyATM4E communication strategy has been designed to create awareness (on the target audiences identified in Section 3.1) about climatic impact of aviation and potential mitigation strategies under investigation within SESAR ER.

FlyATM4E will showcase potential climatic impact reductions (and associated costs) derived from achieved results, seeking to foster ATM stakeholder acceptance, and thereby laying the foundations for the future implementation of a climatic-friendly ATM.

This strategy will be Implemented through the use of different media, the definition of a timely plan of communication activities and a series of indicators to measure its impact and effectiveness.

4.1.1 Communication means

4.1.1.1 FlyATM4E Website.

A dedicated web page has been created to promote the project and its research activities and your contribution to SESAR, including a link to the SJU website https://www.FlyATM4E.eu
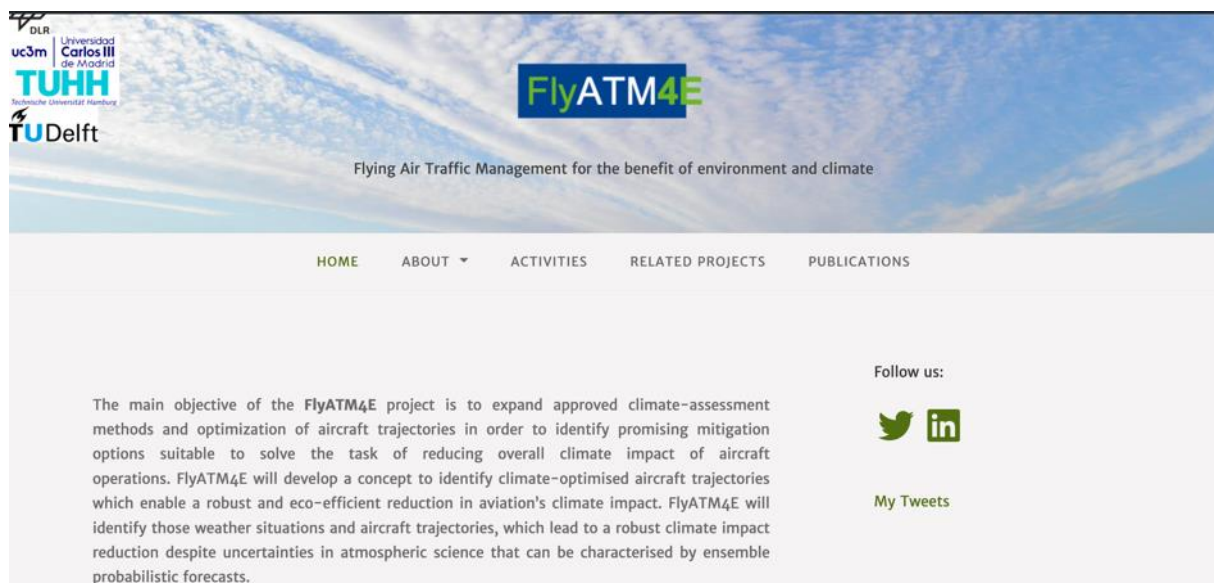
Figure 3: FlyATM4E Website

4.1.1.2 SJU website.

In parallel, with the aid of the banner and other requested information, SJU has developed specific project web pages on SJU website - https://www.sesarju.eu/projects/flyATM4E

Figure 4: FlyATM4E in SJU site

4.1.1.3 Social Media

FLYATM4E will be present in different social media networks, namely:

- Linked-In (Targeted to stakeholders), already on air (Figure 5)

- Twitter (Targeted to the general public), already on air (see Figure 6)

- Research-gate (Targeted to the scientific community)

We will tag the relevant SJU & H2020 communications channels in order to maximize outreach.

Figure 5: LInked-in group screenshoot

Figure 6: Twitter screenshot

4.1.1.4 Institutional Outreach Channels

FLYATM4E plans to do two outreach media campaigns (first at approximately Month 6; and the second upon the finalization of the technical activities in Month 24), including a video-interview, a press-release, and the broadcasting using all the media identified. We will tag the relevant SJU & H2020 communications channels in order to maximize outreach.

The WP4 Leader (UC3M) counts on the support of the participating organisations structures on communication and dissemination to help them achieve their objectives of information transfer to the general public regarding their initiatives, processes and results.

By way of example, U3CM University's Communication structure is described in more detail, demonstrating to what extend a partner's structure can assist in project dissemination. A UC3M service promotes, manages and carries out activities in the area of corporate and brand communication, internal communication, advertising, media relations, social networks, etc. In addition, these activities are also undertaken in the area of scientific information and knowledge, through the Office of Scientific Information (OIC in Spanish). This unit is linked to the Autonomous Community of Madrid's Network of Scientific Culture and Innovation Units (UCC+i) of the Spanish Foundation for Science and Technology (FECYT – Fundación Española para la Ciencia y la Tecnología).

The OIC uses a variety of formats and journalistic genres to emit scientific information regarding research projects and their findings (in open access), along with other subjects of interest in the area of research and innovation, with institutional support from the Vice-Chancellor's Office for Communication and Culture and the Vice-Chancellor's Office for Scientific Policy.

It likewise participates in campaigns such as Science Week and European Researchers' Night to disseminate scientific advances to society at large. These science education activities seek public

engagement through interactions with the populace, promoting a 'science with and for society' philosophy.

In addition, this Office emits news articles and press releases on a weekly basis, using a web format, videos, photos, etc. In each communication campaign, the OIC prepares a dossier to track the impact that these contents have in webs and communication media.

News articles are distributed through the following channels and media:

- **Official scientific news platforms:**

  o **-Notiweb. Madrid+d. Comunidad de Madrid** (Autonomous Community of Madrid). This science and technology news bulletin is a reference for university professors and researchers, science and technology managers, innovative companies and technology-based entrepreneurs, administrators of scientific policy, journalists, and everyday citizens interested in these issues. It has over 64,000 subscribers, particularly in the area of academics within the Spanish-speaking world. Website: www.madrimasd.org/informacionidi/notiweb/default.asp

  o -**SINC Agency (Servicio de Información y Noticias Científicas – Science News and Information Service), FECYT**. This is the first public information agency specializing in science, technology and innovation in Spanish. All contents have a Creative Commons 3.0 licence. SINC offers its service to journalists, scientists and citizens to shed light on the latest, most relevant scientific developments, with special emphasis on Spanish studies. Approximately 1,000 journalist members use it as news source. Website: www.agenciasinc.es

  o **DiCYT (Agencia de Noticias para la divulgación de la Ciencia y Tecnología - News Agency for Public Understanding of Science and Technology). 3CIN Foundation.** This agency focuses on creating synergies between countries on both sides of the Atlantic and improving visibility of R+D+I in the Spanish and Portuguese languages, with 18,000 registered users. Website: www.dicyt.com

  o **AlphaGalileo** is a business-to-business service that distributes research news (in the fields of science, medicine, art, humanities and social sciences) to 7,000 journalists from around the world who have asked to receive this news. A third of the visitors to the site are from the US and it has media registered from more than 75 countries. Website: www.alphagalileo.org

  o **-EurekAlert! - EurekAlert! Chinese**. This is an online, global news service operated by American Association for the Advancement of Science's (AAAS) that provides a central place through which universities, medical centres, journals, government agencies, corporations and other organizations engaged in research can bring their news to the media. It is a global leader in the sector of the distribution of news on science, health, medicine and technology. There are around 11,800 journalists from approximately one hundred countries registered using this platform as a news source. Websites: www.eurekalert.org - http://chinese.eurekalert.org

- **UC3M's external communication channels:**

- o **News on the corporate web homepage: www.uc3m.es** The University's scientific information and knowledge news is published weekly in this section. This page provides access to the UC3M Newsletter Bulletin and its corporate magazine i3.

- o **-Scientific news web: www.uc3m.es/infocientifica** News regarding scientific information and knowledge is published weekly on these pages, with 44 news items generated and 3,195 media appearances during 2015.

- o **Social Networks**: Contents are adapted for distribution in the following UC3M social network corporate accounts:

  - Facebook (https://www.facebook.com/uc3m) Followers: over 33,000.

  - Twitter (https://twitter.com/uc3m) Followers: Over 25,000.

  - Instagram (https://www.instagram.com/universidadcarlosiiidemadrid/) Followers: 2,500.

  - Weiboo (http://www.weibo.com/p/1002065478763531) Followers: over 100.

  - University Twitter account specializing in scientific information: Divulga UC3M (https://twitter.com/ciencia_uc3m). Followers: over 4,000.

- o **-Video Channels:** Videos with interviews and news regarding scientific information and knowledge, in addition to being distributed in the scientific platforms, are published in ARCA (UC3M's video portal): http://arca.uc3m.es and YouTube EDU: www.youtube.com/user/UC3M (over 2,600 subscribers, 1,300,000 views)

- o **- Press release deliveries**: All news is sent to the media directory and specialized science and technology sections, which have over one hundred registries**.**

- o **- Electronic bulletins for specific audiences**: Each month, electronic bulletins targeting companies, alumni and secondary schools are published. These bulletins also disseminate UC3M's scientific news. http://hosting01.uc3m.es/spcestud/web/boletin14.html

- o **-Photographic reports:** For each news article a process is carried out to select its the most representative images. This previous selection and the photographic reports facilitate creation of albums in UC3M Flickr: https://www.flickr.com/photos/eventosuc3m/sets . Once created, the link to these albums are included at the end of each news item.

- **Internal communication channels:**

These news media enable knowledge to be made available to the over 20,000 UC3M students and its approximately 2,600 employees.

- o **- UC3M Newsletter:** This is a weekly electronic bulletin emailed every Monday to all uc3m addresses, and which includes scientific news. It is sent to the news media as UC3M's

activities calendar. It is also accessible from the public zone of the corporate webpage: http://newsletter.uc3m.es/

o **Digital Signage:** This is a network of screens placed in the public zones of the four campuses, with an ample broadcast schedule in which interviews with researchers are emitted, with subtitles for this channel to make the interviews accessible to more viewers.

o **-Corporate Magazine i3:** This is a multimedia monthly corporate media outlet that is accessible on-line, in which scientific information and knowledge news and reports regarding research and innovation are published. Website: http://hosting01.uc3m.es/semanal3/digital3

In a similar way, as described in detail for U3CM, other partners will use their internal communication and dissemination structures to support efficient project dissemination.

4.2 Dissemination strategy

In order to enhance excellence in science, FlyATM4E has a commitment to deliver state-of-the-art research, attending scientific conferences with international peer review and proceedings publication, yet to publish in top ranked JCR journals and also publish according to the open access philosophy (direct cost has been allocated to GOLD open Access publications). Other activities oriented towards the dissemination of research results include: the elaboration of the project web site and the organization of a workshop, as well as Fostering high-talented individuals to follow scientific careers.

4.2.1 Dissemination through JCR journals

Some of the international Journals in which FLYATM4E research intend to publish are:

1. Transportation Research Part C: emerging technologies (JCR 2019; CATEGORY Transportation Science and Technology: Impact factor 6.077; Q1).

2. Transportation Research Part B: methodological (JCR 2019; CATEGORY Transportation Science and Technology: Impact factor 4.796; Q1).

3. Transportation Research Part D: Transport and environment (JCR 2018; CATEGORY Transportation Science and Technology: Impact factor 4.577; Q2)

4. IEEE Transactions on Intelligent Transportation Systems (JCR 2019; CATEGORY Transportation Science and Technology: Impact factor 6.31; Q1).

5. Journal of Air Transport Management (JCR 2019; CATEGORY Transportation: Impact factor 2.811; Q2).

6. Journal of Guidance, Control, and Dynamics (JCR 2019 CATEGOR Eng. Aerospace: Impact factor 2.692; Q1).

7. Geoscientific Model Development (JCR 2019; CATEGORY Geosciences, Multidisciplinary: Impact factor 5.240; Q1)

8. Aerospace MDPI. Open access Journal.

9. Transport Policy JCR 2019; CATEGORY Economics: Impact factor 3.38; Q1)

10. Atmospheric Environment (JCR 2019; CATEGORY Environmental Sciences: Impact factor 4.039; Q2)

11. Atmospheric Chemistry and Physics (JCR 2019; CATEGORY Environmental Sciences: Impact factor 5.41; Q1)

12. Environmental Research Letters (JCR 2019; CATEGORY Environmental Sciences: Impact factor 6.096; Q1)

These journals are top ranked in their respective categories. The commitment to publish in these journals will certainly enhance the scientific excellence of the project.

4.2.2 Dissemination through international conferences and congresses

Some of the international conferences to which the research members will attend and present FlyATM4E results are:

1. SESAR Innovation Days (SID). https://www.sesarju.eu/sesarinnovationdays

2. International Conference on Research in Air Transportation (ICRAT). http://www.icrat.org/

3. USA/Europe ATM Seminar. (ATM Seminar). http://www.atmseminarus.org/

4. ENRI Workshop on ATM/CNS. www.enri.go.jp/eiwac/eiwac_2021_eng.html

Figure 7: SID's 2020 advertisement

5. The ECATS conference (Making aviation environmentally sustainable). http://www.ecats-network.eu/events/3rd-ecats-conference

They typically include an international peer review committee, publish proceedings, and are well recognized in ATM forums as the most relevant conferences. The research members have already attended to past editions of these conferences. The attendance to this conference will also enhance links with other institutions and/or industrial actors.

In addition, FLYATM4E will also participate in other international events (that do not necessarily include peer-review papers) such as the World ATM Congress (https://www.worldatmcongress.org), Aerodays (https://www.aerodays.eu/), the Berlin Aviation Summit (https://www.aerodays.eu/berlin-aviation-summit/), the Aerospace Europe Conference (https://www.cleansky.eu/event/aerospace-europe-conference-eac2020), just to name a few.

4.2.3 Internal peer-reviewing of conference and journal papers

In the case of joint works, before the submission of a conference or journal paper, it will be internally peer-reviewed according to the processes specified in the Consortium Agreement (CA). This will certainly enhance quality and excellence of the work.

4.2.4 Dissemination through the participation in Engage activities

Engage is the SESAR Knowledge Transfer Network. It is managed by a consortium of academia and industry, with the support of the SESAR JU, to promote and facilitate the development of air traffic

management research in Europe. The focus of Engage is two-fold: inspiring new researchers and helping to align exploratory and industrial research, through a wide range of activities and financial support actions.

Among other activities, Engage is currently funding PhD Students and catalytic project, it is organizing workshops around four thematic challenges and dedicated summer schools, and it is helping in the organisation of the SESAR Innovation Days. In addition, it has recently launched, in cooperation with SESAR JU, the SESAR digital academy.

FlyATM4E consortium members will contribute to the activities of Engage (or related to it) as follows:

- Attending and (eventually) presenting research activities at the workshops organised around the different thematic challenges. In particular, FLYATM4E researchers have been actively participating in the workshops of the "Thematic challenge 3 – Efficient provision and use of meteorological information in ATM" and will keep contributing to them.

- Thematic workshop on MET services will be organised in autumn 2020 where FlyATM4E researchers intend to participate with a thematic contribution.

- Acting as supervisors of PhD students co-funded by Engage, as it is the case of the WP4 Leader, Manuel Soler. Thus, we will be involved in the Summer Schools.

- Contributing to the SESAR Digital Academy, whose mission is to become a recognised learning initiative supporting Europe's future aviation and ATM workforce. FLYATM4E will communicate its research activities within this forum.

4.2.5 Dissemination through open access to publications

According to the Grant Agreement (GA), open access (free of charge online access for any user) to all peer-reviewed scientific publications relating to the project's results must be ensured. To fulfil this requirement, within six months of publication, the publication will be deposited in an open access repository, for example, the European Commission repository OpenAire and partners' institutional repositories.

Figure 8: Open Aire Capture

4.2.6 Dissemination through open software

Since a central aim of this consortium is to provide benefit to the European community, some of the project partners may be either using open source code in their deliverables or contributing their deliverables to the open source communities (See Section 4.3.3, which includes information about software management).

4.2.7 Dissemination via the SESAR JU communications channels

When flyers, articles, workshops or other communications activities take place, FlyATM4E will share this with the SESAR JU communication channels so that messaging can be disseminated, and outreach can be maximised. One example could be the project inclusion in SESAR eNews.

4.3 Exploitation strategy

The FlyATM4E Consortium strategy for exploitation of results is primarily oriented towards policymaking. In order to wake up interest in the institutions and foster industrial acceptance, involving stakeholders, understanding their needs, and identifying the barriers is key.

In addition, intellectual property on which all partners agree has been defined in the CA. Jointly with the legal entities of all sites, rules have been established for the exploitation of results, including their ownership and how exploitation is organized if that one or more partners want to exploit specific results. In accordance with the CA, the consortium will exploit IP generated within the project to generate added value both in additional methodological development in climatic-friendly operations, but also to leverage the results to form the basis for further development projects with the partners and the EU industry.

4.3.1 Strategy for stakeholder engagement

Table 4 present the strategy to be followed in order to engage different stakeholders. The strategy differs by stakeholder target group, as identified in Section 3.1.

High Influence – High Interter	Key Players	
Strategy: Closely engage. Communicate frequently. Active request management, utilise feedback.		
Group	**Stakeholders**	**Prime engagement methods**
Regulators	EASA, ICAO, EEA	• Key stakeholder will be invited to form Advisory Board.
OEM	Engine manufacturers, aircraft manufacturers.	• Strategic meetings for two-way communication
Aligned EU and other projects	e.g. Eco2Fly, Engage, PJ18 4DTM, ACACIA, ClimOp, CREATE, Dyncat	• Workshops, symposium, and conferences (face2face &online)
Eurocontrol	The NM and the Environmental office	
European Organisations	e.g. ECAC, ACARE	• Web site and social media
Internat. civil aviation bodies	e.g. USFAA, CCAA, CAA	
High Influence - Moderate Interest	Stakeholders requiring attention	
Strategy: Keep informed. Utilise interest, maintain as a supporter or advocate		
Group	**Stakeholders**	**Prime engagement methods**
Aircraft operators	Airlines, e.g. Lufthansa	• Invitation to Advisory Board
Air Navigation Service Prov.	National ANSPs	• Circulate FlyATM4E results
Airports	airport industry bodies, e.g. ACI	• Utilise interested association bodies, e.g., ACI as dissemination channels
National authorities	National agencies, e.g. German ministry of environment, BMU	
Moderate Influence – High Interest	Stakeholders requiring attention	
Strategy: Keep informed. Engage interest, communicate regularly, consult and involve		
Group	**Stakeholders**	**Prime engagement methods**
International structures and interest groups	E.g., working groups from IPCC, and WMO, OECD	• Key stakeholders will be invited to participate on Advisory Board.
EU Interest groups (organ.).	E.g., EREA, AET	• Utilise interested association bodies such as EREA as dissemination channels.
Manufacturing and consulting organisations	Software developers, carbon trading organisations	
Provider of Avionics	E.g., Selex, Thales	• Conferences, workshops and scholarly outputs to disseminate new knowledge and findings.
Universities/Research Establishments	Individual universities and research centres	
Moderate Influence - Moderate Interest	Stakeholders requiring moderate effort	
Strategy: Monitoring needs and keeping updated		
Group	**Stakeholders**	**Prime engagement methods**
Specialised media	Trade magazines (e.g. Aviation Week Network, Green Aviation)	• Website, press release, and news letter
General media	National media including news agencies and e-media.	• Social media, including LinkedIn and ResearchGate
Consultants	Individuals, e.g. CE Delft	

Table 4: Strategy for stakeholder engagement

4.3.2 Exploitation through the FlyATM4E Workshop

FlyATM4E Stakeholder workshops providing information on novel concepts and progress will be held online on a regular basis online. Such online events have proven to provide efficient dissemination, when formulating key messages, inviting on a regular basis, circulating a detailed agenda, and offering sufficient possibility for questions and answers. Key messages formulated from the Steering Committee (SC) will support efficient communication. Additionally, in the finalisation phase (M25-M30) a face-to-face stakeholder workshop will disseminate FlyATM4E achievements with a clear focus on implementation. It will host scientific talks on advancements and concepts, but also aim for industrial perspectives on applications. A panel discussion will foster exchange about challenges and opportunities on future ATM developments for eco-efficient routing.

4.3.3 Exploitation through software management

An important aspect to consider for further exploitation of results is the development of scientific libraries that follow established procedures and standards. This will facilitate its future exploitation either as open-source libraries or as proprietary libraries.

Indeed, software development and maintenance are something intrinsic to FLYATM4E activities. All the research activities to be conducted in WP1, WP2, and WP3 require software development (in the form of scientific libraries).

4.3.3.1 Software life cycle

The purpose of this section is to create a common schema for the overall software life cycle, which includes the following phases:

- Requirements
- Design
- Implementation
- Test
- Operation and maintenance

The software life cycle model is shown in Figure 9. This cycle is repeated after each release.
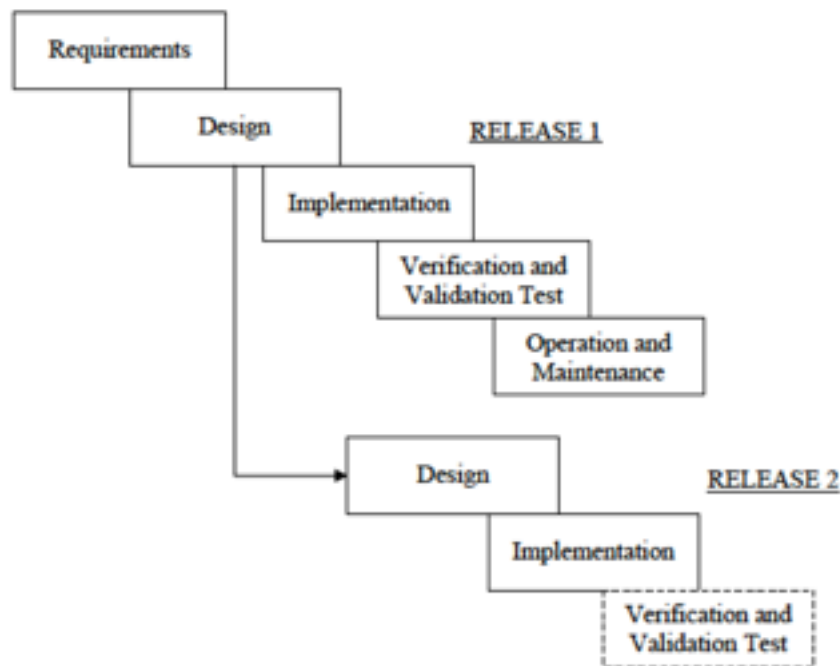
Figure 9: Software development life cycle with incremental delivery approach

4.3.3.1.1 The requirements phase

The requirements phase has the following purposes:

- to fully specify the functional and non-functional requirements of the proposed Software; i.e. to specify what services the software should provide and what functions it should perform, but without prescribing any implementation details,
- to specify both the problems and the constraints upon the solution in a rigorous form.

The goal for this first phase of software development is to provide a complete, unambiguous, and understandable requirements document. This phase should minimize the risks of wrong software development, software release delays, and not testable requirements.

The outputs for this phase would be:

- User's Requirements,
- Verification of requirements and validation plan.

For scientific libraries to be developed within WP1, WP2, and WP3, the requisites are derived from the overall concept of the project, including goals, assumptions, and hypotheses to be tested.

4.3.3.1.2 The Design Phase

The design phase is the technical key point of the software development; which translates requirements into a diagrammatic representation of the software that could be assessed for its quality before the coding actually begins. As with requirements, the design is documented and becomes a part of the software configuration baseline. The design of the architecture, components, interfaces and data are created, documented. Two types of technical activities are carried on:

- Software specifications (will describe what the software does)
- Software design (will describe how the software does it)

Software Specifications: A detailed description defining the functions which are intended to be developed to cope with the requirements is provided. The major points of the software specification are the analysis of the functions and the definition of module interfaces, which results in software functional specifications and interface control documents.

Software Design The objective of the software design is to define the software. Modules (classes, functions, etc.) and their interfaces. The module structure is specified down to the component level, defining the component to the point where implementation can begin. The output is the software design description.

4.3.3.1.3 The Implementation Phase

In this phase the software is created and tested on a module by module basis, and it includes:

- Coding
- Unit test and module integration

Coding: During coding, the software detailed designs are transformed into code, which can be then compiled (in case it is needed) and debugged. The software user manual (documented in the code and automatically generated) is also developed. The source code is reviewed to ensure that it accurately implements the detailed design and it follows to the coding standard. The outputs are:

- the debugged code (in the form of source, library, make files, etc),
- the software user manual.

Unit test and module integration: The testing at unit level (class or function) is intended to prove the completeness and correctness of the developed module, covering both code and documentation. The code related to the unit test is included in the module itself. The integration process is very complex and is made as a sequence of steps where one or more modules are inserted in an integration environment. The integration environment can be formed by real parts or by emulators depending on availability of the real system, on the possibility to emulate its behaviour and on the needs for tests. The integration of different modules continues up to complete involvement of the defined set of modules that are part of a release of the software.

4.3.3.1.4 The Verification and Validation Test Phase

The verification and validation of software requires that software is checked against its specifications. The goal is to reduce software errors to an acceptable level. Verification and validation also require that software products comply with standards, guidelines, user requirements, functional and system requirements. Verification and Validation Plan. Part of this plan is carrying out an acceptance test that requires the active involvement of the end users.

The outputs are:

- Verification and Validation Test Report.

4.3.3.2 Programming Environment and standards

In FLYATM4E project, there are no particular recommendations concerning methodology to be used for analysis and design of the software, each partner is free to use its own programming environment and standards. However, the use of an object-oriented approach will be encouraged.

4.3.3.2.1 Programming Environment

The programming environments we will be using throughout the project are, depending on the partner:

- Python (UC3M, DLR)
- Fortran (DLR, TUD)
- Matlab (TUHH)

4.3.3.2.2 Programming Standards

Software Programming Standards should be applied for the software development. The Software Programming Standards describe:

- Programming Style
- Naming Conventions for subroutine, file, variable, etc.
- Directory Structure, i.e. the minimum standard directory structure that each development shall follow.
- MAKEFILE Standard.

All in all, using a software standard helps developers conform to common coding standard and at the same time avoid some 'silly' mistakes.

The following standards will be used:

- Python: PEP8 standard (or any update to be appear along the duration of the project)

4.3.3.3 Software documentation plan

The documents which will be produced during the Software life cycle can be grouped into the following categories

- Requirement Documentation
    - o User's Requirements
- Design Documentation
    - o Software Functional Specification
    - o Interface Control Documents
    - o Software Design Description
- Test Documentation
    - o Software Verification and Validation Test Plan
    - o Software Verification and Validation Test Report
- User Documentation
    - o Software User Manual
- Management Documentation
    - o Software Management Plan

5 Schedule of communication and dissemination activities

Table 5 presents the foreseen list of Communication and Dissemination Activities. To avoid that communication channels are not used, we present in Table 6 the communication responsibilities. Note that all the communication material will be sent to SJU for its review.

CA#	Description	Target	Date
CA1	Participation at each SESAR Innovation Days with a poster describing the status of the project.	Stakeholders	T0+06 (31/10/2020) T0+18 (31/10/2021) T0+30 (31/10/2022)
CA2	Participation at SESAR Innovation Days (Q4, each year) with scientific papers showing the progress of the project.	Scientific Stakeholders	T0+18 (31/10/2021) T0+30 (31/10/2022)
CA3	Publication of papers in scientific journals, e.g.: Aerospace, Journal of Air Traffic Management; Transportation Research Part D (Transport and Environment); Journal of Guidance, Control, and Dynamics; Environmental Research Letters	Scientific	2021 and 2022
CA4	Participation and presentation at scientific conferences (others that SIDs): • International Conference on Research Air Transportation (ICRAT) (Q2, 2022) • USA/Europe ATM Seminar (Q2, 2021) • ENRI-Workshop (Q4, 2021) • ECATS (Q4, 2020) • World ATM Congress (Q2, 2021-2022)	Scientific Stakeholders	T0+4 (13/10/2020) See each conference
CA5	Organisation of a dedicated workshop to present the project's results. This workshop will be organized by the end of the project.	Scientific Stakeholders	T0+30 (31/10/2022)
CA6	After the workshop, publication of FlyATM4E press describing the major outcomes of the project	All	T0+30 (31/10/2022)
CA7	Creation of FLYATM4E website www.flyatm4e.eu	All	T0+01 (31/05/2020) Monthly updates
CA8	Social Media (Twitter, Linked-In, Research Gate)	All	T0+01 (31/05/2020) Weekly updates
CA9	UC3M outreach news	General Public	1 after KoM 1 at the end of the project

CA10	SESAR outreach news (newsletter)	Stakeholders	1 after KoM 1 at the end of the project
CA11	Participation in Engage workshops	Scientific Stakeholders	Once per year in TC2 and TC3
CA12	Participation in SESAR digital Academy	General Public	1 at the end of the project

Table 5: Communication activities

CA#	Responsible	Date
CA1	Manuel Soler (UC3M) as WP4 leader will coordinate the inputs needed to produce the poster.	T0+06 (31/10/2020) T0+18 (31/10/2021) T0+30 (31/10/2022)
CA2	The SC will be responsible of identifying potential research that can be channelled up to a SID paper. Researchers involved will be in charge of writing the papers. The first author of the publication will lead the authorship.	T0+18 (31/10/2021) T0+30 (31/10/2022)
CA3	The SC will be responsible of identifying potential research that can be channelled up to papers in scientific journals, e.g.: Transportation Research Part D (Transport and Environment); Journal of Air Traffic Management; Journal of Guidance, Control, and Dynamics; Environmental Research Letters. Researchers involved will be in charge of writing the papers. The first author of the publication will lead the authorship.	2021 and 2022
CA4	The SC will be responsible of identifying potential research that can be channelled up to scientific conferences (others that SIDs): International Conference on Research Air Transportation (ICRAT), USA/Europe ATM Seminar, and ECATS. Researchers involved will be in charge of writing the papers. The first author of the publication will lead the authorship.	T0+13 (31/05/2021) T0+25 (31/05/2022)
CA5	The workshop will be organized by DLR by the end of the project. All the partners will be involved for the invitation of speakers and attendees. FLYATM4E main results will be also presented by the different FLYATM4E partners.	T0+30 (31/10/2022)
CA6	Manuel Soler (UC3M) as WP4 leader will coordinate the outreach activity	T0+30 (31/10/2022)
CA7	Thorben Bethe (UC3M), under the coordination of Manuel Soler (UC3M), will be in charge of preparing the website and do periodic updates	T0+01 (31/05/2020) Monthly updates
CA8	Thorben Bethe (UC3M), under the coordination of Manuel Soler (UC3M), will be in charge of doing periodic updates on the social media.	T0+01 (31/05/2020) Weekly updates
CA9	Manuel Soler (UC3M) as WP4 leader will coordinate the outreach activity	1 after KoM 1 at the end of the project

CA10	Sigrun Matthes (DLR), as PC, will coordinate the outreach activity in coordination with SESAR JU	1 after Review Meeting 1 at the end of the project
CA11	Both Sigrun Matthes (DLR), as PC, and Manuel Soler (UC3M), as WP4 leader and leader of Engage's Research Challenge #3, will be the focal points of contact for this activity.	Once per year in TC3
CA12	Sigrun Matthes (DLR), as PC, will coordinate the outreach activity in coordination with SESAR JU	1 at the end of the project

Table 6: Communication responsible

In the period ranging Month 24 (where the technical activities will end) to Month 30, FLYATM4E will be devoted to dissemination events. We summarize the activities (already presented in Table 5) we intend to complete in those 6 months:

- CA1 and CA2: Participation in SIDs'22 (Q4, 2022, TBC) with a poster and 1 conference paper.
- CA3: Submission of, at least, 2 journal papers with the results of the project.
- CA5: Organization of the FLyATM4E workshop (~M30)
- CA9: Outreach campaign (produced by UC3M outreach service) with the final results of the project (~M26). Targeting General Public
- CA10: Outreach campaign SESAR e-news with the final results of the project (~M26). Targeting Stakeholders
- CA11: Participation in the Environmental and Meteorology Engage workshop (Q4, 2020, TBC)
- CA12: Participation in SESAR digital Academy, presenting the main achievements of the Project (~M26-M28)

Before Month 24, coinciding with the Final Review Meeting, we will be updating this Communication, Dissemination and Exploitation Plan in order to prepare a specific plan for those 6 months with the objective of maximizing the outreach during that period.

6 Communication and Dissemination Success Criteria

6.1.1 Metrics for measuring success of the communication activities

The metrics proposed to measure the success of the communications activities are the following:

- Number of results obtained in an internet search engine (e.g. Google) when any of the following search terms are used: *"FLYATM4E SESAR", "FLYATM4E H2020", "FLYATM4E ATM", "Aviation and climate change".* It will be reported every six months, showing the evolution of these analytics over the course of the project. Target KPI is to have 10 search engine results per month.

- Website: Number of visitors to the project website. It can be gathered from free web analytics services as, for example, Google Analytics. It will be reported every six months, showing the evolution of these analytics over the course of the project. Target KPI is to have at least 20 visitors and 50-page views per month.

- Twitter: Number of twits (target KPI is 1 per week), number of re-twits (Target KPI is 10), number of "followers" (target KPI is to reach 100) and "following" (target KPI is to reach 50); click-throughs with benchmark. It will be reported every six months, showing the evolution of these analytics over the course of the project

- Linked-in: Number of messages (target KPI is 1 per week), number of "followers" (target KPI is to reach 100) and "following" (target KPI is to reach 100). It will be reported every six months, showing the evolution of these analytics over the course of the project.

- Number of attendants to the workshop, including speakers and panellists. We will measure the nationalities and the stakeholders. Target KPI is to have more than 30 attendees, including at least 8 nationalities.

- Number of channels reached with the UC3M outreach service. Target KPI is to reach at least 10 channels (including internal and external channels)

- Number of articles published by media/and in targeted scientific journals based on targeted outreach. Target KPI is to publish at least 4 conference papers and 2 journal papers.

6.1.2 Metrics for measuring success of the Dissemination activities

The metrics proposed to measure the success of the dissemination activities are the following:

- Number and quality of Web of Science indexed Journal Papers. The quality will be measured based on the impact factor and the quartile of the journal in its corresponding category (e.g., number of Q1 papers). Target is to publish at least 2 journal papers (1 to be JCR Q1)

- Number of conference papers published in international conferences. Target KPI is to publish at least 4 conference papers.

- Number of posters published in international conferences. Target KPI is to publish at least 3 posters

- Number of communications in international conferences. Target KPI is to communicate in at least 4 international conferences

- Number of communications in other forums, e.g., Engage workshops. Target KPI is to communicate in at least 8 events

7 References

1. SJU, *Project Handbook of SESAR 2020 Exploratory Research Call H2020-SESAR-2019-2 (ER4) (Programme Execution Guidance). 14th March 2019. Edition 3*. 2019.
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