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Final report on communication and dissemination

Deliverable D6.2

APACHE

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ASSESSMENT OF PERFORMANCE IN CURRENT ATM OPERATIONS AND OF NEW CONCEPTS OF OPERATIONS FOR ITS HOLISTIC ENHANCEMENT

This report[1] is part of a project that has received funding from the SESAR Joint Undertaking under grant agreement No 699338 under European Union's Horizon 2020 research and innovation programme.

Abstract

This document reviews the communication and dissemination plan for the APACHE Project and reports on the specific actions performed during whole duration of the Project (9 May 2016 to 8 May 2018). The success of these activities is measured against different metrics that were established beforehand in the APACHE Project communication and dissemination plan. Targets achieved include the Participation in the SESAR innovation days; publications in conference proceedings; dedicated stakeholder consultation activities and workshops; consultation with the APACHE external experts advisory board; dissemination towards Industrial Research and SESAR scientific committee; and visitors of the APACHE public web site. Conversely, some other targets were not achieved, namely: journal papers published; targets set for social media communication (twitter and LinkedIn), press releases; communication to general public; and the APACHE final event, which was finally cancelled. The report concludes with recommendations and specific actions that are foreseen after the closure of the project, once the final results will be available and additional dissemination and communication actions will be done, especially aiming to address some of the abovementioned unachieved targets.

[1] The opinions expressed herein reflect the author's view only. Under no circumstances shall the SESAR Joint Undertaking be responsible for any use that may be made of the information contained herein.

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1 Introduction

The APACHE Project covers the topic *ER-11-2015 – ATM Performance within the area of ATM Operations, Architecture, Performance and Validation* and proposes a new approach based on simulation, optimization and performance assessment tools, which aims to capture complex interdependencies between Key Performance Areas (KPA) at different modelling scales (micro, meso and macro).

1.1 Purpose, context and scope of the document

This Deliverable *D6.2 – Final report on communication and dissemination*, as part of the work package (WP) 6: *WP6 – Dissemination, communication and exploitation*, and in particular *WP6.2 – Communication and dissemination*, reviews all actions taken during the whole project according to the communication and dissemination plan included in the Project Management Plan (APACHE Consortium, 2016), where different actions, audiences and success metrics were identified. WP6.2 spans along the whole duration of the project and gathers inputs from WPs which might be eligible for a communication and dissemination action. Figure 1-1 shows the relationship of this deliverable with other relevant deliverables and WPs in the context of the Project.

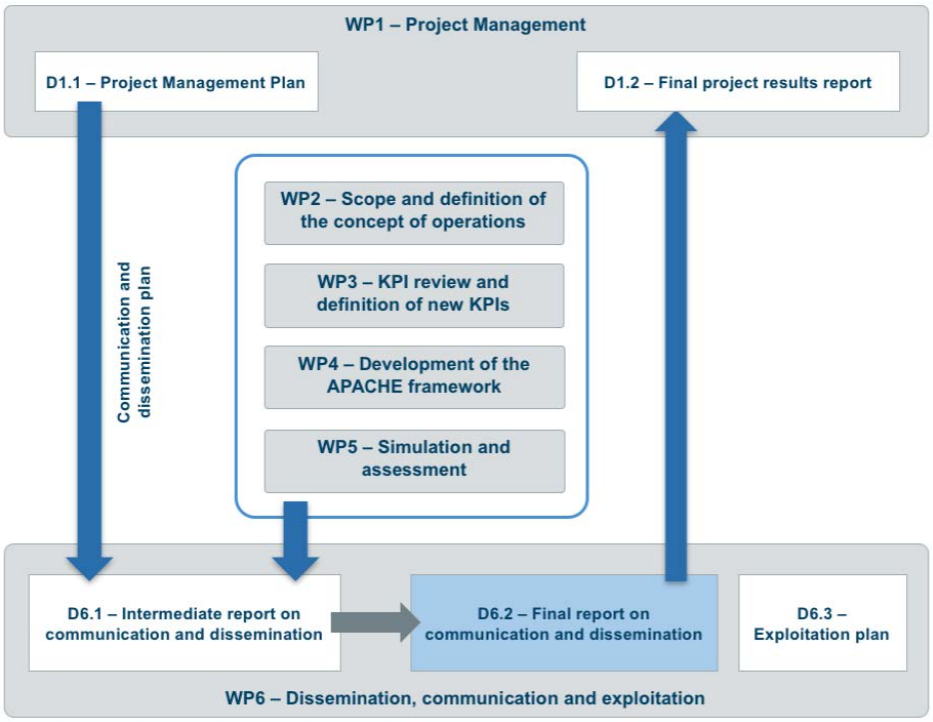

Figure 1-1. Context of deliverable D6.2

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1.2 Document structure

The document is structured as follows:

- **Section 1:** Introductory section that outlines the purpose, context and scope of this deliverable and containing a glossary of terms and concept definitions.
- **Section 2:** Review of all communication and dissemination activities performed during the APACHE Project.
- **Section 3:** Assessment of the success of the communication and dissemination activities, according to the target levels established in the communication and dissemination plan.
- **Section 4:** Conclusions and further actions expected in communication and dissemination after the closure of the project.

1.3 Glossary

Term	Explanation
ALG	Advanced Logistics Group
ANSP	Air Navigation Service Provider
ATC	Air Traffic Control
ATM	Air Traffic Management
BRTE	Boeing Research and Technology Europe
CANSO	Civil Air Navigation Services Organisation
CeADAR	Centre for Applied Data Analytics
CIRA	Centro Italiano Ricerche Aerospaziali
ConOps	Concept of Operations
CRIDA	Centro de Referencia de Investigación, desarrollo e innovación en ATM
DASC	Digital Avionics Systems Conference
DGAC	Directorate General for Civil Aviation
EC	European Commission
EEAB	External Experts Advisory Board
ENAC	√âcole Nationale de l'Aviation Civile
ENAIRE	Spanish Airports and Air Navigation
ER	Exploratory Research
Fraunhofer-IAIS	Fraunhofer Institute for Intelligent Analysis and Information Systems
ICAO	International Civil Aviation Organization
ICRAT	International Conference in Research in Air Transportation
ID	IDentifier
IR	Industrial Research

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Term	Explanation
KPA	Key Performance Area
KPI	Key Performance Indicator
KTN	Knowledge Transfer Network
NM	Network Manager
PDF	Portable Document Format
PRB	Performance Review Body
PRU	Performance Review Unit
RA	Risk Assessment (APACHE system component)
SEAS	South-East Aviation Summit
SESAR	Single European Sky ATM Research
SIDs	SESAR Innovation Days
SJU	SESAR Joint Undertaking
SYM-OP-IS	SYMposium on OPerational research
TCP	Traffic and Capacity Planner (APACHE system component)
TP	Trajectory Planner (APACHE system component)
UB-FTTE	University of Belgrade-Faculty of Transport and Traffic Engineering
UPC	Technical University of Catalonia
URL	Uniform Resource Locator
WP	Work Package

Table 1-1. Glossary

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2 Summary of communication and dissemination activities

APACHE communication and dissemination activities are covered in **WP6**, with all APACHE Consortium partners involved under the coordination of UPC (WP6 leader). WP6 is composed by three main tasks:

- WP6.1 (lead by UB-FTTE): Stakeholders consultation and workshops.
- WP6.2 (lead by UPC): Communication and dissemination
- WP6.3 (lead by ALG): Exploitation plan (out of the scope of this deliverable).

In the APACHE Project Management Plan (APACHE Consortium, 2016) the target audiences and objectives for communication and dissemination were identified, and 11 different activities were planned to cover all objectives, as shown in Table 2-1.

Communication and dissemination material:	Communication and dissemination activity	Target audience(s):	Related sub WP
Detailed APACHE objectives and methodology. Final or intermediate technical results. New ATM performance framework. Validation results.	Participation in SESAR innovation days	SESAR research community and Academia	WP6.2
	Publication of papers in peer-reviewed scientific journals	International air transportation research community (in particular in ATM) and Academia.	WP6.2
	Publication (and presentation) of papers in scientific conferences	International air transportation research community (in particular in ATM) and Academia.	WP6.2
	Dedicated stakeholder consultation activities and workshops	Air transport stakeholders, policy makers, PRB, air transportation research community.	WP6.1
	APACHE EEAB consultation	APACHE EEAB	WP6.1
Final Project results.	APACHE Project final event	Air transport stakeholders, policy makers, PRB, air transportation research community.	WP1, WP6.1
	EC (European commission) research and innovation events	European research community and Academia. EC research program managers and policy makers.	WP6.2
General information about the project, public deliverables, newsletters, announcements, teasers.	APACHE Project public website	All previous audiences plus General Public.	WP6.2
	Social media communication: Twitter and LinkedIn	All previous audiences plus General Public.	WP6.2
	General media communication and press releases.	All previous audiences plus General Public.	WP6.2
	General public conferences or presentations	General Public	WP6.2

Table 2-1: Planned communication and dissemination activities and target audiences (Source: APACHE Consortium, 2016)

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Table 2-2, in turn, details the planned schedule for each activity, as initially outlined in the communication and dissemination plan. This section reviews those actions taken during this period.

Communication and dissemination activity	Sub WP	Expected timing for the activity
Participation in SESAR innovation days	WP6.2	Expected in Nov 2016 and Dec 2017
Publication of papers in peer-reviewed scientific journals	WP6.2	Expected from M21 (Jan 2018)
Publication (and presentation) of papers in scientific conferences	WP6.2	Expected from M12 (Apr 2017)
Dedicated stakeholder consultation activities and workshops	WP6.1	Expected in Nov 2016 and Feb 2018
APACHE EEAB consultation	WP6.1	Expected for MS5, MS10 and MS11
APACHE Project final event	WP1, WP6.1	Expected at M24 (Apr 2018)
EC research and innovation events	WP6.2	Expected from M18 (Oct 2017)
APACHE Project public website	WP6.2	Expected from M5 (Sep 2016)
Social media communication: Twitter and LinkedIn	WP6.2	Expected from M3 (Jul 2016)
General media communication and press releases	WP6.2	Expected from M7 (Nov 2016)
General public conferences or presentations	WP6.2	Expected from M9 (Jan 2017)

Table 2-2: Expected timings for communication and dissemination activities (Source: APACHE Consortium, 2016)

2.1 Participation in SESAR Innovation Days (SIDs)

According to the SIDs web page[2]:

"The SESAR Innovation Days are the main vehicle for SESAR to share progress and disseminate results of its innovative research programme. With the transition from SESAR Workpackage E (long-term and innovative research) to SESAR 2020 ER (Exploratory Research) the 2016 SIDs will see a mix of mature research projects presenting their final results and new projects, recently started, presenting their approach and first results. In addition to disseminating results of SESAR research projects, papers and posters are invited in an open call for contributions."

The SIDs have become a landmark event in the European aviation research calendar with a potential audience of more than 250 persons between scientific community, industrial and SJU representatives. The conference included keynote speakers, technical paper sessions organised in two parallel tracks, a poster exhibit and dedicated poster sessions as well as various networking activities. Moreover, parallel workshops were also organised before, during or right after the SIDs, such as the APACHE workshop organised in 2016 (see section 2.4 below).

The APACHE Consortium participated in two editions of the SIDs, in 2016 and 2017.

2.1.1 Participation in the 6th SESAR Innovation Days

The Sixth SESAR Innovation days took place between **Nov 8th** and **Nov 10th 2016** in **Delft** (The Netherlands). The host was Technical University of Delft, Faculty of Airspace Engineering.

A Poster (Prats et al., 2016) was presented in the conference by UPC (see Fig. 2-1a) and a poster teaser was also presented by Xavier Prats (APACHE Coordinator) in one session of the Conference.

Several members of the APACHE consortium attended the conference (see Fig. 2-1b):

- UPC: Marc Melgosa and Xavier Prats.

[2] http://www.sesarinnovationdays.eu/

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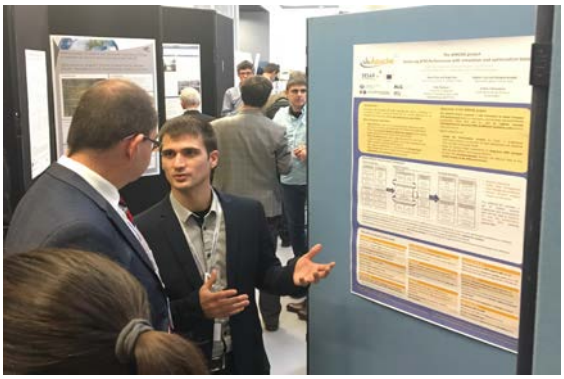
- ALG: Georgina Ansaldo and Vladimir Coca.
- UB-FTTE: Tatjana Kristic-Simic, Bojana Mirkovic and Fedja Netjasov.
- ENAC: Daniel Delahaye and Andrija Vidosavljevic.

The poster and its abstract are publicly available in the SIDs and APACHE public websites:

- http://sesarinnovationdays.eu/2016/posters)
- https://apache-sesar.barcelonatech-upc.eu/en/publications

Finally, it should be noted that a paper was also submitted (in September 2016) but was not accepted for publication mainly due to the lack of results at this initial stage of the project.



a) APACHE poster presentation

b) APACHE consortium members

Figure 2-1. Participation in the 6th SESAR Innovation days (Delft, The Netherlands)

2.1.2 Participation in the 7th SESAR Innovation Days

The Seventh SESAR Innovation days took place between **Nov 27th** and **Nov 30th 2017** in **Belgrade** (Serbia). The host was University of Belgrade, Faculty of Transport and Traffic Engineering (member of APACHE consortium).

A Paper (Prats et al., 2017) was published in the conference proceedings and presented by Xavier Prats, the APACHE Coordinator (see Fig 2-2a).

Two posters were presented in the conference. A poster on the proposed KPIs (Mirkovic et al., 2017), presented by UB-FTTE (Fig 2-2b) and a joint poster with the AURORA and INTUIT projects (Marcos et al., 2017), jointly presented by different members of the three project consortia

Several members of the APACHE consortium attended the conference:

- UPC: Ramon Dalmau[3], Yan Xu, Marc Melgosa and Xavier Prats.
- UB-FTTE: Tatjana Kristic-Simic, Bojana Mirkovic, Goran Pavlovic, Dusan Crnogorac, Obrad Babic and Fedja Netjasov.

[3] Mr. Ramon Dalmau was awarded with the SESAR Young Scientist Award 2017. (https://www.sesarju.eu/news/sesar-young-scientist-award-recognising-scientific-excellence-atm)

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- ENAC: Daniel Delahaye and Andrija Vidosavljevic.

The paper and posters (along with their abstracts) are publicly available in the SIDs and APACHE public websites:

- http://sesarinnovationdays.eu/2016/posters)
- https://apache-sesar.barcelonatech-upc.eu/en/publications

a) APACHE paper presentation b) APACHE poster presentation

Figure 2-2. Participation in the 7th SESAR Innovation days (Belgrade, Serbia)

2.2 Publication of papers in peer-reviewed scientific journals

No journal papers, directly related with the APACHE project, have been published in a peer-reviewed scientific journal. It should be noted, however, the difficulty to have an accepted paper in a journal before the closure of the project, taking into account, on one hand that relevant results are obtained at the end of the APACHE project and; on the other hand, the long revision and acceptance process (several months to a year) that are typically needed before a paper is published in a journal.

Nevertheless, it is worth mentioning that three manuscripts are being finished at the moment this Deliverable was written:

- *Mirkovic, B., Pavlovic, G., Netjasov, F., Babic, O. Barrado, C., Prats, X. Costa, M. I., Ansaldo, G. Vidosavljevic, A. Measuring Performance of the Future European Air Traffic Management System: a review of current performance areas and indicators.* Planned to be submitted to the Journal of Air Transport Management in mid-May 2018.
- *Mirkovic, B., Pavlovic, G., Netjasov, F., Babic, O. Barrado, C., Prats, X. Costa, M. I., Ansaldo, G. Vidosavljevic, A. Measuring Performance of the Future European Air Traffic Management System: proposal of novel performance indicators.* This paper is a continuation of the previous one and is planned to be submitted to the Journal of Air Transport Management by the end of June 2018.
- Xu, Y., Dalmau, R., Melgosa, M., de Montlaur, A. and Prats, X. A Framework for Collaborative Demand and Capacity Balancing under Trajectory Based Operations. This paper is being prepared as the natural continuation of (Xu et al., 2018) and is planned to be submitted to the Journal of Transportation Research, Part B: Methodological by the end of May.

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Moreover, some additional publications are also foreseen in the midterm, gathering the most relevant results of the project. Target journals are, for instance, "Transportation Research, Part D: Transport and Environment" (aiming to publish the contributions of APACHE assessing the Environment KPA); or "Transportation Research, Part C: Emerging technologies" (aiming to publish the benefits of an integrated tool such as the APACHE Framework and/or papers focused on a specific component of the APACHE System).

2.3 Publication (and presentation) of papers in scientific conferences

Besides the paper published in the 7th SESAR innovation days conference proceedings mentioned above (Prats et al., 2017), five other papers have been published in three different conferences:

- The XLIV Symposium on operational research (SYM-OP-IS), which was held in Zlatibor (Serbia) in July 2017. The paper (Netjasov and Crnogorac, 2017) was presented, which gives an overview of the Risk Assessment (RA) component implemented in the APACHE Framework. The presentation was given by Fedja Netjasov from UB-FTTE (see Fig 2-3).
- The 8th International Conference in Research in Air Transportation (ICRAT), which will be celebrated in Castelldefels, Barcelona (Catalonia) in June 2018. The host is the *Universitat Politècnica de Catalunya* (UPC) – Coordinator of the APACHE Project. Three papers have been accepted in this conference:
    - (Dalmau et al., 2018), presenting the Trajectory Planner (TP) component implemented in the APACHE Framework. The presentation will be given by Mr. Ramon Dalmau from UPC.
    - (Xu et al., 2018), presenting the Traffic and Capacity Planner (TCP) component implemented in the APACHE Framework. The presentation will be given by Mr. Yan Xu from UPC.
    - (Netjasov and Crnogorac, 2018), presenting some results concerning the Safety Performance Indicators developed in APACHE. The presentation will be given by Dr. Fedja Netjasov from UB-FTTE.
- The 37th Digital Avionics Systems Conference (DASC), which will be celebrated in London (United Kingdom) in September 2018. (Xu and Prats, 2018) will be presented, which shows some results of the APACHE Case Studies obtained with the TCP component in "future ConOps" mode (implementing an advanced demand and capacity balance algorithm). The presentation will be given by Yan Xu or Xavier Prats, from UPC.

Moreover, at least a publication is foreseen for the next USA/Europe ATM Research & Development Seminar, which is planned for June 2019 in Vienna (Austria); and another publication to the Transportation Research Board (TRB) annual meeting, which is planned for January 2019 in Washington D.C.

2.4 Dedicated stakeholder consultation activities and workshops

Two main actions have been carried out in this field: an open workshop collocated with the SIDs 2016 and a set of coordination activities with other SESAR-ER projects devoted to ATM performance.

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Figure 2-3. Fedja Netjasov (UB-FTTE) at the Symopis 2017 (Zlatibor, Serbia)

Figure 2-4. Pictures from 1st APACHE stakeholders (open) workshop (Nov 10th 2016 in Delft, The Netherlands).

2.4.1 1st APACHE open workshop

An open workshop was organised in Delft, The Netherlands on Nov 10th 2016, right after the Sixth SESAR innovation days (http://sesarinnovationdays.eu/2016/apache-workshop).

The objective of this workshop was to ***present*** to the aviation community and ***discuss*** a set of novel and updated Key Performance Indicators proposed to be used for performance targeting, measuring, base-lining and benchmarking in future SESAR technical and operational ATM concept (2020+). Such metrics were the main outcome of the first draft of Deliverable D3.1 "Review of current KPIs and proposal for new ones" and all feedback obtained from this workshop was taken into account to produce the final version of this deliverable (APACHE Consortium, 2017a). As introductory part, the workshop started by a short review of main ATM performance frameworks (also detailed in D3.1) identifying gaps, limitations and room for improvement.

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The workshop was open to the general public and in particular to the SESAR community (more than 40 researchers, ATM professionals, performance experts, students, etc. attended the workshop) attending the SESAR innovation days. Some members of the APACHE External Experts Advisory Board (EEAB) assisted to the workshop as expert panellists in a round table. After this round table, the general public could also ask questions and provide feedback. Finally, a questionnaire was given to all the attendees to further gather written feedback and useful remarks.

The exact agenda of the workshop and the list of moderators and panellists is shown below and Figure 2-4 shows a couple of pictures taken during the workshop.

Agenda of the workshop

Part 1 (1h00'):

- *A review of current KPAs/KPIs used by the Performance Review Body (PRB) and other relevant institutions (ICAO, CANSO, EUROCONTROL, SESAR) (15 min)*
- *Comparison of different approaches and highlighting the main issues (15 min)*
- *Round table and open discussion (30 min).*

Part 2 (1h30'):

- *A short description of APACHE Project (10 min).*
- *Proposal of new and/or enhanced existing KPAs/KPIs to better describe current and future ATM (30 min).*
- *Round table and open discussion (50 min).*

Moderators:

- Dr. Bojana Mirkovic (UB-FTTE)
- Dr. Fedja Netjasov (UB-FTTE)

Round-table panellists:

- Mr. Brian Flynn (Eurocontrol - Head of Performance, Forecasting and Relations in Eurocontrol's Network Manager Directorate)
- Mr. Mihail Genchev (Eurocontrol - ATC/ATM operations expert).
- Dr. Tamara Pejovic (Eurocontrol - Senior performance expert at the Performance Review Unit).
- Dr. Andrea Ranieri (SESAR Joint Undertaking, ATM expert).
- Ms. Marina Sanz (ENAIRE - Quality and environmental impact division).

2.4.2 2nd APACHE workshop

The APACHE 2nd Stakeholder Workshop was organised on Nov 23rd 2017 at ENAC premises (Toulouse). This second workshop was not open to the general public and only a selected group of 5 external experts attended, plus 7 members of the APACHE consortium.

The objective of the workshop was threefold:

- to discuss and agree on the prioritization and selection of the scenarios and case studies;
- to discuss and agree on the specific trade-off assessments and Pareto efficiency analysis; and
- to discuss on metric aggregation and visualisation.

The exact agenda of the workshop and the list of moderators and panellists is shown below and Figure 2-5 shows a couple of pictures taken during the workshop.

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Agenda of the workshop:

Introduction (1h00'):

- *Workshop objectives*
- *The APACHE project*
- *Brief description of SESAR solutions modelling by APACHE*

Validation of case studies (2h15'):

- *Description of scenarios and case studies proposed by APACHE*
- *Discussion on methodology to capture ATM performance trade-offs (Pareto optimality)*

Data aggregation and visualisation (1h00'):

- *Selection of "key" performance indicators vs. aggregation of metrics*
- *Discussion on visualisation alternatives*

Wrap-up, AOB and workshop closure (30')

Moderators:

- Dr. Fedja Netjasov (UB-FTTE)
- Dr. Xavier Prats (UPC)

Invited external experts:

- Ms. Marina Sanz (ENAIRE - Quality and environmental impact division).
- Ms. Marta Llobet (EUROCONTROL – Safety expert. Directorate SESAR & research. Performance & Method Unit).
- Dr. Mete Celiktin (EUROCONTROL – Senior expert. Directorate NM. Network strategy and development unit).
- Mr. Gerald Regniaud (DGAC – Rennes area control centre).
- Mr. Michael Benhamed (ENAC – Flight operations course director)

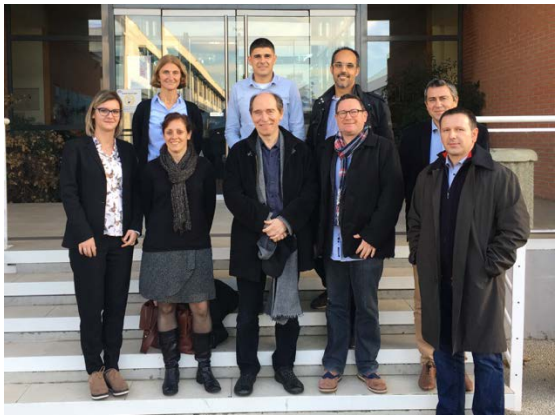

Figure 2-5. Pictures from 2nd APACHE stakeholders workshop (Nov 23rd 2017 in Toulouse, France)

2.4.3 APACHE-AURORA-INTUIT Coordination meetings

Besides APACHE, two other SESAR-ER projects focus in the assessment of ATM performance:

- **AURORA** (Advanced User-centric efficiency metRics for air traffic perfORmance Analytics), which aims to propose new metrics to assess the operational efficiency of the ATM system,

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encapsulating the airspace users' operational objectives, considering fuel consumption, schedule adherence and cost efficiency of the flights, at the same time as fairness among different airspace users is also considered. The project explores and tests techniques borrowed from the data science and information management fields for the collection and aggregation of data. The project is conducted by a consortium composed by CRIDA (Project Coordinator), Boeing Research and Technology Europe, CeADAR, and Flight radar (http://aurora-er.eu).

- **INTUIT** (Interactive Toolset for Understanding Trade-offs in ATM Performance) aimig at exploring the potential of a variety of visual analytics and machine learning techniques to improve our understanding of the trade-offs between Air Traffic Management KPAs, identify cause-effect relationships between performance drivers and performance indicators at different scales, and develop new decision support tools for ATM performance monitoring and management. The project is conducted by a consortium composed by Nommon (Project Coordinator), ALG, Fraunhofer-IAIS, CeDInt-UPM, and Transport & Mobility Leuven (https://www.intuit-sesar.eu).

In Nov 2016, during the 6th SIDs, synergies among the three projects were identified and some coordination was envisaged, first to share in detail the objectives, scope and methodology of the three projects; and later on, to propose some joint assessment or case study. During the duration of the project a total of 7 coordination and dissemination meetings were carried out aiming at aligning the research efforts of the three projects, identify possible overlaps and synergies, performing a joint case study and jointly preparing the dissemination actions towards the SESAR Scientific Committee and PJ-19.4 (see Section 2.7).

Dr. Xavier Prats (APACHE coordinator) was the APACHE representative appointed for these coordination and dissemination activities, with the suport of Dr. Cristina Barrado (APACHE executive bord member) and in close coordination with the rest of the APACHE partners.

Table 2-3 summarises the 7 joint coordination and dissemination activitites jointly done with AURORA and INTUIT projects, while Figure 2-6 shows a picture taken in one of these meetings.

Title	Date	Venue	Attendees	Objectives of the meeting
APACHE-AURORA-INTUIT coordination meeting #1	19/12/2016	Tele-conference	CRIDA, NOMMON, SJU, UPC	Presentation of the three projects, scope, objectives and methodologies. Initial identification of possible synergies and overlapping and opportunities for collaboration.
APACHE-AURORA-INTUIT coordination meeting #2	19/01/2017	CRIDA-ENAIRE Madrid (Spain)	ALG, CRIDA, NOMMON, SJU, UPC	Identification of gaps and overlapping between the three projects; identification of potential options to increase the added value of the three projects by sharing information or working together; and agreement on actions dealing with these options.
APACHE-AURORA-INTUIT coordination meeting #3	29/03/2017	CRIDA-ENAIRE Madrid (Spain)	ALG, CRIDA, NOMMON, BRTE, SJU, UPC	Review the progress on the actions taken in previous meetings. Reporting intermediate results and findings from each project that could be aligned with the use case. Analysis of the case of study and identification of next steps. Agreement on new tasks on collaboration.
APACHE-AURORA-INTUIT coordination meeting #4	04/07/2017	Tele-conference	CRIDA, NOMMON, UPC	Review the progress on the actions taken in previous meetings. Reporting intermediate results and findings from each project that could be aligned with the common use case. Analysis of the case of study and identification of next steps. Agreement on new tasks on collaboration.

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APACHE-AURORA-INTUIT coordination meeting #5	26/09/2017	UPC Barcelona (Spain)	ALG, CRIDA, CeADAR, NOMMON, SJU, UPC	SJU update on SESAR Research Pipeline. Progress on the open actions. Reporting results/finding of the agreed case of study. Agreement on next dissemination actions.
APACHE-AURORA-INTUIT coordination meeting #6	17/01/2018	Nommon, Madrid (Spain)	Boeing, CeADAR, CRIDA, NOMMON, SJU, UPC	Review the progress on the actions taken in previous meetings. Preparation of the Performance work forum organised by the SESAR Scientific Committee.
APACHE-AURORA-INTUIT coordination meeting #7	01/02/2018	Tele-conference	CRIDA, NOMMON, UPC	Preparation of the Performance work forum organised by the SESAR Scientific Committee. Final tuning and alignment of the three presentations.

Table 2-3: Summary of the joint coordination and dissemination activities with AURORA and INTUIT projects.

Figure 2-6. Pictures from the 3rd APACHE-AURORA-INTUIT coordination and dissemination meeting (Madrid, Spain).

2.4.4 Dissemination actions with other SESAR Exploratory research projects

Two minor dissemination actions were also performed to two other SESAR Exploratory research projects:

- **VISTA:** a SESAR Exploratory Research project in the topic of "Economics and legal change in ATM". The project aims to examine the effects of conflicting market forces on European performance in ATM, through the evaluation of impact metrics on four key stakeholders, and the environment. The project comprises a systematic, impact trade-off analysis using classical and complexity metrics, encompassing both fully monetised and quasi-cost impact measures. VISTA project started in **July 2016**.
- **EvoATM:** a SESAR Exploratory Research project in the topic of "ATM operations, architecture, performance and validation". The overall goal of the project is to build a framework to better understand and model how architectural and design choices influence the ATM system and its behaviours, and vice versa how the expected ATM overall performances drive the design choices. EvoATM project started in **February 2018.**

On Oct 23rd 2017, the APACHE Coordinator was invited to attend a workshop organised by the **VISTA project**. Taking advantage of this opportunity the APACHE project was also briefly presented to the VISTA consortium representatives.

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On May 5th 2018, a 1h30 teleconference took place between the APACHE Coordinator and the Coordinator of the **EvoATM project** (CIRA). The main goal of this teleconference was to present the objectives and main results of the APACHE project and identify synergies and complementarities with EvoATM. More dissemination actions towards the different partners of the EvoATM consortium are foreseen in the near future.

2.5 APACHE External Experts Advisory Board (EEAB) consultation

Besides the participation of some members of the EEAB in the two APACHE workshops, explained in section 2.4 above, the EEAB was consulted two weeks before each workshop by sending to all EEAB members some written material. In this way, the EEAB workshop panellists and invited experts had some time to prepare their feedback given in the workshop.

Moreover, all EEAB members gave some feedback and/or made some corrections in the provided documents after celebrating the workshops. This valuable feedback was taken into account in the production of some APACHE Deliverables, as detailed as follows:

- 1st APACHE Workshop: An advanced Draft of Deliverable D3.1 was sent before the workshop. All feedback collected during and after the workshop was taken into account in the first release of Deliverable D3.1.
- 2nd APACHE Workshop: An internal technical note (APACHE Consortium, 2017b) was sent before the workshop. All feedback collected during and after the workshop was taken into account to define WP5.1 activities and to produce the first release of Deliverable D5.1.

2.6 APACHE Project final event

A final event was initially planned in the APACHE Communication and Dissemination plan in order to present results to different air transportation stakeholders, policy makers, representatives of the Performance Review Body (PRB) and the air transportation research community in general.

Finally, this event was not celebrated, partially due to the lack of time to organise it (plus the difficulty to find a suitable date in May 2018); but mainly due to the fact that APACHE results were already disseminated in two recent events as detailed in section 2.7.

2.7 EC research and innovation events

The APACHE consortium was invited to disseminate the project objectives, methodology and initial results to two events where representatives of the SESAR JU, EUROCONTROL and SESAR Project PJ19 (among others) were invited.

2.7.1 Performance work forum organised by the SESAR scientific committee

The **first** event was hosted at the **SESAR JU** premises on **February 7th 2018** in Brussels. The objectives of the workshop were to:

- increase industrial research (IR) awareness of the results of exploratory research (ER) projects working on performance assessment;

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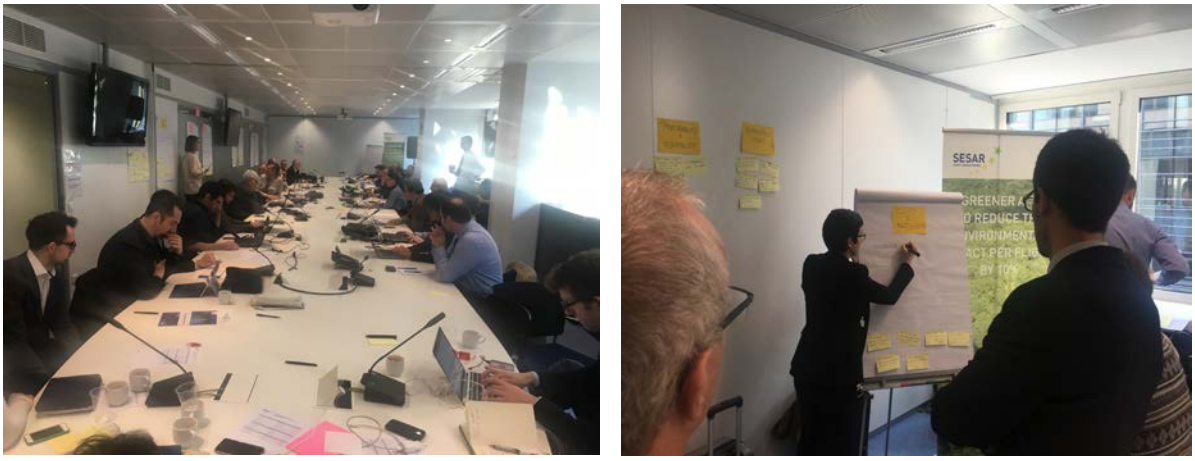
- discuss issues and needs related to the evolution of the (PJ.19) performance framework to ensure alignment with stakeholder expectations, future policy objectives, and development of (e.g. decision-support) tools;
- identify potential direct uptake of results (e.g. KPIs, open models, datasets, tools, etc.) of ER projects addressing performance, by PJ.19;
- identify how to exploit the results of ER projects dealing with performance, in (wider) IR;
- identify research needs that could be addressed by ER-4 projects to: (i) drive the evolution of the performance framework to be better aligned with stakeholders' expectations and; (ii) support gaps identified by PJ.19 where further support and liaison would be beneficial.

The workshop was chaired by Dr. Andrew Cook (University of Westminster; in capacity as SESAR 2020 Scientific Committee member), who was also co-facilitator of the stakeholder group sessions with Dr. Dirk Schaefer (EUROCONTROL, in capacity as SESAR 2020 Scientific Committee observer). Attendees of the workshop included representatives from: IR PJ.20, IR PJ.19, IR PJ.19-04, ER-1 projects APACHE, AURORA, COCTA, COMPARE, INTUIT and Vista; EUROCONTROL; the SESAR 2020 KTN (Engage); the SESAR JU; and, the SESAR 2020 Scientific Committee (Task Force 3 and observers).

APACHE was represented by the APACHE Coordinator (Dr. Xavier Prats from UPC), Dr. Fedja Netjasov (principal investigator at UB-FTTE), Ms. Andrada Bujor (researcher at ALG) and Dr. Andrea Ranieri (researcher at ALG).

The workshop had two parts, the first one devoted to presentation sessions, where a 30' presentation on APACHE was given by Dr. Xavier Prats. The second part was a stakeholder brainstorming and discussion session (see Figure 2-7).



(a) Presentations session **(b)Brainstorming session**

Figure 2-7. Pictures from the Performance Work forum at the SESAR JU.

2.7.2 Dissemination to PJ-19.04 members

The **second** event was hosted at **CRIDA** premises on **March 6th 2018** in Madrid, taking advantage of a PJ-19.04 progress meeting that was held there during March 5th and 6th.

The session was chaired by Mr. Jose Manuel Cordero (CRIDA; in capacity as PJ-19.4 leader). Around 30 people attended the session, including various representatives from PJ-19, CRIDA and a representative of the VISTA SESAR ER project.

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APACHE was represented by the APACHE Coordinator (Dr. Xavier Prats from UPC), Dr. Fedja Netjasov, (principal investigator at UB-FTTE), Dr. Bojana Mirkovic (researcher at UB-FTTE), Ms. Andrada Bujor (researcher at ALG) and Dr. Andrija Vidosavljevic (principal investigator at ENAC).

The objectives of the session were to present the APACHE findings (around 1h30), allowing time for questions, discussions and debate with the attendees (around 1h). The ultimate goal was to bridge the gap between Exploratory and Industrial Research. See Figure 2-8 for a picture of this event.

Figure 2-8. Presentation of APACHE to PJ-19.04 members (Madrid, Spain).

2.8 APACHE Project public website

The APACHE public website was publicly launched on September 28th 2016 with the following URL:

http://apache-sesar.barcelonatech-upc.eu

The website is composed by the following principal pages:

- **Main page:** Including the title and logo of the project, details on the grant agreement and SESAR Call and a short description of the Project. In the right side of the page the SESAR and EC logos are displayed (with links). This page also contains links to APACHE twitter and LinkedIn group, a news feed and a twitter feed.
- **"About APACHE" page:** describing the project in detail: objectives, research approach, and research questions. A PDF version of this information is available for download.
- **"Consortium" page:** including a map of Europe depicting the geographical precedence of the APACHE Consortium partners and a short description and links to the institutions' official websites. Moreover, this page links to other pages presenting the different teams of researchers contributing to the project, including their short bio and a picture.
- **"Publications" page:** all public deliverables are available here for download. Moreover, all publications will also be listed here with links to the Editorial web page of the publication.
- **"Media" page:** containing photos and videos of relevant APACHE activities or events. Dissemination material in the form of videos/pictures/leaflets is also included here.

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2.9 Social media communication: Twitter and LinkedIn

A specific Twitter account was created on June 13th 2016 with the ID **@APACHE_SESAR.** The main activity during the project has been centered to publicise the APACHE deliverables, the 1st workshop, and the participation of APACHE researchers into relevant meetings or events. Furthermore, some retweets from other relevant SESAR exploratory research projects or from the SESAR Joint Undertaking account have been made. During the last part of the project (and beyond the project closure) the Twitter activity will focus to announce project results and main findings.

Regarding the LinkedIn Group, instead of creating a specific group for APACHE, it was agreed to join an existing group on "ATM Economics, Performance, Regulation and Legal Aspects" managed by Nommon, which leads another SESAR exploratory research project on ATM performance (INTUIT). This group is open to other projects including SESAR WP-E and SESAR 2020 projects, such as INTUIT, ACCESS, ACCHANGE, COMPAIR and BigData4ATM. The APACHE Project was included in the list of related projects for the group on June 15th 2016. The URL of this group is:
https://www.linkedin.com/groups/4959224.

2.10 General media communication and press releases

No activities of this type were finally carried out at the moment of writing this Deliverable (May 2018). It is expected, however to publish a press release after the closure of the project, highlighting the main findings and results. UPC, as coordinator of the project, will lead this communication activity.

2.11 General public conferences or presentations

Three specific ations were peformed during the Project:

- **Workshop with aeronautical engineering students to brainstorm on new KPIs**, organised at UPC premises in Castellefels and with the partipation of APACHE researchers (from UPC and ALG) as well as several graduate and undergraduate students from UPC. Firstly, the APACHE project was introducted, contextualising it with the specific challenges of measuring ATM performance and the SESAR programe. Then an interactive team brainstorming session was carried out with the objective to propose new KPIs for a wide set of KPAs (see Figure 2-9).
- Participation in the ***ENAC Journée de portes ouvertes,*** in Toulouse (France) on Oct 15th 2016, where the APACHE project was presented in a small stand, with video presentation of project objectives, research questions and approach, open to the general public by Dr. Andrija Vidosavljevic from ENAC. See Figure 2-10 for some pictures of the event.
- Participation in the **South-East Aviation Summit (SEAS**), held in Belgrade on December 13th-14th 2016 (http://www.seas.rs). Prof. Radosav Jovanovic from UB-FTTE attended this event and participated in a panel discussion entitled *"Future of air traffic management in South East Europe",* where he had the occasion to present the APACHE project to the audience. Prof. Obrad Babic from UB-FTTE also attended this summit. See Figure 2-11 for some pictures of the event.
- Presentation of APACHE to **aeronautical engineering students at UPC** on Mar 2018, presenting the objectives and methodology of the project, along with the principal results found. This

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presenation was done by Dr. Xavier Prats within the framework of an undergraduate course focus in air traffic management.

- Presentation of the APACHE project on Feb 2018 at **ENAC PhD student seminar** where main objectives and methodology of the project were presented. Presentation was done by Dr. Andrija Vidosavljevic and about 10 Phd were attending the event.
- Presentation of the APACHE project on May 2018 at **Supaero fomation CAE** – *«Vers une Aeronautique plus vertueuse».* During this course (4 hours) main ATM solutions employed in the current and evisioned in the future system were explained with all benefits on reducing negative effect of aviation on the environment. During this event APACHE project was presented as a part of inovative research on the ATM performance assessment. APACHE objectives and methodology where presented allong with issues identified regarding environmental KPI. Presentation was done by Dr. Andrija Vidosavljevic and about 30 last-year engineer student were following the course.

Figure 2-9. UPC workshop on new KPIs

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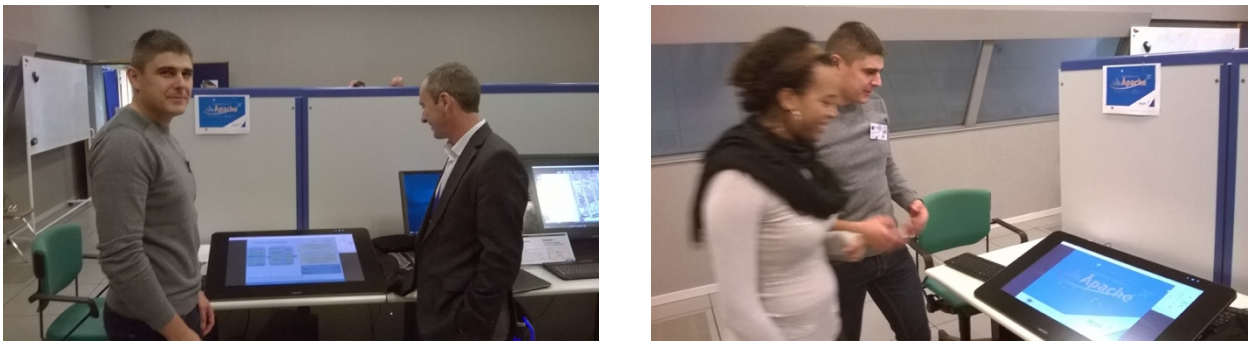

Figure 2-10. ENAC Journée de portes ouvertes

Figure 2-11. Participation in the South-East Europe aviation summit

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3 Metrics for measuring success of communication activities

The APACHE communication and dissemination plan, which is included in the Project Management Plan (D1.1), established the metrics to monitor and assess the effectiveness of the different communication and dissemination activities. Table 3-1 shows, for each dissemination activity performed during the Project, the achieved metric versus the target values initially setup in the communication and dissemination plan.

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Dissemination or communication activity	Performance metrics	Target values	Achieved values (see Section 2 for details)	Target achieved
Participation in SESAR innovation days (SIDs)	Accepted papers or posters	1 poster or paper for SIDs'16 1 paper for SIDs'17	1 poster in SIDs'16 2 posters in SIDs'17 1 paper in SIDs'17	**YES**
Publication of journal papers	Accepted papers	3 papers	3 papers drafted	**NO**
Publication of conference papers	Accepted papers	5 papers	6 papers accepted	**YES**
Dedicated stakeholders consultation activities and workshops	Workshop participants Different stakeholders	15 participants 5 stakeholders	**-APACHE 1st workshop:** 40+ participants and 7 different stakeholders (ANSP, industry, university or research centre, PRU, NM, SJU, SMEs). **-APACHE 2nd workshop:** 11 participants and 5 different stakeholders (Eurocontrol, ANSP, AU, Universities, SME). **- APACHE-AURORA-INTUIT coordination and dissemination:** between 5 and 10 participants. **- VISTA and EvoATM dissemination**: 2 participants each.	**YES**
APACHE EEAB consultation	EEAB members Different stakeholders	5 members 3 stakeholders	- D3.1 reviewed by **7 members**, from **6 different stakeholders** (PRU, ANSP, NM, SJU, airline, research centre). - TNO_WP6-04 reviewed by **7 members**, from 5 **different stakeholders** (PRU, ANSP, NM, AU, research centre).	**YES**
APACHE final event	Event participants. Different stakeholders	20 participants 5 stakeholders	Event finally not celebrated.	**NO**
EC research and innovation events	Participation by at least one member of the APACHE Consortium	1 participation	- Participation in the **Performance work forum** organised by the **SESAR Scientific Committee.** - Participation in the dissemination session organised by the **PJ-19.04**	**YES**
APACHE Project public website	# of unique visitors Number of downloads	250 visitors 25 downloads	**1,010** new visitors and **358** visitors for the "publications page"(**). See Appendix A for a detailed analysis.	**YES**
Social media communication: Twitter and LinkedIn	# of retweets or likes # twitter followers # of posts related with APACHE in LinkedIn	20 retweets/likes 30 followers 15 posts	77 retweets/likes (*) 18 followers (*) 0 posts	**NO**
General media communication and press releases.	# of activities	7 activities	0 activities.	**NO**
General public conferences or presentations	# of activities	7 activities	6 activities	**NO**

(*) Excluding those accounts belonging to the APACHE consortium members.

(**) Due to technical limitations, it was not possible to count the exact number of downloads. Yet, the specific page containing all APAHCE deliverables (Publications page) received a total of 358 visitors and we could conclude that among them more than 25 downloaded one or more documents (see Figure A-1e)

Table 3-1: Success of communication activities assessment

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4 Conclusions and future work

This document has reviewed the communication and dissemination activities of the APACHE Project (9 May 2016 – 8 May 2018). The success of these activities have been compared with the target objectives established in the APACHE communication and dissemination plan (APACHE Consortium, 2016).

The aim of all the communication and dissemination activities performed, roughly, during the first year and a half of the project were to raise the awareness about the Project, its objectives, scope and methodology; and to generate enough understanding about its progress and achievements. During the final 6 months, initial results started to arrive and some actions were focused already to disseminate them. The most important part of the results (in quality and quantity), however, were obtained at the very end of the project and no time was left for a proper dissemination and communication. This partially explains the low performance in some of the dissemination or communication activities that did not achieve the target goal (see Table 3-1).

It can be concluded that dissemination and communication was a clear success regarding the visibility of the APACHE Project in the SIDs and via the APACHE public website; publications in conference proceedings; dedicated stakeholder consultation activities and workshops towards research audiences, but also more specifically towards the SESAR Scientific Committee and SESAR Industrial Research (PJ-19.04). Nevertheless, a low impact was achieved in social media communication (especially via LinkedIn); general media communication and press releases; and general public conferences or presentations.

In this context, some additional dissemination and communication actions are still foreseen by the APACHE consortium after the closure of the project. Namely:

1. Presentation of the project in high-schools and universities with the most relevant results and also to raise awareness of ATM and its complexity.
2. Press release at Spanish level to announce the end of the project, highlighting the most relevant results and conclusions.
3. Journal papers and conference articles as described in sections 2.2 and 2.3, respectively.
4. Posts in LinkedIn and twitter once the final deliverables of APACHE will be approved by the SJU. In this context, social media activity will be extended at least 6 months after the closure of the Project.

These actions will help to complement the number of dissemination and communication actions done so far, especially for those channels where the target objective was not achieved (see Table 3-1).

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5 References

APACHE Consortium. 2016 (Oct). Project Management Plan. APACHE Project, Deliverable D1.1. Version 01.00.00.

APACHE Consortium. 2017a (Apr). Review of current KPIs and proposal for new ones. APACHE Project, Deliverable D3.1. Version 01.00.00.

APACHE Consortium. 2017b (Nov). APACHE 2nd stakeholder workshop. Briefing document for the workshop attendees. APACHE Technical note TNO_WP6-04. Version 01.00.

Dalmau, R., Melgosa, M., Vilardaga, S. and Prats, X. 2018 (Jun). A Fast and Flexible Aircraft Trajectory Predictor and Optimiser for ATM Research Applications. Proceedings of the 8th International Conference on Research on Air Transportation (ICRAT). Castelldefels, Catalonia

Marcos, R., Sánchez, P. and Prats, X. 2017 (Nov). New approaches to ATM performance analysis: overview of the APACHE, AURORA and INTUIT projects. Poster in the 7th SESAR Innovation Days. Belgrade (Serbia).

Mirkovic, B., Pavlovic, G., Netjasov, F., Babic, O., Barrado, C., Prats, X., Coca, V., Bujor A. and Vidosavljevic, A. 2017 (Nov). Measuring Performance of the European Air Traffic Management System Review of current performance indicators and proposal for new ones. Poster in the 7th SESAR Innovation Days. Belgrade (Serbia).

Netjasov, F. and Crnogorac, D. 2017 (Sep). Assessment of safety performance indicators of future air traffic management system. In proceedings of the XLIV Symposium on operational research (SYM-OP-IS). Zlatibor (Serbia).

Netjasov, F. and Crnogorac, D. 2018 (Jun). Potential Safety Occurrences as Indicators of Air Traffic Management Safety Performances: A network based simulation model. Proceedings of the 8th International Conference on Research on Air Transportation (ICRAT). Castelldefels, Catalonia

Prats, X., Ruiz, S., Coca, V., Ansaldo, G., Netjasov, F. and Vidosavljevic, A. 2016 (Nov). The APACHE project: Assessing ATM performance with simulation and optimisation tools. Poster in the 6th SESAR Innovation Days. Delft (The Netherlands).

Prats, X., Barrado, C., Vidosavljevic, A., Delahaye, D., Netjasov, F. and Crnogorac, D. 2017 (Nov). Assessing ATM Performance with Simulation and Optimisation Tools: The APACHE Project. In proceedings of the 7th SESAR Innovation Days. Belgrade (Serbia).

Xu, Y., Dalmau, R., Melgosa, M., de Montlaur, A. and Prats, X. 2018 (Jun) Alternative Trajectory Options for Delay Reduction in Demand and Capacity Balancing. Proceedings of the 8th International Conference on Research on Air Transportation (ICRAT). Castelldefels, Catalonia.

Xu, Y. and Prats, X. 2018 (Sep) Synchronization of Traffic Flow and Sector Opening for Collaborative Demand and Capacity Balancing. Proceedings of the 37th Digital Avionics System Conference (DASC). London (UK).

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Appendix A APACHE website statistics

Google Analytics (https://analytics.google.com) has been used to monitor the usage of the APACHE public website. This tool provides a wide range of information regarding the number, characteristics and behaviour of the website visitors, which can be used to estimate its impact and effectiveness.

Taking into account the purposes of the APACHE website, the statistics shown here focus on some metrics to characterise the audience, the geographical distribution of the visits and sources and referral of traffic.

The period analysed starts goes from **September 28th 2016 to May 7th 2018;** corresponding, respectively, to the public launch of the APACHE website and one days before the closure of the project.

A.1 Analysis of the audience

The APACHE website audience is assessed using seven different metrics, defined by Google as:

- **Sessions:** *The total number of Sessions within the date range. A session is the period time a user is actively engaged with the website. All usage data (Screen Views, Events, Ecommerce, etc.) is associated with a session.*
- **Users***: Users who have initiated at least one session during the date range. That is the number of single visitors (only counted once) over the analysed period of time.*
- **Page views:** *The total number of pages viewed. Repeated views of a single page are counted.*
- ***Pages/session:*** *or Average Page Depth, is the average number of pages viewed during a session. Repeated views of a single page are counted.*
- **Average session duration:** *The average length of a Session.*
- **Percentage of new sessions**: *An estimate of the percentage of first time visits.*
- **Bounce rate:** *The percentage of single-page sessions in which there was no interaction with the page. A bounced session has a duration of 0 seconds, meaning that the visitor left the website from the entrance page.*

For the time period analysed, a total of **1,617 sessions** were recorded, with a total of **1,016 users** and **4,544 page views.** Google also estimated **1,012 new visitor sessions** and 605 **returning visitor sessions.** This represents a good balance, showing that the site is attracting new visitors and encouraging old ones to come back.

For the whole period, the **average pages per session** was **2.81** with an **average session duration of 2'17''**, which are not bad values taking into account the site has only few pages. **The percentage of new sessions** was **62.59%**, which is in line with the ratio between the absolute number of sessions and new users. The **bounce rate** was **46.57%,** which is a good result showing that the majority of users interacted with the site, exploring perhaps different pages or clicking to a link appearing in the entrance page (EC and SESAR sites, Twitter account, etc.).

Figure A-1 shows graphically the results of the previous metrics as a function of time (values aggregated by week bins).

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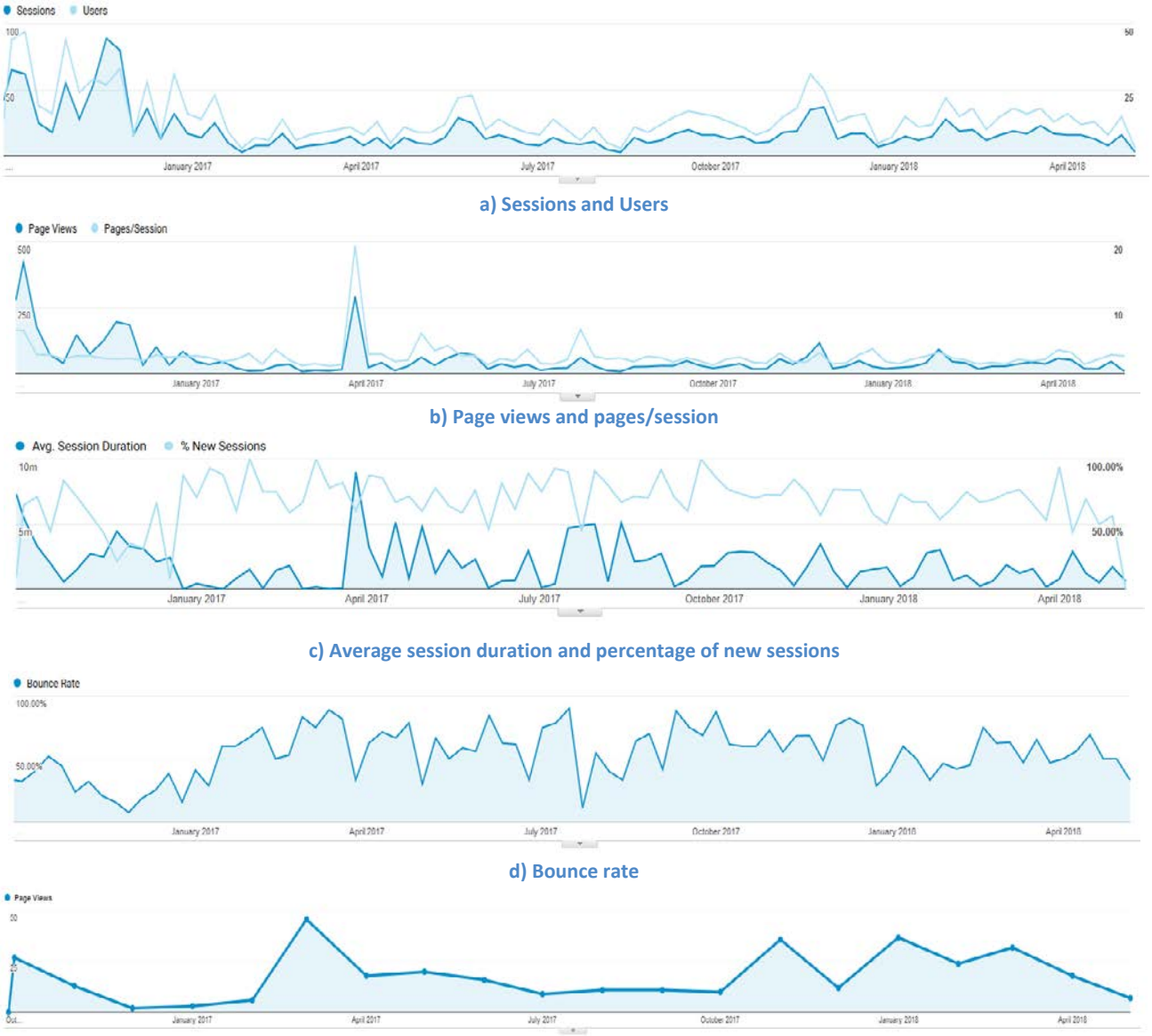

a) Sessions and Users

b) Page views and pages/session

c) Average session duration and percentage of new sessions

d) Bounce rate

e) Number of visitors of the "Publications" web page

Figure A-1: Various audience metrics for the APACHE website

A.2 Audience geolocation

Figure A-2 shows graphically, in four world maps, the location characteristics of the APACHE website audience.

As expected, the biggest activity comes from Spain and Serbia, as these countries represent two of the three countries of the APACHE consortium (France, Serbia and Spain). A notable activity comes from Spain, which can be explained by the fact that the Coordinator (UPC) and two partner institutions (ALG and UPC) are from this country, and also because the two other SESAR-ER projects in ATM performance (AURORA and INTUIT) are also coordinated by Spanish institutions (CRIDA and Nommon, respectively).

Users from the United States of America and the United Kingdom also showed some interest in the website.

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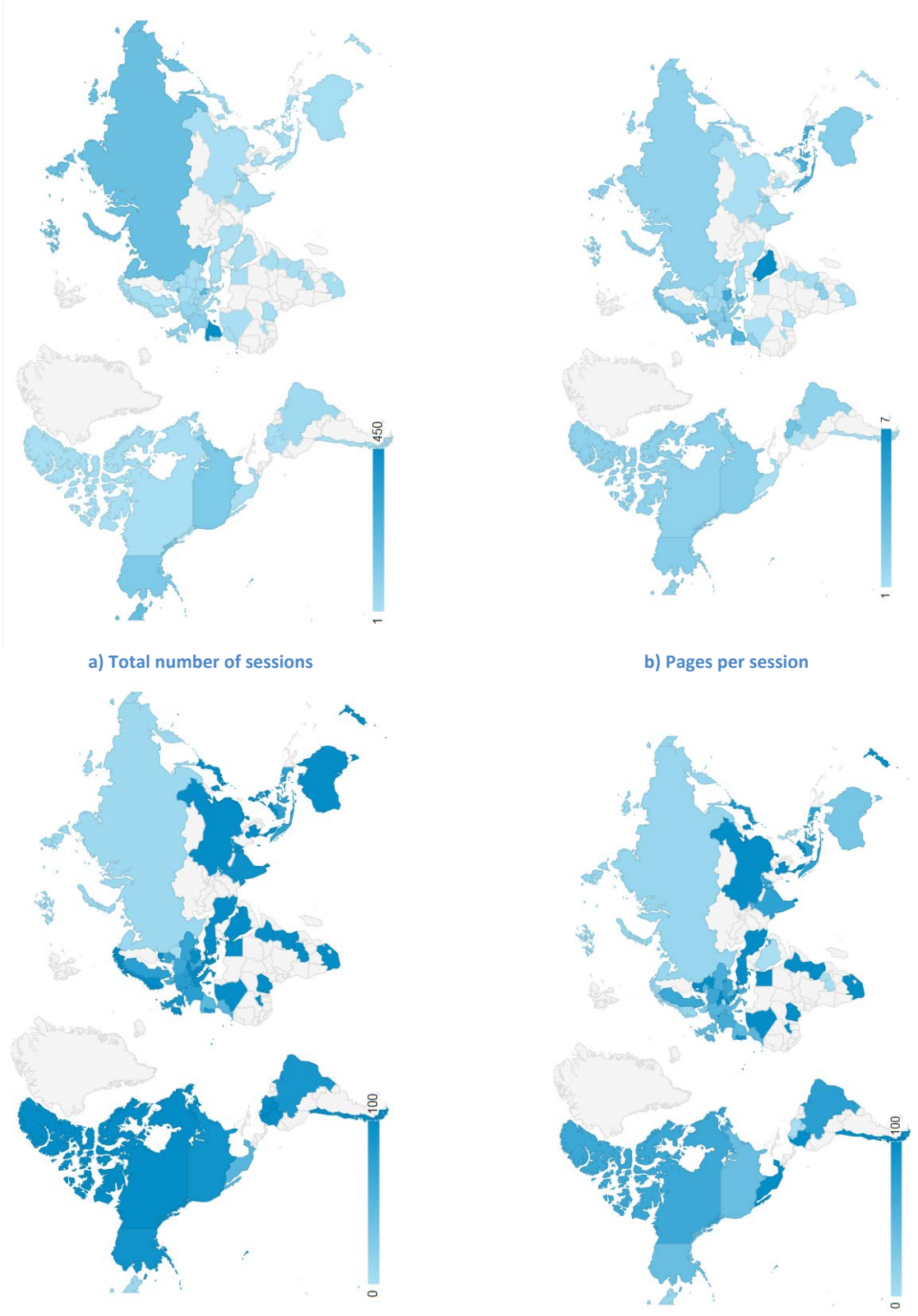

a) Total number of sessions

b) Pages per session

c) Percentage of new sessions

d) Bounce rate

Figure A-2: APACHE website audience geo-location characteristics

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A.3 Traffic sources

Google also reports on the origin of the different visits, distinguishing among the following sources of traffic:

- **Referral traffic,** coming through links on other websites
- **Organic search traffic,** generated from unpaid search engines, such as google.
- **Direct traffic**, coming from users directly typing the URL of the main APACHE website or one of its sub-pages (also including visitors using their bookmarks/favourites or clicking a link in a PDF, word document, e-mail, etc.).
- **Social traffic**, generated from links in Twitter, Facebook, LinkedIn, etc.

Table A-1 shows the source characteristics of the traffic generated by the APACHE website. The main referral source was the website of the SESAR Innovation Days, which publicised the 1st APACHE workshop, followed by links from the website of the APACHE consortium institutions. Regarding the social traffic, it mainly comes from Twitter and Reddit social networks.

Source	Sessions	New users	Pages/session	Avg. session duration	% New sessions	Bounce rate
Organic Search	712	564	2.44	1’23’’	79.21%	53.23%
Referral	381	173	2.86	3’21’’	45.41%	35.55%
Direct	450	259	3.45	2’31’’	57.56%	51.56%
Social	72	14	2.26	4’17’’	19.44%	22.22%

Table A-1: APAHCE web site traffic sources

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