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TAPAS

TOWARDS AN AUTOMATED AND EXPLAINABLE ATM SYSTEM

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Abstract

This document describes the different exploitation and dissemination activities that are planned within the TAPAS project and also contains the project communication strategy. Undertaken by TAPAS partners, these activities are identified and developed to guarantee the use and exploitation of TAPAS results and achievements. Dissemination and Exploitation is focused in ensuring that TAPAS outputs are in line with stakeholders' needs and expectations, linking the relevant participation of TAPAS partners with the SESAR Industrial Research and paving the way to further research and exploitation of TAPAS outputs.



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Executive Summary

Dissemination, Communication and Exploitation are considered to be crucial activities for the successful impact of TAPAS project results. In order to ensure TAPAS results are properly disseminated, this Dissemination and Exploitation plan describes the different dissemination and exploitation activities planned within the TAPAS project. Thus, guaranteeing TAPAS results and achievements are appropriately disseminated inside and outside the consortium to the proper audience, at the right moment and through the correct means to achieve the expected impact.

The dissemination plan includes the dissemination objectives and the dissemination material that is going to be used. It also includes the required dissemination activities and dissemination means such as workshops with stakeholders, conferences and publications for disseminating TAPAS results and challenges.

The TAPAS Dissemination and Exploitation plan also covers the communication strategy to be followed by the project, including the means of communication among the project partners, together with the means for external communication with non-partner stakeholders, such as website and social media.

1 Introduction

1.1 Purpose of the Document

Systematic and professional dissemination and exploitation of TAPAS outputs is crucial for a successful impact of the project results. Therefore, the need of internal and external communication between partners and non-partner stakeholders and of planning dissemination and exploitation activities.

These activities are introduced in the present Exploitation and Dissemination plan, which aims at describing the key information generated during TAPAS project's lifecycle as well as planning the exploitation of the project results.

In order to achieve said goals, the TAPAS dissemination plan includes a description of the dissemination objectives, together with the identification of the dissemination material and the partners' roles throughout this process. It also includes different dissemination activities, such as workshops with stakeholders, the use of internet resources and suitable journals and conferences, which are of interest for the publication of TAPAS' results. Additionally, to guarantee that the dissemination activities achieve the expected measures, quantitative objectives and the expected results will be presented in this dissemination plan.

This document also addresses the communication plan to be followed by the TAPAS project.

On the other hand, the TAPAS exploitation plan covers the description of the exploitable outcomes and the identification of potential customers and actions taken to ensure that the exploitable results are in accordance with the customer's needs and achieve enough dissemination.

The TAPAS dissemination and exploitation plan has been developed in accordance with the Grant Agreement, in particular with Article 28 – Exploitation Results and Article 29 – Dissemination Results – Open Access – Visibility of JU funding and support from JU members [1].

The dissemination, communication and exploitation plan also follows the established guidelines in the context of SESAR Exploratory Research, including the H2020 Research Participant Portal Online Manual [2], and the reference terms gathered in the Terminology section of the Research Participant Portal [3], where the following definitions and concepts are derived:

- **Project Results**, which are outputs generated during the project that can create impact during and/or after the funding and products that can be used by the project partners and other stakeholders. There are different types of results:
 - Reusable and exploitable entities (inventions, products, services), or
 - Elements (knowledge, technology, processes, networks) that have potential to contribute for further work, research or innovations.
 - Administrative deliverables, reports or dissemination materials (e.g. publications) are often not results in themselves.
- **Communication**, a strategically planned process that starts at the outset of the action and continues throughout its entire lifetime, aimed at promoting the action and its results. It requires strategic and targeted measures for communicating about (i) the action and (ii) its results to a multitude of audiences, including the media and the public and possibly engaging in a two-way exchange.

A process that shall reach out to society as a whole and to some specific audiences and demonstrate how EU funding contributes to tackling societal challenges.

- **Dissemination**, a process through which the results of a project are published (by any appropriate means other than protecting or exploiting them, e.g. scientific publications policy roadmap, workshops, demonstrations, sharing the results on online repository) maximizing the impact of the research and enabling the value of results to be potentially wider than the original focus.

The main differences between communication and dissemination are shown in Figure 1. Communication seeks to inform about the existence of the project and its results, while dissemination activities focus solely on results, enabling their use and uptake. Furthermore, the dissemination audience is composed of potential users of the results (scientists, project community, industry, policy makers, etc.), whereas communication addresses wider audiences.

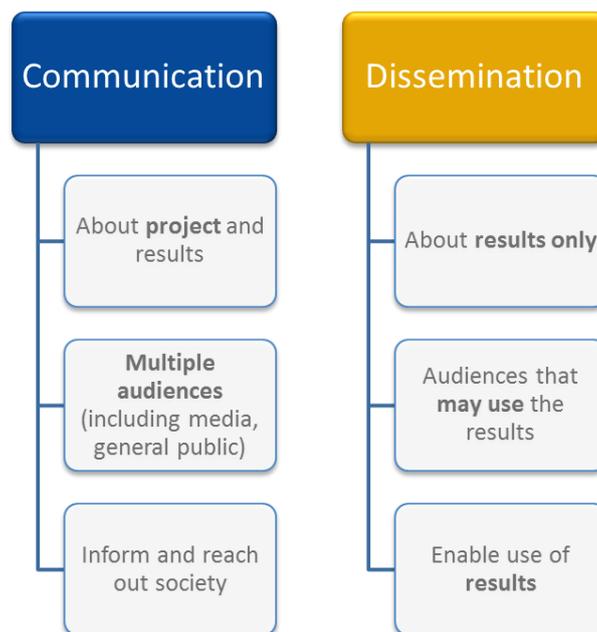


Figure 1: Communication versus Dissemination Activities

- **Exploitation**, a process through which the results produced in an EU project are made use in further activities (other than those covered by the project, e.g.: in other research activities, feeding a PhD thesis; in developing, creating and marketing a product, process or service; registration of patents; creation of spin-offs/ start-ups; granting open/copy licenses; or providing concrete input to standards and policy changes). These results can be commercial, societal, political, and they can be performed by project partners or by others (e.g.: through making results available under open licenses).

The main differences between dissemination and exploitation are shown in Figure 2. While dissemination is enabling the use of results, exploitation shall ensure the results are used. Therefore, the exploitation audience must be chosen carefully. Moreover, it is recommended for exploitation

activities to include all results (even those protected by Intellectual Property Rights (IPRs)), calling for an effort from partners to make best use of the project products.

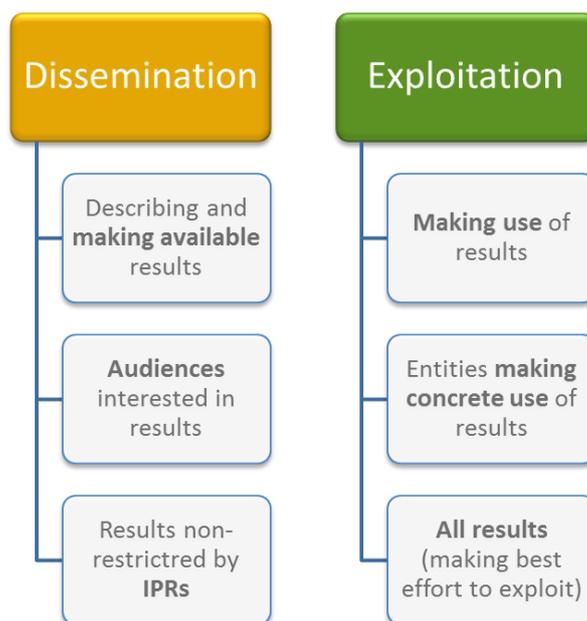


Figure 2: Dissemination versus Exploitation Activities

1.2 Intended readership

This document is intended to be used by TAPAS project members.

1.3 Acronyms and Terminology

Term	Definition
AI	Artificial Intelligence
ANS	Air Navigation Systems
ATC	Air Traffic Control
ATCO	Air Traffic Controller
ATFCM	Air Traffic Flow and Capacity Management
ATM	Air Traffic Management
CD&R	Conflict Detection & Resolution
EASA	European Aviation Safety Agency
ER	Exploratory Research
Horizon 2020	EU Research and Innovation programme implementing the Innovation Union, a Europe 2020 flagship initiative aimed at securing Europe's global competitiveness.



IPRs	Intellectual Property Rights
KPA	Key Performance Area
ML	Machine Learning
TRL	Technology Readiness Level
SESAR	Single European Sky ATM Research Programme
SJU	SESAR Joint Undertaking (Agency of the European Commission)
SJU Work Programme	The programme which addresses all activities of the SESAR Joint Undertaking Agency.
SESAR Programme	The programme which defines the Research and Development activities and Projects for the SJU.
VA	Visual Analytics
XAI	Explainable Artificial Intelligence
WP	Work Package

Table 1: Acronyms List

1.4 Project Introduction

1.4.1 Project “About” Text

As Artificial Intelligence (AI) becomes an increasing part of our lives in general, individuals are finding that the need to trust these AI based systems is paramount. Air Traffic Management (ATM) is not a stranger to this: with a system close to, or already at, a saturation level, AI applications are considered a main enabler to reach higher levels of automation.

This would mean a fundamental shift in the automation approach when moving from the classical human-machine interaction to a potentially much richer solution enabled by these AI systems, in which trust in the operations needs to be generated. As humans, operators must be able to fully understand how decisions are being made so that they can trust the decisions of AI systems. The lack of explainability and trust hampers the ability (both individual and global) to fully trust AI systems.

TAPAS aims at exploring highly automated AI-based scenarios through analysis and experimental activities applying eXplainable Artificial Intelligence (XAI) and Visual Analytics, in order to derive general principles of transparency which pave the way for the application of these AI technologies in ATM environments, enabling higher levels of automation.

1.4.2 Project extended description

TAPAS (*Towards an Automated and eXplainable ATM System*) project addresses the SESAR 2020 Exploratory Research topic **SESAR-ER4-1-2019, “Digitalisation and Automation Principles for ATM”**, with focus on the **AI/ML models’ Transparency challenge**.

The **transparency challenge** is considered crucial in safety-critical domains and a priority when enabling higher levels of automation. The transparency in an automated system aims to increase



situational awareness and the reaction capabilities of the operators using said system. Furthermore, transparency is also necessary for social acceptance and regulatory approval of systems **integrating AI/ML models**. However, not all systems require the same levels of transparency. The balance between the effectiveness of the solution and the ability to explain the rationale behind it is the main challenge to be explored.

TAPAS will address explicitly the effectiveness of introducing AI/ML solutions in order to increase the **levels of automation in ATM**, considering the need of the operator to trust the system, defined as the ability to understand and explain its behaviour and outcomes.

According to this, the main objective of TAPAS is the exploration of highly automated XAI (eXplainable Artificial Intelligence) scenarios through validation activities and Visual Analytics (VA) in order to identify needs and strategies to address **transparency and explainability** in the operational cases considered, paving the way for the application of these AI/ML technologies in ATM environments.

The operational cases considered in TAPAS are the following two:

- Conflict Detection & Resolution (CD&R) applied to Air Traffic Control (ATC). This operational case concerns the conflict detection and resolution process in the planner and executive controller timeframe, therefore in the tactical phase, as part of the separation assurance process.
- Air Traffic Flow and Capacity Management (ATFCM). This operational case focuses on the detection, declaration and resolution of imbalances during the pre-tactical phase.

These cases should help to provide a general validity of the conclusions, as higher levels of automation are not exclusive to the ATC function.

1.4.3 Project keywords

Bellow, a list of keywords that can be used to help identify TAPAS project is provided. These will be used as metadata on the SESAR JU website and as hashtags on relevant social media messaging.

Explainable Artificial Intelligence, Visual Analytics, Machine learning, Transparency, Human-Systems Integration, Air Traffic Management, Automation.

1.4.4 Project key messages

In this section a summary of TAPAS key messages is provided, together with a brief description of each one of them.

- ***Transparency and explainability as crucial contributor to achieve greater levels of automation in the ATM system.***
- ***Moving forward to the use of Visual analytics techniques to validate the solutions provided by the automated system.***
- ***Setting the scene for the implementation of transparency of Artificial Intelligence in the ATM domain.***

1.4.5 Focal point for dissemination and exploitation

Founding Members





The following table presents the focal point for dissemination, communication and exploitation activities.

Name	Role	Email address
Enrique Iglesias Martinez	WP6 Leader Dissemination Communication and Exploitation manager	eiglesiasm@e-crida.enaire.es

Table 2. Focal points of contact

2 Dissemination Material and Exploitable Results

2.1 TAPAS Objectives

As stated previously, the main objective of TAPAS is the exploration of highly automated eXplainable Artificial Intelligence (XAI) scenarios, through Visual Analytics (VA) and validation activities, to identify needs and strategies to address transparency and explainability in the considered operational cases.

The proposed research will advance the state-of-the-art in two main areas:

1. Identification of principles and criteria for AI/ML transparency/explainability in ATM domain scenarios, based on the two operational cases considered and with the target to identify transparency requirements for AI/ML methods in general, limiting domain-specific results. This will be achieved by addressing different temporal, functional and safety-critical perspectives, as those provided by the complementary operational cases considered in TAPAS. It is the ambition of the project to maximise the applicability of results to different operational environments, while setting the limitations when this is not feasible.

The project will explore the use of XAI and VA to apply them in the operational cases considered, through practical experiments and validation activities in simulation platforms. In particular, for each level of automation considered in each operational case, the project will implement a distribution of functionalities between the human and the machine including AI/ML ones. These will be verified using different validation techniques such as real-time simulation and gaming, combined evaluation of operators, a-priori and a-posteriori expert judgement, and objective criteria verification.

2. Selection and development of suitable and explainable AI/ML methods in the operational cases identified, to fit the needs of transparency as expressed in the explainability criteria developed for each automation level and according to actors' needs.

The project will develop prototypes of XAI methods that address the balance between explainability and effectiveness according to specific needs, but also in search of developing a more general taxonomy of AI/ML techniques considering the two aforementioned magnitudes. Given the early Technology Readiness Level (TRL) of this project (pre-TRL 1), these prototypes will be focused on testing purposes.

TAPAS main objective is refined into several sub-objectives as follows:

TAPAS WP	Objectives
WP1 Management	To ensure that the work performed is carried on time, within budget and with the required level of quality.

TAPAS WP	Objectives
WP2 Operational Cases	To identify and structure the characteristics of the proposed automation system for each of the two operational cases considered: tactical conflict detection and resolution (CDR) and air traffic flow and capacity management (ATFCM)
WP3 Principles for Transparency	<p>To connect the operational domain with AI/ML implementation and experiments. It acts as an orchestrator between operational WP and technical ones, analysing the results.</p> <p>To ensure common inputs and specific transparency and explainability criteria that are crucial to robustly achieve actionable automation levels when developing AI/ML-based models, which are the main objective of TAPAS research and extracting conclusions.</p>
WP4 Transparent AI/ML Methods Implementation	<p>To implement and deliver XAI methods, as well as the appropriate Visual Analytics techniques, so as to provide the information and data related to the problems to be mitigated and solutions prescribed, at different levels of analysis (scale and detail) according to the required level of automation and targeted audiences.</p> <p>To implement and deliver a prototype realizing the functionality set as requirements in WP02, according to the specifications set in WP03. This includes integration in the necessary platforms to allow conduction of validation exercise(s).</p>
WP5 Validation	To validate through different validation techniques the AI/ML implementations for the different automation levels considered, providing results and evidence for further WP03 analysis and derivation of principles.
WP6 Communication, Exploitation and Dissemination	To elaborate and implement the actions required to ensure that the project's results are disclosed and known as much and as widely as possible.
WP7 Ethics requirements	To ensure compliance with the 'ethics requirements' set out in this work package.

Table 3: TAPAS Sub-objectives

2.2 Dissemination and Exploitation Objectives

The objective of the project's dissemination activities is to ensure that TAPAS's key messages and its main achievements reach all relevant stakeholders and target group organisations. The dissemination and exploitation activities are critical in this project, whose results aim at being general principles for deploying AI/ML automation in ATM.

More specifically, TAPAS dissemination-related objectives are:

- To broadcast TAPAS to the affected target audiences and identified stakeholders to ensure widespread awareness and consideration in relevant fora addressing related topics;
- To communicate TAPAS results to target stakeholders in a two-way exchange in order to:



- Obtain users' needs and expertise to be taken into account in TAPAS's activities;
- Disseminate the achievements to their potential users thus facilitating the evolution of the project's solution to further maturity levels.

2.3 Dissemination Material

All public documents will be available. The achieved results from the TAPAS project will be included in the different TAPAS deliverables. Additionally, the results of this research will be also be published in dedicated publications, newsletters and presented in different conferences. The following means of communication will be used as supporting material to properly disseminate the findings as the project progresses:

- Roadmap of human-machine function delegation;
- User requirements for explainability at different automation levels;
- Experimental results and conclusions;
- Consolidation of all findings in a final data package to provide evidence on the maturity reached.

TAPAS Milestones indicate when intermediate results will be available. These intermediate results, together with the final results, will also be used in TAPAS workshops or conferences in order to get stakeholders' feedback for the associated deliverables.

2.4 TAPAS Benefits and exploitable results

TAPAS project's results will have an impact in the different stakeholders. The following table summarises the expected benefits:

Stakeholder Groups	Benefits
SJU Project Officer	<ul style="list-style-type: none"> - TAPAS Progress toward expected results; - Project general status including foreseen or actual delays, resources usage, risks or issues, and other managerial aspects; - Content and timing of press releases and joint publications.
ANSPs	<ul style="list-style-type: none"> - Knowledge gained in principles and criteria for AI/ML transparency/explainability in ATM domain scenarios. - Knowledge gained in suitable and explainable AI/ML methods applicable in ATM domain scenarios.
EU Commission	<ul style="list-style-type: none"> - Benefits of TAPAS outcomes and their potential application. - On-going European initiatives that could be reinforced with TAPAS' results.



Network Manager	- Benefits of TAPAS outcomes and their potential application.
Industry	- I+D+i TAPAS results (criteria for AI/ML transparency/explainability, suitable XAI models, etc.)
S2020 IR Projects	- Advances related to automation principles for ATM, where applicable. - Synergies with other projects related to automation.
Other exploratory research projects	- Synergies with other solutions being developed under Exploratory research projects, which address the automation topic.
Scientific Community on ATM and XAI	- I+D+i TAPAS results (criteria for AI/ML transparency/explainability, suitable XAI models, etc.)
Regulatory authorities	- Advances related to automation principles for ATM, where applicable to update the regulatory framework.

Table 4: TAPAS benefits for different stakeholder groups

One of the key goals of the TAPAS project is to seek for an incremental approach to extend its impact on ATM domain as much as possible. Figure 3 below and the following sections explain the expected impact of TAPAS from different points of view, identifying the areas where TAPAS impacts, linked to the project objectives and ambitions.

Although TAPAS addresses low TRL values, the project is intended to contribute to different aspects of ATM Performance, in full alignment with the SESAR Performance Framework and related methodologies for Transversal Areas (e.g. Safety and Human Performance).

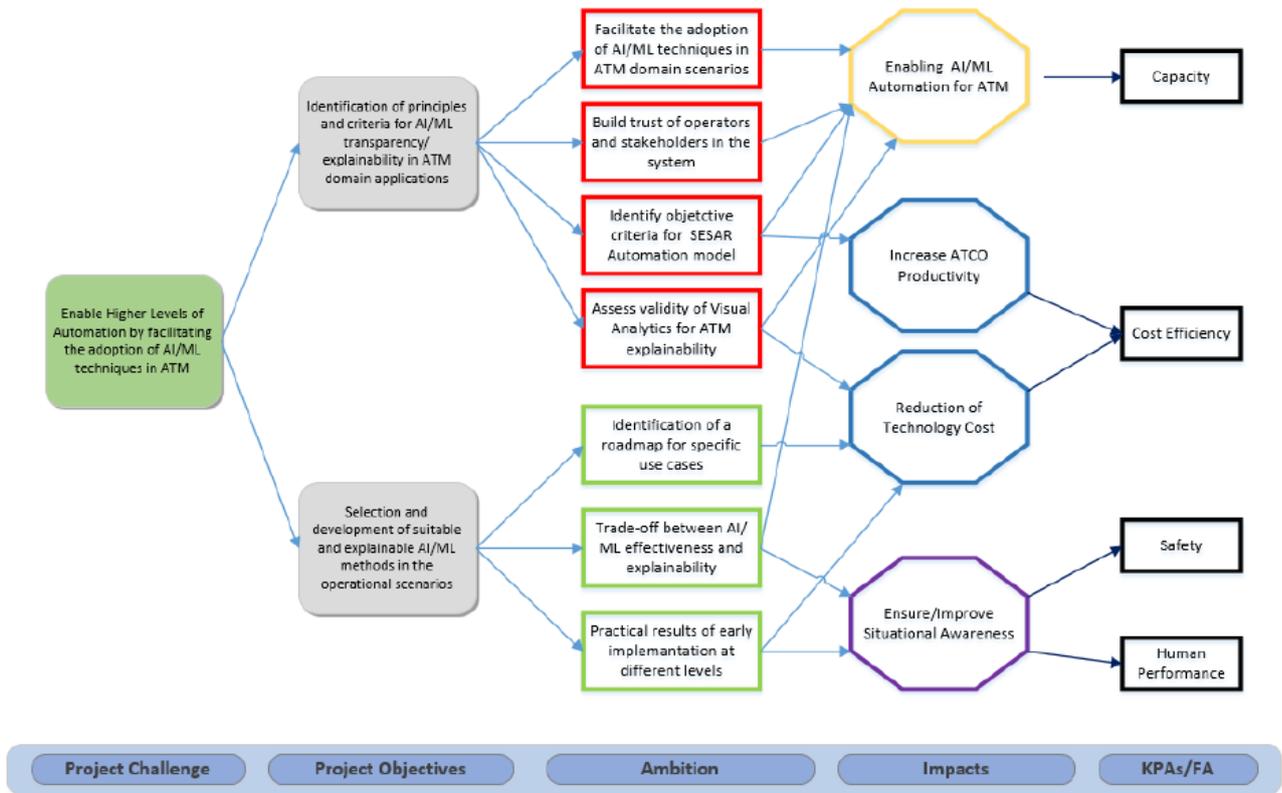


Figure 3: TAPAS Benefit Impact Mechanism

Enabling AI/ML Automation for ATM

The research developed in TAPAS intends to facilitate trust in AI/ML applications, which is considered crucial in safety-critical domains. This will enable the adoption of AI/ML methods in ATM automation environments, and help in mitigating the risks associated with high automation. In particular, explainability/transparency aspects will be addressed by the project, as an inherent need to apply AI/ML methods.

This approach would eventually lead to increased automation levels which, in particular, would have an impact in the most critical application area of ATM automation, ATCO workload. The workload that an air traffic controller has to deal with has a direct impact in KPA Capacity according to SESAR Performance Framework, and as a consequence, also addresses the corresponding SESAR Performance Ambition.

Reduction of Air Navigation System (ANS) Costs

During the project lifecycle, TAPAS will identify criteria to be considered in the increasing levels of Automation, facilitating the adoption of AI/ML techniques in a range of use cases. As said before, these use cases cover the use of automation and AI/ML techniques in CD&R in ATC and in the detection, declaration and resolution of imbalances in an ATFCM context.

However, this guidance is intended to serve as a catalyst for industrial implementation in an efficient way, and also to enable strategies for achievement of higher levels of automation in ATM. This will



bring benefits in terms of Technology cost, a contributing factor for KPA Cost Efficiency (equates to ANS Productivity) as described in SESAR Performance Framework. This impact is fully aligned with the SESAR Performance Ambition.

Increase of ATCO Productivity

TAPAS will explore different levels of automation according to the SESAR model. In each context, the roles and responsibilities will be different, and these will be allocated between humans and systems in different ways, but in all cases, there will exist task/tasks that is/are delegated to the system.

While TAPAS will not directly develop these concepts, the results of the research will facilitate deployment of AI/ML systems, enabling higher levels of automation. This benefit will increase the ATCO Productivity that again, has a direct positive impact on KPA Cost-Efficiency and also to the SESAR Performance Ambition.

Ensure Safety Level through Situational Awareness

Safety is the key social KPA driver of TAPAS. In general, the project acts as an enabling solution to the critical hazards brought by operational environments where system performs most or even all aspects of the control task.

Guaranteeing situational awareness is an essential focus area for Safety and Human Performance KPAs. Contributing to it in AI/ML automated environments where other KPAs are improved, is a key condition for the validity of TAPAS' outcomes. Again, this impact addresses the SESAR Performance Ambition.

3 Dissemination Plan

3.1 TAPAS Dissemination objectives and strategy

Dissemination is considered a critical activity in TAPAS project, whose results aim at being general principles for deploying AI/ML automation in ATM.

Although dissemination will be a constant need throughout TAPAS project lifecycle, the particular dissemination objectives will change as the project progresses. At the beginning of the project, dissemination will focus specially on catching the interest of target stakeholders and getting their feedback to ensure that their inputs feed TAPAS activities, so they can be built in the right direction and answer to stakeholders needs. Later on, dissemination priorities will gradually move towards the publication of results to ensure their further exploitation.

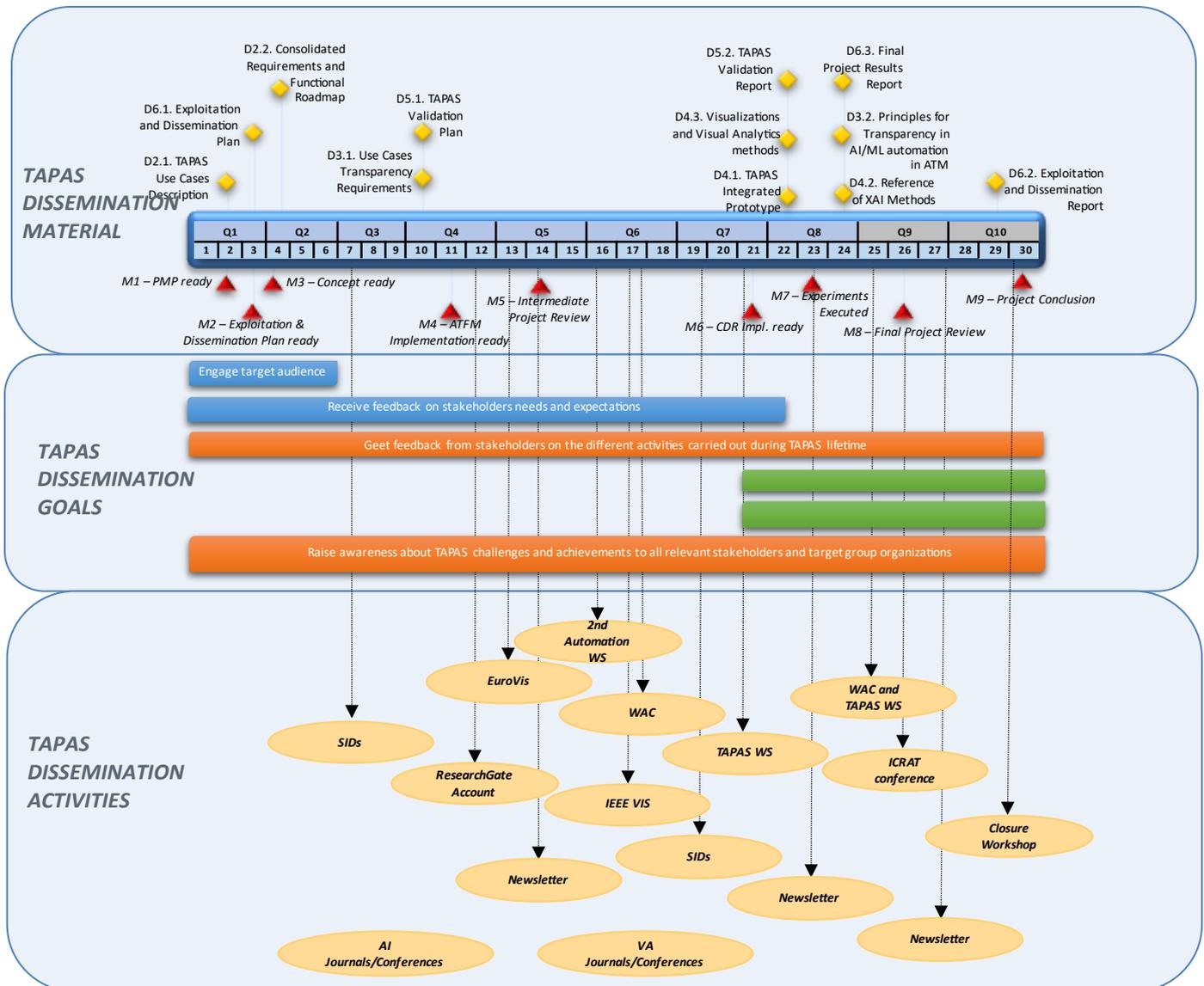


Figure 4: TAPAS Dissemination Objectives and strategy.

The figure above shows the dissemination and exploitation strategy during the project.

For the final six months of the project the main goal is to generate a paper to be published in ATM SEMINAR, which will take place in Europe in 2023. Apart from that, and the planned workshop, as it can be seen in Figure 4, TAPAS will also aim to disseminate its results in other conferences, such as ICRA or VAST.

Regarding the final workshop, it's also important to highlight that it will have among its participants, industrial partners and EASA, in order to disseminate the results in a wider way and taking into account all the possible points of view.

3.2 Dissemination Matrix

The requirements of each dissemination activity are documented in the Dissemination Matrix below. This matrix includes the objectives and target audience for each one of the dissemination activities.

Dissemination Type	Objective of Dissemination	Medium	Audience	Responsible	Deliverable (Information to be shared)	Format
Workshops	Disseminate Project results and obtain stakeholders feedback	<ul style="list-style-type: none"> Face to Face (if possible due to Covid-19 situation) 	<ul style="list-style-type: none"> Project Coordinator WP Leader WP Team Industry ANSP S2020 IR Projects Other ER Projects Scientific Community on ATM and XAI 	WP6 Leader	<ul style="list-style-type: none"> Agenda Meeting Minutes Session results 	<ul style="list-style-type: none"> Word files archived on project SharePoint site
TAPAS news, disseminate project results	Announce Project results or events to promote project visibility	<ul style="list-style-type: none"> Professional Network Conferences 	<ul style="list-style-type: none"> Project Team Industry ANSP S2020 IR Projects Other ER Projects Scientific Community on ATM and XAI 	WP6 Leader	<ul style="list-style-type: none"> Web announcement 	<ul style="list-style-type: none"> Web announcement
Announce Workshop	Increase project visibility	<ul style="list-style-type: none"> Website Professional Network 	<ul style="list-style-type: none"> Project Team Industry Wider Scientific Community on ATM and XAI 	Project Coordinator	<ul style="list-style-type: none"> Web announcement 	<ul style="list-style-type: none"> Web announcement
Workshop invitation	Involve TAPAS stakeholders	<ul style="list-style-type: none"> Email 	<ul style="list-style-type: none"> Industry ANSP Scientific Community on ATM and XAI 	Project Coordinator	<ul style="list-style-type: none"> Invitation Brochure Workshop Agenda Email 	<ul style="list-style-type: none"> Invitation Brochure Workshop Agenda Email

Dissemination Type	Objective of Dissemination	Medium	Audience	Responsible	Deliverable (Information to be shared)	Format
Publications (Scientific Journals, posters...)	Promote results	TAPAS <ul style="list-style-type: none"> • Journals • Conferences 	<ul style="list-style-type: none"> • Industry • S2020 IR Projects • Other ER projects • Scientific Community on ATM and XAI 	All Project Member	<ul style="list-style-type: none"> • Article • Paper • Poster • ... 	<ul style="list-style-type: none"> • Article • Paper • Poster • ...

Table 5: TAPAS Dissemination Matrix

3.3 Dissemination channels

From the dissemination matrix presented above it can be deduced the following dissemination channels that TAPAS will use. These dissemination channels are summarised in the table below:

Target audiences	Workshops	Scientific Journals and articles	Conferences and presentations
SJU Project Officer	X		
EU Commission			X
S2020 IR Projects	X	X	X
Other Exploratory Research Projects	X	X	X
Industry, ANSPs	X	X	X
Project Members (all)			
Advisory Board	X	X	
Network Manager	X	X	X
Regulatory authorities	X	X	X
Scientific Community on ATM and XAI	X	X	X
General Public (including media and broad public)	X	X	X

Table 6. Dissemination channels.



3.4 TAPAS Dissemination Activities

TAPAS dissemination activities will consist mainly of Conferences, Publications and Workshops. This section details the dissemination activities planned, including the purpose, means, key messages, timing, and responsible role for each activity.

- Workshops

Workshops are a way to let in new ideas and ensure that stakeholders' needs are being addressed. They will embrace objectives such as open debates to gain experience, establish new ideas and catch stakeholders' attention and interest. Besides, workshops host gatherings for partners to take an active part in various parts of the project and understand and revise concept terms.

TAPAS consortium will organise at least three four different workshops:

- **1st Workshop.** This workshop will be organised in cooperation and coordination with other automation projects as the Second Automation Workshop that TAPAS project will organised and where TAPAS challenges and first achievements will be share.
- **2nd Workshop.** This workshop will be organised with the purpose of sharing the first results of TAPAS with operational experts and relevant stakeholders to get to know their feedback and expectations on TAPAS first results, achievements, methodologies applied.
- **3rd Workshop.** This last workshop will be organised at the end of the project. Its main objective will be to present the final results and assess their alignment with TAPAS initial objectives. A great diffusion of the results is also expected at the end of the project as well as to help spread new findings. This workshop will involve key external target audiences to ensure widespread dissemination in related fora.

Additionally, TAPAS representatives will attend selected workshops that could be organized by the other ER4 projects in line with the requirements of the Call.

- Conferences and publications

The partners will participate in publications, conferences, and seminars to raise awareness and gain possible TAPAS' outcomes users. Additionally, publications will be used as a mechanism of dissemination to help spread new findings between stakeholders and give a more tangible feel to news and Project's process.

- Partners will participate in different conferences and forums to disseminate TAPAS results, like iTEC, ANSP and Airlines R&D forums, visual analytics conferences and in EUROCAE WGs, where INDRA and CRIDA take part as chairperson/secretary role. Additionally, the following conferences have been identified as relevant to disseminate the aim and results of the project:
- SESAR Innovation Days (SID)
- World ATM Congress (WAC)
- IEEE VIS: Visualization & Visual Analytics



- EuroVis
- SESAR Digital Academy Webinar
- SESAR Annual Conference

Publications are a mechanism of dissemination that can be used in an external way to keep archives of the projects process, help spread changes or new developments between partners, and to give a more tangible feel to news and projects results. The following journals and magazines are identified related to publication of scientific articles and communications:

- Journal Artificial Intelligence
- Journal Visual Informatics
- ACM Computing Services
- MDPI AI
- Journal of Air Transport Management;
- Journal of Air Transportation.
- IEEE Computer Graphics Applications
- PAIS 2022

Following tables describe in detail the objectives, responsible partners and planned dates for each dissemination activity.

TAPAS Project Results Workshops

Purpose	Promoting the use of the project outputs and results Disseminate and broadcast the challenges and results provided by TAPAS
Responsible	WP6 Leader
Key message	<p>TAPAS 1st workshop:</p> <ul style="list-style-type: none"> - Second Automation Workshop, where TAPAS will share its achievements and challenges in conjunction and coordination with other automation SESAR projects <p>TAPAS 2nd workshop:</p> <ul style="list-style-type: none"> - Disseminate the initial findings and challenges of TAPAS - Get feedback from operational experts and relevant stakeholders <p>TAPAS 3rd workshop:</p> <ul style="list-style-type: none"> - Present the final results - Diffusion of the results
Dates	<p>-1st workshop</p> <ul style="list-style-type: none"> • September 2021 <p>- 2nd workshop</p> <ul style="list-style-type: none"> • In Q7-Q8 (Exact date to be determined) <p>- 3rd workshop</p> <ul style="list-style-type: none"> • In Q10 (Exact date to be determined)

Dissemination channels and tools	Target Groups shall be reached directly by contacting companies with experience in the required fields of expertise or by means of emails, Professional Network and website announcements.
Target Group	All TAPAS Stakeholder Groups
Success criteria	TAPAS results have been properly presented to the audience. Stakeholder's feedback on the results is collected.
Others comments	The results of this workshop will be included as part of D6.3 Final Project Results Report.

Table 7: TAPAS Project Results Workshop Description

Participation and presentation at scientific conferences	
Purpose	Raise awareness about the challenges and results provided by TAPAS Get feedback on the expectations and experiences of the Stakeholders
Responsible	All
Key message	TAPAS will provide different outcomes to pave the way for the application of AI/ML methods in ATM environment: <ul style="list-style-type: none"> - Principles and criteria for AI/ML transparency/explainability in ATM domain scenarios (Transparency challenge) - Suitable XAI models to be applied in ATM scenarios - Use of Visual Analytics in the exploration of highly automated XAI (eXplainable Artificial Intelligence)
Date	<ul style="list-style-type: none"> - SESAR Innovation Days (SID) http://www.sesarinnovationdays.eu/ <ul style="list-style-type: none"> • Online, 7-10 December 2020 - EuroVis - https://www.eurovis.org/ <ul style="list-style-type: none"> • Online, 14-18 June 2021 - IEEE VIS: Visualization & Visual Analytics - http://ieevis.org/ <ul style="list-style-type: none"> • Online, 24-29 October 2021 - World ATM Congress (WAC) - http://www.worldatmcongress.org/ <ul style="list-style-type: none"> • Madrid, 26-28 October 2021 - SESAR Innovation Days (SID) http://www.sesarinnovationdays.eu/ <ul style="list-style-type: none"> • Online, 7-10 December 2021 - Human Mental Workload: Models and Applications (H-WORKLOAD) - http://www.hworkload.org <ul style="list-style-type: none"> • Online, 24-26 November 2021 - World ATM Congress (WAC) - http://www.worldatmcongress.org/ <ul style="list-style-type: none"> • Madrid, 21-23 June 2022 - EuroVis - https://www.eurovis.org/ <ul style="list-style-type: none"> • 2022, To be confirmed - IEEE VIS: Visualization & Visual Analytics - http://ieevis.org/ <ul style="list-style-type: none"> • 2022, To be confirmed - International Conference on Research in Air Transportation (ICRAT) http://www.icrat.org/icrat/ <ul style="list-style-type: none"> • Tampa, Florida in early summer 2022 - European / International Joint Conference on AI (ECAI / IJCAI)- https://www.ijcai.org/ <ul style="list-style-type: none"> • IJCAI, Montreal, 2022 • ECAI, 2022, To be confirmed - Autonomous Agents and Multiagent Systems (AAMAS) <ul style="list-style-type: none"> • 2022, To be confirmed
Dissemination channels and tools	Conference attendance, posters, presentations.

Target Group	Scientific Community on ATM and XAI
Success criteria	Represent and disseminate main TAPAS results
Other comments	N/A

Table 8: TAPAS Conferences Participation Description

Publications	
Purpose	Maximize the impact of the research and enable the value of results to be potentially wider than the original focus.
Responsible	All
Key message	Depending on the publication it might focus in one of the following topics: <ul style="list-style-type: none"> - Principles and criteria for AI/ML transparency/explainability in ATM domain scenarios (Transparency challenge) - Suitable XAI models to be applied in ATM scenarios - Use of Visual Analytics in the exploration of highly automated XAI (eXplainable Artificial Intelligence)
Date	-
Dissemination channels and tools	Articles, Publications, Papers. <ul style="list-style-type: none"> - Artificial Intelligence, https://www.journals.elsevier.com/artificial-intelligence - Visual Informatics, https://www.journals.elsevier.com/visual-informatics/ - ACM Computing Services, https://www.acm.org/ - MDPI AI, https://www.mdpi.com/journal/ai - Transportation Research, https://www.sciencedirect.com/journal/transportation-research - Transportation Science, https://www.informs.org/Publications/ - Journal of ATM, http://www.journals.elsevier.com/journal-of-air-transport-management - Journal of Advanced Transportation, http://onlinelibrary.wiley.com/journal/10.1002/(ISSN)2042-3195/
Target Group	Scientific Community on ATM and XAI
Success criteria	Achieve at least the acceptance of one TAPAS publication in a scientific journal or conference.
Others comments	According to the Grant Agreement: <p><i>A beneficiary that intends to disseminate its results must give advance notice to the other beneficiaries of — unless agreed otherwise — at least 45 days, together with sufficient information on the results it will disseminate.</i></p> <p><i>Each beneficiary must ensure open access (free of charge online access for any user) to all peer-reviewed scientific publications relating to its results (see Article 29 of the Grant Agreement [1]).</i></p>

Table 9: TAPAS Publications Description

3.5 Partners' Roles in Dissemination

Dissemination activities will be separated in two main groups according to their means of communication:

- Internal dissemination between TAPAS partners. Dissemination of evaluation reports and final project report are included. Project's partners should be informed of every change or update taking place in the project. Advisory Board members will have similar visibility;
- External dissemination with stakeholders and possible beneficiaries from the Project's outcome. Interested parties in the project should be informed of the project progress and possible changes or updates. Communication will work both ways.

Each consortium member will be assigned specific roles and responsibilities to be carried out following scheduled goals as planned and summarised in the table below:

Partner	Internal dissemination	External dissemination
CRIDA	Dissemination of TAPAS outcome among key ENAIRE's internal target audiences as a mean to address the ANSP's (Air Navigation Service Provider) challenges dealing with the automation.	Dissemination in ANSP's R&D forums as ENAIRE representative. Dissemination in EUROCAE WGs where CRIDA participate as chairperson/secretary role.
BRTE	Dissemination of TAPAS outcome among key BRTE internal target audiences dealing with the automation.	Dissemination in Airlines' R&D forums.
ISA	Dissemination of TAPAS solution among key internal target audiences as a mean to address the ANSP's challenges dealing with the principles of automation in simulators.	Dissemination among users working forums and across ISA's network of simulation users.
Fraunhofer	Dissemination of TAPAS main findings during internal FRAUNHOFER seminars	Dissemination in Visual Analytics Conferences.
UPRC	Dissemination and knowledge transfer to the various branches of engineering studies inside ML/AI at master and PhD level.	Dissemination of TAPAS activities and solutions on forums related with the following topics and/or disciplines: Human factors in ATM, Machine Learning, XAI, Agents and Multiagent systems.
INDRA	Dissemination within the different areas dealing with automation in ATM.	Dissemination in iTEC forums. Dissemination in EUROCAE WGs where INDRA plays a chairperson/secretary role.

Table 10: Partners roles and responsibilities for dissemination

3.6 Evaluation of the effectiveness

3.6.1 Design of Success Criteria

In order to guarantee the accomplishment of the expected measures in dissemination activities, and to facilitate an efficient and transparent project management in general, quantitative objectives and expected results in dissemination will be included in the dissemination plan.

Indicator type	Indicator	Goal
Execution	Minimum number of conferences and seminars in which TAPAS project will be presented	6
	Key Stakeholders contacted to make TAPAS results known	7
	Number of publications released	2
	Minimum number of workshops organized by TAPAS	3
	Minimum number of workshops organized by other projects in the ER4 call or by the SJU with TAPAS' participation	4
Results	TAPAS presence in ATM Publications	3
	Number of Key Stakeholders reached and interested in further exploitation	2
	Attendees to TAPAS's sessions in seminars and conferences	50

Table 11: TAPAS Dissemination Indicators

The indicators included in TAPAS and Exploitation Plan will serve as a starting point and as a valuable criterion in evaluations that will be conducted throughout the project.

Especially in the mid-term evaluation, the review of indicators and the assessment of the activities enable internal trouble detection and its timely correction so that an effective and efficient management and coordination is achieved.

3.7 Open access to scientific publications

TAPAS project will promote, when possible, the online access to its scientific information free of charge, such as free access to scientific articles, research data and TAPAS results, among other publications. This access will be mainly done through TAPAS website and through the public journals previously mentioned (see section 3.4).

The project aims to participate in forums, journals and other publications with gold open access. Even though, no budget has been allocated for gold open access publication fees, the use of multiple public journals will guarantee the open access to said publications.

Additionally, TAPAS project does not discard participating in green open access journals. If that happened, the present document will be updated with the repositories used.



As for the scientific publications published through green open access, the repository/repositories the project is planning to use are yet to be determined.

Additionally, since TAPAS project participates to the open research data pilot (ORD pilot), the project will follow ORD principles to achieve and produce FAIR data: Findable, Accessible, Interoperable and Reusable data.

4 Communication Plan

4.1 Communication Strategy

The communication strategy will support the exploitation of project results, focusing on the coordination of the outreach and dissemination activities necessary to achieve the project exploitation targets and promoting the work done during the project by using appropriate and useful tools, methods and channels.

The success and impact of an innovative cooperative Project depends strongly on the dissemination and communicative actions. To guarantee a strategic planning and efficient management of all the activities and communication tools, a Communication Plan is created.

Through the Communication Plan, different strategies are established to adapt the Project's multiple messages to their respective target audiences and stakeholders. The selected communication strategies facilitate the dissemination of the knowledge and allow active collaboration between all target audiences and stakeholders impacted by the development and implementation of the project.

4.2 Communication Objectives

The goal of a Communication Plan is setting up a communication framework for the project. TAPAS communication activities required to implement the dissemination and exploitation activities will follow the H2020 communication guidelines.

In particular, the general objectives of the Communication Plan are:

- To optimise the information flow among the project members and organize an efficient communication between involved stakeholders;
- To broadcast the project to the affected target audiences and main stakeholders, including other Exploratory Research and SESAR2020 projects;
- To inform and communicate the project results to the interested policy body.

4.3 Communication target audiences

The Project Coordinator will take a proactive role in ensuring effective communication on the project and the SJU Communication Department will be consulted as required to ensure that communications are performed according to SJU guidelines.

The Project Members will have different communication requirements and responsibilities according to their role and responsibilities as it is defined in the organisational structure.

Communication Target Audience	Communication Requirements
EU Commission	<ul style="list-style-type: none"> - Benefits of outcomes and their potential application.
SJU Project Officer	<ul style="list-style-type: none"> - Progress toward expected results; - Project general status including foreseen or actual delays, resources usage, risks or issues, and other managerial aspects; - Content and timing of press releases and joint publications.
General Assembly	<ul style="list-style-type: none"> - Progress towards expected results; - Project general status (foreseen or actual delays, resources usage, budget consumption, risks, administrative or legal issues, etc.); - Content and timing of press releases and joint publications.
Project Coordinator	<ul style="list-style-type: none"> - WP status (tasks, deliverable, risks...); WP dependencies; - Content and timing of press releases and joint publications.
WP Leaders	<ul style="list-style-type: none"> - Tasks status; - WP dependencies.
Project Members	<ul style="list-style-type: none"> - Tasks status; - Meetings.
Advisory Board	<ul style="list-style-type: none"> - Progress towards expected results; - Benefits of outcomes and their potential application.
S2020 IR Projects	<ul style="list-style-type: none"> - Relation with SESAR IR programme
Other projects in the SESAR ER Call	<ul style="list-style-type: none"> - Consistency with other solutions being developed under Exploratory Research Projects within Work Area 1 and Work Area 2

Table 12. Internal target audiences and communication requirements.

The external target audience, involved in the communications, are also identified to ensure that each target audience might be approached adequately.

Communication Target Audience /Stakeholders	Communication Requirements
Network Manager	- Benefits of outcomes and their potential application.
ANSP	- Benefits of outcomes and their potential application.
Regulatory authorities	- Benefits of TAPAS outcomes and their potential use when updating regulatory framework.
Scientific Community on ATM and XAI	- Communication of the project intermediate and final results effective manner. - Benefits of outcomes and their potential application.
Industry	- Communication of the project intermediate and final results effective manner. - Benefits of outcomes and their potential application.
General Public (including media and broad public)	- Communication of the project intermediate and final results in an effective manner. - Benefits of outcomes and their potential application.

Table 13. External target audiences and communication requirements.

4.4 Communication channels

TAPAS project considers using the following communication channels to guarantee an efficient communication between partners and external target audiences:

- **Face-to-face and online meetings.** This channel allows the interaction between speakers and recipients to clarify messages and exchange information. Before COVID-19 crisis, different interviews and other presentations were planned as face-to-face meetings. However, due to COVID-19 impact, online meetings, webinars and other online interactions have gradually replaced this type of meetings.
- **Electronic communication.** As it is said before in this document, TAPAS project will make use of Internet and social media platforms, which can be used for one-on-one, group or mass communication. This is a very efficient way to communicate between partners and to broadcast TAPAS projects outcomes and important achievements.

The Electronic communication will mainly take place through the project website and social networks such as LinkedIn and Twitter. A dedicated website and a Twitter account have already been created, where the relevant news about the project will be posted. The information will be updated frequently, allowing people from different backgrounds to have access to TAPAS outcomes. Also, through these means, discussions around TAPAS main challenges and topics will be generated.

- **Publications.** Written communication will be used when a message that does not require interaction needs to be communicated to a group. Papers, news, and announcements will be delivered through this channel, frequently in combination with the electronic communication channel.

Communication actions make an impact on different target audience/stakeholders in independent ways, and therefore various communication channels are to be defined to pursue the strategic goals.

These channels present different tools to be used to adapt to the communication needs that each target audience/stakeholder requires. The selected channels are presented in the table below:

Target audiences	H2020 Participants Portal	Meetings and teleconferences	Email	Website	Social Media (Twitter, LinkedIn)	Leaflets, posters, press releases
SJU Project Officer	X	X	X			
EU Commission	X		X	X		X
S2020 IR Projects			X	X	X	X
Other Exploratory Research Projects			X	X	X	X
Industry, ANSPs				X	X	X
Project Members (all)	X	X	X	X	X	
Advisory Board		X	X		X	X
Network Manager				X	X	X
Regulatory authorities				X	X	X
Scientific Community on ATM and XAI				X	X	X
General Public (including media and broad public)				X	X	X

Table 14. Communication channels.

4.1 Communication activities

TAPAS communication activities, especially when addressing external target audiences will consist mainly of a dedicated Website and Social Media, press releases and other articles in broader media outlets. This section will further describe said communication activities, including the purpose, means, key messages, timing and responsible role for each activity.

- Website (T0+4)

The website will be a way to keep everyone in contact with updated and relevant information. It will include access to documents referring the project, live updated project information, updated schedule of events (such as conferences, workshops, etc...), links with related projects and fully integrated 'intranet support' for selected user accounts (at least consortium) to access restricted and working documents.



The website will be linked to Twitter, LinkedIn and Research Gate to empower the communication of TAPAS material, discussions and activities.

The planning of the website will be done in collaboration with the SESAR JU. In fact, the dedicated webpage of TAPAS will be linked to the SJU Portal: <https://www.sesarju.eu/projects/tapas>.

In order to ensure that the webpage is kept up to date, the point of contact for dissemination, communication and exploitation activities (WP6 Leader) will maintain a monthly coordination meeting with the project coordinator to know the main achievements of the project during the last month and to decide if the content is appropriate for the website or not.

Web page will be maintained for at least 12 months after the end of the project. The website will be operational by the end of November 2020, through the following URL: www.tapas-atm.eu.

- Social Media.

The website will be linked to social media, such as Twitter and LinkedIn to maximise the dissemination of the project results and promote discussion and knowledge exchange. The main goal of the social media is to have a quick way to inform and to update the stakeholders from different topics: workshops, intermediate results, deliverable publications, etc.

TAPAS website and social media

Purpose	TAPAS website and social media will serve to communicate project achievements and announce workshops and latest news. Additionally, it will have SharePoint platform with access restricted to project members.
Key message	TAPAS will provide different outcomes to pave the way for the application of AI/ML methods in ATM environment: <ul style="list-style-type: none"> - Principles and criteria for AI/ML transparency/explainability in ATM domain scenarios (Transparency challenge) - Suitable XAI models to be applied in ATM scenarios - Use of Visual Analytics in the exploration of highly automated XAI (eXplainable Artificial Intelligence)
Responsible	WP6 Leader is responsible to maintain TAPAS website up to date and publish TAPAS main achievements into the social media.
Date	From September 2020 and maintained at least 12 months after the end of the project.
Communication channels and tools	Website (www.tapas-atm.eu) Twitter (@TAPAS_SESAR_ER4) LinkedIn (TAPAS Project - ER4 Project -, https://es.linkedin.com/in/tapas-project-744b3b208)
Target Group	Project Members, Scientific Community on ATM and XAI, SESAR Community, General Public.
Success criteria	TAPAS website and social media are kept up-to-date as the main information mean to share public documentation with the R&D community and working documents with TAPAS members.
Others comments	N/A

Table 15: TAPAS Website and Social Media Description

- Press releases, leaflets and other articles in broader media outlets.

TAPAS project will also publish press releases, leaflets and other articles that target multiple audiences as part of its communication activities.

Press release, leaflets and other articles in broader media outlets.	
Purpose	Maximize the impact of the research and enable to broadcast TAPAS results, achievements to the general public.
Responsible	All
Key message	Depending on the publication it might focus in one of the following topics: <ul style="list-style-type: none"> - Principles and criteria for AI/ML transparency/explainability in ATM domain scenarios (Transparency challenge) - Suitable XAI models to be applied in ATM scenarios - Use of Visual Analytics in the exploration of highly automated XAI (eXplainable Artificial Intelligence)
Date	-
Communication channels and tools	Press release, leaflets and other articles in broader media outlets. <ul style="list-style-type: none"> • CORDIS, https://cordis.europa.eu/es • SESAR Newsletters, initially TAPAS plans to deliver newsletter at Q5, as well as at Q10
Target Group	General Public (including media and broad public)
Success criteria	Achieve at least the appearance of one TAPAS press release
Others comments	-

Table 16. TAPAS press releases, leaflets and other articles in broader media outlets.

4.1 Project logo

As part of the communication activities, TAPAS has designed a dedicated logo through which identify the project.



Figure 5. TAPAS project logo.

4.2 Evaluation of the effectiveness

4.2.1 Design of Success Criteria

Additionally, to the qualitative objectives described above in section 4.2 Communication Objectives, other quantitative objectives have been defined to guarantee the TAPAS project Communication is made in an effective way, both inside and outside the project.



KPIs and targets	
Meetings and teleconferences	+1 progress meeting per semester to communicate TAPAS progress and general status, together with WP status and foreseeing risks. +1 scheduled meeting between WPs that have dependencies between one another
Email	Use email to coordinate and communicate updates and other relevant information to all Consortium members and as a mean to communicate with members of other relevant SESAR Projects when needed.
Website	+1 update per month in TAPAS website +200 unique website visitors throughout the project lifecycle
Other Internet sites of interest	+4 Internet sites where TAPAS is placed
Social Media (Twitter, LinkedIn)	Use Twitter and LinkedIn as social media to reach out to society and broadcast, not only TAPAS results (dissemination), but also TAPAS project progress, work, workshops, and other announcements. Announce important new about TAPAS project and results as needed. +1 update per month in Twitter and LinkedIn
Leaflets, posters, press releases	+ 6 number of leaflets, posters or press releases published within TAPAS project framework

Table 17. TAPAS Communication Indicators.

5 Exploitation Plan

5.1 Project exploitable results

As TAPAS Grant Agreement points out, TAPAS main results, expected to be achieved at the end of this project, are:

- 001. Principles for transparency in AI/ML automation in ATM domain
- 002. Reference of XAI methods applicable in ATM domain
- 003. Reference on visualization in Visual analytics methods in ATM domain.
- 004. ATFCM and CDR prototype based on XAI and VA techniques

5.2 Exploitation Strategy and objectives

The exploitation strategy to ensure that the results are used is described in the following roadmap.

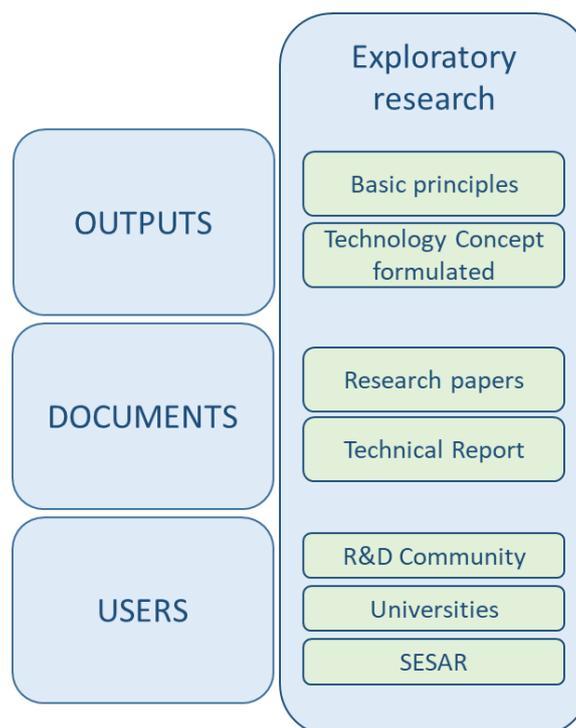


Figure 6: Exploitation roadmap

The roadmap for the exploitation strategy is divided into three main areas: outputs, documents and users. Each area will take part in a different way on the exploitation of the TAPAS project results, as defined below:



- **Outputs.** It will take into account the basic principles and the formulated Technology Concept, as well as general guidelines for further applications.
- **Documents.** The main objectives of this area are to generate proper technical reports (both intermediate and final deliverables) and research papers to make available to the community the outputs of the project.
- **Users.** This area will focus on the exchange of information of the TAPAS achievements among the projects and the potential users of the results: R&D Community, Universities and SESAR. In this way, it will be very important for this area, to take advantage of the Advisory Board, since they will ensure the exploitation of the TAPAS results among their organizations.

On the other hand, TAPAS main exploitation objectives are:

- **Research, development and innovation:**
 - Use of TAPAS outcomes beyond TAPAS project lifecycle, in other different projects (both within SESAR framework and outside SESAR), as a baseline for further developments in automation and application of XAI/ML and VA techniques.
- **Commercial use of TAPAS intermediate and final results:**
 - Principles for transparency in AI/ML automation in ATM domain to be used by the industry when developing new automated systems if project results confirm the potential and maturity for such purposes.

5.3 Exploitation of results

The expected outcomes of TAPAS project will allow the Consortium members the capacity to integrate the explored XAI models and VA techniques in other SESAR projects to prove the concept in other environments. As well as considering these tools for the future research regarding automation and AI/ML techniques for internal projects outside SESAR.

Moreover, in promoting the adoption of similar techniques in other studies, TAPAS expects that new XAI solutions, validated through tailored simulation and analysis studies and its tools, can help improve transparency and user confidence in the deployment of safe and reliable automation technology.

Beneficiary	Result (ID)	How do they plan to use the project results	When
SJU Project Officer	001. Principles for transparency in AI/ML automation in ATM domain 002. Reference of XAI methods applicable in ATM domain 003. Reference on visualization in Visual analytics methods in ATM domain.	Benefits of TAPAS outcomes and their potential application.	During TAPAS lifecycle and after the end of the project.

Beneficiary	Result (ID)	How do they plan to use the project results	When
	004. ATFCM and CDR prototype based on XAI and VA techniques		
CRIDA	001. Principles for transparency in AI/ML automation in ATM domain 002. Reference of XAI methods applicable in ATM domain 003. Reference on visualization in Visual analytics methods in ATM domain. 004. ATFCM and CDR prototype based on XAI and VA techniques	TAPAS results will allow CRIDA the capacity to integrate the explored XAI and VA in other SESAR projects to prove the concept in other environments. Furthermore, to consider these tools for the future research regarding automation for internal projects in CRIDA and ENAIRE.	During TAPAS lifecycle and after the end of the project.
BRTE	001. Principles for transparency in AI/ML automation in ATM domain 002. Reference of XAI methods applicable in ATM domain 003. Reference on visualization in Visual analytics methods in ATM domain. 004. ATFCM and CDR prototype based on XAI and VA techniques	TAPAS requirements will be used at BRTE to adapt them to new AI based services for airlines and to build methodology for broader AI based developments. Also, TAPAS prototypes will be used to adapt solutions developed to new ML developments.	During TAPAS lifecycle and after the end of the project.
Fraunhofer	001. Principles for transparency in AI/ML automation in ATM domain 002. Reference of XAI methods applicable in ATM domain 003. Reference on visualization in Visual analytics methods in ATM domain. 004. ATFCM and CDR prototype based on XAI and VA techniques	Fraunhofer targets only at scientific exploitation, including publications, adaptation of methods for new domains and applications, acquisition of follow-up projects.	During TAPAS lifecycle and after the end of the project.
INDRA	001. Principles for transparency in AI/ML automation in ATM domain 002. Reference of XAI methods applicable in ATM domain	TAPAS results will help INDRA to improve knowledge at the company about Machine	During TAPAS lifecycle and after the end of the project.

Beneficiary	Result (ID)	How do they plan to use the project results	When
	<p>003. Reference on visualization in Visual analytics methods in ATM domain.</p> <p>004. ATFCM and CDR prototype based on XAI and VA techniques</p>	learning and XAI from experts in TAPAS project.	
ISA	<p>001. Principles for transparency in AI/ML automation in ATM domain</p> <p>002. Reference of XAI methods applicable in ATM domain</p> <p>003. Reference on visualization in Visual analytics methods in ATM domain.</p> <p>004. ATFCM and CDR prototype based on XAI and VA techniques</p>	<p>TAPAS findings will allow ISA to promote the approach among its simulation user community. In promoting the adoption of similar techniques in other studies, ISA expects that new XAI solutions, validated through tailored simulation and analysis studies supported by ISA and its tools, can help improve transparency and user confidence in the deployment of safe and reliable automation technology across the aviation community.</p> <p>Also, as a member of the FAA multi-agency Machine Learning group, ISA would be interested to present the project and its results if permitted.</p>	During TAPAS lifecycle and after the end of the project.
UPRC	<p>001. Principles for transparency in AI/ML automation in ATM domain</p> <p>002. Reference of XAI methods applicable in ATM domain</p> <p>003. Reference on visualization in Visual analytics methods in ATM domain.</p> <p>004. ATFCM and CDR prototype based on XAI and VA techniques</p>	TAPAS outcomes will help UPRC in: providing consultation services to national, public and private enterprises for developing and applying explainable AI/ML methods towards introducing automation in operational modes in the aviation domain and in other domains, and for	During TAPAS lifecycle and after the end of the project.

Beneficiary	Result (ID)	How do they plan to use the project results	When
		integrating data from big data sources as well; in terms of pure academic exploitation, TAPAS results can be used to enhance the teaching scope and quality by introducing new findings and technologies into the undergraduate and MSc programmes curricula, deliver supervision of PhD theses, seminars and tutorials on XAI areas and big data integration; and to make adjustments to institution's current research directions regarding XAI and data integration from big data sources.	

Table 18: Project internal exploitation of results

On the other hand, the identification of the XAI and VA techniques will provide a method to deal with the innovative aspects of SESAR 2020 solutions related to the automation process in the ATM.

SESAR Validation infrastructure will also prove the innovative AI/ML approaches to support the future automation process. The following table, commentary summarised the project external exploitation of results, some of them already presented in previous sections.

User Group	Result (ID)	How could they use the project results	When
EU Commission	001. Principles for transparency in AI/ML automation in ATM domain 002. Reference of XAI methods applicable in ATM domain 003. Reference on visualization in Visual analytics methods in ATM domain.	Benefits of outcomes (specially 001) and their potential application.	During TAPAS lifecycle and after the end of the project.
Industry	001. Principles for transparency in AI/ML automation in ATM domain	The results of this project will pave the way to the ATM related industries for implementing and deploying	During TAPAS lifecycle and after

User Group	Result (ID)	How could they use the project results	When
	<p>002. Reference of XAI methods applicable in ATM domain</p> <p>003. Reference on visualization in Visual analytics methods in ATM domain.</p> <p>004. ATFCM and CDR prototype based on XAI and VA techniques</p>	<p>AI/ML solutions, in close collaboration with ANSPs, among other potential actors related.</p>	<p>the end of the project.</p>
ANSPs	<p>001. Principles for transparency in AI/ML automation in ATM domain</p> <p>002. Reference of XAI methods applicable in ATM domain</p> <p>003. Reference on visualization in Visual analytics methods in ATM domain.</p> <p>004. ATFCM and CDR prototype based on XAI and VA techniques</p>	<p>Knowledge gained in both XAI and VA methods, as well as in criteria for transparency and explainability for AI/ML.</p> <p>TAPAS results will act as facilitator for the adoption of increased automation levels in various operational environments, jointly with industrial development.</p>	<p>During TAPAS lifecycle and after the end of the project.</p>
Network Manager	<p>001. Principles for transparency in AI/ML automation in ATM domain</p> <p>002. Reference of XAI methods applicable in ATM domain</p> <p>003. Reference on visualization in Visual analytics methods in ATM domain.</p>	<p>Benefits of TAPAS outcomes and their potential application.</p> <p>On-going European initiatives that could be reinforced with TAPAS' results</p>	<p>During TAPAS lifecycle and after the end of the project.</p>
Regulatory authorities	<p>001. Principles for transparency in AI/ML automation in ATM domain</p>	<p>Another possibility is to introduce the projects results and conclusions to regulatory authorities or government (EASA, National Aviation Authorities, EU or national governments) to support them with a background in their effort to form regulations, which eventually relies on social trust in AI/ML technologies.</p>	<p>During TAPAS lifecycle and after the end of the project.</p>

User Group	Result (ID)	How could they use the project results	When
Other SESAR projects	001. Principles for transparency in AI/ML automation in ATM domain 002. Reference of XAI methods applicable in ATM domain 003. Reference on visualization in Visual analytics methods in ATM domain.	Advances related to automation principles for ATM, where applicable. Synergies with other projects related to automation.	During TAPAS lifecycle and after the end of the project.
Scientific Community on ATM and XAI	001. Principles for transparency in AI/ML automation in ATM domain 002. Reference of XAI methods applicable in ATM domain 003. Reference on visualization in Visual analytics methods in ATM domain.	The results concerning explainability of AI/ML techniques in the ATM domain are expected to set the background for further investigation and enabling of applications in these highly automated environments, as well as allow potential follow-up research and innovation projects.	During TAPAS project lifecycle and even after the end of the project.
General Public	001. Principles for transparency in AI/ML automation in ATM domain 002. Reference of XAI methods applicable in ATM domain 003. Reference on visualization in Visual analytics methods in ATM domain.	By enabling higher levels of automation, which improve efficiency of operations and system capacity while keeping the level of safety (thus providing societal benefits), the general acceptance of the ATM in the society will be positively affected.	During TAPAS project lifecycle and even after the end of the project.

Table 19: Project external exploitation of results

The exploitation strategy and activities performed in TAPAS will be considered successful if TAPAS outcomes are properly used after or during TAPAS lifecycle by another project or projects.

TAPAS has identified the previous statement as the success criteria for determining if the Exploitation of TAPAS results has been effective. At least one different project should use TAPAS results as a baseline to continue or further developed the work done in TAPAS or it should use some of the work or knowledge done and achieved by the partners when dealing with XAI or VA techniques and automation in an ATM domain.

As it is expressed in the previous sections, one of the expected outcomes for partners involved in this project is to use the results of TAPAS in other projects, for example in SESAR projects, but also in other internal ones.



5.4 IPR Management

IPR management will be based on the following principles:

- the Consortium members will define the background needed for the project and the conditions for granting access rights, ensuring that appropriate confidentiality obligations are in place;
- results (foreground) shall be the property of the beneficiary carrying out the work. Where several beneficiaries have jointly carried out the work and their contribution cannot be differentiated, they shall jointly own such results. Each joint owner shall be entitled to use the results on a royalty-free basis, without the prior consent of the other owners. Each joint owner shall be entitled to grant non-exclusive licenses to third parties under fair and reasonable compensation to the other owners;
- each Party will have the right to transfer ownership of its own results following the procedures of the Grant Agreement (GA);
- where results are capable of commercial application, its owner shall provide for adequate and effective protection, having due regard to the legitimate interests of the other beneficiaries;
- the IPR strategy will aim at maximising the dissemination of the research results while guaranteeing the protection of confidentiality obligations and the legitimate interests of the owner(s). The Consortium Agreement will include a dedicated section on knowledge and IPR management, which will develop the previous points, will implement the provisions established in the GA, and will include provisions for the settlement of disputes.



6 Schedule of communication and dissemination activities

Activity	Description	Target audience	Tools to be used to further support communications and dissemination	Provisional /frequency	dates	Responsible Role	KPIs and targets
Workshops	Organised three different workshops to promote the use of the project outputs and results	All TAPAS Stakeholder Groups	Use of emails, Professional Network and website announcements to reach the target Groups.	1st workshop, September 2021 2nd workshop, Q7-Q8 (TBD) 3rd workshop, Q10 (TBD)		WP6 Leader	+3 workshops organized by TAPAS. +2 stakeholders reached and interested in further exploitation. +7 key Stakeholders contacted to make TAPAS results known.
Conferences and presentations	Attend to different conferences to raise awareness about TAPAS results and challenges, and get feedback on expectations	Scientific Community on ATM and XAI	Conference attendance, posters, presentations.	SID (7-10 December 2020); EuroVis (14-18 June 2021); IEEE VIS (24-29 October 2021); WAC (26-28 October 2021); SID (7-10 December 2021); WAC (21-23 June 2022); EuroVis (2022); IEEE VIS (2022); AAMAS (2022); SESAR Annual Conference (October 2022); EASN Conference (October 2022).		All	+6 conferences and seminars in which TAPAS project will be presented. +4 workshops organized by other projects in the ER4 call or by the SJU with TAPAS' participation. + 50 attendees to TAPAS's sessions in seminars and conferences



Activity	Description	Target audience	Tools to be used to further support communications and dissemination	Provisional /frequency	dates	Responsible Role	KPIs and targets
Scientific publications	Maximize the impact of the research and enable the value of results to be potentially wider than the original focus.	Scientific Community on ATM and XAI	Articles, Publications, Papers. CORDIS Newsletter	-		All	+3 TAPAS presence in ATM Publications
TAPAS Website	To communicate project achievements and announce workshops and latest news	Project Members, Scientific Community on ATM and XAI, SESAR Community, general Public.	Website (www.tapas-atm.eu)	Operational from the end of November 2020 and maintained at least 12 months after the end of the project.		WP6 Leader	Update at least once a month TAPAS website. +200 unique website visitors throughout the project lifecycle
Social Media	Use Twitter and LinkedIn to reach out to society and broadcast, TAPAS results and progress, work, workshops and other announcements.	General Public	Twitter (@TAPAS_SESAR_ER4) LinkedIn (TAPAS Project - ER4 Project -, https://es.linkedin.com/in/tapas-project-744b3b208)	Operational from the end of November 2020 and maintained at least 12 months after the end of the project.		W6 Leader	One update per month in Twitter and LinkedIn



Activity	Description	Target audience	Tools to be used to further support communications and dissemination	Provisional /frequency	dates	Responsible Role	KPIs and targets
Leaflets, posters, press releases	Maximize the impact of the research and broadcast TAPAS results and achievements	General Public	Leaflets, posters, press releases CORDIS https://cordis.europa.eu/es SESAR Newsletter	-		All	+4 websites where TAPAS is placed +6 leaflets, posters or press releases published within TAPAS framework.
Email	To coordinate and communicate updates and other relevant information to all Consortium members and to communicate with members of other relevant SESAR Projects.	SJU Project Officer, EU Commission, S2020 IR Projects, other Exploratory Research Projects, all project members, Advisory Board.	Emails.		During all TAPAS project lifecycle	All	+1 progress meeting per semester to communicate TAPAS progress and general status, together with WP status and foreseeing risks. +1 scheduled meeting between WPs that have dependencies between one another
Meetings and teleconferences	To communicate TAPAS progress and general	SJU Project Officer, all project	Use of emails to reach directly to the involved target audience.		During all TAPAS project lifecycle	All	+1 progress meeting per semester to communicate TAPAS



Activity	Description	Target audience	Tools to be used to further support communications and dissemination	Provisional /frequency	dates	Responsible Role	KPIs and targets
	status and to coordinate activities among WP.	members, Advisory Board.					and WP progress and status. +1 meeting between WPs that have dependencies

Table 20: Schedule of Communication and Dissemination Activities

7 References

- [1] TAPAS Grant Agreement 892358
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- [4] TAPAS Project Management Plan, [Online]. Available: <https://stellar.sesarju.eu/servlet/dl/DownloadServlet?downloadKey=xrn%3Adatabase%3Aondb%2Frecord%2F20429138&resuming=true&zip=true&disposition=attachment&domainName=saas&domainName=saas>
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- [7] TAPAS Kick-off-Meeting: SJU Guidance Slides, 3rd June 2020.