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Roadmap for developing an open science code of conduct

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Content list

1 Summary

1.1 Synopsis

This document is part of the OSCAR project (Open ScienCe Aeronautic & Air Transport Research). The main aim of the OSCAR project is to pave the way for open science in the European Aeronautic and Air Transport (AAT) research landscape. The document at hand is deliverables D4.1 and is dealing with the analysis of WP2 and WP3. For more information on the project its WPs, deliverables and results please see the OSCAR project proposal or the other documents of the project available at the official website of the project: https://oscar-h2020.eu/.

In this deliverable (D4.1), we are presenting the results of our analysis of the currently available results (2020-07-13) of WP2 and WP3 in particular deliverables D2.1, D2.3, D3.1 and D3.2. For a visual representation of the dependency graph, please see Figure 1.

In the deliverable at hand, we are focusing mainly on challenges, legal and contractual constraints and opportunities for implementing open science in the European AAT research landscape. We identify key challenges, key opportunities and derive key recommendation for action.

The identified key challenges, key opportunities and derived recommendations for action are mainly aimed at our own OSCAR project consortium. Our analysis aims to strategically align our own project and provide an information base for our further decisions.

Of course, our analysis does not only result in recommendations for ourselves but also in first tentative recommendations that might be interesting for outsiders.

This document has the following five core sections:

- Section 2 gives an overview over the OSCAR project and its main goals and its structure. The sub-section 2.4 is dedicated specifically to work package 4 (WP4) which is dealing with the development and implementation of the OSCAR open science code of conduct.
- Section 3 summarises the contents of work package WP2 and WP3 and highlights the main conclusions and key results of each corresponding deliverable D2.1, D2.3, D3.1 and D3.2.
- Section 4 presents the identified key challenges and key opportunities, the key recommendations for action derived from the results of WP2 and WP3 with focus on the legal and contractual framework of the implementation of open science in the European AAT research landscape.
- Section 5 addresses the problem of delay of the deliverable D4.1 and discusses the quality of our analysis critically.

1.2 Objective and background

One of the main goals of work package 4 (WP4) is to develop an open science code of conduct for the European AAT research landscape. For this purpose, preparatory work had and has to be done to explore and define the appropriate content and structure of the open science code of conduct. Furthermore, it is important to have a concise and comprehensive roadmap that lays out all the necessary steps, activities and milestones. Based on our early planning at the beginning of

the OSCAR project and based on insights form deliverable D4.1 we were able to develop such a roadmap. The key elements of this roadmap to our code of conduct are presented in the deliverables D4.2 at hand.

1.3 Key results and conclusions

The work on the roadmap (D4.2) for our code of conduct started at the beginning of the project. Based on the proposal and previous project findings so far (early 2019), the general roadmap was depicted in a Gantt chart, timetables and task breakdown structures. The Gantt chart shows the critical paths of the development of the code of conduct. The current roadmap gives us specific recommendations for action and implications on further steps in the development phase of the code of conduct.

Additional contents and strategical information gathered from deliverable D4.1 were incorporated into the roadmap at hand as soon as they were available. We achieved a solid and promising roadmap to develop our open science code of conduct.

Our roadmap includes a maintenance workflow and update pattern for the open science code of conduct that takes into account the specific requirements of the European policy making workflows.

In summary, we arrived at the following seven general recommendation for actions for the further development of the open science code of conduct:

1. We will identify and **incorporate lessons learned by other code of conduct projects**.
2. We will identify and commit to **best practices using de facto standards of existing code of conduct projects**.
3. We will integrate our code of conduct development and maintenance workflow with the **existing workflows of the European Commission**.
4. We will develop an additional framework for **clean, simple, flexible opt-in, opt-out models** for integrating open science in AAT projects.
5. We will **develop inputs to our general communication strategies** (WP6) that take into account the specific modalities of the European Commission and the main stakeholders in the European AAT research landscape.
6. We will develop **additional information materials** like fact sheets and templates to guide the AAT community and address their fears and pain points.

All media and files including spread sheets and image files in full resolutions used in this document are available in the media.zip file in the attachment of this document.

2 Overview of the OSCAR project

2.1 Project description

The transport sector is a fast-growing sector of Europe and is associated with a wide range of economic and societal benefits – acting as a catalyst of technology transfer to many fields of mainly industrial application and vice versa taking up technologies from other sectors.

Today, the transport sector is confronted with diverse challenges: climate change, CO2 emissions, dependency from fossil fuels, evolving mobility demands, increasing global competition, emergence of new enabling technologies etc.

The transport sector as such is usually categorized by transport modes (car, road transport, rail, maritime, and aeronautics) and is characterised by the production and the operation of transport equipment. Additionally, both production and operation of transport infrastructure, as well as aspects of inter-modality of transport, need to be considered.

In this context, open science is considered as an important and promising opportunity to support the intended performance gain and innovations: “open science, open innovation and open to the world – the so-called 3 O’s – are very likely to impact European innovation performance, growth and international competitiveness” (European Commission 2016b).

Traditional intellectual property rights (IPR) management focuses on keeping intellectual property under lock and key. The basic idea of traditional IPR management is to allow a company to use the competitive advantages gained through secret i.e. non-disclosed research and innovation to gain an advantage over its competitors in the market, via patents and licenses.

One of the basic principles of open science is to open up the scientific process as much as possible and thus to open up the intellectual property associated with the same scientific process. The basic idea of open science is to make knowledge and other intellectual assets freely available to the scientific community and society for reasons of fairness, good scientific practice, reusability and responsibility towards society. It is important to note that even if you share your knowledge freely with the scientific community or with society, you are *not* giving up your copyrights to a creation. The creator retains all their rights to their creation in any case, even if they share it freely with others, for example by placing it under a free license such as a Creative Commons license (Creative Commons 2020).

It is fair to say, that conventional IPR management and open science are in a state of tension. If traditional IPR management and open science principles are described in generic terms, one could assume or perceive that open science and conventional IPR management contradict each other. Yet, it is important to note that open science and conventional IPR do *not* contradict each other, because they are completely distinct categories. In fact, open science and conventional IPR management can be well harmonized because there are *no logical or conceptual barriers* to this.

For example “while open access to research data […] becomes applicable by default in Horizon 2020, the Commission also recognises that there are good reasons to keep some or even all research data generated in a project closed.” (European Commission 2020c)

The European Commission endorses the principle *as open as possible, as closed as necessary* "and focuses on encouraging sound data management as an essential part of research best practice." (European Commission 2020c)

European AAT research covers the scale of the Technology Readiness Level (TRL) from level 1 to level 6 (EARTO 2014). Arguably, the TRLs within a project are important factors influencing how much research can be opened up. The more fundamental research is done, the more this research can be opened up. The more applied industry-related research is done, the less the research process can be opened up. Therefore, for the implementation of open science all aspects of the nature of each individual project need to be considered.

When implementing open science in European AAT research in general, reasonable compromises between closing and opening the respective project contents must be found. In doing so, special attention must be paid to the respective TRL of the respective project, because TLRs provides a good interface base to decide where, how and when which assets can be opened.

The OSCAR project aims to resolve this perceived tension between open science and traditional IPR management in the AAT research sector and to harmoniously integrate both approaches. OSCAR addresses the issue of the current perception, acceptance, and implementation of open science in the field of European AAT research.

The main goal of the OSCAR project is to initiate and deliver optimized open science opt-in, opt-out or hybrid models for the European AAT research landscape. This requires an in-depth understanding of open science (principles, application, and benefits) as well as of the structure of the European AAT landscape. It also requires to convince stakeholders open science and to guide them through the integration of open science in their daily research work beyond single European projects.

2.2 Project structure

In order to realize the main goal and the related sub-goals of OSCAR, we need to have (1) detailed understanding of the level of awareness and acceptance of open science in AAT research, (2) to develop and adapt implementation approaches for open science and (3) to evaluate those approaches. While these three objectives provide tools and practical information to implement open science in AAT research projects it is also necessary to raise the motivation to implement open science within the AAT research community.

- **Objective 1, WP2, WP3**: An assessment of the development of open science in European AAT projects since the beginning of FP7, i.e. FP7 and Horizon 2020, considering also the AAT related JTIs Clean Sky and SESAR. To some extent, projects, which relate at least partly with core AAT research, have been considered. The assessment shall have been based on:
    - a statistical analysis of estimated 1500+ collaborative research respectively CSA projects. It should have revealed factors facilitating respectively hampering the acceptance of open science approaches;
    - an intense consultation phase with researchers and administrative or legal staff from industry (IND) including SME, research organisations (REC), universities and academia research (HES) to gather comprehensive first-hand experience about

awareness of open science as such, perceived benefits and drawbacks of the idea and potentially concrete examples.
    - However, during the implementation of OSCAR legal constraints prevented accessing the needed EU eCORDA database, thus the statistical analysis had to be replaced by other means in order to identify suitable target projects.
- **Objective 2, WP4**: Objective 2 is to develop an open science code of conduct that is tailored to the needs of the European AAT research landscape. This includes analysing current legal constraints and opportunities as well as implementation approaches of open science into the European AAT research landscape.
- **Objective 3, WP5**: Objective 3 is to test the (interim) results in the course of WP4, to finalise recommendations targeting legal aspects and to validate the related open science code of conduct by simulating the application of the code of conduct in pilot project cases.
- **Objective 4, WP6**: Objectives 1 to 3 will contribute to increase of the implementation of open science in the European AAT research landscape. However, to achieve the ambitious goal of OSCAR, the acceptance of the idea as such, as well as open science code of conduct is crucial. Different complementary communication measures will be conducted to maximise the intended acceptance of and support for open science in AAT research landscape.

2.3 Project steps

OSCAR achieves its goals in three consecutive steps:

2.3.1 Step 1: Information and opinion gathering

As a first step, the OSCAR consortium analysed the European AAT research landscape with respect to the awareness and the perception of open science. We have focused on collaborative research projects (FP7: Level 1 and Level 2, Horizon 2020: Research and Innovation Actions, Innovation Actions) and Coordination and Support Actions as most common instruments in AAT research. As mentioned before, the intended statistical analysis could not be performed (no access to eCORDA) thus another approach based on the professional experiences of the consortium members had to be developed.

In AAT, most research consortia consist of:

- Industry (IND incl. SME; from OEMs and the whole supply chain, represented by the IMG4 group);
- Research establishments (REC., represented by EREA);
- Academia research (HES, represented by EASN);
- In some cases, other types of partners as e.g. public bodies (PUB).

Some project consortia allows to distinguish between more research driven and more application driven projects, although there will be a level of uncertainty. There is also some tendency to associate lower TRL with the Framework Programmes and being driven by REC and/or HES. Vice versa higher TRL may be associated with some projects in Clean Sky with more emphasize in the role of IND, which might affect the degree of openness.

One main concern about open science and open access in particular is less the concept itself rather than the way it is implemented by the European Commission through the Rules for Participation (RfP). First, in HORIZON 2020 there is no differentiation of the IPR and open access rules with reference to the TRL or the nature of projects and there are no specific rules applicable to public or private partnerships as well and it will probably remain so in HORIZON EUROPE. Currently, there is one single regime that applies to all situations, even where the difficulty of conciliate openness and projects with industrial partners is greatest. To minimize this difficulty, with the objective of better acceptability and understanding of the open science approach, it would be necessary to be able to apply slightly different and adapted open science rules, depending on the type of project. Second, rules applicable to open data are unclear especially about the types of tools or platforms to manage and share research content openly and freely. It creates uncertainty and reluctance to share data.

One of the aims of OSCAR is to offer suggestions for more exact and diversified guidelines on how to implement IPR rules in coherence with open science.

The taxonomy of ACARE mentions 12 technical fields as Flight Physics, Aero-structures, Propulsion etc. in total which need to be dealt with in order to achieve the FlightPath 2050 goals. During FP7 the European Commission introduced the first elements of open science – namely open access and later the open data pilot. Open access became mandatory in Horizon 2020, while open data remains a pre-set option, but consortia may opt out.

Since the beginning of FP7 respectively Clean Sky estimated 1500+ AAT research projects have been started. Considering the publication of calls and the usual project duration there are likely permanently 100 to 200 collaborative projects running in parallel. One can expect that clustering of projects by technical field and by other indicators provide sub-groups of sufficient size for statistical analysis of the acceptance of open science. The primary focus was on the timely evolution of open science by cluster, which turned out to be not feasible.

WP3 uses the services of WP6 (Networking, Dissemination & Exploitation) in order to spread publishable results to the research community and to attract project consortia for cooperation with OSCAR. The OSCAR consortium will select about 20 target projects, which agree to contribute to OSCAR within the framework of a non-disclosure agreement (NDA). Consortia will be interviewed on their experience with and expectations of open science in general, and how to implement open science in concrete projects. Practical hands-on experience will reveal opportunities and drawbacks. In addition, projects dealing with other transport modes, inter-modality and projects affecting AAT research indirectly shall be considered. WP3 will both address researchers executing these projects and administrative staff, i.e. representatives of the legal and the financial departments. Practical experience confirms – especially in medium and large organisations – the different points of view of researchers and administrative staff.

2.3.2 Step 2: Development of a preliminary code of conduct and considerations of legal constraints

WP4 mainly deals with the development of the OSCAR open science code of conduct. In this second step, we are iteratively developing the methodology and conceptual framework for the open science code of conduct as well as the open science code of conduct itself. Step 1 so far (2020-07-13) gave us insights into the level of understanding and acceptance of open science, its potential perceived conflicts with IPR within the AAT research projects. Step 1 also showed us

some important aspects of the open science community, i.e. plurality of platforms, data formats, practices, its dynamic development etc. These early outcomes are a good information base on which we can build the further development of our open science code of conduct.

One early outcome of WP4 will be an overview of the legal and contractual framework regarding open science and IPR in European AAT research projects. This overview will address rights and obligations related to open science in conjunction with aspects of IPR protection and competitiveness. Current grant agreement (GA) and CAMs deal – amongst other – with IPR protection issues. Thus, a practical implementation of open science should address those CAMs and should demonstrate compatibility of open science and conventional contracts in the project context. It shall be emphasized that the OSCAR consortium is *not* mandated to change these models. We may provide recommendations only on how open science and the open science code of conduct can be harmonised with conventional contractual practices within the European AAT research landscape. The remaining calls in Horizon 2020 and the preparation of FP9 together with the time schedule of OSCAR indicate that efforts should be spent on FP9.

The main goal of WP4 is to arrive at a short, clear and easy to use open science code of conduct for the European AAT research community. This open science code of conduct will be tailored for the implementation in European AAT research projects by addressing the specific requirements of the AAT field.

In **WP2** we systematically analysed current CAMs regarding their compatibility with open science. Our analysis showed that CAMs are indeed compatible with open science. For more information on this analysis, please see the deliverable D2.3.

We are developing the first open science of conduct we know of. Our code of conduct aims to be short, clear and easy to use with all European AAT research projects. Our code of conduct should help researchers and engineers to integrate open science in their daily work. We will develop recommendations and guidelines on how to implement open science where it makes sense.

2.3.3 Step 3: Demonstration & validation

WP5 dealing with **Demonstration and Validation of the OSCAR open science code of conduct in Pilot Projects** is closely interacting with WP4 in order to feedback first experiences with interim WP4 results gathered in pilot projects. The iterative process will start with H2020 projects running at that time in which the application of the draft open science code of conduct will be simulated. We want to answer the questions: Which impact of both the deliberation on the legal framework and on the code of conduct will be expected? Which suggestions will seem to be acceptable, which objections – be it regarding contractual aspects or regarding practical application – will come up? WP5 provides these answers to WP4 in order to develop more mature versions of the code of conduct and of a set of recommendations for future CAMs. Once the partners agree on an acceptable level of maturity, OSCAR aims at a test implementation in at least one suitable project, ideally in one of each category of RIA, IA, CSA. To achieve this ambitious goal the support of the European Commission will likely be needed, i.e. to identify such project(s) at an early stage of preparation.

2.4 Objectives and tasks of OSCAR WP4, legal and contractual constraints and the OSCAR code of conduct

The focus of WP4 is the development of the OSCAR open science code of conduct for the European AAT research projects and its implementation into legal frameworks in the EU project landscape. WP4 consists of 5 Tasks and corresponding deliverables.

2.4.1 T4.1 Analysis of WP2 and WP3 results to identify state of the art, challenges, legal and contractual constraints and opportunities for implementing Open Science in AAT research (TL Fraunhofer IRB, M6 – M10)

In work packages WP2 and WP3 preliminary information on existing practices of and opinions on the application of open science in the European AAT research was systematically collected. In this task T4.1, we analysed the results of WP2 and WP3 as of 2020-07-13 with focus on the following aspects:

- Legal and contractual constraints for implementing open science in European AAT research landscape;
- Challenges for implementing open science in the European AAT research landscape;
- Opportunities for implementing open science in European AAT research landscape.

Based on the results of the analysis done in this task we derived measures to (a) implement open science in in the European AAT research landscape in general and (b) tailor the development of the open science code of conduct in particular.

Deliverable D4.1 aggregates the results of D2.1, D2.3, D3.1 and D3.2 and derives key challenges, key opportunities as well as key actions for the implementation of open science in general and the open science code of conduct in particular.

The analysis performed in D4.1 supports and informs the roadmap delivered with D4.2. The task T4.1 and the corresponding deliverable D4.1 strongly depended on the results of WP2 and WP3. The results from WP2 and WP3 were available later than planned. For more information on the delays, please see the documents of WP2 and WP3. Due to these delays, our activities in task T4.1 took place not only from month 6 to month 10 as planned but from month 6 to month 19. Because of these delays, the Deliverables D4.1 could also only be completed with a delay. Please see section 5 *Quality* for more information.

We elaborate on the results of this task T4.1 in the respective deliverable at hand D4.1.

2.4.2 T4.2 Methodology & framework for the OSCAR code of conduct (TL Fraunhofer IRB, M8 – M11)

Based on

1. the analysis from T4.1,
2. the roadmapping workshop in Paris in November 2019 with ONERA, SAFRAN on the legal and contractual constraints and opportunities and
3. on a literature research on the theory and development of codes of conduct

we developed a road map and conceptual framework for the OSCAR open science code of conduct. This roadmap includes a detailed work breakdown structure, a Gantt chart and a maintenance and update pattern for the code of conduct (see D4.2).

The finalisation of deliverable D4.2 depended on the finalisation of deliverable D4.1 that was delayed due to delays in WP2 and WP3. Please see section 2.4.1 *Analysis of WP2 and WP3* above and section 5 *Quality*.

An early initial draft version of the code of conduct was created by December 2019. This early draft of the code of conduct was given to the whole OSCAR consortium to give feedback and improve it.

The results of this task will be delivered with deliverable *D4.2: Roadmap to Code of Conduct (including maintenance workflow).*

2.4.3 T4.3 Iterative preparation of the OSCAR Code of Conduct and simulated application in pilot cases (TL Fraunhofer IRB, M12 – M18)

Based on T4.1 and T4.2 the first version of the code of conduct will be available at the end of July 2020. We understand this code of conduct as a living document and this first version will be continuously and iteratively improved in the further course of the project together with all project partners. We will incorporate new information and insights that we generate during the project into the new versions of the code of conduct. The development of additional information material will be considered, such as:

- Specifics of knowledge generation and research projects in the AAT sector;
- Development of auxiliary information to enable the AAT community to implement open science and its advantages (like faster innovation cycles) in their research projects;
- User stories regarding potential implementation patterns of open science in the AAT sector and
- Fact sheets on the relation of IP and responsible research innovation (RRI) and open science.

We plan to test the applicability of the open science code of conduct to selected pilot case projects. The simulation process envisaged consists of adapting existing documents stemming from the project context on a trial basis so that they contain or reference the open science code of conduct. Alternatively, we will obtain the relevant information via a short survey. We use the findings from this short simulation to further optimise the code of conduct.

The final version of the code of conduct, which will be available towards the end of the project, will be a hardened and tailored open science code of conduct that is short, clear and easy to use.

To communicate the open science code of conduct appropriate measurement like input to the general communication strategy and a dissemination plan (see WP6) will be developed in close cooperation with activities in WP5 and WP6.

Some early results of this task will be delivered with deliverable *D4.3: First version of the Oscar Code of Conduct*.

2.4.4 T4.4 Preliminary integration of the OSCAR Code of Conduct in established Consortium Agreement models (TL Fraunhofer IRB, M14 – M16)

Consortium agreements (CAs) are legally binding contracts that are essential in all European projects. These documents regulate the mutual work and exchange between the project partners with focus on confidentiality, protection of background and foreground IP in a given project. CAs concretize the more generic rules of the respective GA. WP4.4 exemplary demonstrates how CA models may take the code of conduct into account grant agreement. Consortium agreement models (CAMs) are contract templates that a project consortium can use to simplify the contract preparation.

At the time the OSCAR project proposal was written, it was planned to incorporate the open science code of conduct into existing CAMs. Initially the following two subtask were planned:

- ST4.4.1 Selection of pilot cases (RIA, IA, CSA): Here adequate pilot case agreement models should have been selected by comprehensible criteria.
- ST4.4.2 draft modification of CA models: The CAs should have been modified. The adopted agreement models should have been tested and reviewed by members of the forum.

However, during the project, this idea quickly proved to be politically and organizationally unfeasible. Therefore, we had come up with an alternative approach. We are now developing additional information materials like fact sheets, FAQ, etc. that can be incorporated into our general communication strategy to promote and disseminate our code of conduct in the ATT community (see WP6). This approach is feasible and much more effective.

The results of this task will be delivered with deliverable *D4.4: Modified Consortium Agreement Models.* Please note that the title may change due to the above mentioned necessary shift in content.

2.4.5 T4.5 Finalization of the OSCAR Code of Conduct V.1.0 and the modified Consortium Agreement models on basis of WP5 results (TL INCAS, M24 – M28)

By incorporating the feedback and insights from all the other activities within the OSCAR project including legal advice and consultation by experts outside of OSCAR, the final version of the open science code of conduct will be prepared by the IRB. Our code of conduct will then be communicated and disseminated according to our general communication strategy developed in WP6.

The results of this task will be delivered with deliverable *D4.5: Final version of the Oscar Code of Conduct.*

The result of D4.3 is the first pilot case version of the open science code of conduct for the AAT research sector. The pilot case version is one precondition for the WP5. In addition, the D4.3 includes the simulated application of the code of conduct in a running EU project.

The result of D4.5 represents the main objective of the work package to provide an applicable open science code of conduct for future European research projects in the AAT sector.

2.5 Relevance and contribution of the deliverable to the objectives of OSCAR

The OSCAR project aims (a) *to research the current state of open science in the European aeronautics and air transport (AAT)* research landscape and (b) to implement open science into the European AAT research landscape. To reach the second goal of the OSCAR project we aim to achieve the following two things. First, to develop an open science code of conduct for the European AAT research landscape. Second, we want to harmonise the main topics of this open science code of conduct not only with the consortium agreement models (CAMs) used in this field but also with other current contractual practices in the AAT field. We received considerable insights into the possible ways on how to harmonise our code of conduct with current practices in the AAT field via the deliverable D4.1.

This deliverable contains a roadmap for the development of a code of conduct, leading to a code of conduct that is as consistent as possible with the current practices of the AAT community.

The current deliverable D4.2 and the corresponding tasks and activities are an important step towards the main objective of the OSCAR project, i.e., developing an open science code of conduct and implementing it into the current landscape of the European AAT research. To achieve this main goal, we need to have a clear understanding on how we want to arrive at a reasonable and maintainable open science code of conduct. The current deliverable lays out the roadmap for *developing, deploying and maintaining an open science code of conduct*. The roadmap for the open science code of conduct makes the necessary steps and key objectives clear.

3 Approach and procedure

3.1 Work performed

3.1.1 Early development of the roadmap

Right at the beginning of the project, an initial roadmap was developed, based on the information available up to that point. The development of the open science code of conduct is the core of workpackage 4 (WP4). Therefore, we developed our initial roadmap mainly in line with WP4 and early on. The largest part of the roadmap including a detailed work breakdown structure was ready in May 2019. All files belonging to this roadmap can be viewed in the attachment (zip file) to this deliverable.

3.1.2 Disclaimer

Please note that the dates and time spans given in this report reflect *only the estimated dates as we planned them at that time in early 2019* at the beginning of the project and *not* necessarily the dates as they actually occurred in the course of the project so far (200-07-22). The time spans and dates given in this report may not reflect the actual time spans, dates. The originally planned time spans and deadlines naturally shift in the course of the project and we continually adapt them to the realities of the project.

The current status of the deliverables, tasks and work performed as described in the deliverable at hand refers to the date of 2020-07-22.

Please note that in our planning we have gone beyond the project proposal at some points (see for example the additional internal tasks and contributions we proposed) to fine-tune our mutual work and activities. Some of those initially planned task (as in the project proposal), activities or additional internal tasks or contributions were substituted in favour of other more effective interactions or due to redundancies were even dropped completely..

The basic structure of our roadmap naturally remains valid regardless of specific dates.

3.1.3 Work packages and time plan for developing the open science code of conduct

We developed a comprehensive time plan (schedule), a Gantt chart for the development of the code of conduct. The full list can be seen in Figure 1, 2 and 3. The corresponding files can be found in the zip file in the attachment of this deliverable. The development of our open science code of conduct has the following three phases:

1. The **alpha** phase,
2. The **beta** phase and
3. The **release** phase.

All three phases can be seen in detail in Figure 4 and 5. In the alpha phase of the development of the open science code of conduct, a first prototype will be created. In addition, this prototype will be used to test the compatibility of the open science code of conduct with the existing consortium agreement models. Further additions to the code of conduct will be made if necessary.

In the beta phase we harmonise our code of conduct with the existing CAMs as well as with the feedback from the consortium and adapt the code of conduct accordingly and incrementally.

In the release phase we will correct critical issues and errors and finalise the code of conduct so that it can be released to the public. The Gantt chart can be seen in Figure 4 and 5.

ID	THEMA	BEGINN	ENDTERMIN	ZUGEWIESEN AN
47	WP4, Legal and contractual constraints and the OSCAR Code of Conduct	28.06.2019	01.04.2021	IRB
59	Alpha phase	28.06.2019	04.05.2020	IRB
73	T4.1, Analysis of WP2 and WP3, legal challenges and opportunities of i...	28.06.2019	01.10.2019	IRB
77	IRB performs initial analysis of WP2 and WP3	28.06.2019	28.06.2019	IRB
76	IRB delivers questionnaire to EASN-TIS	01.07.2019	01.07.2019	IRB
79	ONERA delivers report on identified national and European partners...	01.08.2019	01.08.2019	ONERA
78	IRB organises conference call; EASN-TIS provides answers to the qu...	01.08.2019	01.08.2019	IRB
80	IRB organises workshop for ONERA and SAFRAN; ONERA and SAF...	27.09.2019	27.09.2019	IRB
81	IRB delivers analysis of survey results of WP2 and WP3 (D4.1)	01.10.2019	01.10.2019	IRB
72	T4.2, Framework for Code of Conduct	28.09.2019	29.11.2019	IRB
82	IRB delivers questionnaire to EASN-TIS	28.09.2019	28.09.2019	IRB
83	IRB organises conference call; EASN-TIS provides answers to the qu...	29.09.2019	29.09.2019	IRB
107	IRB delivers the Roadmap to Code of Conduct to OAB and OAB and ...	04.11.2019	04.11.2019	IRB

Figure 1: Gantt chart overview part 1

85	OAB delivers a review of the Roadmap to Code of Conduct to IRB	29.11.2019	29.11.2019	OAB
106	ONERA delivers review of the Roadmap to Code of Conduct to IRB	29.11.2019	29.11.2019	ONERA
114	T4.4, Integration the Code of Conduct draft into the Consortium Agree...	02.12.2019	04.05.2020	IRB
115	ST4.4.1, Selection of pilot case Consortium Agreement Models (IRB)	02.12.2019	03.02.2020	IRB
125	EASN-TIS delivers commented list of 10 pilot case Consortium A...	02.12.2019	02.12.2019	EASN-TIS
117	IRB delivers selection of 3 pilot case Consortium Agreement Mod...	03.02.2020	03.02.2020	IRB
116	ST4.4.2, Modification of pilot case Consortium Agreement Models (I...	02.03.2020	04.05.2020	IRB
119	IRB delivers testing integration of the Code of Conduct into the 3...	02.03.2020	02.03.2020	IRB
124	SAFRAN delivers review of the testing integration of the Code of...	30.03.2020	30.03.2020	IRB
120	IRB delivers preliminary integration of the Code of Conduct draft ...	04.05.2020	04.05.2020	IRB
50	T4.3, Iterative implementation, Code of Conduct, simulated application i...	02.12.2019	04.05.2020	IRB
86	IRB delivers draft of the Code of Conduct to OAB	02.12.2019	02.12.2019	IRB
87	OAB review of the draft of the Code of Conduct to IRB	13.01.2020	13.01.2020	OAB
89	IRB delivers first version of the Code of Conduct to ONERA and SAF...	01.04.2020	01.04.2020	IRB
95	ONERA delivers review of the first version of the Code of Conduct t...	04.05.2020	04.05.2020	ONERA
60	Beta phase	02.06.2020	27.01.2021	IRB

Figure 2: Gantt chart overview part 2

54	IT4.1, Incremental adaption of the Consortium Agreement Models	02.06.2020	02.11.2020	IRB
96	SAFRAN delivers preliminary report on the assessment of the RIA, I...	02.06.2020	02.06.2020	SAFRAN
97	SAFRAN delivers interim report on the assessment of the RIA, IA, CS...	03.08.2020	03.08.2020	SAFRAN
121	IRB delivers pre-final of the modified Consortium Agreement Models...	01.09.2020	01.09.2020	IRB
123	SAFRAN delivers review of the pre-final modified Consortium Agree...	01.10.2020	01.10.2020	SAFRAN
102	IRB delivers modified Consortium Agreement Models to EASN-TIS (...	02.11.2020	02.11.2020	IRB
55	IT4.2, Incremental adaption of the Code of Conduct	30.09.2020	27.01.2021	IRB
122	IRB delivers interim version of the Code of Conduct to SAFRAN	30.09.2020	30.09.2020	IRB
99	SAFRAN delivers recommendations for modifications in the develop...	01.10.2020	01.10.2020	SAFRAN
100	IRB delivers pre-final Code of Conduct to INCAS	27.01.2021	27.01.2021	IRB
74	Release phase	10.02.2021	01.04.2021	IRB
75	T4.5, Finalisation of Code of Conduct (INCAS)	10.02.2021	01.04.2021	IRB
101	INCAS delivers improvements of the pre-final Code of Conduct to IR...	10.02.2021	10.02.2021	INCAS
104	IRB organises workshop on our main results and key insights for ON...	10.02.2021	10.02.2021	IRB
103	IRB and INCAS delivers final version of the OSCAR Code of Conduct...	01.04.2021	01.04.2021	IRB
57	M4.1, Final version of the OSCAR Code of Conduct, IRB	01.04.2021	01.04.2021	IRB

Figure 3: Gantt chart overview part 3

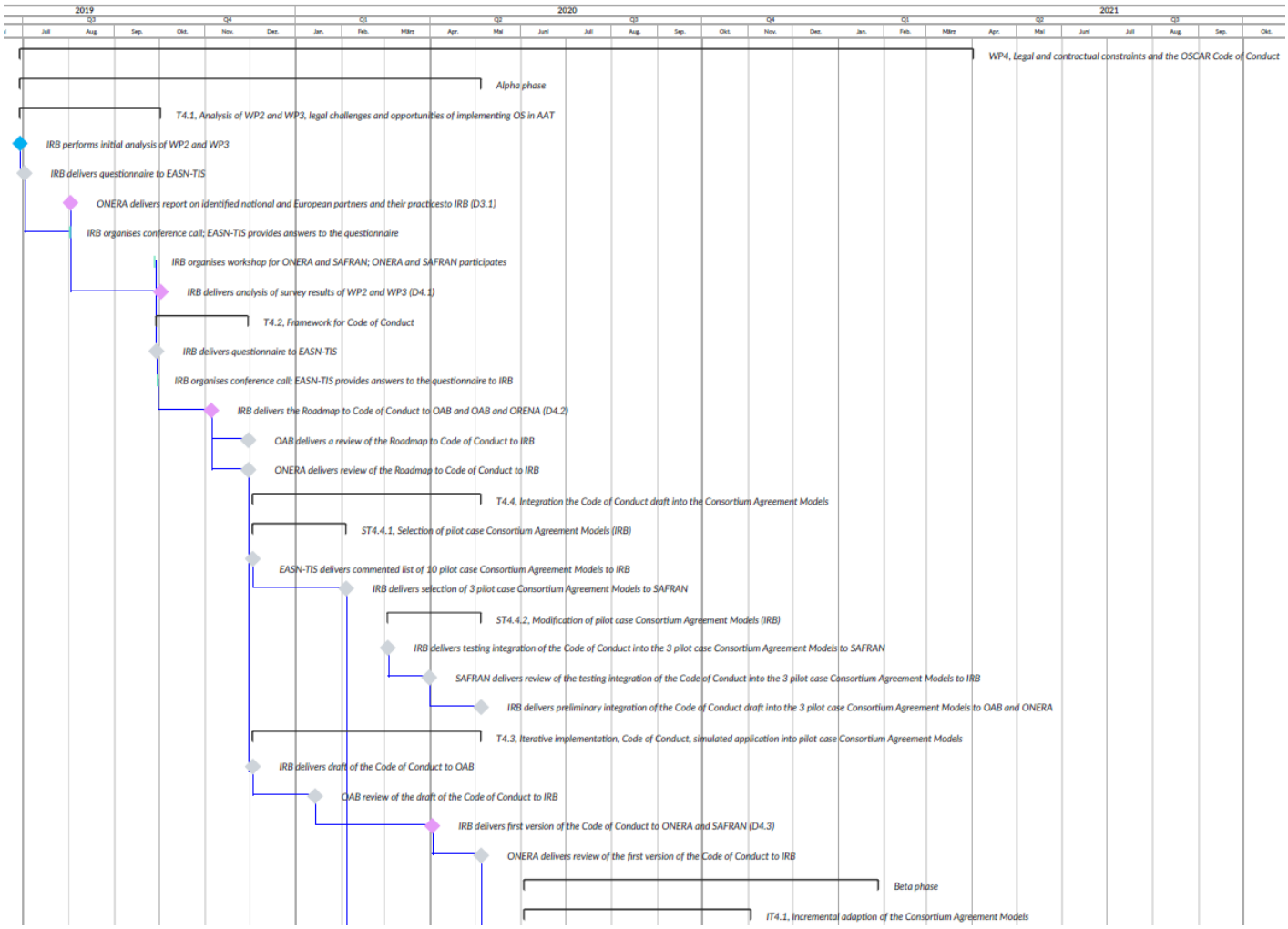

Figure 4 Gantt chart, code of conduct, alpha phase

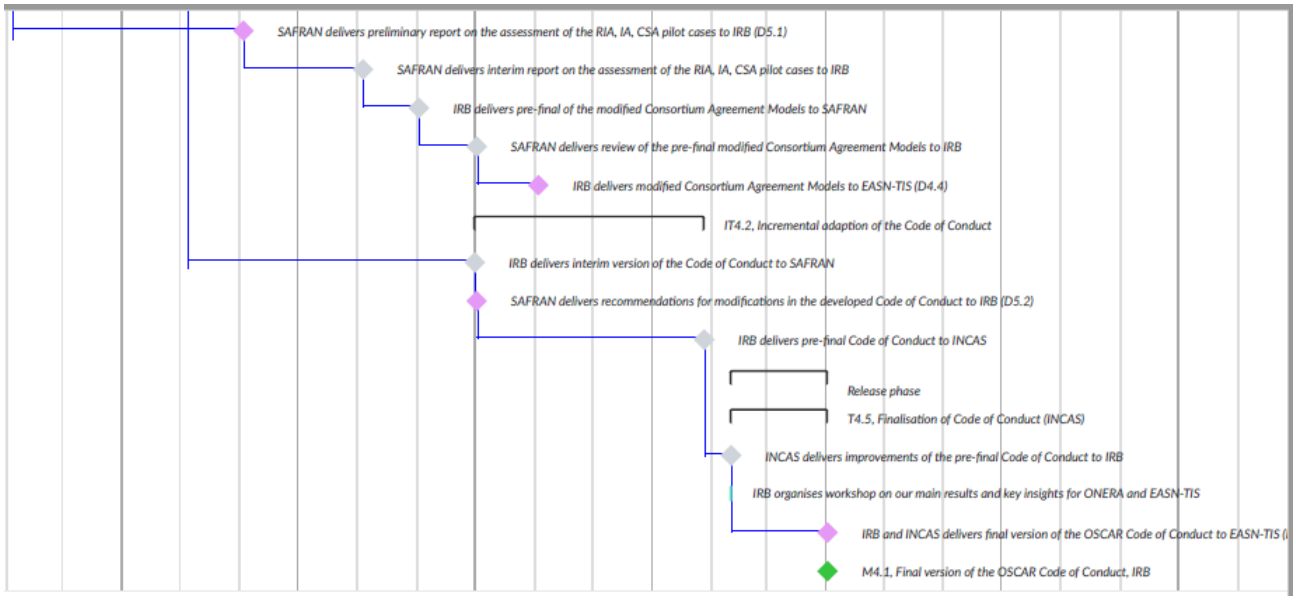

Figure 5: Gantt chart, code of conduct, beta and release phase

3.1.4 Milestone

In WP4 we have the following milestone:

M4.1: Final version of the OSCAR Code of Conduct, Month 28

4 Results

4.1 Tasks, subtasks and critical paths

In this section, we describe the necessary interactions between the partners and the critical path of the individual tasks. Some of the more fine-grained tasks subtask or internal tasks are not foreseen in the proposal however, IRB has proposed them as additional important commitments and contributions.

4.1.1 T4.1 Analysis of WP2 and WP3 results to identify state of the Art, challenges, legal and contractual constraints and opportunities for implementing Open Science in AAT research (TL Fraunhofer IRB, M6 – M10)

Precondition: The results of the survey in (WP2) and the forum (WP3) are available. WP2 and WP3 deliver comprehensive information on existing practices and expectations for the application of Open Science principles in aeronautical research in Europe. We will especially use the knowledge gained by D2.3 of WP2.

In task T4.1, we will analyze these results of WP2 and WP3.

The interactions 76 and 78 were dropped in favour of the workshop with IRB, ONERA and SAFRAN as described in section *4 Roadmapping workshop on the legal constraints of a code of conduct.*

T4.1					
ID	**Action Flow**	**Assignment**	**Type**	**Date**	**Status (2020-07-22)**
77	IRB performs initial analysis of WP2 and WP3	IRB	Internal Milestone	28.06.2019	Postponed, July 2020
76	IRB delivers questionnaire on the AAT landscape to EASN-TIS	IRB	Contribution	01.07.2019	Dropped in favour of workshop, see ID 80
78	IRB organises conference call; EASN-TIS provides answers to the questionnaire on the AAT landscape	IRB	Event	01.08.2019	Dropped in favour of workshop, see ID 80
79	ONERA delivers report on identified national and European partners and their practices to IRB (D3.1)	ONERA	Deliverable	01.08.2019	Pending
80	IRB organises workshop for ONERA and SAFRAN; ONERA and SAFRAN participates	IRB	Event	27.09.2019	Took place in November 2019
81	IRB delivers analysis of survey results of WP2 and WP3 (D4.1)	IRB	Deliverable	01.10.2019	Will be delivered till the end of July 2020

4.1.2 T4.2 Methodology & framework for the OSCAR Code of Conduct (TL Fraunhofer IRB, M8 – M11)

In task T4.2, we will perform preliminary and conceptual tasks concerning the methodology and framework for the code of conduct.

The interactions 82 and 83 were dropped in favour of the workshop with IRB, ONERA and SAFRAN as described in section *4 Roadmapping workshop on the legal constraints of a code of conduct.*

			T4.2		
ID	**Action Flow**	**Assignment**	**Type**	**Date**	**Status (2020-07-22)**
82	IRB delivers questionnaire on the proposed Code of Conduct framework to EASN-TIS	IRB	Contribution	28.09.2019	Dropped in favour of workshop, see 80
83	IRB organises conference call; EASN-TIS provides answers to the questionnaire on the proposed Code of Conduct framework to IRB	IRB	Contribution	29.09.2019	Dropped in favour of workshop, see 80
107	IRB delivers the Roadmap to Code of Conduct to consortium and consortium (D4.2)	IRB	Deliverable	04.11.2019	Postponed to end of July 2020 because it depended on D4.1 which depended on deliverables D2.1, D2.3, D3.2 which could not be deliver in time
85	Consortium delivers a review of the Roadmap to Code of Conduct to IRB	OAB	Contribution	29.11.2019	Workaround: we use the entire consortium to give feedback
106	ONERA delivers review of the Roadmap to Code of Conduct to IRB	ONERA	Contribution	29.11.2019	We use the entire consortium to give feedback

4.1.3 T4.3 Iterative preparation of the OSCAR Code of Conduct and simulated application in pilot cases (TL Fraunhofer IRB, M12 – M18)

Based on the results, insights and feedback of all activities, we will develop the Code of Conduct incrementally. In this task, we rely on the contributions of and the mutual exchange with our partners, especially SAFRAN.

Please note that T4.3 changed considerably. For the changes and the new approach, please see section 2.4.3.

Instead of using confidential project documents and contracts, IRB will now use documents from the context of European AAT research projects and/or information obtained by a short survey, to optimize the open science code of conduct.

The adopted documents (if any) and/or the results from the short survey will be incorporated into the current code of conduct until the end of 2020.

In the following, we list the originally planned and now replaced tasks, contributions and deliverables for documentation purposes only.

In task T4.3 the following aspect will be taken into consideration:

1. Specialties of knowledge generation in the AAT sector regarding the realization of Open Science.
2. Development of auxiliary information to enable the collaboration partners to identify, value and reuse open research results (publications, data and software) to increase the knowledge/technology transfer into AAT innovation processes.
3. Development of scenarios regarding the exploitation of the research results for the questions: When does it make sense to open or to protect the results or even to combine the two concepts to take full advantage of their economic potential and to maximize their impact on science, economy and, where applicable, on politics and society.

For approval, we will consult the OSCAR Advisory Board. After testing and adoption, the approval of a pilot case version of the Oscar COC takes place.

T4.3					
ID	**Action Flow**	**Assignment**	**Type**	**Date**	**Status (2020-07-22)**
86	IRB delivers draft of the Code of Conduct to the project consortium	IRB	Contribution	02.12.2019	Delivered in time (December 2019)
87	Consortium review of the draft of the Code of Conduct to IRB	OAB	Contribution	13.01.2020	Internal feedback workshop took place on 2020-07-08
89	IRB delivers first version of the Code of Conduct to consortium (D4.3)	IRB	Deliverable	01.04.2020	Will be delivered till the end of July 2020
95	Consortium reviews of the first version of the Code of Conduct to IRB	ONERA	Contribution	04.05.2020	Postponed, end of September 2020

4.1.4 T4.4 Preliminary integration of the OSCAR Code of Conduct in established Consortium Agreement models (TL Fraunhofer IRB, M14 – M16)

In task T4.4 we initially planned to provisionally integrate the Code of Conduct into selected, existing Consortium Agreement Models. Please note that T4.4 changed considerably.

IRB will now develop additional information materials and inputs to our general communication and dissemination strategy (see WP6) like fact sheets, FAQ, templates etc.

Those information materials will be developed continuously and iteratively in close cooperation with THELSYS and SAFRAN. The first versions will be available at the end of 2020. The final versions will be available in the last months of the project.

In the following, we list the originally planned and now replaced tasks, contributions and deliverables for documentation purposes only. For a detailed list of the changes and the new approach, please see section 2.4.4.

ST4.4.1 Selection of pilot cases (RIA, IA, CSA)

In subtask ST4.4.1, we will select adequate pilot case Consortium Agreement Models by comprehensible criteria. In this task, we rely on the contribution of and the mutual exchange with EASN-TIS.

ST4.4.2 Draft modification of CA models

In subtask ST4.4.2, we will improve the Code of Conduct according to the feedback. In this task, we rely on the contribution of and the mutual exchange with all of our partners.

The interaction of 117 has changed so that not IRB alone but the entire consortium will perform the search and selection of pilot cases.

		T4.4			
ID	**Action Flow**	**Assignment**	**Type**	**Date**	**Status (2020-07-22)**
ST4.4.1					
125	The project consortium delivers a commented list of 10 pilot case Consortium Agreement Models to IRB	EASN-TIS	Contribution	02.12.2019	discarded
117	IRB delivers selection of 3 pilot case Consortium Agreement Models to SAFRAN	IRB	Contribution	03.02.2020	discarded
ST4.4.2					
119	IRB delivers testing integration of the Code of Conduct into the 3 pilot case Consortium Agreement Models to SAFRAN	IRB	Contribution	02.03.2020	discarded
124	SAFRAN delivers review of the testing integration of the Code of Conduct into the 3 pilot case Consortium Agreement Models to IRB	SAFRAN	Contribution	30.03.2020	discarded
120	IRB delivers preliminary integration of the Code of Conduct draft into the 3 pilot case Consortium Agreement Models to OAB and ONERA	IRB	Contribution	04.05.2020	discarded

4.1.5 Internal Task IT4.1

To reach the deliverable D4.4 we need the specific IRB internal tasks IT4.1 and IT4.2 that bridges the tasks T4.4 and T4.5. These internal tasks are not foreseen in the proposal however, the IRB has proposed them as an additional important commitment. In these tasks IT4.1 and IT4.2, we will have feedback loops with SAFRAN. IRB will deliver the incremental versions of the documents and SAFRAN will give IRB short feedback. By doing so we can incrementally improve the Code of Conduct and the modified Consortium Agreement Models.

In this task IT4.1, we will improve the integration of the Code of Conduct into the Consortium Agreement Models.

The entire internal task IT4.1 will be substituted by a simulation of the integration of the open science code of conduct into a current consortium agreements of a current project.

IT4.1					
ID	**Action Flow**	**Assignment**	**Type**	**Date**	**Status (2020-07-22)**
96	Consortium and SAFRAN delivers preliminary report on the assessment of the RIA, IA, CSA pilot cases to IRB (D5.1)	SAFRAN	Deliverable	02.06.2020	Pending, awaiting project documents, workaround: using old documents
97	SAFRAN delivers interim report on the assessment of the RIA, IA, CSA pilot cases to IRB	SAFRAN	Contribution	03.08.2020	discarded
121	IRB delivers pre-final of the modified Consortium Agreement Models to SAFRAN	IRB	Contribution	01.09.2020	discarded
123	SAFRAN delivers review of the pre-final modified Consortium Agreement Models to IRB	SAFRAN	Contribution	01.10.2020	discarded
102	IRB delivers modified Consortium Agreement Models to EASN-TIS (D4.4)	IRB	Deliverable	02.11.2020	discarded

4.1.6 Internal Task IT4.2

To reach deliverable D4.4 we need the specific IRB internal tasks IT4.1 and IT4.2 that bridge the tasks T4.4 and T4.5. These internal tasks are not foreseen in the proposal, however, the IRB has proposed them as an additional important commitment. In these tasks IT4.1 and IT4.2, we will have feedback loops with SAFRAN. IRB will deliver the incremental versions of the documents and SAFRAN will give IRB short feedback. By doing so we can incrementally improve the Code of Conduct and the modified Consortium Agreement Models.

In the task IT4.2, we will improve the Code of Conduct.

IT4.2					
ID	**Action Flow**	**Assignment**	**Type**	**Date**	**Status (2020-07-22)**
122	IRB delivers interim version of the Code of Conduct to SAFRAN	IRB	Contribution	30.09.2020	Pending
99	SAFRAN delivers recommendations for modifications in the developed Code of Conduct to IRB (D5.2)	SAFRAN	Deliverable	01.10.2020	SAFRAN is our legal expert and important for this task
100	IRB delivers pre-final Code of Conduct to INCAS	IRB	Contribution	27.01.2021	IRB will perform this task alone

4.1.7 T4.5 Finalization of the OSCAR Code of Conduct V.1.0 and the modified Consortium Agreement models on basis of WP5 results (TL INCAS, M24 – M28)

In task T4.5, we will incorporate the knowledge we gained from the testing of the Consortium Agreement Models and the feedback from the Advisory Board. We will develop the final version of the Code of Conduct.

T4.5					
ID	**Action Flow**	**Assignment**	**Type**	**Date**	**Status (2020-07-22)**
104	IRB organises workshop on our main results and key insights for ONERA and EASN-TIS	IRB	Event	10.02.2021	Pending
101	INCAS delivers improvements of the pre-final Code of Conduct to IRB	INCAS	Contribution	10.02.2021	Pending, IRB will perform this task alone
103	IRB and INCAS delivers final version of the OSCAR Code of Conduct to EASN-TIS (D4.5)	IRB	Deliverable	01.04.2021	Pending
57	M4.1, Final version of the OSCAR Code of Conduct, IRB	IRB	Contribution	01.04.2021	Pending

4.2 Key findings for the development of our open science code of conduct

The European aeronautic and air transport (AAT) research landscape is rather complex. Yet, we managed to develop a useful overview map of different networks, events and stakeholder in the AAT field (D2.1). This overview will help us communicate our code of conduct.

The analysis of the five commonly used CAMs in the European AAT research landscape, performed in D2.3, showed that *open science and its underlying conceptual framework is indeed compatible with the currently used CAMs*. Furthermore, this analysis has also shown us that there are a few promising candidate categories of open science, which in our code of conduct are expected to work well with the current AAT contract practice. Those promising categories of open science are:

1. Open source software,
2. Open data,
3. Copyright and licensing,
4. Intellectual property and
5. Ethics and responsibility.

Interestingly, digitalisation, a key driver of open science and also a key driver of modern research seems not to be relevant in the analysed CAMs. This could be a blind spot of the European AAT community and we should address this issue, because it is a very important megatrend. In

addition, and in agreement with our other results, deliverable D3.1 showed that open access publications are more visible—even in the AAT sector.

The preliminary results of the AAT community surveys on open science, which are being conducted in WP2, point in a similar direction.

Currently only the one of the many categories of open science is directly addressed in the Grant Agreement Model (GAM) namely the subcategory open access. Hence, we came to the conclusion that open science should not only be fostered in the context of CAM development, but also in the Rules of Participation (RfP) and the GAM, on which the CAMs are based. This means that we have to work closely together with the European Commission and similar policy makers in the AAT community.

In general, with the insights of the analysis of our results so far (see deliverable D4.1) we can directly derive the following four main elements for our roadmap:

- We need additional information materials on open science tailored especially to the AAT community;
- Our code of conduct needs to be short, easy to apply and should come in the style of a opt-in, opt-out or hybrid model;
- Our code of conduct should embrace current best practices and already used concepts within the open science as well as the AAT community;
- Extension of the communication activities, to create incentives and clear rules (see also Méndez (2019)) in close cooperation with the European Commission and the leaders of WP5 and WP6.

For an in-depth analysis of our results so far as well as the conclusions and implications drawn from those results, please consult the deliverable D4.1 *Analysis of WP2 and WP3.*

4.3 Maintenance workflow and update pattern

Based on the results of deliverable D4.1 we derived the following maintenance workflow for an open science code of conduct (see Figure 6). The maintenance workflow and update pattern we developed consists of six interconnected steps. In the first step, we release a current version of the open science code of conduct. This stable version of the code of conduct will be updated with new legal contents from the EU commission. In the next step, we integrate the new legal contents into the code of conduct. The updated code of conduct will then be approved by a legal review board. If there are improvements or additional requirements by the legal board, we will integrate those improvements into the code of conduct. In the next step, we will freeze the code of conduct for final release and fix only critical issues. When all critical issues are fixed, we will release the next version of the open science code of conduct.

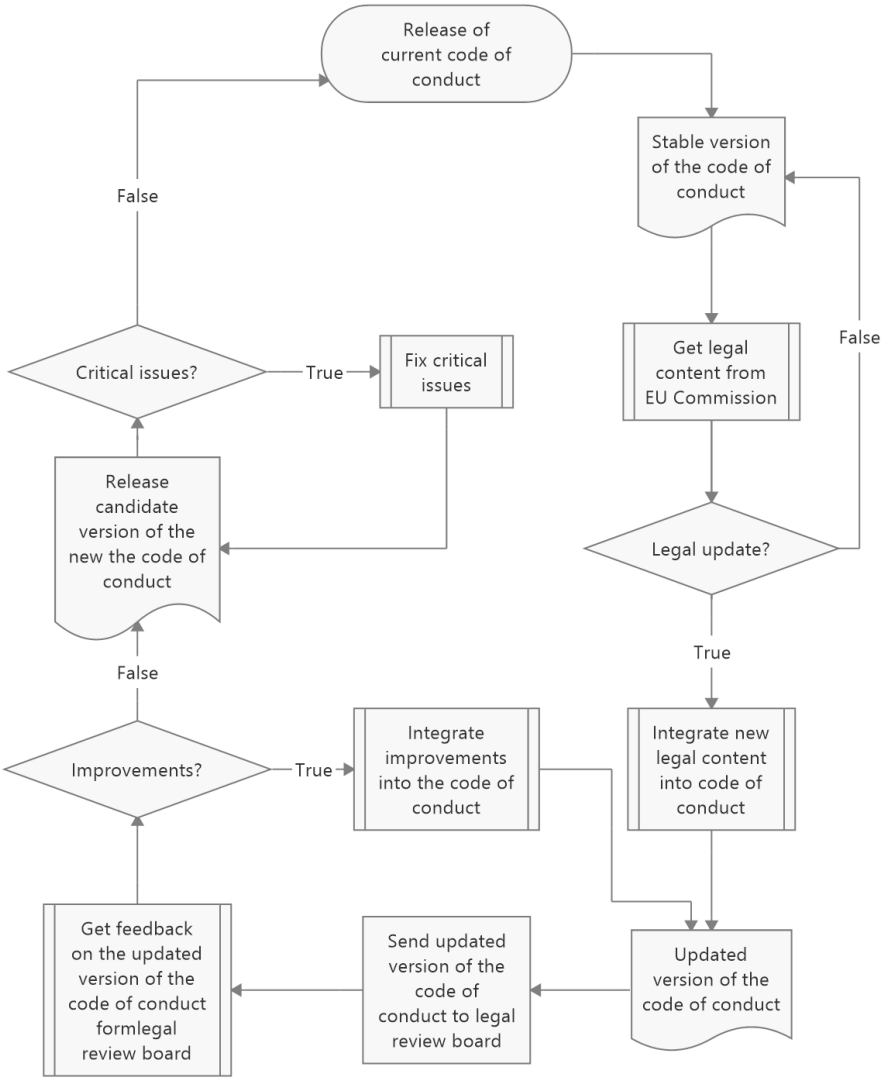

Figure 6: Open science code of conduct maintenance workflow and update pattern

5 Quality

5.1 Comparison of planned activities and performed work

Right at the beginning of the project, we developed a detailed roadmap for the development of our open science code of conduct. The largest part of the roadmap including a detailed work breakdown structure was ready in May 2019.

However, the activities for the development of D4.2 did not proceed according to our plan, because it partly depended on the results of deliverable D4.1. Deliverable D4.1 in turn depended directly and critically on the results from WP2 and WP3, in particular, on the deliverables D2.1, D2.3, D3.1 and D3.2. However, the results form WP2 and WP3 were delayed mainly due to the ongoing COVID-19 pandemic, but also unforeseen complexity of the contents and the resulting internal project coordination overhead. The work packages, tasks, deliverables, their distribution to the project partners and their chronological sequence described in the OSCAR project proposal naturally only represent estimates at the project start. Adjustments and/or delays during the course of large projects like the OSCAR project can occur. During the course of the OSCAR project, unforeseeable changes in the planned work occurred despite the greatest care, due to changing demands and intermediate results. Those adjustments were ipso facto accompanied by a previously unforeseeable additional expenditure (overhead) not only in terms of content, but also in terms of project communication and project management. Adjustments to the content during the project period required additional new project coordination and project management, because the entire consortium and the individual partners had to reach new agreements and have to coordinate their new efforts.

For detailed information on the reasons of the individual delays of the different deliverables D2.1, D3.1, D3.2 and D4.1 please see the respective individual deliverables.

5.1.1 Limits of the approach

The legal and contractual structures and frameworks in the European project context was easy to grasp, as they are well documented. However, it turns out to be very difficult to gain insights into the contractual regulations of other European AAT projects. Furthermore, the lack of concrete insight into the actual contractual framework of other AAT project limits the ways in which the open science code of conduct could be integrated into the existing landscape.

5.2 Quality of the results

The quality of the results depended on the results in deliverable D4.2. However, we believe that the insight gained in the deliverable at hand are more than sufficient to continue working on the following tasks.

The roadmap we developed in task T4.2 and present in the deliverable D4.2 is an excellent information base on which we can make well-informed decisions and strategically optimize our project.

6 Conclusions

Based on the results of the deliverable D4.1, and based on the results of the roadmapping workshop on the legal constraints in Paris in November 2019 with IRB, ONERA and SAFRAN (see D4.1) we were able to develop a solid roadmap for our open science code of conduct.

The key elements of our roadmap are:

1. **Lessons learned**: We will identify and incorporate lessons learned by other code of conduct projects.
2. **Best practices**: We will identify and commit to best practices using de facto standards of existing code of conduct projects.
3. **Maintenance workflow**: We will integrate our code of conduct development and maintenance workflow with the existing workflows of the European Commission.
4. **Opt-in, opt-out model**: We will develop an additional framework for clean, simple, flexible opt-in, opt-out models for integrating open science in AAT projects.
5. **Communication strategy**: We will develop inputs to our general communication strategies with close cooperation of the work package leaders of WP5 and WP6 that take into account the specific modalities of the European Commission and the main stakeholders in the European AAT research landscape.
6. **Additional information material**: We will develop additional information materials like fact sheets and templates to guide the AAT community and address their fears and pain points.

The roadmap at hand gives us clear, comprehensive and precise steps toward the main goal of OSCAR: *to develop an open science code of conduct, that can be integrated with ease into the European AAT research landscape*.

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