E.02.23 D0.11 - ALIAS II - Final Report

Document information	
Project Title	ALIAS II
Project Number	E.02.23
Project Manager	Deep Blue
Deliverable Name	D0.11 - ALIAS II - Final Report
Deliverable ID	D0.11
Edition	00.02.01
Template Version	03.00.00
Task contributors	
Deep Blue; European University Institute (EUI)	

Abstract

The final report of the ALIAS II project provides a publishable summary of the results. In addition, it lists all deliverables, dissemination activities, eligible costs, bills and lessons learned.

Authoring & Approval

Prepared By - *Authors of the document.*		
Name & Company	Position & Title	Date
▮▮▮▮▮ / Deep Blue	Project Manager	27/06/2016
▮▮▮▮▮ / Deep Blue	Task leader	27/06/2016
▮▮▮▮▮ / EUI	Task contributor	27/06/2016
Reviewed By – *Reviewers internal to the project.*		
Name & Company	Position & Title	Date
▮▮▮▮▮ / EUI	Task contributor	07/07/2016

Reviewed By – *Other SESAR projects, Airspace Users, staff association, military, Industrial Support, other organisations.*		
Name & Company	Position & Title	Date
<Name / Company>	<Position / Title>	<DD/MM/YYYY>
<Name / Company>	<Position / Title>	<DD/MM/YYYY>

Approved for submission to the SJU By – *Representatives of the company involved in the project.*		
Name & Company	Position & Title	Date
<Name / Company>	<Position / Title>	<DD/MM/YYYY>

Rejected By – *Representatives of the company involved in the project.*		
Name & Company	Position & Title	Date
<Name / Company>	<Position / Title>	<DD/MM/YYYY>

Rational for rejection
None.

Document History

Edition	Date	Status	Author	Justification
00.00.01	01/06/2016	First Draft	▮▮▮▮▮	New Document
00.01.00	07/07/2016	Second Draft	▮▮▮▮▮	Everything consolidated, excluding the Publishable Summary, still missing
00.02.00	14/07/2016	Final	▮▮▮▮▮	Publishable Summary added
00.02.01	31/07/2016	Final	▮▮▮▮▮	Comments emerged during the Closure meeting added

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This deliverable consists of SJU Foreground.

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Publishable summary

The increasing automation foreseen for the future ATM [1][2], while augmenting capacity, safety and efficiency, will likely change the tasks of humans. Automated technologies will take charge of tasks currently carried out by human operators, and/or will make their work more dependent on data and information that someone else, including automated agents, has previously selected or approved as reliable. Such a change would demand for a critical revision on the actual human contribution to the performance of complex socio-technical systems, and consequently, on the criteria for the allocation of liability [3]. Three main questions are considered prominent in this context:

- to what extent the use of new automatic tools may shift liability for accidents from operators to technology, namely from operators to manufacturers, system designers and aviation organizations such as Air Navigation Service Providers, certificatory Agencies, etc.?
- how manufacturers, system designers, ANSP, certification bodies and other involved stakeholders may identify and mitigate the risks and issues coming from this liability shift?
- Is it possible to develop a clear methodological legal framework and tools able to address the previous questions?

The ALIAS (Addressing Liability Impact of Automated Systems) Project is based on the idea that the ways in which liabilities are attributed and distributed among the stakeholders (and their possible effects in terms of stakeholders' acceptability) have to be properly taken into account during the design process, according to a new approach that we have called "design according to liabilities" [4]. The idea is that addressing liability issues proactively (i.e. earlier in the design process) would be easier, less costly and controversial than at later stages, when the system is deployed.

The design according to liabilities entails not only a change of perspective within the user-centered design methodology, but also a new approach towards liability. Such an approach looks at liability as one of the inherent properties of an ATM system, being it likely to affect stakeholders' acceptability and constrain technological deployment, in the same way as safety and human performance.

The project is structured in two phases: the first phase, called ALIAS (2011-2013), officially initiated the research on the liability impact of automated systems. It released two products: the **Network of Legal Research in ATM** and the **Legal Case**. The second phase, called ALIAS II (2014-2016), was launched as a follow up activity to continue and implement the work done in the first phase.

ALIAS II: Objectives and milestones

The main objectives pursued by ALIAS II project are the following:

- Extend the role of The **Network of Legal Research in ATM** within SESAR, making the network a key point of reference for all those projects that deal with topics of liability attribution and legal issues in general
- **Validate and consolidate the Legal Case methodology** through test applications and expert interviews, in order to release, at the end of the project, a self-standing and ready-to-use methodology
- Develop a digital **training on the Legal Case**, in order to train and educate the European CNS/ATM Community to the use of the methodology.

Approach and Methodology

The innovative ideas behind the attribution of liabilities in highly automated socio-technical systems, as well as the definition of a Legal Case to support all the design and development phases of such systems contribute to the definition of a large audience of potential stakeholders for the project's outcomes. Following the principles of User Centred approach, the involvement of stakeholders in the evaluation and validation of the proposed methodology (the Legal Case) as well as their contribution to the definition of realistic and suitable test application has been considered as the key enabler to accomplish the objectives of the project. A Dissemination and Networking Plan was defined at the beginning of ALIAS II to provide the Consortium with criteria to identify the potential stakeholders and a common strategy and useful tools to manage all the activities involving them. In particular, the Plan identified some reference communications strands:

- The ALIAS Conference – an annual event organised by the Consortium to spread the results and involve the stakeholders;

- Online dissemination – ALIAS website, the ALIAS network (a portal to link interested professionals and to collect useful documents) and a social media strategy;

- Conferences and events – external events worth of attention and participation by the Consortium (including papers publication and participation in scientific conferences).

The involvement of potential end-users and stakeholders has been a fundamental enabler for the validation and consolidation of the Legal Case. A preliminary assessment proved the Legal Case to be at v3 level of the EOCVM model [5] based on which ALIAS II team considered that pre-operational validation could be achieved through a realistic simulation based on a complete application of the methodology. During the project a validation strategy have been defined and implemented, following two main steps:

- Test application of the legal case to two technologies;

- Consolidation interviews with external stakeholders.

Consolidated Legal Case

The technologies chosen to perform a test application of the Legal Case were ACAS X (Airborne Collision Avoidance System) and RPAS (Remotely Piloted Aircraft Systems). Two user groups of major aviation experts involved respectively in ACAS X development and RPAS integration were set up to represent possible end-users of the Legal Case results, while the Legal Case moderator was represented by the ALIAS Consortium. Two focal points supporting the Project during the test applications were selected among the major experts of respectively ACAS X and RPAS technologies. Factors that influenced the choice of these technologies included the level of maturity of the technologies under analysis, the expected impact on the liability attribution scheme of the overall ATM system, the current availability of a harmonized European legal framework, the outcome that we expected from the application of the Legal Case (in terms of legal assessment of the technology).

Experts' interviews were introduced later in the project to enlarge the amount and the quality of feedback received with the test applications. While the test applications were used to perform concrete iterative step-by-step applications of the methodology, the experts' interviews were meant to produce hypotheses and gather more general feedback on the quality of the Legal Case, especially with respect to its suitability to the ATM domain.

Validation results confirmed that the process is generally easy to use and follow. The legal design measures, which are a key output of the Legal Case analysis, were considered relevant and useful by the aviation stakeholders who participated in the validation process. Such outcome makes us confident that the Legal Case could be successfully introduced in the aviation domain. As a confirmation to the interest triggered by the Legal Case in the domain, just after the completion of the ACAS-X test application, the ALIAS team has been invited to present the methodology and the outcomes of the consolidation at a plenary meeting of the EUROCAE Working Group 75[1]. The presentation has been appreciated and further synergies with WG 75 will be possible during the exploitation of the project's outcomes.

The validation outcomes supported the identification of some concerns and related improvements, mainly linked to the usability and domain suitability of the Legal Case. The recommendations informed the consolidation of the Legal Case, through changes and updates. In the consolidated version, the ALIAS team implemented the following improvements:

- Refinement of the workflow of the Legal Case, in terms of steps and sub-steps, objectives and tasks, gates.

- Consolidation of supporting materials, namely classification and argumentation maps, supporting tables and tools.

- Integration and usability of the argument mapping software.

- Development of guidelines to integrate the Legal Case in the SESAR Business Case.

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[1] WG 75 is in charge of the definition of standards for the Airborne Collision Avoidance Systems.

The **consolidated Legal Case** methodology outlines a new process for systematically identifying and addressing liability issues in automated ATM systems. The process comprises the four steps depicted in the following figure.

Figure 1: Four steps of the consolidated Legal Case

Training and Coaching

The problem of liability attribution in complex systems, and the solution proposed by ALIAS (the Legal Case), might pose some hurdles to whom is approaching them for the first time. On one hand, the legal terminology and all the judicial reasoning behind the process may turn out to be hard to understand for ATM experts, on the other hand safety and automation aspects may be a challenge for legal experts and lawyers. The Consortium considers training and coaching activities essential enablers to reduce the knowledge gap and to ease the process of understanding the liability attribution principles in the form of the Legal Case.

An e-learning dedicated training course (3 lessons) entitled "Liability and automation in aviation" has been developed within ALIAS II and deployed on the EUROCONTROL IANS (Institute of Air Navigation Services) Training Zone, that is the e-learning portal of the Institute. The course is composed of 3 lessons, composed by 7 modules. Text, images, video and voice-over are integrated in the course, and additional material (papers, external websites) are provided. Some exercises help the user to self-assess the comprehension of the topics.

Tutoring activities might be provided in case of request by trainees as specifically concerns training content and exercises. The coaching intends to provide customized support on demand to interested users. It may be requested and provided online as well. The e-learning course, as well as the coaching service will be provided, maintained and updated for at least one year after the closure of ALIAS II project.
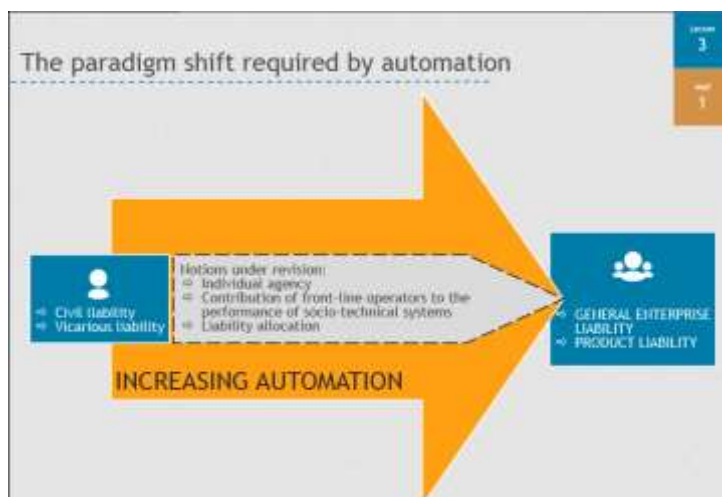
Figure 2: One frame of the e-learning

Figure 3: One exercise about the Legal Case

A pilot session conducted during the project with automation and legal experts provided the team with some feedbacks and comments, used to refine and improve some aspects and contents. A functionality to collect comments and feedbacks from the users is available on the IANS Training Zone and it will be used by the team to monitor the level of satisfaction and improve the training.

Future steps based on the outcomes of the project

Both the Network of Legal Research in ATM and the Legal Case methodology developed during the ALIAS Project are considered promising tools to investigate the challenging topics of liability aspects of new automated technologies. The interest raised by the project and by its initiatives witnesses the relevance of the topics addressed and the suitability of the means adopted.

In particular, the team is considering to further refine and extend the Legal Case. We are also considering the application of the methodology to other relevant domains (in particular transportations domains) and its extension so as to include not only liability, but a wider scope in terms of legal and regulatory concerns. We will also explore further research opportunities and funding possibilities to further develop and exploit the outcomes of ALIAS II.

The Network of Legal Research will maintain its status of a virtual community meeting online and discussing about themes of liability attribution in automated contexts. We will maintain the website for a minimum of 2 years after the termination of the project.

More information and publications available at: http://aliasnetwork.eu/ .

1 Introduction

1.1 Purpose of the document

The purpose of this document is to:

- Summarise the technical results and conclusions of the project (Publishable Summary);

- Provide a complete overview of all deliverables;

- Provide a complete overview of all dissemination and networking activities.

- Provide a complete overview of the billing status, eligible costs, planned and actual effort (incl. an explanation of the discrepancies).

- Analyse the lessons learnt at project level.

1.2 Intended readership

The document itself is intended for the Project Officer of the ALIAS II Project. Through this document, the Officer is provided with a report of the activities carried out in the project and of the achievements reached.

The publishable summary is intended for the SESAR Community, in particular for those involved in the Technical and Operational Projects of SESAR. All those developing new technological solutions based on automation may profit by the application of the Legal Case produced by the ALIAS project to explore the liability implications of their technologies.

The summary is also intended for the Transversal Projects of SESAR, involved in the development and refinement of other case-based methodologies (e.g. the Safety Case or the HP Case), as the Legal Case intends to complement those Cases and be also integrated in the Business Case.

1.3 Inputs from other projects

The Project has used input from the ALIAS project. In particular, the Legal Case methodology outlined there has been consolidated, validated and applied to some real applications during ALIAS II.

2 Technical Project Deliverables

Number	Title	Short Description	Approval status
As per latest schedule	*As per latest schedule*		*Submitted, approved or rejected*
D1.1	Network activity plan	This deliverable introduces the Network Activity Plan that will be applied during the ALIAS II project. It provides information about the communication strategy of the project, the network activities planned in the near future and the evaluation process that will be used to know if the communication strategy is achieving its aims. Due to the continuity with the ALIAS Project, network activities in ALIAS II will extend and widen their scope, serving not only to maintain the Community but also to involve it in actively supporting the Project's technical activities.	*approved*
D2.1	Plan of test applications	Strategic document that describes the objectives and organisation of the validation of the Legal Case methodology designed by the ALIAS project. The general validation plan is composed of two types of activities, test applications and interviews. The document presents the two test applications on the ACAS X and RPAS technologies, as well as the interviews. The results of the validation activities will be used as inputs for the consolidation of the Legal Case methodology.	*approved*
D4.1	Dissemination plan	This deliverable introduces the dissemination plan that will be applied during the ALIAS II project. It provides information about the dissemination strategy of the project, the dissemination actions planned in the near future and the evaluation process that will be used to know if this dissemination strategy is achieving its aims. Due to the continuity with the ALIAS Project, dissemination in ALIAS II will extend and widen its scope, serving not only to communicate the Project's outcomes but also to provide occasions for encountering relevant stakeholders to support the Project's technical activities.	*approved*
D4.2	Contribution to SIDs 2014	Paper submitted and poster published at SESAR Innovation Days 2014	*approved*
D1.2	Intermediate network activity report	This deliverable presents the ALIAS Network Activities carried out in the first half of the project, namely in the period comprised from January 2014 to April 2015. The activities are described with respect to the goals of the Network as defined in E.02.23 – ALIAS II – D1.1 Network Activity Plan. The success in reaching the goals is measured by specific indicators and related results. The report concludes with the	*approved*

		re-definition of the networking strategy on the basis of the results obtained so far.	
D4.3	Intermediate dissemination report	This deliverable describes the dissemination activities carried out in the first half of the ALIAS II project.	*approved*
D2.2	Report of test applications	It presents the results of the validation activities of the Legal Case methodology. These were based on test applications and experts' interviews. The results of the validation, including recommendations for improvement will be used to support the consolidation of the Legal Case methodology, to be presented in the next WP2 deliverable, D2.3 - Consolidated Legal Case.	*approved*
D3.1	E-learning platform	This deliverable describes the benchmarking activities carried out by ALIAS to select an e-learning platform to host the digital training on the Legal Case methodology.	*approved*
D2.3	Consolidated legal case	This document presents the consolidated version of the Legal Case that was developed by the ALIAS II project and highlights the transition from the first version of the Legal Case to the current consolidated one. The Legal Case is a methodological tool for identifying and addressing liability issues in automated air-traffic-management (or ATM) systems. It can be applied in a proactive way at the design stage of a system, to address liability issues arising from new technologies, or in a retroactive way at the deployment stage, to address liabilities arising from existing technologies.	*approved*
D4.4	Contribution to SIDs 2015	Paper and poster published at SESAR Innovation Days 2015	*approved*
D3.2	Plan of training and coaching activities	This deliverable describes the plan of ALIAS II training and coaching activities.	*approved*
D3.3	Report on training and coaching activities	This deliverable provides the report of the ALIAS II training and coaching activities.	*submitted*
D4.5	Final dissemination and network activity report	This deliverable describes the network and dissemination activities carried out in the second half of the ALIAS II project	*submitted*

Table 1 - List of Project Deliverables

3 Dissemination Activities

This chapter provides a detailed description of the network and dissemination activities carried out by ALIAS II.

3.1 Participation and publication in conferences and events

In the first phase of the project, the participation in conferences and events was mainly targeted to specialized audience with the aim of informing and raising awareness on the ALIAS II project.

In the second half of the project, the participation in conferences and events was mainly targeted to specialized audience with the aim of informing and engaging in using project's results.

Below the detailed description of the events in which we participated.

Event	Description	Key issues for the benefit of ALIAS
The 2nd World ATM Congress (WAC) (Madrid, 4-6 March 2014) The 3rd World ATM Congress (WAC) (Madrid, 10-12 March 2015)	The World ATM Congress represents an occasion for networking opportunities and exchange of information about the latest trends and developments in air traffic control with the wider aviation community and industry. The event is organized on an annual basis since 2013 and hosts important stakeholders of the ATM field and industries of the civil aviation on a worldwide scale. The format combines large-scale exhibition, world-class conference and social events. For the second edition of WAC, the SESAR JU agreed to host the general leaflet on ALIAS II objectives at their stand. The leaflet explains the two phases of the ALIAS research, highlighting how ALIAS II is consolidating and following up the results obtained in ALIAS (in particular the Legal Case). Giuseppe Contissa represented ALIAS there. He presented the Legal Case methodology with particular focus on the test applications of the methodology on ACAS X and RPAS, which will result in recommendations and advice to produce a final consolidated version of the tool. During the third edition of the WAC, ALIAS participated in the workshop organized by the HALA¡ Research Network (Towards higher levels of automation in the future ATM System). The workshop was entitled "Identifying open issues for reduced-crew operation in the cockpit of large civil aircrafts and implications for the future ATM system". It examined the idea of operations with reduced crew taking into account its technical, social and legal aspects and their potential implications throughout the future ATM system, especially in terms of reallocation of tasks between the various	WAC 2 gave the opportunity to exchange opinions and gather feedback for its development and attracted new participants in the ALIAS Network. WAC 3 was an important occasion to introduce ALIAS project to people coming from GMV Portugal, Air European and APROCTA (Spanish ATCO Professional Association).

	operators involved in operation beyond classical cooperation between flying crew and ATCOs. ALIAS was represented there by Giuseppe Contissa (EUI), who presented a talk on open legal issues and main perspectives, prepared on the basis of the legal research carried out during the ALIAS II project	
The 5th European Air Transport Regulation Forum (Florence, 24 March 2014)	The European Transport Regulation Forum is the annual event organized by the Florence School of Regulation to discuss emerging legal issues in the future Single European Sky. The 5th Florence Air Forum focused on possible market elements and the subsequent evolution of the role of Eurocontrol. Following the usual format of the Florence School of Regulation, the 5th Florence Air Forum aims at offering a platform to senior stakeholders from regulators, politics, operators, ANSPs, air carriers, airports, authorities, associations to discuss with prominent academics and to take stock of topics relevant to aviation regulation and policies.	Due to questions discussed and the participating stakeholders, this annual event represents a relevant occasion for the ALIAS project. In this edition, ALIAS took the opportunity to informally present the project's progress with particular focus on the test applications of the Legal Case to ACAS X and RPAS. The interest in the topics of ALIAS was high enough to include an article by ALIAS in the last issue of European Transport Regulation Observer. The article is entitled "Markets in Air Traffic Control and the evolving role of EUROCONTROL".
Strategic Research and Innovation (SRIA) (April 2014)	SRIA event was organized by the Italian division of Advisory Council for Aeronautics Research in Europe (ACARE) at the La Sapienza University in Rome (Italy) (more information available at http://www.apre.it/eventi/2014/i-semestre/presentazione-sria-it/). The event was held in Italian with the aim to present the Italian guidelines regarding the national investments in research and development in the aeronautics and air transport domain.	The ALIAS project was represented there by Migle Laukyte (EUI) who informally discussed the specificities of ALIAS projects with the participants of this event. The event confirmed that liability and automation are included the future research initiatives agenda. Representatives of Italian section of ACARE (Advisory Council for Aviation Research and Innovation in Europe) included the topics into the Italian agenda. Furthermore, this event was an occasion to spread the word about ALIAS Conference among the representatives of Italian aviation industry.
XIX ANACNA Workshop (Rome, 8 April 2014)	The XIX ANACNA workshop focused on human factors and safety issues related to air traffic control operations. It gathered the Italian wide air traffic controllers community to discuss future operational challenges, with particular focus on innovative automated systems.	The ALIAS Project was represented there by Paola Lanzi, who was one of the forth invited speakers of this event, which had more than 150 participants. She presented the Legal Case Methodology from the human factors perspective to Air Traffic Controllers. The audience showed interest in this new approach towards the distribution and attribution of legal responsibility to the people involved in the shortcomings produced by the automation processes in aviation. This event was broadcasted in streaming, the video is available here http://anacna.it/gallery/xix-congresso-anacna.html.
STASA course for	This is the higher education course that	Participants from STASA itself, ENAC, ENAV, experts on transport accidents

aviation lawyers (Rome, 28 May 2014)	STASA organized for lawyers and legal scholars working in aviation, and generally in transportation domain (the program is available here http://www.stasanews.it/e107_plugins/calendar_menu/event.php?1401174000.event.124) Paola Lanzi represented ALIAS in that occasion. She presented a talk entitled "Liability and automation within the system of air transport" which was based on the work carried out during ALIAS project and included specific examples of highly automated technologies and possible legal problems these technologies could give rise to.	investigation, Italian Ministry of Transportation and other national institutions were interested in ALIAS project, as well as all the lawyers who participated in this course. Another result was the interest of aviation lawyers who expressed their willingness to contribute to the legal research of ALIAS.
EuroUSC-Italia Course on Civil Drones (Naples, 12-13 September 2014)	EuroUSC-Italia Higher Education Course "Civil drones, operators and regulations: challenges and solutions in the Italian and European scene" was held at University "Parthenope" of Naples. The course was entirely dedicated to drones and involved the participants from national CAAs, research institutions and drone operators.	ALIAS project was represented there by Giuseppe Contissa (EUI) who held a lecture on the problems related to the liability and RPAS integration in civil airspace and addressed these problems in the light of the current liability attribution scheme which is not yet ready to face the challenges created by the future drone operators. The course gave the project the possibility to exchange opinion with RPAS operators, on their needs and issues in relation in particular to regulations, procedures, and liability issues of RPAS. It gave also the possibility to exchange contacts for future collaborations in the area of interest of the ALIAS project research.
The 6th European Air Transport Regulation Forum (Florence, 3rd October 2014)	The 6th European Air Transport Regulation Forum was entitled "Making effective use of technology in SESAR deployment". The 6th Florence Air Forum addressed the different interests in the Single European Sky and discussed how deployment and its governance can best accommodate the various interests at hand, while making the most effective use of SESAR deployment. Summary of presentations is available at http://fsr.eui.eu/Documents/WorkshopPaper/Transport/2014/141003SESARdeploymentSummaryDraft.pdf	Hanna Schebesta represented ALIAS there, participating as observer. The Forum was an occasion for establishing contacts with stakeholders to involve in the Network and invite to the ALIAS Conference.
The 4th SESAR Innovation Days (Madrid, 25-27 November 2014)	The 4th SESAR Innovation Days took place on at the Polytechnical University of Madrid http://www.sesarinnovationdays.eu/. The event, as a main forum to disseminate the results of WPE projects, included contributions on such variety of subjects as ATM system architecture, ATM system design, ATM innovation process and innovation lifecycle, human factors and safety, full automation, resilience of ATM systems, uncertainty, applied modelling,	ALIAS participated with a poster presentation (for the poster, see section 3.4.2) describing our approach to address liability within the SESAR innovation process. The participation in SID 2014 was the occasion to present the Legal Case methodology and the Network of Legal Research in ATM to our reference community, which is the wide SESAR WP-E long-term research in ATM. The Network was officially

	optimization techniques, CNS technical enablers, data science and information management, application of economics to facilitate the changes in ATM, and legal and regulatory aspects that the above mentioned topics raise.	recognized as the reference community to address the legal challenges of the paradigm shift required by automation, as witnessed by the fall publication of the SESAR Magazine.
38th meeting of EUROCAE WG-75 (February 2015)	This workshop took place on February 6, 2015. This event was hosted by NATS at NSL headquarters at Heathrow House (London, UK). This working group which focuses on TCAS matters is chaired by Ken Carpenter, who is also the member of ACAS X User Group which is testing the Legal Case Methodology on ACAS X, and which secretary is Garfield Dean, who is the ALIAS focal point to this User Group. This meeting was one of the face-to-face meetings when this working group meets to discuss current issues regards TCAS.	Hanna Schebesta represented ALIAS there, participating as observer. The Legal Case approach and the test application on ACAS X were briefly presented (10 minutes). During the meeting several ACAS X issues were discussed which were of particular relevance for the currently on-going test application – these were notably the drafting of the MOPS and several technical clarifications regarding the ADS-B only tracks.
The 5th SESAR Innovation Days (Bologna, 1-3 December 2015)	The 5th SESAR Innovation Days took place on at the University of Bologna. The event, as a main forum to disseminate the results of WPE projects, included contributions on such variety of subjects as ATM system architecture, ATM system design, ATM innovation process and innovation lifecycle, human factors and safety, full automation, resilience of ATM systems, uncertainty, applied modelling, optimization techniques, CNS technical enablers, data science and information management, application of economics to facilitate the changes in ATM, and legal and regulatory aspects that the above mentioned topics raise.	ALIAS participated with a poster presentation and a paper presentation. The poster has been described in section 3.1. As anticipated in the previous section (3.4) the paper is entitled "Design according to liabilities: ACAS X and the treatment of ADS-B position data", and describes the results of the test application of the Legal Case on the new airborne collision avoidance systems (ACAS X). The presentation was an occasion to present the Legal Case methodology and its possible results to our reference community, which is the wide SESAR WP-E long-term research in ATM.
Workshop on European Regulation of drones (Pisa, 24 May 2016)	This workshop took place on May 24, 2016. The event was hosted by the BioRobotic Institute of the Sant'Anna University in Pisa. The workshop was organized by ALIAS Consortium, and addressed the current status of the European Regulation of drones. The workshop followed a pilot session on the ALIAS training on liability and automation.	The ALIAS Consortium presented the current status of the European Regulation of drones. Several legal issues associated to the civil use of drones were discussed. The Legal Case approach and the test application on RPAS were presented as a possible means to analyze liability issues of drone operations and possibly derive mitigating solutions.
EASA-OPTICS Workshop (Cologne, 12-14 April 2016)	This workshop was entitled "Aviation Safety Research: do politics and safety mix well?" and was organised by the European Aviation Safety Agency (EASA), in cooperation with the Advisory Council of Aviation Research & Innovation in Europe (ACARE) and the European Commission. It offered the opportunity to engage with policy and decision makers, as well as leading aviation safety researchers, to confirm promising research avenues and define the ongoing and future Air Safety Research and Innovation Strategy.	The ALIAS Consortium participated with a presentation of the Legal Case as main outcome of project research on liability and automation. In particular, the possibility to combine a legal and safety analysis of new technologies was addressed. The participation was the occasion to establish contacts with the safety research community.
European	The aim of the European Conference on	The ALIAS Consortium participated

[Conference on human centered design for intelligent transport systems (Loughborough, UK, 30 June 2016)](#)	Human Centred Design for ITS was to gather the community of Human Factors researchers, to offer an overview of the current developments and trends and to create an area for discussions and debates on these topics.	with a presentation of the Legal Case as main outcome of project research on liability and automation. In particular, the potential to use the Legal Case in other transport domains was addressed. The participation was the occasion to establish contacts with the experts working on other transport domains.

ALIAS II team organized two editions of the ALIAS Conferences, one per year (2014 and 2015), with the aim to:

- offer the ALIAS Network Community an opportunity to meet and discuss in person;

- enlarge the ALIAS Network Community with new members possibly from different domains and with different backgrounds;

- share and disseminate the results and the achievements of ALIAS II;

- get feedback on the output of the ALIAS II project (as for example the Legal Case methodology) from the (current and future) stakeholders;

- find new opportunities of collaboration and/or application for the Legal Case methodology;

- find an answer to concrete needs of the ALIAS II project: for instance the ALIAS Conference 2014 contributed to the plan that ALIAS team is working out for the Legal Case test applications.

3.2 The 2nd ALIAS Conference (Florence, 1-2 october 2014)

Following the success of the first edition of the ALIAS conference held in Florence in 2012, the 2nd ALIAS Conference, entitled "Legal and Social Impact of Automated Systems in Aviation" took place on October 1-2, 2014 and was held in Villa La Fonte at the European University Institute (EUI) in Florence, Italy.

The Conference addressed the problems related to liability and automation in air transportation, focusing on the legal challenges that innovation and automation — and in particular, ACAS X and RPAS (Remotely Piloted Aircraft Systems) technologies — (may) introduce in the air traffic management (ATM) and that the SESAR Joint Undertaking has to deal with. It brought together experts from different disciplines among which aviation engineering and legal philosophy to discuss how the automation of ATM changes the allocation of liability in case of accidents. The organization of the event was entirely managed by WP1 – Network of Legal Research in ATM and is described in detail in deliverable D1.2 – ALIAS II - Intermediate Network Activity Report.

Besides being an occasion to bring together judges and technical/operational experts, the Conference:

- provided occasions for establishing contacts with relevant stakeholders to support the technical activities of the project, in particular the validation of the Legal Case (WP2) and the preparation of the training materials (WP3);

- created the occasion of cross-fertilisation between ALIAS and the SESAR WP-E projects, who presented the legal issues they are facing in their long-term research;

- provided occasion for physical encounters among the registered users of the ALIAS Network, thus continuing to promote the sense of belonging to the ALIAS Community.

Two press releases were collected after the conference:

- The [European Cockpit Association (ECA) press release](#) describes the ALIAS Conference as "a successful first attempt" to address liability of new aviation systems before these are fully implemented, and, ultimately, before the first major accident has occurred. In fact the next generation of air traffic management systems and the fast-growing Remotely Piloted Aircraft

Systems (RPAS) industry open a number of questions in the legal field, notably the issue of liability in case of an accident.

- The press released by Droneitaly focused on the debate we had with EUROCONTROL, legal experts and industry on the legal challenges associated to the implementation of the new generation of airborne collision avoidance systems - ACAS X (the press is in Italian).

3.3 The 3rd ALIAS Conference (Florence, 5-6 October 2015)

The 3rd ALIAS Conference, entitled "Liabilities and Automation in Aviation: the case of RPAS and Collision Avoidance Systems" took place on October 5-6, 2015 and was held in Villa La Fonte at the European University Institute (EUI) in Florence, Italy.

The Conference addressed liability and automation in air transport, focusing on air traffic management and the innovation challenge associated to the paradigm shift required by the SESAR increasing automated technologies. In line with this, special session with judges were arranged to address possible liabilities arising in future aviation scenarios. The Conference Programme (**Error! Reference source not found.**) addressed two special sessions devoted to the evaluation of the results of the test applications of the Legal Case, respectively on ACAS X and RPAS. In these sessions, the results of each test application was presented, namely the legal implications of the aforementioned technologies as analysed with the Legal case methodology. The user group members were involved as panellists to provide expert feedback on such results. A final session addressed the legal issues faced by the SESAR WP-E projects.

Besides being an occasion to bring together judges and technical/operational experts, the Conference:

- provided the occasion for gathering expert feedback on the results of the technical activities of the project, in particular the test applications of the Legal Case on the ACAS X and RPAS technologies;

- created the occasion of cross-fertilisation between ALIAS and the SESAR WP-E projects, who presented the legal issues they are facing in their long-term research;

- provided the occasion for physical encounters among the registered users of the ALIAS Network, thus continuing to promote the sense of belonging to the ALIAS Community.

Concerning the Legal case, the Conference provided relevant feedback for the consolidation of the methodology: in particular, feedback from engineers and technical experts contributed to the validation and improvement of Step 1 of the legal case; feedback from lawyers and judges contributed to the refinement of Legal Analysis Maps an of the overall workflow of Step 2; contributions from insurers helped to re-design the workflow of Step 3; finally, the contribution from all stakeholders and experts provided relevant input for improving the presentation of outputs of each step, of the Supporting Materials, and of the Legal Case Report foreseen in Step 4 of the methodology.

Besides, feedback of test applications on the ACAS X and RPAS technologies confirmed the approach adopted and the results obtained with the Legal Case. They also contained useful suggestion for further improvements of the methodology, and its possible application to other technologies within the ATM domain, and other transport domains.

All the improvements resulting from feedback generated during the conference were incorporated in the Consolidated version of the Legal Case.

3.4 Online dissemination

Online dissemination includes all the dissemination actions that are carried out over the internet, exploiting the Project website, the ALIAS Network platform and the ALIAS channels of Twitter, Scribd, Slideshare and Youtube.

3.4.1 The Project website

The project website aims at raising awareness and informing about the project, targeting both general

public and specialized audience. The project website was developed during the first phase of ALIAS (2011-2013). In ALIAS II it was updated it to reflect current achievements, as follows:

- A general graphic regeneration of the pages;

- update of the information, in order to present the two projects (ALIAS and ALIAS II) as a unique research initiative, even if structured in two steps;

- development of a new page containing an archive of the news;

- development of a back-office section to smooth over the website update process, which is now managed directly by the project team, rather than requiring the intervention of technical administrator, as in the former version;

- change of the service provider, so as to avoid the problems of malfunctions of the web-site and difficulty to access it from some browsers/platforms that were encountered with the former one in the last part of the previous ALIAS project.

3.4.2 Virtual interaction on the ALIAS Network

The ALIAS Network is a virtual community aimed at enabling and maintaining the interactions among experts and professional interested in the topics covered by ALIAS and ALIAS II projects.

ALIAS II continued to maintain active the virtual interaction with the members of the ALIAS Community, engaging them by:

- New topics/comments publication on the Discussion Forum;

- New content upload on the ALIAS Digital Library;

- Use of the ALIAS profile on Twitter

New topics and comments are periodically published on the Discussion Forum so as to involve the members of the community in active discussion, in line with the network enabled research approach.

The ALIAS Network Community currently involves around 230 experts and professionals from different fields:

- Most of the users currently registered belong to Universities and Research Institutes, thus confirming that proactive liability risk assessment is being perceived as theme of relevance in the field of research;

- Law Firms and the Insurance Companies, which were supposed to be the most active parties involved in performing the legal analysis, are still the least represented;

- The data regarding Air Navigation Service Providers (ANSPs), Pilots and Controllers Associations show that among the operators the demand of legal support and advice is currently growing;

- The ALIAS research is gaining the interest of the representatives of Regulators, who are represented by more than 20 registered users. In the future, Regulators may be supported by the ALIAS project activities and could play an important role in the Community.
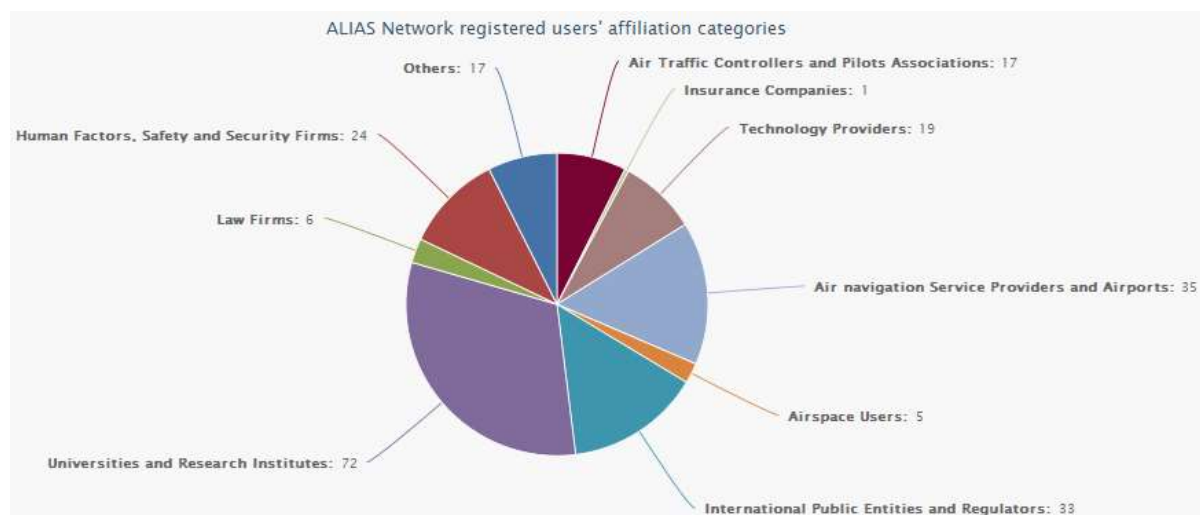
Figure 4: Affiliation categories of the registered users

Such distribution reflects the multidisciplinary nature of the community, which is made of technology experts, engineers, scientists, other operators and also involves lawyers (who usually come into play only once the technology is built and adopted) as relevant actors in the early stage of technological development.

Even though the number and the distribution of users within the Network has satisfied the ambitions of the consortium (See D1.1 – Plan of network activity and D1.2 – Intermediate report on network activity), the number and quality of interactions among the members of the community have not fully reflected such good outcomes. The main mean of interaction within members of the network are the posts and their related comments. Although some posts and topics have risen members' attention, leading to lively and interesting discussions (e.g. posts dedicated to the analysis of real accidents), the mean number of comments for each post has resulted poorer than expected.

Following some of the analysis we performed to have proper insights of the activity over the network (see D1.2), it emerged the tendency of having more interactions in the weeks preceding the ALIAS conferences or other important events. It was likely related to the advertising done to promote such events, with its positive effect over the visibility of the project and the ALIAS network. At the same time, it emerged that some of the topics or posts with few or no comments in the network, were instead subject of lively and interesting discussions during the ALIAS conferences or other events. Basing on these considerations, we have defined a strategy to promote and increase the interactions within the ALIAS network, by:

- creating a tighter link between the virtual community (ALIAS network) and the real one (people meeting at the conferences). This may be achieved by giving more evidence to the connections between what is discussed during the events and what is online. One possible task could be the activation of social network accounts and trends (or even simple mobile apps) to support all the duration of the conferences. These one could be used as a hook to invite the participants to continue the discussions online alsp in the days just after the conference. This strategy has been tested during the 3rd ALIAS Conference and it led to some positive results. More effort should be dedicated to this task to make it more effective.

- As a general remark, increasing the number and incidence of social network activities could have a positive effect on interaction within the ALIAS network. The integration of social comments platforms (like Disqus, https://disqus.com/), will be explored and evaluated during the next steps of maintenance of the ALIAS network.

3.5 Exploitation plans

The SESAR Vision contained in the last European ATM Master Plan (2015) identifies a number of concepts and technologies (e.g. virtual centers, new data communication capabilities, the full integration of RPAS, ACAS X, etc), that will deployed in the near future, thanks to a progressive

increase of the level of automation support, the implementation of virtualisation technologies as well as the use of standardised and interoperable systems.

In particular, the activities concerning the full integration of RPAS into the ATM system, the creation of a cybersecurity framework, and the further development of ACAS X, will pose several fundamental challenges especially with regards to liability, safety, security and economic issues.

Future research topics should be focused on the analysis of such issues, and on the definition of a clear legal and regulatory environment for the deployment of such new technologies in the future European ATM system.

Both the Network of Legal Research in ATM and the Legal Case methodology developed during the ALIAS Project are considered promising tools to investigate the challenging topics of liability aspects of new automated technologies. The interest raised by the project and by its initiatives witnesses the relevance of the topics addressed and the suitability of the means adopted.

In particular, the following activities are foreseen:

1) The Legal Case methodology is a self-standing and valid methodology, ready to be used by the stakeholders in the ATM domain. However, it needs to be maintained, in particular with regard to new laws and regulations that may have an impact on liability. We plan to maintain and update the methodology after the conclusion of ALIAS II project, in particular we are considering to further refine and extend the legal analysis maps. We are also considering the application of the methodology to other relevant domains (in particular transportations domains) and its extension so as to include not only liability, but a wider scope in terms of legal and regulatory concerns.

2) A software tool for the application of the Legal Case methodology is currently under development. The tool will support all the steps of the methodology: the selection of relevant information on the technology under consideration, the identification of levels of automation, the legal assessment, the design of new legal measures, the production of a final report. We plan to offer such tools to stakeholder of the ATM domain.

3) A patent application to cover the Legal Case methodology and the software tool for its application is being considered.

4) The project produced many internal deliverables and research that have not yet been fully published. The project team will review such material and assess the feasibility and modalities for potential publications. In particular, contacts have been established with an Editor for the publication of a book about the Legal Case.

5) The Network of Legal Research will maintain its status of a virtual community meeting online and discussing about themes of liability attribution in automated contexts. We will maintain the website for a minimum of 2 years after the termination of the project.

6) We are evaluating how and when to organize new dissemination activities, in particular seminars and workshops to discuss the issues of liability and automation, and present the Legal Case methodology.

7) We will also explore further research opportunities and funding possibilities in order to establish when and how the Network of Legal Research and future dissemination activities can be sustained.

4 Total Eligible Costs

Date	Deliverables on Bill	Contribution for Effort	Contribution for Other Costs (specify)	Status
10/09/2014	D0.1, D0.2, D1.1, D2.1, D4.1, D0.3	€ 40.720,44	**€ 6.967,69** (€ 6.247,39 travelling costs to KoM and technical meetings and € 720,31 of other minor costs for meeting organization and dissemination)	Paid
29/01/2015	D0.4, D4.2, D0.5	€ 13.262,56	**€ 3.940,91** (€ 2.332,78 travelling costs to SID and coordination meetings and 1.608,13 of other minor costs for meeting organization and dissemination – SID ALIAS II poster)	Paid
22/06/2015	D0.6, D1.2, D4.3	€ 104.429,37	**€ 13.040,84** (€ 9.607,97 travelling costs to Gate review meeting Brussels and € 3.432,87 of other minor costs mainly for printout of dissemination material, Web space for mass emails, Webhosting, graphic design of dissemination material)	Paid
09/03/2016	D0.7, D2.2, D0.8, D2.3, D4.4, D3.2, D0.9	€ 208.265,94	**€ 11.605,48** (€ 10.771,83 travelling costs related to technical meetings and € 833,65 of other minor costs related to meeting organization (catering and printing services)	Paid
to be issued	D0.10, D1.3, D3.3, D4.5, D0.11	*€ 192.943,01*	*€ 14.853,50 (to be confirmed with final invoice)*	N.A
GRAND TOTAL		*€ 559.621,32*	*€ 40.250,00*	

Table 2 Overview of Billing

Company	Planned man-days	*Actual man-days	*Total Cost so far (*this values will be confirmed when the final invoice will be issued)	Total Contribution so far	Reason for Deviation
Deep Blue coordinator	*806*	*Ca. 562*	*€ 236.579,08 (this value includes OH @ 7%)*	*€ 177.434,31*	No particular deviations reported
EUI	*967*	*Ca. 709*	*€ 214.640,50*	*€ 214.640,50*	No particular deviations reported

GRAND TOTAL	1773 **This value does not include the final invoice**	1271 **This value does not include the final invoice**	Actual: € 451.219,58 **This value does not include the final invoice**	€ 392.074,81 **This value does not include the final invoice**	

Table 3 Overview of Effort and Costs per project participant

5 Project Lessons Learnt

What worked well?
The test applications were successful and fruitful: the cooperation with involved experts functioned extraordinarily well. The selection of technologies was suitable, and both the ACAS X and the RPAS example proved valuable case studies. In addition, the feedback received on the legal analysis and for the methodology were very positive.
The two editions of the conference raised a large interest in the aviation community (and in other transport domains), and managed to bring together aviation and legal experts. This was appreciated by the participants and provided a valuable contribution to the ALIAS research objectives, and ultimately for the improvement of the Legal Case methodology.
The consolidated Legal Case: due to the success of the test applications, the experience in applying and the feedback received were helpful in restructuring several elements of the original Legal Case, making the methodology leaner, effective and structured.
The cooperation within the ALIAS Consortium was excellent. The objectives of the project were extremely challenging: a continuous debate and a close cooperation were necessary between the two project partners in all phases of the project, since the complementary of their knowledge and background was essential for the development of the project.
The cooperation with EUROCONTROL and the SJU worked equally well. Both EUROCONTROL and the SJU adopted a very supportive and cooperative approach with the project. The feedback and suggestions provided revealed extremely useful for the development of project results and the complete achievement of its objectives.

What should be improved?
The current application of the Legal Case methodology foresees continuous guidance of experts for the entire process. In practice, an application of the methodology relies very much on the efforts of the project members for the application, data collection and presentation of results. A new software tool for the application of the Legal Case methodology is currently under development. It will improve the application of the methodology, thanks to a set of interactive tools supporting the collection of relevant information on the technology, the assessment of its level of automation, the analysis of the related liability risks, and the design of new legal design measures.
Even though the number and the distribution of users within the Network of legal experts has satisfied the ambitions of the consortium, the number and quality of interactions among the members of the community have not fully reflected such good outcomes. The effort needed to increase and maintain online interactions has been underestimated. The project team is studying a strategy (see 3.4.2) to improve this tendency during the 2 years of maintenance of the website after the end of the project.
The project produced many internal deliverables and research that have not yet been published. This leaves some parts of the project outcomes underexploited. The project team will review the project material and assess the feasibility and modalities for potential publications.
The scope of the ALIAS project was limited to the liability aspect of innovation in the aviation sector. During the research, it became repeatedly clear that other regulatory issues would be interesting. While the scope of the ALIAS project needed to be defined, and liability was a suitable approach, it

would be interesting to explore whether the project research can be expanded to include a wider scope in terms of legal and regulatory concerns.

Both during the phase of conducting and presenting research, the project's focus on liability has often made actors reluctant to engage with the methodology and its results. Actors attitudes reflected fear of legal liabilities, such as that a legal analysis would uncover legal risks, and ultimately slow down processes of innovation.

The Legal Case is specifically meant to address liabilities in a way that furthers innovation, research and development. It is therefore very important for the ALIAS project to communicate this fact effectively. Managers of other projects, on the other hand, should be convinced not to ignore legal issues in order to speed up processes at the innovation stage, as the legal liability implications will then resurface during the deployment phase.

Table 4 - Project Lessons Learnt

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