



GRANT AGREEMENT FOR MEMBERS¹

NUMBER 101017587 — PJ32-W3 VC

This **Agreement** ('the Agreement') is **between** the following parties:

on the one part,

the **Single European Sky ATM Research Joint Undertaking** ('the JU'), represented for the purposes of signature of this Agreement by the JU Executive Director or his/her representative, Florian GUILLERMET,

and

on the other part,

1. 'the coordinator':

EUROCONTROL - EUROPEAN ORGANISATION FOR THE SAFETY OF AIR NAVIGATION (EUROCONTROL), established in Rue de la Fusée 96, BRUXELLES 1130, Belgium, VAT number: not applicable, as 'beneficiary not receiving JU funding' (see Article 9), represented for the purposes of signing the Agreement by Eamonn BRENNAN

and the following other beneficiaries, if they sign their 'Accession Form' (see Annex 3 and Article 56):

2. **VALSTYBES IMONE ORO NAVIGACIJA (ON (B4))**, established in BALIO KARVELIO G. 25, VILNIUS LT-02184, Lithuania, VAT number: LT100604610,

3. **POLSKA AGENCJA ZEGLUGI POWIETRZNEJ (PANSO (B4))**, established in UL. WIEZOWA 8, WARSZAWA 02 147, Poland, VAT number: PL5222838321,

4. **AUSTRO CONTROL OSTERREICHISCHE GESELLSCHAFT FUR ZIVILLUFTFAHRT MBH (ACG/COOPANS)**, established in WAGRAMER STRASSE 19, WIEN 1220, Austria, VAT number: ATU37259408,

5. **CROATIA CONTROL, CROATIAN AIR NAVIGATION SERVICES LTD (CCL/COOPANS)**, established in RUDOLFA FIZIRA 2, VELIKA GORICA 10410, Croatia, VAT number: HR33052761319,

¹ 'Members' means "members of the Joint Undertaking" as defined under Article 1(2) and 1(3) of the Statutes of the JU, Annex to the SESAR Regulation.

6. **LUFTFARTSVERKET (LFV/COOPANS)**, established in HOSPITALSGATAN 30, NORRKOPING 602 27, Sweden, VAT number: SE202100079501,
7. **NAVIAIR (NAVIAIR/COOPANS)**, established in NAVIAIR ALLE 1, KASTRUP 2770, Denmark, VAT number: DK26059763,
8. **DFS DEUTSCHE FLUGSICHERUNG GMBH (DFS)**, established in AM DFS CAMPUS 10, LANGEN 63225, Germany, VAT number: DE114110232,
9. **DIRECTION DES SERVICES DE LA NAVIGATION AERIENNE (DSNA)**, established in 50 RUE HENRY FARMAN, PARIS 75720, France, VAT number: FR29120064019,
10. **ENAIRE (ENAIRE)**, established in AVENIDA DE ARAGON S/N BLOQUE 330, PORTAL 2 PARQUE EMPRESARIAL LAS MERCEDES, MADRID 28022, Spain, VAT number: ESQ2822001J,
11. **ENAV SPA (ENAV)**, established in VIA SALARIA 716, ROMA 00138, Italy, VAT number: IT02152021008,
12. **FREQUENTIS AG (FRQ (FSP))**, established in Innovationsstrasse 1, WIEN 1100, Austria, VAT number: ATU14715600,
13. **HUNGAROCONTROL MAGYAR LEGIFORGALMISZOLGALAT ZARTKORUEN MUKODO RESZVENYTARSASAG (HC (FSP))**, established in IGLO UTCA 33 35, BUDAPEST 1185, Hungary, VAT number: HU13851325, as ‘beneficiary not receiving JU funding’ (see Article 9),
14. **INDRA SISTEMAS SA (INDRA)**, established in AVENIDA DE BRUSELAS 35, ALCOBENDAS MADRID 28108, Spain, VAT number: ESA28599033,
15. **LEONARDO - SOCIETA PER AZIONI (LDO)**, established in PIAZZA MONTE GRAPPA 4, ROMA 00195, Italy, VAT number: IT00881841001,
16. **SINTEF AS (SINTEF (NATMIG))**, established in STRINDVEGEN 4, TRONDHEIM 7034, Norway, VAT number: NO919303808MVA,
17. **SKYGUIDE, SA SUISSE POUR LES SERVICES DE LA NAVIGATION AERIENNE CIVILS ET MILITAIRES (SKYGUIDE)**, established in ROUTE DE PRE BOIS 15-17, GENEVA 1215, Switzerland, VAT number: CH514204,
18. **THALES LAS FRANCE SAS (THALES AIR SYS)**, established in AVENUE GAY LUSSAC 2, ELANCOURT 78990, France, VAT number: FR15319159877,
19. **NATS (EN ROUTE) PUBLIC LIMITED COMPANY (NATS)**, established in 4000 PARKWAY WHITELEY, FAREHAM PO15 7FL, United Kingdom, VAT number: GB440379456, as ‘beneficiary not receiving JU funding’ (see Article 9),
20. **RIZENI LETOVEHO PROVOZU CESKE REPUBLIKY STATNI PODNIK (ANS CR (B4))**, established in JENEC NAVIGACNI 787, JENEC 252 61, Czech Republic, VAT number: CZ699004742, as ‘beneficiary not receiving JU funding’ (see Article 9),

21. LETOVE PREVADZKOVE SLUZBY SLOVENSKEJ REPUBLIKY, STATNY PODNIK (LPS SR (B4)), established in IVANSKA CESTA 93, BRATISLAVA 823 07, Slovakia, VAT number: SK2020244699, as ‘beneficiary not receiving JU funding’ (see Article 9),

22. UDARAS EITLIOCHTA NA HEIREANN THE IRISH AVIATION AUTHORITY (IAA/ COOPANS), established in D'OLIER STREET 11-12 THE TIMES BUILDING, DUBLIN D02 T449, Ireland, VAT number: IE8211082B, as ‘beneficiary not receiving JU funding’ (see Article 9),

23. ATOS BELGIUM (ATOS (FSP)), established in DA VINCILAAN 5, ZAVENTEM 1930, Belgium, VAT number: BE0401848135, as ‘beneficiary not receiving JU funding’ (see Article 9),

24. AIRTEL ATN LIMITED (AIRTEL (NATMIG)), established in 2 HARBOUR SQUARE CROFTON ROAD, DUN LOAGHAIRE DUBLIN A96D6R0, Ireland, VAT number: IE8287698U, as ‘beneficiary not receiving JU funding’ (see Article 9),

25. SAAB AKTIEBOLAG (SAAB (NATMIG)), established in .., LINKOPING 581 88, Sweden, VAT number: SE556036079301, as ‘beneficiary not receiving JU funding’ (see Article 9),

Unless otherwise specified, references to ‘beneficiary’ or ‘beneficiaries’ include the coordinator.

The parties referred to above have agreed to enter into the Agreement under the terms and conditions below.

By signing the Agreement or the Accession Form, the beneficiaries accept the grant and agree to implement it under their own responsibility and in accordance with the Agreement, with all the obligations and conditions it sets out.

The Agreement is composed of:

Terms and Conditions

Annex 1	Description of the action
Annex 2	Estimated budget for the action
	2a Additional information on the estimated budget
Annex 3	Accession Forms
	3a Declaration on joint and several liability of linked third parties
Annex 4	Model for the financial statements
Annex 5	Model for the certificate on the financial statements
Annex 6	Model for the certificate on the methodology

TERMS AND CONDITIONS

TABLE OF CONTENTS

CHAPTER 1 GENERAL.....	12
ARTICLE 1 — SUBJECT OF THE AGREEMENT.....	12
CHAPTER 2 ACTION.....	12
ARTICLE 2 — ACTION TO BE IMPLEMENTED — COMPLEMENTARY GRANT.....	12
ARTICLE 3 — DURATION AND STARTING DATE OF THE ACTION.....	12
ARTICLE 4 — ESTIMATED BUDGET AND BUDGET TRANSFERS.....	12
4.1 Estimated budget.....	12
4.2 Budget transfers.....	12
CHAPTER 3 GRANT.....	12
ARTICLE 5 — GRANT AMOUNT, FORM OF GRANT, REIMBURSEMENT RATES AND FORMS OF COSTS.....	12
5.1 Maximum grant amount.....	12
5.2 Form of grant, reimbursement rates and forms of costs.....	13
5.3 Final grant amount — Calculation.....	13
5.4 Revised final grant amount — Calculation.....	15
ARTICLE 6 — ELIGIBLE AND INELIGIBLE COSTS.....	15
6.1 General conditions for costs to be eligible.....	15
6.2 Specific conditions for costs to be eligible.....	16
6.3 Conditions for costs of linked third parties to be eligible.....	22
6.4 Conditions for in-kind contributions provided by third parties free of charge to be eligible.....	23
6.5 Ineligible costs.....	23
6.6 Consequences of declaration of ineligible costs.....	23
CHAPTER 4 RIGHTS AND OBLIGATIONS OF THE PARTIES.....	23
SECTION 1 RIGHTS AND OBLIGATIONS RELATED TO IMPLEMENTING THE ACTION.....	24
ARTICLE 7 — GENERAL OBLIGATION TO PROPERLY IMPLEMENT THE ACTION.....	24
7.1 General obligation to properly implement the action.....	24
7.2 Consequences of non-compliance.....	24
ARTICLE 8 — RESOURCES TO IMPLEMENT THE ACTION — THIRD PARTIES INVOLVED IN THE ACTION.....	24
ARTICLE 9 — IMPLEMENTATION OF ACTION TASKS BY BENEFICIARIES NOT RECEIVING JU FUNDING.....	24
9.1 Rules for the implementation of action tasks by beneficiaries not receiving JU funding.....	24

9.2	Consequences of non-compliance.....	25
ARTICLE 10 — PURCHASE OF GOODS, WORKS OR SERVICES.....		25
10.1	Rules for purchasing goods, works or services.....	25
10.2	Consequences of non-compliance.....	26
ARTICLE 11 — USE OF IN-KIND CONTRIBUTIONS PROVIDED BY THIRD PARTIES AGAINST PAYMENT.....		26
11.1	Rules for the use of in-kind contributions against payment.....	26
11.2	Consequences of non-compliance.....	26
ARTICLE 12 — USE OF IN-KIND CONTRIBUTIONS PROVIDED BY THIRD PARTIES FREE OF CHARGE.....		26
12.1	Rules for the use of in-kind contributions free of charge.....	27
12.2	Consequences of non-compliance.....	27
ARTICLE 13 — IMPLEMENTATION OF ACTION TASKS BY SUBCONTRACTORS.....		27
13.1	Rules for subcontracting action tasks.....	27
13.2	Consequences of non-compliance.....	28
ARTICLE 14 — IMPLEMENTATION OF ACTION TASKS BY LINKED THIRD PARTIES.....		28
14.1	Rules for calling upon linked third parties to implement part of the action.....	28
14.2	Consequences of non-compliance.....	29
ARTICLE 14a — IMPLEMENTATION OF ACTION TASKS BY INTERNATIONAL PARTNERS.....		29
ARTICLE 15 — FINANCIAL SUPPORT TO THIRD PARTIES.....		29
15.1	Rules for providing financial support to third parties.....	29
15.2	Financial support in the form of prizes.....	29
15.3	Consequences of non-compliance.....	29
ARTICLE 16 — PROVISION OF TRANS-NATIONAL OR VIRTUAL ACCESS TO RESEARCH INFRASTRUCTURE.....		29
16.1	Rules for providing trans-national access to research infrastructure.....	29
16.2	Rules for providing virtual access to research infrastructure.....	29
16.3	Consequences of non-compliance.....	30
SECTION 2 RIGHTS AND OBLIGATIONS RELATED TO THE GRANT ADMINISTRATION.....		30
ARTICLE 17 — GENERAL OBLIGATION TO INFORM.....		30
17.1	General obligation to provide information upon request.....	30
17.2	Obligation to keep information up to date and to inform about events and circumstances likely to affect the Agreement.....	30
17.3	Consequences of non-compliance.....	30
ARTICLE 18 — KEEPING RECORDS — SUPPORTING DOCUMENTATION.....		30
18.1	Obligation to keep records and other supporting documentation.....	30

18.2	Consequences of non-compliance.....	32
ARTICLE 19 — SUBMISSION OF DELIVERABLES.....		32
19.1	Obligation to submit deliverables.....	32
19.2	Consequences of non-compliance.....	32
ARTICLE 20 — REPORTING — PAYMENT REQUESTS.....		32
20.1	Obligation to submit reports.....	32
20.2	Reporting periods.....	32
20.3	Periodic reports — Requests for interim payments.....	32
20.4	Final report — Request for payment of the balance.....	34
20.5	Information on cumulative expenditure incurred.....	34
20.6	Currency for financial statements and conversion into euro.....	34
20.7	Language of reports.....	35
20.8	Consequences of non-compliance.....	35
ARTICLE 21 — PAYMENTS AND PAYMENT ARRANGEMENTS.....		35
21.1	Payments to be made.....	35
21.2	Pre-financing payment — Amount — Amount retained for the Guarantee Fund.....	35
21.3	Interim payments — Amount — Calculation.....	36
21.4	Payment of the balance — Amount — Calculation — Release of the amount retained for the Guarantee Fund.....	36
21.5	Notification of amounts due.....	37
21.6	Currency for payments.....	37
21.7	Payments to the coordinator — Distribution to the beneficiaries.....	37
21.8	Bank account for payments.....	38
21.9	Costs of payment transfers.....	38
21.10	Date of payment.....	38
21.11	Consequences of non-compliance.....	38
ARTICLE 22 — CHECKS, REVIEWS, AUDITS AND INVESTIGATIONS — EXTENSION OF FINDINGS.....		39
22.1	Checks, reviews and audits by the JU and the Commission.....	39
22.2	Investigations by the European Anti-Fraud Office (OLAF).....	40
22.3	Checks and audits by the European Court of Auditors (ECA).....	41
22.4	Checks, reviews, audits and investigations for international organisations.....	41
22.5	Consequences of findings in checks, reviews, audits and investigations — Extension of findings.....	41
22.6	Consequences of non-compliance.....	43
ARTICLE 23 — EVALUATION OF THE IMPACT OF THE ACTION.....		43

23.1	Right to evaluate the impact of the action.....	43
23.2	Consequences of non-compliance.....	43
SECTION 3 RIGHTS AND OBLIGATIONS RELATED TO BACKGROUND AND RESULTS.....		44
SUBSECTION 1 GENERAL.....		44
ARTICLE 23a — MANAGEMENT OF INTELLECTUAL PROPERTY.....		44
23a.1	Obligation to take measures to implement the Commission Recommendation on the management of intellectual property in knowledge transfer activities.....	44
23a.2	Consequences of non-compliance.....	44
SUBSECTION 2 RIGHTS AND OBLIGATIONS RELATED TO BACKGROUND.....		44
ARTICLE 24 — AGREEMENT ON BACKGROUND.....		44
24.1	Agreement on background.....	44
24.2	Consequences of non-compliance.....	44
ARTICLE 25 — ACCESS RIGHTS TO BACKGROUND.....		45
25.1	Exercise of access rights — Waiving of access rights — No sub-licensing.....	45
25.2	Access rights for other beneficiaries, for implementing their own tasks under the action.....	45
25.3	Access rights for other beneficiaries, for exploiting their own results.....	45
25.4	Access rights for affiliated entities.....	45
25.5	Access rights for third parties.....	46
25.6	Consequences of non-compliance.....	46
SUBSECTION 3 RIGHTS AND OBLIGATIONS RELATED TO RESULTS.....		46
ARTICLE 26 — OWNERSHIP OF RESULTS.....		46
26.1	Ownership by the beneficiary that generates the results.....	46
26.2	Joint ownership by several beneficiaries.....	46
26.3	Rights of third parties (including personnel).....	47
26.4	JU ownership, to protect results.....	47
26.5	Consequences of non-compliance.....	48
ARTICLE 27 — PROTECTION OF RESULTS — VISIBILITY OF JU FUNDING AND SUPPORT FROM JU MEMBERS.....		48
27.1	Obligation to protect the results.....	48
27.2	JU ownership, to protect the results.....	48
27.3	Information on JU funding and support from JU members.....	48
27.4	Consequences of non-compliance.....	49
ARTICLE 28 — EXPLOITATION OF RESULTS.....		49
28.1	Obligation to exploit the results.....	49
28.2	Results that could contribute to European or international standards — Information on JU funding and support from JU members	49

28.3	Consequences of non-compliance.....	49
ARTICLE 29 — DISSEMINATION OF RESULTS — OPEN ACCESS — VISIBILITY OF JU FUNDING AND SUPPORT FROM JU MEMBERS.....		
29.1	Obligation to disseminate results.....	50
29.2	Open access to scientific publications.....	50
29.3	Open access to research data.....	51
29.4	Information on JU funding and support from JU members — Obligation and right to use the JU logo and the EU emblem	51
29.5	Disclaimer excluding JU responsibility.....	51
29.6	Consequences of non-compliance.....	51
ARTICLE 30 — TRANSFER AND LICENSING OF RESULTS.....		
30.1	Transfer of ownership.....	51
30.2	Granting licenses.....	52
30.3	JU right to object to transfers or exclusive licensing.....	52
30.4	Consequences of non-compliance.....	53
ARTICLE 31 — ACCESS RIGHTS TO RESULTS.....		
31.1	Exercise of access rights — Waiving of access rights — No sub-licensing.....	53
31.2	Access rights for other beneficiaries, for implementing their own tasks under the action.....	53
31.3	Access rights for other beneficiaries, for exploiting their own results.....	53
31.4	Access rights of affiliated entities.....	53
31.5	Access rights for the JU, the EU institutions, other EU bodies, offices or agencies and EU Member States.....	54
31.6	Access rights for third parties.....	54
31.7	Consequences of non-compliance.....	54
SECTION 4 OTHER RIGHTS AND OBLIGATIONS.....		
ARTICLE 32 — RECRUITMENT AND WORKING CONDITIONS FOR RESEARCHERS.....		
32.1	Obligation to take measures to implement the European Charter for Researchers and Code of Conduct for the Recruitment of Researchers.....	54
32.2	Consequences of non-compliance.....	54
ARTICLE 33 — GENDER EQUALITY.....		
33.1	Obligation to aim for gender equality.....	55
33.2	Consequences of non-compliance.....	55
ARTICLE 34 — ETHICS AND RESEARCH INTEGRITY.....		
34.1	Obligation to comply with ethical and research integrity principles.....	55
34.2	Activities raising ethical issues.....	56
34.3	Activities involving human embryos or human embryonic stem cells.....	56

34.4	Consequences of non-compliance.....	56
ARTICLE 35 — CONFLICT OF INTERESTS.....		57
35.1	Obligation to avoid a conflict of interests.....	57
35.2	Consequences of non-compliance.....	57
ARTICLE 36 — CONFIDENTIALITY.....		57
36.1	General obligation to maintain confidentiality.....	57
36.2	Consequences of non-compliance.....	58
ARTICLE 37 — SECURITY-RELATED OBLIGATIONS.....		58
37.1	Results with a security recommendation.....	58
37.2	Classified information.....	58
37.3	Activities involving dual-use goods or dangerous materials and substances.....	58
37.4	Consequences of non-compliance.....	58
ARTICLE 38 — PROMOTING THE ACTION — VISIBILITY OF JU FUNDING AND SUPPORT FROM JU MEMBERS.....		58
38.1	Communication activities by beneficiaries.....	58
38.2	Communication activities by the JU.....	59
38.3	Consequences of non-compliance.....	60
ARTICLE 39 — PROCESSING OF PERSONAL DATA.....		61
39.1	Processing of personal data by the JU and the Commission.....	61
39.2	Processing of personal data by the beneficiaries.....	61
39.3	Consequences of non-compliance.....	61
ARTICLE 40 — ASSIGNMENTS OF CLAIMS FOR PAYMENT AGAINST THE JU.....		61
CHAPTER 5 DIVISION OF BENEFICIARIES' ROLES AND RESPONSIBILITIES — RELATIONSHIP WITH COMPLEMENTARY BENEFICIARIES — RELATIONSHIP WITH PARTNERS OF A JOINT ACTION.....		62
ARTICLE 41 — DIVISION OF BENEFICIARIES' ROLES AND RESPONSIBILITIES — RELATIONSHIP WITH COMPLEMENTARY BENEFICIARIES — RELATIONSHIP WITH PARTNERS OF A JOINT ACTION.....		62
41.1	Roles and responsibility towards the JU.....	62
41.2	Internal division of roles and responsibilities.....	62
41.3	Internal arrangements between beneficiaries — Consortium agreement.....	63
41.4	Relationship with complementary beneficiaries — Collaboration agreement.....	63
41.5	Relationship with partners of a joint action — Coordination agreement.....	63
CHAPTER 6 REJECTION OF COSTS — REDUCTION OF THE GRANT — RECOVERY — SANCTIONS — DAMAGES — SUSPENSION — TERMINATION — FORCE MAJEURE.....		63
SECTION 1 REJECTION OF COSTS — REDUCTION OF THE GRANT — RECOVERY — SANCTIONS.....		64
ARTICLE 42 — REJECTION OF INELIGIBLE COSTS.....		64

42.1	Conditions.....	64
42.2	Ineligible costs to be rejected — Calculation — Procedure.....	64
42.3	Effects.....	64
ARTICLE 43 — REDUCTION OF THE GRANT.....		64
43.1	Conditions.....	64
43.2	Amount to be reduced — Calculation — Procedure.....	65
43.3	Effects.....	65
ARTICLE 44 — RECOVERY OF UNDUE AMOUNTS.....		65
44.1	Amount to be recovered — Calculation — Procedure.....	66
ARTICLE 45 — ADMINISTRATIVE SANCTIONS.....		69
SECTION 2 LIABILITY FOR DAMAGES.....		69
ARTICLE 46 — LIABILITY FOR DAMAGES.....		69
46.1	Liability of the JU.....	70
46.2	Liability of the beneficiaries.....	70
SECTION 3 SUSPENSION AND TERMINATION.....		70
ARTICLE 47 — SUSPENSION OF PAYMENT DEADLINE.....		70
47.1	Conditions.....	70
47.2	Procedure.....	70
ARTICLE 48 — SUSPENSION OF PAYMENTS.....		70
48.1	Conditions.....	70
48.2	Procedure.....	71
ARTICLE 49 — SUSPENSION OF THE ACTION IMPLEMENTATION.....		71
49.1	Suspension of the action implementation, by the beneficiaries.....	71
49.2	Suspension of the action implementation, by the JU.....	72
ARTICLE 50 — TERMINATION OF THE AGREEMENT OR OF THE PARTICIPATION OF ONE OR MORE BENEFICIARIES.....		73
50.1	Termination of the Agreement, by the beneficiaries.....	73
50.2	Termination of the participation of one or more beneficiaries, by the beneficiaries.....	74
50.3	Termination of the Agreement or the participation of one or more beneficiaries, by the JU.....	76
SECTION 4 FORCE MAJEURE.....		80
ARTICLE 51 — FORCE MAJEURE.....		80
CHAPTER 7 FINAL PROVISIONS.....		81
ARTICLE 52 — COMMUNICATION BETWEEN THE PARTIES.....		81
52.1	Form and means of communication.....	81
52.2	Date of communication.....	82

52.3	Addresses for communication.....	82
ARTICLE 53 — INTERPRETATION OF THE AGREEMENT.....		82
53.1	Precedence of the Terms and Conditions over the Annexes.....	82
53.2	Privileges and immunities.....	82
ARTICLE 54 — CALCULATION OF PERIODS, DATES AND DEADLINES.....		83
ARTICLE 55 — AMENDMENTS TO THE AGREEMENT.....		83
55.1	Conditions.....	83
55.2	Procedure.....	83
ARTICLE 56 — ACCESSION TO THE AGREEMENT.....		84
56.1	Accession of the beneficiaries mentioned in the Preamble.....	84
56.2	Addition of new beneficiaries.....	84
ARTICLE 57 — APPLICABLE LAW AND SETTLEMENT OF DISPUTES.....		84
57.1	Applicable law.....	84
57.2	Dispute settlement.....	84
ARTICLE 58 — ENTRY INTO FORCE OF THE AGREEMENT.....		85

CHAPTER 1 GENERAL

ARTICLE 1 — SUBJECT OF THE AGREEMENT

This Agreement sets out the rights and obligations and the terms and conditions applicable to the grant awarded to the beneficiaries for implementing the action set out in Chapter 2.

CHAPTER 2 ACTION

ARTICLE 2 — ACTION TO BE IMPLEMENTED — COMPLEMENTARY GRANT

The grant is awarded for the action entitled ‘**Virtual Centre**’ — ‘**PJ32-W3 VC**’ (**‘action’**), as described in Annex 1.

The grant is a ‘**complementary grant**’ to the grant agreement(s) under the call(s) for proposals H2020-SESAR-2019-1 (Wave 2).

ARTICLE 3 — DURATION AND STARTING DATE OF THE ACTION

The duration of the action will be **24 months** as of 1 January 2021 (**‘starting date of the action’**).

ARTICLE 4 — ESTIMATED BUDGET AND BUDGET TRANSFERS

4.1 Estimated budget

The ‘**estimated budget**’ for the action is set out in Annex 2.

It contains the estimated eligible costs and the forms of costs, broken down by beneficiary (and linked third party) and budget category (see Articles 5, 6, and 14). It also shows the estimated costs of the beneficiaries not receiving JU funding (see Article 9).

4.2 Budget transfers

The estimated budget breakdown indicated in Annex 2 may be adjusted — without an amendment (see Article 55) — by transfers of amounts between beneficiaries, budget categories and/or forms of costs set out in Annex 2, if the action is implemented as described in Annex 1.

However, the beneficiaries may not add costs relating to subcontracts not provided for in Annex 1, unless such additional subcontracts are approved by an amendment or in accordance with Article 13.

CHAPTER 3 GRANT

ARTICLE 5 — GRANT AMOUNT, FORM OF GRANT, REIMBURSEMENT RATES AND FORMS OF COSTS

5.1 Maximum grant amount

The '**maximum grant amount**' is **EUR 5 579 565.38** (five million five hundred and seventy nine thousand five hundred and sixty five EURO and thirty eight eurocents).

5.2 Form of grant, reimbursement rates and forms of costs

The grant reimburses **70% of the action's eligible costs** (see Article 6) ('**reimbursement of eligible costs grant**') (see Annex 2).

The estimated eligible costs of the action are **EUR 7 970 809.25** (seven million nine hundred and seventy thousand eight hundred and nine EURO and twenty five eurocents).

Eligible costs (see Article 6) must be declared under the following forms ('**forms of costs**'):

(a) for **direct personnel costs**:

- as actually incurred costs ('**actual costs**') or
- on the basis of an amount per unit calculated by the beneficiary in accordance with its usual cost accounting practices ('**unit costs**').

Personnel **costs for SME owners or beneficiaries that are natural persons** not receiving a salary (see Article 6.2, Points A.4 and A.5) must be declared on the basis of the amount per unit set out in Annex 2a (**unit costs**);

(b) for **direct costs for subcontracting**: as actually incurred costs (**actual costs**);

(c) for **direct costs of providing financial support to third parties**: not applicable;

(d) for **other direct costs**:

- for costs of internally invoiced goods and services: on the basis of an amount per unit calculated by the beneficiary in accordance with its usual cost accounting practices ('**unit costs**');
- for all other costs: as actually incurred costs (**actual costs**);

(e) for **indirect costs**: on the basis of a flat-rate applied as set out in Article 6.2, Point E ('**flat-rate costs**');

(f) **specific cost category(ies)**: not applicable.

5.3 Final grant amount — Calculation

The '**final grant amount**' depends on the actual extent to which the action is implemented in accordance with the Agreement's terms and conditions.

This amount is calculated by the JU — when the payment of the balance is made (see Article 21.4) — in the following steps:

Step 1 — Application of the reimbursement rates to the eligible costs

Step 2 — Limit to the maximum grant amount

Step 3 — Reduction due to the no-profit rule

Step 4 — Reduction due to substantial errors, irregularities or fraud or serious breach of obligations

5.3.1 Step 1 — Application of the reimbursement rates to the eligible costs

The reimbursement rate(s) (see Article 5.2) are applied to the eligible costs (actual costs, unit costs and flat-rate costs; see Article 6) declared by the beneficiaries and linked third parties (see Article 20) and approved by the JU (see Article 21).

5.3.2 Step 2 — Limit to the maximum grant amount

If the amount obtained following Step 1 is higher than the maximum grant amount set out in Article 5.1, it will be limited to the latter.

5.3.3 Step 3 — Reduction due to the no-profit rule

The grant must not produce a profit.

‘**Profit**’ means the surplus of the amount obtained following Steps 1 and 2 plus the action’s total receipts, over the action’s total eligible costs.

The ‘**action’s total eligible costs**’ are the consolidated total eligible costs approved by the JU.

The ‘**action’s total receipts**’ are the consolidated total receipts generated during its duration (see Article 3).

The following are considered **receipts**:

- (a) income generated by the action; if the income is generated from selling equipment or other assets purchased under the Agreement, the receipt is up to the amount declared as eligible under the Agreement;
- (b) financial contributions given by third parties to the beneficiary or to a linked third party specifically to be used for the action, and
- (c) in-kind contributions provided by third parties free of charge and specifically to be used for the action, if they have been declared as eligible costs.

The following are however not considered receipts:

- (a) income generated by exploiting the action’s results (see Article 28);
- (b) financial contributions by third parties, if they may be used to cover costs other than the eligible costs (see Article 6);
- (c) financial contributions by third parties with no obligation to repay any amount unused at the end of the period set out in Article 3.

If there is a profit, it will be deducted from the amount obtained following Steps 1 and 2.

5.3.4 Step 4 — Reduction due to substantial errors, irregularities or fraud or serious breach of obligations — Reduced grant amount — Calculation

If the grant is reduced (see Article 43), the JU will calculate the reduced grant amount by deducting the amount of the reduction (calculated in proportion to the seriousness of the errors, irregularities or fraud or breach of obligations, in accordance with Article 43.2) from the maximum grant amount set out in Article 5.1.

The final grant amount will be the lower of the following two:

- the amount obtained following Steps 1 to 3 or
- the reduced grant amount following Step 4.

5.4 Revised final grant amount — Calculation

If — after the payment of the balance (in particular, after checks, reviews, audits or investigations; see Article 22) — the JU rejects costs (see Article 42) or reduces the grant (see Article 43), it will calculate the ‘**revised final grant amount**’ for the beneficiary concerned by the findings.

This amount is calculated by the JU on the basis of the findings, as follows:

- in case of **rejection of costs**: by applying the reimbursement rate to the revised eligible costs approved by the JU for the beneficiary concerned;
- in case of **reduction of the grant**: by calculating the concerned beneficiary’s share in the grant amount reduced in proportion to the seriousness of the errors, irregularities or fraud or breach of obligations (see Article 43.2).

In case of **rejection of costs and reduction of the grant**, the revised final grant amount for the beneficiary concerned will be the lower of the two amounts above.

ARTICLE 6 — ELIGIBLE AND INELIGIBLE COSTS

6.1 General conditions for costs to be eligible

‘**Eligible costs**’ are costs that meet the following criteria:

(a) for **actual costs**:

- (i) they must be actually incurred by the beneficiary;
- (ii) they must be incurred in the period set out in Article 3, with the exception of costs relating to the submission of the periodic report for the last reporting period and the final report (see Article 20);
- (iii) they must be indicated in the estimated budget set out in Annex 2;
- (iv) they must be incurred in connection with the action as described in Annex 1 and necessary for its implementation;
- (v) they must be identifiable and verifiable, in particular recorded in the beneficiary’s accounts

in accordance with the accounting standards applicable in the country where the beneficiary is established and with the beneficiary's usual cost accounting practices;

- (vi) they must comply with the applicable national law on taxes, labour and social security, and
- (vii) they must be reasonable, justified and must comply with the principle of sound financial management, in particular regarding economy and efficiency;

(b) for **unit costs**:

- (i) they must be calculated as follows:

{amounts per unit set out in Annex 2a or calculated by the beneficiary in accordance with its usual cost accounting practices (see Article 6.2, Point A and Article 6.2.D.5)

multiplied by

the number of actual units};

- (ii) the number of actual units must comply with the following conditions:

- the units must be actually used or produced in the period set out in Article 3;
- the units must be necessary for implementing the action or produced by it, and
- the number of units must be identifiable and verifiable, in particular supported by records and documentation (see Article 18);

(c) for **flat-rate costs**:

- (i) they must be calculated by applying the flat-rate set out in Annex 2, and
- (ii) the costs (actual costs or unit costs) to which the flat-rate is applied must comply with the conditions for eligibility set out in this Article.

6.2 Specific conditions for costs to be eligible

Costs are eligible if they comply with the general conditions (see above) and the specific conditions set out below for each of the following budget categories:

- A. direct personnel costs;
- B. direct costs of subcontracting;
- C. not applicable;
- D. other direct costs;
- E. indirect costs;
- F. not applicable.

'Direct costs' are costs that are directly linked to the action implementation and can therefore be attributed to it directly. They must not include any indirect costs (see Point E below).

'Indirect costs' are costs that are not directly linked to the action implementation and therefore cannot be attributed directly to it.

A. Direct personnel costs

Types of eligible personnel costs

A.1 Personnel costs are eligible, if they are related to personnel working for the beneficiary under an employment contract (or equivalent appointing act) and assigned to the action (**‘costs for employees (or equivalent)’**). They must be limited to salaries (including during parental leave), social security contributions, taxes and other costs included in the **remuneration**, if they arise from national law or the employment contract (or equivalent appointing act).

Beneficiaries that are non-profit legal entities² may also declare as personnel costs **additional remuneration** for personnel assigned to the action (including payments on the basis of supplementary contracts regardless of their nature), if:

- (a) it is part of the beneficiary’s usual remuneration practices and is paid in a consistent manner whenever the same kind of work or expertise is required;
- (b) the criteria used to calculate the supplementary payments are objective and generally applied by the beneficiary, regardless of the source of funding used.

‘Additional remuneration’ means any part of the remuneration which exceeds what the person would be paid for time worked in projects funded by national schemes.

Additional remuneration for personnel assigned to the action is eligible up to the following amount:

- (a) if the person works full time and exclusively on the action during the full year: up to EUR 8 000;
- (b) if the person works exclusively on the action but not full-time or not for the full year: up to the corresponding pro-rata amount of EUR 8 000, or
- (c) if the person does not work exclusively on the action: up to a pro-rata amount calculated as follows:

$$\left\{ \begin{array}{l} \text{EUR 8 000} \\ \text{divided by} \\ \text{the number of annual productive hours (see below)}, \\ \text{multiplied by} \\ \text{the number of hours that the person has worked on the action during the year} \end{array} \right\}.$$

A.2 The **costs for natural persons working under a direct contract** with the beneficiary other than an employment contract are eligible personnel costs, if:

- (a) the person works under conditions similar to those of an employee (in particular regarding the way the work is organised, the tasks that are performed and the premises where they are performed);
- (b) the result of the work carried out belongs to the beneficiary (unless exceptionally agreed otherwise), and

² For the definition, see Article 2.1(14) of the Rules for Participation Regulation No 1290/2013: ‘**non-profit legal entity**’ means a legal entity which by its legal form is non-profit-making or which has a legal or statutory obligation not to distribute profits to its shareholders or individual members.

- (c) the costs are not significantly different from those for personnel performing similar tasks under an employment contract with the beneficiary.

A.3 The **costs of personnel seconded by a third party against payment** are eligible personnel costs, if the conditions in Article 11.1 are met.

A.4 **Costs of owners** of beneficiaries that are small and medium-sized enterprises (**'SME owners'**) who are working on the action and who do not receive a salary are eligible personnel costs, if they correspond to the amount per unit set out in Annex 2a multiplied by the number of actual hours worked on the action.

A.5 **Costs of 'beneficiaries that are natural persons'** not receiving a salary are eligible personnel costs, if they correspond to the amount per unit set out in Annex 2a multiplied by the number of actual hours worked on the action.

Calculation

Personnel costs must be calculated by the beneficiaries as follows:

{ {hourly rate
multiplied by
the number of actual hours worked on the action},
plus
for non-profit legal entities: additional remuneration to personnel assigned to the action under the
conditions set out above (Point A.1)}.

The number of actual hours declared for a person must be identifiable and verifiable (see Article 18).

The total number of hours declared in JU, EU or Euratom grants, for a person for a year, cannot be higher than the annual productive hours used for the calculations of the hourly rate. Therefore, the maximum number of hours that can be declared for the grant are:

{number of annual productive hours for the year (see below)
minus
total number of hours declared by the beneficiary, for that person in that year, for other JU, EU or
Euratom grants}.

The **'hourly rate'** is one of the following:

- (a) for personnel costs declared as **actual costs** (i.e. budget categories A.1, A.2, A.3): the hourly rate is calculated *per full financial year*, as follows:

{actual annual personnel costs (excluding additional remuneration) for the person
divided by
number of annual productive hours}.

using the personnel costs and the number of productive hours for each full financial year covered by the reporting period concerned. If a financial year is not closed at the end of the

reporting period, the beneficiaries must use the hourly rate of the last closed financial year available.

For the ‘number of annual productive hours’, the beneficiaries may choose one of the following:

- (i) ‘fixed number of hours’: 1 720 hours for persons working full time (or corresponding pro-rata for persons not working full time);
- (ii) ‘individual annual productive hours’: the total number of hours worked by the person in the year for the beneficiary, calculated as follows:

{annual workable hours of the person (according to the employment contract, applicable collective labour agreement or national law)

plus

overtime worked

minus

absences (such as sick leave and special leave)}.

‘Annual workable hours’ means the period during which the personnel must be working, at the employer’s disposal and carrying out his/her activity or duties under the employment contract, applicable collective labour agreement or national working time legislation.

If the contract (or applicable collective labour agreement or national working time legislation) does not allow to determine the annual workable hours, this option cannot be used;

- (iii) ‘standard annual productive hours’: the ‘standard number of annual hours’ generally applied by the beneficiary for its personnel in accordance with its usual cost accounting practices. This number must be at least 90% of the ‘standard annual workable hours’.

If there is no applicable reference for the standard annual workable hours, this option cannot be used.

For all options, the actual time spent on **parental leave** by a person assigned to the action may be deducted from the number of annual productive hours.

As an alternative, beneficiaries may calculate the hourly rate *per month*, as follows:

{actual monthly personnel cost (excluding additional remuneration) for the person

divided by

{number of annual productive hours / 12}}}

using the personnel costs for each month and (one twelfth of) the annual productive hours calculated according to either option (i) or (iii) above, i.e.:

- fixed number of hours or
- standard annual productive hours.

Time spent on **parental leave** may not be deducted when calculating the hourly rate per month. However, beneficiaries may declare personnel costs incurred in periods of parental leave in proportion to the time the person worked on the action in that financial year.

If parts of a basic remuneration are generated over a period longer than a month, the beneficiaries may include only the share which is generated in the month (irrespective of the amount actually paid for that month).

Each beneficiary must use only one option (per full financial year or per month) for each full financial year;

(b) for personnel costs declared on the basis of **unit costs** (i.e. budget categories A.1, A.2, A.4, A.5): the hourly rate is one of the following:

- (i) for SME owners or beneficiaries that are natural persons: the hourly rate set out in Annex 2a (see Points A.4 and A.5 above), or
- (ii) for personnel costs declared on the basis of the beneficiary's usual cost accounting practices: the hourly rate calculated by the beneficiary in accordance with its usual cost accounting practices, if:
 - the cost accounting practices used are applied in a consistent manner, based on objective criteria, regardless of the source of funding;
 - the hourly rate is calculated using the actual personnel costs recorded in the beneficiary's accounts, excluding any ineligible cost or costs included in other budget categories.

The actual personnel costs may be adjusted by the beneficiary on the basis of budgeted or estimated elements. Those elements must be relevant for calculating the personnel costs, reasonable and correspond to objective and verifiable information;

and

- the hourly rate is calculated using the number of annual productive hours (see above).

B. Direct costs of subcontracting (including related duties, taxes and charges such as non-deductible value added tax (VAT) paid by the beneficiary) are eligible if the conditions in Article 13.1.1 are met.

C. Direct costs of providing financial support to third parties

Not applicable

D. Other direct costs

D.1 Travel costs and related subsistence allowances (including related duties, taxes and charges such as non-deductible value added tax (VAT) paid by the beneficiary) are eligible if they are in line with the beneficiary's usual practices on travel.

D.2 The depreciation costs of equipment, infrastructure or other assets (new or second-hand) as recorded in the beneficiary's accounts are eligible, if they were purchased in accordance with

Article 10.1.1 and written off in accordance with international accounting standards and the beneficiary's usual accounting practices.

The **costs of renting or leasing** equipment, infrastructure or other assets (including related duties, taxes and charges such as non-deductible value added tax (VAT) paid by the beneficiary) are also eligible, if they do not exceed the depreciation costs of similar equipment, infrastructure or assets and do not include any financing fees.

The costs of equipment, infrastructure or other assets **contributed in-kind against payment** are eligible, if they do not exceed the depreciation costs of similar equipment, infrastructure or assets, do not include any financing fees and if the conditions in Article 11.1 are met.

The only portion of the costs that will be taken into account is that which corresponds to the duration of the action and rate of actual use for the purposes of the action.

D.3 Costs of other goods and services (including related duties, taxes and charges such as non-deductible value added tax (VAT) paid by the beneficiary) are eligible, if they are:

- (a) purchased specifically for the action and in accordance with Article 10.1.1 or
- (b) contributed in kind against payment and in accordance with Article 11.1.

Such goods and services include, for instance, consumables and supplies, dissemination (including open access), protection of results, certificates on the financial statements (if they are required by the Agreement), certificates on the methodology, translations and publications.

D.4 Capitalised and operating costs of 'large research infrastructure'³ directly used for the action are eligible, if:

- (a) the value of the large research infrastructure represents at least 75% of the total fixed assets (at historical value in its last closed balance sheet before the date of the signature of the Agreement or as determined on the basis of the rental and leasing costs of the research infrastructure⁴);
- (b) the beneficiary's methodology for declaring the costs for large research infrastructure has been positively assessed by the Commission ('**ex-ante assessment**');
- (c) the beneficiary declares as direct eligible costs only the portion which corresponds to the duration of the action and the rate of actual use for the purposes of the action, and
- (d) they comply with the conditions as further detailed in the annotations to the H2020 grant agreements.

³ '**Large research infrastructure**' means research infrastructure of a total value of at least EUR 20 million, for a beneficiary, calculated as the sum of historical asset values of each individual research infrastructure of that beneficiary, as they appear in its last closed balance sheet before the date of the signature of the Agreement or as determined on the basis of the rental and leasing costs of the research infrastructure.

⁴ For the definition, see Article 2(6) of the H2020 Framework Programme Regulation No 1291/2013: '**Research infrastructure**' are facilities, resources and services that are used by the research communities to conduct research and foster innovation in their fields. Where relevant, they may be used beyond research, e.g. for education or public services. They include: major scientific equipment (or sets of instruments); knowledge-based resources such as collections, archives or scientific data; e-infrastructures such as data and computing systems and communication networks; and any other infrastructure of a unique nature essential to achieve excellence in research and innovation. Such infrastructures may be 'single-sited', 'virtual' or 'distributed'.

D.5 Costs of internally invoiced goods and services directly used for the action are eligible, if:

- (a) they are declared on the basis of a unit cost calculated in accordance with the beneficiary's usual cost accounting practices;
- (b) the cost accounting practices used are applied in a consistent manner, based on objective criteria, regardless of the source of funding;
- (c) the unit cost is calculated using the actual costs for the good or service recorded in the beneficiary's accounts, excluding any ineligible cost or costs included in other budget categories.

The actual costs may be adjusted by the beneficiary on the basis of budgeted or estimated elements. Those elements must be relevant for calculating the costs, reasonable and correspond to objective and verifiable information;

- (d) the unit cost excludes any costs of items which are not directly linked to the production of the invoiced goods or service.

'Internally invoiced goods and services' means goods or services which are provided by the beneficiary directly for the action and which the beneficiary values on the basis of its usual cost accounting practices.

E. Indirect costs

Indirect costs are eligible if they are declared on the basis of the flat-rate of 25% of the eligible direct costs (see Article 5.2 and Points A to D above), from which are excluded:

- (a) costs of subcontracting and
- (b) costs of in-kind contributions provided by third parties which are not used on the beneficiary's premises;
- (c) not applicable;
- (d) not applicable.

Beneficiaries receiving an operating grant⁵ financed by the EU or Euratom budget cannot declare indirect costs for the period covered by the operating grant, unless they can demonstrate that the operating grant does not cover any costs of the action.

F. Specific cost category(ies)

Not applicable

6.3 Conditions for costs of linked third parties to be eligible

⁵ For the definition, see Article 121(1)(b) of Regulation (EU, Euratom) No 966/2012 of the European Parliament and of the Council of 25 October 2012 on the financial rules applicable to the general budget of the Union and repealing Council Regulation (EC, Euratom) No 1605/2002 ('**Financial Regulation No 966/2012**') (OJ L 218, 26.10.2012, p.1): '**operating grant**' means direct financial contribution, by way of donation, from the budget in order to finance the functioning of a body which pursues an aim of general EU interest or has an objective forming part of and supporting an EU policy.

Costs incurred by linked third parties are eligible if they fulfil — *mutatis mutandis* — the general and specific conditions for eligibility set out in this Article (Article 6.1 and 6.2) and Article 14.1.1.

6.4 Conditions for in-kind contributions provided by third parties free of charge to be eligible

In-kind contributions provided free of charge are eligible direct costs (for the beneficiary or linked third party), if the costs incurred by the third party fulfil — *mutatis mutandis* — the general and specific conditions for eligibility set out in this Article (Article 6.1 and 6.2) and Article 12.1.

6.5 Ineligible costs

‘**Ineligible costs**’ are:

(a) costs that do not comply with the conditions set out above (Article 6.1 to 6.4), in particular:

- (i) costs related to return on capital;
- (ii) debt and debt service charges;
- (iii) provisions for future losses or debts;
- (iv) interest owed;
- (v) doubtful debts;
- (vi) currency exchange losses;
- (vii) bank costs charged by the beneficiary’s bank for transfers from the JU;
- (viii) excessive or reckless expenditure;
- (ix) deductible VAT;
- (x) costs incurred during suspension of the implementation of the action (see Article 49);

(b) costs declared under another JU, EU or Euratom grant (including other grants awarded by the JU, grants awarded by a Member State and financed by the EU or Euratom budget and grants awarded by bodies other than the JU for the purpose of implementing the EU or Euratom budget); in particular, indirect costs if the beneficiary is already receiving an operating grant financed by the EU or Euratom budget in the same period, unless it can demonstrate that the operating grant does not cover any costs of the action.

6.6 Consequences of declaration of ineligible costs

Declared costs that are ineligible will be rejected (see Article 42).

This may also lead to any of the other measures described in Chapter 6.

CHAPTER 4 RIGHTS AND OBLIGATIONS OF THE PARTIES

SECTION 1 RIGHTS AND OBLIGATIONS RELATED TO IMPLEMENTING THE ACTION

ARTICLE 7 — GENERAL OBLIGATION TO PROPERLY IMPLEMENT THE ACTION

7.1 General obligation to properly implement the action

The beneficiaries must implement the action as described in Annex 1 and in compliance with the provisions of the Agreement and all legal obligations under applicable EU, international and national law.

7.2 Consequences of non-compliance

If a beneficiary breaches any of its obligations under this Article, the grant may be reduced (see Article 43).

Such breaches may also lead to any of the other measures described in Chapter 6.

ARTICLE 8 — RESOURCES TO IMPLEMENT THE ACTION — THIRD PARTIES INVOLVED IN THE ACTION

The beneficiaries must have the appropriate resources to implement the action.

If it is necessary to implement the action, the beneficiaries may:

- purchase goods, works and services (see Article 10);
- use in-kind contributions provided by third parties against payment (see Article 11);
- use in-kind contributions provided by third parties free of charge (see Article 12);
- call upon subcontractors to implement action tasks described in Annex 1 (see Article 13);
- call upon linked third parties to implement action tasks described in Annex 1 (see Article 14);
- call upon international partners to implement action tasks described in Annex 1 (see Article 14a).

In these cases, the beneficiaries retain sole responsibility towards the JU and the other beneficiaries for implementing the action.

ARTICLE 9 — IMPLEMENTATION OF ACTION TASKS BY BENEFICIARIES NOT RECEIVING JU FUNDING

9.1 Rules for the implementation of action tasks by beneficiaries not receiving JU funding

Beneficiaries that are not eligible for JU funding or request zero JU funding (**‘beneficiaries not receiving JU funding’**) must implement the action tasks attributed to them in Annex 1 in accordance with Article 7.1.

Their costs are estimated in Annex 2 but:

- will not be reimbursed and
- will not be taken into account for the calculation of the grant (see Articles 5.2, 5.3 and 5.4, and 21).

Chapter 3, Articles 10 to 15, 18.1.2, 20.3(b), 20.4(b), 20.6, 21, 23a, 26.4, 27.2, 28.1, 28.2, 30.3, 31.5, 40, 42, 43, 44, 47 and 48 do not apply to HC (FSP), IAA/COOPANS, LPS SR (B4), SAAB (NATMIG), NATS, AIRTEL (NATMIG), ATOS (FSP), ANS CR (B4).

They will not be subject to financial checks, reviews and audits under Article 22.

Chapter 3, Articles 10 to 15, 18.1.2, 20.6, 23a, 26.4, 27.2, 28.1, 28.2, 30.3, 31.5 and 40 do not apply to EUROCONTROL.

The beneficiary will not be subject to financial checks, reviews and audits under Article 22 for its own costs.

Beneficiaries not receiving JU funding may provide in-kind contributions to another beneficiary. In this case, they will be considered as a third party for the purpose of Articles 11 and 12.

If a beneficiary requesting zero funding receives funding later on (through an amendment; see Article 55), all obligations will apply retroactively.

9.2 Consequences of non-compliance

If a beneficiary not receiving JU funding breaches any of its obligations under this Article, its participation in the Agreement may be terminated (see Article 50).

Such breaches may also lead to any of the other measures described in Chapter 6 that are applicable to it.

ARTICLE 10 — PURCHASE OF GOODS, WORKS OR SERVICES

10.1 Rules for purchasing goods, works or services

10.1.1 If necessary to implement the action, the beneficiaries may purchase goods, works or services.

The beneficiaries must make such purchases ensuring the best value for money or, if appropriate, the lowest price. In doing so, they must avoid any conflict of interests (see Article 35).

The beneficiaries must ensure that the JU, the Commission, the European Court of Auditors (ECA) and the European Anti-Fraud Office (OLAF) can exercise their rights under Articles 22 and 23 also towards their contractors.

10.1.2 Beneficiaries that are ‘contracting authorities’ within the meaning of Directive 2004/18/EC⁶ (or 2014/24/EU⁷) or ‘contracting entities’ within the meaning of Directive 2004/17/EC⁸ (or 2014/25/EU⁹) must comply with the applicable national law on public procurement.

⁶ Directive 2004/18/EC of the European Parliament and of the Council of 31 March 2004 on the coordination of procedures for the award of public work contracts, public supply contracts and public service contracts (OJ L 134, 30.04.2004, p. 114).

10.2 Consequences of non-compliance

If a beneficiary breaches any of its obligations under Article 10.1.1, the costs related to the contract concerned will be ineligible (see Article 6) and will be rejected (see Article 42).

If a beneficiary breaches any of its obligations under Article 10.1.2, the grant may be reduced (see Article 43).

Such breaches may also lead to any of the other measures described in Chapter 6.

ARTICLE 11 — USE OF IN-KIND CONTRIBUTIONS PROVIDED BY THIRD PARTIES AGAINST PAYMENT

11.1 Rules for the use of in-kind contributions against payment

If necessary to implement the action, the beneficiaries may use in-kind contributions provided by third parties against payment.

The beneficiaries may declare costs related to the payment of in-kind contributions as eligible (see Article 6.1 and 6.2), up to the third parties' costs for the seconded persons, contributed equipment, infrastructure or other assets or other contributed goods and services.

The third parties and their contributions must be set out in Annex 1. The JU may however approve in-kind contributions not set out in Annex 1 without amendment (see Article 55), if:

- they are specifically justified in the periodic technical report and
- their use does not entail changes to the Agreement which would call into question the decision awarding the grant or breach the principle of equal treatment of applicants.

The beneficiaries must ensure that the JU, the Commission, the European Court of Auditors (ECA) and the European Anti-Fraud Office (OLAF) can exercise their rights under Articles 22 and 23 also towards the third parties.

11.2 Consequences of non-compliance

If a beneficiary breaches any of its obligations under this Article, the costs related to the payment of the in-kind contribution will be ineligible (see Article 6) and will be rejected (see Article 42).

Such breaches may also lead to any of the other measures described in Chapter 6.

ARTICLE 12 — USE OF IN-KIND CONTRIBUTIONS PROVIDED BY THIRD PARTIES FREE OF CHARGE

⁷ Directive 2014/24/EU of the European Parliament and of the Council of 26 February 2014 on public procurement and repealing Directive 2004/18/EC. (OJ L 94, 28.03.2014, p. 65).

⁸ Directive 2004/17/EC of the European Parliament and of the Council of 31 March 2004 coordinating the procurement procedures of entities operating in the water, energy, transport and postal services sectors (OJ L 134, 30.04.2004, p. 1)

⁹ Directive 2014/25/EU of the European Parliament and of the Council of 26 February 2014 on procurement by entities operating in the water, energy, transport and postal services sectors and repealing Directive 2004/17/EC (OJ L 94, 28.03.2014, p. 243).

12.1 Rules for the use of in-kind contributions free of charge

If necessary to implement the action, the beneficiaries may use in-kind contributions provided by third parties free of charge.

The beneficiaries may declare costs incurred by the third parties for the seconded persons, contributed equipment, infrastructure or other assets or other contributed goods and services as eligible in accordance with Article 6.4.

The third parties and their contributions must be set out in Annex 1. The JU may however approve in-kind contributions not set out in Annex 1 without amendment (see Article 55), if:

- they are specifically justified in the periodic technical report and
- their use does not entail changes to the Agreement which would call into question the decision awarding the grant or breach the principle of equal treatment of applicants.

The beneficiaries must ensure that the JU, the Commission, the European Court of Auditors (ECA) and the European Anti-Fraud Office (OLAF) can exercise their rights under Articles 22 and 23 also towards the third parties.

12.2 Consequences of non-compliance

If a beneficiary breaches any of its obligations under this Article, the costs incurred by the third parties related to the in-kind contribution will be ineligible (see Article 6) and will be rejected (see Article 42).

Such breaches may also lead to any of the other measures described in Chapter 6.

ARTICLE 13 — IMPLEMENTATION OF ACTION TASKS BY SUBCONTRACTORS

13.1 Rules for subcontracting action tasks

13.1.1 If necessary to implement the action, the beneficiaries may award subcontracts covering the implementation of certain action tasks described in Annex 1.

Subcontracting may cover only a limited part of the action.

The beneficiaries must award the subcontracts ensuring the best value for money or, if appropriate, the lowest price. In doing so, they must avoid any conflict of interests (see Article 35).

The tasks to be implemented and the estimated cost for each subcontract must be set out in Annex 1 and the total estimated costs of subcontracting per beneficiary must be set out in Annex 2. The JU may however approve subcontracts not set out in Annex 1 and 2 without amendment (see Article 55), if:

- they are specifically justified in the periodic technical report and
- they do not entail changes to the Agreement which would call into question the decision awarding the grant or breach the principle of equal treatment of applicants.

The beneficiaries must ensure that the JU, the Commission, the European Court of Auditors (ECA) and the European Anti-Fraud Office (OLAF) can exercise their rights under Articles 22 and 23 also towards their subcontractors.

13.1.2 The beneficiaries must ensure that their obligations under Articles 35, 36, 38 and 46 also apply to the subcontractors.

Beneficiaries that are ‘contracting authorities’ within the meaning of Directive 2004/18/EC (or 2014/24/EU) or ‘contracting entities’ within the meaning of Directive 2004/17/EC (or 2014/25/EU) must comply with the applicable national law on public procurement.

13.2 Consequences of non-compliance

If a beneficiary breaches any of its obligations under Article 13.1.1, the costs related to the subcontract concerned will be ineligible (see Article 6) and will be rejected (see Article 42).

If a beneficiary breaches any of its obligations under Article 13.1.2, the grant may be reduced (see Article 43).

Such breaches may also lead to any of the other measures described in Chapter 6.

ARTICLE 14 — IMPLEMENTATION OF ACTION TASKS BY LINKED THIRD PARTIES

14.1 Rules for calling upon linked third parties to implement part of the action

14.1.1 The following **affiliated entities**¹¹ and **third parties with a legal link to a beneficiary**¹² (**‘linked third parties’**) may implement the action tasks attributed to them in Annex 1:

- CENTRO DE REFERENCIA INVESTIGACION DESARROLLO E INNOVACION ATM, A.I.E. (CRIDA), affiliated or linked to ENAIRE, if it has accepted joint and several liability with the beneficiary (see Annex 3a)
- NEXTANT APPLICATIONS & INNOVATIVE SOLUTION SRL (NAIS), affiliated or linked to ENAV
- TECHNO SKY SRL TECHNOLOGIES FOR AIR TRAFFIC MANAGEMENT (TECHNO SKY), affiliated or linked to ENAV
- IDS AIRNAV SRL (IDS AIRNAV), affiliated or linked to ENAV

¹¹ For the definition see Article 2.1(2) Rules for Participation Regulation No 1290/2013: ‘**affiliated entity**’ means any legal entity that is:

- under the direct or indirect control of a participant, or
- under the same direct or indirect control as the participant, or
- directly or indirectly controlling a participant.

‘Control’ may take any of the following forms:

- (a) the direct or indirect holding of more than 50% of the nominal value of the issued share capital in the legal entity concerned, or of a majority of the voting rights of the shareholders or associates of that entity;
- (b) the direct or indirect holding, in fact or in law, of decision-making powers in the legal entity concerned.

However the following relationships between legal entities shall not in themselves be deemed to constitute controlling relationships:

- (a) the same public investment corporation, institutional investor or venture-capital company has a direct or indirect holding of more than 50% of the nominal value of the issued share capital or a majority of voting rights of the shareholders or associates;
- (b) the legal entities concerned are owned or supervised by the same public body.

¹² ‘**Third party with a legal link to a beneficiary**’ is any legal entity which has a legal link to the beneficiary implying collaboration that is not limited to the action.

- PDTS GMBH (PDTS), affiliated or linked to FRQ (FSP)
- SKYSOFT-ATM SA (SKYSOFT), affiliated or linked to SKYGUIDE

The linked third parties may declare as eligible the costs they incur for implementing the action tasks in accordance with Article 6.3.

The beneficiaries must ensure that the JU, the Commission, the European Court of Auditors (ECA) and the European Anti-Fraud Office (OLAF) can exercise their rights under Articles 22 and 23 also towards their linked third parties.

14.1.2 The beneficiaries must ensure that their obligations under Articles 18, 20, 35, 36 and 38 also apply to their linked third parties.

14.2 Consequences of non-compliance

If any obligation under Article 14.1.1 is breached, the costs of the linked third party will be ineligible (see Article 6) and will be rejected (see Article 42).

If any obligation under Article 14.1.2 is breached, the grant may be reduced (see Article 43).

Such breaches may also lead to any of the other measures described in Chapter 6.

ARTICLE 14a — IMPLEMENTATION OF ACTION TASKS BY INTERNATIONAL PARTNERS

Not applicable

ARTICLE 15 — FINANCIAL SUPPORT TO THIRD PARTIES

15.1 Rules for providing financial support to third parties

Not applicable

15.2 Financial support in the form of prizes

Not applicable

15.3 Consequences of non-compliance

Not applicable

ARTICLE 16 — PROVISION OF TRANS-NATIONAL OR VIRTUAL ACCESS TO RESEARCH INFRASTRUCTURE

16.1 Rules for providing trans-national access to research infrastructure

Not applicable

16.2 Rules for providing virtual access to research infrastructure

Not applicable

16.3 Consequences of non-compliance

Not applicable

SECTION 2 RIGHTS AND OBLIGATIONS RELATED TO THE GRANT ADMINISTRATION

ARTICLE 17 — GENERAL OBLIGATION TO INFORM

17.1 General obligation to provide information upon request

The beneficiaries must provide — during implementation of the action or afterwards and in accordance with Article 41.2 — any information requested in order to verify eligibility of the costs, proper implementation of the action and compliance with any other obligation under the Agreement.

17.2 Obligation to keep information up to date and to inform about events and circumstances likely to affect the Agreement

Each beneficiary must keep information stored in the Participant Portal Beneficiary Register (via the electronic exchange system; see Article 52) up to date, in particular, its name, address, legal representatives, legal form and organisation type.

Each beneficiary must immediately inform the coordinator — which must immediately inform the JU and the other beneficiaries — of any of the following:

- (a) **events** which are likely to affect significantly or delay the implementation of the action or the EU's or the JU's financial interests, in particular:
 - (i) changes in its legal, financial, technical, organisational or ownership situation or those of its linked third parties and
 - (ii) changes in the name, address, legal form, organisation type of its linked third parties;
- (b) **circumstances** affecting:
 - (i) the decision to award the grant or
 - (ii) compliance with requirements under the Agreement.

17.3 Consequences of non-compliance

If a beneficiary breaches any of its obligations under this Article, the grant may be reduced (see Article 43).

Such breaches may also lead to any of the other measures described in Chapter 6.

ARTICLE 18 — KEEPING RECORDS — SUPPORTING DOCUMENTATION

18.1 Obligation to keep records and other supporting documentation

The beneficiaries must — for a period of five years after the payment of the balance — keep records and other supporting documentation in order to prove the proper implementation of the action and the costs they declare as eligible.

They must make them available upon request (see Article 17) or in the context of checks, reviews, audits or investigations (see Article 22).

If there are on-going checks, reviews, audits, investigations, litigation or other pursuits of claims under the Agreement (including the extension of findings; see Article 22), the beneficiaries must keep the records and other supporting documentation until the end of these procedures.

The beneficiaries must keep the original documents. Digital and digitalised documents are considered originals if they are authorised by the applicable national law. The JU or the Commission may accept non-original documents if it considers that they offer a comparable level of assurance.

18.1.1 Records and other supporting documentation on the scientific and technical implementation

The beneficiaries must keep records and other supporting documentation on scientific and technical implementation of the action in line with the accepted standards in the respective field.

18.1.2 Records and other documentation to support the costs declared

The beneficiaries must keep the records and documentation supporting the costs declared, in particular the following:

- (a) for **actual costs**: adequate records and other supporting documentation to prove the costs declared, such as contracts, subcontracts, invoices and accounting records. In addition, the beneficiaries' usual cost accounting practices and internal control procedures must enable direct reconciliation between the amounts declared, the amounts recorded in their accounts and the amounts stated in the supporting documentation;
- (b) for **unit costs**: adequate records and other supporting documentation to prove the number of units declared. Beneficiaries do not need to identify the actual eligible costs covered or to keep or provide supporting documentation (such as accounting statements) to prove the amount per unit.

In addition, **for unit costs calculated in accordance with the beneficiary's usual cost accounting practices**, the beneficiaries must keep adequate records and documentation to prove that the cost accounting practices used comply with the conditions set out in Article 6.2.

The beneficiaries and linked third parties may submit to the JU, for approval by the Commission, a certificate (drawn up in accordance with Annex 6) stating that their usual cost accounting practices comply with these conditions (**'certificate on the methodology'**). If the certificate is approved, costs declared in line with this methodology will not be challenged subsequently, unless the beneficiaries have concealed information for the purpose of the approval.

- (c) for **flat-rate costs**: adequate records and other supporting documentation to prove the eligibility of the costs to which the flat-rate is applied. The beneficiaries do not need to identify the costs covered or provide supporting documentation (such as accounting statements) to prove the amount declared at a flat-rate.

In addition, for **personnel costs** (declared as actual costs or on the basis of unit costs), the beneficiaries must keep **time records** for the number of hours declared. The time records must be in writing and approved by the persons working on the action and their supervisors, at least monthly. In the absence of reliable time records of the hours worked on the action, the JU or the Commission may accept alternative evidence supporting the number of hours declared, if it considers that it offers an adequate level of assurance.

As an exception, for **persons working exclusively on the action**, there is no need to keep time records, if the beneficiary signs a **declaration** confirming that the persons concerned have worked exclusively on the action.

For costs declared by linked third parties (see Article 14), it is the beneficiary that must keep the originals of the financial statements and the certificates on the financial statements of the linked third parties.

18.2 Consequences of non-compliance

If a beneficiary breaches any of its obligations under this Article, costs insufficiently substantiated will be ineligible (see Article 6) and will be rejected (see Article 42), and the grant may be reduced (see Article 43).

Such breaches may also lead to any of the other measures described in Chapter 6.

ARTICLE 19 — SUBMISSION OF DELIVERABLES

19.1 Obligation to submit deliverables

The coordinator must submit the ‘**deliverables**’ identified in Annex 1, in accordance with the timing and conditions set out in it.

19.2 Consequences of non-compliance

If the coordinator breaches any of its obligations under this Article, the JU may apply any of the measures described in Chapter 6.

ARTICLE 20 — REPORTING — PAYMENT REQUESTS

20.1 Obligation to submit reports

The coordinator must submit to the JU (see Article 52) the technical and financial reports set out in this Article. These reports include requests for payment and must be drawn up using the forms and templates provided in the electronic exchange system (see Article 52).

20.2 Reporting periods

The action is divided into the following ‘**reporting periods**’:

- RP1: from month 1 to month 12
- RP2: from month 13 to month 24

20.3 Periodic reports — Requests for interim payments

The coordinator must submit a periodic report within 60 days following the end of each reporting period.

The **periodic report** must include the following:

(a) a '**periodic technical report**' containing:

- (i) an **explanation of the work carried out** by the beneficiaries;
- (ii) an **overview of the progress** towards the objectives of the action, including milestones and deliverables identified in Annex 1.

This report must include explanations justifying the differences between work expected to be carried out in accordance with Annex 1 and that actually carried out.

The report must detail the exploitation and dissemination of the results and — if required in Annex 1 — an updated '**plan for the exploitation and dissemination of the results**'.

The report must indicate the communication activities;

- (iii) a **summary** for publication by the JU;
- (iv) the answers to the '**questionnaire**', covering issues related to the action implementation and the economic and societal impact, notably in the context of the JU and the Horizon 2020 key performance indicators and JU and the Horizon 2020 monitoring requirements;

(b) a '**periodic financial report**' containing:

- (i) an '**individual financial statement**' (see Annex 4) from each beneficiary and from each linked third party, for the reporting period concerned.

The individual financial statement must detail the eligible costs (actual costs, unit costs and flat-rate costs; see Article 6) for each budget category (see Annex 2).

The beneficiaries and linked third parties must declare all eligible costs, even if — for actual costs, unit costs and flat-rate costs — they exceed the amounts indicated in the estimated budget (see Annex 2). Amounts which are not declared in the individual financial statement will not be taken into account by the JU.

If an individual financial statement is not submitted for a reporting period, it may be included in the periodic financial report for the next reporting period.

The individual financial statements of the last reporting period must also detail the **receipts of the action** (see Article 5.3.3).

Each beneficiary and each linked third party must **certify** that:

- the information provided is full, reliable and true;
- the costs declared are eligible (see Article 6);
- the costs can be substantiated by adequate records and supporting documentation

(see Article 18) that will be produced upon request (see Article 17) or in the context of checks, reviews, audits and investigations (see Article 22), and

- for the last reporting period: that all the receipts have been declared (see Article 5.3.3);
- (ii) an **explanation of the use of resources** and the information on subcontracting (see Article 13) and in-kind contributions provided by third parties (see Articles 11 and 12) from each beneficiary and from each linked third party, for the reporting period concerned;
- (iii) not applicable;
- (iv) a '**periodic summary financial statement**', created automatically by the electronic exchange system, consolidating the individual financial statements for the reporting period concerned and including — except for the last reporting period — the **request for interim payment**.

20.4 Final report — Request for payment of the balance

In addition to the periodic report for the last reporting period, the coordinator must submit the final report within 60 days following the end of the last reporting period.

The **final report** must include the following:

- (a) a '**final technical report**' with a **summary** for publication containing:
 - (i) an overview of the results and their exploitation and dissemination;
 - (ii) the conclusions on the action, and
 - (iii) the socio-economic impact of the action;
- (b) a '**final financial report**' containing:
 - (i) a '**final summary financial statement**', created automatically by the electronic exchange system, consolidating the individual financial statements for all reporting periods and including the **request for payment of the balance** and
 - (ii) a '**certificate on the financial statements**' (drawn up in accordance with Annex 5) for each beneficiary and for each linked third party, if it requests a total contribution of EUR 325 000 or more, as reimbursement of actual costs and unit costs calculated on the basis of its usual cost accounting practices (see Article 5.2 and Article 6.2).

20.5 Information on cumulative expenditure incurred

Not applicable

20.6 Currency for financial statements and conversion into euro

Financial statements must be drafted in euro.

Beneficiaries and linked third parties with accounting established in a currency other than the euro

must convert the costs recorded in their accounts into euro, at the average of the daily exchange rates published in the C series of the *Official Journal of the European Union*, calculated over the corresponding reporting period.

If no daily euro exchange rate is published in the *Official Journal of the European Union* for the currency in question, they must be converted at the average of the monthly accounting rates published on the Commission's website, calculated over the corresponding reporting period.

Beneficiaries and linked third parties with accounting established in euro must convert costs incurred in another currency into euro according to their usual accounting practices.

20.7 Language of reports

All reports (technical and financial reports, including financial statements) must be submitted in the language of the Agreement.

20.8 Consequences of non-compliance

If the reports submitted do not comply with this Article, the JU may suspend the payment deadline (see Article 47) and apply any of the other measures described in Chapter 6.

If the coordinator breaches its obligation to submit the reports and if it fails to comply with this obligation within 30 days following a written reminder, the JU may terminate the Agreement (see Article 50) or apply any of the other measures described in Chapter 6.

ARTICLE 21 — PAYMENTS AND PAYMENT ARRANGEMENTS

21.1 Payments to be made

The following payments will be made to the coordinator:

- one **pre-financing payment**;
- one or more **interim payments**, on the basis of the request(s) for interim payment (see Article 20), and
- one **payment of the balance**, on the basis of the request for payment of the balance (see Article 20).

21.2 Pre-financing payment — Amount — Amount retained for the Guarantee Fund

The aim of the pre-financing is to provide the beneficiaries with a float.

It remains the property of the JU until the payment of the balance.

The amount of the pre-financing payment will be EUR **4 463 652.30** (four million four hundred and sixty three thousand six hundred and fifty two EURO and thirty eurocents).

The JU will — except if Article 48 applies — make the pre-financing payment to the coordinator within 30 days, either from the entry into force of the Agreement (see Article 58) or from 10 days before the starting date of the action (see Article 3), whichever is the latest.

An amount of EUR **278 978.27** (two hundred and seventy eight thousand nine hundred and seventy eight EURO and twenty seven eurocents), corresponding to 5% of the maximum grant amount (see Article 5.1), is retained by the JU from the pre-financing payment and transferred into the ‘**Guarantee Fund**’.

21.3 Interim payments — Amount — Calculation

Interim payments reimburse the eligible costs incurred for the implementation of the action during the corresponding reporting periods.

The JU will pay to the coordinator the amount due as interim payment within 90 days from receiving the periodic report (see Article 20.3), except if Articles 47 or 48 apply.

Payment is subject to the approval of the periodic report. Its approval does not imply recognition of the compliance, authenticity, completeness or correctness of its content.

The **amount due as interim payment** is calculated by the JU in the following steps:

Step 1 — Application of the reimbursement rates

Step 2 — Limit to 90% of the maximum grant amount

21.3.1 Step 1 — Application of the reimbursement rates

The reimbursement rate(s) (see Article 5.2) are applied to the eligible costs (actual costs, unit costs and flat-rate costs; see Article 6) declared by the beneficiaries and the linked third parties (see Article 20) and approved by the JU (see above) for the concerned reporting period.

21.3.2 Step 2 — Limit to 90% of the maximum grant amount

The total amount of pre-financing and interim payments must not exceed 90% of the maximum grant amount set out in Article 5.1. The maximum amount for the interim payment will be calculated as follows:

{90% of the maximum grant amount (see Article 5.1)

minus

{pre-financing and previous interim payments} }.

21.4 Payment of the balance — Amount — Calculation — Release of the amount retained for the Guarantee Fund

The payment of the balance reimburses the remaining part of the eligible costs incurred by the beneficiaries for the implementation of the action.

If the total amount of earlier payments is greater than the final grant amount (see Article 5.3), the payment of the balance takes the form of a recovery (see Article 44).

If the total amount of earlier payments is lower than the final grant amount, the JU will pay the balance within 90 days from receiving the final report (see Article 20.4), except if Articles 47 or 48 apply.

Payment is subject to the approval of the final report. Its approval does not imply recognition of the compliance, authenticity, completeness or correctness of its content.

The **amount due as the balance** is calculated by the JU by deducting the total amount of pre-financing and interim payments (if any) already made, from the final grant amount determined in accordance with Article 5.3:

$$\begin{aligned} & \{\text{final grant amount (see Article 5.3)} \\ & \text{minus} \\ & \{\text{pre-financing and interim payments (if any) made}\}. \end{aligned}$$

At the payment of the balance, the amount retained for the Guarantee Fund (see above) will be released and:

- if the balance is positive: the amount released will be paid in full to the coordinator together with the amount due as the balance;
- if the balance is negative (payment of the balance taking the form of recovery): it will be deducted from the amount released (see Article 44.1.2). If the resulting amount:
 - is positive, it will be paid to the coordinator
 - is negative, it will be recovered.

The amount to be paid may however be offset — without the beneficiaries' consent — against any other amount owed by a beneficiary to the JU up to the maximum JU contribution indicated, for that beneficiary, in the estimated budget (see Annex 2).

21.5 Notification of amounts due

When making payments, the JU will formally notify to the coordinator the amount due, specifying whether it concerns an interim payment or the payment of the balance.

For the payment of the balance, the notification will also specify the final grant amount.

In the case of reduction of the grant or recovery of undue amounts, the notification will be preceded by the contradictory procedure set out in Articles 43 and 44.

21.6 Currency for payments

The JU will make all payments in euro.

21.7 Payments to the coordinator — Distribution to the beneficiaries

Payments will be made to the coordinator.

Payments to the coordinator will discharge the JU from its payment obligation.

The coordinator must distribute the payments between the beneficiaries without unjustified delay.

Pre-financing may however be distributed only:

(a) to beneficiaries that have acceded to the Agreement (see Article 56).

21.8 Bank account for payments

All payments will be made to the following bank account:

Name of bank: ING BELGIUM NV/SA (FORMERLY BANK BRUSSELS LAMBERT SA),
BRUSS
Full name of the account holder: EUROCONTROL AGENCYDIVISION DR AD TR
IBAN code: BE36310109735681

21.9 Costs of payment transfers

The cost of the payment transfers is borne as follows:

- the JU bears the cost of transfers charged by its bank;
- the beneficiary bears the cost of transfers charged by its bank;
- the party causing a repetition of a transfer bears all costs of the repeated transfer.

21.10 Date of payment

Payments by the JU are considered to have been carried out on the date when they are debited to its account.

21.11 Consequences of non-compliance

21.11.1 If the JU does not pay within the payment deadlines (see above), the beneficiaries are entitled to **late-payment interest** at the rate applied by the European Central Bank (ECB) for its main refinancing operations in euros ('reference rate'), plus three and a half points. The reference rate is the rate in force on the first day of the month in which the payment deadline expires, as published in the C series of the *Official Journal of the European Union*.

If the late-payment interest is lower than or equal to EUR 200, it will be paid to the coordinator only upon request submitted within two months of receiving the late payment.

Late-payment interest is not due if all beneficiaries are EU Member States (including regional and local government authorities or other public bodies acting on behalf of a Member State for the purpose of this Agreement).

Suspension of the payment deadline or payments (see Articles 47 and 48) will not be considered as late payment.

Late-payment interest covers the period running from the day following the due date for payment (see above), up to and including the date of payment.

Late-payment interest is not considered for the purposes of calculating the final grant amount.

21.11.2 If the coordinator breaches any of its obligations under this Article, the grant may be reduced (see Article 43) and the Agreement or the participation of the coordinator may be terminated (see Article 50).

Such breaches may also lead to any of the other measures described in Chapter 6.

ARTICLE 22 — CHECKS, REVIEWS, AUDITS AND INVESTIGATIONS — EXTENSION OF FINDINGS

22.1 Checks, reviews and audits by the JU and the Commission

22.1.1 Right to carry out checks

The JU will — during the implementation of the action or afterwards — check the proper implementation of the action and compliance with the obligations under the Agreement, including assessing deliverables and reports.

For this purpose the JU may be assisted by external persons or bodies.

The JU may also request additional information in accordance with Article 17. The JU may request beneficiaries to provide such information to it directly.

Information provided must be accurate, precise and complete and in the format requested, including electronic format.

22.1.2 Right to carry out reviews

The JU may — during the implementation of the action or afterwards — carry out reviews on the proper implementation of the action (including assessment of deliverables and reports), compliance with the obligations under the Agreement and continued scientific or technological relevance of the action.

Reviews may be started up to two years after the payment of the balance. They will be formally notified to the coordinator or beneficiary concerned and will be considered to have started on the date of the formal notification.

If the review is carried out on a third party (see Articles 10 to 16), the beneficiary concerned must inform the third party.

The JU may carry out reviews directly (using its own staff) or indirectly (using external persons or bodies appointed to do so). It will inform the coordinator or beneficiary concerned of the identity of the external persons or bodies. They have the right to object to the appointment on grounds of commercial confidentiality.

The coordinator or beneficiary concerned must provide — within the deadline requested — any information and data in addition to deliverables and reports already submitted (including information on the use of resources). The JU may request beneficiaries to provide such information to it directly.

The coordinator or beneficiary concerned may be requested to participate in meetings, including with external experts.

For **on-the-spot** reviews, the beneficiaries must allow access to their sites and premises, including to external persons or bodies, and must ensure that information requested is readily available.

Information provided must be accurate, precise and complete and in the format requested, including electronic format.

On the basis of the review findings, a ‘**review report**’ will be drawn up.

The JU will formally notify the review report to the coordinator or beneficiary concerned, which has 30 days to formally notify observations (‘**contradictory review procedure**’).

Reviews (including review reports) are in the language of the Agreement.

22.1.3 Right to carry out audits

The JU or the Commission may — during the implementation of the action or afterwards — carry out audits on the proper implementation of the action and compliance with the obligations under the Agreement.

Audits may be started up to two years after the payment of the balance. They will be formally notified to the coordinator or beneficiary concerned and will be considered to have started on the date of the formal notification.

If the audit is carried out on a third party (see Articles 10 to 16), the beneficiary concerned must inform the third party.

The JU or the Commission may carry out audits directly (using its own staff) or indirectly (using external persons or bodies appointed to do so). It will inform the coordinator or beneficiary concerned of the identity of the external persons or bodies. They have the right to object to the appointment on grounds of commercial confidentiality.

The coordinator or beneficiary concerned must provide — within the deadline requested — any information (including complete accounts, individual salary statements or other personal data) to verify compliance with the Agreement. The JU or the Commission may request beneficiaries to provide such information to it directly.

For **on-the-spot** audits, the beneficiaries must allow access to their sites and premises, including to external persons or bodies, and must ensure that information requested is readily available.

Information provided must be accurate, precise and complete and in the format requested, including electronic format.

On the basis of the audit findings, a ‘**draft audit report**’ will be drawn up.

The JU or the Commission will formally notify the draft audit report to the coordinator or beneficiary concerned, which has 30 days to formally notify observations (‘**contradictory audit procedure**’). This period may be extended by the JU or the Commission in justified cases.

The ‘**final audit report**’ will take into account observations by the coordinator or beneficiary concerned. The report will be formally notified to it.

Audits (including audit reports) are in the language of the Agreement.

The JU or the Commission may also access the beneficiaries’ statutory records for the periodical assessment of unit costs or flat-rate amounts.

22.2 Investigations by the European Anti-Fraud Office (OLAF)

Under Regulations No 883/2013¹⁶ and No 2185/96¹⁷ (and in accordance with their provisions and procedures), and Article 110 of the JU Financial Rules¹⁸, the European Anti-Fraud Office (OLAF) may — at any moment during implementation of the action or afterwards — carry out investigations, including on-the-spot checks and inspections, to establish whether there has been fraud, corruption or any other illegal activity affecting the financial interests of the EU.

22.3 Checks and audits by the European Court of Auditors (ECA)

Under Article 287 of the Treaty on the Functioning of the European Union (TFEU) and Article 110 of the JU Financial Rules, the European Court of Auditors (ECA) may — at any moment during implementation of the action or afterwards — carry out audits.

The ECA has the right of access for the purpose of checks and audits.

22.4 Checks, reviews, audits and investigations for international organisations

In conformity with its financial regulations, the European Union, including the European Anti-Fraud Office (OLAF) and the European Court of Auditors (ECA), may undertake, including on the spot, checks, reviews, audits and investigations.

This Article will be applied in accordance with any specific agreement concluded in this respect by the international organisation and the European Union.

22.5 Consequences of findings in checks, reviews, audits and investigations — Extension of findings

22.5.1 Findings in this grant

Findings in checks, reviews, audits or investigations carried out in the context of this grant may lead to the rejection of ineligible costs (see Article 42), reduction of the grant (see Article 43), recovery of undue amounts (see Article 44) or to any of the other measures described in Chapter 6.

Rejection of costs or reduction of the grant after the payment of the balance will lead to a revised final grant amount (see Article 5.4).

Findings in checks, reviews, audits or investigations may lead to a request for amendment for the modification of Annex 1 (see Article 55).

Checks, reviews, audits or investigations that find systemic or recurrent errors, irregularities, fraud or breach of obligations may also lead to consequences in other JU, EU or Euratom grants awarded under similar conditions (**‘extension of findings from this grant to other grants’**).

¹⁶ Regulation (EU, Euratom) No 883/2013 of the European Parliament and of the Council of 11 September 2013 concerning investigations conducted by the European Anti-Fraud Office (OLAF) and repealing Regulation (EC) No 1073/1999 of the European Parliament and of the Council and Council Regulation (Euratom) No 1074/1999 (OJ L 248, 18.09.2013, p. 1).

¹⁷ Council Regulation (Euratom, EC) No 2185/1996 of 11 November 1996 concerning on-the-spot checks and inspections carried out by the Commission in order to protect the European Communities' financial interests against fraud and other irregularities (OJ L 292, 15.11.1996, p. 2).

¹⁸ The SESAR JU Financial Rules are made publicly available on the SESAR JU official website.

Moreover, findings arising from an OLAF investigation may lead to criminal prosecution under national law.

22.5.2 Findings in other grants

The JU or the Commission may extend findings from other grants to this grant (**‘extension of findings from other grants to this grant’**), if:

- (a) the beneficiary concerned is found, in other JU, EU or Euratom grants awarded under similar conditions, to have committed systemic or recurrent errors, irregularities, fraud or breach of obligations that have a material impact on this grant and
- (b) those findings are formally notified to the beneficiary concerned — together with the list of grants affected by the findings — no later than two years after the payment of the balance of this grant.

The extension of findings may lead to the rejection of costs (see Article 42), reduction of the grant (see Article 43), recovery of undue amounts (see Article 44), suspension of payments (see Article 48), suspension of the action implementation (see Article 49) or termination (see Article 50).

22.5.3 Procedure

The JU or the Commission will formally notify the beneficiary concerned the systemic or recurrent errors and its intention to extend these audit findings, together with the list of grants affected.

22.5.3.1 If the findings concern **eligibility of costs**: the formal notification will include:

- (a) an invitation to submit observations on the list of grants affected by the findings;
- (b) the request to submit **revised financial statements** for all grants affected;
- (c) the **correction rate for extrapolation** established by the JU or the Commission on the basis of the systemic or recurrent errors, to calculate the amounts to be rejected if the beneficiary concerned:
 - (i) considers that the submission of revised financial statements is not possible or practicable or
 - (ii) does not submit revised financial statements.

The beneficiary concerned has 90 days from receiving notification to submit observations, revised financial statements or to propose a duly substantiated **alternative correction method**. This period may be extended by the JU or the Commission in justified cases.

The JU or the Commission may then start a rejection procedure in accordance with Article 42, on the basis of:

- the revised financial statements, if approved;
- the proposed alternative correction method, if accepted

or

- the initially notified correction rate for extrapolation, if it does not receive any observations or revised financial statements, does not accept the observations or the proposed alternative correction method or does not approve the revised financial statements.

22.5.3.2 If the findings concern **substantial errors, irregularities or fraud or serious breach of obligations**: the formal notification will include:

- (a) an invitation to submit observations on the list of grants affected by the findings and
- (b) the flat-rate the JU or the Commission intends to apply according to the principle of proportionality.

The beneficiary concerned has 90 days from receiving notification to submit observations or to propose a duly substantiated alternative flat-rate.

The JU or the Commission may then start a reduction procedure in accordance with Article 43, on the basis of:

- the proposed alternative flat-rate, if accepted
- or
- the initially notified flat-rate, if it does not receive any observations or does not accept the observations or the proposed alternative flat-rate.

22.6 Consequences of non-compliance

If a beneficiary breaches any of its obligations under this Article, any insufficiently substantiated costs will be ineligible (see Article 6) and will be rejected (see Article 42).

Such breaches may also lead to any of the other measures described in Chapter 6.

ARTICLE 23 — EVALUATION OF THE IMPACT OF THE ACTION

23.1 Right to evaluate the impact of the action

The JU or the Commission may carry out interim and final evaluations of the impact of the action measured against the objective of the EU programme.

Evaluations may be started during implementation of the action and up to five years after the payment of the balance. The evaluation is considered to start on the date of the formal notification to the coordinator or beneficiaries.

The JU or the Commission may make these evaluations directly (using its own staff) or indirectly (using external bodies or persons it has authorised to do so).

The coordinator or beneficiaries must provide any information relevant to evaluate the impact of the action, including information in electronic format.

23.2 Consequences of non-compliance

If a beneficiary breaches any of its obligations under this Article, the JU may apply the measures described in Chapter 6.

SECTION 3 RIGHTS AND OBLIGATIONS RELATED TO BACKGROUND AND RESULTS

SUBSECTION 1 GENERAL

ARTICLE 23a — MANAGEMENT OF INTELLECTUAL PROPERTY

23a.1 Obligation to take measures to implement the Commission Recommendation on the management of intellectual property in knowledge transfer activities

Beneficiaries that are universities or other public research organisations must take measures to implement the principles set out in Points 1 and 2 of the Code of Practice annexed to the Commission Recommendation on the management of intellectual property in knowledge transfer activities¹⁹.

This does not change the obligations set out in Subsections 2 and 3 of this Section.

The beneficiaries must ensure that researchers and third parties involved in the action are aware of them.

23a.2 Consequences of non-compliance

If a beneficiary breaches its obligations under this Article, the JU may apply any of the measures described in Chapter 6.

SUBSECTION 2 RIGHTS AND OBLIGATIONS RELATED TO BACKGROUND

ARTICLE 24 — AGREEMENT ON BACKGROUND

24.1 Agreement on background

The beneficiaries must identify and agree (in writing) on the background for the action (**‘agreement on background’**).

‘Background’ means any data, know-how or information — whatever its form or nature (tangible or intangible), including any rights such as intellectual property rights — that:

- (a) is held by the beneficiaries before they acceded to the Agreement, and
- (b) is needed to implement the action or exploit the results.

24.2 Consequences of non-compliance

¹⁹ Commission Recommendation C(2008) 1329 of 10.4.2008 on the management of intellectual property in knowledge transfer activities and the Code of Practice for universities and other public research institutions attached to this recommendation.

If a beneficiary breaches any of its obligations under this Article, the grant may be reduced (see Article 43).

Such breaches may also lead to any of the other measures described in Chapter 6.

ARTICLE 25 — ACCESS RIGHTS TO BACKGROUND

25.1 Exercise of access rights — Waiving of access rights — No sub-licensing

To exercise access rights, this must first be requested in writing (**‘request for access’**).

‘Access rights’ means rights to use results or background under the terms and conditions laid down in this Agreement.

Waivers of access rights are not valid unless in writing.

Unless agreed otherwise, access rights do not include the right to sub-license.

25.2 Access rights for other beneficiaries, for implementing their own tasks under the action

The beneficiaries must give each other access — on a royalty-free basis — to background needed to implement their own tasks under the action, unless the beneficiary that holds the background has — before acceding to the Agreement —:

- (a) informed the other beneficiaries that access to its background is subject to legal restrictions or limits, including those imposed by the rights of third parties (including personnel), or
- (b) agreed with the other beneficiaries that access would not be on a royalty-free basis.

25.3 Access rights for other beneficiaries, for exploiting their own results

The beneficiaries must give each other access — under fair and reasonable conditions — to background needed for exploiting their own results, unless the beneficiary that holds the background has — before acceding to the Agreement — informed the other beneficiaries that access to its background is subject to legal restrictions or limits, including those imposed by the rights of third parties (including personnel).

‘Fair and reasonable conditions’ means appropriate conditions, including possible financial terms or royalty-free conditions, taking into account the specific circumstances of the request for access, for example the actual or potential value of the results or background to which access is requested and/or the scope, duration or other characteristics of the exploitation envisaged.

Requests for access may be made — unless agreed otherwise — up to one year after the period set out in Article 3.

25.4 Access rights for affiliated entities

Unless otherwise agreed in the consortium agreement, access to background must also be given — under fair and reasonable conditions (see above; Article 25.3) and unless it is subject to legal restrictions or limits, including those imposed by the rights of third parties (including personnel) —

to affiliated entities²⁰ established in an EU Member State or ‘**associated country**’²¹, if this is needed to exploit the results generated by the beneficiaries to which they are affiliated.

Unless agreed otherwise (see above; Article 25.1), the affiliated entity concerned must make the request directly to the beneficiary that holds the background.

Requests for access may be made — unless agreed otherwise — up to one year after the period set out in Article 3.

25.5 Access rights for third parties

The beneficiaries must give — under the conditions set out in Article 25.2 — access to their background to complementary beneficiaries²² (see Article 2).

25.6 Consequences of non-compliance

If a beneficiary breaches any of its obligations under this Article, the grant may be reduced (see Article 43).

Such breaches may also lead to any of the other measures described in Chapter 6.

SUBSECTION 3 RIGHTS AND OBLIGATIONS RELATED TO RESULTS

ARTICLE 26 — OWNERSHIP OF RESULTS

26.1 Ownership by the beneficiary that generates the results

Results are owned by the beneficiary that generates them.

‘**Results**’ means any (tangible or intangible) output of the action such as data, knowledge or information — whatever its form or nature, whether it can be protected or not — that is generated in the action, as well as any rights attached to it, including intellectual property rights.

26.2 Joint ownership by several beneficiaries

Two or more beneficiaries own results jointly if:

- (a) they have jointly generated them and
- (b) it is not possible to:
 - (i) establish the respective contribution of each beneficiary, or
 - (ii) separate them for the purpose of applying for, obtaining or maintaining their protection (see Article 27).

²⁰ For the definition, see ‘affiliated entity’ footnote (Article 14.1).

²¹ For the definition, see Article 2.1(3) of the Rules for Participation Regulation No 1290/2013: ‘**associated country**’ means a third country which is party to an international agreement with the Union, as identified in Article 7 of Horizon 2020 Framework Programme Regulation No 1291/2013. Article 7 sets out the conditions for association of non-EU countries to Horizon 2020.

²² ‘**Complementary beneficiary**’ means a beneficiary of the complementary grant agreement.

The joint owners must agree (in writing) on the allocation and terms of exercise of their joint ownership (**‘joint ownership agreement’**), to ensure compliance with their obligations under this Agreement.

Unless otherwise agreed in the joint ownership agreement, each joint owner may grant non-exclusive licences to third parties to exploit jointly-owned results (without any right to sub-license), if the other joint owners are given:

- (a) at least 45 days advance notice and
- (b) fair and reasonable compensation.

Once the results have been generated, joint owners may agree (in writing) to apply another regime than joint ownership (such as, for instance, transfer to a single owner (see Article 30) with access rights for the others).

26.3 Rights of third parties (including personnel)

If third parties (including personnel) may claim rights to the results, the beneficiary concerned must ensure that it complies with its obligations under the Agreement.

If a third party generates results, the beneficiary concerned must obtain all necessary rights (transfer, licences or other) from the third party, in order to be able to respect its obligations as if those results were generated by the beneficiary itself.

If obtaining the rights is impossible, the beneficiary must refrain from using the third party to generate the results.

26.4 JU ownership, to protect results

26.4.1 The JU may — with the consent of the beneficiary concerned — assume ownership of results to protect them, if a beneficiary intends — up to four years after the period set out in Article 3 — to disseminate its results without protecting them, except in any of the following cases:

- (a) the lack of protection is because protecting the results is not possible, reasonable or justified (given the circumstances);
- (b) the lack of protection is because there is a lack of potential for commercial or industrial exploitation, or
- (c) the beneficiary intends to transfer the results to another beneficiary or third party established in an EU Member State or associated country, which will protect them.

Before the results are disseminated and unless any of the cases above under Points (a), (b) or (c) applies, the beneficiary must formally notify the JU and at the same time inform it of any reasons for refusing consent. The beneficiary may refuse consent only if it can show that its legitimate interests would suffer significant harm.

If the JU decides to assume ownership, it will formally notify the beneficiary concerned within 45 days of receiving notification.

No dissemination relating to these results may take place before the end of this period or, if the JU takes a positive decision, until it has taken the necessary steps to protect the results.

26.4.2 The JU may — with the consent of the beneficiary concerned — assume ownership of results to protect them, if a beneficiary intends — up to four years after the period set out in Article 3 — to stop protecting them or not to seek an extension of protection, except in any of the following cases:

- (a) the protection is stopped because of a lack of potential for commercial or industrial exploitation;
- (b) an extension would not be justified given the circumstances.

A beneficiary that intends to stop protecting results or not seek an extension must — unless any of the cases above under Points (a) or (b) applies — formally notify the JU at least 60 days before the protection lapses or its extension is no longer possible and at the same time inform it of any reasons for refusing consent. The beneficiary may refuse consent only if it can show that its legitimate interests would suffer significant harm.

If the JU decides to assume ownership, it will formally notify the beneficiary concerned within 45 days of receiving notification.

26.5 Consequences of non-compliance

If a beneficiary breaches any of its obligations under this Article, the grant may be reduced (see Article 43).

Such breaches may also lead to the any of the other measures described in Chapter 6.

ARTICLE 27 — PROTECTION OF RESULTS — VISIBILITY OF JU FUNDING AND SUPPORT FROM JU MEMBERS

27.1 Obligation to protect the results

Each beneficiary must examine the possibility of protecting its results and must adequately protect them — for an appropriate period and with appropriate territorial coverage — if:

- (a) the results can reasonably be expected to be commercially or industrially exploited and
- (b) protecting them is possible, reasonable and justified (given the circumstances).

When deciding on protection, the beneficiary must consider its own legitimate interests and the legitimate interests (especially commercial) of the other beneficiaries.

27.2 JU ownership, to protect the results

If a beneficiary intends not to protect its results, to stop protecting them or not seek an extension of protection, the JU may — under certain conditions (see Article 26.4) — assume ownership to ensure their (continued) protection.

27.3 Information on JU funding and support from JU members

Applications for protection of results (including patent applications) filed by or on behalf of a beneficiary must — unless the JU requests or agrees otherwise or unless it is impossible — include the following:

“The project leading to this application has received funding from the SESAR Joint Undertaking (JU) under grant agreement No 101017587. The JU receives support from the European Union’s Horizon 2020 research and innovation programme and the SESAR JU members other than the Union”.

27.4 Consequences of non-compliance

If a beneficiary breaches any of its obligations under this Article, the grant may be reduced (see Article 43).

Such a breach may also lead to any of the other measures described in Chapter 6.

ARTICLE 28 — EXPLOITATION OF RESULTS

28.1 Obligation to exploit the results

Each beneficiary must — up to four years after the period set out in Article 3 — take measures aiming to ensure ‘**exploitation**’ of its results (either directly or indirectly, in particular through transfer or licensing; see Article 30) by:

- (a) using them in further research activities (outside the action);
- (b) developing, creating or marketing a product or process;
- (c) creating and providing a service, or
- (d) using them in standardisation activities.

This does not change the security obligations in Article 37, which still apply.

28.2 Results that could contribute to European or international standards — Information on JU funding and support from JU members

If results could reasonably be expected to contribute to European or international standards, the beneficiary concerned must — up to four years after the period set out in Article 3 — inform the JU.

If results are incorporated in a standard, the beneficiary concerned must — unless the JU requests or agrees otherwise or unless it is impossible — ask the standardisation body to include the following statement in (information related to) the standard:

“Results incorporated in this standard received funding from the SESAR Joint Undertaking (JU) under grant agreement No 101017587. The JU receives support from the European Union’s Horizon 2020 research and innovation programme and the SESAR JU members other than the Union”.

28.3 Consequences of non-compliance

If a beneficiary breaches any of its obligations under this Article, the grant may be reduced in accordance with Article 43.

Such a breach may also lead to any of the other measures described in Chapter 6.

ARTICLE 29 — DISSEMINATION OF RESULTS — OPEN ACCESS — VISIBILITY OF JU FUNDING AND SUPPORT FROM JU MEMBERS

29.1 Obligation to disseminate results

Unless it goes against their legitimate interests, each beneficiary must — as soon as possible — ‘**disseminate**’ its results by disclosing them to the public by appropriate means (other than those resulting from protecting or exploiting the results), including in scientific publications (in any medium).

This does not change the obligation to protect results in Article 27, the confidentiality obligations in Article 36, the security obligations in Article 37 or the obligations to protect personal data in Article 39, all of which still apply.

A beneficiary that intends to disseminate its results must give advance notice to the other beneficiaries of — unless agreed otherwise — at least 45 days, together with sufficient information on the results it will disseminate.

Any other beneficiary may object within — unless agreed otherwise — 30 days of receiving notification, if it can show that its legitimate interests in relation to the results or background would be significantly harmed. In such cases, the dissemination may not take place unless appropriate steps are taken to safeguard these legitimate interests.

If a beneficiary intends not to protect its results, it may — under certain conditions (see Article 26.4.1) — need to formally notify the JU before dissemination takes place.

29.2 Open access to scientific publications

Each beneficiary must ensure open access (free of charge online access for any user) to all peer-reviewed scientific publications relating to its results.

In particular, it must:

- (a) as soon as possible and at the latest on publication, deposit a machine-readable electronic copy of the published version or final peer-reviewed manuscript accepted for publication in a repository for scientific publications;

Moreover, the beneficiary must aim to deposit at the same time the research data needed to validate the results presented in the deposited scientific publications.

- (b) ensure open access to the deposited publication — via the repository — at the latest:
 - (i) on publication, if an electronic version is available for free via the publisher, or
 - (ii) within six months of publication (twelve months for publications in the social sciences and humanities) in any other case.
- (c) ensure open access — via the repository — to the bibliographic metadata that identify the deposited publication.

The bibliographic metadata must be in a standard format and must include all of the following:

- the terms “SESAR Joint Undertaking”, “European Union (EU)” and “Horizon 2020”;
- the name of the action, acronym and grant number;

- the publication date, and length of embargo period if applicable, and
- a persistent identifier.

29.3 Open access to research data

Not applicable;

29.4 Information on JU funding and support from JU members — Obligation and right to use the JU logo and the EU emblem

Unless the JU requests or agrees otherwise or unless it is impossible, any dissemination of results (in any form, including electronic) must:

- (a) display the JU logo and
- (b) display the EU emblem and
- (c) include the following text:

“This project has received funding from the SESAR Joint Undertaking (JU) under grant agreement No 101017587. The JU receives support from the European Union’s Horizon 2020 research and innovation programme and the SESAR JU members other than the Union”.

When displayed together with another logo, the JU logo and the EU emblem must have appropriate prominence.

For the purposes of their obligations under this Article, the beneficiaries may use the JU logo and the EU emblem without first obtaining approval from the JU or the Commission.

This does not however give them the right to exclusive use.

Moreover, they may not appropriate the JU logo and the EU emblem or any similar trademark or logo, either by registration or by any other means.

29.5 Disclaimer excluding JU responsibility

Any dissemination of results must indicate that it reflects only the author's view and that the JU is not responsible for any use that may be made of the information it contains.

29.6 Consequences of non-compliance

If a beneficiary breaches any of its obligations under this Article, the grant may be reduced (see Article 43).

Such a breach may also lead to any of the other measures described in Chapter 6.

ARTICLE 30 — TRANSFER AND LICENSING OF RESULTS

30.1 Transfer of ownership

Each beneficiary may transfer ownership of its results.

It must however ensure that its obligations under Articles 26.2, 26.4, 27, 28, 29, 30 and 31 also apply to the new owner and that this owner has the obligation to pass them on in any subsequent transfer.

This does not change the security obligations in Article 37, which still apply.

Unless agreed otherwise (in writing) for specifically-identified third parties or unless impossible under applicable EU and national laws on mergers and acquisitions, a beneficiary that intends to transfer ownership of results must give at least 45 days advance notice (or less if agreed in writing) to the other beneficiaries that still have (or still may request) access rights to the results. This notification must include sufficient information on the new owner to enable any beneficiary concerned to assess the effects on its access rights.

Unless agreed otherwise (in writing) for specifically-identified third parties, any other beneficiary may object within 30 days of receiving notification (or less if agreed in writing), if it can show that the transfer would adversely affect its access rights. In this case, the transfer may not take place until agreement has been reached between the beneficiaries concerned.

30.2 Granting licenses

Each beneficiary may grant licences to its results (or otherwise give the right to exploit them), if:

- (a) this does not impede the access rights under Article 31 and
- (b) not applicable.

In addition to Points (a) and (b), exclusive licences for results may be granted only if all the other beneficiaries concerned have waived their access rights (see Article 31.1).

This does not change the dissemination obligations in Article 29 or security obligations in Article 37, which still apply.

30.3 JU right to object to transfers or exclusive licensing

The JU may — up to four years after the period set out in Article 3 — object to a transfer of ownership or the exclusive licensing of results, if:

- (a) it is to a third party established in a non-EU country not associated with Horizon 2020 and
- (b) the JU considers that the transfer or licence is not in line with EU interests regarding competitiveness or is inconsistent with ethical principles or security considerations.

A beneficiary that intends to transfer ownership or grant an exclusive licence must formally notify the JU before the intended transfer or licensing takes place and:

- identify the specific results concerned;
- describe in detail the new owner or licensee and the planned or potential exploitation of the results, and
- include a reasoned assessment of the likely impact of the transfer or licence on EU competitiveness and its consistency with ethical principles and security considerations.

The JU may request additional information.

If the JU decides to object to a transfer or exclusive licence, it must formally notify the beneficiary concerned within 60 days of receiving notification (or any additional information it has requested).

No transfer or licensing may take place in the following cases:

- pending the JU decision, within the period set out above;
- if the JU objects;
- until the conditions are complied with, if the JU objection comes with conditions.

30.4 Consequences of non-compliance

If a beneficiary breaches any of its obligations under this Article, the grant may be reduced (see Article 43).

Such a breach may also lead to any of the other measures described in Chapter 6.

ARTICLE 31 — ACCESS RIGHTS TO RESULTS

31.1 Exercise of access rights — Waiving of access rights — No sub-licensing

The conditions set out in Article 25.1 apply.

The obligations set out in this Article do not change the security obligations in Article 37, which still apply.

31.2 Access rights for other beneficiaries, for implementing their own tasks under the action

The beneficiaries must give each other access — on a royalty-free basis — to results needed for implementing their own tasks under the action.

31.3 Access rights for other beneficiaries, for exploiting their own results

The beneficiaries must give each other — under fair and reasonable conditions (see Article 25.3) — access to results needed for exploiting their own results.

Requests for access may be made — unless agreed otherwise — up to one year after the period set out in Article 3.

31.4 Access rights of affiliated entities

Unless agreed otherwise in the consortium agreement, access to results must also be given — under fair and reasonable conditions (Article 25.3) — to affiliated entities established in an EU Member State or associated country, if this is needed for those entities to exploit the results generated by the beneficiaries to which they are affiliated.

Unless agreed otherwise (see above; Article 31.1), the affiliated entity concerned must make any such request directly to the beneficiary that owns the results.

Requests for access may be made — unless agreed otherwise — up to one year after the period set out in Article 3.

31.5 Access rights for the JU, the EU institutions, other EU bodies, offices or agencies and EU Member States

The beneficiaries must give access to their results — on a royalty-free basis — to the JU and to EU institutions, other EU bodies, offices or agencies, for developing, implementing or monitoring EU policies or programmes.

Such access rights are limited to non-commercial and non-competitive use.

This does not change the right to use any material, document or information received from the beneficiaries for communication and publicising activities (see Article 38.2).

31.6 Access rights for third parties

The beneficiaries must give — under the conditions set out in Article 31.2 — access to their results to complementary beneficiaries²² (see Article 2).

31.7 Consequences of non-compliance

If a beneficiary breaches any of its obligations under this Article, the grant may be reduced (see Article 43).

Such breaches may also lead to any of the other measures described in Chapter 6.

SECTION 4 OTHER RIGHTS AND OBLIGATIONS

ARTICLE 32 — RECRUITMENT AND WORKING CONDITIONS FOR RESEARCHERS

32.1 Obligation to take measures to implement the European Charter for Researchers and Code of Conduct for the Recruitment of Researchers

The beneficiaries must take all measures to implement the principles set out in the Commission Recommendation on the European Charter for Researchers and the Code of Conduct for the Recruitment of Researchers²³, in particular regarding:

- working conditions;
- transparent recruitment processes based on merit, and
- career development.

The beneficiaries must ensure that researchers and third parties involved in the action are aware of them.

32.2 Consequences of non-compliance

²² ‘Complementary beneficiary’ means a beneficiary of a complementary grant agreement.

²³ Commission Recommendation 2005/251/EC of 11 March 2005 on the European Charter for Researchers and on a Code of Conduct for the Recruitment of Researchers (OJ L 75, 22.3.2005, p. 67).

If a beneficiary breaches its obligations under this Article, the JU may apply any of the measures described in Chapter 6.

ARTICLE 33 — GENDER EQUALITY

33.1 Obligation to aim for gender equality

The beneficiaries must take all measures to promote equal opportunities between men and women in the implementation of the action. They must aim, to the extent possible, for a gender balance at all levels of personnel assigned to the action, including at supervisory and managerial level.

33.2 Consequences of non-compliance

If a beneficiary breaches its obligations under this Article, the JU may apply any of the measures described in Chapter 6.

ARTICLE 34 — ETHICS AND RESEARCH INTEGRITY

34.1 Obligation to comply with ethical and research integrity principles

The beneficiaries must carry out the action in compliance with:

- (a) ethical principles (including the highest standards of research integrity)
- and
- (b) applicable international, EU and national law.

Funding will not be granted for activities carried out outside the EU if they are prohibited in all Member States or for activities which destroy human embryos (for example, for obtaining stem cells).

The beneficiaries must ensure that the activities under the action have an exclusive focus on civil applications.

The beneficiaries must ensure that the activities under the action do not:

- (a) aim at human cloning for reproductive purposes;
- (b) intend to modify the genetic heritage of human beings which could make such changes heritable (with the exception of research relating to cancer treatment of the gonads, which may be financed), or
- (c) intend to create human embryos solely for the purpose of research or for the purpose of stem cell procurement, including by means of somatic cell nuclear transfer.

In addition, the beneficiaries must respect the fundamental principle of research integrity — as set out, for instance, in the European Code of Conduct for Research Integrity²⁴.

This implies compliance with the following fundamental principles:

²⁴ European Code of Conduct for Research Integrity of ALLEA (All European Academies)
http://ec.europa.eu/research/participants/data/ref/h2020/other/hi/h2020-ethics_code-of-conduct_en.pdf

- **reliability** in ensuring the quality of research reflected in the design, the methodology, the analysis and the use of resources;
- **honesty** in developing, undertaking, reviewing, reporting and communicating research in a transparent, fair and unbiased way;
- **respect** for colleagues, research participants, society, ecosystems, cultural heritage and the environment;
- **accountability** for the research from idea to publication, for its management and organisation, for training, supervision and mentoring, and for its wider impacts

and means that beneficiaries must ensure that persons carrying out research tasks follow the good research practices and refrain from the research integrity violations described in this Code.

This does not change the other obligations under this Agreement or obligations under applicable international, EU or national law, all of which still apply.

34.2 Activities raising ethical issues

Activities raising ethical issues must comply with the ‘**ethics requirements**’ set out as deliverables in Annex 1.

Before the beginning of an activity raising an ethical issue, each beneficiary must have obtained:

- (a) any ethics committee opinion required under national law and
- (b) any notification or authorisation for activities raising ethical issues required under national and/or European law

needed for implementing the action tasks in question.

The documents must be kept on file and be submitted upon request by the coordinator to the JU (see Article 52). If they are not in English, they must be submitted together with an English summary, which shows that the action tasks in question are covered and includes the conclusions of the committee or authority concerned (if available).

34.3 Activities involving human embryos or human embryonic stem cells

Activities involving research on human embryos or human embryonic stem cells may be carried out, in addition to Article 34.1, only if:

- they are set out in Annex 1 or
- the coordinator has obtained explicit approval (in writing) from the JU (see Article 52).

34.4 Consequences of non-compliance

If a beneficiary breaches any of its obligations under this Article, the grant may be reduced (see Article 43) and the Agreement or participation of the beneficiary may be terminated (see Article 50).

Such breaches may also lead to any of the other measures described in Chapter 6.

ARTICLE 35 — CONFLICT OF INTERESTS

35.1 Obligation to avoid a conflict of interests

The beneficiaries must take all measures to prevent any situation where the impartial and objective implementation of the action is compromised for reasons involving economic interest, political or national affinity, family or emotional ties or any other shared interest (**‘conflict of interests’**).

They must formally notify to the JU without delay any situation constituting or likely to lead to a conflict of interests and immediately take all the necessary steps to rectify this situation.

The JU may verify that the measures taken are appropriate and may require additional measures to be taken by a specified deadline.

35.2 Consequences of non-compliance

If a beneficiary breaches any of its obligations under this Article, the grant may be reduced (see Article 43) and the Agreement or participation of the beneficiary may be terminated (see Article 50).

Such breaches may also lead to any of the other measures described in Chapter 6.

ARTICLE 36 — CONFIDENTIALITY

36.1 General obligation to maintain confidentiality

During implementation of the action and for four years after the period set out in Article 3, the parties must keep confidential any data, documents or other material (in any form) that is identified as confidential at the time it is disclosed (**‘confidential information’**).

If a beneficiary requests, the JU may agree to keep such information confidential for an additional period beyond the initial four years.

If information has been identified as confidential only orally, it will be considered to be confidential only if this is confirmed in writing within 15 days of the oral disclosure.

Unless otherwise agreed between the parties, they may use confidential information only to implement the Agreement.

The beneficiaries may disclose confidential information to their personnel or third parties involved in the action only if they:

- (a) need to know to implement the Agreement and
- (b) are bound by an obligation of confidentiality.

This does not change the security obligations in Article 37, which still apply.

The JU may disclose confidential information to its staff, other EU institutions and bodies. It may disclose confidential information to third parties, if:

- (a) this is necessary to implement the Agreement or safeguard the EU’s or JU’s financial interests and

(b) the recipients of the information are bound by an obligation of confidentiality.

The confidentiality obligations no longer apply if:

- (a) the disclosing party agrees to release the other party;
- (b) the information was already known by the recipient or is given to him without obligation of confidentiality by a third party that was not bound by any obligation of confidentiality;
- (c) the recipient proves that the information was developed without the use of confidential information;
- (d) the information becomes generally and publicly available, without breaching any confidentiality obligation, or
- (e) the disclosure of the information is required by EU or national law.

36.2 Consequences of non-compliance

If a beneficiary breaches any of its obligations under this Article, the grant may be reduced (see Article 43).

Such breaches may also lead to any of the other measures described in Chapter 6.

ARTICLE 37 — SECURITY-RELATED OBLIGATIONS

37.1 Results with a security recommendation

Not applicable

37.2 Classified information

Not applicable

37.3 Activities involving dual-use goods or dangerous materials and substances

Not applicable

37.4 Consequences of non-compliance

Not applicable

ARTICLE 38 — PROMOTING THE ACTION — VISIBILITY OF JU FUNDING AND SUPPORT FROM JU MEMBERS

38.1 Communication activities by beneficiaries

38.1.1 Obligation to promote the action and its results

The beneficiaries must promote the action and its results, by providing targeted information to multiple audiences (including the media and the public) in a strategic and effective manner.

This does not change the dissemination obligations in Article 29, the confidentiality obligations in Article 36 or the security obligations in Article 37, all of which still apply.

Before engaging in a communication activity expected to have a major media impact, the beneficiaries must inform the JU (see Article 52).

38.1.2 Information on JU funding and support from JU members — Obligation and right to use the JU logo and the EU emblem

Unless the JU requests or agrees otherwise or unless it is impossible, any communication activity related to the action (including in electronic form, via social media, etc.) and any infrastructure, equipment and major results funded by the grant must:

- (a) display the JU logo and
- (b) display the EU emblem and
- (c) include the following text:

For communication activities:

“This project has received funding from the SESAR Joint Undertaking (JU) under grant agreement No 101017587. The JU receives support from the European Union’s Horizon 2020 research and innovation programme and the SESAR JU members other than the Union”.

For infrastructure, equipment and major results:

“This *[infrastructure]**[equipment]**[insert type of result]* is part of a project that has received funding from the SESAR Joint Undertaking (JU) under grant agreement No 101017587. The JU receives support from the European Union’s Horizon 2020 research and innovation programme and the SESAR JU members other than the Union”.

When displayed together with another logo, the JU logo and the EU emblem must have appropriate prominence.

For the purposes of their obligations under this Article, the beneficiaries may use the JU logo and the EU emblem without first obtaining approval from the JU or the Commission.

This does not, however, give them the right to exclusive use.

Moreover, they may not appropriate the JU logo and the EU emblem or any similar trademark or logo, either by registration or by any other means.

38.1.3 Disclaimer excluding JU responsibility

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

38.2 Communication activities by the JU

38.2.1 Right to use beneficiaries’ materials, documents or information

The JU may use, for its communication and publicising activities, information relating to the action, documents notably summaries for publication and public deliverables as well as any other material, such as pictures or audio-visual material received from any beneficiary (including in electronic form).

This does not change the confidentiality obligations in Article 36 and the security obligations in Article 37, all of which still apply.

If the JU's use of these materials, documents or information would risk compromising legitimate interests, the beneficiary concerned may request the JU not to use it (see Article 52).

The right to use a beneficiary's materials, documents and information includes:

- (a) **use for its own purposes** (in particular, making them available to persons working for the JU or any other EU institution, body, office or agency or body or institutions in EU Member States; and copying or reproducing them in whole or in part, in unlimited numbers);
- (b) **distribution to the public** (in particular, publication as hard copies and in electronic or digital format, publication on the internet, as a downloadable or non-downloadable file, broadcasting by any channel, public display or presentation, communicating through press information services, or inclusion in widely accessible databases or indexes);
- (c) **editing or redrafting** for communication and publicising activities (including shortening, summarising, inserting other elements (such as meta-data, legends, other graphic, visual, audio or text elements), extracting parts (e.g. audio or video files), dividing into parts, use in a compilation);
- (d) translation;
- (e) giving **access in response to individual requests** under Regulation No 1049/2001²⁷, without the right to reproduce or exploit;
- (f) **storage** in paper, electronic or other form;
- (g) **archiving**, in line with applicable document-management rules, and
- (h) the right to authorise **third parties** to act on its behalf or sub-license the modes of use set out in Points (b), (c), (d) and (f) to third parties if needed for the communication and publicising activities of the JU.

If the right of use is subject to rights of a third party (including personnel of the beneficiary), the beneficiary must ensure that it complies with its obligations under this Agreement (in particular, by obtaining the necessary approval from the third parties concerned).

Where applicable (and if provided by the beneficiaries), the JU will insert the following information:

“© – [year] – [name of the copyright owner]. All rights reserved. Licensed to the SESAR Joint Undertaking under conditions.”

38.3 Consequences of non-compliance

If a beneficiary breaches any of its obligations under this Article, the grant may be reduced (see Article 43).

Such breaches may also lead to any of the other measures described in Chapter 6.

²⁷ Regulation (EC) No 1049/2001 of the European Parliament and of the Council of 30 May 2001 regarding public access to European Parliament, Council and Commission documents, OJ L 145, 31.5.2001, p. 43.

**ARTICLE 39 — PROCESSING OF PERSONAL DATA****39.1 Processing of personal data by the JU and the Commission**

Any personal data under the Agreement will be processed by the JU or the Commission under Regulation No 45/2001²⁸ and according to the ‘notifications of the processing operations’ to the Data Protection Officer (DPO) of the JU or the Commission (publicly accessible in the DPO register).

Such data will be processed by the ‘**data controller**’ of the JU or the Commission for the purposes of implementing, managing and monitoring the Agreement or protecting the financial interests of the JU, EU or Euratom (including checks, reviews, audits and investigations; see Article 22).

The persons whose personal data are processed have the right to access and correct their own personal data. For this purpose, they must send any queries about the processing of their personal data to the data controller, via the contact point indicated in the ‘privacy statement’ that are published on the JU and the Commission websites.

They also have the right to have recourse at any time to the European Data Protection Supervisor (EDPS).

39.2 Processing of personal data by the beneficiaries

The beneficiaries must process personal data under the Agreement in compliance with applicable EU and national law on data protection (including authorisations or notification requirements).

The beneficiaries may grant their personnel access only to data that is strictly necessary for implementing, managing and monitoring the Agreement.

The beneficiaries must inform the personnel whose personal data are collected and processed by the JU or the Commission. For this purpose, they must provide them with the privacy statement(s) (see above), before transmitting their data to the JU or the Commission.

39.3 Consequences of non-compliance

If a beneficiary breaches any of its obligations under Article 39.2, the JU may apply any of the measures described in Chapter 6.

ARTICLE 40 — ASSIGNMENTS OF CLAIMS FOR PAYMENT AGAINST THE JU

The beneficiaries may not assign any of their claims for payment against the JU to any third party, except if approved by the JU on the basis of a reasoned, written request by the coordinator (on behalf of the beneficiary concerned).

If the JU has not accepted the assignment or the terms of it are not observed, the assignment will have no effect on it.

In no circumstances will an assignment release the beneficiaries from their obligations towards the JU.

²⁸ Regulation (EC) No 45/2001 of the European Parliament and of the Council of 18 December 2000 on the protection of individuals with regard to the processing of personal data by the Community institutions and bodies and on the free movement of such data (OJ L 8, 12.01.2001, p. 1).

CHAPTER 5 DIVISION OF BENEFICIARIES' ROLES AND RESPONSIBILITIES **— RELATIONSHIP WITH COMPLEMENTARY BENEFICIARIES —** **RELATIONSHIP WITH PARTNERS OF A JOINT ACTION**

ARTICLE 41 — DIVISION OF BENEFICIARIES' ROLES AND RESPONSIBILITIES **— RELATIONSHIP WITH COMPLEMENTARY BENEFICIARIES —** **RELATIONSHIP WITH PARTNERS OF A JOINT ACTION**

41.1 Roles and responsibility towards the JU

The beneficiaries have full responsibility for implementing the action and complying with the Agreement.

The beneficiaries are jointly and severally liable for the **technical implementation** of the action as described in Annex 1. If a beneficiary fails to implement its part of the action, the other beneficiaries become responsible for implementing this part (without being entitled to any additional JU funding for doing so), unless the JU expressly relieves them of this obligation.

The **financial responsibility** of each beneficiary is governed by Article 44.

41.2 Internal division of roles and responsibilities

The internal roles and responsibilities of the beneficiaries are divided as follows:

(a) Each **beneficiary** must:

- (i) keep information stored in the Participant Portal Beneficiary Register (via the electronic exchange system) up to date (see Article 17);
- (ii) inform the coordinator immediately of any events or circumstances likely to affect significantly or delay the implementation of the action (see Article 17);
- (iii) submit to the coordinator in good time:
 - individual financial statements for itself and its linked third parties and, if required, certificates on the financial statements (see Article 20);
 - the data needed to draw up the technical reports (see Article 20);
 - ethics committee opinions and notifications or authorisations for activities raising ethical issues (see Article 34);
 - any other documents or information required by the JU under the Agreement, unless the Agreement requires the beneficiary to submit this information directly to the JU.

(b) The **coordinator** must:

- (i) monitor that the action is implemented properly (see Article 7);
- (ii) act as the intermediary for all communications between the beneficiaries and the JU (in particular, providing the JU with the information described in Article 17), unless the Agreement specifies otherwise;

- (iii) request and review any documents or information required by the JU and verify their completeness and correctness before passing them on to the JU;
- (iv) submit the deliverables and reports to the JU (see Articles 19 and 20);
- (v) ensure that all payments are made to the other beneficiaries without unjustified delay (see Article 21);
- (vi) inform the JU of the amounts paid to each beneficiary, when required under the Agreement (see Articles 44 and 50) or requested by the JU.

The coordinator may not delegate or subcontract the above-mentioned tasks to any other beneficiary or third party (including linked third parties).

41.3 Internal arrangements between beneficiaries — Consortium agreement

Not applicable

41.4 Relationship with complementary beneficiaries — Collaboration agreement

The beneficiaries must conclude a written ‘collaboration agreement’ with the complementary beneficiaries to coordinate the work under the Agreement and the complementary grant agreement(s) (see Article 2), covering for instance:

- efficient decision making processes and
- settlement of disputes.

The collaboration agreement must not contain any provision contrary to the Agreement.

The beneficiaries and complementary beneficiaries must create and participate in common boards and advisory structures to decide on collaboration and synchronisation of activities, including on management of outcomes, common approaches towards standardisation, SME involvement, links with regulatory and policy activities, and commonly shared dissemination and awareness raising activities.

The beneficiaries must give access to their results to the complementary beneficiaries, for the purposes of the complementary grant agreement(s) (see Article 31.6).

The beneficiaries must share the technical reports (see Article 20.3 and 20.4). The confidentiality obligations in Article 36 apply.

41.5 Relationship with partners of a joint action — Coordination agreement

Not applicable

CHAPTER 6 REJECTION OF COSTS — REDUCTION OF THE GRANT — RECOVERY — SANCTIONS — DAMAGES — SUSPENSION — TERMINATION — FORCE MAJEURE

SECTION 1 REJECTION OF COSTS — REDUCTION OF THE GRANT — RECOVERY — SANCTIONS

ARTICLE 42 — REJECTION OF INELIGIBLE COSTS

42.1 Conditions

The JU will — after **termination of the participation of a beneficiary**, at the time of an **interim payment, at the payment of the balance or afterwards** — reject any costs which are ineligible (see Article 6), in particular following checks, reviews, audits or investigations (see Article 22).

The rejection may also be based on the **extension of findings from other grants to this grant** (see Article 22.5.2).

42.2 Ineligible costs to be rejected — Calculation — Procedure

Ineligible costs will be rejected in full.

If the rejection of costs does not lead to a recovery (see Article 44), the JU will formally notify the coordinator or beneficiary concerned of the rejection of costs, the amounts and the reasons why (if applicable, together with the notification of amounts due; see Article 21.5). The coordinator or beneficiary concerned may — within 30 days of receiving notification — formally notify the JU of its disagreement and the reasons why.

If the rejection of costs leads to a recovery, the JU will follow the contradictory procedure with pre-information letter set out in Article 44.

42.3 Effects

If the JU rejects costs at the time of an **interim payment or the payment of the balance**, it will deduct them from the total eligible costs declared, for the action, in the periodic or final summary financial statement (see Articles 20.3 and 20.4). It will then calculate the interim payment or payment of the balance as set out in Articles 21.3 or 21.4.

If the JU rejects costs **after termination of the participation of a beneficiary**, it will deduct them from the costs declared by the beneficiary in the termination report and include the rejection in the calculation after termination (see Article 50.2 and 50.3).

If the JU — **after an interim payment but before the payment of the balance** — rejects costs declared in a periodic summary financial statement, it will deduct them from the total eligible costs declared, for the action, in the next periodic summary financial statement or in the final summary financial statement. It will then calculate the interim payment or payment of the balance as set out in Articles 21.3 or 21.4.

If the JU rejects costs **after the payment of the balance**, it will deduct the amount rejected from the total eligible costs declared, by the beneficiary, in the final summary financial statement. It will then calculate the revised final grant amount as set out in Article 5.4.

ARTICLE 43 — REDUCTION OF THE GRANT

43.1 Conditions



The JU may — **after termination of the participation of a beneficiary, at the payment of the balance or afterwards** — reduce the grant amount (see Article 5.1), if :

- (a) a beneficiary (or a natural person who has the power to represent or take decisions on its behalf) has committed:
 - (i) substantial errors, irregularities or fraud or
 - (ii) serious breach of obligations under the Agreement or during the award procedure (including improper implementation of the action, submission of false information, failure to provide required information, breach of ethical principles) or
- (b) a beneficiary (or a natural person who has the power to represent or take decision on its behalf) has committed — in other EU or Euratom grants awarded to it under similar conditions — systemic or recurrent errors, irregularities, fraud or serious breach of obligations that have a material impact on this grant (**extension of findings from other grants to this grant**; see Article 22.5.2).

43.2 Amount to be reduced — Calculation — Procedure

The amount of the reduction will be proportionate to the seriousness of the errors, irregularities or fraud or breach of obligations.

Before reduction of the grant, the JU will formally notify a ‘**pre-information letter**’ to the coordinator or beneficiary concerned:

- informing it of its intention to reduce the grant, the amount it intends to reduce and the reasons why and
- inviting it to submit observations within 30 days of receiving notification.

If the JU does not receive any observations or decides to pursue reduction despite the observations it has received, it will formally notify **confirmation** of the reduction (if applicable, together with the notification of amounts due; see Article 21).

43.3 Effects

If the JU reduces the grant **after termination of the participation of a beneficiary**, it will calculate the reduced grant amount for that beneficiary and then determine the amount due to that beneficiary (see Article 50.2 and 50.3).

If the JU reduces the grant **at the payment of the balance**, it will calculate the reduced grant amount for the action and then determine the amount due as payment of the balance (see Articles 5.3.4 and 21.4).

If the JU reduces the grant **after the payment of the balance**, it will calculate the revised final grant amount for the beneficiary concerned (see Article 5.4). If the revised final grant amount for the beneficiary concerned is lower than its share of the final grant amount, the JU will recover the difference (see Article 44).

ARTICLE 44 — RECOVERY OF UNDUE AMOUNTS

44.1 Amount to be recovered — Calculation — Procedure

The JU will — after **termination of the participation of a beneficiary, at the payment of the balance or afterwards** — claim back any amount that was paid, but is not due under the Agreement.

Each beneficiary's financial responsibility in case of recovery is limited to its own debt (including undue amounts paid by the JU for costs declared by its linked third parties), except for the amount retained for the Guarantee Fund (see Article 21.4).

44.1.1 Recovery after termination of a beneficiary's participation

If recovery takes place after termination of a beneficiary's participation (including the coordinator), the JU will claim back the undue amount from the beneficiary concerned, by formally notifying it a debit note (see Article 50.2 and 50.3). This note will specify the amount to be recovered, the terms and the date for payment.

If payment is not made by the date specified in the debit note, the JU will **recover** the amount:

- (a) by '**offsetting**' it — without the beneficiary's consent — against any amounts owed to the beneficiary concerned by the JU.

In exceptional circumstances, to safeguard the EU's or JU's financial interests, the JU may offset before the payment date specified in the debit note;

- (b) if a linked third party has accepted joint and several liability (see Article 14), by **holding the third party liable** up to the maximum JU contribution indicated, for the linked third party, in the estimated budget (see Annex 2) and/or
- (c) by **taking legal action** (see Article 57).

If payment is not made by the date specified in the debit note, the amount to be recovered (see above) will be increased by **late-payment interest** at the rate set out in Article 21.11, from the day following the payment date in the debit note, up to and including the date the JU receives full payment of the amount.

Partial payments will be first credited against expenses, charges and late-payment interest and then against the principal.

Bank charges incurred in the recovery process will be borne by the beneficiary, unless Directive 2007/64/EC²⁹ applies.

44.1.2 Recovery at payment of the balance

If the payment of the balance takes the form of a recovery (see Article 21.4), the JU will formally notify a '**pre-information letter**' to the coordinator:

- informing it of its intention to recover, the amount due as the balance and the reasons why;

²⁹ Directive 2007/64/EC of the European Parliament and of the Council of 13 November 2007 on payment services in the internal market amending Directives 97/7/EC, 2002/65/EC, 2005/60/EC and 2006/48/EC and repealing Directive 97/5/EC (OJ L 319, 05.12.2007, p. 1).

- specifying that it intends to deduct the amount to be recovered from the amount retained for the Guarantee Fund;
- requesting the coordinator to submit a report on the distribution of payments to the beneficiaries within 30 days of receiving notification, and
- inviting the coordinator to submit observations within 30 days of receiving notification.

If no observations are submitted or the JU decides to pursue recovery despite the observations it has received, it will **confirm recovery** (together with the notification of amounts due; see Article 21.5) and:

- pay the difference between the amount to be recovered and the amount retained for the Guarantee Fund, **if the difference is positive** or
- formally notify to the coordinator a **debit note** for the difference between the amount to be recovered and the amount retained for the Guarantee Fund, **if the difference is negative**. This note will also specify the terms and the date for payment.

If the coordinator does not repay the JU by the date in the debit note and has not submitted the report on the distribution of payments: the JU will **recover** the amount set out in the debit note from the coordinator (see below).

If the coordinator does not repay the JU by the date in the debit note, but has submitted the report on the distribution of payments: the JU will:

- (a) identify the beneficiaries for which the amount calculated as follows is negative:

$\{ \{ \{ \text{beneficiary's costs declared in the final summary financial statement and approved by the JU} \}$
multiplied by the reimbursement rate set out in Article 5.2 for the beneficiary concerned

plus

its linked third parties' costs declared in the final summary financial statement and approved by the JU
multiplied by the reimbursement rate set out in Article 5.2 for each linked third party concerned}

divided by

the JU contribution for the action calculated according to Article 5.3.1}

multiplied by

the final grant amount (see Article 5.3)},

minus

{pre-financing and interim payments received by the beneficiary}}.

- (b) formally notify to each beneficiary identified according to point (a) a **debit note** specifying the terms and date for payment. The amount of the debit note is calculated as follows:

$\{ \{ \text{amount calculated according to point (a) for the beneficiary concerned} \}$

divided by

the sum of the amounts calculated according to point (a) for all the beneficiaries identified according to point (a)}

multiplied by

the amount set out in the debit note formally notified to the coordinator}.

If payment is not made by the date specified in the debit note, the JU will **recover** the amount:

- (a) by **offsetting** it — without the beneficiary's consent — against any amounts owed to the beneficiary concerned by the JU.

In exceptional circumstances, to safeguard the EU's or JU's financial interests, the JU may offset before the payment date specified in the debit note;

- (b) by **drawing on the Guarantee Fund**. The JU will formally notify the beneficiary concerned the debit note on behalf of the Guarantee Fund and recover the amount:

- (i) if a linked third party has accepted joint and several liability (see Article 14), by **holding the third party liable** up to the maximum JU contribution indicated, for the linked third party, in the estimated budget (see Annex 2) and/or

- (ii) by **taking legal action** (see Article 57).

If payment is not made by the date in the debit note, the amount to be recovered (see above) will be increased by **late-payment interest** at the rate set out in Article 21.11, from the day following the payment date in the debit note, up to and including the date the JU receives full payment of the amount.

Partial payments will be first credited against expenses, charges and late-payment interest and then against the principal.

Bank charges incurred in the recovery process will be borne by the beneficiary, unless Directive 2007/64/EC applies.

44.1.3 Recovery of amounts after payment of the balance

If, for a beneficiary, the revised final grant amount (see Article 5.4) is lower than its share of the final grant amount, it must repay the difference to the JU.

The beneficiary's share of the final grant amount is calculated as follows:

{ { beneficiary's costs declared in the final summary financial statement and approved by the JU multiplied by the reimbursement rate set out in Article 5.2 for the beneficiary concerned

plus

its linked third parties' costs declared in the final summary financial statement and approved by the JU multiplied by the reimbursement rate set out in Article 5.2 for each linked third party concerned }

divided by

the JU contribution for the action calculated according to Article 5.3.1 }

multiplied by

the final grant amount (see Article 5.3) }.

If the coordinator has not distributed amounts received (see Article 21.7), the JU will also recover these amounts.

The JU will formally notify a **pre-information letter** to the beneficiary concerned:

- informing it of its intention to recover, the due amount and the reasons why and
- inviting it to submit observations within 30 days of receiving notification.

If no observations are submitted or the JU decides to pursue recovery despite the observations it has received, it will **confirm** the amount to be recovered and formally notify to the beneficiary concerned a **debit note**. This note will also specify the terms and the date for payment.

If payment is not made by the date specified in the debit note, the JU will **recover** the amount:

- (a) by **offsetting** it — without the beneficiary's consent — against any amounts owed to the beneficiary concerned by the JU.

In exceptional circumstances, to safeguard the EU's or JU's financial interests, the JU may offset before the payment date specified in the debit note;

- (b) by **drawing on the Guarantee Fund**. The JU will formally notify the beneficiary concerned the debit note on behalf of the Guarantee Fund and recover the amount:

- (i) if a linked third party has accepted joint and several liability (see Article 14), by **holding the third party liable** up to the maximum JU contribution indicated, for the linked third party, in the estimated budget (see Annex 2) and/or
- (ii) by **taking legal action** (see Article 57).

If payment is not made by the date in the debit note, the amount to be recovered (see above) will be increased by **late-payment interest** at the rate set out in Article 21.11, from the day following the date for payment in the debit note, up to and including the date the JU receives full payment of the amount.

Partial payments will be first credited against expenses, charges and late-payment interest and then against the principal.

Bank charges incurred in the recovery process will be borne by the beneficiary, unless Directive 2007/64/EC applies.

ARTICLE 45 — ADMINISTRATIVE SANCTIONS

In addition to contractual measures, the JU may also adopt administrative sanctions under Articles 84 and 89 of the JU Financial Rules read in conjunction with Articles 106 and 131(4) of the Financial Regulation No 966/2012 (i.e. exclusion from future procurement contracts, grants, prizes and expert contracts and/or financial penalties).

SECTION 2 LIABILITY FOR DAMAGES

ARTICLE 46 — LIABILITY FOR DAMAGES

46.1 Liability of the JU

The JU cannot be held liable for any damage caused to the beneficiaries or to third parties as a consequence of implementing the Agreement, including for gross negligence.

The JU cannot be held liable for any damage caused by any of the beneficiaries or third parties involved in the action, as a consequence of implementing the Agreement.

46.2 Liability of the beneficiaries

Except in case of force majeure (see Article 51), the beneficiaries must compensate the JU for any damage it sustains as a result of the implementation of the action or because the action was not implemented in full compliance with the Agreement.

SECTION 3 SUSPENSION AND TERMINATION

ARTICLE 47 — SUSPENSION OF PAYMENT DEADLINE

47.1 Conditions

The JU may — at any moment — suspend the payment deadline (see Article 21.2 to 21.4) if a request for payment (see Article 20) cannot be approved because:

- (a) it does not comply with the provisions of the Agreement (see Article 20);
- (b) the technical or financial reports have not been submitted or are not complete or additional information is needed, or
- (c) there is doubt about the eligibility of the costs declared in the financial statements and additional checks, reviews, audits or investigations are necessary.

47.2 Procedure

The JU will formally notify the coordinator of the suspension and the reasons why.

The suspension will **take effect** the day notification is sent by the JU (see Article 52).

If the conditions for suspending the payment deadline are no longer met, the suspension will be **lifted** — and the remaining period will resume.

If the suspension exceeds two months, the coordinator may request the JU if the suspension will continue.

If the payment deadline has been suspended due to the non-compliance of the technical or financial reports (see Article 20) and the revised report or statement is not submitted or was submitted but is also rejected, the JU may also terminate the Agreement or the participation of the beneficiary (see Article 50.3.1(I)).

ARTICLE 48 — SUSPENSION OF PAYMENTS

48.1 Conditions

The JU may — at any moment — suspend payments, in whole or in part and for one or more beneficiaries, if:

- (a) a beneficiary (or a natural person who has the power to represent or take decision on its behalf) has committed or is suspected of having committed:
 - (i) substantial errors, irregularities or fraud or
 - (ii) serious breach of obligations under the Agreement or during the award procedure (including improper implementation of the action, submission of false information, failure to provide required information, breach of ethical principles) or
- (b) a beneficiary (or a natural person who has the power to represent or take decision on its behalf) has committed — in other JU, EU or Euratom grants awarded to it under similar conditions — systemic or recurrent errors, irregularities, fraud or serious breach of obligations that have a material impact on this grant (**extension of findings from other grants to this grant**; see Article 22.5.2).

If payments are suspended for one or more beneficiaries, the JU will make partial payment(s) for the part(s) not suspended. If suspension concerns the payment of the balance, — once suspension is lifted — the payment or the recovery of the amount(s) concerned will be considered the payment of the balance that closes the action.

48.2 Procedure

Before suspending payments, the JU will formally notify the coordinator or beneficiary concerned:

- informing it of its intention to suspend payments and the reasons why and
- inviting it to submit observations within 30 days of receiving notification.

If the JU does not receive observations or decides to pursue the procedure despite the observations it has received, it will formally notify **confirmation** of the suspension. Otherwise, it will formally notify that the suspension procedure is not continued.

The suspension will **take effect** the day the confirmation notification is sent by the JU.

If the conditions for resuming payments are met, the suspension will be **lifted**. The JU will formally notify the coordinator or beneficiary concerned.

During the suspension, the periodic report(s) for all reporting periods except the last one (see Article 20.3), must not contain any individual financial statements from the beneficiary concerned and its linked third parties. The coordinator must include them in the next periodic report after the suspension is lifted or — if suspension is not lifted before the end of the action — in the last periodic report.

The beneficiaries may suspend implementation of the action (see Article 49.1) or terminate the Agreement or the participation of the beneficiary concerned (see Article 50.1 and 50.2).

ARTICLE 49 — SUSPENSION OF THE ACTION IMPLEMENTATION

49.1 Suspension of the action implementation, by the beneficiaries

49.1.1 Conditions

The beneficiaries may suspend implementation of the action or any part of it, if exceptional circumstances — in particular *force majeure* (see Article 51) — make implementation impossible or excessively difficult.

49.1.2 Procedure

The coordinator must immediately formally notify to the JU the suspension (see Article 52), stating:

- the reasons why and
- the expected date of resumption.

The suspension will **take effect** the day this notification is received by the JU.

Once circumstances allow for implementation to resume, the coordinator must immediately formally notify the JU and request an **amendment** of the Agreement to set the date on which the action will be resumed, extend the duration of the action and make other changes necessary to adapt the action to the new situation (see Article 55) — unless the Agreement or the participation of a beneficiary has been terminated (see Article 50).

The suspension will be **lifted** with effect from the resumption date set out in the amendment. This date may be before the date on which the amendment enters into force.

Costs incurred during suspension of the action implementation are not eligible (see Article 6).

49.2 Suspension of the action implementation, by the JU

49.2.1 Conditions

The JU may suspend implementation of the action or any part of it, if:

- (a) a beneficiary (or a natural person who has the power to represent or take decisions on its behalf) has committed or is suspected of having committed:
 - (i) substantial errors, irregularities or fraud or
 - (ii) serious breach of obligations under the Agreement or during the award procedure (including improper implementation of the action, submission of false information, failure to provide required information, breach of ethical principles);
- (b) a beneficiary (or a natural person who has the power to represent or take decisions on its behalf) has committed — in other JU, EU or Euratom grants awarded to it under similar conditions — systemic or recurrent errors, irregularities, fraud or serious breach of obligations that have a material impact on this grant (**extension of findings from other grants to this grant**; see Article 22.5.2), or
- (c) the action is suspected of having lost its scientific or technological relevance.

49.2.2 Procedure

Before suspending implementation of the action, the JU will formally notify the coordinator or beneficiary concerned:

- informing it of its intention to suspend the implementation and the reasons why and
- inviting it to submit observations within 30 days of receiving notification.

If the JU does not receive observations or decides to pursue the procedure despite the observations it has received, it will formally notify **confirmation** of the suspension. Otherwise, it will formally notify that the procedure is not continued.

The suspension will **take effect** five days after confirmation notification is received (or on a later date specified in the notification).

It will be **lifted** if the conditions for resuming implementation of the action are met.

The coordinator or beneficiary concerned will be formally notified of the lifting and the Agreement will be **amended** to set the date on which the action will be resumed, extend the duration of the action and make other changes necessary to adapt the action to the new situation (see Article 55) — unless the Agreement has already been terminated (see Article 50).

The suspension will be lifted with effect from the resumption date set out in the amendment. This date may be before the date on which the amendment enters into force.

Costs incurred during suspension are not eligible (see Article 6).

The beneficiaries may not claim damages due to suspension by the JU (see Article 46).

Suspension of the action implementation does not affect the JU's right to terminate the Agreement or participation of a beneficiary (see Article 50), reduce the grant or recover amounts unduly paid (see Articles 43 and 44).

ARTICLE 50 — TERMINATION OF THE AGREEMENT OR OF THE PARTICIPATION OF ONE OR MORE BENEFICIARIES

50.1 Termination of the Agreement, by the beneficiaries

50.1.1 Conditions and procedure

The beneficiaries may terminate the Agreement.

The coordinator must formally notify termination to the JU (see Article 52), stating:

- the reasons why and
- the date the termination will take effect. This date must be after the notification.

If no reasons are given or if the JU considers the reasons do not justify termination, the Agreement will be considered to have been '**terminated improperly**'.

The termination will **take effect** on the day specified in the notification.

50.1.2 Effects

The coordinator must — within 60 days from when termination takes effect — submit:

- (i) a periodic report (for the open reporting period until termination; see Article 20.3) and
- (ii) the final report (see Article 20.4).

If the JU does not receive the reports within the deadline (see above), only costs which are included in an approved periodic report will be taken into account.

The JU will **calculate** the final grant amount (see Article 5.3) and the balance (see Article 21.4) on the basis of the reports submitted. Only costs incurred until termination are eligible (see Article 6). Costs relating to contracts due for execution only after termination are not eligible.

Improper termination may lead to a reduction of the grant (see Article 43).

After termination, the beneficiaries' obligations (in particular Articles 20, 22, 23, Section 3 of Chapter 4, 36, 37, 38, 40, 42, 43 and 44) continue to apply.

50.2 Termination of the participation of one or more beneficiaries, by the beneficiaries

50.2.1 Conditions and procedure

The participation of one or more beneficiaries may be terminated by the coordinator, on request of the beneficiary concerned or on behalf of the other beneficiaries.

The coordinator must formally notify termination to the JU (see Article 52) and inform the beneficiary concerned.

If the coordinator's participation is terminated without its agreement, the formal notification must be done by another beneficiary (acting on behalf of the other beneficiaries).

The notification must include:

- the reasons why;
- the opinion of the beneficiary concerned (or proof that this opinion has been requested in writing);
- the date the termination takes effect. This date must be after the notification, and
- a request for amendment (see Article 55), with a proposal for reallocation of the tasks and the estimated budget of the beneficiary concerned (see Annexes 1 and 2) and, if necessary, the addition of one or more new beneficiaries (see Article 56). If termination takes effect after the period set out in Article 3, no request for amendment must be included unless the beneficiary concerned is the coordinator. In this case, the request for amendment must propose a new coordinator.

If this information is not given or if the JU considers that the reasons do not justify termination, the participation will be considered to have been **terminated improperly**.

The termination will **take effect** on the day specified in the notification.

50.2.2 Effects

The coordinator must — within 30 days from when termination takes effect — submit:

- (i) a report on the distribution of payments to the beneficiary concerned and
- (ii) if termination takes effect during the period set out in Article 3, a ‘**termination report**’ from the beneficiary concerned, for the open reporting period until termination, containing an overview of the progress of the work, an overview of the use of resources, the individual financial statement and, if applicable, the certificate on the financial statement (see Articles 20.3 and 20.4).

The information in the termination report must also be included in the periodic report for the next reporting period (see Article 20.3).

If the request for amendment is rejected by the JU (because it calls into question the decision awarding the grant or breaches the principle of equal treatment of applicants), the Agreement may be terminated according to Article 50.3.1(c).

If the request for amendment is accepted by the JU, the Agreement is **amended** to introduce the necessary changes (see Article 55).

The JU will — on the basis of the periodic reports, the termination report and the report on the distribution of payments — **calculate** the amount which is due to the beneficiary and if the (pre-financing and interim) payments received by the beneficiary exceed this amount.

The **amount which is due** is calculated in the following steps:

Step 1 — Application of the reimbursement rate to the eligible costs

The grant amount for the beneficiary is calculated by applying the reimbursement rate(s) to the total eligible costs declared by the beneficiary and its linked third parties in the termination report and approved by the JU.

Only costs incurred by the beneficiary concerned until termination takes effect are eligible (see Article 6). Costs relating to contracts due for execution only after termination are not eligible.

Step 2 — Reduction due to substantial errors, irregularities or fraud or serious breach of obligations

In case of a reduction (see Article 43), the JU will calculate the reduced grant amount for the beneficiary by deducting the amount of the reduction (calculated in proportion to the seriousness of the errors, irregularities or fraud or breach of obligations, in accordance with Article 43.2) from the grant amount for the beneficiary.

If the payments received **exceed the amounts due**:

- if termination takes effect during the period set out in Article 3 and the request for amendment is accepted, the beneficiary concerned must repay to the coordinator the amount unduly received. The JU will formally notify the amount unduly received and request the beneficiary concerned to repay it to the coordinator within 30 days of receiving notification. If it does not repay the coordinator, the JU will draw upon the Guarantee Fund to pay the

coordinator and then notify a **debit note** on behalf of the Guarantee Fund to the beneficiary concerned (see Article 44);

- in all other cases, in particular if termination takes effect after the period set out in Article 3, the JU will formally notify a **debit note** to the beneficiary concerned. If payment is not made by the date in the debit note, the Guarantee Fund will pay to the JU the amount due and the JU will notify a debit note on behalf of the Guarantee Fund to the beneficiary concerned (see Article 44);
- if the beneficiary concerned is the former coordinator, it must repay the new coordinator according to the procedure above, unless:
 - termination takes effect after an interim payment and
 - the former coordinator has not distributed amounts received as pre-financing or interim payments (see Article 21.7).

In this case, the JU will formally notify a **debit note** to the former coordinator. If payment is not made by the date in the debit note, the Guarantee Fund will pay to the JU the amount due. The JU will then pay the new coordinator and notify a debit note on behalf of the Guarantee Fund to the former coordinator (see Article 44).

If the payments received **do not exceed the amounts due**: amounts owed to the beneficiary concerned will be included in the next interim or final payment.

If the JU does not receive the termination report within the deadline (see above), only costs included in an approved periodic report will be taken into account.

If the JU does not receive the report on the distribution of payments within the deadline (see above), it will consider that:

- the coordinator did not distribute any payment to the beneficiary concerned and that
- the beneficiary concerned must not repay any amount to the coordinator.

Improper termination may lead to a reduction of the grant (see Article 43) or termination of the Agreement (see Article 50).

After termination, the concerned beneficiary's obligations (in particular Articles 20, 22, 23, Section 3 of Chapter 4, 36, 37, 38, 40, 42, 43 and 44) continue to apply.

50.3 Termination of the Agreement or the participation of one or more beneficiaries, by the JU

50.3.1 Conditions

The JU may terminate the Agreement or the participation of one or more beneficiaries, if:

- (a) one or more beneficiaries do not accede to the Agreement (see Article 56);
- (b) a change to their legal, financial, technical, organisational or ownership situation (or those of its linked third parties) is likely to substantially affect or delay the implementation of the action or calls into question the decision to award the grant;



- (c) following termination of participation for one or more beneficiaries (see above), the necessary changes to the Agreement would call into question the decision awarding the grant or breach the principle of equal treatment of applicants (see Article 55);
- (d) implementation of the action is prevented by force majeure (see Article 51) or suspended by the coordinator (see Article 49.1) and either:
 - (i) resumption is impossible, or
 - (ii) the necessary changes to the Agreement would call into question the decision awarding the grant or breach the principle of equal treatment of applicants;
- (e) a beneficiary is declared bankrupt, being wound up, having its affairs administered by the courts, has entered into an arrangement with creditors, has suspended business activities, or is subject to any other similar proceedings or procedures under national law;
- (f) a beneficiary (or a natural person who has the power to represent or take decisions on its behalf) has been found guilty of professional misconduct, proven by any means;
- (g) a beneficiary does not comply with the applicable national law on taxes and social security;
- (h) the action has lost scientific or technological relevance;
- (i) not applicable;
- (j) not applicable;
- (k) a beneficiary (or a natural person who has the power to represent or take decisions on its behalf) has committed fraud, corruption, or is involved in a criminal organisation, money laundering or any other illegal activity;
- (l) a beneficiary (or a natural person who has the power to represent or take decisions on its behalf) has committed:
 - (i) substantial errors, irregularities or fraud or
 - (ii) serious breach of obligations under the Agreement or during the award procedure (including improper implementation of the action, submission of false information, failure to provide required information, breach of ethical principles);
- (m) a beneficiary (or a natural person who has the power to represent or take decisions on its behalf) has committed — in other JU, EU or Euratom grants awarded to it under similar conditions — systemic or recurrent errors, irregularities, fraud or serious breach of obligations that have a material impact on this grant (**extension of findings from other grants to this grant**; see Article 22.5.2);
- (n) despite a specific request by the JU, a beneficiary does not request — through the coordinator — an amendment to the Agreement to end the participation of one of its linked third parties or international partners that is in one of the situations under points (e), (f), (g), (k), (l) or (m) and to reallocate its tasks.

50.3.2 Procedure

Before terminating the Agreement or participation of one or more beneficiaries, the JU will formally notify the coordinator or beneficiary concerned:

- informing it of its intention to terminate and the reasons why and
- inviting it, within 30 days of receiving notification, to submit observations and — in case of Point (l.ii) above — to inform the JU of the measures to ensure compliance with the obligations under the Agreement.

If the JU does not receive observations or decides to pursue the procedure despite the observations it has received, it will formally notify to the coordinator or beneficiary concerned **confirmation** of the termination and the date it will take effect. Otherwise, it will formally notify that the procedure is not continued.

The termination will **take effect**:

- for terminations under Points (b), (c), (e), (g), (h), (j), (l.ii) and (n) above: on the day specified in the notification of the confirmation (see above);
- for terminations under Points (a), (d), (f), (i), (k), (l.i) and (m) above: on the day after the notification of the confirmation is received.

50.3.3 Effects

(a) for **termination of the Agreement**:

The coordinator must — within 60 days from when termination takes effect — submit:

- (i) a periodic report (for the last open reporting period until termination; see Article 20.3) and
- (ii) a final report (see Article 20.4).

If the Agreement is terminated for breach of the obligation to submit reports (see Articles 20.8 and 50.3.1(l)), the coordinator may not submit any reports after termination.

If the JU does not receive the reports within the deadline (see above), only costs which are included in an approved periodic report will be taken into account.

The JU will **calculate** the final grant amount (see Article 5.3) and the balance (see Article 21.4) on the basis of the reports submitted. Only costs incurred until termination takes effect are eligible (see Article 6). Costs relating to contracts due for execution only after termination are not eligible.

This does not affect the JU's right to reduce the grant (see Article 43) or to impose administrative sanctions (Article 45).

The beneficiaries may not claim damages due to termination by the JU (see Article 46).

After termination, the beneficiaries' obligations (in particular Articles 20, 22, 23, Section 3 of Chapter 4, 36, 37, 38, 40, 42, 43 and 44) continue to apply.

(b) for **termination of the participation of one or more beneficiaries**:

The coordinator must — within 60 days from when termination takes effect — submit:

- (i) a report on the distribution of payments to the beneficiary concerned;
- (ii) a request for amendment (see Article 55), with a proposal for reallocation of the tasks and estimated budget of the beneficiary concerned (see Annexes 1 and 2) and, if necessary, the addition of one or more new beneficiaries (see Article 56). If termination is notified after the period set out in Article 3, no request for amendment must be submitted unless the beneficiary concerned is the coordinator. In this case the request for amendment must propose a new coordinator, and
- (iii) if termination takes effect during the period set out in Article 3, a **termination report** from the beneficiary concerned, for the open reporting period until termination, containing an overview of the progress of the work, an overview of the use of resources, the individual financial statement and, if applicable, the certificate on the financial statement (see Article 20).

The information in the termination report must also be included in the periodic report for the next reporting period (see Article 20.3).

If the request for amendment is rejected by the JU (because it calls into question the decision awarding the grant or breaches the principle of equal treatment of applicants), the Agreement may be terminated according to Article 50.3.1(c).

If the request for amendment is accepted by the JU, the Agreement is **amended** to introduce the necessary changes (see Article 55).

The JU will — on the basis of the periodic reports, the termination report and the report on the distribution of payments — **calculate** the amount which is due to the beneficiary and if the (pre-financing and interim) payments received by the beneficiary exceed this amount.

The **amount which is due** is calculated in the following steps:

Step 1 — Application of the reimbursement rate to the eligible costs

The grant amount for the beneficiary is calculated by applying the reimbursement rate(s) to the total eligible costs declared by the beneficiary and its linked third parties in the termination report and approved by the JU.

Only costs incurred by the beneficiary concerned until termination takes effect are eligible (see Article 6). Costs relating to contracts due for execution only after termination are not eligible.

Step 2 — Reduction due to substantial errors, irregularities or fraud or serious breach of obligations

In case of a reduction (see Article 43), the JU will calculate the reduced grant amount for the beneficiary by deducting the amount of the reduction (calculated in proportion to the seriousness of the errors, irregularities or fraud or breach of obligations, in accordance with Article 43.2) from the grant amount for the beneficiary.

If the payments received **exceed the amounts due**:

- if termination takes effect during the period set out in Article 3 and the request for amendment is accepted, the beneficiary concerned must repay to the coordinator the amount unduly received. The JU will formally notify the amount unduly received and request the beneficiary concerned to repay it to the coordinator within 30 days of receiving notification. If it does not repay the coordinator, the JU will draw upon the Guarantee Fund to pay the coordinator and then notify a **debit note** on behalf of the Guarantee Fund to the beneficiary concerned (see Article 44);
- in all other cases, in particular if termination takes effect after the period set out in Article 3, the JU will formally notify a **debit note** to the beneficiary concerned. If payment is not made by the date in the debit note, the Guarantee Fund will pay to the JU the amount due and the JU will notify a debit note on behalf of the Guarantee Fund to the beneficiary concerned (see Article 44);
- if the beneficiary concerned is the former coordinator, it must repay the new coordinator according to the procedure above, unless:
 - termination takes effect after an interim payment and
 - the former coordinator has not distributed amounts received as pre-financing or interim payments (see Article 21.7).

In this case, the JU will formally notify a **debit note** to the former coordinator. If payment is not made by the date in the debit note, the Guarantee Fund will pay to the JU the amount due. The JU will then pay the new coordinator and notify a debit note on behalf of the Guarantee Fund to the former coordinator (see Article 44).

If the payments received **do not exceed the amounts due**: amounts owed to the beneficiary concerned will be included in the next interim or final payment.

If the JU does not receive the termination report within the deadline (see above), only costs included in an approved periodic report will be taken into account.

If the JU does not receive the report on the distribution of payments within the deadline (see above), it will consider that:

- the coordinator did not distribute any payment to the beneficiary concerned and that
- the beneficiary concerned must not repay any amount to the coordinator.

After termination, the concerned beneficiary's obligations (in particular Articles 20, 22, 23, Section 3 of Chapter 4, 36, 37, 38, 40, 42, 43 and 44) continue to apply.

SECTION 4 FORCE MAJEURE

ARTICLE 51 — FORCE MAJEURE

‘Force majeure’ means any situation or event that:

- prevents either party from fulfilling their obligations under the Agreement,
- was unforeseeable, exceptional situation and beyond the parties' control,
- was not due to error or negligence on their part (or on the part of third parties involved in the action), and
- proves to be inevitable in spite of exercising all due diligence.

The following cannot be invoked as force majeure:

- any default of a service, defect in equipment or material or delays in making them available, unless they stem directly from a relevant case of force majeure,
- labour disputes or strikes, or
- financial difficulties.

Any situation constituting force majeure must be formally notified to the other party without delay, stating the nature, likely duration and foreseeable effects.

The parties must immediately take all the necessary steps to limit any damage due to force majeure and do their best to resume implementation of the action as soon as possible.

The party prevented by force majeure from fulfilling its obligations under the Agreement cannot be considered in breach of them.

CHAPTER 7 FINAL PROVISIONS

ARTICLE 52 — COMMUNICATION BETWEEN THE PARTIES

52.1 Form and means of communication

Communication under the Agreement (information, requests, submissions, 'formal notifications', etc.) must:

- be made in writing and
- bear the number of the Agreement.

All communication must be made through the Participant Portal **electronic** exchange system and using the forms and templates provided there.

If — after the payment of the balance — the JU finds that a formal notification was not accessed, a second formal notification will be made by registered post with proof of delivery ('formal notification on **paper**'). Deadlines will be calculated from the moment of the second notification.

Communications in the electronic exchange system must be made by persons authorised according to the Participant Portal Terms & Conditions. For naming the authorised persons, each beneficiary must have designated — before the signature of this Agreement — a 'legal entity appointed representative

(LEAR)'. The role and tasks of the LEAR are stipulated in his/her appointment letter (see Participant Portal Terms & Conditions).

If the electronic exchange system is temporarily unavailable, instructions will be given on the JU and Commission websites.

52.2 Date of communication

Communications are considered to have been made when they are sent by the sending party (i.e. on the date and time they are sent through the electronic exchange system).

Formal notifications through the **electronic** exchange system are considered to have been made when they are received by the receiving party (i.e. on the date and time of acceptance by the receiving party, as indicated by the time stamp). A formal notification that has not been accepted within 10 days after sending is considered to have been accepted.

Formal notifications **on paper** sent by **registered post** with proof of delivery (only after the payment of the balance) are considered to have been made on either:

- the delivery date registered by the postal service or
- the deadline for collection at the post office.

If the electronic exchange system is temporarily unavailable, the sending party cannot be considered in breach of its obligation to send a communication within a specified deadline.

52.3 Addresses for communication

The **electronic** exchange system must be accessed via the following URL:

<https://ec.europa.eu/info/funding-tenders/opportunities/portal/screen/myarea/projects>

The JU will formally notify the coordinator and beneficiaries in advance any changes to this URL.

Formal notifications on paper (only after the payment of the balance) addressed **to the JU** must be sent to the official mailing address indicated on the JU's website.

Formal notifications on paper (only after the payment of the balance) addressed **to the beneficiaries** must be sent to their legal address as specified in the Participant Portal Beneficiary Register.

ARTICLE 53 — INTERPRETATION OF THE AGREEMENT

53.1 Precedence of the Terms and Conditions over the Annexes

The provisions in the Terms and Conditions of the Agreement take precedence over its Annexes.

Annex 2 takes precedence over Annex 1.

53.2 Privileges and immunities

Nothing in the Agreement may be interpreted as a waiver of any privileges or immunities accorded

to the *EUROCONTROL - EUROPEAN ORGANISATION FOR THE SAFETY OF AIR NAVIGATION* by its constituent documents or international law.

ARTICLE 54 — CALCULATION OF PERIODS, DATES AND DEADLINES

In accordance with Regulation No 1182/71³⁰, periods expressed in days, months or years are calculated from the moment the triggering event occurs.

The day during which that event occurs is not considered as falling within the period.

ARTICLE 55 — AMENDMENTS TO THE AGREEMENT

55.1 Conditions

The Agreement may be amended, unless the amendment entails changes to the Agreement which would call into question the decision awarding the grant or breach the principle of equal treatment of applicants.

Amendments may be requested by any of the parties.

55.2 Procedure

The party requesting an amendment must submit a request for amendment signed in the electronic exchange system (see Article 52).

The coordinator submits and receives requests for amendment on behalf of the beneficiaries (see Annex 3).

If a change of coordinator is requested without its agreement, the submission must be done by another beneficiary (acting on behalf of the other beneficiaries).

The request for amendment must include:

- the reasons why;
- the appropriate supporting documents, and
- for a change of coordinator without its agreement: the opinion of the coordinator (or proof that this opinion has been requested in writing).

The JU may request additional information.

If the party receiving the request agrees, it must sign the amendment in the electronic exchange system within 45 days of receiving notification (or any additional information the JU has requested). If it does not agree, it must formally notify its disagreement within the same deadline. The deadline may be extended, if necessary for the assessment of the request. If no notification is received within the deadline, the request is considered to have been rejected.

An amendment **enters into force** on the day of the signature of the receiving party.

³⁰ Regulation (EEC, Euratom) No 1182/71 of the Council of 3 June 1971 determining the rules applicable to periods, dates and time-limits (OJ L 124, 8.6.1971, p. 1).

An amendment **takes effect** on the date agreed by the parties or, in the absence of such an agreement, on the date on which the amendment enters into force.

ARTICLE 56 — ACCESSION TO THE AGREEMENT

56.1 Accession of the beneficiaries mentioned in the Preamble

The other beneficiaries must accede to the Agreement by signing the Accession Form (see Annex 3) in the electronic exchange system (see Article 52) within 30 days after its entry into force (see Article 58) and for beneficiaries for which the JU has requested joint and several liability of a linked third party, by also submitting — at accession — a declaration on joint and several liability (see Annex 3a) signed by the third party.

They will assume the rights and obligations under the Agreement with effect from the date of its entry into force (see Article 58).

If a beneficiary does not accede to the Agreement within the above deadline, the coordinator must — within 30 days — request an amendment to make any changes necessary to ensure proper implementation of the action. This does not affect the JU's right to terminate the Agreement (see Article 50).

56.2 Addition of new beneficiaries

In justified cases, the beneficiaries may request the addition of a new beneficiary which must be a Leader or a Core Partner¹ of the JU.

For this purpose, the coordinator must submit a request for amendment in accordance with Article 55. It must include an Accession Form (see Annex 3) signed by the new beneficiary in the electronic exchange system (see Article 52).

New beneficiaries must assume the rights and obligations under the Agreement with effect from the date of their accession specified in the Accession Form (see Annex 3).

ARTICLE 57 — APPLICABLE LAW AND SETTLEMENT OF DISPUTES

57.1 Applicable law

The Agreement is governed by the applicable EU law, supplemented if necessary by the law of Belgium.

As an exception, the Agreement is governed by a different applicable law for the following beneficiaries:

- EUROCONTROL - EUROPEAN ORGANISATION FOR THE SAFETY OF AIR NAVIGATION: by the general principles governing the law of international organisations and the rules of general international law

57.2 Dispute settlement

¹ As defined under Article 1 of the Statutes, Annex I to Council Regulation (EU) No 558/2014 of 6 May 2014 (OJ L 169/77).

If a dispute concerning the interpretation, application or validity of the Agreement cannot be settled amicably, the General Court — or, on appeal, the Court of Justice of the European Union — has sole jurisdiction. Such actions must be brought under Article 272 of the Treaty on the Functioning of the EU (TFEU).

As an exception, if such a dispute is between the JU and SINTEF AS, SKYGUIDE, SA SUISSE POUR LES SERVICES DE LA NAVIGATION AERIENNE CIVILS ET MILITAIRES, the competent Belgian courts have sole jurisdiction.

As an exception, for the following beneficiaries:

- EUROCONTROL - EUROPEAN ORGANISATION FOR THE SAFETY OF AIR NAVIGATION

such disputes must — if they cannot be settled amicably — be referred to arbitration. Each party must formally notify to the other party its intention of resorting to arbitration and the identity of the arbitrator. The Permanent Court of Arbitration Optional Rules for Arbitration Involving International Organisations and States in force at the date of entry into force of the Agreement will apply. The appointing authority will be the Secretary-General of the Permanent Court of Arbitration following a written request submitted by either party. The arbitration proceedings must take place in Brussels and the language used in the arbitral proceedings will be English. The arbitral award will be binding on all parties and will not be subject to appeal.

If a dispute concerns administrative sanctions or offsetting, the beneficiaries must bring action before the General Court — or, on appeal, the Court of Justice of the European Union — under Article 263 TFEU.

ARTICLE 58 — ENTRY INTO FORCE OF THE AGREEMENT

The Agreement will enter into force on the day of signature by the JU or the coordinator, depending on which is later.

SIGNATURES

For the coordinator

For the JU



ANNEX 1 (part A)

Research and Innovation action

NUMBER — 101017587 — PJ32-W3 VC

Table of Contents

1.1. The project summary.....	3
1.2. The list of beneficiaries.....	4
1.3. Workplan Tables - Detailed implementation.....	6
1.3.1. WT1 List of work packages.....	6
1.3.2. WT2 List of deliverables.....	7
1.3.3. WT3 Work package descriptions.....	8
Work package 1.....	8
Work package 2.....	10
Work package 3.....	15
1.3.4. WT4 List of milestones.....	20
1.3.5. WT5 Critical Implementation risks and mitigation actions.....	21
1.3.6 WT6 Summary of project effort in person-months.....	22
1.3.7. WT7 Tentative schedule of project reviews.....	24

1.1. The project summary

Project Number ¹	101017587	Project Acronym ²	PJ32-W3 VC
One form per project			
General information			
Project title ³	Virtual Centre		
Starting date ⁴	01/01/2021		
Duration in months ⁵	24		
Call (part) identifier ⁶	H2020-SESAR-2020-2		
Topic	SESAR-WAVE3-01-2020 Virtual Centre		
Fixed EC Keywords			
Free keywords	Virtual Centre, Airspace Delegation, Air Traffic Service Unit, ATM Data Service provider, virtualisation, de-fragmentation, digitalisation, interoperability, Airspace Architecture Study, SESAR		
Abstract ⁷			
<p>PJ32-W3-01 Virtual Centre - Complement of PJ10-W2-93 Delegation of airspace amongst Air Traffic Service Units (ATSUs). While PJ10 W2-93 addresses the ATC aspects of airspace delegation amongst ATSUs, this solution will further investigate the Air Traffic Flow and Capacity Management (ATFCM) aspects of such airspace delegation amongst ATSUs.</p> <p>This proposal addresses also the need to develop the technical infrastructure to support the validation activities planned by SESAR2020 Wave 2 solution PJ10-W2-93 on the ATC aspects of airspace delegation amongst ATSUs and the validation activities required on the ATFCM aspects of airspace delegation amongst ATSUs.</p>			

1.2. List of Beneficiaries

 Associated with document Ref. Ares(2020)7579636 - 14/12/2020

Project Number ¹	101017587	Project Acronym ²	PJ32-W3 VC
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List of Beneficiaries

No	Name	Short name	Country	Project entry month ⁸	Project exit month
1	EUROCONTROL - EUROPEAN ORGANISATION FOR THE SAFETY OF AIR NAVIGATION	EUROCONTROL	Belgium	1	24
2	VALSTYBES IMONE ORO NAVIGACIJA	ON (B4)	Lithuania	1	24
3	POLSKA AGENCJA ZEGLUGI POWIETRZNEJ	PANSA (B4)	Poland	1	24
4	AUSTRO CONTROL OSTERREICHISCHE GESELLSCHAFT FUR ZIVILLUFTFAHRT MBH	ACG/COOPANS	Austria	1	24
5	CROATIA CONTROL, CROATIAN AIR NAVIGATION SERVICES LTD	CCL/COOPANS	Croatia	1	24
6	LUFTFARTSVERKET	LFV/COOPANS	Sweden	1	24
7	NAVIAIR	NAVIAIR/COOPANS	Denmark	1	24
8	DFS DEUTSCHE FLUGSICHERUNG GMBH	DFS	Germany	1	24
9	DIRECTION DES SERVICES DE LA NAVIGATION AERIENNE	DSNA	France	1	24
10	ENAIRES	ENAIRES	Spain	1	24
11	ENAV SPA	ENAV	Italy	1	24
12	FREQUENTIS AG	FRQ (FSP)	Austria	1	24
13	HUNGAROCNTRL MAGYAR LEGIFORGALMISZOLGALAT ZARTKORUEN MUKODO RESZVENYTARSASAG	HC (FSP)	Hungary	1	24
14	INDRA SISTEMAS SA	INDRA	Spain	1	24
15	LEONARDO - SOCIETA PER AZIONI	LDO	Italy	1	24
16	SINTEF AS	SINTEF (NATMIG)	Norway	1	24
17	SKYGUIDE, SA SUISSE POUR LES SERVICES DE LA NAVIGATION AERIENNE CIVILS ET MILITAIRES	SKYGUIDE	Switzerland	1	24
18	THALES LAS FRANCE SAS	THALES AIR SYS	France	1	24
19	NATS (EN ROUTE) PUBLIC LIMITED COMPANY	NATS	United Kingdom	1	24
20	RIZENI LETOVEHO PROVOZU CESKE REPUBLIKY STATNI PODNIK	ANS CR (B4)	Czech Republic	1	24
21	LETOVE PREVADZKOVE SLUZBY SLOVENSKEJ REPUBLIKY, STATNY PODNIK	LPS SR (B4)	Slovakia	1	24

1.2. List of Beneficiaries

No	Name	Short name	Country	Project entry month ⁸	Project exit month
22	UDARAS EITLIOCHTA NA HEIREANN THE IRISH AVIATION AUTHORITY	IAA/COOPANS	Ireland	1	24
23	ATOS BELGIUM	ATOS (FSP)	Belgium	1	24
24	AIRTEL ATN LIMITED	AIRTEL (NATMIG)	Ireland	1	24
25	SAAB AKTIEBOLAG	SAAB (NATMIG)	Sweden	1	24

1.3. Workplan Tables - Detailed implementation

 Associated with document Ref. Ares(2020)7579636 - 14/12/2020

1.3.1. WT1 List of work packages

WP Number ⁹	WP Title	Lead beneficiary ¹⁰	Person-months ¹¹	Start month ¹²	End month ¹³
WP1	Project Management	1 - EUROCONTROL	12.00	1	24
WP2	Operational Thread	1 - EUROCONTROL	441.68	1	24
WP3	Technical Thread	9 - DSNA	500.04	1	24
Total			953.72		

1.3.2. WT2 list of deliverables

Deliverable Number¹⁴	Deliverable Title	WP number⁹	Lead beneficiary	Type¹⁵	Dissemination level¹⁶	Due Date (in months)¹⁷
D1.1	Project Management Plan	WP1	1 - EUROCONTROL	Report	Confidential, only for members of the consortium (including the Commission Services)	2
D1.2	Management Progress Report N 1	WP1	1 - EUROCONTROL	Report	Confidential, only for members of the consortium (including the Commission Services)	10
D1.3	Management Project Report N 2	WP1	1 - EUROCONTROL	Report	Confidential, only for members of the consortium (including the Commission Services)	22
D2.1	PJ32-W3 Solution Data Pack V2	WP2	1 - EUROCONTROL	Report	Public	21
D3.1	VC Maturity Report	WP3	12 - FRQ (FSP)	Report	Public	22

1.3.3. WT3 Work package descriptions

Work package number ⁹	WP1	Lead beneficiary ¹⁰	1 - EUROCONTROL
Work package title	Project Management		
Start month	1	End month	24

Objectives

WP01 – Project Management will coordinate and monitor the project's progress to accomplish the main objectives regarding time and resources. It will ensure PJ32-W3 coordination with the SESAR 2020 Programme/SJU and fulfil the administrative requirements of the grant agreement

Description of work and role of partners

WP1 - Project Management [Months: 1-24]

EUROCONTROL

The Project Management task will ensure:

1. Ensure Project Management and Coordination – Project Management Plan (PMP) production, day-to-day monitoring and control of project progress (including risk management) with respect to project objectives, timetable and acceptance of deliverables. The Project Manager (PM) will be responsible to carry out the main management activities at project level and the reporting process, and ensure timely delivery.
 2. Regular management meetings will be organized:
 - Project Review meeting with SJU (annual),
 - PMB (webex and F2F – monthly or on demand),
 - EPMB (F2F - annual or on demand).
 3. The PM, together with the PMB and EPMB members, will act as project steering committee. Any Change request affecting the project will be handled by the EPMB to allow flexibility.
 4. Ensure Project Quality Management - PMP will describe the quality management.
 5. Ensure Project Ethics Management if any Ethics requirements is to be managed.
 6. Ensure the Administration of the project according to the grant agreement and H2020 obligations, and process the necessary Grant Amendment.
 7. Ensure project Dissemination and Communication in cooperation with the SJU and the PJ32-W3 WP Leaders and all involved partners. A communication plan will be produced and maintained to define and report on the project communication activity. The communication plan will be part of the PMP. Communication actions will be monitored in the PJ10/PJ32 common PMB.
- Report on a yearly basis the PJ32-W3 activity – Management Progress Report. It will reflect the PJ32-W3 activities such as support to the SJU, Maturity Gates, Concept validation, technical infrastructure, coordination with PJ10-W2-93 and PJ09-W2-44, communication, etc

Participation per Partner

Partner number and short name	WP1 effort
1 - EUROCONTROL	12.00
Total	12.00

List of deliverables

Deliverable Number ¹⁴	Deliverable Title	Lead beneficiary	Type ¹⁵	Dissemination level ¹⁶	Due Date (in months) ¹⁷
D1.1	Project Management Plan	1 - EUROCONTROL	Report	Confidential, only for members of the consortium (including the Commission Services)	2
D1.2	Management Progress Report N 1	1 - EUROCONTROL	Report	Confidential, only for members of the consortium (including the Commission Services)	10
D1.3	Management Project Report N 2	1 - EUROCONTROL	Report	Confidential, only for members of the consortium (including the Commission Services)	22

Description of deliverables

D.1.1 Project Management Plan T0 + 2 months
D.1.2 Management Progress Report N°1 T0 + 10 months
D.1.3 Management Project Report N°2 T0 + 22 months
Technical and Financial report at T0+14 and T0+26

D1.1 : Project Management Plan [2]
Description of the project plan

D1.2 : Management Progress Report N 1 [10]
Description of achievements during the past period

D1.3 : Management Project Report N 2 [22]
Description of project achievements

Schedule of relevant Milestones

Milestone number ¹⁸	Milestone title	Lead beneficiary	Due Date (in months)	Means of verification
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Work package number ⁹	WP2	Lead beneficiary ¹⁰	1 - EUROCONTROL
Work package title	Operational Thread		
Start month	1	End month	24

Objectives

WP02 will bring ATFCM procedures and requirements and their impacts on ATC systems to support airspace delegation at E-OCVM maturity level 2, complementing PJ10-W2-93. It will assess the ATFCM aspects of Airspace Delegation and the Capacity on Demand via two main Validation Exercises. A specific sub-work package is defined for each validation exercise. It will complement the OSED/SPR/INTEROP/TS/IRS document and associated SESAR architecture (EATMA) produced by PJ10-W2-93. It will define and plan the validation activities (VALP production) and consolidate the performance assessment made during the validation exercises (VALR production and complement CBA of PJ10-W2-93).

Description of work and role of partners

WP2 - Operational Thread [Months: 1-24]

EUROCONTROL, ON (B4), PANSAs (B4), ACG/COOPANS, CCL/COOPANS, LFV/COOPANS, NAVIAIR/COOPANS, DFS, DSNA, ENAIRE, ENAV, INDRA, LDO, SINTEF (NATMIG), THALES AIR SYS

The WP02 will define, set-up, run and analyse the two validation exercises (EXE1 & EXE2) defined to validate the ATFCM procedures and requirements and their impacts on ATC systems to support airspace delegation and bring it to E-OCVM maturity level 2. As defined in chapter 1.3 (Concept and Methodology), the validation exercises are made of several scenarios. The WP02 is structured with:

- One WP in charge of coordinating the two validation exercises (EXE1 & EXE2) from the concept definition (OSED/SPR-INTEROP) and technical requirements (TS/IRS) production, the validation plan (VALP) definition and the final validation report (VALR) production. It will take care of the Maturity Gate (V2) at the end of PJ32-W3 project.
- One WP for each validation scenario defined for each validation exercise as described in the table below.

EXE1 - ATFCM aspects of Airspace Delegation Assessment - scenario 1 WP02.03

EXE1 - ATFCM aspects of Airspace Delegation Assessment - scenario 2a WP02.04 & WP02.05

EXE1 - ATFCM aspects of Airspace Delegation Assessment - scenario 2b WP02.06

EXE1 - ATFCM aspects of Airspace Delegation Assessment - scenario 3 WP02.07

EXE1 - ATFCM aspects of Airspace Delegation Assessment - scenario 3 & 4 WP02.08

EXE2 - Assess the Capacity on Demand assessment WP02.09

Therefore WP02 is structured with nine tasks:

- WP02.01 – WP Management
- WP02.02 - ATFCM Process and Procedures definition
- WP02.03 - ATFCM aspects of Airspace Delegation Assessment – EXE1 scenario 1
- WP02.04 - ATFCM aspects of Airspace Delegation Assessment – EXE1 scenario 2a
- WP02.05 - ATFCM aspects of Airspace Delegation Assessment – EXE1 scenario 2a
- WP02.06 - ATFCM aspects of Airspace Delegation Assessment – EXE1 scenario 2b
- WP02.07 - ATFCM aspects of Airspace Delegation Assessment – EXE1 scenario 4
- WP02.08 - ATFCM aspects of Airspace Delegation Assessment – EXE1 scenario 3 & 4
- WP02.09 - Capacity on Demand assessment

WP02.01 – WP management

This task will organise and coordinate the activities of the WP02 team (within the team and with other PJ32-W3 WPs and other SESAR 2020 Solution and Enabling projects when need be); report to the Project Manager on progress and issues, and participate in the PMB & EPMB.

This task will not produce any contractual deliverable but will support the overall PJ32-W3 management to produce the project reports.

WP02.02 - ATFCM Process and Procedures definition

LEAD EUROCONTROL with contribution of ON (B4), PANSAs (B4), ACG/COOPANS, CCL/COOPANS, LFV/COOPANS, Naviair/COOPANS, DFS, DSNA, ENAIRE, ENAV, INDRA, LDO, SINTEF (NATMIG), THALES AIR SYS

This task will define the ATFCM procedures and requirements (including operational, technical and service architecture) and their impacts on ATC systems to support airspace delegation amongst different ATSUs in consideration of evolving geographical/organisational scopes of airspace delegation in the Virtual Centre context. These requirements will complement the requirements defined by PJ10-W2-93 (in the OSED/SPR-INTEROP). It will define the technical requirements for the validation platforms to the WP03 (Technical Thread). It will also define the technical requirements and services complementing the TS/IRS (including the SDDs) produced by PJ10-W2-93.

This task will define and plan the validation activities (into a Validation Plan – VALP) to:

- validate the operational feasibility of ATFCM procedures and requirements of airspace delegation for support functions and HMI (for local and regional network management) and their impacts on ATC systems;
- assess the performance of Airspace Delegation at network level in consideration of evolving geographical/organisational scopes of airspace delegation.

Once the validation activities completed, this sub-WP will collect and consolidate the validation results and performances assessment into a validation report (VALR). The ATFCM procedures and requirements and their impacts on ATC systems to support airspace delegation amongst different ATSUs will be reviewed in light of the validation results and findings. This review may end up into revised contributions to the OSED/SPR-INTER document maintained by PJ10-W2-93.

The task will review and complement the CBA produced by PJ10-W3-93 to assess the affordability of the ATFCM procedures and requirements defined to support airspace delegation.

When completed, this task will deliver the PJ32-W3 Solution V2 data pack, prepare and run the V2 Maturity Gate with SJU, in parallel with PJ10-93 V3 gate.

Input

- PJ10-W2-93 OSED/SPR/INTEROP
- PJ10-W2-93 TS/IRS

Output (contractual deliverable)

- PJ32-W3 Solution Data Pack V2, containing V2 VALR, CN, ATFCM complements for Sol 93 OSED, TS and CBA

Output (non-contractual deliverable)

- PJ32-W3 VALP
- PJ32-W3 VALR
- Contribution to PJ10-W2-93 OSED/SPR/INTEROP (not in form of a stand-alone deliverable but a set of changes integrated into PJ10-W2-93 deliverable)
- Contribution to PJ10-W2-93 TS/IRS (not in form of a stand-alone deliverable but a set of changes integrated into PJ10-W2-93 deliverable)
- Contribution to PJ10-W2-93 CBA (not in form of a stand-alone deliverable but input data for PJ10-W2-93 CBA production)

WP02.03 - ATFCM aspects of Airspace Delegation Assessment – EXE1 scenario 1

Lead ENAIRE with contribution of EUROCONTROL

This task will be in charge of running the validation exercise 1 scenario 1 - Load balancing between ATSUs, of the same ANSP defined in chapter 1.3 (Concept and Methodology), section b) Method.

It will:

1. Contribute to the production of the Validation Plan
2. Define the technical requirement of the validation platform used
3. Set up the validation environment (infrastructure, platforms, tools and data needed to support the validation) and run the validation exercise
4. Collect and assess the validation results and contribute to the production of the Validation Report

Output (non-contractual deliverable)

- Contribution to PJ32-W3 VALP
- Contribution to PJ32-W3 VALR

WP02.04 - ATFCM aspects of Airspace Delegation Assessment – EXE1 scenario 2a

Lead PANSA (B4) with contribution of ON (B4), INDRA and EUROCONTROL

This task will be in charge of running the first validation exercise 1 scenario 2a - Load balancing between multiple neighbouring ATSUs from same ANSPs with NM coordination, defined in chapter 1.3 (Concept and Methodology), section b) Method.

Work will be arranged as for WP02.03 but for a different validation scenario.

WP02.05 - ATFCM aspects of Airspace Delegation Assessment - EXE1 scenario 2a

Lead Naviar/COOPANS with contribution of ACG/COOPANS, CCL/COOPANS, LFV/COOPANS, THALES AIR SYS and EUROCONTROL

This task will be in charge of running the second validation exercise 1 scenario 2a - Load balancing between multiple ATSUs from neighbouring ANSPs with local coordination with NM information, defined in chapter 1.3 (Concept and Methodology), section b) Method.

Work will be arranged as for WP02.03 but for a different validation scenario.

WP02.06 - ATFCM aspects of Airspace Delegation Assessment - EXE1 scenario 2b

Lead EUROCONTROL with contribution of PANSAs (B4), ENAIRE

This task will be in charge of running the validation exercise 1 scenario 2b - Load balancing between multiple ATSUs from neighbouring ANSPs with NM coordination, defined in chapter 1.3 (Concept and Methodology), section b) Method.

Work will be arranged as for WP02.03 but for a different validation scenario.

WP02.07 - ATFCM aspects of Airspace Delegation Assessment - EXE1 scenario 3

Lead Naviair/COOPANS with contribution of ACG/COOPANS, CCL/COOPANS, LFV/COOPANS, THALES AIR SYS

This task will be in charge of running the validation exercise 1 Scenario 3 - Contingency delegation of ATSU services, defined in chapter 1.3 (Concept and Methodology), section b) Method.

Work will be arranged as for WP02.03 but for a different validation scenario.

WP02.08 - ATFCM aspects of Airspace Delegation Assessment - EXE1 scenario 3 & 4

Lead ENAV with contribution of LDO, SINTEF (NATMIG))

This task will be in charge of running the validation exercise 1 Scenario 3 - Contingency delegation of ATSU services & Scenario 4 - ATFCM aspect for Civil/Military airspace delegation, defined in chapter 1.3 (Concept and Methodology), section b) Method.

Work will be arranged as for WP02.03 but for a different validation scenario.

WP02.09 - Assess the Capacity on Demand assessment

Lead EUROCONTROL with contribution of ON (B4), PANSAs (B4), DFS, DSNA, ACG/COOPANS, CCL/COOPANS, LFV/COOPANS, Naviair/COOPANS, ENAIRE, ENAV, NATS

This task will be in charge of running the validation exercise 2 - Capacity on Demand Performance Analysis, defined in chapter 1.3 (Concept and Methodology), section b) Method.

Work will be arranged as for WP02.03 but for a different validation scenario.

Participation per Partner

Partner number and short name	WP2 effort
1 - EUROCONTROL	182.00
2 - ON (B4)	2.52
3 - PANSAs (B4)	17.00
4 - ACG/COOPANS	4.66
5 - CCL/COOPANS	8.24
6 - LFV/COOPANS	9.54
7 - NAVIAIR/COOPANS	5.31
8 - DFS	4.00
9 - DSNA	4.00
10 - ENAIRE	10.40
CRIDA	28.00
11 - ENAV	6.62
NAIS	10.14
TECHNO SKY	3.82

Partner number and short name	WP2 effort
IDS AIRNAV	4.61
14 - INDRA	32.32
15 - LDO	38.50
16 - SINTEF (NATMIG)	18.00
18 - THALES AIR SYS	52.00
Total	441.68

List of deliverables

Deliverable Number ¹⁴	Deliverable Title	Lead beneficiary	Type ¹⁵	Dissemination level ¹⁶	Due Date (in months) ¹⁷
D2.1	PJ32-W3 Solution Data Pack V2	1 - EUROCONTROL	Report	Public	21

Description of deliverables

Contractual
D.2.1 PJ32-W3 Solution Data Pack T0 + 21 months
Non-contractual (deliverable numbering aligned with SJU guidance - transformed into project milestones)
D.02.10 VALP T0 + 8 months
D.02.20 Contribution to PJ10-W2-93 OSED/SPR/INTEROP (not in form of a stand-alone deliverable) T0 + 12 months
D.02.30 Contribution to PJ10-W2-93 TS/IRS (not in form of a stand-alone deliverable) T0 + 12 months
D.02.40 VALR T0 + 20 months
D.02.50 Contribution to PJ10-W2-93 CBA (not in form of a stand-alone deliverable) T0 + 18 months
D2.1 : PJ32-W3 Solution Data Pack V2 [21]
Contractual Deliverable provided to support the Solution V2 Maturity Gate

Schedule of relevant Milestones

Milestone number ¹⁸	Milestone title	Lead beneficiary	Due Date (in months)	Means of verification
MS1	WP02 contribution to PJ10-W2-93 OSED	1 - EUROCONTROL	12	Contribution to PJ10-W2-93 OSED/SPR/INTEROP for ATFCM elements
MS2	WP02 contribution to PJ10-W2-93 TS	1 - EUROCONTROL	12	Contribution to PJ10-W2-93 TS/IRS for the ATFCM elements
MS3	VALP ready	1 - EUROCONTROL	8	Availability of the Validation plan for WP02 exercises
MS4	VALR ready	1 - EUROCONTROL	20	Validation report covering validation activities in WP02

Schedule of relevant Milestones

Milestone number¹⁸	Milestone title	Lead beneficiary	Due Date (in months)	Means of verification
MS5	Maturity Gate	1 - EUROCONTROL	23	PJ32-W3 V2 maturity gate conducted in parallel with the one of PJ10
MS6	WP02 CBA contribution	1 - EUROCONTROL	18	Contribution to PJ10-W2-93 CBA for ATFCM elements

Work package number ⁹	WP3	Lead beneficiary ¹⁰	9 - DSNA
Work package title	Technical Thread		
Start month	1	End month	24

Objectives

WP03 – Technical Thread will produce and deploy the Virtual Centre technical infrastructure to support validation activities for PJ10-W2-93 and PJ32-W3. It will ensure close cooperation with and expertise provision to PJ10-W2-93. It will review and when need be complement the TS/IRS produced by PJ10-W2-93 and complemented by PJ32-W3 Operational Thread. It will review the VALP to make sure the validation platform produced will comply with technical and validation requirements required for PJ10-W2-93 validation and PJ32-W3. It will further increase the maturity level of the Virtual Centre concept by performing a demonstration of the Virtual Centre architecture and services at the end of Wave3 and produce a transition plan.

Description of work and role of partners

WP3 - Technical Thread [Months: 1-24]

DSNA, EUROCONTROL, ON (B4), ACG/COOPANS, CCL/COOPANS, LFV/COOPANS, NAVIAIR/COOPANS, DFS, ENAV, FRQ (FSP), INDRA, LDO, SKYGUIDE, THALES AIR SYS

The WP03 is structured into seven tasks:

- WP03.01 – WP Management
- WP03.02 - Define Virtual Centre Architecture and Services
- WP03.03 - PJ10-W2-93 Exe 3 platforms developments
- WP03.04 - PJ10-W2-93 Exe 4 platforms developments
- WP03.05 - PJ10-W2-93 Exe 5 platforms developments
- WP03.06 – PJ32-W3 Exe 1 validation platforms development
- WP03.07 - Virtual Centre Architecture and Services technical demonstration

WP03.01 – WP management

This task will organise and coordinate the activities of the WP02 team (within the team and with other PJ32-W3 WP02 WPs and other SESAR 2020 Solution and Enabling projects when need be); report to the Project Manager on progress and issues, and participate in the PMB & EPMB.

This task will not produce any contractual deliverable but will support the overall PJ32-W3 management to produce the project reports.

WP03.02 - Define Virtual Centre Architecture and Services

Lead DSNA with contribution of ON (B4), ACG/COOPANS, CCL/COOPANS, LFV/COOPANS, Naviair/COOPANS, DFS, ENAIRE, ENAV, EUROCONTROL, FRQ (FSP), INDRA, LDO, SKYGUIDE, THALES AIR SYS

This task will capture the technical requirement (from the other PJ32-W3 task), review and consolidate the TS/IRS (including relevant SDDs, technical and service architecture) produced by PJ10-W2-93 to capture the technical requirements for the validation platform development and to consolidate the Virtual Centre technical specification. As such, this task will also contribute to the VALPs produced by PJ10-W2-93 and PJ32-W3.

The task will use and, if need be, complement the OSED/SPR-INTEROP document produced by PJ10-W3-93 and complemented by PJ32-W3. This task will perform the security risk assessment and identify and/or complement the Security Requirements defined of the PJ10-W2-93 OSED.

This task will identify the standardisation needs and provide relevant inputs to PJ20 regarding the update of the EAMP standardisation roadmap.

This task will capture the validation technical reporting information (from the other PJ32-W3 tasks) and, if need be, complement the VALR documents produced by PJ10-W3-93 and PJ32-W3.

The task will review and complement the CBA produced by PJ10-W3-93 and PJ32-W3 to assess the affordability of the ATFCM procedures and requirements defined to support airspace delegation with respect to its expected benefits from a technical perspective.

Input

- PJ10-W2-93 OSED/SPR/INTEROP
- PJ10-W2-93 TS/IRS
- PJ10-W2-93 VALP

- PJ32-W3 VALP

Outputs (not contractual deliverables)

- Contribution to PJ32-W3 VALR (not in form of a stand-alone deliverable but a set of changes integrated into PJ32-W3 deliverable)
- Contribution to PJ32-W3 CBA (not in form of a stand-alone deliverable but input data for PJ32-W3 CBA production)
- Contribution to PJ10-W2-93 OSED/SPR/INTEROP (not in form of a stand-alone deliverable but a set of changes integrated into PJ10-W2-93 deliverable)
- Contribution to PJ10-W2-93 TS/IRS (not in form of a stand-alone deliverable but a set of changes integrated into PJ10-W2-93 deliverable)
- Contribution to PJ10-W2-93 VALR (not in form of a stand-alone deliverable but a set of changes integrated into PJ10-W2-93 deliverable)
- Contribution to PJ10-W2-93 CBA (not in form of a stand-alone deliverable but input data for PJ10-W2-93 CBA production)

WP03.03 - PJ10-W2-93 Exe 3 Platforms developments

Lead SKYGUIDE with contribution of DFS, DSNA, ENAV, EUROCONTROL, FRQ (FSP), INDRA, LDO

This task will responsible for the design, development and deployment of the validation platforms/tools required sur support the PJ10-W2-93 validation exercise 3.

This task will:

1. Coordinate with PJ10-W2-93 exercise 3 team to get the technical requirements of the validation platform/tools used for the validation. This includes contribution to the PJ10-W2-93 VALP.
2. Produce (or upgrade) and deploy the validation platforms. Before delivering the validation platforms/tools for the PJ10-W2-93 validation activities, this task will perform the required integration and verification activities to ensure platform/tools readiness for the execution of the validation activities. It will also perform technical validation activities to ensure that the required quality of service is met, in particular for the transfer of data between geographically separated locations, remote installation of HMI, remote supervision, transversal technical features as recording.
3. Produce the Availability Note to describe the content of the validation platforms delivered.
4. Collect, assess and provide the validation results to WP03.02.

Output (contractual deliverable)

- Availability Note for PJ10-W2-93 EXE3

WP03.04 - PJ10-W2-93 Exe 4 platforms developments

Lead ENAV with contribution of LDO

This task will interact with PJ10-W2-93 team in charge of the validation exercise 4 to provide the validation platform.

Work will be arranged as for WP03.03 but for a different validation team.

Output (contractual deliverable)

- Availability Note for PJ10-W2-93 EXE4

WP03.05 - PJ10-W2-93 Exe 5 Platforms developments

Lead Naviar/COOPANS with contribution of ACG/COOPANS, CCL/COOPANS, LFV/COOPANS, THALES AIR SYS

This task will interact with PJ10-W2-93 team in charge of the validation exercise 5 to provide the validation platform.

Work will be arranged as for WP03.03 but for a different validation team.

Output (contractual deliverable)

- Availability Note for PJ10-W2-93 EXE5

WP03.06 - PJ32-W3 Exe 1 validation platforms development

Lead EUROCONTROL with contribution from ON(B4), ACG/COOPANS, CCL/COOPANS, LFV/COOPANS, Naviar/COOPANS, DFS, ENAIRE, ENAV, FRQ(FSP), INDRA, LDO, SKYGUIDE, THALES AIR SYS

This task will interact with PJ32-W3 team in charge of the validation exercise 1, to provide the validation platform.

Work will be arranged as for WP03.03 but for a different validation team.

Output (contractual deliverable)

- Availability Note for PJ32-W3 EXE1

WP03.07 - Virtual Centre Architecture and Services technical demonstration

Lead FRQ (FSP) with contribution of DFS, DSNA, ENAV, EUROCONTROL, INDRA, SKYGUIDE

The task will organise a technical Virtual Centre demonstration at the end of PJ32-W3. This technical demonstration will be organised with PJ10-W2-9. The demonstration will take place at Frequentis premises as a follow up of the SESAR

Virtual Centre Executive Day, which took place in October 2019. The audience of the technical demonstration will go beyond SESAR to maximize the impact of this technical demonstration.

This demonstration will be made of several ADSPs and ATSUs provided by several providers. It will be a multi-vendor demonstration using multiple ADSPs of different vendors delivering services to a common ATSU, or a single ADSP delivering services to different ATSUs of different vendors, or any combination of these possibilities.

The exact scope and contributions for this technical demonstration will be further refined during the execution of PJ32-W3 and PJ10-W2-93 projects, and the SJU.

This task will:

1. Coordinate with PJ10-W2-93 Partners and the SJU to define the technical demonstration set-up,
2. Produce and deploy the platforms used for the demonstration. It will perform the required integration and verification activities to ensure platform/tools readiness for the execution of the demonstration,
3. Ensure the communication about this technical demonstration (before, during and after the event),
4. Run the technical demonstration and collect the feedback from the demonstration attendees,
5. Produce a demonstration report which will describe the Virtual Centre maturity level achieved at the end of SESAR2020 Wave2 and Wave3, the items remaining to be refined and validated to make the Virtual Centre deployed and a high level roadmap of deployment. It will describe:
 - the exploitable results;
 - the identification of the potential customers and
 - the actions to ensure that the exploitable results i) satisfy the customer needs; ii) are adequate for uptake activities if not yet at the status of established solutions at the project end; iii) achieve enough dissemination.

Output (not contractual deliverable)

- Virtual Centre Maturity Report

Participation per Partner

Partner number and short name	WP3 effort
1 - EUROCONTROL	110.00
2 - ON (B4)	5.87
4 - ACG/COOPANS	1.17
5 - CCL/COOPANS	2.06
6 - LFV/COOPANS	1.25
7 - NAVIAIR/COOPANS	1.33
8 - DFS	2.00
9 - DSNA	47.00
11 - ENAV	4.41
TECHNO SKY	3.82
IDS AIRNAV	10.75
12 - FRQ (FSP)	51.50
PDTS	35.53
14 - INDRA	13.85
15 - LDO	31.50
17 - SKYGUIDE	22.00
18 - THALES AIR SYS	156.00
Total	500.04

List of deliverables

Deliverable Number ¹⁴	Deliverable Title	Lead beneficiary	Type ¹⁵	Dissemination level ¹⁶	Due Date (in months) ¹⁷
D3.1	VC Maturity Report	12 - FRQ (FSP)	Report	Public	22

Description of deliverables

Contractual

D3.1 Virtual Centre Maturity Report T0+22 months

Non-contractual (deliverable numbering aligned with SJU guidance - transformed into project milestones)

D.03.10 Contribution to PJ10-W2-93 OSED/SPR/INTEROP (not in form of a stand-alone deliverable) T0 + 12 months

D.03.20 Contribution to PJ10-W2-93 TS/IRS (not in form of a stand-alone deliverable) T0 + 12 months

D.03.30 Contribution to PJ10-W2-93 VALR (not in form of a stand-alone deliverable) T0 + 18 months

D.03.40 Contribution to PJ32-W3 CBA (not in form of a stand-alone deliverable) T0 + 18 months

D.03.50 Availability Note for PJ10-W2-93 EXE3 T0 + 15 months

D.03.60 Availability Note for PJ10-W2-93 EXE4 T0 + 15 months

D.03.70 Availability Note for PJ10-W2-93 EXE5 T0 + 15 months

D.03.80 Availability Note for PJ32-W3 EXE1 T0 + 12 months

D3.1 : VC Maturity Report [22]

Virtual Centre Maturity Report providing complete assessment of VC concept taking into account PJ32 and PJ9-44 and PJ10-93

Schedule of relevant Milestones

Milestone number ¹⁸	Milestone title	Lead beneficiary	Due Date (in months)	Means of verification
MS7	WP03 PJ10 OSED contribution	9 - DSNA	12	Technical Contribution to PJ10-W2-93 OSED/SPR/INTEROP
MS8	PJ10 TS Contribution	9 - DSNA	12	Technical Contribution to PJ10-W2-93 TS/IRS
MS9	PJ10 VALR contribution	9 - DSNA	18	Technical contribution to PJ10-W2-93 VALR
MS10	WP03 CBA contribution	9 - DSNA	18	Contribution to PJ10-W2-93 CBA
MS11	PJ10-W2-93 EXE3 Platform	17 - SKYGUIDE	15	platform development supporting PJ10-W2-93 EXE3
MS12	PJ10-W2-93 EXE4 platform	11 - ENAV	15	Platform delivery to support PJ10-W2-93 EXE4
MS13	PJ10-W2-93 EXE5 platform	7 - NAVIAIR/COOPANS	15	Platform delivery to support PJ10-W2-93 EXE5
MS14	PJ32-W3 EXE1 platform	1 - EUROCONTROL	12	Platform delivery to support PJ32-W3 EXE1

Schedule of relevant Milestones

Milestone number¹⁸	Milestone title	Lead beneficiary	Due Date (in months)	Means of verification
MS15	VC Maturity Report	12 - FRQ (FSP)	22	Virtual Centre Maturity report ready and delivered to SJU as non-contractual deliverable

1.3.4. WT4 List of milestones

Milestone number ¹⁸	Milestone title	WP number ⁹	Lead beneficiary	Due Date (in months) ¹⁷	Means of verification
MS1	WP02 contribution to PJ10-W2-93 OSED	WP2	1 - EUROCONTROL	12	Contribution to PJ10-W2-93 OSED/SPR/INTEROP for ATFCM elements
MS2	WP02 contribution to PJ10-W2-93 TS	WP2	1 - EUROCONTROL	12	Contribution to PJ10-W2-93 TS/IRS for the ATFCM elements
MS3	VALP ready	WP2	1 - EUROCONTROL	8	Availability of the Validation plan for WP02 exercises
MS4	VALR ready	WP2	1 - EUROCONTROL	20	Validation report covering validation activities in WP02
MS5	Maturity Gate	WP2	1 - EUROCONTROL	23	PJ32-W3 V2 maturity gate conducted in parallel with the one of PJ10
MS6	WP02 CBA contribution	WP2	1 - EUROCONTROL	18	Contribution to PJ10-W2-93 CBA for ATFCM elements
MS7	WP03 PJ10 OSED contribution	WP3	9 - DSNA	12	Technical Contribution to PJ10-W2-93 OSED/SPR/INTEROP
MS8	PJ10 TS Contribution	WP3	9 - DSNA	12	Technical Contribution to PJ10-W2-93 TS/IRS
MS9	PJ10 VALR contribution	WP3	9 - DSNA	18	Technical contribution to PJ10-W2-93 VALR
MS10	WP03 CBA contribution	WP3	9 - DSNA	18	Contribution to PJ10-W2-93 CBA
MS11	PJ10-W2-93 EXE3 Platform	WP3	17 - SKYGUIDE	15	platform development supporting PJ10-W2-93 EXE3
MS12	PJ10-W2-93 EXE4 platform	WP3	11 - ENAV	15	Platform delivery to support PJ10-W2-93 EXE4
MS13	PJ10-W2-93 EXE5 platform	WP3	7 - NAVIAIR/COOPANS	15	Platform delivery to support PJ10-W2-93 EXE5
MS14	PJ32-W3 EXE1 platform	WP3	1 - EUROCONTROL	12	Platform delivery to support PJ32-W3 EXE1
MS15	VC Maturity Report	WP3	12 - FRQ (FSP)	22	Virtual Centre Maturity report ready and delivered to SJU as non-contractual deliverable

1.3.5. WT5 Critical Implementation risks and mitigation actions

Risk number	Description of risk	WP Number	Proposed risk-mitigation measures
1	Risk 1: PJ32-W3 deliverables (OSED/SPR-INTEROP/TS/IRS) are not properly consolidated with PJ10-W2-93 concept and validation needs: The PJ32-W3 operational and technical requirements are inconsistent with the PJ10-W2-93 operational and technical environment definition. PJ32-W3 validation objectives are redundant, inconsistent or not complimenting the PJ10-W2-93 validation roadmap.	WP2, WP3	PJ32-W3 and PJ10-W2-93 agree to hold regular consolidation meetings at managerial and operational level. Common PMP and workshops for concept definition will ensure that experts from both projects define operational and technical requirements with common interface needs in a collaborative manner
2	Risk 2: PJ32-W3 platform delivery comes too late or with inappropriate functionality PJ32-W3 tool development is delivered too late or with inappropriate functionality to allow proper preparation and execution of the validation exercises.	WP2	Exercise leaders implement a process to ensure regular reviews of tool development by operational target users. The process is organised through technical milestones with platform developers to ensure a systematic control of the timely progress of the platform development in line with the agreed development roadmap
3	Risk 3: Shortened time-line and pressure resulting from a slow recovery from the COVID19 pandemic The foreseen validation exercises are impacted by lack of critical staff in the build-up and the execution of the validation exercises. The shift in time allows for a minor reduction of the risk, however, the MFF prevents an extension beyond the hard date of the 31st of December 2022. The required interaction on the technical thread with PJ10-W2-93 can create a mutual delay in the projects	WP2	Deliver the maturity gates in an approaching level as defined in the Grant proposal. This is essential for the Technical aspects to be covered between PJ10-W2-93 and PJ32-W3. For the time being, the delivery is foreseen at V3 for PJ10-W2-93 and V2 for PJ32-W3 and should be "degraded" to approaching V3

1.3.6. WT6 Summary of project effort in person-months

	WP1	WP2	WP3	Total Person/Months per Participant
1 - EUROCONTROL	12	182	110	304
2 - ON (B4)	0	2.52	5.87	8.39
3 - PANS (B4)	0	17	0	17
4 - ACG/COOPANS	0	4.66	1.17	5.83
5 - CCL/COOPANS	0	8.24	2.06	10.30
6 - LFV/COOPANS	0	9.54	1.25	10.79
7 - NAVIAIR/COOPANS	0	5.31	1.33	6.64
8 - DFS	0	4	2	6
9 - DSNA	0	4	47	51
10 - ENAIRE	0	10.40	0	10.40
· CRIDA	0	28	0	28
11 - ENAV	0	6.62	4.41	11.03
· NAIS	0	10.14	0	10.14
· TECHNO SKY	0	3.82	3.82	7.64
· IDS AIRNAV	0	4.61	10.75	15.36
12 - FRQ (FSP)	0	0	51.50	51.50
· PDTS	0	0	35.53	35.53
13 - HC (FSP)	0	0	0	0
14 - INDRA	0	32.32	13.85	46.17
15 - LDO	0	38.50	31.50	70
16 - SINTEF (NATMIG)	0	18	0	18
17 - SKYGUIDE	0	0	22	22
· SKYSOFT	0	0	0	0
18 - THALES AIR SYS	0	52	156	208

	WP1	WP2	WP3	Total Person/Months per Participant
19 - NATS	0	0	0	0
20 - ANS CR (B4)	0	0	0	0
21 - LPS SR (B4)	0	0	0	0
22 - IAA/COOPANS	0	0	0	0
23 - ATOS (FSP)	0	0	0	0
24 - AIRTEL (NATMIG)	0	0	0	0
25 - SAAB (NATMIG)	0	0	0	0
Total Person/Months	12	441.68	500.04	953.72

1.3.7. WT7 Tentative schedule of project reviews

Review number ¹⁹	Tentative timing	Planned venue of review	Comments, if any
RV1	14	Brussels	Intermediate Review Meeting

1. Project number

The project number has been assigned by the Commission as the unique identifier for your project. It cannot be changed. The project number **should appear on each page of the grant agreement preparation documents (part A and part B)** to prevent errors during its handling.

2. Project acronym

Use the project acronym as given in the submitted proposal. It can generally not be changed. The same acronym **should appear on each page of the grant agreement preparation documents (part A and part B)** to prevent errors during its handling.

3. Project title

Use the title (preferably no longer than 200 characters) as indicated in the submitted proposal. Minor corrections are possible if agreed during the preparation of the grant agreement.

4. Starting date

Unless a specific (fixed) starting date is duly justified and agreed upon during the preparation of the Grant Agreement, the project will start on the first day of the month following the entry into force of the Grant Agreement (NB : entry into force = signature by the JU). Please note that if a fixed starting date is used, you will be required to provide a written justification.

5. Duration

Insert the duration of the project in full months.

6. Call (part) identifier

The Call (part) identifier is the reference number given in the call or part of the call you were addressing, as indicated in the publication of the call in the Official Journal of the European Union. You have to use the identifier given by the Commission in the letter inviting to prepare the grant agreement.

7. Abstract

8. Project Entry Month

The month at which the participant joined the consortium, month 1 marking the start date of the project, and all other start dates being relative to this start date.

9. Work Package number

Work package number: WP1, WP2, WP3, ..., WPn

10. Lead beneficiary

This must be one of the beneficiaries in the grant (not a third party) - Number of the beneficiary leading the work in this work package

11. Person-months per work package

The total number of person-months allocated to each work package.

12. Start month

Relative start date for the work in the specific work packages, month 1 marking the start date of the project, and all other start dates being relative to this start date.

13. End month

Relative end date, month 1 marking the start date of the project, and all end dates being relative to this start date.

14. Deliverable number

Deliverable numbers: D1 - Dn

15. Type

Please indicate the type of the deliverable using one of the following codes:

R	Document, report
DEM	Demonstrator, pilot, prototype
DEC	Websites, patent filings, videos, etc.
OTHER	
ETHICS	Ethics requirement
ORDP	Open Research Data Pilot
DATA	data sets, microdata, etc.

16. Dissemination level

Please indicate the dissemination level using one of the following codes:

- PU Public
- CO Confidential, only for members of the consortium (including the Commission Services)
- EU-RES Classified Information: RESTREINT UE (Commission Decision 2005/444/EC)
- EU-CON Classified Information: CONFIDENTIEL UE (Commission Decision 2005/444/EC)
- EU-SEC Classified Information: SECRET UE (Commission Decision 2005/444/EC)

17. Delivery date for Deliverable

Month in which the deliverables will be available, month 1 marking the start date of the project, and all delivery dates being relative to this start date.

18. Milestone number

Milestone number: MS1, MS2, ..., MSn

19. Review number

Review number: RV1, RV2, ..., RVn

20. Installation Number

Number progressively the installations of a same infrastructure. An installation is a part of an infrastructure that could be used independently from the rest.

21. Installation country

Code of the country where the installation is located or IO if the access provider (the beneficiary or linked third party) is an international organization, an ERIC or a similar legal entity.

22. Type of access

- TA-uc if trans-national access with access costs declared on the basis of unit cost,
- TA-ac if trans-national access with access costs declared as actual costs, and
- TA-cb if trans-national access with access costs declared as a combination of actual costs and costs on the basis of unit cost,
- VA-uc if virtual access with access costs declared on the basis of unit cost,
- VA-ac if virtual access with access costs declared as actual costs, and
- VA-cb if virtual access with access costs declared as a combination of actual costs and costs on the basis of unit cost.

23. Access costs

Cost of the access provided under the project. For virtual access fill only the second column. For trans-national access fill one of the two columns or both according to the way access costs are declared. Trans-national access costs on the basis of unit cost will result from the unit cost by the quantity of access to be provided.

History of Changes Table	
Page/section	Nature of change and reason
Part A (1st GA draft)	
WP01 Description	Add a sentence about monitoring of COMM's actions in bullet 7.
WP02 Description	Exercise WP02.07 – ATFCM aspects of Airspace Delegation is associated to scenario 4 and not scenario 3
WP02 Deliverables	Contribution to OSEd and TS brought forward to allow time for development based on these documents: <ul style="list-style-type: none"> • INTEROP = T0+8 months • TS = T0+12 months
WP02 Deliverables	D32.02.1 PJ32-W3 Solution Data Pack is pushed to T0+21 as the gate is in parallel with PJ10-93 and at T0+23
WP03 Deliverables And Milestones	Deliverable Contribution to PJ32-W3 VALR can be removed as there is no need to identify a specific deliverable towards the same project Corresponding milestone also suppressed
WP03 Deliverables And Milestones	Deliverable Contribution to PJ32-W3 CBA can be removed as there is no need to identify a specific deliverable towards the same project Corresponding milestone also suppressed
List of Deliverables	Project Management Plan delivery brought forward to T0+2
List of Deliverables	PJ32-W3 Solution Data Pack pushed to T0+21 as the gate is in parallel with PJ10-93 and at T0+23
List of Milestones	M32.05 PJ32 W3 Maturity Gate pushed from T0+18 to T0+23 in order to align it with PJ10-93 maturity gate as both have to be done in parallel
Part A (2nd GA draft)	
List of Milestones	M4 milestone on VALR of WP02 pushed from T0+18 to T0+20 to be compatible with timing of exercises
WP02 Description	Correction: FRQ removed from partners participating in WP02.02 ATFCM Process and Procedures Definition (FRQ has no effort planned for WP02)
List of Deliverables	Two management reports at T0+10 and T0+22 (project deliverables) Tech and Financial report are in T0+14 and T0+26 but not project deliverables
WP01 Description	Deliverables are changed to match project handbook 2 management report in Oct 2021 and Oct 2022 Technical and Financial reports in Feb 2022 and Feb 2023
WP03 Description	List of partners added in description of WP03.06
WP02 Description	Removal of Hungarocontrol
WP03 Description	Removal of Hungarocontrol
WP02 Effort	Removal of Hungarocontrol effort
Milestones	M16 moved from T0+20 to T0+22 to align with VC Maturity Report timing
Deliverables	4 AN removed from WP3 deliverables, replaced by VC Maturity report
WP03 Description	AN defined as internal deliverables and VC Maturity Report as Contractual one
WP03 Description	Add a task on standardisation roadmap in description of WP03.02 (question S5)

WP02 Description	In WP02.02, description of outcome of discussion with SJU regarding V2 data pack and gate (question S12)
Part A (3rd GA draft- Second submission)	
WP03 Description	Removal of SINTEF from WP description text
Financial	Budget increase for LFV and LTP SKYSOFT ATM (85 714 € each)
Milestone	Missing milestone added for WP02 CBA contribution→ implies re-numbering of milestones
Part A (4th GA draft- Third submission)	
WP02 Description	Removal of SKYGUIDE from WP02 Description (no effort) (Bid alignment)
Part B (1st GA draft)	
4.1	Update the names and bio data of project key members for three newcomers
4.3	Paragraph 4.3 “Global budget approach taken by the SJU Members” is suppressed as it is not relevant to the context of the Grant Agreement
5.1	Addition of Ethics Management
Part B (2nd GA draft)	
1.3	Update technical objectives for EXE01 (add VCT-01 and VCT-02)
1.3	Update name of THALES platform from ECOSystem to TopSky Flow
3.4	Removal of description of other costs for SKYGUIDE as update figure (90.000€) is below 15%
4.2.17	Information related to THALES subcontracting added
3.4	Removal of HC other costs
1.3	Removal of HC from exercise description
3.1	Update of MS Project Plans to match timing of deliverables and milestones
1.3 (b)	Update Support methodology to add a mention on standardisation roadmap (question S5)
3.2.3	Escalation process for ePMB (question S10)
1.3 (b)	In paragraph on Compliance with SESAR development and validation method, describe the V2 gate to reflect the agreement reached with SJU on question S12
Part B (3rd GA draft- Second submission)	
3.3	Removal of Hungarocontrol from text on partners contribution
4.1.1.	Modification of LFV tasks (increase of budget)
4.2.7	Modification of SKYSOFT ATM tasks (increase of budget)
3.1	Definition of WP02 V2 Data Pack
Part B (4th GA draft- Third submission)	
Fig.2	WBS depiction slightly corrected
1.3	SKYGUIDE removed from EXE 02 of WP 02 (Bid alignment)
1.3	Removal of VCT07 from EXE05 in WP03 (Bid alignment)
1.3	Update of platforms in PJ32-W3 EXE1 description (Bid alignment)
4.1	Update of description for ENAIRE and LEONARDO (Bid alignment)
4.1	Re-insert Hungarocontrol as Silent partner in 4.1.1.13
4.2	Add rank of company in 4.1.1 as reference

Table of Contents

1	EXCELLENCE	5
1.1	OBJECTIVES	5
1.1.1	<i>Operational Thread - validation of airspace delegation amongst ATSUs</i>	<i>6</i>
1.1.2	<i>Technical Thread - Virtual Centre technical validation infrastructure</i>	<i>6</i>
1.2	RELATION TO THE WORK PROGRAMME (SESAR JU SPD 2020-2022)	7
1.3	CONCEPT AND METHODOLOGY	8
1.4	AMBITION	26
2	IMPACT	28
2.1	EXPECTED IMPACTS	28
2.2	MEASURES TO MAXIMISE IMPACT	30
3	IMPLEMENTATION	33
3.1	WORK PLAN – WORK PACKAGES, DELIVERABLES	33
3.2	MANAGEMENT STRUCTURE, MILESTONES AND PROCEDURES	35
3.2.1	<i>Project Manager (PM).....</i>	<i>35</i>
3.2.2	<i>Project Management Board (PMB)</i>	<i>36</i>
3.2.3	<i>Extended Project Management Board (EPMB)</i>	<i>36</i>
3.2.4	<i>Work Package Lead (WPL)</i>	<i>36</i>
3.2.5	<i>Work Package Team</i>	<i>37</i>
3.3	CONSORTIUM AS A WHOLE	37
3.4	RESOURCES TO BE COMMITTED	42
4	MEMBERS OF THE CONSORTIUM	43
4.1	PARTICIPANTS (APPLICANTS)	43
4.1.1	<i>Companies Profile</i>	<i>43</i>
4.1.2	<i>Main profiles/CV (they may be the same person for more than one role)</i>	<i>79</i>
4.2	THIRD PARTIES INVOLVED IN THE PROJECT (INCLUDING USE OF THIRD PARTY RESOURCES).....	80
4.2.1	<i>(1)Linked to EUROCONTROL</i>	<i>80</i>
4.2.2	<i>(4)Linked to ACG/COOPANS.....</i>	<i>81</i>
4.2.3	<i>(9)Linked to DSNA.....</i>	<i>82</i>
4.2.4	<i>(10)Linked to ENAIRE</i>	<i>83</i>
4.2.5	<i>(11)Linked to ENAV</i>	<i>84</i>
4.2.6	<i>(12)Linked to FRQ (FSP).....</i>	<i>87</i>
4.2.7	<i>(17)Linked to SKYGUIDE.....</i>	<i>88</i>
4.2.8	<i>(18)Linked to THALES AIR SYS</i>	<i>88</i>
5	ETHICS AND SECURITY	90
5.1	ETHICS	90
5.1.1	<i>Humans</i>	<i>90</i>
5.1.2	<i>Protection of personal data</i>	<i>95</i>
5.1.3	<i>Technical and Organisational Measures to preserve rights of participants.....</i>	<i>95</i>
5.1.4	<i>General</i>	<i>97</i>
5.2	SECURITY.....	97

1 Excellence

This Virtual Centre Wave3 (PJ32-W3) project proposal addresses the requirements of the topic ‘**Virtual Centre**’ (SESAR-WAVE3-01-2020) part of the SESAR Joint Undertaking (SJU) restricted call for proposals for Industrial Research (IR) and Very Large Demonstration (VLD) Wave 3 (H2020-SESAR-2020-2) and in compliance with the SJU IR and VLD Wave 3 Call Technical Specifications (version 01.00).

The SJU Single Programming Document (SPD) 2020-2022 (version 01.00) in its Section III, chapter 2.6.1.3.4 clearly identifies the need for complementary industrial research addressing the Virtual Centre concept:

- To **address gaps in R&D to cover the Airspace Architecture Study (AAS)** such as digitalisation, automation, defragmentation, and/or new needs following the update of the European Air Traffic Management Master Plan 2020. The **Virtual Centre concept** is one of the major components of the AAS target architecture. Business continuity, operational flexibility and resilience are some of the main Virtual Centre principles. **Delegation of airspace** is thus a vital part of the Virtual Centre concept.

To **complement the activities of the SESAR Wave2 activities**: SESAR Solution 93 - Delegation of Airspace amongst Air Traffic Service Units (ATSUs), part of SESAR Wave2 “Separation Management and Controller Tools” project (PJ10-W2); and also investigate the cross-border use of the Dynamic Airspace Configurations (DAC) concept (SESAR Solution 44 – Dynamic Airspace Configuration) part of SESAR Wave2 “Digital Network Management Services” project (PJ09-W2).

This proposal addresses the following solution:

- **Solution PJ32-W3 Virtual Centre - Complement of PJ10-W2-93** Delegation of airspace amongst ATSUs. While PJ10-W2-93 addresses the Air Traffic Control (ATC) aspects of airspace delegation amongst ATSUs in the context of Virtual Centre, this solution will further investigate the Air Traffic Flow and Capacity Management (ATFCM) aspects of such airspace delegation amongst ATSUs in the context of Virtual Centre.

This proposal also addresses the need **to develop, verify and integrate the technical infrastructure** to support the validation activities planned by PJ10-W2-93 and PJ32-W3 in the Virtual Centre context.

Therefore, the project proposes two threads of activities:

- **One Operational Thread - validation of airspace delegation amongst Air Traffic Control Units (ATSUs)** - to complement PJ10-W2-93 ATC aspects of Delegation of airspace amongst ATSUs with the ATFCM aspects and the impact on ATC side;
- **One Technical Thread - Virtual Centre technical validation infrastructure** - to develop and/or complement, verify and integrate the technical validation infrastructure(s) required to support airspace delegation validation exercises (both PJ10-W2-93 and PJ32-W3) in the Virtual Centre context.

1.1 Objectives

From the AAS, the Virtual Centre is one or more Air Traffic Service Units (ATSUs) using ATM Data Services provided (ADSP) remotely. The concept provides for geographical decoupling between ATM data service providers and ATSUs. The ATM data services provide the data required for ATS. It includes functions like flight correlation, trajectory prediction, conflict detection and conflict resolution, arrival management planning. These services rely on underlying integration services for weather, surveillance and aeronautical information. They also include the coordination and synchronisation of ATM data in function of all trajectory interactions by the providers of ATS. It is a major driver for Virtualisation and ATM Data Services.

The AAS mentions also the Service-Oriented Architecture (SOA) that aims not to prescribe specific implementation choices in terms of service provision, but merely to provide a flexible architecture that allows stakeholders to choose their desired implementation options. The logical architecture is the starting point for identifying a virtual infrastructure that enables vertical and geographical decoupling of services that increases flexibility, scalability and resilience.

From SESAR programme, the Virtual Centre is a single ATSU or a grouping of collaborative ATSUs using data services provided by ADSP(s). The concept provides, at least, geographical decoupling between ADSP(s)

and ATSU(s), through service interfaces defined in Service Level Agreements (SLA). One ATSU may use data services from multiple ADSPs, just as an ADSP may serve multiple ATSUs.

The Virtual Centre concept allows an innovative Virtual Centre architecture between ATSU and ADSP, enabling that a volume of airspace be controlled by one ATSU or another, e.g. depending on the availability of resources (business continuity, operational flexibility), or in order to provide service in the case of contingency (resilience). This is referred in the AAS as the “capacity-on-demand” service.

Complementing the Delegation of Airspace amongst ATSUs (SESAR Solution PJ10-W2-93) for what concerns the airspace delegation, and investigating the cross-border use of the DAC concept (SESAR Solution PJ09-W2-44), the **Virtual Centre Wave3 proposal aims to further validate the airspace delegation in the Virtual Centre context** (airspace delegation for two ATSUs (part of two different Air Navigation Service Providers (ANSPs) but also including ATSUs within the same ANSP) which can deliver service over the same volume of airspace, potentially including a cross-border rostering scheme). In addition, it aims to increase the maturity level of the Virtual Centre concept itself. The overall objective is to demonstrate the positive impact of the Virtual Centre concept on improving the Network:

- The ability to dynamically adapt to changes in capacity e.g. in case of contingency in an ATSU, traffic needs or Air Traffic Controller (ATCO) shortage;
- The Cost-efficiency through the decoupling of the ATM data provision from the ATC service provision enabling flexible, scalable and resilient ATM service provision.

1.1.1 Operational Thread - validation of airspace delegation amongst ATSUs

PJ10-W2-93 addresses the ATC aspects of airspace delegation amongst ATSUs, PJ32-W3 will complement this and investigate the ATFCM aspects of such airspace delegation amongst ATSUs (and the possible side effect on ATC side). With this complementary work, airspace delegation including all ATFCM aspects, Air Traffic Services (ATS) procedures and defined services, will be validated and deployable in a Virtual Centre context.

The Operational Thread is expected to demonstrate positive impact on:

- **Network performance** with the ability dynamically adapting to changes in capacity e.g. in case of ATCO shortage making use of the ‘capacity-on-demand’ service defined in the AAS or providing contingency services.
- **Defragmentation of service provision and operational interoperability** with the ability to provide ATC services in any airspace through an interoperable, cost-efficient and flexible service provision infrastructure.

The PJ32-W3 Operational Thread will address specific Validation Concept Operational (VCO) objectives:

1. Objective VCO-01 - **Define ATFCM procedures and requirements** in support of PJ10-W2-93 defined Use Cases (UC) and to consider the evolving geographical/organisational scopes of airspace delegation in the Virtual Centre context.
2. Objective VCO-02 - **Test operational feasibility, acceptance and impact** of ATFCM (and their side effects on ATC) in support of airspace delegation in the Virtual Centre context.
3. Objective VCO-03 – **Evaluate the performance benefits for capacity on demand** operations as a function of the geographical / organisational scope of airspace delegation in the European Civil Aviation Conference (ECAC) area.

1.1.2 Technical Thread - Virtual Centre technical validation infrastructure

The Technical Thread focusses on completing and/or providing the technical validation infrastructure to support PJ10-W2-93 and PJ32-W3 validation activities; and to further increase the maturity level of the Virtual Centre concept, with a specific focus on Virtual Centre architecture and services.

The Technical Thread is expected to demonstrate positive impact on:

- **Defragmentation of service provision** with the ability to provide ATC services in any airspace through an interoperable, cost-efficient and flexible service provision infrastructure;

- **Interoperability** with the ability for any ATSU to interface with one or more data service providers (SOA, open architecture, common and standard interfaces) from different locations;
- **Sharing of infrastructure** with the opportunity to share development cost of ADSP (investments and operating costs), multiples ATSUs could invest and access to innovative functions more rapidly
- **Scalability** with Open architecture (standardised methods of operation, information, procedures, services and common interfaces) guaranteeing long-term upgradability and scalability, and the ability to consider future services;
- **Deployment** orientation with the ability to support the automation and digitalisation concepts in support of the AAS and to provide a solid foundation to the next generation of ATM services provision and related methodologies.

The PJ32-W3 Technical Thread will address specific Validation Concept Technical (VCT) objectives:

1. Objective VCT-01 - **Support validation of PJ10-W2-93 and PJ32-W3 Operational Thread** by contributing to the Technical Specification (TS) and Interface Requirement Specification (IRS) definition before and after implementation.
2. Objective VCT-02 - **Produce and complement/provide the technical validation platform**; and feeding it with representative traffic for PJ10-W2-93 Real Time validation exercises.
3. Objective VCT-03 - **Increase the number of defined as well as implemented Virtual Centre Services** that could be used remotely by ATSUs to be validated by PJ10-W2-93 and PJ32-W3 Operational Thread in the context of Airspace delegation between ATSUs.
4. Objective VCT-04 – **Demonstrate the Virtual Centre architecture interoperability and flexibility** through increased number of cross-validated services using multiple ADSPs of different vendors delivering services to a common ATSU, or single ADSP delivering services to different ATSUs of different vendors, or combination of these possibilities.
5. Objective VCT-05 – **Complement the performance assessment of the Virtual Centre architecture and services** with regard to technical (supervision, recording), performance (including cost efficiency), Cost Benefit Analysis (CBA), network capacity and Quality of Service (QoS) aspects. The SESAR 2020 Performance framework will be used but new indicators may be proposed for automation and digitalisation measurement.
6. Objective VCT-06 – **Complement the cyber security level of the Virtual Centre architecture and services** from what was performed for SESAR2020 Wave1 (PJ15-09 and PJ16-03). The Security Risk Assessment Methodology (SecRAM) will be used.
7. Objective VCT-07 – **Assess the maturity of the Virtual Centre architecture and services** completeness against a proposed deployment roadmap (based on the Airspace Architecture Implementation plan). Topics requiring additional validation activities will be proposed. Standardisation needs will be identified. A Transition path will be produced.

1.2 Relation to the work programme (SESAR JU SPD 2020-2022)

Many SESAR R&D activities have been performed in the context of Virtual Centre and airspace delegation:

- SESAR1 introduced the Virtual Centre concept with the Workstation, Service Interface Definition (B04.04) project. This project investigated the possible out-sourcing of some ATM data services to information providers supporting multiple stakeholders. To enable the possible delivery of such a concept, a clear industry standard interface definition was required in particular between the controller working position (CWP) and the related data services. The appropriate partitioning of the architecture and definition of the interface needed to take maximum advantage of open architecture techniques. Realising this interface would enable ANSPs to deploy using a Virtual Centre Business Model approach that supports progressive unbundling of infrastructure. The B04.04 project focussed on a first Virtual Centre architecture: ADSP / CWP separation, a high level service definition and a feasibility demonstration. This work achieved the European Operational Concept Validation Methodology (E-OCVM) Maturity level 1, calling for further R&D activities.
- SESAR2020 Wave1 further refined the Virtual Centre concept with two projects running in parallel:

- PJ15 (Common Service) project and the Data Centre Service for Virtual Centres (PJ15-09) solution - this project produced operational requirements for the delegation of the provision of ATC services between ATSUs and contingency. This Solution explored different possible use cases, which includes the delegation of ATC services based on traffic and organization needs, either static on a fix-time transfer scheduling day/night or dynamic when the traffic density is below/over a certain level. It also addressed the delegation and contingency use cases, allowing ATSUs to transfer responsibility in case of the services degradation or failure. It produced a Virtual Centre Operational Service and Environment Definition (OSED), Operational, Safety. & Performance and Interoperability requirements (SPR/INTEROP), Human Performance Assessment (HP), Safety Performance Assessment (SAF) and CBA. This work achieved an E-OCVM Maturity level 1. Notwithstanding the initial maturity, the strong Business Case became apparent and invited for further refinement and validation in Wave 2.
- PJ16-03 (Virtual Centre) project - this technical project identified a complete set of use cases: contingency amongst ATSUs, delegation of airspace between ATSUs, training and rationalisation of infrastructure. However, the project focussed its work on the rationalisation of the infrastructure. The project developed a concept for separating the CWP from the data centre where the data is produced. It produced and validated a Virtual Centre technical architecture and a set of Virtual Centre services. The work achieved a Technology Readiness Level (TRL) 6 maturity.
- ongoing SESAR2020 Wave2 programme with:
 - PJ10-W2-93 - Delegation of Airspace amongst ATSUs and
 - PJ09-W2-44 – Dynamic Airspace Configuration.

The Virtual Centre Wave3 proposal aims to complement these previous activities in order **to further define and validate airspace delegation in a Virtual Centre context**, taking into consideration the work already achieved and the recommendations drawn in the recent AAS and its implementation plan. The underlying objective is to **progress the maturity of the Virtual Centre concept towards deployment**.

1.3 Concept and methodology

(a) Concept

As explained above, the SESAR Solution PJ32-W3 Virtual Centre is complementing ongoing SESAR activities on airspace delegation (PJ10-W2-93 and PJ09-W2-44) and Virtual Centre (PJ10-W2-93), and other SESAR1 and SESAR2020 Wave1 activities.

As reminded in the call, the Virtual Centre concept consists of an innovative Virtual Centre architecture between ATSUs and ADSPs, enabling that a volume of airspace can be controlled by one ATSU or another. It mentions a clear focus on airspace delegation and contingency operation complementing the PJ10-W2-93.

From a concept point of view, PJ32-W3 will focus on the **ATFCM aspects of airspace delegation amongst ATSUs** (from the same ANSP or of different ANSPs, neighbouring or not entities) based on the Virtual Centre architecture. This will demonstrate that a given volume of airspace can be delegated from one ATSU to another, e.g. depending on the availability of resources, or in order to provide service in the case of contingency. In addition, it will **enable the ‘capacity-on-demand’ service** defined in the AAS.

Several validation exercises will be designed and performed to **investigate and validate the ATFCM situation analysis and decision making process to support airspace delegation** and their impacts on ATC systems. Flow Management Position (FMP) support tools will consider the availability of ATCOs at any given time in both ATSUs when proposing a change of sectorization. Cross-border use of the DAC concept will be investigated as well (complementing the validation activities performed by PJ09-W2-44 on DAC). The objective is to achieve **E-OCVM maturity level 2** for ATFCM procedures and requirements in support of airspace delegation.

Also, the Virtual Centre architecture and services will be further developed and/or complemented through the development (and/or complement), verification and integration of the technical infrastructure to support the validation activities planned to be performed in the Virtual Centre context by:

- PJ10-W2-93 on the ATC aspects of airspace delegation amongst ATSUs;
- PJ32-W3 for the validation activities required on the ATFCM aspects of airspace delegation amongst ATSUs and their impacts on ATC systems.

This technical infrastructure development will be a common activity with PJ10-W2-93.

Operational Thread - validation of airspace delegation amongst ATSUs

Two validation exercises are proposed **to achieve E-OCVM maturity level 2** for ATFCM procedures and requirements in support of airspace delegation in complement to PJ10-W2-93 activities:

- **Validation exercise 1 - ATFCM process for Airspace Delegation** to define and validate the operational feasibility of ATFCM procedures and their consequences on ATFCM (and when need be complementing ATC) systems and requirements for airspace delegation in the Virtual Centre context;
- **Validation exercise 2 - Capacity on Demand Performance Analysis** to assess the performance of airspace delegation at network level in consideration of evolving geographical/organisational scopes of airspace delegation.

Validation Exercise 1 - ATFCM process for Airspace Delegation

PJ32-W3 will further complement the Virtual Centre concept by defining and validating how ATFCM will be involved in the decision making process to manage the delegation of airspace and the impacts on ATC systems.

It will test the operational feasibility and validate the ATFCM procedures and requirements in support of PJ10-W2-93 defined use cases, and to consider the evolving geographical/organisational scopes of airspace delegation in the Virtual Centre context. The project will complement the six use cases (see below UC #1 to 6) defined by PJ10-W2-93 requiring ATFCM support to airspace delegation:

- UC #1+2 - static delegation of ATC services at fixed time.
This can be coordinated bilaterally at strategic and pre-tactical level. Only minor ATFCM aspects are relevant for R&D. Agreement on a framework for standard ATFCM processes and procedures for airspace delegation between ATSUs in an ECAC wide application will be required.
PJ32-W3 will review and complement the requirements produced by PJ10-W2-93 (OSED and SPR-INTEROP) with ATFCM procedures in support of static delegation of ATC services.
- UC #3+4 - dynamic delegation of ATC services in response to traffic needs or ATCO shortage.
This is most relevant at pre-tactical and tactical level. It is initially only between neighbouring ATSUs but can be expanded later to FIR and ECAC level. PJ32-W3 will further complement these PJ10-W2-93 uses cases #3+4, by defining and validating how ATFCM will be involved in the decision making process and the impact on ATC systems. Investigation of Network Management (NM) role in the identification of opportunities and the coordination of solutions between different ATSUs will be made. This is a major R&D relevant ATFCM aspect. Three different scenarios shall be differentiated:
 - **Scenario 1 - Load balancing between ATSUs of the same ANSP;**
 - **Scenario 2a - Load balancing between multiple neighbouring ATSUs from same or different ANSPs with NM coordination or local coordination with NM information.**
 - **Scenario 2b - Load balancing between multiple ATSUs from different ANSPs with NM coordination or local coordination with NM information;**
 - **Scenario 3 - Delegation of airspace between Civil and Military ATSUs.**
- UC# 5 - dynamic delegation of ATC services to operate cross border sectors (this is similar to UC #3+4 but including initial cross border DAC limited to pre-defined cross border sectors).
PJ32-W3 will further complement PJ10-W2-93 and PJ09-W2-44 exercises with the operational and performance evaluation of ATFCM processes and support tools with specific focus on:
 - **Scenario 1 - Load balancing between ATSUs of the same ANPS;**
 - **Scenario 2a - Load balancing between multiple neighbouring ATSUs from same or different ANSPs with NM coordination or local coordination with NM information.**
- UC #6 - delegation of ATC services in support of contingency operations.

This requires considerable NM ATFCM or local coordination with NM information crisis support including redirection of traffic, ramp-up and close-out procedures. It is proposed to be part of the PJ32-W3 validation exercise 1 with specific focus on:

○ **Scenario 4 - Contingency delegation of ATSU services.**

Four different complexity levels of airspace delegation with increasing flexibility and scope of application, both in terms of geographical and organisational dimension will be considered:

- Level 1: Delegation of ATC services to the neighbouring ATSU of the same ANSP;
- Level 2: Delegation of ATC services to the neighbouring ATSU from another ANSP;
- Level 3: Delegation of ATC services to any ATSU of the same ANSP;
- Level 4: Delegation of ATC services to an ATSU from another ANSP in the ECAC area.

However, it will not address the ATSU and ATCO qualification and licencing issues. We will assume pre-defined sectors, ATCO licencing granted for receiving and delegating ATSU; interchangeable ADSP and tactical ATS handover. Both FMPs have full visibility over delegating and receiving ATSU, both ATSU have agreed Letters of Agreements (LoAs) defining those assumptions and constraints/limitations, if any¹. The table below describes the links and benefit of the PJ32-W3 validation activities vs the PJ10-W2-93 Uses Case.

This is the result of the assessment made with PJ10-W2-93 and PJ32-W3 partners at the time of producing the Wave3 offer. This will be reviewed with the revised versions of the OSED/SPR-INTEROP and Validation Plan (VALP) when available from PJ10-W2-93 during the execution of these projects.

PJ10-W2-93 UC	PJ32-W3 complement	Benefits
UC #1+2 Static Delegation of ATC services at Fixed Time (e.g. at Night in a low traffic condition)	Definition of ATFCM procedures in support of static delegation of ATC services.	Agreement on a framework for standard ATFCM processes and procedures for airspace delegation between ATSUs in an ECAC wide application
UC #3+4 Dynamic Delegation of ATC services in response to traffic needs or ATCO shortage	Complementing PJ10-W2-93 exercises with the operational and performance evaluation of ATFCM processes and support tools (including ATC systems) in the context of <ul style="list-style-type: none"> Scenario 1 - load balancing between ATSUs of the same ANSP. 	Validation of ATFCM procedures and tools (including ATC systems) in support of dynamic airspace delegation between two different ATSUs (Level 1 and 3 type of delegation)
	<ul style="list-style-type: none"> Scenario 2a - Load balancing between multiple neighbouring ATSUs from same or different ANSPs with NM coordination or local coordination with NM information 	Validation of ATFCM procedures and tools (including ATC systems) in support of dynamic cross border airspace delegation (Level 1 and 2 type delegation)
	<ul style="list-style-type: none"> Scenario 2b - Load balancing between multiple ATSUs from different ANSPs with NM coordination or local coordination with NM information. 	Validation of ATFCM procedures and tools (including ATC systems) in support of dynamic airspace delegation between two different ATSU (Level 2 and 4 type of delegation)
	<ul style="list-style-type: none"> Scenario 3 - Delegation of airspace between Civil and Military ATSUs. 	Test requirements Civil Military coordination, in the specific case of the delegation of airspace, with various coordination activities both in the Strategic Planning Phase.

¹ These topics are worked out in the SESAR programme from the start with Wave1 project PJ10-06 (Generic (non-geographical) Controller Validations)), Wave2 project PJ10-W2-73 (Collaborative Control & Generic (non-geographical) Controller Validations) and proposed in Wave3 topic "Increased flexibility in ATCO validation".

UC# 5 Dynamic Delegation of ATC services to operate Cross Border sectors	Complementing PJ10-W2-93 and PJ09-W2-44 exercises with the operational and performance evaluation of ATFCM processes and support tools (including ATC systems) in the context of <ul style="list-style-type: none"> Scenario 2a - Load balancing between multiple neighbouring ATSUs from same or different ANSPs with NM coordination or local coordination with NM information 	Validation of ATFCM procedures and tools (including ATC systems) in support of dynamic cross border airspace delegation (Level 1 and 2 type delegation)
UC #6 Delegation of ATC services in support of Contingency operations	Contingency delegation of ATSU services are no longer planned to be covered by PJ10-W2-93. This UC covers the definition and validation of ATFCM procedures in support of contingency operations <ul style="list-style-type: none"> Scenario 4 - Contingency delegation of ATSU services. 	Agreement on a framework for standard ATFCM processes and validation of ATFCM procedures and tools (including ATC systems) in the context of contingency delegation within the ECAC area.

The table below describes the level of airspace delegation types covered by the validation scenarios.

PJ32-W3 Validation Scenarios	Delegation of ATC services within the same ANSP		Delegation of ATC services between different ANSPs	
	Level 1 neighbouring ATSU	Level 3 any ATSU	Level 2 neighbouring ANSP	Level 4 any ANSP
Scenario 1 - load balancing between ATSUs of the same ANSP	✓	✓		
Scenario 2a - Load balancing between multiple neighbouring ATSUs from same or different ANSPs with NM coordination or local coordination with NM information	✓		✓	
Scenario 2b - Load balancing between multiple ATSUs from different ANSPs with NM coordination or local coordination			✓	✓
Scenario 3 - Delegation of airspace between Civil/Military ATSUs	✓			
Scenario 4 - Contingency delegation of ATSU services	✓			

Validation Exercise 2 - Capacity on Demand Performance Analysis

In order to assess the performance of airspace delegation at network level, the PJ32-W3 Operational Thread proposes a model-based simulation using the EUROCONTROL Research Network Strategic Tool (R-NEST), a certified ATFCM model-based simulator, to evaluate the performance benefits for **capacity on demand** operations as a function of the geographical / organisational scope of airspace delegation in the ECAC area. It will consider all aspects of airspace delegation in the context of pre-tactical and tactical ATFCM aspects.

This validation exercise will evaluate the performance of current operation (baseline) against the four different complexity levels of airspace delegation defined earlier.

Performance evaluations will be based on the following assumptions:

- Delegating and receiving ATSUs are fully certified for bidirectional airspace delegations;
- There are no ATCO qualification and licensing issues.

Technical Thread - Virtual Centre technical validation infrastructure

Three main activities are proposed:

- Support and provide whole or part of the technical infrastructure and platforms required for the validation exercises for PJ10-W2-93 (V3 maturity level);

- Support and provide whole or part of the technical infrastructure and platforms required for the validation activity for PJ32-W3 Operational Thread (V2 maturity level);
- Technical demonstration of the Virtual Centre concept.

Support Validation Exercises for PJ10-W2-93

PJ32-W3 will support the validation activities defined by PJ10-W2-93 by providing and/or completing the technical validation platforms based on PJ10-W2-93 requirements expressed in the PJ10-W2-93 TS/IRS to support ATC aspects of airspace delegation.

PJ10-W2-93 is planning five validation exercises:

- Validation Exercise 1 proposed to bring at a complete E-OCVM V2 maturity level, the outcomes of the Wave1 activities of PJ16-03 and PJ15-09 in the context of the Delegation and Contingency of Airspace, as well as future development of virtual centre services. This validation exercise will reuse and evolve the technical platform developed in PJ16-03 for the validation of the operational use cases. This platform consists of several ADSPs and CWP's from different vendors for ATM and Voice.

PJ32-W3 will not provide support. This validation is planned to take place early 2021, almost at the time when PJ32-W3 (if awarded) will start in execution. There will not be any time to support to this Validation exercise 1, but technical findings will be taken into account by the PJ32-W3 in coordination with PJ10-W2-93.

- Validation Exercise 2 proposed to identify and validate under which conditions (time, periods, traffic demand, static, dynamic, number of sectors), the delegation of airspace among ATSU's is feasible. It will demonstrate that modified operational procedures necessary to mitigate lack of ATCO training or competences are feasible to tackle the concept. It will also demonstrate that the abovementioned delegation brings benefits on Cost-Efficiency, Capacity and Flexibility and does not have negative impacts on Human Performance or Safety.

PJ32-W3 will not provide support. The objectives are purely operational making the assumptions in the Real Time Simulation (RTS) that there are standardised services supporting the procedures. The validation is focused on ATS procedures feasibility. Existing legacy platforms will be used.

- Validation Exercise 3 (E-OCVM V3 maturity level) proposed to define and validate the ATC aspects of airspace delegation with a realistic operational environment (ANSP perspective) and representative users in the Virtual Centre context. It will define delegation procedures and required training for ATCO's. It will investigate the possibility to delegate part of the airspace to several ANSP's. It will involve multi-customer ADSP's from several providers for both ATM and for Voice services. This validation exercise reuses and further evolves the multi-vendor validation platform of Validation Exercise 1 and will also benefit from achievements of the PJ32-W3 Technical Thread. The validation runs of Validation Exercise 3 can furthermore be used to collect data, e.g. response times and message sizes which enable a technical evaluation of the services within the PJ32-W3 Technical Thread.

PJ32-W3 will complement the validation platform developed by PJ10-W2-93 with:

- **Probes² used during operational scenarios to measure Performance** and capacity of the overall Virtual Centre infrastructure. This will also allow the completion of the operational scenario as well as the validation scope extension (e.g. number of used operations, performance during short peak load scenario, use of secured infrastructure etc...);
- **Additional Virtual Centre services** to validate and cross validate a wider range of operations than the one strictly required for airspace delegation, thus enlarging the scope of the technical and cross validation objectives and further increasing the maturity level of the Virtual Concept maturity;
- **Service compliance tools to check the level of compliance** of the Virtual Centre services provided and consumed by the different CWP's and ADSP prototypes, to assess the level of interoperability.

² Probe is a software (or other device) inserted implemented in the validation platform or infrastructure for the purpose of monitoring and/or collecting data about network activity.

- Validation Exercise 4 proposed to define and validate the ATS aspects of airspace delegation between civil and military ATSUs in the Virtual Centre context.

PJ32-W3 will develop a new prototype consuming existing or new services to support Airspace delegation tactical/pre tactical phase in the Virtual Centre context. This will welcome a new entrant (ENAV/IDSAirNav) in the Virtual Centre infrastructure, strengthening multi-vendor aspects and providing feedbacks on the different use of existing services. The IDS AirNav AirSpace Management (ASM) module capability is to improve airspace management processes by providing mutual visibility on civil and military environment, by increasing mutual understanding and by enabling a more efficient decision-making process. This module provides an interface allowing online airspace reservation, enabling transparent coordination and maximising automation of routine tasks through a shared real-time airspace status display, situational awareness of all players is enhanced, and flight safety greatly improved.

The overall objective of this exercise is to demonstrate the ability of re-sectorize the ATSU airspace configuration dynamically, to better accommodate forecast (traffic demand, in the medium/short-term. It intends to demonstrate technical and operational use cases of delegation of ATC services and contingency in a Virtual Centre architecture. The target scenario addresses civil/military coordination management, as defined in the Flexible Use of Airspace concept, and information sharing in case of delegation of airspace.

- Validation Exercise 5 proposed to validate the operational requirements and processes in a contingency scenario in the Virtual Centre context. A virtualized platform consisting of (at least) one ATSU and two ADSPs will be used for the validation. Different scenarios, with degradation or loss of an ADSP will be investigated to determine the operational impact in such situations.

PJ32-W3 will complement the Virtual Centre infrastructure to support this validation exercise 5 and in particular, the ATFCM requirements will be implemented as defined in the PJ32-W3 Operational Thread and their impacts on ATC systems (Integrated Network Management and Extended ATC Planning (INAP) concept as defined in PJ09-W2-44).

- Validation Exercise 6 proposed to identify and validate the operational procedures, the feasibility and the conditions necessary for the cross boarder delegation of ATC services of one or several sectors, between Poland and Lithuania. Cost-Efficiency will be analysed for a low traffic demand condition, where full transfer of responsibility of one or more sectors from one ATSU to another is performed, as the number of ATCOs on duty should decrease.

PJ32-W3 will not provide support. The objectives are purely operational. Existing legacy platforms will be used.

This is the result of the assessment made with PJ10-W2-93 and PJ32-W3 partners at the time of producing the Wave3 offer. This will be reviewed with the revised versions of the TS/IRS and Validation Plan (VALP) when available from PJ10-W2-93 and PJ32-W3 during the execution of these projects. The table below describes how PJ32-W3 Technical Thread will support PJ10-W2-93 validation and the added value.

PJ10-W2-93 Validation Exercise	PJ32-W3 complement	Added value
Validation Exercise 1	N/A	Too early to get a concrete support from PJ32-W3 Technical Thread, but findings can be taken into account by the Technical Thread
Validation Exercise 2	N/A	PJ32-W3 will not provide support this exercise as the objectives are purely operational
Validation Exercise 3	PJ32-W3 will complete the PJ10-W2-93 validation infrastructure with: <ul style="list-style-type: none"> supervisory tool to support Airspace delegation tactical phase; 	Complement the validation platform developed by PJ10-W2-93 and future increase the maturity level of the Virtual Centre concept

	<ul style="list-style-type: none"> • probes used during operational scenario to measure Performance; • additional Virtual Centre services and • service compliance tools 	
Validation Exercise 4	PJ32-W3 will develop a new prototype consuming existing or new services to support Airspace delegation tactical/pre tactical phase.	Support PJ10-W2-93 validation and demonstrate the ability implementation of a Virtual centre infrastructure flexibility and agility to get new services consumers
Validation Exercise 5	PJ32-W3 will develop and provide a Virtual Centre infrastructure to support this validation exercise	Support PJ10-W2-93 validation and demonstrate the implementation of a Virtual centre infrastructure based on the Wave1 PJ16.03 project by implementing ATFCM requirements and their impacts on ATC system.
Validation Exercise 6	N/A	PJ32-W3 will not provide support this exercise as the objectives are purely operational

Support Validation Exercises for PJ32-W3 Operational Thread

PJ32-W3 will support the validation activities defined by the PJ32-W3 Operational Thread, by providing the technical validation platforms based on technical requirements expressed in the PJ32-W3 TS/IRS to support ATFCM aspects of airspace delegation and their impacts on ATC systems.

PJ32-W3 Operational Thread is planning two validation exercises: ATFCM process for Airspace Delegation and Capacity on Demand Performance Analysis.

These validation exercises will be respectively real time validation with human in the loop, and model-based simulations. Several tools will be used such as EUROCONTROL advanced FMP platform, Network Management Operation Centre (NMOC) platform and advanced Gaming Platform for Network Management (INNOVE). All three platforms are provided by EUROCONTROL. However, for some exercises, several partners are planning to use their own advanced FMP platforms to be shared amongst partners and/or connected to EUROCONTROL platforms. All these platforms exist already but some technical requirements expressed by PJ32-W3 require upgrades. The PJ32-W3 Technical Thread will ensure these validation platforms are upgraded accordingly. A more detailed description of the validation methodology (thus technical infrastructure and platforms used) is provide in the next section (1.3 (b) Methodology).

Technical demonstration of the Virtual Centre concept

As explained above in the section 1.2, the Virtual Centre Wave3 proposal is not only to define and validate airspace delegation in complement with PJ10-W2-93, but also to increase the maturity of the Virtual Centre Concept, the level of interoperability, cost-efficiency and flexibility of the Virtual Centre architecture and service.

The Technical demonstration is proposed to:

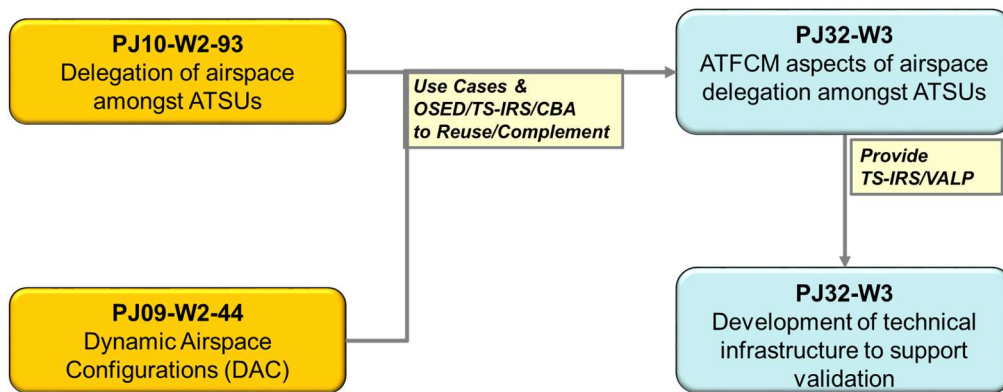
- increase the number of cross-validated Virtual centre services;
- **ensure multi-vendor exercises** using multiple ADSPs of different vendors delivering services to a common ATSU, or single ADSP delivering services to different ATSUs of different vendors, or combination of these possibilities to steer toward increased interoperability and standardisation;
- **complement performance assessments** done in PJ10-W2-93 and PJ32-W3 Operational Thread to get an integrated and complete picture of the performance benefits of the Virtual Centre concept;
- **complement the security requirements** defined by PJ10-W2-93 and PJ32-W3 Operational Thread to get an integrated and complete picture of the security requirements for the Virtual Centre concept.

(b) Methodology

The validation methodology to achieve the target maturity in SESAR 2020 Wave3 consists of many different methods, techniques and tools, which are all in line with the E-OCVM and the current maturity level. This section describes the validation scenario as well as the validation platforms, organisation and dependencies on other solutions or projects.

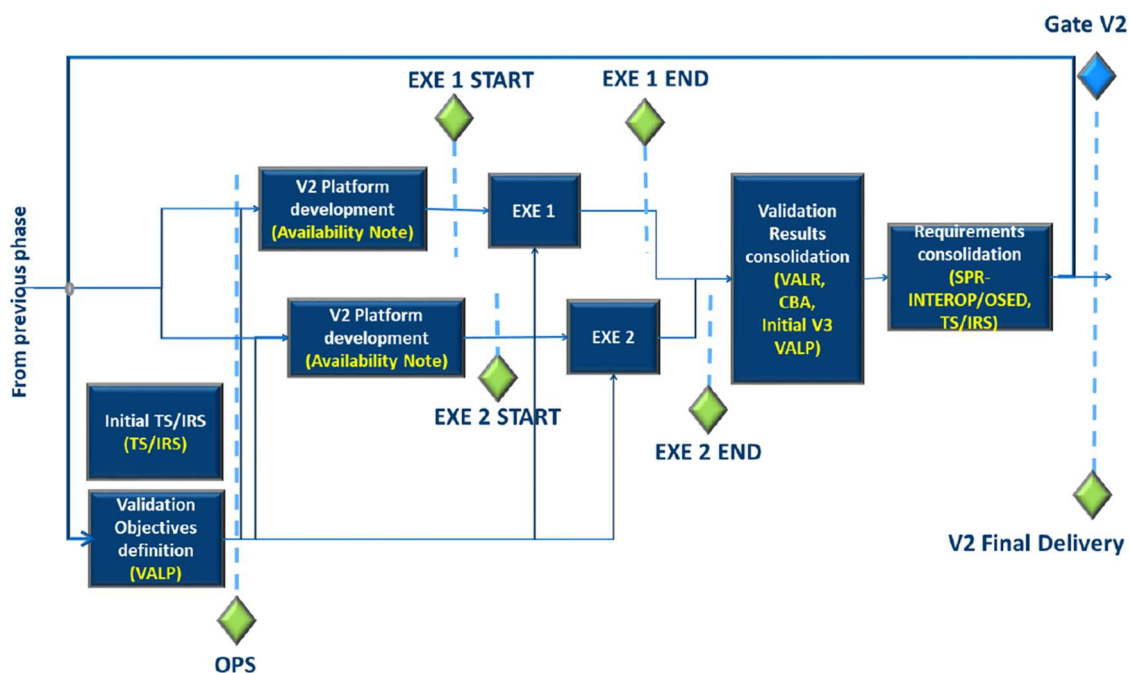
Operational Thread - validation of airspace delegation amongst ATSU's

PJ32-W3 is expected to bring ATFCM procedures and requirements to support airspace delegation at E-OCVM **maturity level 2** complementing PJ10-W2-93. PJ32-W3 will coordinate with PJ09-W2-44 on DAC aspects. Several partners envisage reusing respectively adaptation of PJ09-W2-44 tools to cover technical requirements in line with the needs for VC airspace delegation validation. The diagram below shows the dependencies with other SESAR 2020 projects. These dependencies are further refined in the next sections below.



Compliance with SESAR development and validation method

PJ32-W3 is following the SESAR development and validation phase related to SESAR ATM Solutions conducted up to V2 maturity as described in the SESAR Project Handbook (Programme Execution Guidance). This SESAR development and validation phase is described in section 2.7.6 (V2 phase for SESAR ATM Solutions) as described in the diagram below.



According to the Call Technical Specifications, the PJ32-W3 Operational Thread is expected to deliver a typical solution data pack at V2 level including SPR-INTEROP/OSD and TS/IRS, and the required VALP and VALR. However, as PJ32-W3 is complementing PJ10-W2-93, it is important to avoid overlaps and/or inconsistencies on the Airspace Delegation concept in the Virtual Centre context. In order to avoid such overlaps and/or inconsistencies, PJ32-W3 will:

1. Not produce a standalone OSD/SPR/INTEROP but **complement the OSD/SPR-INTEROP document produced by PJ10-W2-93**, with the ATFCM procedures and requirements defined to support airspace delegation and their impacts on ATC requirements. These additional requirements will be described in a set of specific chapters to be inserted into the PJ10-W2-93 OSD/SPR/INTEROP document. In order to ensure consistency, PJ32-W3 will coordinate this with PJ10-W2-93;
2. **Produce the VALP** to define the validation objectives, requirements and plan for ATFCM procedures and requirements validation and their impacts on ATC requirements. The validation exercises and scenario are defined to complement the PJ10-W2-93 Uses Cases (see section 1.2). Nevertheless, PJ32-W3 will review the VALP produced by PJ10-W2-93 to ensure that it is fully complementary and to avoid overlaps and/or inconsistencies;
3. Not produce a standalone TS/IRS but **complement the TS/IRS document produced by PJ10-W2-93** to define the technical requirement of the validation platform used to validate the ATFCM procedures and requirements and their impacts on ATC requirements. These additional requirements will be described in a set of specific chapters to be inserted into the PJ10-W2-93 TS/IRS document. In order to ensure consistency, PJ32-W3 will coordinate this with PJ10-W2-93;
4. **Produce the VALR** at the end of the validation exercises to consolidate the validation results, and to capture the relevant conclusions and recommendations.
5. Not produce a standalone CBA but **complement the CBA produced by PJ10-W2-93** to assess the affordability of the ATFCM procedures and requirements defined to support airspace delegation with respect to its expected benefits.
6. From the complementary OSD/SPR-INTEROP/TS/IRS and CBA information provided to complement the PJ10-W2-93 deliverables, PJ32-W3 will **produce a Solution Data Pack** in order to run a V2 Maturity Gate³. This maturity gate will be run in parallel with the PJ10-93 V3 gate, in order to be able to have a global assessment of the Virtual Centre Concept maturity covering ATC and ATFCM elements, with as outcome a V3 maturity with some likely gaps for the ATFCM part.

Validation methodology

Two validation exercises are proposed for ATFCM procedures, and requirements to support airspace delegation are proposed:

- Validation exercise 1 to define, test the operational feasibility and validate the ATFCM procedures and requirements of airspace delegation in complement of PJ10-W2-93;
- Validation exercise 2 to assess the performance of Airspace Delegation at network level in consideration of evolving geographical/organisational scopes of airspace delegation;

Each of these validation exercises is described in detailed below. Each is designed in order:

- To optimise the resource by using generic validation platforms and sharing validation tools as much as possible;
- To ensure full coverage of ATFCM procedures and requirements and their impacts on ATC requirements validation, and to avoid duplications.

Validation Exercise 1 - ATFCM process for Airspace Delegation

³ PJ32-W3 will coordinate with PJ10-W2-93 to try running the Maturity Gates together. This will be further coordinated with SJU when PJ32-W3 have been awarded and in execution.

Validation exercise 1 is to define, test the operational feasibility and validate the ATFCM procedures and requirements (and when need be complementing their impacts on ATC requirements) to support airspace delegation complementing the validation of PJ10-W2-93.

Validation will be organised in form of **real time simulation with human operation in the loop**. Validation will involve regional Network Management and local Flow Management representing future processes and functions developed to support different aspects of Virtual Centre Operations from simple airspace delegation to more complex capacity optimisations at regional level. There will be two or more advanced Flow Management Positions (FMP) with FMP operators to represent the local FMP operations of delegating and receiving ATSUs. A Network Management Operation Centre (NMOC) position with an NM operator will be representing future functions of the NM Operations Centre in support of Virtual Centre operations. All three positions will be possibly interconnected via a Gaming Platform for Network Management (**INNOVE**) provided by EUROCONTROL. This will form a **generic validation platform set-up** used for most of the validation runs. This generic validation platform set-up is illustrated in the figure below.

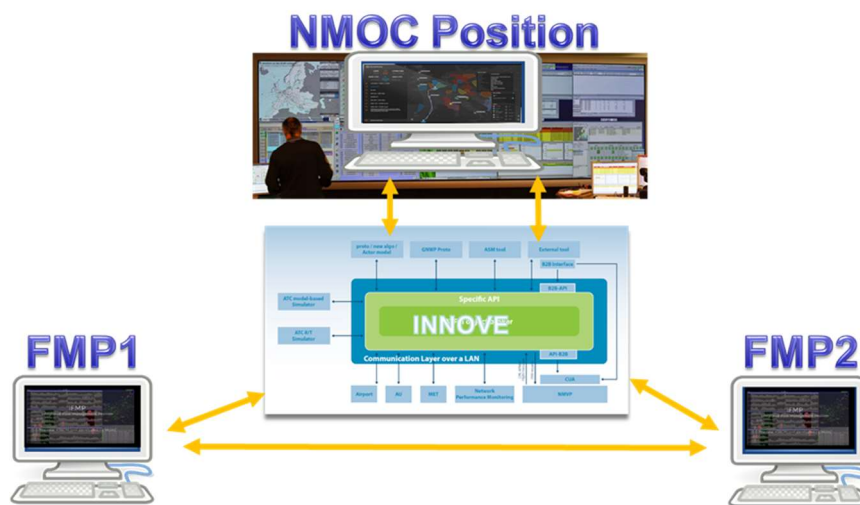


Figure 1: Experimental design for the validation of ATFCM processes in support of Virtual Centre Operations

Validation tools and platforms used for the validation exercises are existing already. Some upgrade will be performed to enhance the existing tools with advanced ATFCM features needed to support airspace delegation in the Virtual centre context.

Exercise Operators and Observers will be involved to ensure a successful run and make live observations that may also be used later on at the debriefing time. Each validation run will be based on a pre-defined scenario to ensure that the simulated ATFCM operations match with the agreed validation objectives. The validation exercise will run a mix between recorded and prepared traffic samples according to the traffic requirements for each individual scenario.

Several operational scenarios have been defined. Each one will be subject to a specific validation activity as described below:

- Validation 1 for Scenario 1 - Load balancing between ATSUs of the same ACC;
- Validation 2 for Scenario 2a - Load balancing between multiple neighbouring ATSUs from same or different ANSPs with NM coordination or different ANSPs with local coordination with NM information;
- Validation 3 for Scenario 2a - Load balancing between multiple neighbouring ATSUs from same or different ANSPs with local coordination with NM information;
- Validation 4 for Scenario 2b - Load balancing between multiple ATSUs from different ANSPs with NM coordination;
- Validation 5 for Scenario 3 – delegation of airspace between Civil/Military ATSUs combined with Scenario 4 - Contingency delegation of ATSU services;
- Validation 6 for Scenario 4 - Contingency delegation of ATSU services.

The tables below provide detail information about how each validation will be performed:

- The mapping with the PJ32-W3 validation context, scenario and objectives;
- The ATFCM R&D topics addressed during the validation;
- The PJ32-W3 Partners contributing to the validation;
- The platform & tools used during the validation (and which PJ32-W3 partner is providing it);
- The timing of the validation (schedule and duration);
- The information (IN) used as input to design and set-up the run;
- The information (OUT) generated at the end of the run.

Context	Dynamic Delegation of ATC services in response to traffic needs or ATCO shortage. (this exercise complements PJ10-W2-93 EXE02 led by ENAIRE)
Scenario	Scenario 1 - Assessing load balancing between ATSU's of the same ANSP
Validation Objectives	Objective VCO-01 - Define ATFCM procedures and requirements in support of PJ10-W2-93 defined Use Cases and in consideration of evolving geographical/organisational scopes of airspace delegation in the Virtual centre context. Objective VCO-02 - Test operational feasibility and acceptance of ATFCM in support of airspace delegation in the Virtual centre context. Sub-Objective VCO-02.01 – To test the feasibility of the seamless process between the ATFCM procedures in support of airspace delegation (PJ32-W3) and the ATS procedures triggered by these ATFCM measures and executed in PJ10-W2-93 EXE02.
ATFCM R&D topics	Standard process for static and pre-defined dynamic solutions Shared roster planning (for level 1 delegations) Cross border visualisation of TV sets, capacities and ATCO availability FMP what-if functionality to identify cross border airspace solutions FMP – FMP coordination process and tools
Partners	(lead) ENAIRE with EUROCONTROL
Platform	2 FMP positions from one ANSP connected via INNOVE ENAIRE/DCB tool (developed under PJ09-W2-44) ENAIRE/RTS SACTA Platform EUROCONTROL/INNOVE
Schedule	Q1 2022
Duration	1 week HIL with 2 FMPs and 2 days-RTS with ATCo to test the ATFCM measures during the execution
IN	PJ32-W3 VALP
OUT	Contribution to PJ32-W3 VALR Complement PJ10-W2-93 OSED/SPR/INTEROP (incl. SESAR Architecture – EATMA)

Context	Dynamic Delegation of ATC services in response to traffic needs or ATCO shortage
Scenario	Scenario 2a - Load balancing between multiple neighbouring ATSU's from same or different ANSPs with NM coordination or local coordination with NM information
Validation Objectives	Objective VCO-01 - Define ATFCM procedures and requirements in support of PJ10-W2-93 defined Use Cases and in consideration of evolving geographical/organisational scopes of airspace delegation in the Virtual centre context. Objective VCO-02 - Test operational feasibility and acceptance of ATFCM in support of airspace delegation in the Virtual centre context.
ATFCM R&D topics	ATFCM framework for dynamic airspace delegation with NM support NM data support for delegation FMP – FMP coordination process and tools for operation ramp-up and close out
Partners	(lead) B4 (PANSO, ON) with INDRA & EUROCONTROL
Platform	2 FMP from at least 2 neighbouring ANSPs and 1 NMOC position connected via INNOVE PANSO/iACM PANSO/iTEC ON/iACM ON/iTEC EUROCONTROL/ NM
Schedule	Q2 2022
Duration	One week

IN	PJ32-W3 VALP
OUT	Contribution to PJ32-W3 VALR Complement PJ10-W2-93 OSED/SPR/INTEROP (incl. SESAR Architecture – EATMA)

Context	Dynamic Cross border Delegation of ATC services to satisfy traffic needs based on ATCO availability
Scenario	Scenario 2a – Load balancing between multiple neighbouring ATSUs from same or different ANSPs with local coordination with NM information
Validation Objectives	Objective VCO-01 - Define ATFCM procedures and requirements in support of PJ10-W2-93 defined Use Cases and in consideration of evolving geographical/organisational scopes of airspace delegation in the Virtual Centre context. Objective VCO-02 - Test operational feasibility and acceptance of ATFCM in support of airspace delegation in the Virtual Centre context.
ATFCM R&D topics	Dynamic change of static/pre-defined configurations Transparency of ATCO availability FMP tool to support hotspot detection based on entry counts and complexity FMP what-if, possibly with cross border functionality FMP processes and tools to initiate/coordinate cross border implementation
Partners	COOPANS (lead) with THALES AIR SYS and EUROCONTROL
Platform	Distributed platform with 2 ADSPs. 2-4 CWP per ATSU. 2 FMP positions. THALES/TopSky-ATC THALES/TopSky-Flow (FMP tool) EUROCONTROL/INNOVE
Schedule	Q2 2022
Duration	1 week
IN	PJ32-W3 VALP, PJ09-W2-44 VALP-EXE#1
OUT	Contribution to PJ32-W3 VALR Complement PJ10-W2-93 OSED/SPR/INTEROP (incl. SESAR Architecture – EATMA) PJ09-W2-44 VALR-EXE#1

Context	Dynamic Delegation of ATC services in response to traffic needs or ATCO shortage
Scenario	Scenario 2b - Load balancing between multiple ATSUs from different ANSPs with NM coordination
Validation Objectives	Objective VCO-01 - Define ATFCM procedures and requirements in support of PJ10-W2-93 defined Use Cases and in consideration of evolving geographical/organisational scopes of airspace delegation in the Virtual Centre context. Objective VCO-02 - Test operational feasibility and acceptance of ATFCM in support of airspace delegation in the Virtual Centre context.
ATFCM R&D topics	ATFCM framework for dynamic airspace delegation with NM support Full transparency of sectorisation options and ATCO availability NMOC what-if solver to identify best opportunities for VC operations NM process and tools to initiate/coordinate VC implementation between two ATSUs NM data support for VC operations FMP – FMP coordination process and tools for operation ramp-up and close out NM performance monitoring
Partners	(lead) EUROCONTROL with PANSA, ENAIRE
Platform	2-3 FMP from at least 2 different ANSPs and 1 NMOC position connected via INNOVE EUROCONTROL/INNOVE EUROCONTROL/PLANTA
Schedule	Feb-Mar 2022
Duration	
IN	PJ32-W3 VALP
OUT	Contribution to PJ32-W3 VALR Complement PJ10-W2-93 OSED/SPR/INTEROP (incl. SESAR Architecture – EATMA)

Context	Dynamic Delegation of ATC services in case of sudden loss of ATSU
Scenario	Scenario 4 - Contingency delegation of ATSU services

Validation Objectives	Objective VCO-01 - Define ATFCM procedures and requirements in support of PJ10-W2-93 Use Cases and in consideration of evolving geographical/organisational scopes of airspace delegation in the Virtual centre context. Objective VCO-02 - Test operational feasibility and acceptance of ATFCM in support of airspace delegation in the Virtual Centre context.
ATFCM R&D topics	ATFCM framework for VC contingency delegation Bilateral agreements for VC contingency delegation Full transparency of sectorisation options and ATCO availability FMP traffic redirection for short notice ATSU losses and during VC ramp –up FMP functionality to coordinate delegation of contingency operation with receiving ATSU FMP functionality to identify best crisis sectorisation scheme FMP data support for contingency VC operations NM - FMP – FMP coordination process and tools for operation ramp-up and close out
Partners	(lead) COOPANS with THALES AIR SYS
Platform	Distributed platform with 2 ADSPs. 2-4 CWP per ATSU. 2 FMP positions. THALES/TopSky-ATC THALES/ TopSky-Flow (FMP tool)
Schedule	Q2 2022
Duration	1 week
IN	PJ32-W3 VALP
OUT	Contribution to PJ32-W3 VALR Complement PJ10-W2-93 OSED/SPR/INTEROP (incl. SESAR Architecture – EATMA)

Context	Dynamic Delegation of ATC services in case of sudden loss of ATSU
Scenario	Scenario 3 - Delegation of airspace between Civil/Military ATSUs Scenario 4 - Contingency delegation of ATSU services
Validation Objectives	Objective VCO-01 - Define ATFCM procedures and requirements in support of PJ10-W2-93 Use Cases and in consideration of evolving geographical/organisational scopes of airspace delegation in the Virtual centre context. Objective VCO-02 - Test operational feasibility and acceptance of ATFCM in support of airspace delegation in the Virtual Centre context.
ATFCM R&D topics	ATFCM framework for VC contingency delegation with NM support Bilateral agreements for VC contingency delegation Full transparency of sectorisation options and ATCO availability NM traffic redirection for short notice ATSU losses and during VC ramp –up NM functionality to coordinate delegation of contingency operation with receiving ATSU FMP/NM functionality to identify best crisis sectorisation scheme NM data support for contingency VC operations NM - FMP – FMP coordination process and tools for operation ramp-up and close out ATFCM framework for Civil /Military coordination with NM support Coordination Civil /Military in the Dynamic Airspace Concept configuration
Partners	(lead) ENAV (IDS AirNav) with LDO, SINTEF (NATMIG)
Platform	IDS AirNav Suite ATFCM, CCS, 4flight CWP
Schedule	Mar-Apr 2022
Duration	1 week
IN	PJ32-W3 VALP
OUT	Contribution to PJ32-W3 VALR Complement PJ10-W2-93 OSED/SPR/INTEROP (incl. SESAR Architecture – EATMA)

Validation Exercise 2 - Capacity on Demand Performance Analysis

In order to assess the performance of Airspace Delegation at network level, PJ32-W3 Operational Thread will run a number of ATFCM model-based simulations to evaluate the performance benefits for **capacity on demand** operations as a function of the geographical / organisational scope of airspace delegation in the ECAC area. The simulations will consider all ATFCM aspects of airspace delegation in the pre-tactical and tactical time horizon. The operational environment used in the simulation is based on the assumption that all ATS/ADSP related aspects of VC are solved and operational. It will be assumed delegating and receiving ATSUs are fully certified for bidirectional airspace delegations. There are no ATCO licensing problems. The

role and functions of ATFCM (including local FMP and Network Manager) are fully adapted to the needs and the scope of the delegation.

This validation exercise will evaluate the performance of current operation (baseline) against the four different complexity levels of airspace delegation.

The validation will use the EUROCONTROL certified R-NEST ATFCM fast time (model-based) simulation with the advanced functionality of an airspace design and sector opening scheme optimizer. The Network Managers Demand Data Repository (DDR2) will be used to get the best accurate picture of the pan-European air traffic demand, past and future, and participating ANSPs will provide complementary operational data such as ATCO availability and sector capacities to reconstruct realistically the Network Operations Planning and Execution process. This ensures transparency and accuracy of the data used and a high degree of realism in the model, leading to the necessary acceptance of simulation results amongst ATM stakeholders.

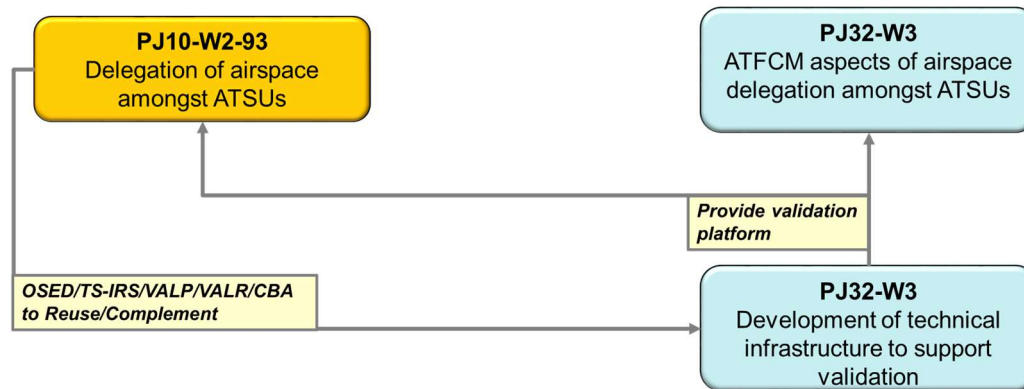
The validation approach will be as follows:

- In the baseline, we reconstruct the real ATFCM operations which took place a certain day in the past and calibrate the model against the performance observed in the DDR2.
- We select 7-15 days with representative traffic samples (high traffic) and run the baseline simulation
- We collect complementary operational resource information from participating ANSPs: sectorisation schemes, ATCO availability, sector capacities
- We feed the R-NEST simulator with the complementary data and
- Rerun the simulation with the R-NEST Sectorisation Optimiser allowing Level 1 airspace delegation opportunities.
- We run the same type of R-NEST simulations for Level 2 ,3 and 4 airspace delegation opportunities
- We verify, clean and analyse the data.
- Each simulation comes up with network performance data: ATFCM delay, ATCO hours used, regulation hours, rerouting etc.
- Finally, we compare the baseline performance with the results of each of the four levels of airspace delegation to evaluate the performance benefits on demand operations (network capacity).
- Finally, we compare the baseline performance with the results of each of the four levels of airspace delegation to evaluate the performance benefits on demand operations (network capacity).

The table below provides detailed information about how the validation will be performed.

Exercise	Capacity on Demand Performance Analysis
Validation Scenarios	<ul style="list-style-type: none"> • Level 0: Baseline: i.e. current operations; • Level 1: Delegation of ATC services to the neighbouring ATSU of the same ANSP; • Level 2: Delegation of ATC services to an ATSU from another but neighbouring ANSP; • Level 3: Delegation of ATC services to any ATSU of the same ANSP; • Level 4: Delegation of ATC services to an ATSU from another ANSP in the ECAC area.
Validation Objectives	Objective VCO-03 – Evaluate the performance benefits for capacity on demand operations as a function of the geographical / organisational scope of airspace delegation in the ECAC area.
ATFCM R&D topics	Quantify opportunities and benefits of VC airspace delegation in the ECAC area under consideration of the 4 levels of implementation
Partners	(lead) EUROCONTROL (incl. MUAC), DSN, ENAIRE, ENAV, DFS, COOPANS, PANS, ON, NATS
Platform	EUROCONTROL/RNEST EUROCONTROL/DDR2
Schedule	June-Dec 2021
Duration	
IN	PJ32-W3 VALP
OUT	Contribution to PJ32-W3 VALR Complement PJ10-W2-93 OSED/SPR/INTEROP (incl. SESAR Architecture – EATMA)

PJ32-W3 Technical Thread is expected to complement and/or provide validation platform to support Airspace Delegation validation exercises performed by PJ10-W2-93 (V3 maturity) and PJ32-W3 (V2 maturity). The diagram below shows the dependencies with other SESAR 2020 projects. These dependencies are further refined in the next sections below.



Compliance with SESAR development and validation method

According to the Call Technical Specifications, and in conformance with the SESAR development and validation phase related to SESAR ATM Solutions conducted up to V2 and V3 maturity (as described in the SESAR Project Handbook (Programme Execution Guidance)), the PJ32-W3 Technical Thread is not expected to deliver a solution data pack but rather the required **availability notes** demonstrating the technical infrastructure readiness to support validation activities in the PJ10-W2-93 and PJ32-W3 Operational Thread.

Support methodology

To ensure the production, on time and according to expressed technical requirements platform delivery, PJ32-W3 Technical Thread will:

1. **Review and complement** (when need be) **the TS/IRS (including relevant SDDs) and VALP** produced by PJ10-W2-93 and complemented by the PJ32-W3 Operational Thread to capture the technical requirements for the validation platform development;
2. **Produce (or upgrade)** and deploy the validation platforms;
3. **Produce the Availability Note** to describe the content of the validation platforms.
4. Reuse and, if need be, complement the OSED/SPR-INTEROP document produced by PJ10-W3-93 and complemented by PJ32-W3. This includes contribution to security assessments and identification of Security Requirements;
5. Identify the Standardisation needs by creating and modifying the relevant standardisation enablers that will be used by PJ20 to update the European Master Plan Standardisation Roadmap
6. Reuse and, if need be, **complement the VALR documents produced by PJ10-W3-93 and PJ32-W3** with the validation technical reporting information;
7. Review and **complement the CBA produced by PJ10-W3-93 and PJ32-W3** to assess the affordability of the ATFCM procedures and requirements defined to support airspace delegation with respect to its expected benefits from a technical perspective.

Before delivering the validation platforms/tools for the PJ10-W2-93 and PJ32-W3 validation activities, the Technical Thread will perform the required integration and verification activities on the technical infrastructure to ensure their readiness for the execution of the validation activities. It will also perform technical validation activities to ensure matching the required quality of service, in particular for the transfer of data between geographically separated locations, remote installation of HMI, remote supervision, transversal technical features as recording.

PJ32-W3 Technical Thread will provide whole or part of the validation platforms/tools required for PJ10-W2-93 and PJ32-W3 validation. The tables below provide detailed information about which validation platform will be developed or upgraded (for already existing validation platform) by which PJ32-W3 Partners.

Support to PJ10-W2-93 - Validation Exercise 3					
Component provided	PJ32-W3 will complement the validation platform developed by PJ10-W2-93 with: 1. probes to measure Performance and capacity of the Virtual Centre infrastructure. 2. additional Virtual Centre services to validate 3. service compliance tool to check the level of compliance of the Virtual Centre services				
PJ32-W3 Objectives	Objective VCT-01 - Support validation of PJ10-W2-93 and PJ32-W3 Operational Thread Objective VCT-02 - Produce and complement/provide the technical validation platform Objective VCT-03 - Increase the number of defined as well as implemented Virtual Centre Services Objective VCT-04 – Demonstrate the Virtual Centre architecture interoperability and flexibility Objective VCT-05 – Complement the performance assessment of the Virtual Centre architecture and services Objective VCT-06 – Complement the cyber security level of the Virtual Centre architecture and services Objective VCT-07 – Assess the maturity of the Virtual Centre architecture and services				
Component			1	2	3
Platform	EUROCONTROL	VC service compliance assessment tool			✓
	FREQUENTIS	FREQ ADSP FREQ HMI FREQ Broker		✓ ✓	
	INDRA	INDRA ADSP INDRA HMI		✓ ✓	
	ENAV	CCS ADSP	✓	✓	
	DFS	HMI		✓	
	SKYGUIDE	SIMULATOR/ATG CWP/HMI	✓	✓ ✓	
	LDO	HMI		✓	
	DSNA	CCS ADSP	✓	✓	
Schedule	Q2 2022 (run of the PJ10-W2-93 validation exercise 3)				
IN	PJ10-W2-93 TS-IRS PJ10-W2-93 VALP				
OUT	PJ10-W2-93 TS-IRS PJ10-W2-93 VALR				

Support to PJ10-W2-93 - Validation Exercise 4					
Component provided	PJ32-W3 will provide a new prototype consuming existing or new services to support Airspace delegation tactical/pre tactical phase.				
PJ32-W3 Objectives	Objective VCT-01 - Support validation of PJ10-W2-93 and PJ32-W3 Operational Thread Objective VCT-02 - Produce and complement/provide the technical validation platform Objective VCT-03 - Increase the number of defined as well as implemented Virtual Centre Services Objective VCT-04 – Demonstrate the Virtual Centre architecture interoperability and flexibility Objective VCT-07 – Assess the maturity of the Virtual Centre architecture and services				
Platform	ENAV/IDS	ATFCM tools			
	LDO	HMI			
Schedule	Q2 2022 (run of the PJ10-W2-93 validation Exercise 4)				
IN	PJ10-W2-93 TS-IRS PJ10-W2-93 VALP				
OUT	PJ10-W2-93 TS-IRS PJ10-W2-93 VALR				

Support to PJ10-W2-93 - Validation Exercise 5					
Component provided	PJ32-W3 will provide the Virtual Centre infrastructure to support this validation exercise 5.				

PJ32-W3 Objectives	Objective VCT-01 - Support validation of PJ10-W2-93 and PJ32-W3 Operational Thread Objective VCT-02 - Produce and complement/provide the technical validation platform	
Platform	THALES AIR SYS	TopsSky-ATC TopSky-Flow
Schedule	Q2 2022 (run of the PJ10-W2-93 validation Exercise 5)	
IN	PJ10-W2-93 TS-IRS/OSD PJ10-W2-93 V3 Validation Plan	
OUT	PJ10-W2-93 TS-IRS/OSD PJ10-W2-93 VALR	

Support to PJ32-W3 - Validation Exercise 1	
Component provided	PJ32-W3 will provide the Virtual Centre infrastructure to support this validation Exercise 1.
PJ32-W3 Objectives	Objective VCT-01 - Support validation of PJ10-W2-93 and PJ32-W3 Operational Thread Objective VCT-02 - Produce and complement/provide the technical validation platform Objective VCT-03 - Increase the number of defined as well as implemented Virtual Centre Services Objective VCT-04 – Demonstrate the Virtual Centre architecture interoperability and flexibility Objective VCT-07 – Assess the maturity of the Virtual Centre architecture and services
Platform	All platforms used to perform PJ32-W3 Validation Exercise 1
Schedule	
IN	PJ10-W2-93 TS-IRS PJ32-W3 VALP
OUT	PJ10-W2-93 TS-IRS PJ32-W3 VALR

Technical demonstration of the Virtual Centre concept

As explained above in the section 1.2, the Virtual Centre Wave3 proposal is not only to define and validate airspace delegation in complement with PJ10-W2-93, but also to increase the maturity of the Virtual Centre Concept as a whole. To support this last ambition, the PJ32-W3 Technical Thread will:

- use the validation exercises performed by PJ10-W2-93 and PJ32-W3 Operational Thread, for demonstration the level of interoperability, cost-efficiency and flexibility of the Virtual Centre architecture and service.
- Run a technical demonstration - multi-vendor demonstration using multiple ADSPs of different vendors delivering services to a common ATSU, or a single ADSP delivering services to different ATSUs of different vendors, or any combination of these possibilities. This will be used to assess the maturity level of the Virtual Centre architecture and services at the end of SESAR2020 Wave3.

This activity will propose to include the following features in the validation exercises performed by PJ10-W2-93 and PJ32-W3 Operational Thread:

- **Compliance** of data exchanges with SDDs to ensure interoperability;
A specific tool provided by EUROCONTROL (already developed for SESAR 2020 Wave1 PJ16-03) will be used **to assess the compliance with TS-IRS SDDs of data exchanges between ATSUs and ADSPs**, and to provide feedback of interoperability level regarding services provided by ADSPs.
- Scope of the validation and **cross validation for Virtual Centre services**
On top of the ten Virtual Centre services defined and validated by PJ16-03 (i.e. Coordination and transfer, Flight data management, Flight data distribution, Correlation management, Correlation distribution, Operational Supervision management, Operational Supervision distribution, Airspace status distribution, Voice Communication Management and Voice Communication Distribution), **four VC service** identified in PJ16-03 (SDDs) will be **implemented and will become by the validations** performed by PJ10-W2-93. These are:
 - SSR code management,
 - SSR code distribution,
 - FDO distribution and management
 - Supervision status distribution.

Other new VC services may be identified by the Operational Thread and might be implemented.

In addition, to increase the maturity of the Virtual Centre services, the number of operations already validated/cross-validated per service will be increased as shown in the table below.

	Service	Coordination and transfer	Flight data management	Flight data distribution	Correlation management	Correlation distribution	OPSUP management	OPSUP distribution	Aispace status distribution	Voice Comm Distribution	Voice Comm Management
TRL6 end of PJ16.03 vs Proposal End of wave 3	Operations validated	6 / 20	12/20	2	2	3	2 / 15	2	1/4	14	8
	Operation cross validated	2 / ??	7 / ??	2		3?	2 / ??	2	1/??	3	2

- **Performance** of the Virtual Centre architecture and services;

A set of “probes” will be implemented in the prototypes for measuring performances of the Virtual Centre architecture and services performances. It will be used during the PJ10-W2-93 validations exercises to support performance assessment. Results of this performance assessment will be included as an annex of the PJ10-W2-93 VALR. Moreover, some specific supervision VC facilities will be implemented to monitor KPI/SLA.

- **Cyber security** of the Virtual Centre architecture and services;

The EUROCONTROL SecRAM methodology will be used to perform the Security Risk Assessment (SRA), which will remain confidential at PJ32-W3 level. This is done to comply with participating nations’ and/or companies’ security policies. Risk assessment will cover the Confidentiality, Integrity and Availability triad to ensure protection of information and information systems from unauthorized access, use, disclosure, disruption, modification, perusal, inspection, recording or destruction. This will lead to identify Security Requirements added in the SPR_INTEROP/OSED (or TS/IRS) produced by PJ10-W2-93 and complemented by the PJ32-W3 Operational Thread.

In addition, at the **end of PJ32-W3, a technical Virtual Centre demonstration will be set up**. It will include several ADSPs and ATSUs provided by several providers. This will be a multi-vendor demonstration using multiple ADSPs of different vendors delivering services to a common ATSU, or a single ADSP delivering services to different ATSUs of different vendors, or any combination of these possibilities. This will be a follow-up of the SESAR Virtual Centre Executive Day, which took place at Frequentis premises the 16th October 2019. This technical demonstration will be organised with PJ10-W2-93 by the end of the PJ32-W3 project. The audience of the technical Virtual Centre demonstration will go beyond SESAR to maximize the impact of this technical demonstration.

The exact scope and contributions for this technical demonstration will be further refined during the execution of the PJ32-W3 and PJ10-W2-93 projects, and the SJU.

PJ32-W3 Technical Thread will report on the Virtual Centre concept maturity and readiness for deployment in a specific **Virtual Centre concept maturity report** to state the achieved Virtual Centre concept maturity level at the end of SESAR 2020 Wave3. The purpose of this report is to maximize the impact of the Virtual Centre project and ensure the successful use of its results beyond the PJ32-W3 project and SESAR 2020 programme. The final version of the Virtual Centre concept maturity report will include:

- the description of exploitable results;
- the identification of the potential customers and
- the actions to ensure that the exploitable results i) satisfy the customer needs; ii) are adequate for uptake activities if not yet at the status of established solutions at the project end; iii) achieve sufficient dissemination.

The table below provides detailed information about how the technical Virtual Centre demonstration will be performed.

Scenario	Technical Virtual Centre demonstration – multi vendors
Objectives	Objective VCT-03 - Increase the number of defined as well as implemented Virtual Centre Services Objective VCT-04 – Demonstrate the Virtual Centre architecture interoperability and flexibility Objective VCT-07 – Assess the maturity of the Virtual Centre architecture and services
Partners	(lead) FRQ (FSP), DFS, DSN, INDRA, EUROCONTROL, ENAV, SKYGUIDE, COOPANS
Platform	EUROCONTROL (supplier of the compliance check tool) DSNA (ADSP CCS to expose new services and operations)

	INDRA (ADSP and HMI) FRQ (FSP) (ADSP voice, broker, potential tools) DFS (to be confirmed) (supplier of HMI) ENAV SKYGUIDE
Schedule	Q3 2022
Duration	1 or 2 days
IN	PJ10-W2-93 OSED/TS/IRS
OUT	Press Release of Virtual Centre Virtual Centre concept maturity report

Coordination/synchronisation with PJ10-W2-93 and PJ32-W3

The **Coordination and synchronisation with the PJ10-W2-93 and PJ32-W3 is to ensure overall consistency and coherency of the Operational and Technical requirements developed** by the two projects. In order to reinforce the synchronisation between the PJ10-W2-93 and PJ32-W3, both projects agreed to hold regular consolidation meetings at managerial, operational and technical level. Common Project Management Board (PMB – see section 3.2) meeting and workshops for concept and technical requirements definition will ensure that experts from both projects define operational and technical requirements with common interface needs in a collaborative manner.

As technical requirements may come from different partners for different project teams and validation exercises at different moment in time, and **to ensure overall consistency and coherency**, the TS/IRS and its SDDs produced for Virtual Centre concept will be subject a **rigorous but light change control management**.

The PJ32-W3 Technical Thread will use a sufficiently stable and mature enough version for initiating the development of the validation platform at the earliest possible time. This stable and mature initial version of the TS/IRS will constitute the baseline for both projects. The delivery of this baseline will be materialised by a specific common milestone in the PJ10-W2-93 and PJ32-W3 Gantt Charts. This common milestone will be agreed at the very start of PJ32-W3 (if awarded).

PJ32-W3 will propose to set up an integrated team, composed of contributing members from PJ10-W2-93 and PJ32-W3. The integrated team will take care of operational inputs from the Operational Threads of PJ10-W2-93 and PJ32-W3, as well as feedbacks and lessons learnt from the implementation of the validation stream of PJ10-W2-93 and Technical Thread of PJ32-W3. The integrated team will meet regularly to:

- analyse any change coming from PJ10-W2-93 and PJ32-W3 from a technical point of view, and identify possible inconsistencies with other changes;
- decide and prioritize the implementation of the changes and select those that will be integrated in the next version of the TS/IRS.

As the members of PJ10-W2-93 and PJ32-W3 are almost the same group of SESAR Partners, it should not be an issue. The PJ32-W3 change management proposal has been pre-coordinated with PJ10-W2-93 when producing the PJ32-W3 offer⁴.

Any report defects or problems will be escalated to the PJ10-W2-93 and PJ32-W3 project coordinators for decision-making.

1.4 Ambition

As explained in chapter 1.2, the Virtual Centre concept has been maturing for several years, with already great and promising achievements. In SESAR 1 Project B.04.04, where the feasibility of common and open services for CWP, in the Virtual Centre context was demonstrated. In the context of SESAR2020 Wave1 projects PJ15-09 and PJ16-03 managed to progress on additional aspects needed for the commissioning of such services (performance, safety, security, etc...). The conclusion of the SESAR 1 project B04.04, SESAR 2020 Wave 1

⁴ The change management process proposed is based on the common agreement of the organization contributing to PJ10-W2-93 and PJ32-W3, and the existence of an active Change Control Board in PJ10-W2-93.

projects PJ15-09 and PJ16-03 was that, from a technical perspective, the concept is capable of delivering in accordance to the needs of an ANSP.

It also showed that the decoupling of the service provider from the service consumer would deliver the flexibility and performance aspects of the services. Location independent service provisioning opens new dimensions by breaking the ancillary vertical construction of the Data centre under an ATSU under a given airspace. It is foreseen that such flexibility will at least support or improve the operational performance of the ATSUs. The objective of the first two projects was focussed more on the technical aspects. The Wave 2 and Wave 3 activities will focus on demonstrating the operational capability of the Virtual Centre concept.

Jointly with the PJ10-W2-93 and PJ09-W2-44, PJ32-W3 will make good use of the experiences and platforms to date. PJ32-W3 will contribute to further determine the Operational environment, including all the relevant documentation needed to describe the operational readiness of the Virtual Centre concept. It will also demonstrate that the concept of virtualisation and digitalisation as specified in the Airspace Architecture Study, launched by the European Commission and the work done by the Wise Persons Group (WPG) are heading along a feasible track, laying down the foundations for a new operational model for the Single European Sky.

2 Impact

2.1 Expected impacts

The PJ32-W3 will allow assessing the Virtual Centre concept impact:

- **Defragmentation** of service provision: The use of Virtual Centre Architecture leads to an efficient use of ANSP infrastructure that tackles the issues presented by fragmented European ATM systems and country-specific architectures, enabling Europe to move to an interoperable, cost-efficient and flexible service provision infrastructure.

ANSPs will be able to move away from deploying large monolithic systems or even integrated sub-systems with proprietary interfaces but would rather make use of certified "plug-in" services. The Virtual Centre Concept pushes forward open architecture, decomposition of services, not only linking CWP and services but also services between themselves. With the technical convergence and services decomposition, ANSPs may elect to purchase services from various providers. The technical certified "plug-in" capabilities are expected to increase the competitiveness of the market and to offer economy of scale to ANSPs thus reducing costs for ANSPs and ultimately for airspace users. In a general manner, it will improve the air navigation service provision.

- **Interoperability:** The Virtual Centre ATSU needs to interface with one or more data service providers or consumers. This is possible with a service-oriented approach focussing on technical services and common interfaces. By using standard interfaces, interoperability increases significantly.

PJ32-W3 will continue the development of open, common and standardised services. It will enable the emergence of a new stakeholder in the ATM business, the ATM Data Service Provider (ADSP), bringing the capability of centralising the provision of ATM Data as a service, and thus optimising the technical infrastructure and human operations needed to provide Data to a group of ATSUs.

- **Sharing of infrastructure:** By sharing development in an ADSP, multiples ATSUs could access to innovative functions more rapidly,

The Virtual Centre Concept pushes forward open architecture and decomposition of services, not only linking CWP and services but also services between themselves. With the technical convergence and services decomposition, and the notion of technical certified "plug-in" capabilities, ANSPs will be able to deploy new capabilities with the ability to provide and/or consume new services in an agile manner not requiring major evolution of the technical infrastructure. This agility is expected to increase the ability to cope quickly with any market/business change and thus increase overall competitiveness.

- **Scalability:** Open architecture guarantees the long-term upgradability and scalability of the solution, and its ability to consider future services required from other R&D activities.

With the possibility of delegating airspace sectors from one ANSP to another, the control method of operations will likely converge, resulting in harmonized procedures, working methods and improved interoperability. Thanks to the decoupling Air Navigation Service Providers (ANSP) from ATM Data Service Providers (ADSP) using standardized interfaces, and the delegation of airspace, a functional convergence will be observed easing infrastructure upgrade and new services integration in the future.

- **Network performance:** The Virtual Centre Concept helps dynamically adapting to changes in capacity e.g. in case of contingency in an ATSU in order to ensure keeping network capacity at its optimum level.

The Virtual Centre concept enables airspace sectors to be flexibly assigned to different ATSU to meet the immediate or forecast operational situation, depending on the resources available at any given time. While this is possible currently in some limited cases it is restricted to very low traffic levels, usually at night, due to the difficulty of transferring control responsibility. Enhanced and additional services will remove this current restriction and allow the dynamic assignment of sectors at any time of the day. It may for instance be driven by load sharing constraints or by cost optimisation.

Currently ANSPs have limited contingency capabilities and the airspace they are in charge of may suffer from extended and significant traffic restrictions in the event of a severe or catastrophic loss of ATC service delivery capability (e.g. total system failure or environmental disaster). By implementing airspace delegation capabilities in the Virtual Centre context, operational and technical convergence,

contingency measures will be easier to put in place; will shorten the extent of air traffic restrictions and reduce their severity.

- **Deployment oriented** outcome: The solution supports the automation and digitalisation concepts in support of the Airspace Architecture Study (AAS) and provides a solid foundation to the next generation of ATM provision and related methodologies.

With technical convergence and services decomposition, ANSPs may elect to purchase services from various providers. The technical certified "plug-in" capabilities are expected to increase the competitiveness of the market and to offer economy of scale to ANSPs thus reducing costs for ANSPs and ultimately for the airspace users. It will lay down the foundations for a new operational model for the Single European Sky, thus enabling the emergence of new stakeholders and actors in the ATM business and new business opportunities for ATM Stakeholders.

To assess the positive impact of the airspace delegation in the Virtual Centre context, the following Key Performance Areas (KPA) as defined in the Performance SESAR2020 "Performance Framework". This Performance Framework describes the performance-driven development approach applied within the (SESAR) programme. It provides a framework to support the goal of ensuring that the programme develops the operational concept and technical enablers needed to meet the performance ambitions described in the 2020 edition of the European ATM Master Plan. For each KPA, when applicable, we describe the level and rational of the improvement.

KPA	Level	Rational
Safety	High	The delegation of airspace among ATSUs may imply a loss of Situational Awareness for the ATCO assuming new responsibilities when absorbing new sectors. This situation may imply risks to be mitigated impacting Safety negatively. Other solutions in Wave 2 (Sol73) and Wave 3 (PJ33) will mitigate these situation ensuring the right competences and endorsements to control these delegated areas.
Environment Fuel Efficiency	Medium	ATFCM measures on demand will be reduced on those cases where these are potential solutions to solve capacity problems due to resource limitations. The transfer of responsibility of one or more overloaded sectors to a different ATSU with spare capacity will avoid the application of demand measures and therefore a positive impact on environment and fuel efficiency.
Airport Capacity		Not Applicable
TMA Capacity	High	Same as for en-route
En-Route Capacity	High	In those cases of lack of capacity in a sector or more sectors of an ATSU due to resource limitations, full transfer of responsibility of any of these sectors to a less overloaded ATSU will improve the use of spare capacity and therefore the throughput will increase.
Predictability	Medium	The ATFCM delays will be reduced on those cases where regulations are potential solutions to solve capacity problems. The transfer of responsibility of one or more overloaded sectors to a different ATSU with spare capacity will avoid the application of regulations (reductions of delay) and therefore a positive impact on predictability.
Punctuality		Not Applicable
Cost-Efficiency	High	When traffic demand is low, full transfer of responsibility of one of more sectors from one ATSU to another ATSU will improve the Cost-Efficiency as the number of ATCOs on duty might decrease.
Technology Cost	High	With the technical convergence and services decomposition, ANSPs may elect to purchase services from various providers. The technical certified "plug-in" capabilities are expected to increase the competitiveness of the market and to offer economy of scale to ANSPs thus reducing costs for ANSPs and ultimately for the airspace users

Interoperability	High	Synchronised application of standards and common principles between different ATSUs together with common technical and operational solutions will ensure the technical and operational interoperability of air navigation systems among ATSUs.
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New indicators will be proposed to measure the level of automation and digitalisation based on the automation model for ATC systems (with automation levels from 0 to 5) used in the European ATM Master Plan 2020 already.

Also new KPI for KPA Cost-Efficiency will be investigated. Right now, the mandatory KPI is ATCO Productivity (Flights per ATCO Hour on Duty) expresses the benefit of increasing the number of flights that an individual controller can handle safely with the same workload. This KPI does not reflect the VC benefit on CEFF. The benefit comes from a more globalised use of ATCOs, not limited to local ATSUs. So when traffic load is low and the delegation of airspace is searching for a reduction of ATCOs on duty, the former KPIs do not address this benefit.

a) Business/Economic Impact

Airspace delegation amongst ATSUs can produce:

- **business continuity** (and **resilience**) in case of ATSU unavailability and/or staff shortage, a given ATSU will be able to take over the airspace controlled by the ATSU, which for any planned or unplanned reason, is not in a position to provide ATC services anymore and/or facing staff unavailability;
- **operational flexibility** for ANSPs (local and regional levels) - the possibility to transfer responsibilities between ATSUs allows to better manage and balance capacity and human resources in particular situation, for example when the capacity demand is very high or very low or in case of contingency via dynamic cross-border ATCO resource allocation;
- **Cost savings** for ANSPs (local and regional levels) - the service-oriented approach allows to purchase services from various providers, opening to a competitive market that would, in the end, reduce costs for ANSPs and airspace users.

Reducing costs for ANSPs may ultimately have positive impacts on the airspace users.

With the adoption of an open architecture, the technical convergence and services decomposition and the emergence of technical certified "plug-in" ATM capabilities, not only the competitiveness of the ATM market is expected to increase, but also, new business opportunities and new ATM service providers are expected to enter the ATM Service provision market. It will also provide the opportunity of bringing innovative solutions by combining airspace and technology improvements.

b) Social Impact

Airspace delegation amongst ANSPs implies harmonisation of the working methods and qualifications for the ATM actors (be it the ATCOs but also the technical staff). Deploying open architecture and ATM services will result in redistribution of responsibilities and changes in the business model for ANSP operations within the European ATM system. While PJ32-W3 is not addressing social impact directly, it will highlight the assumptions made about staff qualifications and any other certification issues for the operational validation and technical verification, to enable proactive identification of social and change management risks and opportunities, with regard to the common goal of improving the overall performance of the ATM system.

2.2 Measures to maximise impact

Acknowledging the key role of the Virtual Centre concept for the European ATM improvement, the project considers it crucial to establish strong communication and consultation links with the ATM community to keep it fully engaged in the processes leading to the definition and validation of the Virtual Centre concept. This should also ensure the ATM community's buy-in for future deployment of the Virtual Centre.

Therefore, the Virtual Centre Wave3 project will put high importance on communication and dissemination activities. The actions for the communication and dissemination of results are addressed in the project management Work Package. It will include tasks which will both communicate and disseminate plans and

outputs to a wide set of ATM stakeholders, but also lay out the steps to ensure exploitation of the project outputs beyond the lifetime of this project.

a) Dissemination and exploitation⁵ of results

The dissemination and exploitation activities required will follow the communication guidelines that will be further developed in the Dissemination and Exploitation Plan.

The purpose of the Dissemination activities is to transfer information about the results generated during the project lifecycle to the relevant stakeholders who can best make use of it and to maximize the impact of project, enabling the value of results to be potentially wider than the original focus. This will create awareness about the project results facilitating their exploitation, and allow stakeholders to become involved in the project activities and to gather their feedback. The most important communities and the proposed scopes and modalities of interaction with them, are described below.

- **Stakeholders** including air traffic control organizations, aircraft manufacturers, controller and pilot associations, airlines, researchers, system manufacturers, standardisation and regulatory bodies interested in issues related to the Virtual Centre concept.
- **Research and development community of SESAR** Industrial Research projects in related subjects. The interaction with the SESAR projects will ensure the alignment of the Virtual Centre concept with what is being produced within SESAR.

The main means for dissemination will be:

- participation in international conferences, presenting project results and achievements,
- meetings, digital newsletters, organisation of workshops and tutorials or other common events,
- contributing publications to high-profile journals (e.g. IEEE Journals), and to participating ANSP and industry websites.

It is expected that the consortium will submit technical papers to international conferences on the Virtual Centre topics covered by this project, thus allowing the project to be presented. In addition, 'Open Days' will be conducted after a significant validation has taken place. Stakeholders are invited to see the developed tools and procedures being applied in a realistic target environment, and also allowing the attendees to put 'hands-on' and have a first-sight experience of the achieved project results. This in turn also allows the project partners to get important feedback from people not directly involved.

Furthermore, it is planned to link the dissemination activities of project results to already existing events. As soon as the project is released and initial results or progress can be reported, it is intended to propagate the achievements through events such as the ATM EUROCONTROL-FAA Seminars. Specific events can also be used for such propagation (e.g. the Digital Avionics Systems Conference (DASC), the International Conference on Research in Air Transportation (ICRAT), the International Council of the Aeronautical Sciences Congress/ICAS or the SESAR Innovation Days (SIDs)). Ideally, a common approach with existing conferences with SJU presence should be planned, an active role in the ATC-Global or World ATM congress conferences would be a very good showcase.

The purpose of the Exploitation is to maximize the impact of the Virtual Centre project and ensure the successful use of its results beyond the project. The final version of the Exploitation Plan will include: the description of exploitable results; the identification of the potential customers; and the actions to ensure that the exploitable results i) satisfy the customer needs; ii) are adequate for uptake activities if not yet at the status of established solutions at the project end; iii) achieve enough dissemination.

The Exploitation Plan will be developed considering the competencies, needs and commercial interests of the different partners by joining their individual exploitation interests.

⁵ See participant portal FAQ on how to address [dissemination and exploitation](#) in Horizon 2020

b) Communication activities^{6,7}

The communication activities aim to inform and promote, engage and create awareness about the project to its target audience. It will reach out to the ATM community as a whole and in particular to those Stakeholders beyond the project consortium. Different communication means and channels will be employed to disseminate project information related to objectives, progress, intermediate and final results to different target groups. These will not be different from those described in the dissemination section, even if used with a more communication oriented purpose, including for example: newsletters, leaflets, factsheets, SESAR Flash info, flyers, and brochures, conferences and meetings (such as SESAR Innovation Days, ATM Seminar, ATM World Conference), scientific and informative publications, website, TV and radio channels, social media (such as LinkedIn). The specific mean will be determined based on a careful assessment of the information needs of each group.

Also, most of the project participants are members of several international organisations, associations and forums. In this way, they will be able to present project's results to a large ATM community, through for instance workshops, conferences, and seminars. Another opportunity to communicate project's results will be through presentations to the European Commission or at specific meetings organised by European bodies (e.g. EASA) in Air Transport.

The appointed **communication manager** co-ordinates all activities in this area. It is envisaged that EUROCONTROL as project manager takes responsibility for communication.

As an internal communication channel the SESAR STELLAR extranet is already established. Furthermore, it is planned to build up a database on STELLAR containing all relevant documents produced in PJ32-W3. At least all programme documentation will be stored in order to have full electronic access to documentation.

At project start, a Virtual Centre project's website will be set up to communicate and disseminate relevant information to all interested parties, including policy makers. During the execution of the project, the website will be continuously updated to provide information about the latest developments and results of the project.

In the course of project, a newsletter with current project status and planned meetings will be the means of a regular flow of information about the project's general progress.

Great attention will be paid to the quality of communication with the European Commission, and to the quality of the reporting. For allowing such precise reporting, the consortium has defined a number of deliverables which will ensure a tight follow-up of the works being carried on. These deliverables have been designed as successive milestones for both the partners and the consortium.

⁶ See participant portal FAQ on how to address [communication activities](#) in Horizon 2020

⁷ For further guidance on communicating EU research and innovation for project participants, please refer to the [H2020 Online Manual](#) on the Participant Portal.

3 Implementation

3.1 Work plan – Work packages, deliverables

The project is organised with three different work packages. There is one Management related work package (WP01) and two others, each split into a certain number of activities and to a certain extent, coordinated independently by its WP Leader. The project structure is provided in Figure 5: PJ32-W3 Work Breakdown Structure.

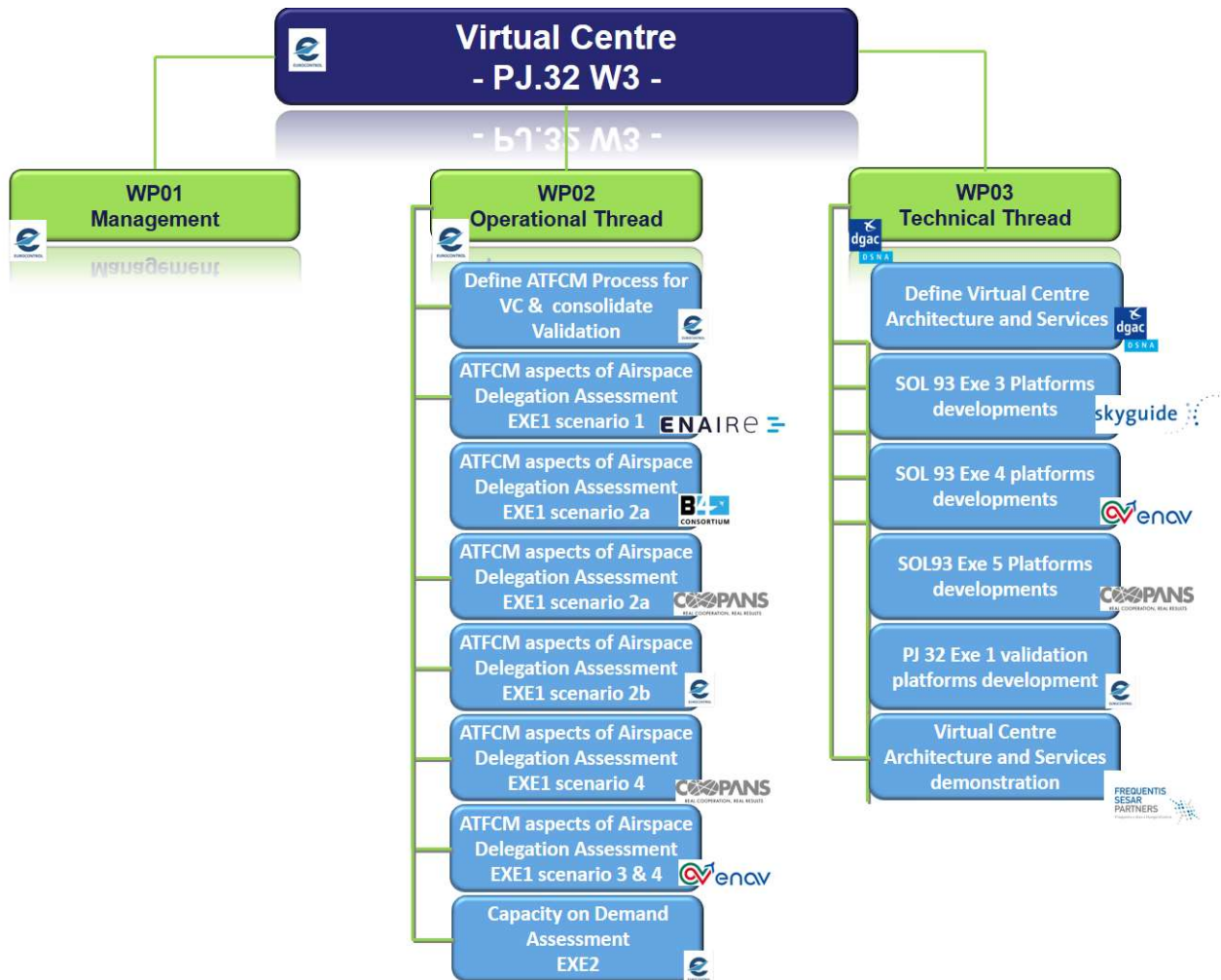


Figure 2: PJ32-W3 Work Breakdown Structure

The two main PJ32-W3 Work Packages (WP) are defined as follow:

- **WP02 – Operational Thread** will bring **ATFCM procedures and requirements** to support airspace delegation at **E-OCVM maturity level 2** complementing PJ10-W2-93. It will develop ATFCM Process and Procedures required to support Airspace Delegation. It will **assess the ATFCM aspects (and their impacts on ATC systems) of Airspace Delegation and the Capacity on Demand** via two main Validation Exercises. A specific sub-work package is defined for each validation exercise. It will **complement the OSED/SPR/INTEROP/TS/IRS** document and associated SESAR architecture (EATMA) produced by PJ10-W2-93. It will define and plan the validation activities (VALP production) and consolidate the performance assessment made during the validation exercises (VALR production and complement CBA of PJ10-W2-93). It will deliver the Solution data pack for and run the Maturity Gate V2. This data pack will include:
 - V2 VALR (ATFCM elements)
 - ATFCM complement to PJ10-W2-93 OSED, TS and CBA
 - Contextual Note

- **WP03 – Technical Thread will produce and deploy the Virtual Centre technical infrastructure to support validation activities** for PJ10-W2-93 and PJ32-W3. It will ensure close cooperation with and expertise provision to PJ10-W2-93. It will review and when need be **complement the TS/IRS** produced by PJ10-W2-93 and complemented by PJ32-W3 Operational Thread. It will review the VALP to make sure the validation platform produced will comply with technical and validation requirements required for PJ10-W2-93 validation and PJ32-W3. It will further increase the maturity level of the Virtual Centre concept by **performing a demonstration of the Virtual Centre** architecture and services at the end of Wave3 and produce a **transition plan**.

Also, a specific WP is defined to comply with the H2020 regulations and to ensure project management, coordination and support to the SESAR 2020 Programme and SJU:

- **WP01 – Project Management will coordinate and monitor the project’s progress** to accomplish the main objectives regarding time and resources. It will ensure PJ32-W3 **coordination with and support provision to SESAR 2020 Programme/SJU** and fulfil the administrative requirements of the grant agreement.

A detailed work package description is provided in Part A of Annex I and detailed planning is available in the Gantt Charts in Figure 3 to Figure 5. In Figure 4 and 5, a detailed planning is provided for only one validation exercise. It shows the way each validation exercise will be performed. Also, each planning shows how the results will be integrated into the Solution Data Pack, Validation Report and the Availability notes.

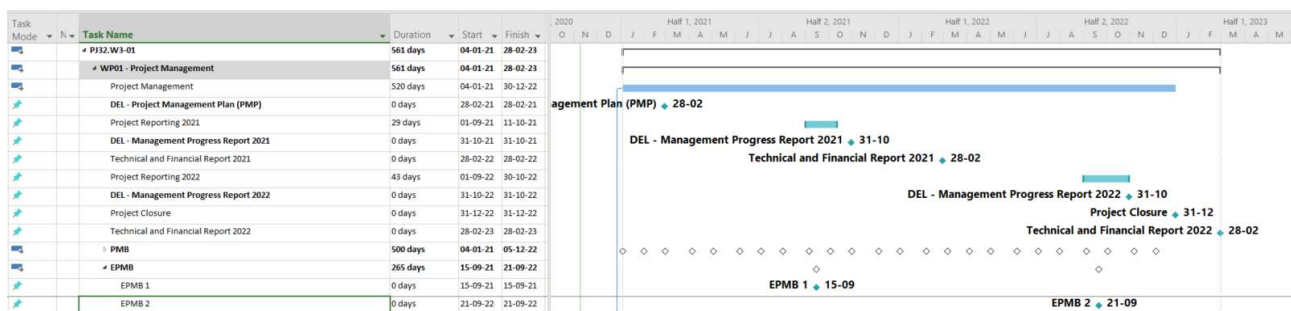


Figure 3: PJ32-W3 Gantt Chart – WP01

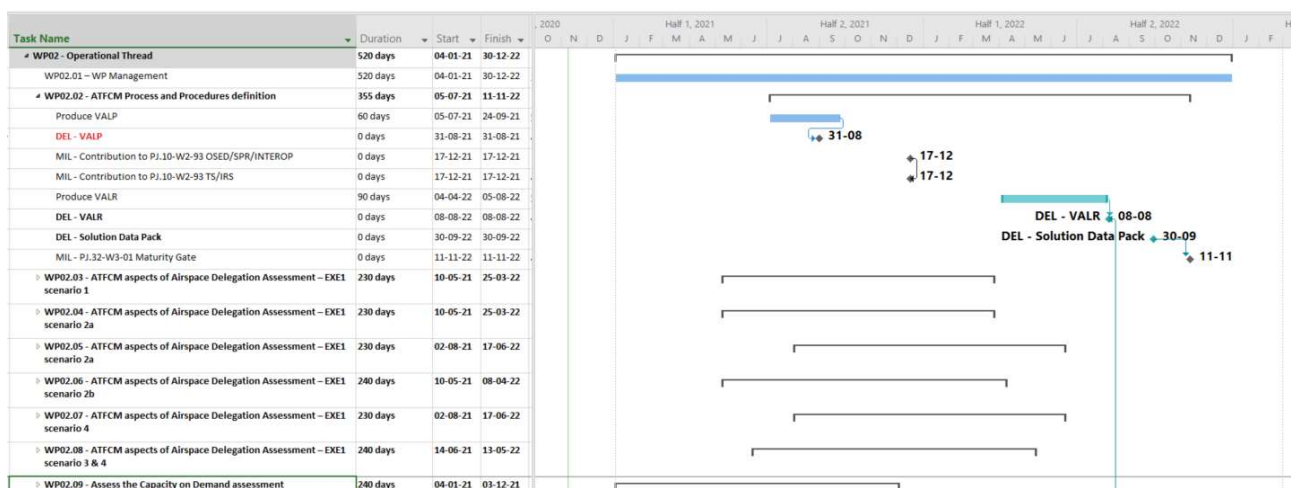


Figure 4: PJ32-W3 Gantt Chart – WP02

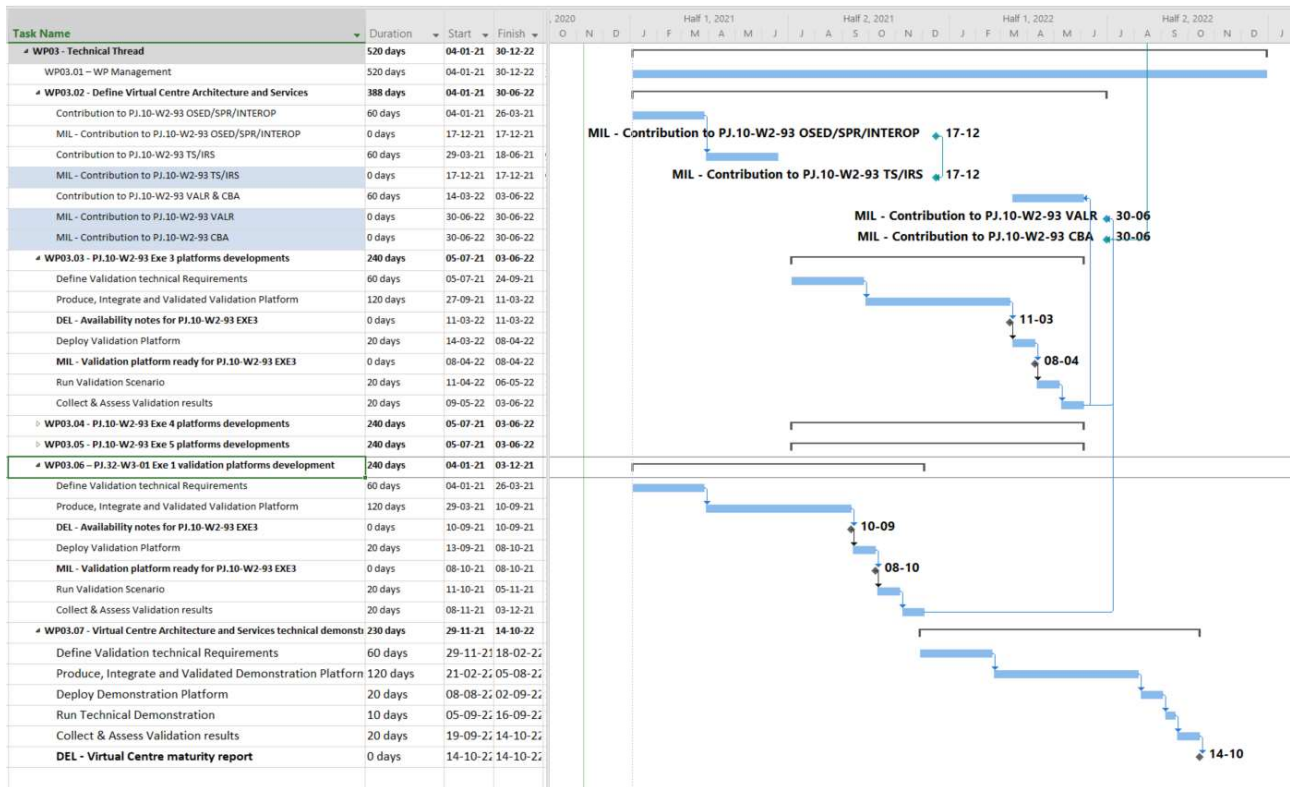


Figure 5: PJ32-W3 Gantt Chart – WP03

3.2 Management structure, milestones and procedures

A lean and efficient management structure will be applied that allows for fast decision making to ensure that the pursued objectives are met. The SESAR2020 Membership Agreement (SMA) specifies management rules that govern the project's workflow as well as all responsibilities and duties of the partners during the course of the project. The administrative and organisational management activities are hosted in WP01. This approach will allow an effective and efficient assignment of partner contributions, while facilitating separation of research and technology tasks from the administrative work necessary to carry out the project.

The project management structure is composed of two main levels that are presented in Figure 7.

The combined legislative-executive level is composed of the Project Manager (PM) and a set of dedicated panels. The PM, as a central point of reference, participates in the Project Management Board, ensuring the overall coordination and follow-up of Project activities. The PM reports to the SESAR Joint Undertaking (SJU) on behalf of the project partners. The PM manages the execution of technical development and control implementation steps, as such, the PM will act as Solution Leader.

3.2.1 Project Manager (PM)

The Project Manager acts as the Specific Grant Agreement point of contact (SGA Coordinator) with the SJU for all contractual matters, and is responsible for:

- checking the quality of the deliverables and verifying their completeness and correctness;
- submitting the deliverables and reports on behalf of the SGA beneficiaries;
- the escalation of issues relevant to the Grant Agreement or to the overall SESAR Programme and management of changes to the Grant Agreement and
- preparing and contributing to the formal contractual closure of the activity.

In addition, the Project Manager is responsible of:

- the timely delivery of the SESAR solutions or technological solutions and enablers for IRs projects;
- the timely execution of SESAR solution validation activities for IRs projects;
- the preparation, execution and maintenance of a Project Management plan;
- the application of common methods, as defined within the Programme Management Plan;

- the provision of a comprehensive oversight of the Project;
- ensuring with partners the engagement of 3rd parties;
- escalation of issues internal to the Project that cannot be resolved by the PMB to the contribution managers of the Project Partners;
- proper and timely communication of information, within and outside of the Project and
- appropriate preparation and contribution to the operational closure of the Project.

3.2.2 Project Management Board (PMB)

The Project Management Board (PMB) will ensure a constant exchange of information between Project Manager, Solution Leads and the SJU. It will be used to monitor the application and to constantly improve the common methods as defined in the PMP.

The PMB should meet periodically (e.g. monthly WebEx and Face to Face as required) to:

- review progress of the solution;
- review solution risks and associated mitigation actions;
- review solution schedule and
- review communication and dissemination activities.

The Project Management Board will be composed of:

- Project Manager (chairman);
- SJU project manager;
- Work Package Leaders;
- The main contributing Partners and
- PJ10-W2-93 representative.

3.2.3 Extended Project Management Board (EPMB)

An Extended Project Management Board (EPMB) meeting including all contributors of the project will convene regularly once a year. Ad-hoc EPMB may be called on request. SJU may be invited for specific agenda items.

The Extended Project Management Board will ensure that all key management decisions of the project are taken with the full support of contributors of the projects. Decision will be made by consensus of all partners involved in a given solution or work package, or in the project if the decision applies to the whole project. In case of disagreement, the escalation process foreseen in Appendix F of the SJU Membership Agreement will apply.

The Extended Project Management Board will meet periodically (preferably Face to Face) to:

- review progress of the project as a whole;
- decide corrective actions;
- review project risks and associated mitigation actions and
- review any potential Change Request to the SGA when necessary.

In addition, in case of significant changes to the project, the Extended Project Management Board shall be asked for approval by correspondence, e.g. for:

- critical deliverables of the project:
 - Initial PMP and updates;
 - CBAs (approved by contributors to the solution);
 - V Data Pack.
- Change Request to the SGA.

In case of difficulties to reach an agreement within the ePMB, the issue will be escalated towards the Contribution Managers for resolution.

3.2.4 Work Package Lead (WPL)

The Work Package Lead is the person responsible for the operational and technical leading of the work packages. He/She is responsible for the project deliverables. The WPL will:

- Organise and coordinate the activities of the work package team (within the team and with other PJ32-W3 WPs and other SESAR 2020 Solution projects);
- Report to the Project Manager on progresses and issues;
- Make proposal for updates and amendments of the activities roadmap, to be agreed at project level;
- Participate to the PMB.

3.2.5 Work Package Team

The main role of the Work Package Team is to:

- Define, validate the SESAR solution and produce the associated deliverables and prototypes;
- Identify and initiate required changes to the SESAR solution, including the validation roadmap;
- Identify and initiate required changes to the SESAR work package;
- Carry-out the activities in accordance with the work package roadmap and raise potential issues as appropriate to the WPL, and PM if necessary.

The Work Package Team is composed of all contributors to the work of a given work package.

3.3 Consortium as a whole

The members of the SESAR Joint Undertaking PPP work and cooperate together to the best of their abilities with a view of implementing SESAR 2020 in a correct, efficient, open and timely manner and of attaining the objectives and the deliverables as envisaged by the ATM Master Plan. The consortium involves key stakeholders of the Airborne Systems, Ground ATM Systems, Service Provision and EUROCONTROL hence providing a wide range of expertise covering all aspects of EUROPEAN ATM.

The PJ32-W3 consortium comprises 15 active organisations from 12 member states of the European Union, and 3 organisations from 3 nations beyond the EU. The consortium was carefully selected according to the skills and experiences required to accomplish the proposed work. The operational expertise, which is crucial for the conceptualisation and implementation phase of the project, is found in the strong representation of end-user organisations in the consortium. The work is structured in a very collaborative way throughout all work packages and will ensure the transfer of knowledge and know-how between all participants.

EUROCONTROL (incl. MUAC) justification for participation

EUROCONTROL will participate in the project actions without requesting funding. EUROCONTROL will, however, fully engage in the project and in particular is committed to providing the effort, contributions to deliverables and to other activities as set out in this tender and in the accompanying administrative forms.

EUROCONTROL has:

- Deep knowledge of the Virtual Centre services developed successively by B04.04, PJ15.09 and PJ16-03; and is contributing to PJ10-W2 and leading PJ09-W2;
- Complete expertise in the ATFCM domain and in the Network Manager systems;
- Strong and recognised Architecture expertise: SESAR PJ19 (Lexicon, services, SOA, EATMA, System lead), including also set-up and opening up of MEGA Db;
- Strong and recognised expertise in modelling techniques of ATM operations, systems and services with associated methodologies;
- Strong and recognised expertise in Cost-Benefits Analysis and in Safety & Human Factors;
- Strong and recognised expertise in ATM simulation and validation, including multi systems and ANSPs.

EUROCONTROL will provide expertise in ATM architecture and service modelling, in particular from its experience gained in Virtual Centre projects (SESAR1 B04.04/SESAR2020 Wave1 PJ15.09 and PJ16-03) and its contribution in SESAR2020 Wave2 PJ10-W2-93 projects. EUROCONTROL will provide strong ATFCM expertise gained in NM/ATFCM projects (SESAR1 WP7/SESAR2020 Wave1 PJ07, PJ08 and PJ09-W2) and its contribution to SESAR2020 Wave2 projects PJ10-W2 and PJ09-W2. EUROCONTROL will also provide technical prototyping and simulation platforms/facilities (i.e. INNOVE, PLANTA, R-NEST, DDR2, Real

Time simulation platforms) to support the exercises and contribute to a relevant coverage of the validation scenarios. EUROCONTROL will also review the operational concept to identify impact and gaps related to ATFCM operations.

Valstybes imone "Oro navigacija" justification for participation

ON, as an ANSP, participating in this project is intend to provide operational and technical expertise, to ensure proper validation exercises.

ON intends to contribute to:

- Strong and recognised expertise in Cost-Benefits Analysis and in Safety & Human Factors;
- preparation of validation exercises
- in validation exercises
- in preparation of validation report.

POLSKA AGENCJA ZEGLUGI POWIETRZNEJ justification for participation

As an ANSP, PANSA's field of expertise is Air Traffic Management operations and services. Among other national and international projects undertaken in the complete evolution of its infrastructures and platforms, PANSA has a constantly growing knowledge drawn from its involvement in the development and validation of concepts in the SESAR2020 Programme.

PANSA is a newcomer to Virtual Centre – PJ10-W2-93 and the related PJ32-W3 concepts – but recognises the strong operational and technical need for participation in the evolution of the concept of Airspace delegation.

In SESAR 2020 Wave 2 Solution PJ.10-W2-93, PANSA participates in activities related to Virtual Centres, in particular relating to the aspect of full transfer of responsibility of one or more ATC sectors from one ATSU to another ATSU in EXE#6. Validation activities will be performed on the iTEC-based Validation Platform.

Additionally, PANSA participates in PJ09-W2-44 in the development of the application of the DAC (Dynamic Airspace Configuration) concept, including integration of DMAs (Dynamic Mobile Area) Type 1 and 2 to better adapt capacity to demand in support of DCB (Dynamic Capacity Balancing) processes. The results of this exercise will contribute to PJ32-W3 activities, checking the impact of flexibility in the airspace configuration across ANSPs' areas of responsibility and its delegation.

PANSA is willing to contribute to the operational thread of Exercise #1 in PJ32-W3, focused on the ATFCM process of airspace delegation, as well as Exercise #2 of the same project.

ACG, CCL, IAA, LFV and Naviair – the COOPANS consortium justification for participation

COOPANS consortium is a leading actor in the development and delivery of new ATM requirements. COOPANS partners have particular expertise in the development of common operational solutions, the development of ATC support tools, and future concepts of operation. The virtual centre supported by appropriate concept of operations offers the opportunity to develop a solution that will deliver performance and flexibility in operations. COOPANS Topsy system already has CWP's geographically separated from the FDP (used in the Dublin Control Centre for a period of time to provide the Shannon Approach Service) and see potential benefits in further exploration of VC capabilities.

The members of COOPANS have previous experience from SESAR W1 PJ16-03 and PJ15-09, were the consortium acted as validation leader for two successful validations related to airspace delegation (TRL4 and TRL6) together with our industrial partner THALES. In PJ32-W3 we would like to support our ongoing W2 activities/validation and complement those activities by expanding the scope to the ATFCM domain. Results from PJ09-W2-44 related to FMP/INAP will be taken into consideration during the planned validation exercise which will explore the dynamic delegation of ATS services between different ANSPs, potentially including DAC, based on VC capabilities.

COOPANS partners will in PJ32-W3:

- Contribute to the overall project progress and documentation
- Act as validation leader for 2 EXE#1 scenarios (2a and 4)
- Participate in EXE#2
- Act as WP lead for 1 technical thread WP.

DFS Deutsche Flugsicherung GMBH justification for participation

The DFS has the technical as well as the operational expertise to contribute to all activities of PJ32-W3. In continuation of the work performed in the previous projects SESAR 1 B.04.04 and SESAR 2020 Wave 1 PJ15-09 and PJ16-03, DFS, as an ANSP, provides operational and technical expertise including system and services development, operating of IBPs and security.

In PJ10-W2-93 DFS is leading the definition of the operational concept as well as the V2 validation exercise which includes several partners. The exercise intends to validate the operational use cases related to delegation of ATS provision and contingency using the services that were defined in Wave 1 PJ16-03.

In solution PJ32-W3 DFS intends to contribute to:

- Definition of the operational concept
- Modelling and refinement of the Service definitions
- Validation exercise 3

Direction des Services de la Navigation Aérienne justification for participation

DSNA has developed significant experiences within the previous and current SESAR solutions linked to the service oriented architecture, by demonstrating a strong involvement in projects B04.04 (as a leader) and PJ16.03 (leader of the service definition, contributor to exercises with the use of the Coflight Cloud Services platform), that have a direct link with PJ10-W2-93 and potentially in PJ32-W3.

In continuation with its current activities, DSNA pursue its strong involvement on the concept of virtual centre to demonstrate the viability of the concepts:

- While acting as an ADSP for the flight plan service provision in PJ10-W2-93.
- While ensuring the follow up of the Services defined in PJ16.03 and the feedbacks consistent with the running of PJ10-W2-93.

In addition to the solid background in SOA and virtualization, DSNA intends to build upon the following experiences and skills:

- DSNA has worked in the SESAR1 7.5.4 and SESAR2020 Wave 1 PJ08 projects, addressing the operational concept of Dynamic Airspace Configuration.
- DSNA has led validation exercises assessing Dynamic Sector Configuration with a huge range of possibilities enabled by a very modular airspace (simulations and shadow mode) and
- DSNA is now involved in PJ09-W2-44 of the wave 2.

Entidad Pública Empresarial ENAIRE justification for participation

As service provider ENAIRE is currently enhancing its internal network architecture, by moving from a situation where the En-Route and TMA centres encompasses both, main servers and control working positions, to a more efficient architecture based on centralising the servers in one/two locations and keeping in most of control centres just the CWP. Similar improvements are being addressed regarding the service provision on Control Towers of Spanish airports.

As previous experiences on SESAR activities, apart from its participation in projects dealing with CWP improvements (SESAR 1, projects 05.09 and 06.09.02) and virtualisation (SESAR 1 contingency remote tower, 06.08.04), it has to be mentioned also the activities performed on SESAR Wave 1 projects, by contributing to the development of the SPR/INTEROP/OSD (V1) for contingency and delegation of Airspace (PJ15-09) and contributing to the definition and modelling of the operational and technical concept of the Virtual Centre, refining the initial set of services up to an operational and ready to standardise maturity level, refining and modelling of the high level architecture (PJ16-03). Currently also ENAIRE is leading SESAR wave 2 PJ09-W2-44 Dynamic Airspace Configuration, operational concept that support the delegation of airspace between ATSU, along with the participation in PJ10-W2-93.

ENAV S.p.A. justification for participation

ENAV has an outstanding expertise in Air Traffic Management operations and services, in the development and validation of concepts also in the SESAR Programme. ENAV has a significant experiences within the previous and current SESAR solutions linked to the service oriented architecture, by demonstrating a strong involvement in projects in SESAR 1, PJ16.03 (contributor to exercises with the use of the Coflight Cloud

Services platform), and leader of PJ15.09 whose objective is to reach V1 maturity for the concept of Airspace delegation that have a direct link with PJ10-W2-93 and potentially in PJ32-W3.

ENAV is leading national and international programs in the complete evolution of its infrastructures and platforms, looking forward to an entire transformational chain into the ATM service-chain. ENAV is structurally collaborating with major industries in IT and ATM domains.

In the PJ32-W3 ENAV will participate with AIRNAV that is the company of the ENAV Group that serves the world of Air Traffic Management (ATM) and airports with Commercial Off-The-Shelf (COTS) solutions and software products aimed at supporting the transition from Aeronautical Information Services (AIS) to Aeronautical Information Management (AIM) in full compliancy with the ICAO and EUROCONTROL mandates for Aeronautical Data Quality (ADQ).

In the EXE 1 Scenario 3 and Scenario 4, ENAV will use IDS AirNav AirSpace Management module: the AMS module capability is to improve airspace management processes by providing mutual visibility on civil and military environment, by increasing mutual understanding and by enabling a more efficient decision-making process. This module provides an interface to allow online airspace reservation, enable transparent coordination and maximise automation of routine tasks. Through a shared real-time airspace status display, situational awareness of all players is enhanced, and flight safety greatly improved.

FREQUENTIS AG justification for participation

Frequentis AG, member of SESAR1 and SESAR 2020, is an international expert for communication and information systems for control centres with safety-critical tasks. Frequentis AG maintains a worldwide network of subsidiaries and local representatives in more than 50 countries to ensure closeness to our customers. Frequentis AG successfully designs and supplies systems and solutions for the domains of communication, networks, SWIM, aeronautical information management, and airport traffic optimization, both in service and infrastructure as well as in the visualization part of the independent CWP; based on service oriented and open, standardised architecture. In SESAR1 and S2020 Wave 1 we successfully demonstrated remarkable achievements towards the next generation ATM system architecture.

With regard to virtual centre Frequentis has a long-term previous experience and involvement in projects B04.04, PJ15-09 and PJ16-03. Frequentis has experience in service brokering, service modelling and provision of Voice services as needed in before mentioned projects.

Frequentis is also participating in PJ10-W2-93, and we intend to contribute to PJ32-W3-02 building on this participation with provision of the Voice ADSP, service brokering and the enhancement of the virtual centre with new services building on the existing and in-place infrastructure.

INDRA Sistemas, S.A. justification for participation

INDRA participated in B.04.04 Modelling and Demonstration Phases and in the transversal participation in the domains of En Route, Approach and Tower projects in SESAR 1 supports the Virtual Centre concept and its technical means. More specific works under the SESAR Programme such as collaboration in the Information Service Reference Model and ATM Information Reference Model or strong implication in SWIM TI related projects are relevant to the ability of the virtual centre to support the required operational performance with the required deployment of underlying systems and services.

In PJ10-W2-93 as a continuation of PJ16-03 and PJ15-09, INDRA participates in several validation exercise, such as EXE#1, 2, 3 and in EXE#6. In this project, INDRA will provide and further develop the platforms in order to fulfil the operational needs for delegation and contingency of ATS services.

INDRA's large contribution to the project PJ16-03, where it had a large contribution in:

- the definition and modelling of the Virtual Centre services,
- the technical requirements definition and implementation

Several validation exercises by providing an iTEC platform as ATC ADSP, ATC CWP positions and Voice ADSP system and position and an ATG. It also gave support to the rest of the partners.

In addition, INDRA participates actively in PJ09-W2-44, where it will contribute to three exercises with different partners to improve the use of airspace capacity for both civil and military users by increasing the

granularity and the flexibility in the airspace configuration within and across ANSPs' areas of responsibility. Focusing on focus also on INAP using DAC in an integrated way.

LEONARDO - Società Per Azioni justification for participation

With its strong technical expertise in ATM systems development LEONARDO will support at technical level PJ32-W3 providing CWP for the virtual centre infrastructure.

LEONARDO's in PJ10-W2-93 contribute in V2 phase for technical specification for the services for virtual centre. In V3 phase LEONARDO support the validation for the EXE3 and EXE4 and provide a CWP prototype for the exercises scope.

SINTEF AS (NATMIG) justification for participation

Although SINTEF DIGITAL has gained competence in state-of-the-art ATM research for several decades, the increased focus through the SESAR 1 (32 projects) and SESAR 2020 (in total 19 projects) involvement has substantially improved our technology and aligned it further to the needs of the aviation industry and airspace users.

The HCI group which will participate in PJ32-W3 participated in SESAR 1 project with Human Performance Management (PJ16.04), Human Performance in Automation Support (PJ16.05) and with Human Performance support and coordination (PJ16.06.05). In SESAR2020 Wave 1, the HCI group participated in PJ08-01, PJ16-03 and PJ16-04. In SESAR2020 Wave 2, the HCI group participates in PJ09-W2 (Solution 44) and PJ10-W2 (Solution 96). Both in Wave 1 and Wave 2, SINTEF has played / will play a central role in planning, conducting, analyzing the results, and reporting the findings from RTS exercises organized in cooperation with ENAV.

In PJ32-W3, SINTEF will support the validation activities in EXE 1 Scenario 3 and Scenario 4, including experiment design, validation design and analysis (mainly HF and SAFETY), VALP and VALR. In PJ09-W2-44 and PJ10-W2-96, SINTEF is integrating their CWP (SIMADES CWP) with the same IDS tools that are used in EXE 1 Scenario 3 and Scenario 4. SINTEF will compare and coordinate these activities to obtain synergies and assess integration of IDS tools with different CWPs. This may also include post analyses of output from tools used in comparable exercises.

SKYGUIDE, SA Suisse pour les services de la navigation aérienne civils et militaires justification for participation

SKYGUIDE launched the concept of virtual centres at the beginning of last decade. We are actively transforming our technical environment to allow a full service based ATS provision. Currently we are virtualising our technical infrastructure and will be in a position to serve two locations from one data room.

In the SESAR context, SKYGUIDE has played key roles in the B04.04 project in SESAR 1 and largely contributed to the success of the PJ16-03 in Wave 1. For the preceding projects, we took the lead in the development of various documents, mainly for the Validation Plan and Report. Furthermore, we provided infrastructure solutions and IT solutions to allow demonstrating the application of Virtual Centres on various locations with multi-vendor solutions feeding various ATSUs.

We are also participating to the PJ10-W2-93 in Wave 2 and see an interest in mutualising the efforts between the projects. We foresee to be able to contribute in showing that it is possible to interact between an ADSP and an ATSU.

Jointly with DSN and ENAV, we expect documenting and demonstrating the capability of extending the number of services required to operate a Virtual centre. In this specific case, we will contribute in progressing on the service description of the Coflight Cloud Services.

THALES LAS FRANCE SAS justification for participation

In SESAR 2020 wave 1, for the operational point of view, THALES LAS FRANCE was an active partner of the solution PJ15-09 by participating of all workshops and providing expertise on the operational Use Cases. For the technical point of view, THALES LAS FRANCE was the solution leader of the Wave 1 PJ16-03 which is in charge of the TS/IRS of the Virtual Centre. During Wave 1, 2 successful TRL4 exercises were conducted with partners and 2 TRL6 exercises were conducted in Q3 2019.

In PJ10-W2-93, THALES LAS FRANCE is an active partner both for defining the Operational concept and implement the concept in the EXE 5 in the TopSky-ATC.

For Wave 3, the objective are: in the Operational Thread to define the AFTCM requirements and their consequences on ATC requirements and, in the Technical Thread, to implement these requirements on our Industrial Based Platform (IBP) with our partners.

NATS (En Route) Public Limited Company justification for participation (In Kind Contribution)

NATS has significant experience in Airspace Capacity Management (ACM) and has developed an extremely advanced ACM operation across both ACCs and is a key stakeholder in many SESAR and Network Management fora with significant R&D effort being integral to NATS business.

Our ACM operation has significant experience of cross border arrival management in operations including full XMAN capability for Heathrow and Gatwick airports which will be essential in Virtual Centre's concepts for traffic management.

In addition, NATS can provide our capabilities in research, concept development, validation and the prototype development of tools and procedures as required.

NATS will participate in the project with an in-kind contribution to the activity to evaluate the performance benefits for capacity on demand operations as a function of the geographical / organisational scope of airspace delegation at ECAC level and will provide:

- ACM Expert personnel with advanced capacity balancing and management experience.
- Submission of sector configuration and capacity values
- Appropriate technical architecture input as required
- Review of results/documentation and input to meetings as required.

3.4 Resources to be committed

Table 3.4b: 'Other direct cost' items (travel, equipment, other goods and services, large research infrastructure)

8/DFS		Cost (€)	Justification
Travel		19000	Estimate for travel costs based on prospected number of meetings and activities in other countries as well as experience from previous SESAR-2020 work for coordinating and carrying out validation work. In particular, DFS is leading the operational concept development in PJ10-W2-Solution 93 and a close coordination with this solution is essential. Estimated number of travels is 26.
Equipment			
Other goods and services			
Total		19000	

4 Members of the consortium

4.1 Participants (applicants)

4.1.1 Companies Profile

4.1.1.1 EUROCONTROL – European Organisation for the safety of Air Navigation (coordinator)

Organisation	1	EUROCONTROL	Intergovernmental Organisation
Description	<p>EUROCONTROL, the European Organisation for the Safety of Air Navigation, is an intergovernmental Organisation with 41 Member States, committed to building, together with its partners, a Single European Sky that will deliver the ATM performance required for the 21st century. EUROCONTROL employs more than 1,900 highly qualified professionals spread over four European countries. Their expertise is deployed to address ATM challenges in a number of key roles:</p> <ul style="list-style-type: none"> • The Network Manager has extended the role of the former Central Flow Management Unit to proactively manage the entire ATM Network (nearly ten million flights every year), in close liaison with ANSPs, airspace users, the military and airports. • The Maastricht Upper Area Control Centre provides air traffic control services for the Netherlands, Belgium, Luxembourg and northern Germany. • The Central Route Charges Office handles billing, collection and redistribution of aviation charges. • It provides a unique platform for civil-military aviation coordination in Europe. • EUROCONTROL is a major player in European ATM research, development and validation and in this respect makes the largest contribution to the SESAR Joint Undertaking. • EUROCONTROL is supporting the deployment through contributions to the Deployment Programme and is supporting the European Commission, EASA and National Supervisory Authorities in their regulatory activities. 		
Previous experience	<p>EUROCONTROL offers the following concrete added values of relevance to PJ.32-W3:</p> <ul style="list-style-type: none"> • Recognized expertise and leadership in Network Management: Cooperative Load and Capacity Management, Airspace Design, Airspace management, Scenario planning, DCB, Performance Measurement and Monitoring, Post Flight Analysis, Traffic Demand Management, NOP Management, AIM, et alt. The Network Manager is the recognized central body providing the overview of demand capacity balancing situation to local stakeholders and providing assessments of impact of local decisions on network performance. EUROCONTROL provided strong ATFCM and leadership expertise in NM/ATCFM projects (SESAR1 WP7 and WP13/SESAR2020 Wave1 PJ07, PJ08 and PJ09) and its contribution to SESAR2020 Wave2 projects PJ.10-W2 and leading PJ.09-W2. • Operational experience with advanced ATC systems and Pilot Test Platforms: Maastricht UAC: Flow Management, ASM, ATC and Extended ATC Planning, Local ATFCM tools (iFMP) integrated with ASM tools (LARA) and resource planning tools (TZone); • Uncontested global leadership and wide expertise in Network Management Systems Development and data/information and service modelling (ETFMS, CHMI, STAM, B2B, AIXM, WXXM, FIXM, AMDB, Digital NOTAM, AIRM); • Well recognised experience and leadership in ATM architecture (EATCHIP, EATMP), with European organisations (e.g. SESAR Joint Undertaking, EUROCONTROL, European Commission) and with non-European organisations (e.g. FAA, ICAO). EUROCONTROL has a long lasting experience in ATM architecture and integration of architecture content produced by external Partners. EUROCONTROL provided strong Architecture and leadership expertise ATM 		

	<p>architecture and Master Planning projects (SESAR1 WPB & WPC/SESAR2020 Wave1 leading PJ19 & PJ20) and its contribution to SESAR2020 Wave2 projects (leading PJ19-W2 and PJ20-W2).</p> <ul style="list-style-type: none"> • Deep knowledge of the Virtual Centre services developed successively by B04.04, PJ15.09 and PJ16-03; and is contributing to PJ.10-W2 and leading PJ.09-W2; • Strong and recognised expertise in Performance assessment (Safety & Human Factors) and Cost-Benefits Analysis. <p>EUROCONTROL offers a unique portfolio of Operational Validation Environments</p>
Entity Profile matching the task	<p>EUROCONTROL is willing to take the coordinator role of PJ.32-W3, the lead of WP02 (Content Integration) and in addition will contribute to WP03 with staff knowledge and capabilities in:</p> <ul style="list-style-type: none"> • ATFCM Experts - Operations • ATC experts – Operations • ATFCM & ATC User Requirements • Operational, Technical, Service and Information Architecture experts • Cyber security experts • Validation platform developers • Validation experts • Safety & Human performance experts • Engineering support for validation platform • Performance & CBA Expert
Contribution	<p>EUROCONTROL will provide overall leadership, project management and coordination activities including project planning, quality and risk management and the interface to other SESAR activities.</p> <p>Particularly close coordination will be established to the projects directly interfacing with Virtual centre and airspace delegation such as PJ.10-W2-93 and PJ.09-W2-44.</p> <p>EUROCONTROL will contribute to all main tasks and deliverables namely:</p> <ul style="list-style-type: none"> • Leadership and contribution to the refinement of an integrated and consolidated OSED; • Contribution to the development of Safety, Performance and interoperability Requirements; • Leadership and contribution to the Development of an Integrated Validation Plan; • Leadership and major contribution to the Technical Specification, architecture and Integration of Systems; • Leadership and major contribution to the Prototype Development (NM systems); • Leadership and contribution to the Validation Exercise Planning and Execution; • Leadership and major contribution to the Performance Assessment, Safety Assessment and Business Case; • Contribution to the Validation Results Analysis and Reporting; • Leadership of Communication Management and interfaces with other regions; <p>EUROCONTROL will provide access to its network operations infrastructure, validation environment and data bases.</p>

4.1.1.2 Valstybes imone "Oro navigacija"

Organisation	1	ON (B4)	Service Provider
Description	<p>Founded by the Ministry of Transport and Communications of the Republic of Lithuania in 1995, valstybes imone Oro navigacija (ON) is a state-owned enterprise providing Air Navigation Services, including Air Traffic Management Services, Communication,</p>		

	<p>Navigation and Surveillance Services, Aeronautical Information Services, as well as Search and Rescue, in the airspace of Republic of Lithuania and over the part of Baltic Sea.</p> <p>With a total staff of 290 (including 90 ATCOs) and altogether five operational units, among them one ACC (Vilnius), three APPs (Vilnius, Kaunas, Palanga), one TWR (Siauliai), ON (B4) controls the airspace of Republic of Lithuania and over the part of Baltic Sea (Vilnius FIR) of the total size of 76 126 km² and provides ATC services at four designated Lithuanian international airports. Each year providing safe and efficient air traffic control services to more than 250 thousand flights ON continues to maintain zero delays level and to meet users' expectations.</p> <p>ON (B4) is a Member of Baltic FAB, a part of B4 Consortium composed of four ANSPs from Central and Eastern European countries and a Member of SESAR Joint Undertaking. Being a member of SESAR Joint Undertaking via B4 Consortium, ON (B4) actively participates in the industrial and transversal projects by SESAR 2020 Programme while participation in SESAR Deployment Programme allows to implement several projects. In 2017, ON (B4) officially joined the European iTEC (Interoperability Through European Collaboration) alliance developing a high-end air traffic management system for busy and complex airspace.</p>
Previous experience	<p>Previous projects:</p> <ul style="list-style-type: none"> • SESAR 2020 Wave1: • PJ.05: Remote Tower for Multiple Airports • PJ.06: Trajectory based Free Routing • PJ.14: Essential and Efficient Communication Navigation and Surveillance Integrated System • PJ.19: Content Integration • PJ.20: Master Plan Maintenance • PJ.22: Validation and Demonstration Engineering • SESAR 2020 Wave 2: • PJ.05 -W2: Digital technologies for Tower • PJ.10-W2: Separation Management and Controller Tools • PJ.13-W2: IFR RPAS • PJ.19-W2: Content Integration, Performance Management and Business Case Development • PJ.20-W2: Master Planning
Entity Profile matching the task	ON (B4) has ATM Operational experts, ATM System experts, Air Traffic Controllers, Safety experts who could participate in this project.
Contribution	ON (B4) will contribute to Operational procedures & acceptance of ATFCM procedures for Virtual Centre Operations. Also intend contribute to preparations of exercises dedicating iTEC technical platform, ATCO and technical resources for validation.

4.1.1.3 POLSKA AGENCJA ZEGLUGI POWIETRZNEJ (B4)

Organisation	1	PANSA (B4)	Service Provider
Description	<p>PANSA (Polish Air Navigation Services Agency) is the national entity acting pursuant to the Act on the Polish Air Navigation Services Agency (2006) to provide air navigation services in Poland. PANSA provides air traffic management services, communication, navigation and surveillance services as well as an aeronautical information services in the Polish airspace and in airspace over the part of Baltic Sea. It operates one combined En-route/TMA control centre at Warsaw, 3 independent TMA control centres (Gdańsk,</p>		

	<p>Kraków, Poznań) and 14 tower units at Polish international airports. In 2019 PANSA handled over 910 thousands IFR movements.</p> <p>PANSA is constituent entity of B4 Consortium, composed of four ANSPs from Central and Eastern part of Europe and their Linked Third Parties. B4 Consortium is a member of A6+ on SESAR 2020 Programme content.</p> <p>PANSA is a Member of the Baltic FAB and Gate One, a regional platform of Central and Eastern European ANSPs.</p> <p>PANSA is also a founding member of the SESAR Deployment Alliance that was mandated by the European Commission to perform functions of the SESAR Deployment Manager that is responsible for synchronisation and coordination of PCP-related implementation projects.</p>
Previous experience	<p>Projects:</p> <ul style="list-style-type: none"> • SESAR 2020 Wave 2 Solution PJ.10-W2-93 under which PANSA participates in activities related to Virtual Centres, in particular relating to the aspect of full transfer of responsibility of one or more ATC sectors from one ATSU to another ATSU in case of contingency. Validation activities will be performed on iTEC based Validation Platform in cooperation with iTEC Partners. • iTEC Collaboration initiative • SESAR 2020 Wave 1 Solution PJ.08-01 “Management of Dynamic Airspace Configurations” under which PANSA developed a prototype of ASM Support System supporting CDM process between ASM and ATFCM partners within the Dynamic Airspace Configuration process. • PANSA’s internal project “CAT Common Airspace Tools” which functionalities encompasses all phases of airspace management – starting from long term event planning at Strategic Level to airspace management at Pre-tactical and Tactical Levels - including automatic ATS/CDR/DCT/RSA management and real-time coordination of airspace users. • SESAR 2020 Wave 2 Solution PJ.09-W2-44 under which PANSA contributes to the development of application of the DAC (Dynamic Airspace Configuration) concept including integration of DMAs (Dynamic Mobile Area) Type 1 and 2 to better adapt capacity to demand in support of DCB (Dynamic Capacity Balancing) processes.
Entity Profile matching the task	<p>Air Navigation Service Providers including the profiles:</p> <ul style="list-style-type: none"> • ATM Operational expertise, • ATM System expertise, • En-Route and Approach Air Traffic Controllers, <p>PANSA profile covers vast and proven track expertise and experience on provision of Airspace Management service which includes development and implementation of own local ASM System Support – CAT (Common Airspace Tools) with functionality encompassing all phases of airspace management – starting from long term event planning to airspace management at level 2 and 3. Likewise experience from SESAR 2020 Wave 1 project PJ.08, including development of the prototype of DAC functionalities to support CDM process between ASM/ATFCM actors.</p>
Contribution	<p>PANSA will contribute to Operational Thread of PJ.32-W3 Sol 1 dealing with ATFCM aspects of Airspace Delegation. PANSA contribution will cover preparation of exercise showing feasibility of use of VC for delegation of airspace between two FIRs depending on traffic situation with use of FMP. PANSA also will support work over procedures and operational use cases for use of VC.</p> <p>PANSA will contribute also to all project deliverables.</p>

4.1.1.4 *Austro Control Österreichische Gesellschaft für Zivilluftfahrt MHB*

Organisation	1	ACG/COOPANS	Service Provider
Description	<p>Austro Control is a state-owned limited liability company.</p> <p>Location: The headquarter is located in Vienna and subdivisions are situated in Linz, Salzburg, Klagenfurt, Graz and Innsbruck.</p> <p>Organizational setup: Two main divisions - Air Navigation Services (operational functions) comprising Air Traffic Management, Engineering Services, Meteorological Services and Aviation Agency (regulatory matters) supported by corporate services</p> <p>Governance structure: A Supervisory Board and a Management Board are responsible for the corporate governance. An audit committee is also established.</p> <p>The primary business of the ANS part of Austro Control is the provision of air navigation services, pursuing the basic principle of a high level of air traffic safety in compliance with Single European Sky framework</p> <p>Austro Control is a member of COOPANS Consortium consisting of 5 Air Navigation Service Providers: Austro Control (ACG), Croatia Control (CCL), Irish Aviation Authority (IAA), Naviar and Luftfartsverket (LFV). All five Air Navigation Service Providers have already for a long time been working under a common framework agreement together with Thales in COOPANS. COOPANS is a joint program based on the incremental development of a common ATM platform. The overarching goal for COOPANS is to enable each individual ANSP to achieve financial savings through cost, resource, and competence sharing and to meet the EU objective of harmonizing ATM systems. This work is now expanded to Research & Innovation by the establishment of the COOPANS Consortium.</p> <p>Austro Control has many years of experience in the delivery of Air Traffic Services, the design of concepts and in development, validation and implementation of Air Traffic Management tools.</p> <p>The enterprise is certified according to ISO 9001.</p>		
Previous experience	<p>Austro Control has participated in SESAR via NORACON consortium in the following WPs:</p> <ul style="list-style-type: none"> • WP00 SESAR2020 preparation: 00.15 • WP3 Validation infrastructure adaptation and integration: 03.03.02, 03.03.03 • WP5 TMA Operations: 05.03.00, 05.06.02, 05.06.04, 05.06.07, 05.07.02, 05.09 • WP6 Airport Operations: 06.05.05, 06.06.01, 06.07.01, 06.08.08, 06.09.03 • WP7 Network Operations: 07.05.04 • WP8 Information Management: 08.01.01, 08.01.06, 08.03.03, 08.03.06, 08.03.10 • WP10 En-Route & Approach ATM Systems: 10.02.01, 10.02.03, 10.03.01, 10.03.08, 10.07.01, 10.10.03 • WP12 Airport Systems : 12.02.01, 12.06.03 • WP13 Network Information Management Systems: 13.02.02 • WP14 SWIM Technical Architecture: 14.02.03, 14.04 • WP16 R&D Transversal Areas: 16.01.01, 16.06.01, 16.06.01.b • WP B Target Concept and Architecture Maintenance: B.04.05 • WP C: Master Plan Maintenance C.02, C.03 <p>Austro Control has participated in SESAR 2020 Wave 1 in the following Projects, Solutions or VLDs:</p> <ul style="list-style-type: none"> • PJ.01-01 • PJ.02-01 • PJ.03a-01 • PJ.04-02 		

	<ul style="list-style-type: none"> • PJ.05-02 • PJ.05-03 • PJ.06-01 • PJ.09-02 • PJ.10-02A • PJ.10-02B • PJ.16-03 • PJ.16-04 • PJ.17-08 • PJ.18.02 • PJ.18.04 • PJ.19-CI01 • PJ.19-CI02 • PJ.20 • PJ.24 • PJ.27 <p>Austro Control currently participates in SESAR 2020 Wave 2 in the following Projects, Solutions or VLDs:</p> <ul style="list-style-type: none"> • PJ.05-35 • PJ.05-97 • PJ.09-44 • PJ.10-96 • PJ.18-53 • PJ.18-56 • PJ.20 • VLD3
Entity Profile matching the task	<p>In general, ACG/COOPANS has a long experience in cooperating with our industry partner THALES at expert and management level for the development of ATM systems, e.g. the recent implementation and customization of TopSky as a new core ATM system.</p> <p>TopSky is one of the most modern ATM systems in the world, and ACG/COOPANS together with the COOPANS partners are continuing to develop the</p> <p>ATM system in anticipation of future European Mandates and SESAR in a cost-efficient manner.</p> <ul style="list-style-type: none"> • Expertise can be offered in many areas: • Development and supervision of operational concepts • Safety concepts & Safety Assessments • Collaborative Decision Making • Air traffic forecast/Capacity planning incl. runway capacity enhancement • Development and implementation of ATM systems & Tools (common development and implementation of TopSky) • Trajectory management (core functionality in TopSky) • Development and implementation of safety and monitoring tools (core functionality in TopSky – 4D MTCD) • Flight procedures, special approach procedures (incl. RNAV) • Performance Based Navigation • Validation and Integration • Participation in European deployment activities (IDSG) • Human Performance Assessment <p>More specifically, ACG/COOANS has gained valuable experience in the domain during Wave1 virtual centre activities, which the contribution to PJ.32 would build on.</p>

Contribution	ACG/COOPANS will contribute to the project with operational expertise focussing on supporting the validation exercises as well as engineering resources dealing with architectural and interface matters.
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4.1.1.5 Croatia Control, Croatian Air Navigation Services Ltd

Organisation	1 CCL/COOPANS	Service Provider
Description	<p>Croatia Control is a state-owned limited liability company.</p> <p>Location: The headquarter is located in Zagreb and subsidiaries are located in Pula, Rijeka, Lošinj, Split/Brač, Zadar, Dubrovnik and Osijek.</p> <p>Divisions: ATM Division, CNS/MET/AIM Division, Corporative Functions Division.</p> <p>Governance structure: An Assembly, a Supervisory Board and main Management. The Assembly consists of the Chairman - the Minister responsible for transport, Minister of Finance and the Minister of Defence. The Supervisory Board monitors the activities of the organization. Supervisory Board appoints the Director General.</p> <p>Director General manages and represents the organization.</p> <p>The primary business of Croatia Control is provision of air navigation services, pursuing the basic principle of a high level of air traffic safety in compliance with Single European Sky framework, and Croatia Control has been certified for provision of the following services:</p> <ul style="list-style-type: none"> • Air Traffic Services (ATS) • Communication, Navigation and Surveillance Services (CNS) • Aeronautical Information Services (AIS) • Aeronautical Meteorological Services (MET) <p>Croatia Control is a member of COOPANS Consortium consisting of 5 Air Navigation Service Providers: Austro Control (ACG), Croatia Control (CCL), Irish Aviation Authority (IAA), Naviar and LFV. Cooperation between COOPANS partners goes beyond SESAR – partners has for a long time worked together with Thales under a common framework agreement in a joint program based on the incremental development of a common ATM platform. The overarching goal for COOPANS is to enable each individual ANSP to achieve financial savings through cost, resource, and competence sharing and to meet the EU objective of harmonizing ATM systems. This work is now expanded to Research & Innovation by the establishment of the COOPANS Consortium.</p> <p>Croatia Control has many years of experience, both in the delivery of Air Traffic Services, design of concepts and in development, validation and implementation of Air Traffic Management tools.</p> <p>Croatia Control is certified ISO 9001, ISO 14001 and BS OHSAS 18001.</p>	
Previous experience	<p>Croatia Control has many years of experience in ATM, ATFCM and ASM, as well in operational use of CPDLC, Mode S and automated system coordination tools in cross border FRA operations which are now an integrated part of the ATM-system Topsky and previously in EUROCAT-E.</p> <p>Croatia Control has participated in SESAR 2020 Wave 1 and is participating in SESAR Exploratory Research and SESAR 2020 Wave 2 projects as a member of COOPANS Consortium in the following projects, solutions or VLDs:</p> <p>SESAR 2020 Wave 1:</p> <ul style="list-style-type: none"> • PJ.01-01 • PJ.04-02 • PJ.05-02 • PJ.05-03 	

	<ul style="list-style-type: none"> • PJ.06-01 • PJ.09-02 • PJ.10-02A • PJ.10-02B • PJ.10-05 • PJ.15-09 • PJ.16-03 • PJ.16-04 • PJ.18.02 • PJ.18.04 • PJ.18-06 • PJ.19-CI02 • PJ.19-CI05 • PJ.20 • PJ.24 <p>SESAR Exploratory Research:</p> <ul style="list-style-type: none"> • FMP-Met <p>SESAR 2020 Wave 2:</p> <ul style="list-style-type: none"> • PJ.05-35 • PJ.05-97 • PJ.09-44 • PJ.10-93 • PJ.10-96 • PJ.18-53
Entity Profile matching the task	<p>Croatia Control as a part of COOPANS has a long experience in cooperating with industry partner Thales at expert and management level for the development of core ATM system EUROCAT-E and Topsky since 2001. TopSky is one of the most modern ATM systems in the world, and Croatia Control together with COOPANS partners are continuing to develop the ATM system in anticipation of future European Mandates and SESAR in a cost efficient manner.</p> <p>Many of the Croatia Control's experts had been working in EUROCAT-E developments and implementation, and now are working with COOPANS partners and Thales on development of the functionalities in the TopSky. COOPANS has particular expertise in the development of common operational solutions, the development of ATM functions and ATC support tools and future concepts of operations.</p> <p>Croatia Control has experience in many areas related to this project, as for example:</p> <ul style="list-style-type: none"> • Development and supervision of operational concepts • Safety concepts & Safety Assessments • Air traffic forecast and capacity planning, including runway capacity enhancement • Development and implementation of ATM systems and tools, dynamic ASM tools (own development), DAM/STAM I measures • Participation in European deployment activities (IDSG) • HP Expert - Human Performance Assessment • Development of new MET services (MET-based decision support for ATM) • ATM expert – Operations • ATFCM Expert – Operations • ATC User Requirements
Contribution	<p>CCL is aiming to demonstrate dynamic cross border airspace delegation based on shared capacity and demand data between neighbouring ANSPs.</p>

CCL will participate in operational and technical preparations and reports with its experts, and will provide ATCOs and FMP staff for validation exercise.

4.1.1.6 Luftfartsverket (LFV) /COOPANS

Organisation	1	LFV/COOPANS	Service Provider
Description	<p>LFV is a member of COOPANS Consortium consisting of five Air Navigation Service Providers: Austro Control (ACG), Croatia Control (CCL), Irish Aviation Authority (IAA), Naviar, Navegação Aérea de Portugal (NAV Portugal) and Luftfartsverket (LFV). Cooperation between COOPANS partners goes beyond SESAR- partners has for a long time worked together with THALES under a common framework agreement in a joint program based on the incremental development of a common ATM platform. The overarching goal for COOPANS is to enable each individual ANSP to achieve financial savings through cost, resource, and competence sharing and to meet the EU objective of harmonizing ATM systems. This work is expanded to Research & Innovation by the establishment of the COOPANS Consortium.</p> <p>Luftfartsverket (LFV) has many years of experience, both in the delivery of Air Traffic Services; design of concepts and in development, validation and implementation of Air Traffic Management tools.</p> <p>LFV has an extensive experience and a close interaction with the industry and Swedish Transport Agency, developing new technology. The effect of this is a flexible product portfolio of functional and cost-efficient solutions, like the development of Remote Tower Services (RTS) that went from idea to reality in record time.</p> <p>The enterprise is certified ISO 9001.</p>		
Previous experience	<p>LVF was involved in several work packages in SESAR1 – in several of them LFV had a leading role.</p> <p>In SESAR 2020, wave 1, LFV has contributed to and also been leading solutions via COOPANS Consortium in the following solutions:</p> <ul style="list-style-type: none"> • PJ.01-01 - Extended Arrival Management with overlapping AMAN operations and interaction with DCB • PJ.01-03B - Use of Arrival and Departure Management Information for Traffic Optimisation in the TMA • PJ.02-08 - Traffic optimisation on single and multiple runway airports (lead) • PJ.02-11 - Enhanced Terminal Area for efficient curved operation • PJ.05-02 - Remotely Provided Air Traffic Service for Multiple Aerodromes (lead) • PJ.05-03 - Remotely Provided Air Traffic Services from a Remote Tower Centre with a flexible allocation of aerodromes to Remote Tower Modules (lead) • PJ.06-01 - Optimized traffic management to enable Free Routing in high and very high complexity environments • PJ.10-01a - High Productivity Controller Team Organisation • PJ.10-02b - Controller Automated Support Tools in En-Route Environment • PJ.10-05 - IFR RPAS Integration • PJ.15-09 - Data Centre Service for Virtual Centres Service • PJ.16-03 - Virtual Centre Concept • PJ.16-04 - Workstation, Controller productivity • PJ.18-02 - Integration of trajectory management processes • PJ.19-CI01 - ATM operations • PJ.19-CI02 - Systems and services • PJ.19-CI04 - Support and Evolution of the Content Integration Framework • PJ20 - Masterplan maintenance 		

	<ul style="list-style-type: none"> • PJ.25 - E-AMAN VLD • PJ.27 - Flight Object Interoperability VLD • PJ.31 - Initial Trajectory Information Sharing VLD <p>SESAR Exploratory Research</p> <ul style="list-style-type: none"> • SAFECLOUDS.eu • SAFELAND • MAHALO <p>SESAR2020 Wave 2:</p> <ul style="list-style-type: none"> • PJ01-W2 EAD • PJ02-W2 AART • PJ04-W2 TAM • PJ05-W2 DTT • PJ09-W2 DNMS • PJ10-W2 PROSA • PJ13-W2 ERICA • PJ14-W2 I-CNNS • PJ18-W2 4D Skyways • PJ19-W2 CI • PJ20-W2 AMPLE • VLD3-W2 SORT
Entity Profile matching the task	<p>An AoR with many airports and with several major airports close to each other and close to AoR boundaries has given LFV extensive experience in optimization of arrival and departure management.</p> <p>Expertise is present in the company in many areas:</p> <ul style="list-style-type: none"> • Remote airport ATC • Development and supervision of operational concepts • Safety concepts & Safety Assessments • Airport safety support tools • Collaborative Decision Making • Air traffic forecast/Capacity planning incl. runway capacity enhancement • CWP design • Development and implementation of ATM systems & Tools (common development and implementation of TopSky) • Trajectory management (core functionality in TopSky) • Development and implementation of safety and monitoring tools (core functionality in TopSky – 4D MTCD) • Flight procedures, special approach procedures (incl. RNAV) • Performance Based Navigation • Integration, validation and analysis of test result • Extended lab environment including NARSIM <p>Participation in European deployment activities (IDSG)Human performance assessment</p>
Contribution	<p>LFV will contribute to operational concept development and participate in validation exercises. Added focus will be put on Use Case addressing Optimised Airspace Utilisation through Dynamic Airspace Configuration in the context of Virtualisation. Focus will also be put on development of local and regional ATFCM requirements to achieve an optimised airspace utilisation. LFV plans to use workforce containing operational experts (ATCOs), validation experts and platform development experts.</p>

4.1.1.7 Naviair

Organisation	1	Naviair/COOPANS	Service Provider
Description	Naviair has many years of experience both in the delivery of Air Traffic Services; design of concepts and in development, validation and implementation of Air Traffic Management tools. The company is certified ISO 9001.		
Previous experience	<p>SESAR 1 experience: Naviair has participated in SESAR via the NORACON consortium in the following WPs:</p> <ul style="list-style-type: none"> • WP00 SESAR2020 preparation 00.14, 00.15 • WP3 Validation infrastructure adaptation and integration: 3.2.1, 3.2.2, 3.3.2, 3.3.3 • WP5 TMA Operations: 5.3, 5.6.1, 5.6.4, 5.6.7, 5.9 • WP6 Airport Operations: 6.8.4 • WP7 Network Operations: 7.5.4 • WP 8 Information Management: 08.1.3, 8.1.5, 8.1.9, 8.3.4, 8.3.10 • WP 10 En-Route & Approach ATM Systems: 10.2.1, 10.2.3, 10.3.1, 10.3.8, 10.9.4, 10.10.3 • WP 14 SWIM Technical Architecture: 14.1.3, 14.4 • WP 16 R&D Transversal Areas: 16.2.3, 16.6.2 • WP B Target Concept and Architecture Maintenance: B4.2, B4.3, B4.5 • WP C Master Plan Maintenance: C2 & C3 <p>SESAR 2020 experience: Naviair as participated and contributed in several projects during Wave 1</p> <ul style="list-style-type: none"> • PJ.01-01 E-AMAN - Extended Arrival Management with overlapping AMAN operations and interaction with DCB • PJ.06-01 Free Route - Optimized traffic management to enable Free Routing in high and very high complexity environments • PJ.10-02A Separation Management - Improved Performance in the Provision of Separation • PJ.10-02B Separation Management - Advanced Separation Management • PJ.14-02-02 Future Satellite Communications Data Link • PJ.14-04-01 Surveillance Performance Monitoring (Task 1) • PJ.14-04-03 New use and evolution of Cooperative and Non-Cooperative Surveillance (Task 3) • PJ.15-9 Common Services, Virtual Centre data centre service • PJ.16-3 CWP Controller productivity - Workstation, Service Interface Definition & Virtual Centre Concept • PJ.18-2 Trajectory Management Process • PJ.18-6 Performance Based Trajectory Prediction • PJ.19 CII/WP2 ATM Operations (SESAR CONOPS) • PJ.20 Master Plan Maintenance • PJ.25 E-AMAN VLD • PJ.27 Flight Object Interoperability VLD • PJ.31 Initial Trajectory Information Sharing VLD 		
Entity Profile matching the task	During Wave1 and Wave 2 virtual centre activities, Naviair have gained valuable experience in the domain. Naviair have acted as COOPANS leading organisation in the virtual centre projects, participated to COOPANS TRL4 validation exercise and acted as validation leader for COOPANS TRL6 validation exercise in PJ.16-03. Both validations were successful and contributed to the overall project success. Naviair have also experience in contribution to different deliverables like OSED/SPR/INTEROP, VALP/VALR, TS/IRS, Human performance and Safety Assessment documentation.		

	<p>Naviar will continue to lead COOPANS consortium in the virtual centre activities and in PJ.32. To guarantee a successful continuation of the development Naviar will provide not only R&D experience and commitment, but also resources in form of:</p> <ul style="list-style-type: none"> • ATM Experts • ATCOs • Exercise leader <p>Naviar are in possession of parts of the technical platform that was used for the TRL6 validation in PJ.16-03 and which could be re-used during the validation activities (if needed).</p>
Contribution	<p>Naviar/COOPANS will:</p> <ul style="list-style-type: none"> • act as COOPANS leader in the project • act as validation leader for COOPANS/THALES participation in EXE#1 • contribute to EXE#2 – FTS to support ECTRL in the analysis of the potential impact a deployment of virtual centre architectures in Europe might have on capacity, by delivering data to the simulation • contribute to different documents and deliverables developed by the project VALP, VALR, OSED, SPR • review project documents TS/IRS, INTEROP, CBA.

4.1.1.8 DFS

Organisation	1	DFS	Service Provider
Description	<p>DFS Deutsche Flugsicherung GmbH, the German air navigation service provider, is a State-owned company under private law with 5,600 employees as at 31/12/2019. DFS ensures the safe and punctual flow of air traffic over Germany. Around 2,200 air traffic controllers guide up to 10,000 flights in German airspace every day, more than three million movements every year. This makes Germany the country with the highest traffic volume in Europe. The company operates control centres in Langen, Bremen, Karlsruhe and Munich as well as control towers at the 16 designated international airports in Germany. The subsidiary DFS Aviation Services GmbH markets and sells products and services related to air navigation services, and provides air traffic control at nine regional airports in Germany and at London Gatwick Airport and Edinburgh Airport in the UK. DFS has been working on the integration of drones into air traffic since 2016 and has set up a joint venture, Droniq GmbH, with Deutsche Telekom.</p>		
Previous experience	<p>DFS is involved since 2014 in the SESAR projects related to Virtual Centre.</p> <p>DFS has contributed to project B.4.4 “Workstation, Service Interface Definition” of SESAR1, being involved in conceptual work, service definition, prototype implementation and technical demonstration activities.</p> <p>In Wave 1 of SESAR 2020, DFS contributed to PJ.16-03 “CWP/HMI” being involved in technical, operational and validation activities. DFS led a pan-European technical validation exercise of the TRL4 phase including 7 partners from ANSPs and industry. During the final TRL6 phase of PJ.16-03, DFS was co-leading a pan-European technical validation exercise including 11 partners from ANSPs and industry. This technical validation exercise will deliver the technical basis for further validation exercises in Solution 93. In addition to its active contribution to the PJ.16-03 deliverables, DFS was the PCIL of PJ.16.</p> <p>In PJ.15-09 ‘Delegation of Airspace and Contingency’ DFS was actively contributing to the deliverables and was leading the development of the Contingency Use Case.</p> <p>In Wave 2, DFS actively contributes to PJ.10-W2-Solution 93. DFS is leading the development of the OSED and is the leader of the first validation exercise (V2) that is</p>		

	planned for PJ.10-W2-Solution 93. In addition, DFS is the PCIL of PJ.10-W2-Solution 93.
Entity Profile matching the task	<p>Air Navigation Service provider (ANSP), including job profiles of air traffic controllers, Air Traffic Management (ATM) specialists in the fields of safety, human factors, software engineering, validation specialists.</p> <p>DFS has the technical as well as the operational expertise to contribute to all activities of PJ.32. In addition, DFS has the necessary infrastructure to participate in validation exercise, as already done in SESAR 1 B.04.04, SESAR 2020 Wave 1 PJ.15-09/PJ.16-03. And SESAR 2020 PJ.10-W2-Solution 93.</p>
Contribution	<p>In continuation of the work already done in SESAR 1 B.04.04, SESAR 2020 Wave 1 PJ.15-09/PJ.16-03 and PJ.10-W2-Solution 93, DFS, as an ANSP, provides operational and technical expertise.</p> <p>In solution PJ.32 DFS intends to contribute to:</p> <ul style="list-style-type: none"> • OSED definition and coordination with PJ.10-W2-Solution 93 • Service definition • Performance Analysis of Capacity on Demand

4.1.1.9 Direction des Services de la Navigation Aérienne

Organisation	1	DSNA	Service Provider
Description	<p>DSNA (Direction des Services de la Navigation Aérienne) is the national air navigation services provider of France. DSNA is entrusted with the provision of air traffic services, associated communication, navigation and surveillance services and aeronautical information services in all airspace under French responsibility and at designated airports. DSNA is member of A6, FABEC and SESAR JU. DSNA has supported the principle of the SESAR programme since its inception and has participated as a major contributor to its definition phase study, has been a major active contributor to the SESAR 1 development phase, to SESAR2020 wave 1 and is an active contributor to SESAR2020 wave 2. DSNA is also involved in the deployment of many PCP and non PCP SESAR solutions.</p>		
Previous experience	<p>DSNA has participated and contributed to many SESAR projects since the beginning but has also been strongly involved in the service oriented architecture and Virtual center topics, as described hereafter :</p> <p>DSNA has been highly involved in Virtual Centres topic in SESAR 1 while leading B4.4 within WP B Target concept and architecture maintenance.</p> <p>Within SESAR 2020, DSNA has participated and/or contributes to the following projects related to Virtual Centre:</p> <ul style="list-style-type: none"> • during Wave 1: <ul style="list-style-type: none"> ○ PJ.15-9 Common Services, Virtual Centre data centre service ○ PJ.16-3 CWP Controller productivity - Workstation, Service Interface Definition & Virtual Centre Concept • During wave 2: <ul style="list-style-type: none"> ○ PJ.10 WP2 PROSA (SOL93) <p>DSNA is also involved in the European CCS partnership which intends to provide remote flight data processing based on Virtual Centre SESAR activities and service definitions.</p> <p>Furthermore, since the beginning of SESAR, DSNA has been engaged in several key projects related to DAC and DCB development (Dynamic Airspace Configuration / Demand Capacity Balancing), including:</p> <ul style="list-style-type: none"> • SESAR1 PJ7.2 – Network Operations, 		

	<ul style="list-style-type: none"> • SESAR 1 PJ 13.2.3 – Dynamic DCB • SESAR 1 PJ 7.5.4 – Dynamic Airspace Configurations, • SESAR2020 wave 1 PJ07, Optimised Airspace Users Operations • SESAR2020 wave 1 PJ08 – Advanced Airspace Management, with an advanced tool to support the dynamic and optimised sectors configurations. • SESAR 2020 wave 1 PJ09 – Advanced DCB <p>In SESAR 2020 wave 2, DSNB is still engaged in these topics in particular through solution 44, Dynamic Airspace Configuration, which is correlated to solution 32.</p>
Entity Profile matching the task	<p>In order to support the project and conduct its different validation activities, DSNB profiles matching the tasks include:</p> <ul style="list-style-type: none"> • ATM Operational expert • ATM R&D expert • Infrastructure expert • Project manager • Validation expert and engineer
Contribution	<p>DSNB will lead and contribute to WP03 (technical Thread) and will contribute also to WP02 Operational Thread while:</p> <ul style="list-style-type: none"> • contributing to EXE#2 – FTS by delivering a collection of data to the simulation ran by EUROCONTROL • providing CCS platform, enriched with various services, to support exercise 3 of SOL 93 • contributing to increase the maturity of the different documents and deliverables by providing feedbacks from implementation or reviewing the documents such as TS-IRS, VALP, VALR

4.1.1.10 Entidad Pública Empresarial ENAIRE

Organisation	1	ENAIRE	Service Provider
Description	<p>The Spanish Business Public Entity “Entidad Pública Empresarial ENAIRE”, hereinafter referred to as “ENAIRE”, is the entity designated by the Spanish State to provide Air Navigation Services for En-Route and Approach phases, ruling 5 En-route/TMA ATC Centres and 21 Control Towers, being one of the major Air Navigation Service Providers in Europe.</p> <p>Airspace under ENAIRE control includes the Peninsula Ibérica (except Portugal), Balearic and Canary Island, and part of North Atlantic, West Mediterranean and West Sahara.</p> <p>ENAIRE manages the air traffic control and aeronautical information services, as well as the communication, navigation and surveillance networks required so that airlines and their fleet can fly safely and smoothly throughout the Spanish airspace.</p> <p>ENAIRE is the leading air navigation and aeronautical information service provider in Spain, the fourth largest in Europe by traffic volume and one of the most important in the world. As a public business entity reporting to the Ministry of Public Works, we manage the Spanish airspace over a territory of 2.190.000 square kilometres. ENAIRE provides air traffic services to 2 million flights carrying over 250 million passengers each year. Through our five control centres, 21 control towers and a comprehensive network of aeronautical infrastructure and equipment, we provide en-route, approach and aerodrome ATC services, as well as flight information, alerts and consulting services. We are the communications, navigation and surveillance service provider across the whole of the Spanish airspace and at airports in Aena network</p>		

	<p>ENAIRE is a major European company in ATM, R&D and project management in the field of Airspace and Air Navigation and a founding member of the A6 alliance, which represents the ANSPs common view within SESAR Programme.</p> <p>ENAIRE has already been an active part of SESAR Programme from the very beginning and has substantially contributed as a SJU member in the different fields of airport and air navigation services management, planning and provision, and other ATM R&D related activities, in order to support the cooperative accomplishment of the European ATM Target Network and the associated European ATM Master Plan.</p> <p>As a services provider and also as owner of related systems and infrastructure, proactive promoter of research and development activities which are at the leading edge and highly experienced executor of validation and system integration processes, ENAIRE expects to maintain its participation in the SJU as one of its major members in those areas of activity where its technical and managerial expertise and know-how, systems and projects can bring the most added value to the deployment of the European ATM Master Plan.</p> <p>The added value provided to SESAR 2020 by ENAIRE and its linked third parties is based in the large set of available assets:</p> <ul style="list-style-type: none"> • Up to 5 En-route/TMA ATC centres, covering both Continental and Oceanic Airspaces, fitted with an advanced and evolving ATM system (SACTA/LIS ATM and in the future iTEC). Four of them, those covering the Continental Spanish Airspace, interconnected and working as a network; • Platforms are able to assume validations and simulations in a wide range of maturity levels, covering from the more immature phases of the R&D till complex simulations using both industrial products and also prototypes; • ATCOs from different ACC's, who are familiar with traffics, contingencies and events of multiple characteristics; and also from towers of different categories; • Engineers/ATCOs with vast expertise on the definition of future CNS and ATM; <p>Paving the way for deployment of mature concepts, especially those included in the PCP, will constitute a paramount and permanent priority for ENAIRE.</p>
Previous experience	<p>ENAIRE has been an active part of the SESAR from the very beginning of the Programme, contributing substantially as a SJU member in different fields (airports, ANS management, ANS planning and provision, etc.). This has been done in order to support the cooperative accomplishment of the European ATM Master Plan. The participation within the SESAR Programme began with SESAR 1, where ENAIRE took an active role in several projects, being the project leader in some of them. After the work performed in SESAR 1, ENAIRE has contributed in the great majority of the projects launched in SESAR 2020 Wave 1 programme, being an important part of the Service Providers Stakeholder group.</p> <p>Participation in SESAR 1 projects:</p> <ul style="list-style-type: none"> • WP3 – Validation infrastructure adaptation and management • WP4 – En route Operations • WP5 - TMA Operations • WP6 – Airport Operations (taking the leadership of the work package) • WP7 – Network Operations • WP8 – Information Management • WP10 – En-Route & Approach ATC Systems • WP12 – Airport system • WP13 – Network Information Management System • WP15 – Non-Avionics Communication, Navigation, Surveillance (CNS) System • WP16 – R&D Transversal Areas • WPB – Target Concept and Architecture Maintenance • WPC – Master Plan Maintenance

Within these projects, ENAIRE has participated in the operational concept development and has been also responsible for the execution of several validations.

Participation in SESAR 2020 Wave 1:

- PJ01: Enhanced Arrivals and Departures
- PJ02: Increased Runway and Airport Throughput
- PJ03a: Integrated Surface Management
- PJ04: Total Airport Management
- PJ06: Trajectory based Free Routing
- PJ07: Optimised Airspace Users Operations
- PJ08: Advanced Airspace Management
- PJ09: Advanced DCB
- PJ10: Controller Tools and Team Organisation for the Provision of Separation in Air Traffic Management
- PJ11: Enhanced Air and Ground Safety Nets
- PJ14: Essential and Efficient Communication Navigation and Surveillance Integrated System
- PJ15: Common Services
- PJ16: Controller Working Position / Human Machine Interface - CWP/HMI
- PJ17: SWIM Technical Infrastructure
- PJ18: 4D Trajectory Management
- PJ19: Content Integration
- PJ20: Master Plan Maintenance
- PJ24: Network Collaborative Management
- PJ27: Flight Object Interoperability VLD Demonstration

Participation in SESAR 2020 Wave 2 projects:

- PJ02-w2: Airport airside and runway throughput
- PJ04-w2: Total Airport Management
- PJ05-w2: Digital technologies for Tower
- PJ07-w2: Optimised airspace users operations
- PJ09-w2: Digital Network Management Services
- PJ10-w2: Separation Management and Controller Tools
- PJ13-w2: IFR RPAS
- PJ14-w2: Integrated CNSS
- PJ18-w2: 4D skyways
- PJ19-w2: Content Integration, Performance Management and Business Case Development
- PJ20-w2: Master Planning
- Other projects managed by the SESAR Joint Undertaking:
- DEMORPAS (Demonstration Activities for Integration of RPAS in SESAR), playing ENAIRE a leading role.
- ARIADNA (Activities on RPAS Integration Assistance and Demonstration for operations in Non-segregated Airspace).

Previous participation in EC projects:

- OPTIMAL – Optimized Procedures and Techniques for IMprovement of Approach and Landing
- RESET – Reduced separation minima
- GIANT – GNSS Introduction In the Aviation sector & GIANT 2 – GNSS Introduction In the Aviation sector -2
- ACCEPTA – ACCelerating EGNOS adoPTion in Aviation
- FilGAPP – Filling the Gap in GNSS Advanced Procedures and Operations
- HEDGE Next – Helicopter Deploy GNSS in Europe – NEXT
- CREDOS – Crosswind Reduced Separations for Departure Operations

	<p>Additionally, ENAIRE and its linked third parties has contributed to several Framework Programme (FP) projects such as:</p> <ul style="list-style-type: none"> • EPISODE 3, Single European Sky Implementation support through validation, FP6, 2004-2010, Key Performance Targets for the future ATM system. • GATE TO GATE, Validation of a European ATM gate to gate operational concept for 2005 – 2010, FP5, 2002-2005, operational concept development and validation. <p>Regarding deployment activities, the Spanish Automated Air Traffic Control System (SACTA) has been continuously evolved. One example could be the following TENT-T project:</p> <ul style="list-style-type: none"> • FRASAI, TENT-T, 2014, Free Routing concept implementation in Santiago – Asturias sector. <p>In addition to these projects, ENAIRE is currently carrying out the following research projects related to RPAS:</p> <ul style="list-style-type: none"> • DOMUS • SAFEDRONE
Entity Profile matching the task	<p>ENAIRE plus its Linked Third Parties will contribute with their long experience like ANSP, and R&D entities, matching the task with the following profiles:</p> <ul style="list-style-type: none"> • Operational expert • ATC system expert • En Route, App and Tower Air Traffic Controllers • Environment expert • Performance expert • Platform integration/maintenance
Contribution	<p>ENAIRE (in association with its Linked Third Parties) will contribute in solution PJ32-W2-01 defining the ATFCM procedures and requirements in support of PJ10-W2-93, testing the operational feasibility and acceptance of ATFCM in support of airspace delegation and, also, evaluating the performance benefits.</p> <p>To achieve these objectives, ENAIRE plans to perform human in the loop validation exercises to connect two local FMPs tools (developed under PJ09-W2-44) and the NM (INNOVE). This simulation would identify DAC measures (between two neighbouring ATSUs within ENAIRE airspace) emulating the short-term phase to solve complexity imbalances. In addition, ENAIRE plans to perform a RTS with ATCOs to test the impact of the measures during the execution phase as well as to participate with EUROCONTROL in a FTS with R-NEST to estimate benefits as a function of the geographical / organisational scope of airspace delegation in ECAC.</p>

4.1.1.11 ENAV S.p.A

Organisation	1	ENAV	Service Provider
Description	<p>ENAV S.p.A. (ENAV) is one of the 5 largest European Air Navigation Service Provider in terms of traffic managed, investments in innovation technology and R&D and is one of the top performers in terms of quality of services provided.</p> <p>ENAV is fully committed to the Single European Sky and, since 2006, operates under the Common Requirement for ANS provision and from 2012 is subject to the European Performance Scheme, as all other European ANSPs.</p> <p>ENAV is a Joint-Stock Company, the only ANSP worldwide listed on a stock exchange, 53% of the share capital is held by the Italian Government, in charge of the provision of</p>		

air traffic control and navigation services within the airspace and the airports placed under its own responsibility by national law without time limit.

ENAV's core business is to manage the regulated Air Traffic Control Services (ATCS), for which it is entrusted, allowing aircraft to fly within the assigned airspace with constantly enhanced levels of safety, optimizing the effectiveness of the service provided and the efficiency of the company, in particular:

- “En route” services: handling of air traffic crossing Italian airspace managed from 4 Areas Control Centres located in Rome, Milan, Padua and Brindisi;
- “Terminal” services: assistance during the phases of approach, takeoff and landing from 45 Control Towers located throughout Italy and divided into 3 charging zones.

Thanks to these complex operational units, ENAV provides around the clock air traffic services ensuring air traffic flow and regularity, with absolute safety.

ENAV provides ATCS to more than 1.8 million flights per year, with peaks of up to 6,575 per day.

ENAV provides also supporting services to other ANSP on a commercial basis, forming an independent source of revenue which is not regulated.

ENAV leverages its significant experience and reputation for promoting development projects worldwide, pursuing further opportunities for growth: currently delivers services in Malaysia, Saudi Arabia, Kenya, Morocco, Albania, UAE and Libya.

As in all high complexity sectors, a constant and consistent technological innovation has to be placed side by side to human skill and experience.

For this reason, ENAV continues to invest in modernisation, new technologies and professional training. ENAV is a component of the European ATM (Air Traffic Management) system and it participates with full rights in all the activities of development, operational validation, research and coordination with systems that are perfectly integrated with the international technological context.

ENAV Group consists of:

- Techno Sky, responsible for the operational management, the support, the maintenance and the hardware/software development of entire range of systems and equipment used to provide flight assistance services.
- IDS AIRNAV is the company of the ENAV Group that serves the world of Air Traffic Management (ATM) and airports with Commercial Off-The-Shelf (COTS) solutions and software products aimed at supporting the transition from Aeronautical Information Services (AIS) to Aeronautical Information Management (AIM) in full compliancy with the ICAO and EUROCONTROL mandates for Aeronautical Data Quality (ADQ).
- D-flight is the first public-private partnership created by ENAV and its partners for the timely development and deployment of U-space, in order to safely and seamlessly integrate complex drones operations within the civil aviation airspace. The company is controlled by ENAV, with a 60% stake, with the remainder of the share capital held by a group of leading Italian technological partners.
- ENAV Asia Pacific, set up in 2013 with head office in Kuala Lumpur, provides air traffic control management and consultancy services, as part of marketing and sales activity, as well as other essential air navigation services.
- ENAV North Atlantic is a company established in USA on January 2014 for the purpose of managing the acquisition of 12.5% of the Aireon LLC share capital. Aireon is the company responsible for the development, financing and deployment of a global satellite surveillance system.
- ESSP - with a 16.6% stake in the Company, ENAV provides the European satellite navigation service EGNOS.

	<p>The services supplied by the Company are Planning, management and provision of Air Navigation Services (ANS) including:</p> <ul style="list-style-type: none"> • Air Traffic Services (ATS), including Air Traffic Control Service (ATC), Flight Information Service (FIS) and Alerting Service (ALRS); • Aeronautical Information Service and related publications (AIS); • Meteorological Services for Air Navigation (MET); • Communication, Navigation, Surveillance Services (CNS); • Air Space Management; • Air space design and air traffic capacity planning; • Flight procedures design and obstacles analysis; • ATM system definition, acquisition, operation and maintenance of operational infrastructures; • Flight inspection services of radio navaids, broadcasting and surveillance systems for Air Traffic Services; • Training of ATM personnel. <p>ENAV is among the main players in SESAR (Single European Sky ATM Research), the ambitious initiative launched by the European Commission to implement the Single European Sky by supporting technical developments for fully interconnected and interoperable systems at European level.</p> <p>ENAV is also member of the SESAR Joint Undertaking, created under European Community law on 27 February 2007, with EUROCONTROL and the European Union as founding members, in order to manage the SESAR Development Phase. ENAV contributes to SJU in a lot of projects providing the technical and operational expertise and infrastructures necessary to develop and validate the evolution of the operational concepts.</p>
Previous experience	<p>ENAV is involved in R&D, strategic planning, technical co-operation and service provision programs with international organisations (e.g. SESAR Joint Undertaking, EUROCONTROL, European Commission, ESSP) and foreign countries, aiming at contributing to the advancement of ATM technology and processes and at improving the service level provided.</p> <p>ENAV has a long-lasting experience in international initiatives and has been participating, managing, coordinating and actively contributing to several international projects and large scale researches, developments and validations.</p> <p>ENAV has been participating in SESAR Programme since its very beginning (SESAR1 and SESAR2020) and is strongly determined to support the successful outcome of the initiative in line with its strategic objectives.</p> <p>Previous R&D projects:</p> <ul style="list-style-type: none"> • SESAR2020 Wave 1 IR Projects (H2020, 2016-2019): PJ01, PJ02, PJ03a, PJ03b, PJ05, PJ06, PJ08, PJ09, PJ10, PJ15, PJ16, PJ19, PJ20, PJ22 • DIODE VLD (SJU/CEF2017, 2018-2020) • CORUS ER (H2020, 2017-2019) • SESAR1 (2009-2016): WPB, WPC, WP3, WP4, WP5, WP6, WP7, WP8, WP10, WP12, WP13, WP14, WP15, WP16 • SESAR1 Large Scale Demonstrations: <ul style="list-style-type: none"> ○ ATC Full Datalink (AFD) ○ WE-FREE ○ MEDALE ○ RACOON ○ FREE SOLUTIONS • BEYOND (H2020, 2015-2017) • DARWIN (H2020, 2015-2018) • SAWSOC (FP7, 2013-2016)

	<ul style="list-style-type: none"> • GAMMA (FP7, 2013-2017) • FUTURE SKY SAFETY (H2020, 2015-2019) • OPTIMAL (FP6, 2004-2008) • AD4 (FP6, 2005-2007) • RETINA (H2020, 2016-2018) • BLUEGNSS (H2020, 2016-2018) • Current R&D projects: • SESAR2020 Wave 1 IR PJ18 Project (H2020, 2016-2020) • SESAR2020 Wave 1 VLD PJ31 (H2020, 2016-2020) • SESAR2020 Wave 2 IR Projects (H2020, 2019-2022): PJ01, PJ02, PJ05, PJ07, PJ09, PJ10, PJ13, PJ14, PJ18, PJ19, PJ20 • ECARO - Egnos Civil Aviation ROadmap project (European GNSS Agency, 2019-2021) • CRUISE - Cyber secuRity in Uas mIssions by SatellitE link (ESA, 2019-2022) • RPASinAir - IFR RPAS integration into controlled airspace (Italian Ministry of Education, University and Research, 2018-2021)
Entity Profile matching the task	<p>ENAV profiles matching the tasks include:</p> <ul style="list-style-type: none"> • ATM Operational expert • U-space and RPAS expert • ATM R&D expert • Air Traffic Controller • Pilot and Pseudo-pilot • KPA expert • Project manager • Procedure designer • Validation expert and engineer <p>All those skills will be made available by ENAV to support the project developments and conduct validation activities.</p>
Contribution	<p>ENAV has a high interest and significant experience in the service oriented architecture and Virtual Centre topics, this being fully confirmed by ENAV strong involvement in relevant projects of SESAR 1 and S2020 W1/W2. In W1, ENAV successfully led Solution PJ15.09 and significantly contribute to Solution PJ16.03, while in W2 ENAV is now leading Solution 93 of PJ10.</p> <p>In continuity with this work and to ensure the needed synergy with PJ10-W2-93, ENAV confirms its commitment to the Virtual Centre topic and is willing to participate in this project. ENAV, supported by its LTPs, will contribute in both Technical and Operational Thread for the identification and consulation services offered in a Virtual Centre environment serving the module of ATFM, Civil/Military and Dynamic Airspace Concept (DAC).</p> <p>ENAV also intends to support the project validation activities with its operational expertise and personnel. ENAV will participate in EXE 1 and EXE 2, led by EUROCONTROL, and will lead Scenarios 3 and 4 of EXE1.</p> <p>Moreover, ENAV intends to contribute to the development of operational concept and related ATC procedures, supporting OSED/VPLAN/VREP and TS elaboration at V2 maturity phase level.</p>

4.1.1.12 FREQUENTIS AG

Organisation	1	FRQ (FSP)	Ground Industry
Description	Frequentis AG, member of SESAR1 and SESAR 2020, is an international expert for communication and information systems for control centres with safety-critical tasks.		

	<p>Frequentis AG maintains a worldwide network of subsidiaries and local representatives in more than 50 countries to ensure closeness to our customers.</p> <p>Frequentis AG successfully designs and supplies systems and solutions for the domains of communication, network infrastructure, SWIM, aeronautical information management, and airport traffic optimization. Important focus lies in the future communication infrastructure domain and new technologies for visualisation. Frequentis is a strong supporter of service oriented and open, standardised architecture. In SESAR 1 and SESAR 2020 Wave 1 and 2 we effectively demonstrated remarkable achievements towards the next generation ATM system architecture.</p> <p>Special attention is given to the users of ATM systems. Our expertise and tooling guarantees early indications of the future user acceptance. Frequentis is also involved in forward-thinking and innovative R&D activities such as implementation of U-space solutions for the safer management of drones.</p> <p>Frequentis AG is member of the Frequentis SESAR Partners consortium together with the companies HUNGAROCONTROL MAGYAR LEGIFORGALMI SZOLGALAT ZARTKORUEN MUKODO RESZVENYTARSASAG and Atos Belgium, founded in 2014 for the main purpose of joining SESAR 2020 activities. Frequentis SESAR Partners is member of the SESAR Joint Undertaking.</p> <p>The consortium is consisting of three companies and has a variety of complementary capabilities. Having a long SESAR history within its framework, an ANSP whose expertise will result in early feedback loops together with IT and data management know how, Frequentis SESAR Partners believes in the high added value of its participation in SESAR 2020 wave 3 efforts.</p>
Previous experience	<p>Previous projects:</p> <ul style="list-style-type: none"> • SESAR 2020 Virtual Centre (PJ15-09) – Delegation of Airspace - Identification and analysis of KPIs and working procedures in several workshops for the new Virtual Centre operations to generate the Operational Service and Environment Description (OSD). • SESAR 2020 W1 (PJ16.03): Technical specification of virtual centre including contribution to the validation events • SESAR 1 (B.4.4) Feasibility of virtual centre
Entity Profile matching the task	<p>Frequentis has the following expertise in relation to this project topic:</p> <ul style="list-style-type: none"> • Expertise and experience with system in operation • Industrial ATC system expertise • Industrial voice system expertise • Network and WAN expertise • SOA architecture and service expertise and understanding
Contribution	<p>Frequentis will contribute to stream 2, technical thread</p> <p>Within the technical thread Frequentis will contribute with further developing the extent of virtual centre services. Frequentis will focus on the Voice ADSP and the services needed to handover sector responsibility between ATSU's.</p> <p>Frequentis will provide the platform and knowledge to validate these services in course of (enhanced) exercises in PJ10 solution 93.</p>

4.1.1.13 HUNGAROCONTROL MAGYAR LEGIFORGALMI SZOLGALAT ZARTKORUEN MUKODO RESZVENYTARSASAG – Silent Partner

Organisation	1	HC(FSP)	Service Provider
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Description	<p>Hungarocontrol Zrt. is a state-owned company in Hungary, which provides air navigation services in the Hungarian airspace and (on a NATO assignment) in the upper airspace over Kosovo, trains air control personnel and conducts air navigation research and development.</p> <p>Hungarocontrol Zrt. is member of the Frequentis SESAR Partners consortium together with the companies Atos Belgium SA/NV and Frequentis AG and was founded in 2014 for the main purpose of joining SESAR2020 activities. Frequentis SESAR Partners is member of the SESAR Joint Undertaking.</p> <p>The consortium is comprised of companies having a variety of complementary capabilities. Having former SESAR1 experience within its framework, an ANSP whose expertise will result in early feedback loops during certain projects, and the wide range IT, data management and security expertise of the consortium forming entities, Frequentis SESAR Partners believes in the high added value of its participation in SESAR2020 efforts.</p> <p>HC (FSP) has more than 50 years of experience in ATM and is committed to implementing and deploying state-of-the-art technology. HC has a well-established relationship with universities and scientific centers and is active in ATM R&D&I activities. HC has participated in SESAR 1 demonstration activities such as REACT-Plus and has also received EU co-funding from the SESAR JU for a Large Scale Demonstration project, Budapest 2.0</p>
Previous experience	<p>HungaroControl Zrt. has participated in SESAR 2020 Wave 1& Wave 2 as a member of FSP Consortium in the following projects, solutions or VLDs:</p> <ul style="list-style-type: none"> • Wave 1 <ul style="list-style-type: none"> ○ PJ.03-A ○ PJ.05-02 ○ PJ.05-03 ○ PJ.10-01B ○ PJ.16-03 ○ PJ.16-04 ○ PJ.28 (as a linked third-party) • SESAR Exploratory research - USIS project • Wave 2: <ul style="list-style-type: none"> ○ PJ02-21 ○ PJ05-35&97 ○ PJ10 ○ PJ13-115&117 ○ PJ20
Entity Profile matching the task	<p>Air Navigation Service Providers including the profiles:</p> <ul style="list-style-type: none"> • ATM Operational expertise, • ATM System expertise • Simulation expertise (Simulation HUB) • En-Route and Approach Air Traffic Controllers, • Human Factors expertise, • Safety expertise <p>Experience relevant to the project as a remote air traffic service provider in the Kosovo upper airspace from 700 km. HC participated in three validation exercises in PJ16.03 and intend to participate in two validation exercises in PJ10-93 with ATM, ATCO, Human Performance and Safety experts</p>
Contribution	N/A

4.1.1.14 INDRA Sistemas, S.A.

Organisation	1	INDRA	Ground Industry
Description	<p>Indra is one of the leading global technology and consulting companies and the technological partner for core business operations of its customers world-wide. It is a world-leader in providing proprietary solutions in specific segments in Transport and Defence markets, and the leading firm in Digital Transformation Consultancy and Information Technologies in Spain and Latin America through its affiliate Minsait. Its business model is based on a comprehensive range of proprietary products, with a high-value innovation component. In the 2017 financial year, Indra achieved revenue of €3.011 billion, with 40,000 employees, a local presence in 46 countries and business operations in over 140 countries. Indra ranks second in Europe by R&D spent. .</p> <p>With the aim to provide our Customers with comprehensive, full and turnkey solutions, Indra product range covers the whole range of Air Traffic Management Systems, including Surveillance, Automation, Communications, Simulators and NAVAIDs.</p> <p>At Indra we have developed air traffic management systems that are deployed across the world, with over 4,000 installations in 160 countries. We are positioned as the market's leading supplier of air traffic management and communications, navigation and surveillance (ATM-CNS) systems. In the field of R&D, we are one of the leading companies in the SESAR program, the key technology behind the Single European Sky initiative.</p> <p>Indra has the in-depth experience and products necessary to undertake any Air Traffic Management programme, with both a proven international management approach and a history of responsible program execution. That experience, together with a solid technology base, permanent innovations and quality in processes and projects are the pillars sustaining Indra leadership position in Air Traffic Management, completely oriented towards Customer needs and aimed to provide our Customers with the highest level of service.</p> <p>Indra is the world leader for Flight Data Processing Systems, having supplied over 40 installations worldwide and has grown to be leader Air Traffic Management system supplier in Europe. In December 2008, Indra supplied EUROCONTROL with the new next-generation interoperable Flight Data Processing System at Maastricht Upper Area Control Centre, one of the busiest and most complex en-route Air Traffic Control Centres in Europe.</p> <p>The implementation of this Flight Data Processing System is a high technological advance directed to improve the safety, capacity, efficiency and environmental performance of Air Traffic management in Europe, and actively contributing to achieving the European's Commission Single European Sky objectives.</p> <p>Indra has been selected by the most advanced European Air Navigation Service Providers to develop the future Air Traffic Management systems following the Single Sky Concept, through the iTEC Program (Interoperability Through European Collaboration). This is currently formed by ENAIRE (Spain), DFS (Germany), NATS (United Kingdom) and LVNL (The Netherlands), with Indra as industrial partner. New partners are PANSA (Poland), AVINOR (Norway), Oro Navigacija (Lithuania). iTEC is currently the most advanced next-generation air traffic management system, after entering full operational service at the Prestwick control center in Scotland</p>		
Previous experience	<p>Since 2009, Indra is full member of the SESAR Joint Undertaking. In SESAR 1 Indra participated in more than 120 projects within the Programme and co-leading both WP10 (En Route and Approach ATC) and WP12 (Airports) Work Packages, as well as playing a key role in many projects under WP14 (SWIM), WP15 (Non-Avionics CNS) and WP13 (NIMS). Indra has also participated in SESAR Demonstration projects.</p>		

	<p>In SESAR2020 Wave 1, Indra participated in IR/VLD Projects 01, 02, 03a, 03b, 04, 05, 06, 07, 08, 09, 10, 11, 14, 15, 16, 17, 18, 19, 20, 22, 24, 25, 27, 28 and 31, being Project Coordinator in PJ15 and PJ18. We have been involved also in SESAR RPAS Demonstration projects SAFEDRONE and DOMUS.</p> <p>In SESAR2020 Wave 2, Indra is participating in IR/VLD Projects 01, 02, 04, 05, 09, 10, 13, 14, 18, 19, 20 and VLD1 (this last, under signature at the time of preparing the current Bid). Indra is also participating in Exploratory Research 4 projects TAPAS (ATM) and BUBLES (RPAS). In the H2020 ECSEL JU framework, Indra is leading the RPAS project COMP4DRONES.</p>
Entity Profile matching the task	<p>As explained in the previous sections, Indra has a solid entity profile in ATM Research due to the background knowledge, human resources and facilities to perform the R&D activities. The ATM background has continuously grown from the 80's first developments for the Spanish ATM system, to joint ventures with other ATM worldwide companies, until alliances with key European ANSPs (iTEC). In term of human resources, hundreds of skilled personnel support the activities, while in terms of facilities, a significant number of laboratories and hardware resources equipped with the latest technology are used.</p>
Contribution	<p>The main contribution of Indra, as Ground Industry Supplier, will be:</p> <ul style="list-style-type: none"> • Support to the elaboration of the operational concepts, from the industrial perspective • Specification, development and testing of the Industry Base Platforms to be used by the ANSPs to perform the Validations • Support to the ANSPs in the Validations and in the elaboration of the conclusions

4.1.1.15 LEONARDO - Società Per Azioni

Organisation	1	LDO	Ground Industry
Description	<p>LEONARDO is a global player in the high-tech sectors and a major operator worldwide in the Aerospace, Defence and Security sectors. LEONARDO is based in Italy, has over 45,000 employees, of whom about 36% abroad, and in 2017 recorded 11.5 billion euro in revenues and received orders in the amount of 11.5 billion. Luciano Carta has been the President since 20 May 2020 and Alessandro Profumo has been the CEO since 16 May 2017. LEONARDO designs and creates products, systems, services and integrated solutions both for the defence sector and for public and private customers of the civil sector, both in Italy and abroad.</p> <p>The wide range of defence and security solutions that LEONARDO offers Governments, private citizens and institutions includes every possible intervention scenario: airborne and terrestrial, naval and maritime, space and cyberspace. In close contact with local customers and partners, LEONARDO works every day to strengthen global security, provide essential physical protection and cybersecurity services for people, territories and infrastructure networks and supports scientific and technological research.</p> <p>LEONARDO operates in about 20 countries with offices and industrial plants in all of the five continents and can rely on a very large network of subsidiaries, joint ventures and international partnerships, with significant industrial presence in three main markets, United Kingdom, Poland and United States and structured partnerships in the most important high potential markets in the world.</p> <p>The new LEONARDO is the culmination of a radical renewal and transformation process: from a financial holding company to a great integrated industry focused on four activity sectors:</p> <ul style="list-style-type: none"> • Helicopters • Aeronautics • Aerostructures 		

	<ul style="list-style-type: none"> • Electronics Defence and Security Systems • Space <p>LEONARDO operates through seven divisions that have inherited the activities of its 100% owned companies (AgustaWestland, Alenia Aermacchi, Selex ES, OTO Melara and WASS):</p> <ul style="list-style-type: none"> • Helicopters • Aircraft • Aerostructures • Airborne & Space Systems • Land & Naval Defence Electronics • Defence Systems • Security & Information Systems <p>LEONARDO also retains Parent Company and Corporate Centre functions for participated companies and joint ventures not included in the divisional scope.</p> <p>These are: the US subsidiary DRS Technologies, which deals with the supply of products, services and integrated support for the military, intelligence agencies and defence companies; ATR, the joint venture established with Airbus Group for the manufacture of regional aircraft; MBDA, the joint venture established with BAE Systems and Airbus Group for missile systems; Telespazio and Thales Alenia Space, the two joint ventures established with Thales as part of the Space Alliance, for satellite services and the manufacture of satellites and orbiting infrastructures, respectively.</p>
Previous experience	<p>Leonardo is a member of the SESAR Joint Undertaking, participating in a lot of projects of SESAR1, like WP3, WP4, WP5, WP6, WP7, WP8, WP9, WP10, WP12, WP13, WP14, WP15, WP16 and WPB.</p> <p>Leonardo contributed also in SESAR 2020 WAVE1 with the following projects PJ02, PJ03a, PJ3b, PJ04, PJ05, PJ10, PJ11, PJ15, PJ14, PJ16, PJ17, PJ18, PJ19, PJ20, PJ22.</p> <p>Leonardo is actually involved in SESAR WAVE2, as Coordinator in PJ.14 and PJ.13, as member in PJ01, PJ02, PJ04, PJ05, PJ10, PJ14, PJ18, PJ19, PJ20.</p> <p>Further, Leonardo has been participating to the following international programme:</p> <ul style="list-style-type: none"> • ELSA to analyse and optimise the VDL2 Infrastructure communication network for the Europe) • GAMMA to study and develop a global ATM solution in order to cope with cyber-security aspects • SANDRA to study, implement and demonstrate in flight a new digital communication system that will lead pilots into the digital world of the 21st century, where a single device transmits communications with the ground and via satellite, digitally at high speed. Detailed information, such as the weather, flight plan or the traffic situation can be exchanged between the tower and the aircraft quickly and reliably, increasing the air traffic safety
Entity Profile matching the task	<p>Leonardo can provide a large numbers of experts for the following categories:</p> <ul style="list-style-type: none"> • ATC Control System experts • Network and Digital Air-to-Ground Communications experts in order to develop the future Communication Infrastructure Solution both for En-Route and Airport segment according to the ICAO Technology Roadmap and ensuring the interoperability aspects • Navigation experts • Surveillance experts to support the new concept and development of the cooperative sensors • Cyber security experts in order to develop an embedded infrastructure for communication domain able to reduce malicious attacks as the men in the middle

	and to ensure the data confidentiality, integrity and availability according to the operational service criticality
Contribution	<p>LEONARDO will contribute to the project enriching the operational discussions with a concrete technical point of view from the industry. The contribution on the ATM systems and service will be based on the long experience on integration, simulation, engineering, software design, and production of advanced technology systems.</p> <p>LDO will provide contributions to technical thread providing CWP for the EXE3 and EXE4 to complement wave 2 activity and will contribute in the study and in the develop new services for virtual centre. In operational thread providing CWP for exercise propose.</p>

4.1.1.16 SINTEF AS

Organisation	1	SINTEF (NATMIG)	Ground Industry
Description	<p>SINTEF is a part of North European ATM Industry Group (NATMIG) Consortium. The NATMIG consortium consists of Airtel ATN (SME - Ireland), Saab AB (multinational industrial concern - Sweden) and SINTEF AS (non-profit research organisation - Norway).</p> <p>SINTEF (http://www.sintef.no/) is the largest independent research organisation in Scandinavia and is a non-profit research organisation. We employ 2000 people most of whom are located in Trondheim and Oslo (Norway). More than 90% of our annual turnover derives from contract research for industry and the public sector in Norway and internationally, and we receive minimal state funding (around 6%). Contract research carried out by SINTEF covers all scientific and technical areas, and ranges from basic research through applied research to commercialisation of results into new products and business ideas, for both the domestic and international markets.</p> <p>Although SINTEF DIGITAL has gained competence in state-of-the-art ATM research for several decades, the increased focus through the SESAR 1 (32 projects) and SESAR 2020 involvement has substantially improved our technology and aligned it further to the needs of the aviation industry and airspace users. The activity in SESAR has also increased SINTEF's aeronautical research portfolio outside SESAR. SINTEF is a multidisciplinary research organisation, and can still bring added value to the ATM domain through our state-of-the-art research in other domains like Oil & Gas, Space, Health & Medicine, Constructions, Energy, Marine, Railway, Roads, Harbours, and Resilience etc.</p> <p>The SINTEF contribution to SESAR is focused around optimisation, (traffic sequencing, routing, taxiing, dynamic airspace, A-CDM), Human Computer Interface, system architecture and development, Digitalisation, Automation, 3D modelling, Safety, Resilience, Cyber Security and navigation (GBAS).</p> <p>SINTEF Human Computer Interaction Group have a high level of competence in evaluation and design of system for complex work situations. The group have been working within the emergency management domain and in air traffic management. The HCI group participated in SESAR 1 project with Human Performance Management (16.04), Human Performance in Automation Support (16.05) and with Human Performance support and coordination (16.06.05). In SESAR2020 Wave 1, the group participated in PJ08 and PJ16. In SESAR2020 Wave 2, the group is active in Solution 44 in PJ09 and in Solution 96 in PJ10. The group have a strong competence in modelling and have developed tools to demonstrate and evaluate how to design for a complex work situation and been responsible for evaluation of new concepts in simulated environments.</p>		
Previous experience	<p>Publications:</p> <p>Eide Aslak Wegner, Ødegård Stian Støer, Karahasanovic Amela (2014). A Post-Simulation Assessment Tool for Training of Air Traffic Controllers. HCI International</p>		

2014, June 22 - June 27: Relevance: a novel human performance evaluation tool was developed to support human performance evaluation.

Følstad Asbjørn, Haugstveit Ida Maria, Kvale Knut, Karahasanovic Amela (2015). Design feedback from users through an online social platform: Benefits and limitations. Interacting with computers. Relevance: The paper presents an on-line, cost-effective way to engage users to design together with the designer user interfaces.

Karahasanovic, A., Nordlander, T., Schittekat, P. (2015) Optimization-Based Training in ATM. I: Foundations of Augmented Cognition, 9th International Conference, AC 2015, Held as Part of HCI International 2015, Los Angeles, CA, USA, August 2-7, 2015, Proceedings. Springer, pp. 757-766

Nordlander, T.E., Karahasanović, A., Schittekat, P. (2015), Increasing trust in optimization based ATM systems through training, proceedings of ICAOR 2015, 7th International Conference on Applied Operational Research, 15-17 July, 2015.

Karahasanovic, A., Nilsson, E. G., Schittekat, P., Volden-Fredeberg, V., Smedsrud, M., Criscuolo, P. and Esposito, G.; Supporting Air Traffic Controllers During Sector Configuration Changes in Dynamic Air Space Configuration. Proceedings of SESAR Innovation Days 2019.

Previous projects:

- Project SESAR Wave 1 PJ08: SINTEF is leading and participating to evaluation exercises validating acceptance of DAC (Dynamic Airspace Configuration) for ATCOs in simulated environment (Milano airspace).
- Project SESAR Wave 1 PJ16: SINTEF is using 3D visualization controlled by multi touch interaction to enhance ATCOs understanding of how the air space changes at run time when applying DAC (Dynamic Airspace Configuration). This work is performed in cooperation with SESAR Wave 1 PJ08.
- Project SESAR Wave 2 PJ09 Solution 44: SINTEF is participating to evaluation exercises validating novel solutions for DAC (Dynamic Airspace Configuration) for ATFCM and ATCOs in simulated environment (Milano airspace).
- Project SESAR Wave 2 PJ10 Solution 96: SINTEF is using 3D visualization and attention guidance controlled by automatic speech recognition to enhance ATCOs understanding of how the air space changes at run time when applying DAC (Dynamic Airspace Configuration). This work is performed in cooperation with SESAR Wave 2 Solution 44.
- Project ZEFMAP is successful SESAR WP-E project led by SINTEF in collaboration with Frequentis and University of Salzburg. The aim of ZefMap was to make successful process improvement methods and tools coming from other domains effective in the context of tower control rooms. The project showed that optimization tools for planning can do calculations and trade-offs (probably) outside of human capability when handling Hamburg airport in simulated scenarios. The decrease in average taxi time was between 33% and 36% while punctuality improved from 57% to 67%.
- Project NextGenDST is a two-year strategic SINTEF project for enabling better collaboration between humans and decision support systems in time-critical complex domains such as ATM

Entity Profile
matching the
task

SINTEF Human Computer Interaction Group have a high level of competence in evaluation and design of system for complex work situations. The group have been working within the emergency management domain and in air traffic management in SESAR 1 and SESAR2020 Wave 1 and 2. A central task in the SESAR2020 activities has been to design, conduct, analyse and report from validation activities. Thus, we have a good match with the tasks at hand. This work requires competence and experience in Human Computer Interaction to be successful. SINTEF has this expertise and applied these in many industries (see Description and previous experience).

Contribution	In PJ32, SINTEF will support the validation activities in EXE 1 Scenario 3 and Scenario 4, including experiment design, validation design and analysis (mainly HF and SAFETY), VALP and VALR. SINTEF will also compare and coordinate these activities with their activities in PJ09-S44 and PJ10-S96 to obtain synergies.
Contribution	HAL (SEAC2020) will

4.1.1.17 SKYGUIDE, SA Suisse pour les services de la navigation aérienne civils et militaires

Organisation	1	SKYGUIDE	Service Provider
Description	<p>SKYGUIDE is the Swiss Civil and Military Air Navigation Services Provider.</p> <p>They are located in the European Core Area. 59% of the services are provided within the national boundaries and 41% within airspace delegated from European neighbours. SKYGUIDE operates one airspace from two Area Control Centres, situated in Geneva and in Wangen in the Zurich area. As a fully integrated Civil and Military Service provider, they operate the Swiss Air Defence & Direction Centre (ADDC) for the OAT operations. SKYGUIDE is also present on 12 regional civilian and military airfields throughout the country.</p> <p>Skyguide is setting up the capability of running a virtual centre, i.e. operating one centre from two locations and setting the premises for future sector-exchange capabilities with foreign ANSPs. We are currently transiting from a point to point technical environment to an Enterprise Service Bus (ESB) environment and virtualising our main systems onto the Service Oriented Architecture (SOA). We intend to be in a position of serving our two CIRs from one data centre. The final objective is to have one control centre on two locations.</p> <p>SKYGUIDE is fully committed to its public service mandate. Switzerland's air navigation service provider is an entrepreneurially-minded and customer focused joint-stock company under Swiss private law, which has its head office in Geneva.</p> <p>Located in the middle of the European ATM Network, SKYGUIDE is able to provide front-end expertise of a dynamic ANSP, dealing with the highest density and complexity airspace of Europe (EUROCONTROL Performance Review Unit assessment). In 2019, SKYGUIDE handled 1.3 Million Civil IFR flights and, for the Airforce, conducted 289 hot missions and 2019 tactical missions with a very high safety and punctuality levels. In order to ensure the required level of performance in this really specific operational environment, SKYGUIDE adopts innovative approaches in various domains like new technologies (e.g. CPDLC, satellite navigation), advanced automated ATC support tools and HMIs, centralised ATC data processing systems.</p> <p>As confirmed by the European air traffic control agency EUROCONTROL, SKYGUIDE has continuously both increased airspace capacity and enhanced the punctuality of the flights over the past 10 years.</p> <p>SKYGUIDE is joining with SkySoft-ATM (as LTP), allowing the provision of a RTD with advanced functionalities, replicating the SKYGUIDE HMI and allowing additional ATC Functions to be included.</p>		
Previous experience	<p>In SESAR 1, SKYGUIDE has been an associate partner of DSN and DFS and contributed in numerous Work Packages and participating to several Large Scale Demonstrations as consortium member.</p> <p>In particular, activities of SKYGUIDE in SESAR 1 linked to PJ.38 objectives have been:</p> <ul style="list-style-type: none"> Pegase (Airbus) Large Scale Demonstration: "Providing Effective Ground & Air data Sharing via Extended Projected Profile" addressing the use of EPP) in the ground Trajectory Prediction tools therefore with the aim of improving controller support tools reliability 		

- ODP (DFS) Large Scale Demonstration: "Optimised Descent Profile"
- We were very active in the B04.04 project as the precursor of the PJ.16-03, PJ.10-93-W2 and PJ.32

SKYGUIDE is full member of SESAR 2020

In SESAR 2020 Wave 1, the Activities of SKYGUIDE linked to PJ.38 solutions objectives have been:

- PJ.10 : PROSA
 - PJ.10.06 : Non Geographic Controller Validations (NGCV) – skyguide contributed significantly to the initial definition of the requirements to allow an ATCO to take over a sector without the full geographical knowledge
- PJ.16 : CWP-HMI
 - Solution 16-03 - Service Interface Definition & Virtual Centre Concept
- SKYGUIDE has contributed to the definition of (centralised) services in the frame of Virtual Centre Concept.
- SKYGUIDE has performed a V2 validation involving centralized services

In SESAR 2020 Wave 2, the Activities of SKYGUIDE linked to PJ.32 solutions objectives are:

- PJ.10 W2 PROSA
 - PJ.10-73 – NGCV - SKYGUIDE will continue working on the operational feasibility of operating different sectors and independently from a specific validation.
 - PJ.10-93 – Virtual Centre - SKYGUIDE continue activities performed in Wave 1 PJ.18-02a. SKYGUIDE will contribute to Operational Scenarios Definitions providing operational, Human Performance, and Safety expertise. SKYGUIDE will led a V2 validation exercise bringing new functionalities linked to CPDLC and using advanced Trajectory Prediction

Entity Profile
matching the
task

The SKYGUIDE Air Navigation Service Provider expertise includes the following profiles :

Operational Expertise :

- En-route and TMA Air Traffic Controllers acting in one of the most complex ATC environment
- Ops experts : experts already contributing to SESAR 2020 Wave 1 and Wave 2
- Technical Development expertise :
- Major software developments of the operational system
- Dedicated software development team for R&D.
- System Engineering: Platform development, integration and validation

Technical Expertise :

- Technical experts in Air/Ground datalink communication
- Technical experts in Service Oriented Architecture

Simulator expertise :

- Simulator team use to prepare and run R&D simulation

Safety expertise :

- Safety expertise – operation expertise

Human Performance expertise :

- HP team expertise – operation expertise

Contribution	<p>Skyguide will actively contribute to the technical stream of PJ.32. We intend to cross-feed our own developments into the project and to make use of the project to continue building on our own service models for the future skyguide ADSP-ATSU relationship.</p> <p>Jointly with the lead of the technical stream, we will continue establishing our service model to reach a level where additional functions from PJ16.03 W1 will be tested.</p>
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4.1.1.18 THALES LAS FRANCE SAS

Organisation	1	THALES AIR SYS	Ground Industry
Description	<p>Thales ATM, from take-off to touchdown and everything in between.</p> <ul style="list-style-type: none"> World leader in ATM, Thales, represented in SESAR 2020 by the Thales LAS France company, offers integrated gate-to-gate solutions, from pre-flight to landing, ensuring airport safety, efficient traffic handling operations, data sharing on aircraft and seamless handover operations between territories. Thales has the largest installed base of solutions and technologies with over 360 TopSky - ATM Solutions, 7,000 nav aids, 700 surveillance radars, and 1,800 ADS-B and multilateration equipment. Thales is trusted by key ATM decision makers across 170 nations, and helps key decision makers master complexity and make timely decisions for better outcomes. <p>At the forefront of all major modernisation initiatives around the world</p> <ul style="list-style-type: none"> Growing aircraft numbers make Air Traffic Management more complex. Thales solutions help to make the skies safer, greener and more efficient. A key player in all major ATM modernisation initiatives, ICAO Aviation System Block Upgrades (ASBU), SESAR and NextGen, Thales focuses on international harmonization. Our product roadmaps are aligned with ICAO ASBU concepts, NextGen and SESAR. Thales has an important experience in En-Route, Approach and Tower systems developing and deploying systems across the world. 		
Previous experience	<p>SESAR 2020 Wave 1: Thales was a key contributor to the programme being involved in all S2020 Wave 1 projects.</p> <p>Thales was project coordinator for :</p> <ul style="list-style-type: none"> PJ16 (Controller Working Position / Human Machine Interface) PJ17 (SWIM Technical Infrastructure) <p>SESAR 2020 Wave 2: Thales is a key contributor to the programme and is being involved in most S2020 Wave 2 projects.</p> <p>Other main ATM related activities:</p> <ul style="list-style-type: none"> 4-FLIGHT: Thales is delivering the future innovative Air Traffic Management system for France, 4-Flight. DSN A will enjoy a new generation ATM system to respond to the increasing complexity and density of air traffic, integrating a new advanced flight data processing system (CoFlight) with Thales's latest generation human machine interface (TopSky - Controller HMI) and sophisticated new controller tools, to better detect conflicts, facilitate traffic analysis. COFLIGHT: Coflight is a new advanced Flight Data Processing System (FDPS), jointly developed by DSN A and ENAV and skyguide ANSPs, together with industrial partners Thales and Leonardo. Designed to meet SESAR performance objectives, Coflight is a unique product, a fundamental enabler to achieve interoperability throughout Europe. COOPANS (CO-Operation of Air Navigation Service providers) is a unique innovative partnership, between five major ANSPs together with Thales as 		

	<p>industry provider. IAA, LFV, Naviair, Austro Control and Croatia Control have implemented an advanced and unified Air Traffic Control system thanks to harmonized functionalities and joint investments. With Thales TopSky - ATC system in operation, the five countries members benefit from a unified solution, through an open architecture which allows them to introduce the latest innovations via regular stepwise evolutions.</p> <ul style="list-style-type: none"> • OneSKY: The OneSKY project for the Australian ANSP Airservices of Australia consists of merging civil and military airspace into one unique airspace managed by the same integrated system. It is the most complex 'system of system' project that THALES ATM has ever competed for, including TopSky - ATC solutions deployed in 15 interconnected civil and military ATC centres. • MARSHALL: The Marshall Project is a transformational infrastructure programme for UK MoD, seeking to ensure safe, efficient and sustainable Air Traffic Management (ATM) service for the UK Armed Forces. Thales provides a complete civil ATM capability for Military Airbases with: <ul style="list-style-type: none"> ○ Efficient and secure solutions for Approach, Tower and Runway operations ○ A totally harmonized solution for operations between civil and military ATC ○ Civil-military data control <p>MODERNISATION INITIATIVES</p> <ul style="list-style-type: none"> • NextGen <p>Thales has a unique position in the ATM Industry, participating to both SESAR and NextGen. NextGen is transforming the US National Airspace System (NAS) to meet future needs and avoid gridlock in the sky and at airports.</p> <ul style="list-style-type: none"> ○ Thales is a key contributor to NextGen ○ Member of RTCA NextGen Advisory Committee ○ Key technology provider for ADS-B program ○ Enabling data comm with Thales automation platform ○ Providing analysis work with the areas of safety and security • ICAO ASBUs <p>All Thales solutions are compliant with Block 0, and on the way to meet Block 1 requirements. Thales has the knowledge and expertise in the ASBUs together with the largest worldwide ATM installed base to advise our users about implementing them wherever they are.</p>
Entity Profile matching the task	<p>Thales Air Sys will provide expertise on these domains:</p> <ul style="list-style-type: none"> • Knowledge of the SESAR environment and processes • Development of Industrial Based Platform (IBP) • Expertise on Service definition for ATC system and ATFCM system • Exercise management with partners • Expertise on Operational concept
Contribution	<p>Thales Air Sys will participate:</p> <ul style="list-style-type: none"> • In the Operational thread, to the definition of the OSED requirements, the TS-IRS requirements and will participate to TVALP and TVALR. • In the Technical thread, to the implementation of an Industrial Based Platform to support both PJ10-W2-93 EXE5 and PJ.32-W3-01 EXE.

4.1.1.19 NATS (En Route) Public Limited Company

Organisation	1	NATS	Service Provider
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Description	<p>NATS (En Route) plc is the core business and the sole provider of ATC services for aircraft flying 'en route' in UK airspace and the eastern part of the North Atlantic. NATS manages 11% of Europe's airspace and circa 25% of Europe's traffic. It is regulated by the UK Civil Aviation Authority (CAA) within the framework of the European Commission's (EC) Single European Sky (SES) and operates under licence from the UK Secretary of State for Transport. It operates from two ATC centres at Swanwick in Hampshire (England) and Prestwick in Ayrshire (Scotland).</p> <p>NATS (En Route) plc purpose is to provide safe, efficient and effective air traffic control services to aircraft operating within airspace where such services are either required or provided, specifically providing:</p> <ul style="list-style-type: none"> • En-route and Terminal Air Traffic Control (ATC) for all UK airspace under a 30 year operating licence to UK Government. In 2017, NATS handled over 2.5 million flights, carrying more than 200 million passengers safely through some of the busiest and most complex airspace in the world. • The design and management of airspace, engineering project and maintenance activities for ANS communications, navigation and surveillance systems, and IT and network management. • Cross business support to UK Ministry of Defence (MoD) which includes the provision of a joint ATC service in the UK FIR, and support to communications systems, radar, facilities and training. • Provision of Instrument Flight Procedure design services, publication of the International Air Pilot Publication (IAIP), Notice to Airmen (NOTAM) documentation, data management and charting services for the UK. • Consultancy services to UK and overseas customers in air traffic management, airspace design, instrument flight procedures, control tower system integration and transition, safety management, engineering, project management. • Training of ATC staff, both as ab-initio controllers, for transition to new airspace or facilities and via supplementary courses including Supervisor Management, On Job Training (OJT) and Incident Management. • Training of engineering staff.
Previous experience	<p>NATS made significant contributions to SESAR Wave 1 Network Management concepts, in particular to ensure that the concepts are reflective of mature and developing sub regional operations and sufficiently detailed to enable validation and eventual operational deployment. Specifically, NATS contributed to the following SESAR 2020 Wave 1 solutions:</p> <ul style="list-style-type: none"> • PJ.09-01 Network Prediction and Performance • PJ.09-02 Integrated Local DCB processes • PJ.09-03 Collaborative Network Management Functions <p>NATS is continuing to contribute in the Network Management concepts in Wave 2, contributing to the following solutions:</p> <ul style="list-style-type: none"> • PJ.09-W2-44 Dynamic Airspace Configurations (DAC) • PJ.09-W2-44 Enhanced Network Traffic Prediction and shared complexity representation <p>Additionally, NATS is a significant contributor to the SESAR work on Virtual Centres, contributing to Solution PJ.10-W2-93 which builds on the successes of the previous Virtual Centre development in SESAR 2020 Wave 1 (Solution PJ.16-03) and SESAR 1 (project B4.4). Specifically, NATS has contributed to the Virtual Centre development and the improved operation for delegation of airspace and contingency in a Virtual Centre environment.</p> <p>NATS also has previous experience in deploying SESAR Solutions and has actively contributed to SESAR 2020 VLDs, notably the Award-Winning PJ.24 (DCB demonstration of Airport Target Times of Arrival to achieve a target level of airborne</p>

	holding) and PJ.25 (xStream) projects, for which the latter has led to the operational deployment of Gatwick XMAN.
Entity Profile matching the task	<p>NATS has significant experience in Airspace Capacity Management (ACM) and has developed an extremely advanced ACM operation across both ACCs and is a key stakeholder in many SESAR and Network Management fora with significant R&D effort being integral to NATS business.</p> <p>Our ACM operation has significant experience of cross border arrival management in operations including full XMAN capability for Heathrow and Gatwick airports which will be essential in Virtual Centre's concepts for traffic management.</p> <p>In addition, NATS can provide our capabilities in research, concept development, validation and the prototype development of tools and procedures as required.</p>
Contribution	<p>NATS will participate in the project with an in-kind contribution to the activity to evaluate the performance benefits for capacity on demand operations as a function of the geographical / organisational scope of airspace delegation at ECAC level and will provide:</p> <ul style="list-style-type: none"> • ACM Expert personnel with advanced capacity balancing and management experience. • Submission of sector configuration and capacity values • Appropriate technical architecture input as required • Review of results/documentation and input to meetings as required

4.1.1.20 RIZENI LETOVEHO PROVOZU CESKE REPUBLIKY STATNI PODNIK – silent partner

Organisation	1	ANS CR (B4)	Service Provider
Description	<p>Air Navigation Services of the Czech Republic (ANS CR) is a progressive provider of safe and cost-effective air traffic services designated by Czech Ministry of Transport. Its task is to provide services to airspace users within the Czech airspace and at 4 international airports - Prague, Brno, Ostrava and Karlovy Vary. Covering rather small but very complex airspace, the company handled more than 850.000 flights in 2017, reaching to 900.000 flights in 2018 as well as in 2019, with minimal level of delay.</p> <p>Operating fleet of jet and propeller calibration aircraft, ANS CR offers wide range of flight inspection services. In addition, ANS CR provides specialized aviation training. The portfolio includes ATC training, pilot and other aviation staff training using its own facilities including ATC and aircraft simulators. The abovementioned activities together with ATM consultancy services are provided to international customers on commercial basis by subsidiary companies CANI (Czech Air Navigation Institute) and CATC (Czech Aviation Training Centre).</p> <p>Being member of SESAR Joint Undertaking via B4 Consortium, ANS CR actively contributes to SESAR 2020 Programme. Participation in SESAR Deployment Programme is ensured by involvement in several implementation projects. Together with other central European countries the Functional Airspace Block Central Europe (FAB CE) was formally established. All such activities contribute to implementation of the Single European Sky (SES) legislation.</p>		
Previous experience	Not applicable		
Entity Profile matching the task	Not applicable, ANS CR (B4) initially will not participate directly in this action.		
Contribution	Support to participating members of B4 Consortium if required.		

4.1.1.21 Letové prevádzkové služby Slovenskej republiky, štátny podnik – silent partner

Organisation	1	LPS SR (B4)	Intergovernmental Organisation
Description	<p>Founded by the Ministry of Transport, Construction and Regional Development of the Slovak Republic in January 2000, LPS SR (Letové prevádzkové služby Slovenskej republiky, štátny podnik) is a state enterprise providing Air Navigation Services, including Air Traffic Services, Aeronautical Telecommunication Services, Aeronautical Information Services, as well as Search and Rescue, in the Slovak Republic.</p> <p>With a total staff of 500 (including 118 ATCOs) and altogether nine Operational units, among them one ACC (Bratislava), two APPs (Bratislava, Košice), five TWRs (Bratislava, Košice, Piešťany, Poprad, Žilina) and Central ATS Reporting Office (Bratislava), LPS SR controls the Slovak airspace (Bratislava FIR) of the total size of 48,800 km² and provides ATC services at five designated Slovak international airports as well as within small parts of the Hungarian airspace.</p> <p>The European-wide trend in air traffic in the last decade, is also reflected in the evolution seen in the Slovak airspace. In recent years, a significant increase in traffic was seen in the FIR Bratislava. As far as provision of air traffic control is concerned, there were no delays which would exceed the determined limit of 0.5 minute per 1 flight.</p> <p>LPS SR is a part of B4 Consortium, Member of SESAR Joint Undertaking.</p> <p>LPS SR is a Member of the FAB CE and a founding member of the Gate One, a regional platform of Central and Eastern European ANSPs.</p>		
Previous experience	Not applicable		
Entity Profile matching the task	Not applicable, LPS SR (B4) initially will not participate directly in this action.		
Contribution	Support to participating members of B4 Consortium if required.		

4.1.1.22 Irish Aviation Authority (IAA) – silent partner

Organisation	1	IAA/COOPANS	Service Provider
Description	<p>Irish Aviation Authority is a state-owned limited liability company</p> <p>Locations: The headquarter is located in Dublin and subdivisions are located in Shannon and Cork</p> <p>Divisions: Two main divisions - Operations and Strategy, Technology and Training supported by corporate services. Furthermore, Irish Aviation Authority has a Safety Regulation Directorate, as Irish Aviation Authority oversees and regulates the implementation of standards for the Irish civil aviation industry.</p> <p>Governance structure: Irish Aviation Authority has a Board of Directors having responsibility for the corporate governance.</p> <p>Irish Aviation Authority (IAA) is a member of COOPANS Consortium consisting of 5 Air Navigation Service Providers: Austro Control (ACG), Croatia Control (CCL), Irish Aviation Authority (IAA), Naviar and LFV. Cooperation between COOPANS partners goes beyond SESAR – partners has for a long time worked together with Thales under a common framework agreement in a joint program based on the incremental development of a common ATM platform. The overarching goal for COOPANS is to enable each individual ANSP to achieve financial savings through cost, resource, and competence</p>		

	<p>sharing and to meet the EU objective of harmonizing ATM systems. This work is now expanded to Research & Innovation by the establishment of the COOPANS Consortium.</p> <p>Irish Aviation Authority (IAA) has many years of experience, both in the delivery of Air Traffic Services; design of concepts and in development, validation and implementation of Air Traffic Management tools.</p> <p>The enterprise is certified ISO 9001.</p>
Previous experience	<p>Irish Aviation Authority (IAA) has participated in SESAR via NORACON consortium in the following WPs: WP5 TMA Operations (5.3, 5.6.1, 5.6.4, 5.6.7, 5.9), WP6 Airport Operations (6.7.1), WP 10 En-Route & Approach ATM Systems (10.2.1, 10.3.8, 10.10.3), WP 16 R&D Transversal Areas (16.4.3, 16.6.1), WP C Master Plan Maintenance (C3)</p> <p>IAA has participated in SESAR 2020 wave 1 in the following projects: PJ.10, PJ.16, PJ.17, PJ.25 and PJ.27</p> <p>IAA is currently participating in wave 2 projects PJ.10 and PJ.18</p>
Entity Profile matching the task	During Wave1 and Wave 2 virtual centre activities, IAA contributed to COOPANS activities in PJ.16-03 both in development of concept description and in the validation activities. Both validations were successful and contributed to the overall project success.
Contribution	IAA will contribute with operational experts primarily with the aim of supporting COOPANS activities

4.1.1.23 ATOS Belgium – silent partner

Organisation	1	ATOS (FSP)	Ground Industry
Description	<p>Atos Belgium is a company within Atos SE (Societas Europaea) group. Atos is a leader in digital services with 2014 pro forma annual revenue of €10 billion and 86,000 employees in 66 countries. Serving a global client base, the Group provides Consulting & Systems Integration services, Managed Services, Cloud operations, Big Data & Security solutions, as well as transactional services. Throughout Europe, more than 300 Atos ATM experts provide solutions and architecture support to Air Navigation Service Providers, Airports, Airlines and EUROCONTROL Network Manager.</p> <p>Atos Belgium is member of the Frequentis SESAR Partners consortium together with the companies HUNGAROCNTRM MAGYAR LEGIFORGALMI SZOLGALAT ZARTKORUEN MUKODO RESZVENYTARSASAG and Frequentis AG which was founded in 2014 for the main purpose of joining SESAR2020 activities. Frequentis SESAR Partners is member of the SESAR Joint Undertaking.</p>		
Previous experience	Not applicable.		
Entity Profile matching the task	Not applicable, ATOS (FSP) initially will not participate actively in this action.		
Contribution	Support to participating members of Frequentis SESAR Partners if required.		

4.1.1.24 AIRTEL ATM Limited – silent partner

Organisation	1	AIRTEL (NATMIG)	Ground Industry
Description	<p>AIRTEL ATN LTD is a part of North European ATM Industry Group (NATMIG) Consortium. NATMIG is a member of SESAR 1. The NATMIG consortium consists of</p>		

	<p>Airtel ATN (SME - Ireland), Saab AB (multinational industrial concern - Sweden) and SINTEF AS (non-profit research organisation - Norway).</p> <p>AIRTEL ATN LTD is an SME which has an extensive line of ATN & FANS data link products and technology used in 35 countries worldwide. Its operational systems include ATN/OSI routers deployed on more than 6,000 aircraft. Its ground systems include Air/Ground Data Link Servers deployed in several European Countries and Air/Ground routers used in VDL Mode-2 networks. It provides data link test and monitoring equipment. It has developed experimental version of future data link systems such as ATN/IPS, SATCOM and AeroMACS.</p> <p>AIRTEL ATN LTD is providing Test and Monitoring equipment to the FAA DCIS program. It has extended its research collaboration to include organisations in China. It is also providing Data Link networking equipment in collaboration with Russian companies.</p> <p>AIRTEL ATN LTD also provides Data Link test services and products in support of Aircraft Data Link certification for ACARS, FANS and ATN/OSI, in particular EU Data Link and US DCIS aircraft testing.</p>
Previous experience	<p>Airtel is involved in R&D projects with international organizations and it is a member of SESAR JU.</p> <p>Previous projects:</p> <ul style="list-style-type: none"> • SESAR 1 • IRIS Precursors • ANTARES • SESAR ELSA • SESAR 2020 Wave1: PJ.14 EECNS, PJ.17 SWIM-TI, PJ.03 SUMO • CEF 2017 IP1: Airtel is leader of WP1.2 and WP1.3 <p>Current projects:</p> <ul style="list-style-type: none"> • SESAR 2020 Wave1: PJ.31 DIGITS • SESAR 2020 Wave2: <ul style="list-style-type: none"> ◦ PJ.14-W2 I-CNSS (PJ.14-W2-60, PJ.14-W2-77, PJ.14-W2-100, PJ.14-W2-107) ◦ PJ.18-W2 4DTM (PJ.18-W2-56) • COMET • IRIS IOC <p>Airtel actively participates to standards groups in different organizations such as ICAO, AEEC, EUROCAE.</p>
Entity Profile matching the task	N/A
Contribution	N/A

4.1.1.25 SAAB Aktiebolag – silent partner

Organisation	1	SAAB (NATMIG)	Ground Industry
Description	SAAB AKTIEBOLAG is part of the North European ATM Industry Group (NATMIG) Consortium. The NATMIG consortium consists of Airtel ATN (SME - Ireland), Saab AB (multinational industrial concern - Sweden) and SINTEF AS (non-profit research organisation - Norway).		

	<p>While SAAB AKTIEBOLAG originates in military and civil aircraft manufacturing and is one of the few companies in the world with the ability to develop, integrate and maintain complete aircraft systems, we are today active in several transport modes and a global supplier in the ATM domain.</p> <p>SAAB AKTIEBOLAG's over 75 years of history in aeronautics, over 4000 civil and military aircraft produced and as well as our broad involvement in ATM businesses, provide a solid background and deep competence in aeronautics in general and RPAS in specific. For the future we plan to continue to be able to provide market-leading aeronautical products including manned and unmanned (RPAS) products that can operate safely in civil airspace, as well as solutions to facilitate others to allow safe RPAS operations in their airspace, whether it's an RPA, a Detect & Avoid system or related ATM components.</p> <p>SAAB AKTIEBOLAG is a global supplier in the ATM domain and Saab has a long history of developing and delivering ATM solutions. SAAB AKTIEBOLAG has pioneered future concepts such as the Remote Tower, which in operational use in Sweden and is undergoing trials in several other countries. In total, SAAB AKTIEBOLAG has deployed 240 ATM systems and subsystems to serve over 60 customers in 40 countries. Our air traffic management systems and tools serve 18 of the 20 busiest airports in the world, 10 of the 12 largest Air Navigation Service Providers (ANSPs), and the 3 largest airlines by passenger count. SAAB AKTIEBOLAG ATM systems guide 2 million aircraft movements each month via our airport surface safety systems.</p>
Previous experience	<p>Saab (NATMIG) has been a SESAR member from the start with the SESAR project experience:</p> <p>SESAR 1 (WP05, WP06, WP10, WP12 and WP16): The main areas of contribution were in AMAN/DMAN, Remote Tower and safety.</p> <p>SESAR 2020 W1 (PJ05): The main area of contribution is in Remote Tower</p> <p>SESAR 2020 W2 (PJ05): The main area of contribution is in Remote Tower</p> <p>SESAR 2020 W2 (PJ13): The main area of contribution is in RPAS</p>
Entity Profile matching the task	N/A
Contribution	N/A

4.1.2 Main profiles/CV (they may be the same person for more than one role)

4.1.1.1 Activity Coordinator (PM/Transversal activity Coordinator - WP01 & WP06 leader)

- EUROCONTROL – Philippe Leplac**

Gender M

Philippe has an Engineering Degree from Ecole Nationale Supérieure des Télécommunications in Paris from 1983.

He worked for 17 years at THALES as Software engineer then Project Manager and then as Manager for the ATM System Engineering activities

He set up an ATM consultancy in 2000 specializing in System Engineering and Programme management in the ATM domain.

He joined EUROCONTROL in 2006 where he first managed Episode 3, then SESAR WP13 before concentrating on projects dealing with Trajectory Management and Flight Object Interoperability.

4.1.1.2 Work Package Leaders (WPL)

• EUROCONTROL (WP02) –Yevgen Pechenik

Gender M

Yevgen obtained Master Degree in ATM from Ukrainian State Flight Academy (5 years studies, Diploma with distinction), qualification "Air Traffic Management Engineer ". Have got more than 20 years in total of professional experience in ATM. Yevgen is part of EUROCONTROL staff, working for EUROCONTROL/RTD/EEC/NET Unit in Bretigny, France as an ASM/ATFCM Senior Operational expert fulfilling the roles of Solution Leader of two Solutions: 08-01 Dynamic Airspace Configurations and 08-02 for SESAR2020 project “Advanced Airspace Management”, as well as Leader of Dynamic Airspace Configurations OSED Development Task in Solution 08-01, PJ08, SESAR 2020. Yevgen has joined EUROCONTROL in 2007 as Airspace Management expert in ASM/ATFCM/ATS Procedures Section of Network Management Directorate (EUROCONTROL/DNM/Network Operations Planning Unit), and worked on Airspace Configuration concept development in the context of the 2017EUROCONTROL Airspace Strategy and ASM Directions of Work Document; ASM/ATFCM Network assessment process development: development of the concept, procedures, system support operational requirements, validation exercise organisation, Development of the Network Manager Flight Efficiency Support Service. In his professional career he also has taken up following roles: Air Traffic Controller (have held ACC, Approach, TWR ATCO Licenses), Deputy Head of Air Navigation Development department of UkSATSE (Ukrainian National ANS provider), Deputy Project manager of SWP07.05.04 “Dynamic Airspace Configurations” project in SESAR I programme.

• DSNA (WP03) – Quentin Grandjean

Gender M

Quentin is currently in charge of ADSP architecture and deployment at the “Direction de la Technique et de l’Innovation (DTI) of DSNA. He is also the System Architect for CoFlight Cloud Service, currently developed by DSNA and ENAV for Skyguide. He has been in charge of validating and integrating the new 4-Flight ATM system in Reims and Aix ACC from 2014 to 2020, managing the validation strategy of 4-Flight for DSNA from 2016 to 2020.

4.2 Third parties involved in the project (including use of third party resources)

4.2.1 (1)Linked to EUROCONTROL

Objective

Does the participant plan to subcontract certain tasks (please note that core tasks of the Y project should not be sub-contracted)

EUROCONTROL plan to subcontract some tasks. The subcontracted part of the activities is in full consistency with the “make or buy” policy applicable at EUROCONTROL ensuring that core activities and expertise is kept internally and respecting H2020 rules as well as any relevant legislation with regards to subcontracting. It mainly consists in:

- Provision of technical / computing support services to support the verification and validation activities of PJ32-W3. These activities consist in the necessary adaptation of EUROCONTROL validation platform (ESCAPE, AudioLAN, eDEP, INNOVE, etc...);
- Specialist studies/assistance outside of EUROCONTROL core activities

EUROCONTROL, as an international organisation, follows strict rules in terms of external assistance selection and procurement. These rules will be applied for the selection of the subcontracting parties in the framework of PJ32-W3.	
Does the participant envisage that part of its work is performed by linked third parties ⁸	N
N/A	
Does the participant envisage the use of contributions in kind provided by third parties (Articles 11 and 12 of the General Model Grant Agreement)	N
N/A	
Does the participant envisage that part of the work is performed by International Partners (Article 14a of the General Model Grant Agreement)?	N
N/A	

4.2.2 (4)Linked to ACG/COOPANS

Objective
Does the participant plan to subcontract certain tasks (please note that core tasks of the project should not be sub-contracted)
Y
<p>Austro Control intends to subcontract parts of the document work (particularly VALP and VALR) to Think Research. This company has sound knowledge and specific expertise in technical and operational aspects of ATM. While the core content-related expertise will be delivered by Austro Control experts, Think Research will be responsible for the actual drafting and consolidation of the documents or parts of them.</p> <p>In particular the following tasks will be subcontracted to Think Research:</p> <ul style="list-style-type: none"> • Elaboration of the ACG/COOPANS contribution to the VALP based on content provided by Austro Control experts. Estimated cost € 7.133,- • Elaboration of the ACG/COOPANS contribution to the VALR based on content provided by Austro Control experts. For this document the participation of Think Research staff as observers to the validation exercise is planned. Estimated cost € 10.000,- <p>Organizational Data:</p> <p>Think Research Ltd.</p> <p>Suite 3 Branksome Park House,</p> <p>Branksome Business Park,</p> <p>Bourne Valley Rd,</p>

⁸ A third party that is an affiliated entity or has a legal link to a participant implying a collaboration not limited to the action. (Article 14 of the Model Grant Agreement).

Bournemouth, BH12 1ED.	
Does the participant envisage that part of its work is performed by linked third parties ⁹	N
N/A	
Does the participant envisage the use of contributions in kind provided by third parties (Articles 11 and 12 of the General Model Grant Agreement)	N
N/A	
Does the participant envisage that part of the work is performed by International Partners (Article 14a of the General Model Grant Agreement)?	N
N/A	

4.2.3 (9)Linked to DSNA

Objective	
Does the participant plan to subcontract certain tasks (please note that core tasks of the project should not be sub-contracted)	Y
DSNA intends to subcontract a set of tasks, for support and expertise in the domain of ATM. DSNA subcontracts allow DSNA/DTI to buy these required studies/services. These subcontracts are a framework for placing specific purchase orders and have been attributed in accordance to the French "Code des Marchés Publics"	
Does the participant envisage that part of its work is performed by linked third parties ¹⁰	N
N/A	
Does the participant envisage the use of contributions in kind provided by third parties (Articles 11 and 12 of the General Model Grant Agreement)	N
N/A	
Does the participant envisage that part of the work is performed by International Partners (Article 14a of the General Model Grant Agreement)?	N
N/A	

⁹ A third party that is an affiliated entity or has a legal link to a participant implying a collaboration not limited to the action. (Article 14 of the Model Grant Agreement).

¹⁰ A third party that is an affiliated entity or has a legal link to a participant implying a collaboration not limited to the action. (Article 14 of the Model Grant Agreement).

4.2.4 (10) Linked to ENAIRE

Objective
Does the participant plan to subcontract certain tasks (please note that core tasks of the project should not be sub-contracted) Y
<p>ENAIRE plans to perform a validation exercise within PJ32 that require the involvement of FMP actors, ATCOs and pseudo-pilots. ENAIRE ATCOs' with proven experience will contribute on the exercises execution by providing their impressions and also improvement areas. However, ENAIRE does not have enough pseudo pilots in its staff to perform all tasks envisaged, so subcontracting pseudo pilots is needed to perform the exercises. For this reason, ENAIRE plans to subcontract pseudo-pilots services for SESAR solution PJ32-W3-01 from SENASA, company with a long tradition in aeronautics in the areas of training, in order to complete the validation exercises involved with the best guarantees.</p>
Does the participant envisage that part of its work is performed by linked third parties ¹¹ Y
<p>CRIDA</p> <p>CRIDA (Centro de Referencia de Investigación, Desarrollo e Innovación ATM, A.I.E.) is a not-for-profit Research Entity established by ENAIRE (the Spanish ATM and Airport Services provider), the Technical University of Madrid "Universidad Politécnica de Madrid – UPM" and INECO. CRIDA was created on the 27th of February of 2008.</p> <p>CRIDA's mission is to improve the efficiency and performance of the Spanish Air Traffic Management (ATM) system through the development of ideas and projects that provide quantifiable solutions based on system performance indicators, considering the Spanish system as an integral part of a global networked system. To achieve this goal, CRIDA must analyse quantitative and systematically the benefits from the system, diagnose problems and identify their causes, propose and design innovative solution alternatives, identify and validate the best alternatives, and collaborate actively in the process of implementation of the selected solution. The analysis of the system is done in direct collaboration with ENAIRE (Spanish Air Navigation Service Provider), as its main partner, contributing to ENAIRE's mission of providing air navigation services safely, efficiently and with the adequate levels of quality respect for the environment.</p> <p>CRIDA is strongly focused on performing R&D+I; its partners and shareholders (ENAIRE, INECO and UPM) are tasked with the commercial exploitation of CRIDA's results. This dichotomy allows CRIDA to focus on the pursuit of knowledge whilst maintaining a strong connection with the real world problems.</p> <p>CRIDA has identified as a research priority the development of operational concepts and supporting tool prototypes that enhance and make more efficient the operation of the air navigation system. As part of this priority, CRIDA research addresses how to improve planning (as related to the DCB operations) and how to increase the automation of the system (aiming to increase the productivity of its actors). The research performed by CRIDA includes its participation in leading research and implementation programmes such as SESAR. The results obtained so far, have allowed the development of complexity management tools already in operation within the Spanish airspace (eCOMMET).</p> <p>The second strategic line of R&D in CRIDA consists in the study and validation of R&D+i solutions assessing their operational impact and quantifying the economic benefits derived from either or both the ATM system's performance improvements and/or the cost reduction associated with its implementation. To</p>

¹¹ A third party that is an affiliated entity or has a legal link to a participant implying a collaboration not limited to the action. (Article 14 of the Model Grant Agreement).

do this, CRIDA researches and develops innovative validation techniques and methodologies to respond to the needs of its partners.

This strategic line ensures that the evaluation of new solutions is based on the same principles and methods as the system performance measurements to facilitate comparative analyses. It also offers the possibility of carrying out evaluations at both conceptual (based on the conceptual definition of the solution and without the need for any development) as pre-industrialization (based on prototypes) levels. Most of the activities performed in this area are included in the SESAR programme.

CRIDA will contribute towards solution PJ32-W3-01 providing its performance and ATM expertise in the definition of ATFCM procedures and requirements needed to achieve the dynamic delegation of predefined airspace between neighboring ATSUs as well as in the evaluation of the operational feasibility and performance benefits. CRIDA will support the performance of a validation exercise hosted by ENAIRE. CRIDA

Does the participant envisage the use of contributions in kind provided by third parties (Articles 11 and 12 of the General Model Grant Agreement) Y

Several companies have been collaborating by means of third party in kind contribution with ENAIRE for long time, and a close collaboration exists in this sense. This has been the habitual practice in SESAR1 and in SESAR 2020 Wave 1 and Wave 2 activities and the results have become optimal in terms of efficiency and mutual collaboration.

The use of this in kind contribution is identified as a key factor for the proper development of the activities under this project. The complementarity of the know-how and expertise profile obtained by this form of collaboration is necessary to achieve the targets with the expected level of quality.

This contribution corresponds to the one referred to in Art. 11 of the AMGA (in-kind contributions against payment), in turn corresponding to category "A.3- seconded persons" of the Annex 2 of the Grant Agreement, and currently is estimated to amount to around 13.000€ (direct costs) for the work developed on ENAIRE's premises (since there is no specific place in Annex 2 to indicate these costs).

Does the participant envisage that part of the work is performed by International Partners (Article 14a of the General Model Grant Agreement)? N

N/A

4.2.5 (11) Linked to ENAV

Objective

Does the participant plan to subcontract certain tasks (please note that core tasks of the project should not be sub-contracted) N

N/A

Does the participant envisage that part of its work is performed by linked third parties¹² Y

¹² A third party that is an affiliated entity or has a legal link to a participant implying a collaboration not limited to the action. (Article 14 of the Model Grant Agreement).

ENAV contribution in the project is complemented by the following LTPs: Techno Sky, IDS AIRNAV and NAIS.

Techno Sky

Techno Sky S.r.l. (Techno Sky) is an ENAV Group Company having the responsibility for the management and maintenance of systems and equipment used for Air Navigation Services in Italy as well as for the support to the ATM operational innovation and for all the relevant ENAV Group R&D activities.

As ENAV's mission critical systems integrator, Techno Sky controls the full value chain, i.e. Research and Development, System Engineering, Design, ATM Software Development, Weather System Development, Verification, Validation, Installation, Integration, Training, Logistics and Maintenance.

In 2017 Techno Sky extended its background of knowledge and expertise on R&D following the transfer of competences and experts coming from SICTA, the former ATM R&D branch of ENAV Group.

The acquisition of ATM R&D experts is showing the Techno Sky constant commitment and focus on technological innovation, as a key factor for its continuous improvement and increased competitiveness on the market.

In addition, by investing in the study and implementation of new and more effective products and applications, Techno Sky acts significantly within the value chain of the ENAV Group and contributes to the efficiency, regularity and safety of Air Traffic Management operations.

Special care is devoted to the study of innovative systems to be used in the Company's core business. These studies and surveys are intended to improve innovative operational services supported by several simulators, platforms, tools and advanced methodologies.

Techno Sky, working in close cooperation with ENAV, has also gained an outstanding expertise in the development of innovative Air Traffic Management operations, in the development and validation of new concepts and procedures for the continuous improvement of performances, in assisting the supply industry to design and engineer new systems to safely support the Air Traffic Controllers in their highly demanding tasks.

Techno Sky, as ENAV Linked Third Party, is involved in ENAV ATM strategic planning, technical co-operation and service provision programs with international organizations (e.g. SESAR Joint Undertaking, SESAR Deployment Manager, EUROCONTROL, European Commission, etc.) and foreign countries, aiming at contributing to the advancement of ATM technology and processes and at improving all the linked services.

Techno Sky participation is quite significant from an ENAV perspective considering it brings an important piece of transversal technical, operational and management expertise.

Moreover, Techno Sky is currently extensively contributing to SESAR 2020 Programme as ENAV LTP by complementing ENAV activities and expertise in 14 W1 projects and 9 W2 projects including Industrial Research, Transversal Activities and Very Large Demonstrations.

Based on the considerations and skills depicted above, ENAV and Techno Sky, as part of the ENAV Group, can be considered as a single entity.

Techno Sky contribution to this project is intended to be provided in all activities where ENAV has expressed interest, with special emphasis on the technical and operational threads developed within the project.

Specifically, Techno Sky will provide transversal contribution to the tasks for the concept, procedures and requirements definition as well as for structuring, executing and reporting on validation activities performed by ENAV. Techno Sky will also support ENAV with its technical expertise in the development of new operational and technical services in the context of Virtual Centre. These experts will support prototype development and integration in preparation of validation exercises especially in a contingency situation for Virtual Centre to assure a business continuity of the system and to provide operational requirements of Civil and Military operations.

IDS AIRNAV

IDS AIRNAV SRL (IDS AIRNAV) is the company of the ENAV Group that serves the world of Air Traffic Management (ATM) and airports with Commercial Off-The-Shelf (COTS) solutions and software products aimed at supporting the transition from Aeronautical Information Services (AIS) to Aeronautical Information Management (AIM) in full compliancy with the ICAO and EUROCONTROL mandates for Aeronautical Data Quality (ADQ).

Developed in close partnership with its customers, and continually supported and updated to adapt to changing and more stringent requirements, IDS AIRNAV portfolio now comprises a comprehensive ADQ compliant solution for Aeronautical Information Management (AIM), which can cover the whole process from data collection to publication as well as a system for Air Traffic Flow Management (ATFM) and Collaborative Decision Making (CDM).

IDS AIRNAV network of services and support teams provide assistance for its solutions, consultancy and a wide range of professional services. These include ICAO recognized flight procedure design services along with ground-based validation, flyability evaluations, R&D activities, risk assessments and mitigation recommendations. Amongst other tailored services IDS AIRNAV can also provide communication, navigation and surveillance (CNS) performance evaluation, NAVAID siting analysis and electromagnetic interference evaluation, as well as terrain and obstacle acquisition and chart design.

IDS AIRNAV, an high tech integrated solutions services company, is now recognised as a leading solution provider to Air Navigation Service Providers, Airports Authorities, aviation agencies, Government and private entities that manage Air Traffic in both the civil and military markets.

Moreover, IDS AIRNAV is already significantly contributing to SESAR 2020 Programme as ENAV LTP by complementing ENAV activities and expertise in 4 W1 and 4 W2 Industrial Research projects and making available several industrial prototypes for ENAV validation activities.

Within this Project, IDS AIRNAV will continue acting as industrial partner of ENAV and will participate in the validation stream EXE1 Scenario with the availability of the Airspace Management Module for validation purposes so to assess the capability to improve airspace management processes by providing mutual visibility on civil and military environment, increasing mutual understanding and enabling a more efficient decision-making process. This module provides an interface to allow online airspace reservation, enable transparent coordination and maximise automation of routine tasks. Through a shared real-time airspace status display, situational awareness of all players is expected to be enhanced, and flight safety greatly improved.

NAIS

Established at the end of 2006, NEXTANT Applications & Innovative Solutions (NAIS) is an Italian, private- owned, ICT Company, classified as SME according to the European Commission classification (2003/361/EC). The company's mission is to develop and propose, to the proper market sectors, innovative applications and services based on ICT technologies and Satellite Navigation, EO & Communication assets.

NAIS' main expertise in the Space & Defence market domains plays a strategic role in the development of innovative application based on ICT and enabling satellite technologies. NAIS executes the whole Technology Transfer Process from R&D Projects to product industrialization and commercialization

NAIS is based in Rome, and its HQ hosts the following facilities: R&D centre, 2° level Helpdesk, Customer support team, product & service provisioning team. Its Quality System is certified ISO 9001:2008. It operates in the following business segments: Space & Defence, Transport/Maritime, Information & Communication Technology, Aeronautical.

Innovative applications and services are available in the field of Smart-mobility (solution for both citizens and tourists, transportation support and information), Emergency (mission management and resource planning), Cultural Heritage (safeguard, fruition and prevention), Maritime (search & rescue, mission management and access to harbour and docks), Defence (air defence systems radar), and Aeronautics (Air Traffic Management systems, conventional and unconventional 2D & 3D operational displays, flight

information systems and portable flight displays for VFR General Aviation aircraft), all based on Satellite technologies (Navigation (EGNOS/GALILEO), Communication, and Earth Observation), innovative HMI techniques based on Virtual and Augmented Reality techniques and Engineering / architectural aspects.
In addition, NAIS is already significantly participating in SESAR 2020 Programme as ENAV LTP and is supporting ENAV work in 5 W1 and 4 W2 Industrial Research projects, with special focus on KPA assessment.
NAIS is already working with ENAV on the Virtual Centre topic in the context of Solution 93 of W2. In line with that, NAIS, with its KPA and ICT expertise, will complement ENAV work in WP02 by providing support to the ENAV technical developments, validation activities and relevant KPA assessment.
Does the participant envisage the use of contributions in kind provided by third parties (Articles 11 and 12 of the General Model Grant Agreement) N
N/A
Does the participant envisage that part of the work is performed by International Partners (Article 14a of the General Model Grant Agreement)? N
N/A

4.2.6 (12) Linked to FRQ (FSP)

Objective
Does the participant plan to subcontract certain tasks (please note that core tasks of the project should not be sub-contracted) N
N/A
Does the participant envisage that part of its work is performed by linked third parties ¹³ Y
The affiliates / linked 3rd party to Frequentis AG, PDTS GmbH is contributing to this action. All Frequentis affiliates are integrated into the research and development process of Frequentis AG, hence its contribution is to be seen as a joint activity. PDTS GmbH (PDTS) located in Vienna develops complex IT-solutions and systems in the fields of chip cards, voice communication and networked data systems. PDTS already contributed to several SESAR 1 and S2020 wave 1 projects, especially where their high level of competence in relation to VoIP communication was required. For SESAR 2020 PDTS will contribute with its core competence around complex IT and VoIP solutions for the future communication infrastructure domain.
Does the participant envisage the use of contributions in kind provided by third parties (Articles 11 and 12 of the General Model Grant Agreement) N
N/A

¹³ A third party that is an affiliated entity or has a legal link to a participant implying a collaboration not limited to the action. (Article 14 of the Model Grant Agreement).

Does the participant envisage that part of the work is performed by International Partners (Article 14a of the General Model Grant Agreement)?	N
N/A	

4.2.7 (17) Linked to SKYGUIDE

Objective	
Does the participant plan to subcontract certain tasks (please note that core tasks of the project should not be sub-contracted)	N
N/A	
Does the participant envisage that part of its work is performed by linked third parties ¹⁴	Y
<p>In the framework of PJ.32, SKYGUIDE is willing to entrust to SKYSOFTATM for the update of the ground platform with the necessary functionalities to perform PJ.32 validations.</p> <p>SKYSOFT-ATM is a skyguide daughter company who also provides skyguide with the HMI and ATM Server within skyguide.</p> <p>SKYSOFT-ATM will adapt the CWP's used today in Geneva and Zürich OPS rooms to connect to cross vendor's ADSP's, one being Coflight Cloud Services, the other based on iTEC, using a maximum number of Virtual Centre Services.</p>	
Does the participant envisage the use of contributions in kind provided by third parties (Articles 11 and 12 of the General Model Grant Agreement)	N
N/A	
Does the participant envisage that part of the work is performed by International Partners (Article 14a of the General Model Grant Agreement)?	N
N/A	

4.2.8 (18) Linked to THALES AIR SYS

Objective	
Does the participant plan to subcontract certain tasks (please note that core tasks of the project should not be sub-contracted)	N
Thales Air Sys (Thales LAS France SAS) has a general policy to outsource a limited proportion of some of its non-critical activities. In accordance with this policy, Thales Air Sys intends to subcontract part of its	

¹⁴ A third party that is an affiliated entity or has a legal link to a participant implying a collaboration not limited to the action. (Article 14 of the Model Grant Agreement).

work in certain non-core activities of this project, typically related to technical specifications, low-level software design & coding, integration or verification tasks.

Thales Air Sys is not in a position to name its subcontractors for this project at this stage as, in accordance with the company's subcontracting and procurement policy, the selection of adequate subcontractors will be done in a timely manner through a competitive selection process

Does the participant envisage that part of its work is performed by linked third parties¹⁵ N

N/A

Does the participant envisage the use of contributions in kind provided by third parties (Articles 11 and 12 of the General Model Grant Agreement) N

N/A

Does the participant envisage that part of the work is performed by International Partners (Article 14a of the General Model Grant Agreement)? N

N/A

¹⁵ A third party that is an affiliated entity or has a legal link to a participant implying a collaboration not limited to the action. (Article 14 of the Model Grant Agreement).

5 Ethics and Security

5.1 Ethics

All participants of the PJ32-W3 VC project will conform to national and European legislation and regulations. In relation to this project, these include:

- The Charter of Fundamental Rights of the EU;
- The Directive 95/46/EC of the European Parliament and of the Council of 24 October 1995 on the protection of individuals with regard to the processing of personal data and on the free movement of such data;
- The Regulation (EC) No 45/2001 of the European Parliament and of the Council of 18 December 2000 ;
- The European General Data Protection Regulations (Regulation (EU) 2016/679) ;
- The EUROCONTROL Regulation on Personal Data Protection, approved by the Permanent Commission on 28.12.2006 and
- The EUROCONTROL Regulation on Agency ATM Data Policy and on ATM Data Protection and Public Access 18/12 on 05/06/2012.

During the project execution, WP04 will ensure compliance with ethics. This means that WP01, via its management board, will verify that all documents from the PJ32-W3 VC project are following European ethical rules and the ethical rules of the concerned country.

During project Kick-off Meeting, WP01 will conduct an information session in order to draw attention to, and inform partners of all relevant ethical issues.

In the following sub-section further explanation is given for the self-assessment presented in the Proposal Submission Forms “Ethics issue table”. This is to provide an overview about the potential ethical issues and handling relating to research activities in the PJ32-W3 VC project.

5.1.1 Humans

In the project experimental studies will be conducted to gain knowledge about human-machine interaction. For these experimental studies healthy adults (no vulnerable adults), mostly ATM Specialists or Professionals, will be recruited on a voluntary basis. Participants of these studies will be clearly informed of the research goals, the methodology of data protection and possible adverse events in a presentation of the research project and in interviews at the beginning of the study. According to the declaration of Helsinki, subjects are free to leave any test at any time without giving any reason and without raising any disadvantages – the project thereby complies with standard protocols surrounding a participant having the right to withdraw from the study. This will be ensured by a written agreement between the experimenter and the test subject (see questionnaire below used in S2020 programme)

Participant Agreement Form SESAR 2020 Validation/Demonstration activities

Full title of project/solution:

Full title of validation/demonstration activity and dates:

Name and contact details of project/solution leader:

**Please Initial
or
Tick Here**

I am aware of the main aspects of the Validation/Demonstration Plan for the above SESAR 2020 activity.	
I confirm that I have had the opportunity to ask questions.	
I understand that my participation is voluntary.	
I understand that my answers to any questionnaire related to human factors aspects (evaluation of workload, situational awareness, human machine interface usability...) will remain anonymous.	
Should I not wish to answer any particular question(s), I am free to decline.	
I give permission for members of the research team to have access to my anonymised responses. I understand that my name will not be linked with the research materials, and I will not be identified or identifiable in the outputs that result from the research without my agreement.	
I agree to take part in the above validation/demonstration activity.	

Name of Participant

Date

Signature

Name of Project/Solution Leader

Date

Signature

This form should be signed and dated by all parties after the participant receives a copy of the participant information sheet and any other written information provided to the participants. A copy of the signed and dated participant agreement form should be kept with the project's main documents which must be kept in a secure location.

Section: Humans	YES	NO	Information to be provided	Documents to be provided
Does your research involve human participants?	X		Confirmation about obtained Informed	

Section: Humans		YES	NO	Information to be provided	Documents to be provided
				consent of the participants.	
If YES:	Are they volunteers for social or human sciences research?		X		
	Are they persons unable to give informed consent (including children/minors)?		X		
	Are they vulnerable individuals or groups?		X		
	Are they children/minors?		X		
	Are they patients?		X		
	Are they healthy volunteers for medical studies		X	Note: The project will use healthy volunteers, but in the project no medical studies are foreseen.	
Does your research also involve physical interventions on the study participants?			X		

Details on the informed consent procedures for the participation of humans

This procedure is a two-step procedure (information phase, signature phase) no coincident on time that will start several months before the actual validation exercise starts.

During the recruitment process, candidate participants in the validation activities will be clearly informed of the research goals and the methodology for personal data protection by means of an information sheet. This will allow candidate participants to understand the nature of the exercise, enabling them to make an informed decision about their participation. Details on the content of the information sheet are given in the next section.

Prior to the exercise, the volunteering research participants will be asked to sign the informed consent form according to the template as given in the next section. The signature of all participants will ensure that they have fully understood that their personal data will be safely collected and processed in accordance with the national/local and European legislative framework, and that their participation remains voluntary even after the trials have started. All participants will receive a copy of their signed informed consent form for them to keep.

The Exercise Leader will be responsible for the custody of the signed informed consent forms in a secure location and will provide copies (via the project coordinator) to the SESAR JU upon request.

Templates of the informed consent forms and information sheet

The information sheet will contain the following kind of information:

- General Information to be included in each information sheet, regardless of the kind of validation exercise:

- A description of the project (summary of objectives and methodology).
- Purpose of the concerned validation exercise.
- The role of the volunteer participants within the trial.
- Use of interview techniques and questionnaires.
- Confidentiality aspects.
- Procedure and policy to share the results.
- How to withdraw from the activity.
- Personal Data Protection procedures including anonymization of data.
- Contact details of data protection officer (DPO)
- Contacts details of exercise leader
- Template of the informed consent sheet to be signed in a second step, if they decide to participate in the exercise.
- Examples of typical questions that will be asked during the interviews after each exercise (post-run questionnaires). These may change slightly according to the nature of the validation exercise.
- Example of typical on-line questionnaires that will be provided during an exercise run. It may change slightly according to the nature of the validation exercise.

Template for the informed consent form/participant agreement form:

The signature of this form will ensure that potential participants have fully understood the information and do not feel pressured or coerced into giving consent.

Participant Agreement Form SESAR 2020 Validation/Demonstration activities	
Full title of project/solution: Full title of validation/demonstration activity and dates: Name and contact details of exercise leader:	
Please Initial or Tick Here	
I am aware of the main aspects of the Validation/Demonstration Plan for the above SESAR 2020 activity.	
I confirm that I have had the opportunity to ask questions.	
I understand that my participation is entirely voluntary. I can refrain from participating in the trial at any time, without any penalty or prejudice.	
I understand that my answers to any questionnaire related to human factors aspects (evaluation of workload, situational awareness, human machine interface usability...) will remain anonymous.	

Should I not wish to answer any particular question(s), I am free to decline without any penalty or prejudice.	
I give permission for members of the research team to have access to my anonymised responses. I understand that my name will not be linked with the research materials, and I will not be identified or identifiable in the outputs that result from the research without my agreement. Any data that will be transferred will be anonymous.	
<p>I understand that my personal data (contact details and signed consent form) will be used only for the purpose of and in the context of the PJ.32-W3 validation exercise and will not be shared by any third party.</p> <p>I have the right to request to have my personal data deleted at any time by contacting the exercise lead or the Solution Leader.</p> <p>After the initial post-processing of the exercise, the mapping between the personal details of the research participants and their unique identifier will be destroyed, thus ensuring the anonymization of all data collected from the research participants during a validation exercise.</p> <p>I understand that retention period for all personal data related to the project is 5 years after end of the project. After this 5-year period, all personal data concerning the volunteer participants will be destroyed.</p>	
<p>Some picture/video could be taken during the validation and may be published in the project website for communication and dissemination purposes. I give authorization to use my image only for these purposes.</p> <p>NB: This approval is optional and does not prevent participation to the validation exercise.</p>	
I will not receive any compensation or incentive for having taken part in this validation exercise.	
I agree to take part in the above validation/demonstration activity.	

Name of Participant

Date

Signature

Name of Exercise Leader

Date

Signature

This form should be signed and dated by all parties after the participant has received a copy of the participant information sheet and any other written information provided to the participants. The original copies of the signed and dated participant agreement form are kept with the Exercise Leader, and must be kept in a secure location. The participant will receive a copy, and they will also be made available to the SESAR JU (via the project lead beneficiary) if requested.

5.1.2 Protection of personal data

Commitment Beneficiaries

All active beneficiaries, their LTP's and in kind contributors of PJ.32-W3 have confirmed compliance with the General Data Protection Regulation (GDPR (EU) 2016/679) and with their respective national legal framework(s) or the EUROCONTROL Regulation on Personal Data Protection.

Data Protection Officer Beneficiaries

All beneficiaries have appointed a DPO and will make this information available to all other subjects involved in the research at the beginning of the project. This information will be provided in the PMP.

The EUROCONTROL DPO is Hans Holderbach (hans.holderbach@eurocontrol.int)

Data Minimisation Principle

In order to limit the data for processing when it is relevant and strictly needed for the purposes of the research project, all active beneficiaries and in kind contributors of PJ.32-W3 have committed to comply to the hereafter described principles.

The following personal data will be collected and processed by the Exercise Leader for each validation exercise:

Name and surname, Type of ATC-licenses, corporate email address and corporate telephone number.

This data will solely be used for the purpose and in the context of the PJ32 validation exercises and will not be shared with any other party. The Exercise Leaders will record this information into a document to which only they have access. They will assign a unique identifier (e.g. participant John Smith has number 10) to each individual participant. This unique number will be used for all the information collected during the validation exercises execution, i.e. the on-line questionnaires during the exercise runs, post-run questionnaires and feedback given during de-briefing sessions and interviews with individual participants. The information collected during the validation exercise will be kept to the strict minimum of relevance for the exercise.

After the initial post-processing of the collected data, the mapping between the personal details of the research participants and their unique identifier will be destroyed, thus ensuring the anonymization of all data collected from the research participants during a validation exercise.

Only this anonymized data will be used in the validation reports and any other documents of the project. In particular, only anonymized data will be transferred between beneficiaries.

5.1.3 Technical and Organisational Measures to preserve rights of participants

In advance and during the study personal data will be acquired. This data will be protected regarding article 8 – protection of personal data – of the European Charter of Fundamental Rights and the Treaty on the Functioning of the European Union. Furthermore, a strategy and methodology will be developed and implemented to ensure the integrity and security of data during the project.

During the recruitment of subjects for the study, some necessary personal information relevant to the study (e.g. experience of work, age, gender) will be stored electronically in computers on a hard drive. This data will not be stored in a cloud solution or portable hard drives or USB sticks. This data will be password protected and only accessible to authorised researchers.

During the study performance only necessary data will be acquired and stored electronically. This data will be password protected and only accessible to authorised researchers. All data will be stored in a strict anonymous

way. Subjects are allocated a unique subject number instead of their first- or surname. The subject number will be assigned randomly at the beginning of the study. This procedure ensures that it will not be possible to somehow associate the data to individual persons. Thus, the data will not be used to judge or assess the professional capabilities of the recruited subjects. The data is purely a means to investigate general cognitive processes.

As also explained under **Data Minimisation Principle**, after initial post-processing of the collected data, the mapping between the personal details of the research participants and their unique identifier will be destroyed. As such it will not be possible anymore to make the link between the data of research participants of a validation exercise and the identity of the participant.

The names of the research participants and their non-sensitive, corporate contact details will be kept for the retention period of 5 years after the end of the project, and will be destroyed right afterwards.

As already described under the Human section, the use of all Images and videos in which the participants appear requires the approval of those participants beforehand. This approval is part of the informed consent signature process before any photo or video recording session.

The Exercise Leaders will take appropriate technical and organisational measures to ensure that the personal data will be stored in a secure place with a controlled access, thus preventing unauthorised access and protecting the personal data against any potential data protection breaches. In this task, they will be supported by the Data Protection Officers of the respective beneficiary organisations in order to ensure that the treatment of personal data will be done in accordance with EU regulation 2016/679.

Section: Protection of Personal Data	YES	NO	Information to be provided	Documents to be provided
Does your research involve personal data collection and/or processing?	X			Free and fully Informed consent sheets (see section 2) of the persons concerned (data subjects) will be obtained
If YES: Does it involve the collection or processing of sensitive personal data (e.g. health, sexual lifestyle, ethnicity, political opinion, religious or philosophical conviction)?		X		
Does it involve processing of genetic information?		X		
Does it involve tracking or observation of participants (e.g. surveillance or localization data, and WAN data such as IP address, cookies, etc.)?		X		
Does your research involve further processing of previously collected personal data (secondary use) (including use of pre-existing data sets or sources, merging existing data sets, sharing data with non-EU member states)?		X		

5.1.4 General

1. The project PJ32-W3-VC has been analysed for possible ethics issues and it has been estimated that this project is similar in nature and categories of stakeholders as other SESAR Wave 2 validation projects. Therefore EUROCONTROL, as Project Coordinator, can use its experience of managing similar validation projects with the same Ethics requirements to correctly handle the Ethics issues in this project, with the support of the in-house Data protection Officer.

2. Implementation of the Ethics Processes

The Project Manager, Work Package leaders and their alternates will ensure that all ethics processes are well-known and understood by the project participants and that they will be applied by the persons in charge of the validation activities, the Exercise Leaders.

Therefore, at the start of each validation exercise, the Project Manager will debrief and/or remind the Exercise Leader of all the Ethics requirements that are in place and what the procedures are to be respected with regard to the participant identification, to the recruitment procedure, the consent procedure, the data minimisation principle, all data protection measures and rules.

For each validation exercise, the Exercise Leader will ensure the correct execution of the ethics processes.

3. Reporting on Ethics Issues

At the Project Management Board (PMB) meetings, there will be systematic reporting on the Ethics Requirements and any possible issue will be discussed. The PMB is invited to monitor all ethics aspects and to supervise compliance to the ethics standards of H2020.

In case new ethics issues will be raised during the course of the project execution, they will be communicated to the SJU and the European Commission. They can be addressed at the next PMB or immediately in case of urgency via ad-hoc communication.

4. Analysis of possible abuse of research data

Given the type of research, we have assessed that there is no potential for misuse of the data gathered during our research. Therefore no mitigation action is required.

In addition, the research findings will be reported in the “solution data-packs” which are SESAR 2020 deliverables defined in the grant agreement. The dissemination level for all “solution data packs” of PJ.32-W3 has been defined as “Public” hence no risk for a potential misuse has been identified.

Potential misuse of any meta-results or research prototypes / platforms by unauthorised personnel will be mitigated by applying appropriate access control procedures to premises that host research platforms and/or prototypes as well as appropriate cybersecurity measures.

5.2 Security

Section: Security	YES	NO	Information to be provided	Documents to be provided
Are activities planned or results expected raising security issues?		X		
Are ‘EU-classified information’ as background or results foreseen?		X		

End of Document

ESTIMATED BUDGET FOR THE ACTION

	Estimated eligible ¹ costs (per budget category)										JU contribution			Additional information		
	A. Direct personnel costs				B. Direct costs of subcontracting	<i>[C. Direct costs of fin. support]</i>	D. Other direct costs		E. Indirect costs ²	Total costs	Reimbursement rate %	Maximum JU contribution ³	Maximum grant amount ⁴	Information for indirect costs	Information for auditors	Other information:
	A.1 Employees (or equivalent)		A.4 SME owners without salary				D.1 Travel	D.5 Costs of internally invoiced goods and services						Estimated costs of in-kind contributions not used on premises	Declaration of costs under Point D.4	Estimated costs of beneficiaries/ linked third parties not receiving JU funding/ international partners
A.2 Natural persons under direct contract		A.5 Beneficiaries that are natural persons without salary		D.2 Equipment												
A.3 Seconded persons				D.3 Other goods and services												
	<i>[A.6 Personnel for providing access to research infrastructure]</i>						<i>[D.4 Costs of large research infrastructure]</i>									
Form of costs ⁶	Actual	Unit ⁷	Unit ⁸		Actual	Actual	Actual	Unit ⁹	Flat-rate ¹⁰							
									25%							
	a	Total b	No hours	Total c	d	<i>[e]</i>	f	Total g	h = 0,25 x (a +b+c+f+g + <i>[i1]</i> ¹³ + <i>[i2]</i> ¹³ -n)	j = a+b+c+d + <i>[e]</i> / <i>+f+g+h +[i1]</i> / <i>[i2]</i>	k	l	m	n	Yes/No	
1. EUROCONTROL ¹⁴	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	7 950 830.00
2. ON (B4)	60 000.00	0.00	0.00	0.00	0.00	0.00	9 000.00	0.00	17 250.00	86 250.00	70.00	60 375.00	60 375.00	0.00	No	n/a
3. PANSa (B4)	76 805.00	0.00	0.00	0.00	0.00	0.00	8 795.00	0.00	21 400.00	107 000.00	70.00	74 900.00	74 900.00	0.00	No	n/a
4. ACG/ COOPANS	75 336.00	0.00	0.00	0.00	17 133.00	0.00	10 958.00	0.00	21 573.50	125 000.50	70.00	87 500.35	87 500.00	0.00	No	n/a
5. CCL/COOPANS	87 310.00	0.00	0.00	0.00	0.00	0.00	12 690.00	0.00	25 000.00	125 000.00	70.00	87 500.00	87 500.00	0.00	No	n/a
6. LFV/COOPANS	146 560.00	0.00	0.00	0.00	0.00	0.00	22 011.20	0.00	42 142.80	210 714.00	70.00	147 499.80	147 499.80	0.00	No	n/a
7. NAVIAIR/ COOPANS	88 000.00	0.00	0.00	0.00	0.00	0.00	12 000.00	0.00	25 000.00	125 000.00	70.00	87 500.00	87 500.00	0.00	No	n/a
8. DFS	77 000.00	0.00	0.00	0.00	0.00	0.00	19 000.00	0.00	24 000.00	120 000.00	70.00	84 000.00	84 000.00	0.00	No	n/a
9. DSNA	545 440.00	0.00	0.00	0.00	166 667.00	0.00	0.00	0.00	136 360.00	848 467.00	70.00	593 926.90	593 926.90	0.00	No	n/a
10. ENAIRE	119 850.00	0.00	0.00	0.00	5 760.00	0.00	3 000.00	0.00	30 712.50	159 322.50	70.00	111 525.75	111 525.75	0.00	No	n/a
- CRIDA	179 200.00	0.00	0.00	0.00	0.00	0.00	12 544.00	0.00	47 936.00	239 680.00	70.00	167 776.00	167 776.00	0.00	No	n/a
Total beneficiary	299 050.00	0.00			5 760.00	0.00	15 544.00	0.00	78 648.50	399 002.50		279 301.75	279 301.75	n/a	n/a	0.00
11. ENAV	122 400.00	0.00	0.00	0.00	0.00	0.00	13 600.00	0.00	34 000.00	170 000.00	70.00	119 000.00	119 000.00	0.00	No	n/a
- TECHNO SKY	63 000.00	0.00	0.00	0.00	0.00	0.00	9 000.00	0.00	18 000.00	90 000.00	70.00	63 000.00	63 000.00	0.00	No	n/a
- IDS AIRNAV	112 000.00	0.00	0.00	0.00	0.00	0.00	8 000.00	0.00	30 000.00	150 000.00	70.00	105 000.00	105 000.00	0.00	No	n/a
- NAIS	66 000.00	0.00	0.00	0.00	0.00	0.00	6 000.00	0.00	18 000.00	90 000.00	70.00	63 000.00	63 000.00	0.00	No	n/a
Total beneficiary	363 400.00	0.00	0.00	0.00	0.00	0.00	36 600.00	0.00	100 000.00	500 000.00		350 000.00	350 000.00	n/a	n/a	0.00
12. FRQ (FSP)	321 857.40	0.00	0.00	0.00	0.00	0.00	21 000.00	0.00	85 714.35	428 571.75	70.00	300 000.23	300 000.23	0.00	No	n/a
- PDTS	228 571.60	0.00	0.00	0.00	0.00	0.00	0.00	0.00	57 142.90	285 714.50	70.00	200 000.15	200 000.15	0.00	No	n/a
Total beneficiary	550 429.00	0.00			0.00	0.00	21 000.00	0.00	142 857.25	714 286.25		500 000.38	500 000.38	n/a	n/a	0.00
13. HC (FSP) ¹⁴	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	0.00
14. INDRA	194 506.00	0.00	0.00	0.00	0.00	0.00	7 780.00	0.00	50 571.50	252 857.50	70.00	177 000.25	177 000.00	0.00	No	n/a
15. LDO	392 000.00	0.00	0.00	0.00	0.00	0.00	19 500.00	0.00	102 875.00	514 375.00	70.00	360 062.50	360 062.50	0.00	No	n/a
16. SINTEF (NATMIG)	0.00	204 572.00	0.00	0.00	0.00	0.00	24 000.00	0.00	57 143.00	285 715.00	70.00	200 000.50	200 000.00	0.00	No	n/a
17. SKYGUIDE	400 000.00	0.00	0.00	0.00	0.00	0.00	80 000.00	0.00	120 000.00	600 000.00	70.00	420 000.00	420 000.00	0.00	No	n/a
- SKYSOFT	298 571.20	0.00	0.00	0.00	0.00	0.00	10 000.00	0.00	77 142.80	385 714.00	70.00	269 999.80	269 999.80	0.00	No	n/a
Total beneficiary	698 571.20	0.00			0.00	0.00	90 000.00	0.00	197 142.80	985 714.00		689 999.80	689 999.80	n/a	n/a	0.00
18. THALES AIR SYS	1 937 142.00	0.00	0.00	0.00	100 000.00	0.00	40 000.00	0.00	494 285.50	2 571 427.50	70.00	1 799 999.25	1 799 999.25	0.00	No	n/a
19. NATS ¹⁴	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	0.00
20. ANS CR (B4) ¹⁴	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	0.00

ESTIMATED BUDGET FOR THE ACTION

	Estimated eligible ¹ costs (per budget category)										JU contribution			Additional information		
	A. Direct personnel costs				B. Direct costs of subcontracting	[C. Direct costs of fin. support]	D. Other direct costs		E. Indirect costs ²	Total costs	Reimbursement rate %	Maximum JU contribution ³	Maximum grant amount ⁴	Information for indirect costs	Information for auditors	Other information:
	A.1 Employees (or equivalent)		A.4 SME owners without salary				D.1 Travel	D.5 Costs of internally invoiced goods and services						Estimated costs of in-kind contributions not used on premises	Declaration of costs under Point D.4	Estimated costs of beneficiaries/ linked third parties not receiving JU funding/ international partners
A.2 Natural persons under direct contract		A.5 Beneficiaries that are natural persons without salary		D.2 Equipment												
A.3 Seconded persons				D.3 Other goods and services												
[A.6 Personnel for providing access to research infrastructure]				[D.4 Costs of large research infrastructure]												
Form of costs ⁶	Actual	Unit ⁷	Unit ⁸				Actual									
									25%							
	a	Total b	No hours	Total c	d	[e]	f	Total g	h = 0,25 x (a +b+c+f+g +[i1] ¹³ + [i2] ¹³ -n)	j = a+b+c+d +[e]/+f+g+h +[i1]/+[i2]	k	l	m	n	Yes/No	
21. LPS SR (B4) ¹⁴	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	0.00
22. IAA/ COOPANS ¹⁴	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	0.00
23. ATOS (FSP) ¹⁴	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	0.00
24. AIRTEL (NATMIG) ¹⁴	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	0.00
25. SAAB (NATMIG) ¹⁴	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	0.00
Total consortium	5 591 549.20	204 572.00		0.00	289 560.00	0.00	348 878.20	0.00	1 536 249.85	7 970 809.25		5 579 566.48	5 579 565.38			7 950 830.00

¹ See Article 6 for the eligibility conditions.

² Indirect costs already covered by an operating grant (received under any EU or Euratom funding programme; see Article 6.5.(b)) are ineligible under the GA. Therefore, a beneficiary/linked third party that receives an operating grant during the action's duration cannot declare indirect costs for the year(s)/reporting period(s) covered by the operating grant, unless it can demonstrate that the operating grant does not cover any costs of the action (see Article 6.2.E).

³ This is the theoretical amount of JU contribution that the system calculates automatically (by multiplying all the budgeted costs by the reimbursement rate). This theoretical amount is capped by the 'maximum grant amount' (that the JU decided to grant for the action) (see Article 5.1).

⁴ The 'maximum grant amount' is the maximum grant amount decided by the JU. It normally corresponds to the requested grant, but may be lower.

⁵ Depending on its type, this specific cost category will or will not cover indirect costs. Specific unit costs that include indirect costs are: costs for energy efficiency measures in buildings, access costs for providing trans-national access to research infrastructure and costs for clinical studies.

⁶ See Article 5 for the forms of costs.

⁷ Unit : hours worked on the action; costs per unit (hourly rate) : calculated according to the beneficiary's usual accounting practice.

⁸ See Annex 2a 'Additional information on the estimated budget' for the details (costs per hour (hourly rate)).

⁹ Unit and costs per unit : calculated according to the beneficiary's usual accounting practices.

¹⁰ Flat rate : 25% of eligible direct costs, from which are excluded: direct costs of subcontracting, costs of in-kind contributions not used on premises, direct costs of financial support, and unit costs declared under budget category F if they include indirect costs (see Article 6.2.E).

¹¹ See Annex 2a 'Additional information on the estimated budget' for the details (units, costs per unit).

¹² See Annex 2a 'Additional information on the estimated budget' for the details (units, costs per unit, estimated number of units, etc).

¹³ Only specific unit costs that do not include indirect costs.

¹⁴ See Article 9 for beneficiaries not receiving JU funding.

¹⁵ Only for linked third parties that receive JU funding.

ANNEX 2a

ADDITIONAL INFORMATION ON THE ESTIMATED BUDGET

- Instructions and footnotes in blue will not appear in the text generated by the IT system (since they are internal instructions only).
- For options [in square brackets]: the applicable option will be chosen by the IT system. Options not chosen will automatically not appear.
- For fields in [grey in square brackets] (even if they are part of an option as specified in the previous item): IT system will enter the appropriate data.

⚠ Transitory period: Until SyGMA fully supports Annex 2a, you must prepare it manually (using this template by choosing and deleting the options/entering the appropriate data).
For the 'unit cost tables': either fill them out manually or use currently existing tables from Annex 1 or the proposal.
The document can then be uploaded in SyGMA and attached to the grant agreement.

Unit cost for SME owners/natural beneficiaries without salary

1. Costs for a [SME owner]/[beneficiary that is a natural person] not receiving a salary

Units: hours worked on the action

Amount per unit ('hourly rate'): calculated according to the following formula:

{the monthly living allowance for researchers in MSCA-IF actions / 143 hours}
multiplied by
{country-specific correction coefficient of the country where the beneficiary is established}

The monthly living allowance and the country-specific correction coefficients are set out in the Work Programme (section 3 MSCA) in force at the time of the call:

- for calls *before* Work Programme 2018-2020:
 - for the monthly living allowance: **EUR 4 650**
 - for the country-specific correction coefficients: see Work Programme 2014-2015 and Work Programme 2016-2017 (available on the [Participant Portal Reference Documents](#) page)
- for calls *under* Work Programme 2018-2020:
 - for the monthly living allowance: **EUR 4 880**
 - for the country-specific correction coefficients: see Work Programme 2018-2020 (available on the [Participant Portal Reference Documents](#) page)

[additional OPTION for beneficiaries/linked third parties that have opted to use the unit cost (in the proposal/with an amendment): For the following beneficiaries/linked third parties, the amounts per unit (hourly rate) are fixed as follows:

- beneficiary/linked third party [short name]: EUR [insert amount]
 - beneficiary/linked third party [short name]: EUR [insert amount]
- [same for other beneficiaries/linked third parties, if necessary]]

Estimated number of units: see Annex 2

Energy efficiency measures unit cost

2. Costs for energy efficiency measures in buildings

Unit: m² of eligible ‘conditioned’ (i.e. built or refurbished) floor area

Amount per unit*: see (for each beneficiary/linked third party and BEST table) the ‘unit cost table’ attached

* Amount calculated as follows:
{EUR 0.1 x estimated total kWh saved per m² per year x 10}

Estimated number of units: see (for each beneficiary/linked third party and BEST table) the ‘unit cost table’ attached

Unit cost table (energy efficiency measures unit cost)¹

Short name beneficiary/linked third party	BEST No	Amount per unit	Estimated No of units	Total unit cost (cost per unit x estimated no of units)

¹ Data from the ‘building energy specification table (BEST)’ that is part of the proposal and Annex 1.

Research infrastructure unit cost

3. Access costs for providing trans-national access to research infrastructure

Units²: see (for each access provider and installation) the ‘unit cost table’ attached

Amount per unit^{*}: see (for each access provider and installation) the ‘unit cost table’ attached

* Amount calculated as follows:

$$\frac{\text{average annual total access cost to the installation (over past two years)}^3}{\text{average annual total quantity of access to the installation (over past two years)}^4}$$

Estimated number of units: see (for each access provider and installation) the ‘unit cost table’ attached

Unit cost table (access to research infrastructure unit cost)⁵

Short name access provider	Short name infrastru cture	Installation		Unit of access	Amount per unit	Estimated No of units	Total unit cost (cost per unit x estimated no of units)
		No	Short name				

Clinical studies unit cost

4. Costs for clinical studies

Units: patients/subjects that participate in the clinical study

Amount per unit^{*}: see (for each sequence (if any), clinical study and beneficiary/linked third party) the ‘unit cost table’ attached

* Amount calculated, for the cost components of each task, as follows:

For **personnel costs**:

For personnel costs of doctors: ‘average hourly cost for doctors’, i.e.:

{certified or auditable total personnel costs for doctors for year N-1

{ 1720 * number of full-time-equivalent for doctors for year N-1 }

multiplied by

estimated number of hours to be worked by doctors for the task (per participant)}

For personnel costs of other medical personnel: ‘average hourly cost for other medical personnel’, i.e.:

{certified or auditable total personnel costs for other medical personnel for year N-1

{ 1720 * number of full-time-equivalent for other medical personnel for year N-1 }

² Unit of access (e.g. beam hours, weeks of access, sample analysis) fixed by the access provider in proposal.

³ In exceptional and duly justified cases, the Commission/Agency may agree to a different reference period.

⁴ In exceptional and duly justified cases, the Commission/Agency may agree to a different reference period.

⁵ Data from the ‘table on estimated costs/quantity of access to be provided’ that is part of the proposal and Annex 1.

H2020 Templates: Annex 2a (Additional information on the estimated budget)

multiplied by
estimated number of hours to be worked by other medical personnel for the task (per participant)}

For personnel costs of technical personnel: 'average hourly cost for technical personnel', i.e.:

$$\frac{\{\text{certified or auditable total personnel costs for technical personnel for year N-1}\}}{\{1720 * \text{number of full-time-equivalent for technical personnel for year N-1}\}}$$

multiplied by
estimated number of hours to be worked by technical personnel for the task (per participant)}

'total personnel costs' means actual salaries + actual social security contributions + actual taxes and other costs included in the remuneration, provided they arise from national law or the employment contract/equivalent appointing act

For **consumables**:

For each cost item: 'average price of the consumable', i.e.:

$$\frac{\{\{\text{certified or auditable total costs of purchase of the consumable in year N-1}\}}{\text{total number of items purchased in year N-1}\}}$$

multiplied by
estimated number of items to be used for the task (per participant)}

'total costs of purchase of the consumable' means total value of the supply contracts (including related duties, taxes and charges such as non-deductible VAT) concluded by the beneficiary for the consumable delivered in year N-1, provided the contracts were awarded according to the principle of best value- for-money and without any conflict of interests

For **medical equipment**:

For each cost item: 'average cost of depreciation and directly related services per unit of use', i.e.:

$$\frac{\{\{\text{certified or auditable total depreciation costs in year N-1} + \text{certified or auditable total costs of purchase of services in year N-1 for the category of equipment concerned}\}}{\text{total capacity in year N-1}}$$

multiplied by
estimated number of units of use of the equipment for the task (per participant)}

'total depreciation costs' means total depreciation allowances as recorded in the beneficiary's accounts of year N-1 for the category of equipment concerned, provided the equipment was purchased according to the principle of best value for money and without any conflict of interests + total costs of renting or leasing contracts (including related duties, taxes and charges such as non-deductible VAT) in year N-1 for the category of equipment concerned, provided they do not exceed the depreciation costs of similar equipment and do not include finance fees

For **services**:

For each cost item: 'average cost of the service per study participant', i.e.:

$$\frac{\{\text{certified or auditable total costs of purchase of the service in year N-1}\}}{\text{total number of patients or subjects included in the clinical studies for which the service was delivered in year N-1}\}}$$

'total costs of purchase of the service' means total value of the contracts concluded by the beneficiary (including related duties, taxes and charges such as non-deductible VAT) for the specific service delivered in year N-1 for the conduct of clinical studies, provided the contracts were awarded according to the principle of best value for money and without any conflict of interests

For **indirect costs**:

$$\{\{\{\text{cost component 'personnel costs'} + \text{cost component 'consumables'} + \text{cost component 'medical equipment'}\}\}$$

minus

$$\{\text{costs of in-kind contributions provided by third parties which are not used on the beneficiary's premises} + \text{costs of providing financial support to third parties (if any)}\}$$

multiplied by

$$25\% \}$$

H2020 Templates: Annex 2a (Additional information on the estimated budget)

The estimation of the resources to be used must be done on the basis of the study protocol and must be the same for all beneficiaries/linked third parties/third parties involved.

The year N-1 to be used is the last closed financial year at the time of submission of the grant application.

Estimated number of units: see (for each clinical study and beneficiary/linked third party) the 'unit cost table' attached

Unit cost table: clinical studies unit cost⁶

Task, Direct cost categories	Resource per patient	Costs year N-1 Beneficiary 1 [short name]	Costs year N-1 Linked third party 1a [short name]	Costs year N-1 Beneficiary 2 [short name]	Costs year N-1 Linked third party 2a [short name]	Costs year N-1 Third party giving in-kind contributions 1 [short name]
Sequence No. 1						
Task No. 1 Blood sample						
(a) Personnel costs:						
- Doctors	n/a					
- Other Medical Personnel	Phlebotomy (nurse), 10 minutes	8,33 EUR	11,59 EUR	10,30 EUR	11,00 EUR	9,49 EUR
- Technical Personnel	Sample Processing (lab technician), 15 minutes	9,51 EUR	15,68 EUR	14,60 EUR	15,23 EUR	10,78 EUR
(b) Costs of consumables:	Syringe	XX EUR	XX EUR	XX EUR	XX EUR	XX EUR
	Cannula	XX EUR	XX EUR	XX EUR	XX EUR	XX EUR
	Blood container	XX EUR	XX EUR	XX EUR	XX EUR	XX EUR
(c) Costs of medical equipment:	Use of -80° deep freezer, 60 days	XX EUR	XX EUR	XX EUR	XX EUR	XX EUR
	Use of centrifuge, 15 minutes	XX EUR	XX EUR	XX EUR	XX EUR	XX EUR
(d) Costs of services	Cleaning of XXX	XX EUR	XX EUR	XX EUR	XX EUR	XX EUR
(e) Indirect costs (25% flat-rate)		XX EUR	XX EUR	XX EUR	XX EUR	XX EUR
Task No. 2						
...						
Amount per unit (unit cost sequence 1):		XX EUR	XX EUR	XX EUR	XX EUR	XX EUR
Sequence No. 2						
Task No. 1						

⁶ Same table as in proposal and Annex 1.

H2020 Templates: Annex 2a (Additional information on the estimated budget)

XXX						
(a) Personnel costs:						
- Doctors	XXX	XX EUR	XX EUR	XX EUR	XX EUR	XX EUR
- Other Medical Personnel	XXX	XX EUR	XX EUR	XX EUR	XX EUR	XX EUR
- Technical Personnel	XXX	XX EUR	XX EUR	XX EUR	XX EUR	XX EUR
(b) Costs of consumables:	XXX	XX EUR	XX EUR	XX EUR	XX EUR	XX EUR
	XXX	XX EUR	XX EUR	XX EUR	XX EUR	XX EUR
	XXX	XX EUR	XX EUR	XX EUR	XX EUR	XX EUR
(c) Costs of medical equipment:	XXX	XX EUR	XX EUR	XX EUR	XX EUR	XX EUR
	XXX	XX EUR	XX EUR	XX EUR	XX EUR	XX EUR
(d) Costs of services	XXX	XX EUR	XX EUR	XX EUR	XX EUR	XX EUR
(e) Indirect costs (25% flat-rate)		XX EUR	XX EUR	XX EUR	XX EUR	XX EUR
Task No. 2						
...						
Amount per unit (unit cost sequence 2):		XX EUR	XX EUR	XX EUR	XX EUR	XX EUR
...						
Amount per unit (unit cost entire study):		XX EUR	XX EUR	XX EUR	XX EUR	XX EUR

ANNEX 3

ACCESSION FORM FOR BENEFICIARIES

VALSTYBES IMONE ORO NAVIGACIJA (ON (B4)), established in BALIO KARVELIO G. 25, VILNIUS LT-02184, Lithuania, VAT number: LT100604610, ('the beneficiary'), represented for the purpose of signing this Accession Form by the undersigned,

hereby agrees

to become beneficiary No ('2')

in Grant Agreement No 101017587 ('the Agreement')

between EUROCONTROL - EUROPEAN ORGANISATION FOR THE SAFETY OF AIR NAVIGATION **and** the Single European Sky ATM Research Joint Undertaking ('the JU'),

for the action entitled 'Virtual Centre (PJ32-W3 VC)'.

and mandates

the coordinator to submit and sign in its name and on its behalf any **amendments** to the Agreement, in accordance with Article 55.

By signing this Accession Form, the beneficiary accepts the grant and agrees to implement it in accordance with the Agreement, with all the obligations and conditions it sets out.

SIGNATURE

For the beneficiary

ANNEX 3

ACCESSION FORM FOR BENEFICIARIES

POLSKA AGENCJA ZEGLUGI POWIETRZNEJ (PANSa (B4)), established in UL. WIEZOWA 8, WARSZAWA 02 147, Poland, VAT number: PL5222838321, ('the beneficiary'), represented for the purpose of signing this Accession Form by the undersigned,

hereby agrees

to become beneficiary No ('3')

in Grant Agreement No 101017587 ('the Agreement')

between EUROCONTROL - EUROPEAN ORGANISATION FOR THE SAFETY OF AIR NAVIGATION **and** the Single European Sky ATM Research Joint Undertaking ('the JU'),

for the action entitled 'Virtual Centre (PJ32-W3 VC)'.

and mandates

the coordinator to submit and sign in its name and on its behalf any **amendments** to the Agreement, in accordance with Article 55.

By signing this Accession Form, the beneficiary accepts the grant and agrees to implement it in accordance with the Agreement, with all the obligations and conditions it sets out.

SIGNATURE

For the beneficiary

ANNEX 3

ACCESSION FORM FOR BENEFICIARIES

AUSTRO CONTROL OSTERREICHISCHE GESELLSCHAFT FUR ZIVILLUFTFAHRT MBH (ACG/COOPANS), established in WAGRAMER STRASSE 19, WIEN 1220, Austria, VAT number: ATU37259408, ('the beneficiary'), represented for the purpose of signing this Accession Form by the undersigned,

hereby agrees

to become beneficiary No ('4')

in Grant Agreement No 101017587 ('the Agreement')

between EUROCONTROL - EUROPEAN ORGANISATION FOR THE SAFETY OF AIR NAVIGATION **and** the Single European Sky ATM Research Joint Undertaking ('the JU'),

for the action entitled 'Virtual Centre (PJ32-W3 VC)'.

and mandates

the coordinator to submit and sign in its name and on its behalf any **amendments** to the Agreement, in accordance with Article 55.

By signing this Accession Form, the beneficiary accepts the grant and agrees to implement it in accordance with the Agreement, with all the obligations and conditions it sets out.

SIGNATURE

For the beneficiary

ANNEX 3

ACCESSION FORM FOR BENEFICIARIES

CROATIA CONTROL, CROATIAN AIR NAVIGATION SERVICES LTD (CCL/COOPANS), established in RUDOLFA FIZIRA 2, VELIKA GORICA 10410, Croatia, VAT number: HR33052761319, ('the beneficiary'), represented for the purpose of signing this Accession Form by the undersigned,

hereby agrees

to become beneficiary No ('5')

in Grant Agreement No 101017587 ('the Agreement')

between EUROCONTROL - EUROPEAN ORGANISATION FOR THE SAFETY OF AIR NAVIGATION **and** the Single European Sky ATM Research Joint Undertaking ('the JU'),

for the action entitled 'Virtual Centre (PJ32-W3 VC)'.

and mandates

the coordinator to submit and sign in its name and on its behalf any **amendments** to the Agreement, in accordance with Article 55.

By signing this Accession Form, the beneficiary accepts the grant and agrees to implement it in accordance with the Agreement, with all the obligations and conditions it sets out.

SIGNATURE

For the beneficiary

ANNEX 3

ACCESSION FORM FOR BENEFICIARIES

LUFTFARTSVERKET (LFV/COOPANS), established in HOSPITALSGATAN 30, NORRKOPING 602 27, Sweden, VAT number: SE202100079501, ('the beneficiary'), represented for the purpose of signing this Accession Form by the undersigned,

hereby agrees

to become beneficiary No ('6')

in Grant Agreement No 101017587 ('the Agreement')

between EUROCONTROL - EUROPEAN ORGANISATION FOR THE SAFETY OF AIR NAVIGATION **and** the Single European Sky ATM Research Joint Undertaking ('the JU'),

for the action entitled 'Virtual Centre (PJ32-W3 VC)'.

and mandates

the coordinator to submit and sign in its name and on its behalf any **amendments** to the Agreement, in accordance with Article 55.

By signing this Accession Form, the beneficiary accepts the grant and agrees to implement it in accordance with the Agreement, with all the obligations and conditions it sets out.

SIGNATURE

For the beneficiary

ANNEX 3

ACCESSION FORM FOR BENEFICIARIES

NAVIAIR (NAVIAIR/COOPANS), established in NAVIAIR ALLE 1, KASTRUP 2770, Denmark, VAT number: DK26059763, ('the beneficiary'), represented for the purpose of signing this Accession Form by the undersigned,

hereby agrees

to become beneficiary No ('7')

in Grant Agreement No 101017587 ('the Agreement')

between EUROCONTROL - EUROPEAN ORGANISATION FOR THE SAFETY OF AIR NAVIGATION **and** the Single European Sky ATM Research Joint Undertaking ('the JU'),

for the action entitled 'Virtual Centre (PJ32-W3 VC)'.

and mandates

the coordinator to submit and sign in its name and on its behalf any **amendments** to the Agreement, in accordance with Article 55.

By signing this Accession Form, the beneficiary accepts the grant and agrees to implement it in accordance with the Agreement, with all the obligations and conditions it sets out.

SIGNATURE

For the beneficiary

ANNEX 3

ACCESSION FORM FOR BENEFICIARIES

DFS DEUTSCHE FLUGSICHERUNG GMBH (DFS), established in AM DFS CAMPUS 10, LANGEN 63225, Germany, VAT number: DE114110232, ('the beneficiary'), represented for the purpose of signing this Accession Form by the undersigned,

hereby agrees

to become beneficiary No ('8')

in Grant Agreement No 101017587 ('the Agreement')

between EUROCONTROL - EUROPEAN ORGANISATION FOR THE SAFETY OF AIR NAVIGATION **and** the Single European Sky ATM Research Joint Undertaking ('the JU'),

for the action entitled 'Virtual Centre (PJ32-W3 VC)'.

and mandates

the coordinator to submit and sign in its name and on its behalf any **amendments** to the Agreement, in accordance with Article 55.

By signing this Accession Form, the beneficiary accepts the grant and agrees to implement it in accordance with the Agreement, with all the obligations and conditions it sets out.

SIGNATURE

For the beneficiary

ANNEX 3

ACCESSION FORM FOR BENEFICIARIES

DIRECTION DES SERVICES DE LA NAVIGATION AERIENNE (DSNA), established in 50 RUE HENRY FARMAN, PARIS 75720, France, VAT number: FR29120064019, ('the beneficiary'), represented for the purpose of signing this Accession Form by the undersigned,

hereby agrees

to become beneficiary No ('9')

in Grant Agreement No 101017587 ('the Agreement')

between EUROCONTROL - EUROPEAN ORGANISATION FOR THE SAFETY OF AIR NAVIGATION **and** the Single European Sky ATM Research Joint Undertaking ('the JU'),

for the action entitled 'Virtual Centre (PJ32-W3 VC)'.

and mandates

the coordinator to submit and sign in its name and on its behalf any **amendments** to the Agreement, in accordance with Article 55.

By signing this Accession Form, the beneficiary accepts the grant and agrees to implement it in accordance with the Agreement, with all the obligations and conditions it sets out.

SIGNATURE

For the beneficiary

ANNEX 3

ACCESSION FORM FOR BENEFICIARIES

ENAIRE (ENAIRE), established in AVENIDA DE ARAGON S/N BLOQUE 330, PORTAL 2 PARQUE EMPRESARIAL LAS MERCEDES, MADRID 28022, Spain, VAT number: ESQ2822001J, ('the beneficiary'), represented for the purpose of signing this Accession Form by the undersigned,

hereby agrees

to become beneficiary No ('10')

in Grant Agreement No 101017587 ('the Agreement')

between EUROCONTROL - EUROPEAN ORGANISATION FOR THE SAFETY OF AIR NAVIGATION **and** the Single European Sky ATM Research Joint Undertaking ('the JU'),

for the action entitled 'Virtual Centre (PJ32-W3 VC)'.

and mandates

the coordinator to submit and sign in its name and on its behalf any **amendments** to the Agreement, in accordance with Article 55.

By signing this Accession Form, the beneficiary accepts the grant and agrees to implement it in accordance with the Agreement, with all the obligations and conditions it sets out.

SIGNATURE

For the beneficiary

ANNEX 3

ACCESSION FORM FOR BENEFICIARIES

ENAV SPA (ENAV), established in VIA SALARIA 716, ROMA 00138, Italy, VAT number: IT02152021008, ('the beneficiary'), represented for the purpose of signing this Accession Form by the undersigned,

hereby agrees

to become beneficiary No ('11')

in Grant Agreement No 101017587 ('the Agreement')

between EUROCONTROL - EUROPEAN ORGANISATION FOR THE SAFETY OF AIR NAVIGATION **and** the Single European Sky ATM Research Joint Undertaking ('the JU'),

for the action entitled 'Virtual Centre (PJ32-W3 VC)'.

and mandates

the coordinator to submit and sign in its name and on its behalf any **amendments** to the Agreement, in accordance with Article 55.

By signing this Accession Form, the beneficiary accepts the grant and agrees to implement it in accordance with the Agreement, with all the obligations and conditions it sets out.

SIGNATURE

For the beneficiary

ANNEX 3

ACCESSION FORM FOR BENEFICIARIES

FREQUENTIS AG (FRQ (FSP)), established in Innovationsstrasse 1, WIEN 1100, Austria, VAT number: ATU14715600, ('the beneficiary'), represented for the purpose of signing this Accession Form by the undersigned,

hereby agrees

to become beneficiary No ('12')

in Grant Agreement No 101017587 ('the Agreement')

between EUROCONTROL - EUROPEAN ORGANISATION FOR THE SAFETY OF AIR NAVIGATION **and** the Single European Sky ATM Research Joint Undertaking ('the JU'),

for the action entitled 'Virtual Centre (PJ32-W3 VC)'.

and mandates

the coordinator to submit and sign in its name and on its behalf any **amendments** to the Agreement, in accordance with Article 55.

By signing this Accession Form, the beneficiary accepts the grant and agrees to implement it in accordance with the Agreement, with all the obligations and conditions it sets out.

SIGNATURE

For the beneficiary

ANNEX 3

ACCESSION FORM FOR BENEFICIARIES

HUNGAROCONTROL MAGYAR LEGIFORGALMISZOLGALAT ZARTKORUEN MUKODO RESZVENYTARSASAG (HC (FSP)), established in IGLO UTCA 33 35, BUDAPEST 1185, Hungary, VAT number: HU13851325, ('the beneficiary'), represented for the purpose of signing this Accession Form by the undersigned,

hereby agrees

to become beneficiary No ('13')

in Grant Agreement No 101017587 ('the Agreement')

between EUROCONTROL - EUROPEAN ORGANISATION FOR THE SAFETY OF AIR NAVIGATION and the Single European Sky ATM Research Joint Undertaking ('the JU'),

for the action entitled 'Virtual Centre (PJ32-W3 VC)'.

and mandates

the coordinator to submit and sign in its name and on its behalf any **amendments** to the Agreement, in accordance with Article 55.

By signing this Accession Form, the beneficiary accepts the grant and agrees to implement it in accordance with the Agreement, with all the obligations and conditions it sets out.

SIGNATURE

For the beneficiary

ANNEX 3

ACCESSION FORM FOR BENEFICIARIES

INDRA SISTEMAS SA (INDRA), established in AVENIDA DE BRUSELAS 35, ALCOBENDAS MADRID 28108, Spain, VAT number: ESA28599033, ('the beneficiary'), represented for the purpose of signing this Accession Form by the undersigned,

hereby agrees

to become beneficiary No ('14')

in Grant Agreement No 101017587 ('the Agreement')

between EUROCONTROL - EUROPEAN ORGANISATION FOR THE SAFETY OF AIR NAVIGATION **and** the Single European Sky ATM Research Joint Undertaking ('the JU'),

for the action entitled 'Virtual Centre (PJ32-W3 VC)'.

and mandates

the coordinator to submit and sign in its name and on its behalf any **amendments** to the Agreement, in accordance with Article 55.

By signing this Accession Form, the beneficiary accepts the grant and agrees to implement it in accordance with the Agreement, with all the obligations and conditions it sets out.

SIGNATURE

For the beneficiary

ANNEX 3

ACCESSION FORM FOR BENEFICIARIES

LEONARDO - SOCIETA PER AZIONI (LDO), established in PIAZZA MONTE GRAPPA 4, ROMA 00195, Italy, VAT number: IT00881841001, ('the beneficiary'), represented for the purpose of signing this Accession Form by the undersigned,

hereby agrees

to become beneficiary No ('15')

in Grant Agreement No 101017587 ('the Agreement')

between EUROCONTROL - EUROPEAN ORGANISATION FOR THE SAFETY OF AIR NAVIGATION **and** the Single European Sky ATM Research Joint Undertaking ('the JU'),

for the action entitled 'Virtual Centre (PJ32-W3 VC)'.

and mandates

the coordinator to submit and sign in its name and on its behalf any **amendments** to the Agreement, in accordance with Article 55.

By signing this Accession Form, the beneficiary accepts the grant and agrees to implement it in accordance with the Agreement, with all the obligations and conditions it sets out.

SIGNATURE

For the beneficiary

ANNEX 3

ACCESSION FORM FOR BENEFICIARIES

SINTEF AS (SINTEF (NATMIG)), established in STRINDVEGEN 4, TRONDHEIM 7034, Norway, VAT number: NO919303808MVA, ('the beneficiary'), represented for the purpose of signing this Accession Form by the undersigned,

hereby agrees

to become beneficiary No ('16')

in Grant Agreement No 101017587 ('the Agreement')

between EUROCONTROL - EUROPEAN ORGANISATION FOR THE SAFETY OF AIR NAVIGATION **and** the Single European Sky ATM Research Joint Undertaking ('the JU'),

for the action entitled 'Virtual Centre (PJ32-W3 VC)'.

and mandates

the coordinator to submit and sign in its name and on its behalf any **amendments** to the Agreement, in accordance with Article 55.

By signing this Accession Form, the beneficiary accepts the grant and agrees to implement it in accordance with the Agreement, with all the obligations and conditions it sets out.

SIGNATURE

For the beneficiary

ANNEX 3

ACCESSION FORM FOR BENEFICIARIES

SKYGUIDE, SA SUISSE POUR LES SERVICES DE LA NAVIGATION AERIENNE CIVILS ET MILITAIRES (SKYGUIDE), established in ROUTE DE PRE BOIS 15-17, GENEVA 1215, Switzerland, VAT number: CH514204, ('the beneficiary'), represented for the purpose of signing this Accession Form by the undersigned,

hereby agrees

to become beneficiary No ('17')

in Grant Agreement No 101017587 ('the Agreement')

between EUROCONTROL - EUROPEAN ORGANISATION FOR THE SAFETY OF AIR NAVIGATION **and** the Single European Sky ATM Research Joint Undertaking ('the JU'),

for the action entitled 'Virtual Centre (PJ32-W3 VC)'.

and mandates

the coordinator to submit and sign in its name and on its behalf any **amendments** to the Agreement, in accordance with Article 55.

By signing this Accession Form, the beneficiary accepts the grant and agrees to implement it in accordance with the Agreement, with all the obligations and conditions it sets out.

SIGNATURE

For the beneficiary

ANNEX 3

ACCESSION FORM FOR BENEFICIARIES

THALES LAS FRANCE SAS (THALES AIR SYS), established in AVENUE GAY LUSSAC 2, ELANCOURT 78990, France, VAT number: FR15319159877, ('the beneficiary'), represented for the purpose of signing this Accession Form by the undersigned,

hereby agrees

to become beneficiary No ('18')

in Grant Agreement No 101017587 ('the Agreement')

between EUROCONTROL - EUROPEAN ORGANISATION FOR THE SAFETY OF AIR NAVIGATION **and** the Single European Sky ATM Research Joint Undertaking ('the JU'),

for the action entitled 'Virtual Centre (PJ32-W3 VC)'.

and mandates

the coordinator to submit and sign in its name and on its behalf any **amendments** to the Agreement, in accordance with Article 55.

By signing this Accession Form, the beneficiary accepts the grant and agrees to implement it in accordance with the Agreement, with all the obligations and conditions it sets out.

SIGNATURE

For the beneficiary

ANNEX 3

ACCESSION FORM FOR BENEFICIARIES

NATS (EN ROUTE) PUBLIC LIMITED COMPANY (NATS), established in 4000 PARKWAY WHITELEY, FAREHAM PO15 7FL, United Kingdom, VAT number: GB440379456, ('the beneficiary'), represented for the purpose of signing this Accession Form by the undersigned,

hereby agrees

to become beneficiary No ('19')

in Grant Agreement No 101017587 ('the Agreement')

between EUROCONTROL - EUROPEAN ORGANISATION FOR THE SAFETY OF AIR NAVIGATION **and** the Single European Sky ATM Research Joint Undertaking ('the JU'),

for the action entitled 'Virtual Centre (PJ32-W3 VC)'.

and mandates

the coordinator to submit and sign in its name and on its behalf any **amendments** to the Agreement, in accordance with Article 55.

By signing this Accession Form, the beneficiary accepts the grant and agrees to implement it in accordance with the Agreement, with all the obligations and conditions it sets out.

SIGNATURE

For the beneficiary

ANNEX 3

ACCESSION FORM FOR BENEFICIARIES

RIZENI LETOVEHO PROVOZU CESKE REPUBLIKY STATNI PODNIK (ANS CR (B4)), established in JENEC NAVIGACNI 787, JENEC 252 61, Czech Republic, VAT number: CZ699004742, ('the beneficiary'), represented for the purpose of signing this Accession Form by the undersigned,

hereby agrees

to become beneficiary No ('20')

in Grant Agreement No 101017587 ('the Agreement')

between EUROCONTROL - EUROPEAN ORGANISATION FOR THE SAFETY OF AIR NAVIGATION **and** the Single European Sky ATM Research Joint Undertaking ('the JU'),

for the action entitled 'Virtual Centre (PJ32-W3 VC)'.

and mandates

the coordinator to submit and sign in its name and on its behalf any **amendments** to the Agreement, in accordance with Article 55.

By signing this Accession Form, the beneficiary accepts the grant and agrees to implement it in accordance with the Agreement, with all the obligations and conditions it sets out.

SIGNATURE

For the beneficiary

ANNEX 3

ACCESSION FORM FOR BENEFICIARIES

LETOVE PREVADZKOVE SLUZBY SLOVENSKEJ REPUBLIKY, STATNY PODNIK (LPS SR (B4)), established in IVANSKA CESTA 93, BRATISLAVA 823 07, Slovakia, VAT number: SK2020244699, ('the beneficiary'), represented for the purpose of signing this Accession Form by the undersigned,

hereby agrees

to become beneficiary No ('21')

in Grant Agreement No 101017587 ('the Agreement')

between EUROCONTROL - EUROPEAN ORGANISATION FOR THE SAFETY OF AIR NAVIGATION **and** the Single European Sky ATM Research Joint Undertaking ('the JU'),

for the action entitled 'Virtual Centre (PJ32-W3 VC)'.

and mandates

the coordinator to submit and sign in its name and on its behalf any **amendments** to the Agreement, in accordance with Article 55.

By signing this Accession Form, the beneficiary accepts the grant and agrees to implement it in accordance with the Agreement, with all the obligations and conditions it sets out.

SIGNATURE

For the beneficiary

ANNEX 3

ACCESSION FORM FOR BENEFICIARIES

UDARAS EITLIOCHTA NA HEIREANN THE IRISH AVIATION AUTHORITY (IAA/ COOPANS), established in D'OLIER STREET 11-12 THE TIMES BUILDING, DUBLIN D02 T449, Ireland, VAT number: IE8211082B, ('the beneficiary'), represented for the purpose of signing this Accession Form by the undersigned,

hereby agrees

to become beneficiary No ('22')

in Grant Agreement No 101017587 ('the Agreement')

between EUROCONTROL - EUROPEAN ORGANISATION FOR THE SAFETY OF AIR NAVIGATION **and** the Single European Sky ATM Research Joint Undertaking ('the JU'),

for the action entitled 'Virtual Centre (PJ32-W3 VC)'.

and mandates

the coordinator to submit and sign in its name and on its behalf any **amendments** to the Agreement, in accordance with Article 55.

By signing this Accession Form, the beneficiary accepts the grant and agrees to implement it in accordance with the Agreement, with all the obligations and conditions it sets out.

SIGNATURE

For the beneficiary

ANNEX 3

ACCESSION FORM FOR BENEFICIARIES

ATOS BELGIUM (ATOS (FSP)), established in DA VINCILAAN 5, ZAVENTEM 1930, Belgium, VAT number: BE0401848135, ('the beneficiary'), represented for the purpose of signing this Accession Form by the undersigned,

hereby agrees

to become beneficiary No ('23')

in Grant Agreement No 101017587 ('the Agreement')

between EUROCONTROL - EUROPEAN ORGANISATION FOR THE SAFETY OF AIR NAVIGATION **and** the Single European Sky ATM Research Joint Undertaking ('the JU'),

for the action entitled 'Virtual Centre (PJ32-W3 VC)'.

and mandates

the coordinator to submit and sign in its name and on its behalf any **amendments** to the Agreement, in accordance with Article 55.

By signing this Accession Form, the beneficiary accepts the grant and agrees to implement it in accordance with the Agreement, with all the obligations and conditions it sets out.

SIGNATURE

For the beneficiary

ANNEX 3

ACCESSION FORM FOR BENEFICIARIES

AIRTEL ATN LIMITED (AIRTEL (NATMIG)), established in 2 HARBOUR SQUARE CROFTON ROAD, DUN LOAGHAIRE DUBLIN A96D6R0, Ireland, VAT number: IE8287698U, ('the beneficiary'), represented for the purpose of signing this Accession Form by the undersigned,

hereby agrees

to become beneficiary No ('24')

in Grant Agreement No 101017587 ('the Agreement')

between EUROCONTROL - EUROPEAN ORGANISATION FOR THE SAFETY OF AIR NAVIGATION **and** the Single European Sky ATM Research Joint Undertaking ('the JU'),

for the action entitled 'Virtual Centre (PJ32-W3 VC)'.

and mandates

the coordinator to submit and sign in its name and on its behalf any **amendments** to the Agreement, in accordance with Article 55.

By signing this Accession Form, the beneficiary accepts the grant and agrees to implement it in accordance with the Agreement, with all the obligations and conditions it sets out.

SIGNATURE

For the beneficiary

ANNEX 3

ACCESSION FORM FOR BENEFICIARIES

SAAB AKTIEBOLAG (SAAB (NATMIG)), established in ..., LINKOPING 581 88, Sweden, VAT number: SE556036079301, ('the beneficiary'), represented for the purpose of signing this Accession Form by the undersigned,

hereby agrees

to become beneficiary No ('25')

in Grant Agreement No 101017587 ('the Agreement')

between EUROCONTROL - EUROPEAN ORGANISATION FOR THE SAFETY OF AIR NAVIGATION **and** the Single European Sky ATM Research Joint Undertaking ('the JU'),

for the action entitled 'Virtual Centre (PJ32-W3 VC)'.

and mandates

the coordinator to submit and sign in its name and on its behalf any **amendments** to the Agreement, in accordance with Article 55.

By signing this Accession Form, the beneficiary accepts the grant and agrees to implement it in accordance with the Agreement, with all the obligations and conditions it sets out.

SIGNATURE

For the beneficiary

ANNEX 3a

**DECLARATION ON JOINT AND SEVERAL LIABILITY OF
LINKED THIRD PARTIES**

CENTRO DE REFERENCIA INVESTIGACION DESARROLLO E INNOVACION ATM, A.I.E. (CRIDA), established in AVDA DE ARAGON 402 4 EDIFICIO ALLENDE, MADRID 28022, Spain, VAT number: ESV85383578, ('the linked third party'), represented for the purpose of signing this Declaration on joint and several liability by its legal representative(s) [forename and surname, function of the legal representative(s) of the linked third party],

linked to beneficiary No 10 **ENAIRE (ENAIRE)**, established in AVENIDA DE ARAGON S/N BLOQUE 330, PORTAL 2 PARQUE EMPRESARIAL LAS MERCEDES, MADRID 28022, Spain, VAT number: ESQ2822001J, ('the beneficiary'),

hereby accepts joint and several liability with the beneficiary

for any amount owed to the JU by the beneficiary under Grant Agreement No 101017587 (PJ32-W3 VC), up to the maximum JU contribution indicated, for the linked third party, in the estimated budget (see Annex 2).

The linked third party irrevocably and unconditionally agrees to pay amounts requested under this Declaration to the JU, immediately and at first demand.

For the linked third party
[forename/surname/function]

Done in English at [place], on [date]

FINANCIAL STATEMENT FOR [BENEFICIARY [name]/ LINKED THIRD PARTY [name]] FOR REPORTING PERIOD [reporting period]

	Eligible ¹ costs (per budget category)													Receipts	EU contribution			Additional information	
	A. Direct personnel costs			B. Direct costs of subcontracting	[C. Direct costs of fin. support]	D. Other direct costs			E. Indirect costs ²	[F. Costs of ...]		Total costs	Receipts	Reimburse ment rate %	Maximum EU contribution ³	Requested EU contribution	Information for indirect costs :		
	A.1 Employees (or equivalent)	A.2 Natural persons under direct contract	A.3 Seconded persons	A.4 SME owners without salary	A.5 Beneficiaries that are natural persons without salary	[C.1 Financial support]	[C.2 Prizes]	D.1 Travel	D.2 Equipment	D.3 Other goods and services	[D.4 Costs of large research infrastructure]	D.5 Costs of internally invoiced goods and services	[F.1 Costs of ...]	[F.2 Costs of ...]	Receipts of the action, to be reported in the last reporting period, according to Article 5.3.3				Costs of in-kind contributions not used on premises
[A.6 Personnel for providing access to research infrastructure]																			
Form of costs ⁴	Actual	Unit	Unit		Actual	Actual	Actual	Actual	Unit	Flat-rate ⁵		Unit	[Unit][Lump sum]						
										25%									
	a	Total b	No hours	Total c	d	[e]	f	[g]	Total h	i=0,25 x (a+b+c+f+[g] + h+[j 1] ⁶ +[j2] ⁶ -p)	No units	Total [j1]	Total [j2]	k = a+b+c+d+[e] +f+[g] +h+ i + [j1] +[j2]	l	m	n	o	p
[short name beneficiary/linked third party]																			

The beneficiary/linked third party hereby confirms that:
The information provided is complete, reliable and true.
The costs declared are eligible (see Article 6).
The costs can be substantiated by adequate records and supporting documentation that will be produced upon request or in the context of checks, reviews, audits and investigations (see Articles 17, 18 and 22).
For the last reporting period: that all the receipts have been declared (see Article 5.3.3).

📌 Please declare all eligible costs, even if they exceed the amounts indicated in the estimated budget (see Annex 2). Only amounts that were declared in your individual financial statements can be taken into account lateron, in order to replace other costs that are found to be ineligible.

¹ See Article 6 for the eligibility conditions
² The indirect costs claimed must be free of any amounts covered by an operating grant (received under any EU or Euratom funding programme; see Article 6.2.E). If you have received an operating grant during this reporting period, you cannot claim indirect costs unless you can demonstrate that the operating grant does not cover any costs of the action.
³ This is the *theoretical* amount of EU contribution that the system calculates automatically (by multiplying the reimbursement rate by the total costs declared). The amount you request (in the column 'requested EU contribution') may be less,
⁴ See Article 5 for the forms of costs
⁵ Flat rate : 25% of eligible direct costs, from which are excluded: direct costs of subcontracting, costs of in-kind contributions not used on premises, direct costs of financial support, and unit costs declared under budget category F if they include indirect costs (see Article 6.2.E)
⁶ Only specific unit costs that do not include indirect costs

ANNEX 5

MODEL FOR THE CERTIFICATE ON THE FINANCIAL STATEMENTS

- For options [*in italics in square brackets*]: choose the applicable option. Options not chosen should be deleted.
- For fields in [grey in square brackets]: enter the appropriate data

TABLE OF CONTENTS

TERMS OF REFERENCE FOR AN INDEPENDENT REPORT OF FACTUAL FINDINGS ON COSTS DECLARED UNDER A GRANT AGREEMENT FINANCED UNDER THE HORIZON 2020 RESEARCH FRAMEWORK PROGRAMME

INDEPENDENT REPORT OF FACTUAL FINDINGS ON COSTS DECLARED UNDER A GRANT AGREEMENT FINANCED UNDER THE HORIZON 2020 RESEARCH FRAMEWORK PROGRAMME

Terms of Reference for an Independent Report of Factual Findings on costs declared under a Grant Agreement financed by [Clean Sky 2] [Bio Based Industries][ECSEL][Fuel Cells and Hydrogen 2][Innovative Medicines Initiative 2][Single European Sky Air Traffic Management Research (SESAR)][Shift2Rail] JU under the Horizon 2020 Research and Innovation Framework Programme

This document sets out the ‘**Terms of Reference (ToR)**’ under which

[OPTION 1: *[insert name of the beneficiary]* (*‘the Beneficiary’*)] [OPTION 2: *[insert name of the linked third party]* (*‘the Linked Third Party’*), third party linked to the Beneficiary *[insert name of the beneficiary]* (*‘the Beneficiary’*)]

agrees to engage

[insert legal name of the auditor] (*‘the Auditor’*)

to produce an independent report of factual findings (*‘the Report’*) concerning the Financial Statement(s)¹ drawn up by the *[Beneficiary]* *[Linked Third Party]* for the Horizon 2020 grant agreement *[insert number of the grant agreement, title of the action, acronym and duration from/to]* (*‘the Agreement’*), and

to issue a Certificate on the Financial Statements’ (*‘CFS’*) referred to in Article 20.4 of the Agreement based on the compulsory reporting template stipulated by the European Commission (*‘the Commission’*).

The Agreement has been concluded under the Horizon 2020 Research and Innovation Framework Programme (H2020) between the Beneficiary and the *[Clean Sky 2][Bio Based Industries][ECSEL][Fuel Cells and Hydrogen 2][Innovative Medicines Initiative 2][Single European Sky Air Traffic Management Research (SESAR)][Shift2Rail]* Joint Undertaking (*“the JU”*).

The JU is mentioned as a signatory of the Agreement with the Beneficiary only. The JU is not a party to this engagement.

1.1 Subject of the engagement

The coordinator must submit to the JU the final report within 60 days following the end of the last reporting period which should include, amongst other documents, a CFS for each beneficiary and for each linked third party that requests a total contribution of EUR 325 000 or more, as reimbursement of actual costs and unit costs calculated on the basis of its usual cost accounting practices (see Article 20.4 of the Agreement). The CFS must cover all reporting periods of the beneficiary or linked third party indicated above.

The Beneficiary must submit to the coordinator the CFS for itself and for its linked third party(ies), if the CFS must be included in the final report according to Article 20.4 of the Agreement.

The CFS is composed of two separate documents:

- The Terms of Reference (*‘the ToR’*) to be signed by the *[Beneficiary]* *[Linked Third Party]* and the Auditor;

¹ By which costs under the Agreement are declared (see template ‘Model Financial Statements’ in Annex 4 to the Grant Agreement).

- The Auditor's Independent Report of Factual Findings ('the Report') to be issued on the Auditor's letterhead, dated, stamped and signed by the Auditor (or the competent public officer) which includes the agreed-upon procedures ('the Procedures') to be performed by the Auditor, and the standard factual findings ('the Findings') to be confirmed by the Auditor.

If the CFS must be included in the final report according to Article 20.4 of the Agreement, the request for payment of the balance relating to the Agreement cannot be made without the CFS. However, the payment for reimbursement of costs covered by the CFS does not preclude the JU, the Commission, the European Anti-Fraud Office and the European Court of Auditors from carrying out checks, reviews, audits and investigations in accordance with Article 22 of the Agreement.

1.2 Responsibilities

The *[Beneficiary]* *[Linked Third Party]*:

- must draw up the Financial Statement(s) for the action financed by the Agreement in compliance with the obligations under the Agreement. The Financial Statement(s) must be drawn up according to the *[Beneficiary's]* *[Linked Third Party's]* accounting and book-keeping system and the underlying accounts and records;
- must send the Financial Statement(s) to the Auditor;
- is responsible and liable for the accuracy of the Financial Statement(s);
- is responsible for the completeness and accuracy of the information provided to enable the Auditor to carry out the Procedures. It must provide the Auditor with a written representation letter supporting these statements. The written representation letter must state the period covered by the statements and must be dated;
- accepts that the Auditor cannot carry out the Procedures unless it is given full access to the *[Beneficiary's]* *[Linked Third Party's]* staff and accounting as well as any other relevant records and documentation.

The Auditor:

- *[Option 1 by default: is qualified to carry out statutory audits of accounting documents in accordance with Directive 2006/43/EC of the European Parliament and of the Council of 17 May 2006 on statutory audits of annual accounts and consolidated accounts, amending Council Directives 78/660/EEC and 83/349/EEC and repealing Council Directive 84/253/EEC or similar national regulations].*
- *[Option 2 if the Beneficiary or Linked Third Party has an independent Public Officer: is a competent and independent Public Officer for which the relevant national authorities have established the legal capacity to audit the Beneficiary].*
- *[Option 3 if the Beneficiary or Linked Third Party is an international organisation: is an [internal] [external] auditor in accordance with the internal financial regulations and procedures of the international organisation].*

The Auditor:

- must be independent from the Beneficiary *[and the Linked Third Party]*, in particular, it must not have been involved in preparing the *[Beneficiary's]* *[Linked Third Party's]* Financial Statement(s);
- must plan work so that the Procedures may be carried out and the Findings may be assessed;
- must adhere to the Procedures laid down and the compulsory report format;
- must carry out the engagement in accordance with this ToR;
- must document matters which are important to support the Report;
- must base its Report on the evidence gathered;
- must submit the Report to the *[Beneficiary]* *[Linked Third Party]*.

The Commission sets out the Procedures to be carried out by the Auditor. The Auditor is not responsible for their suitability or pertinence. As this engagement is not an assurance engagement, the Auditor does not provide an audit opinion or a statement of assurance.

1.3 Applicable Standards

The Auditor must comply with these Terms of Reference and with²:

- the International Standard on Related Services ('ISRS') 4400 *Engagements to perform Agreed-upon Procedures regarding Financial Information* as issued by the International Auditing and Assurance Standards Board (IAASB);
- the *Code of Ethics for Professional Accountants* issued by the International Ethics Standards Board for Accountants (IESBA). Although ISRS 4400 states that independence is not a requirement for engagements to carry out agreed-upon procedures, the JU requires that the Auditor also complies with the Code's independence requirements.

The Auditor's Report must state that there is no conflict of interests in establishing this Report between the Auditor and the Beneficiary *[and the Linked Third Party]*, and must specify - if the service is invoiced - the total fee paid to the Auditor for providing the Report.

1.4 Reporting

The Report must be written in the language of the Agreement (see Article 20.7).

Under Article 22 of the Agreement, the JU, the Commission, the European Anti-Fraud Office and the Court of Auditors have the right to audit any work that is carried out under the action and for which costs are declared from the European Union budget. This includes work related to this engagement. The Auditor must provide access to all working papers (e.g. recalculation of hourly rates, verification of the time declared for the action) related to this assignment if the JU, the Commission, the European Anti-Fraud Office or the European Court of Auditors requests them.

1.5 Timing

The Report must be provided by [dd Month yyyy].

1.6 Other terms

[The [Beneficiary] [Linked Third Party] and the Auditor can use this section to agree other specific terms, such as the Auditor's fees, liability, applicable law, etc. Those specific terms must not contradict the terms specified above.]

[legal name of the Auditor]	[legal name of the [Beneficiary][Linked Third Party]]
[name & function of authorised representative]	[name & function of authorised representative]
[dd Month yyyy]	[dd Month yyyy]
Signature of the Auditor	Signature of the [Beneficiary][Linked Third Party]

² Supreme Audit Institutions applying INTOSAI-standards may carry out the Procedures according to the corresponding International Standards of Supreme Audit Institutions and code of ethics issued by INTOSAI instead of the International Standard on Related Services ('ISRS') 4400 and the Code of Ethics for Professional Accountants issued by the IAASB and the IESBA.

**Independent Report of Factual Findings on costs declared
under a grant agreement financed by the [Clean Sky 2] [Bio Based Industries][ECSEL][Fuel
Cells and Hydrogen 2][Innovative Medicines Initiative 2][Single European Sky Air Traffic
Management Research (SESAR)][Shift2Rail] JU under the Horizon 2020 Research and
Innovation Framework Programme**

(To be printed on the Auditor's letterhead)

To
[name of contact person(s)], [Position]
[[Beneficiary's] [Linked Third Party's] name]
[Address]
[dd Month yyyy]

Dear [Name of contact person(s)],

As agreed under the terms of reference dated [dd Month yyyy]

with [OPTION 1: [insert name of the beneficiary] ('the Beneficiary')] [OPTION 2: [insert name of
the linked third party] ('the Linked Third Party'), third party linked to the Beneficiary [insert name of
the beneficiary] ('the Beneficiary')],

we

[name of the auditor] ('the Auditor'),
established at
[full address/city/state/province/country],
represented by
[name and function of an authorised representative],

have carried out the procedures agreed with you regarding the costs declared in the Financial
Statement(s)³ of the [Beneficiary] [Linked Third Party] concerning the grant agreement
[insert grant agreement reference: number, title of the action and acronym] ('the Agreement'),

with a total cost declared of
[total amount] EUR,

and a total of actual costs and unit costs calculated in accordance with the [Beneficiary's] [Linked
Third Party's] usual cost accounting practices' declared of

[sum of total actual costs and total direct personnel costs declared as unit costs calculated in
accordance with the [Beneficiary's] [Linked Third Party's] usual cost accounting practices] EUR

and **hereby provide our Independent Report of Factual Findings ('the Report')** using the
compulsory report format agreed with you.

The Report

³ By which the Beneficiary declares costs under the Agreement (see template 'Model Financial Statement' in
Annex 4 to the Agreement).



Our engagement was carried out in accordance with the terms of reference ('the ToR') appended to this Report. The Report includes the agreed-upon procedures ('the Procedures') carried out and the standard factual findings ('the Findings') examined.

The Procedures were carried out solely to assist the JU in evaluating whether the [Beneficiary's] [Linked Third Party's] costs in the accompanying Financial Statement(s) were declared in accordance with the Agreement. The JU draws its own conclusions from the Report and any additional information it may require.

The scope of the Procedures was defined by the European Commission ('the Commission'). Therefore, the Auditor is not responsible for their suitability or pertinence. Since the Procedures carried out constitute neither an audit nor a review made in accordance with International Standards on Auditing or International Standards on Review Engagements, the Auditor does not give a statement of assurance on the Financial Statements.

Had the Auditor carried out additional procedures or an audit of the [Beneficiary's] [Linked Third Party's] Financial Statements in accordance with International Standards on Auditing or International Standards on Review Engagements, other matters might have come to its attention and would have been included in the Report.

Not applicable Findings

We examined the Financial Statement(s) stated above and considered the following Findings not applicable:

Explanation (to be removed from the Report):

If a Finding was not applicable, it must be marked as 'N.A.' ('Not applicable') in the corresponding row on the right-hand column of the table and means that the Finding did not have to be corroborated by the Auditor and the related Procedure(s) did not have to be carried out.

The reasons of the non-application of a certain Finding must be obvious i.e.

- i) if no cost was declared under a certain category then the related Finding(s) and Procedure(s) are not applicable;*
- ii) if the condition set to apply certain Procedure(s) are not met the related Finding(s) and those Procedure(s) are not applicable. For instance, for 'beneficiaries with accounts established in a currency other than euro' the Procedure and Finding related to 'beneficiaries with accounts established in euro' are not applicable. Similarly, if no additional remuneration is paid, the related Finding(s) and Procedure(s) for additional remuneration are not applicable.*

List here all Findings considered not applicable for the present engagement and explain the reasons of the non-applicability.

....

Exceptions

Apart from the exceptions listed below, the [Beneficiary] [Linked Third Party] provided the Auditor all the documentation and accounting information needed by the Auditor to carry out the requested Procedures and evaluate the Findings.

Explanation (to be removed from the Report):

- If the Auditor was not able to successfully complete a procedure requested, it must be marked as 'E' ('Exception') in the corresponding row on the right-hand column of the table. The reason such as the inability to reconcile key information or the unavailability of data that prevents the Auditor from carrying out the Procedure must be indicated below.*
- If the Auditor cannot corroborate a standard finding after having carried out the corresponding procedure, it must also be marked as 'E' ('Exception') and, where possible, the reasons why the Finding was not fulfilled and its possible impact must be explained here below.*

List here any exceptions and add any information on the cause and possible consequences of each exception, if known. If the exception is quantifiable, include the corresponding amount.

....

Example (to be removed from the Report):

1. *The Beneficiary was unable to substantiate the Finding number 1 on ... because*
2. *Finding number 30 was not fulfilled because the methodology used by the Beneficiary to calculate unit costs was different from the one approved by the Commission. The differences were as follows: ...*
3. *After carrying out the agreed procedures to confirm the Finding number 31, the Auditor found a difference of _____ EUR. The difference can be explained by ...*

Further Remarks

In addition to reporting on the results of the specific procedures carried out, the Auditor would like to make the following general remarks:

Example (to be removed from the Report):

1. *Regarding Finding number 8 the conditions for additional remuneration were considered as fulfilled because ...*
2. *In order to be able to confirm the Finding number 15 we carried out the following additional procedures:*

Use of this Report

This Report may be used only for the purpose described in the above objective. It was prepared solely for the confidential use of the [Beneficiary] [Linked Third Party], the JU and the Commission, and only to be submitted to the JU in connection with the requirements set out in Article 20.4 of the Agreement. The Report may not be used by the [Beneficiary] [Linked Third Party], by the JU or the Commission for any other purpose, nor may it be distributed to any other parties. The JU or the Commission may only disclose the Report to authorised parties, in particular to the European Anti-Fraud Office (OLAF) and the European Court of Auditors.

This Report relates only to the Financial Statement(s) submitted to the JU by the [Beneficiary] [Linked Third Party] for the Agreement. Therefore, it does not extend to any other of the [Beneficiary's] [Linked Third Party's] Financial Statement(s).

There was no conflict of interest⁴ between the Auditor and the Beneficiary [and Linked Third Party] in establishing this Report. The total fee paid to the Auditor for providing the Report was EUR [] (including EUR [] of deductible VAT).

We look forward to discussing our Report with you and would be pleased to provide any further information or assistance.

[legal name of the Auditor]

⁴ A conflict of interest arises when the Auditor's objectivity to establish the certificate is compromised in fact or in appearance when the Auditor for instance:

- was involved in the preparation of the Financial Statements;
- stands to benefit directly should the certificate be accepted;
- has a close relationship with any person representing the beneficiary;
- is a director, trustee or partner of the beneficiary; or
- is in any other situation that compromises his or her independence or ability to establish the certificate impartially.

Grant Agreement number: [insert number] [insert acronym] [insert call identifier]  Associated with document Ref. Ares(2020)7579636 - 14/12/2020

[name and function of an authorised representative]

[dd Month yyyy]

Signature of the Auditor

Agreed-upon procedures to be performed and standard factual findings to be confirmed by the Auditor

The European Commission ('the Commission') reserves the right to i) provide the auditor with additional guidance regarding the procedures to be followed or the facts to be ascertained and the way in which to present them (this may include sample coverage and findings) or to ii) change the procedures, by notifying the Beneficiary in writing. The procedures carried out by the auditor to confirm the standard factual finding are listed in the table below.

If this certificate relates to a Linked Third Party, any reference here below to 'the Beneficiary' is to be considered as a reference to 'the Linked Third Party'.

The 'result' column has three different options: 'C', 'E' and 'N.A.':

- 'C' stands for 'confirmed' and means that the auditor can confirm the 'standard factual finding' and, therefore, there is no exception to be reported.
- 'E' stands for 'exception' and means that the Auditor carried out the procedures but cannot confirm the 'standard factual finding', or that the Auditor was not able to carry out a specific procedure (e.g. because it was impossible to reconcile key information or data were unavailable),
- 'N.A.' stands for 'not applicable' and means that the Finding did not have to be examined by the Auditor and the related Procedure(s) did not have to be carried out. The reasons of the non-application of a certain Finding must be obvious i.e. i) if no cost was declared under a certain category then the related Finding(s) and Procedure(s) are not applicable; ii) if the condition set to apply certain Procedure(s) are not met then the related Finding(s) and Procedure(s) are not applicable. For instance, for 'beneficiaries with accounts established in a currency other than the euro' the Procedure related to 'beneficiaries with accounts established in euro' is not applicable. Similarly, if no additional remuneration is paid, the related Finding(s) and Procedure(s) for additional remuneration are not applicable.

Ref	Procedures	Standard factual finding	Result (C / E / N.A.)
A	ACTUAL PERSONNEL COSTS AND UNIT COSTS CALCULATED BY THE BENEFICIARY IN ACCORDANCE WITH ITS USUAL COST ACCOUNTING PRACTICE		
	<p>The Auditor draws a sample of persons whose costs were declared in the Financial Statement(s) to carry out the procedures indicated in the consecutive points of this section A.</p> <p><i>(The sample should be selected randomly so that it is representative. Full coverage is required if there are fewer than 10 people (including employees, natural persons working under a direct contract and personnel seconded by a third party), otherwise the sample should have a minimum of 10 people, or 10% of the total, whichever number is the highest)</i></p> <p>The Auditor sampled [] people out of the total of [] people.</p>		

Ref	Procedures	Standard factual finding	Result (C / E / N.A.)
A.1	<p>PERSONNEL COSTS</p> <p><u>For the persons included in the sample and working under an employment contract or equivalent act (general procedures for individual actual personnel costs and personnel costs declared as unit costs)</u></p> <p>To confirm standard factual findings 1-5 listed in the next column, the Auditor reviewed following information/documents provided by the Beneficiary:</p> <ul style="list-style-type: none"> ○ a list of the persons included in the sample indicating the period(s) during which they worked for the action, their position (classification or category) and type of contract; ○ the payslips of the employees included in the sample; ○ reconciliation of the personnel costs declared in the Financial Statement(s) with the accounting system (project accounting and general ledger) and payroll system; ○ information concerning the employment status and employment conditions of personnel included in the sample, in particular their employment contracts or equivalent; ○ the Beneficiary's usual policy regarding payroll matters (e.g. salary policy, overtime policy, variable pay); ○ applicable national law on taxes, labour and social security and ○ any other document that supports the personnel costs declared. <p>The Auditor also verified the eligibility of all components of the retribution (see Article 6 GA) and recalculated the personnel costs for employees included in the sample.</p>	1) The employees were i) directly hired by the Beneficiary in accordance with its national legislation, ii) under the Beneficiary's sole technical supervision and responsibility and iii) remunerated in accordance with the Beneficiary's usual practices.	
		2) Personnel costs were recorded in the Beneficiary's accounts/payroll system.	
		3) Costs were adequately supported and reconciled with the accounts and payroll records.	
		4) Personnel costs did not contain any ineligible elements.	
		5) There were no discrepancies between the personnel costs charged to the action and the costs recalculated by the Auditor.	
	<p><i>Further procedures if 'additional remuneration' is paid</i></p> <p>To confirm standard factual findings 6-9 listed in the next column, the Auditor:</p> <ul style="list-style-type: none"> ○ reviewed relevant documents provided by the Beneficiary (legal form, legal/statutory 	6) The Beneficiary paying "additional remuneration" was a non-profit legal entity.	

Ref	Procedures	Standard factual finding	Result (C / E / N.A.)
	<p>obligations, the Beneficiary's usual policy on additional remuneration, criteria used for its calculation, the Beneficiary's usual remuneration practice for projects funded under national funding schemes ...);</p> <ul style="list-style-type: none"> recalculated the amount of additional remuneration eligible for the action based on the supporting documents received (full-time or part-time work, exclusive or non-exclusive dedication to the action, usual remuneration paid for projects funded by national schemes) to arrive at the applicable FTE/year and pro-rata rate (see data collected in the course of carrying out the procedures under A.2 'Productive hours' and A.4 'Time recording system'). <p><i>'ADDITIONAL REMUNERATION' MEANS ANY PART OF THE REMUNERATION WHICH EXCEEDS WHAT THE PERSON WOULD BE PAID FOR TIME WORKED IN PROJECTS FUNDED BY NATIONAL SCHEMES.</i></p> <p><i>IF ANY PART OF THE REMUNERATION PAID TO THE EMPLOYEE IS QUALIFIED AS "ADDITIONAL REMUNERATION" AND IS ELIGIBLE UNDER THE PROVISIONS OF ARTICLE 6.2.A.1, THIS CAN BE CHARGED AS ELIGIBLE COST TO THE ACTION UP TO THE FOLLOWING AMOUNT:</i></p> <p>(A) <i>IF THE PERSON WORKS FULL TIME AND EXCLUSIVELY ON THE ACTION DURING THE FULL YEAR: UP TO EUR 8 000/YEAR;</i></p> <p>(B) <i>IF THE PERSON WORKS EXCLUSIVELY ON THE ACTION BUT NOT FULL-TIME OR NOT FOR THE FULL YEAR: UP TO THE CORRESPONDING PRO-RATA AMOUNT OF EUR 8 000, OR</i></p> <p>(C) <i>IF THE PERSON DOES NOT WORK EXCLUSIVELY ON THE ACTION: UP TO A PRO-RATA AMOUNT CALCULATED IN ACCORDANCE TO ARTICLE 6.2.A.1.</i></p>	<p>7) The amount of additional remuneration paid corresponded to the Beneficiary's usual remuneration practices and was consistently paid whenever the same kind of work or expertise was required.</p>	
		<p>8) The criteria used to calculate the additional remuneration were objective and generally applied by the Beneficiary regardless of the source of funding used.</p>	
		<p>9) The amount of additional remuneration included in the personnel costs charged to the action was capped at EUR 8,000 per FTE/year (up to the equivalent pro-rata amount if the person did not work on the action full-time during the year or did not work exclusively on the action).</p>	
	<p><i>Additional procedures in case "unit costs calculated by the Beneficiary in accordance with its usual cost accounting practices" is applied:</i></p> <p>Apart from carrying out the procedures indicated above to confirm standard factual findings 1-5 and, if applicable, also 6-9, the Auditor carried out following procedures to confirm standard</p>	<p>10) The personnel costs included in the Financial Statement were calculated in accordance with the Beneficiary's usual cost accounting practice. This methodology was consistently</p>	

Ref	Procedures	Standard factual finding	Result (C / E / N.A.)
	<p>factual findings 10-13 listed in the next column:</p> <ul style="list-style-type: none"> obtained a description of the Beneficiary's usual cost accounting practice to calculate unit costs; reviewed whether the Beneficiary's usual cost accounting practice was applied for the Financial Statements subject of the present CFS; verified the employees included in the sample were charged under the correct category (in accordance with the criteria used by the Beneficiary to establish personnel categories) by reviewing the contract/HR-record or analytical accounting records; verified that there is no difference between the total amount of personnel costs used in calculating the cost per unit and the total amount of personnel costs recorded in the statutory accounts; verified whether actual personnel costs were adjusted on the basis of budgeted or estimated elements and, if so, verified whether those elements used are actually relevant for the calculation, objective and supported by documents. 	used in all H2020 actions.	
		11) The employees were charged under the correct category.	
		12) Total personnel costs used in calculating the unit costs were consistent with the expenses recorded in the statutory accounts.	
		13) Any estimated or budgeted element used by the Beneficiary in its unit-cost calculation were relevant for calculating personnel costs and corresponded to objective and verifiable information.	
	<p><u>For natural persons included in the sample and working with the Beneficiary under a direct contract other than an employment contract, such as consultants (no subcontractors).</u></p> <p>To confirm standard factual findings 14-17 listed in the next column the Auditor reviewed following information/documents provided by the Beneficiary:</p> <ul style="list-style-type: none"> the contracts, especially the cost, contract duration, work description, place of work, ownership of the results and reporting obligations to the Beneficiary; the employment conditions of staff in the same category to compare costs and; any other document that supports the costs declared and its registration (e.g. invoices, accounting records, etc.). 	14) The natural persons worked under conditions similar to those of an employee, in particular regarding the way the work is organised, the tasks that are performed and the premises where they are performed.	
		15) The results of work carried out belong to the Beneficiary, or, if not, the Beneficiary has obtained all necessary rights to fulfil its obligations as if those	

Ref	Procedures	Standard factual finding	Result (C / E / N.A.)
		results were generated by itself.	
		16) Their costs were not significantly different from those for staff who performed similar tasks under an employment contract with the Beneficiary.	
		17) The costs were supported by audit evidence and registered in the accounts.	
	<u>For personnel seconded by a third party and included in the sample (not subcontractors)</u> To confirm standard factual findings 18-21 listed in the next column, the Auditor reviewed following information/documents provided by the Beneficiary: <ul style="list-style-type: none"> ○ their secondment contract(s) notably regarding costs, duration, work description, place of work and ownership of the results; ○ if there is reimbursement by the Beneficiary to the third party for the resource made available (in-kind contribution against payment): any documentation that supports the costs declared (e.g. contract, invoice, bank payment, and proof of registration in its accounting/payroll, etc.) and reconciliation of the Financial Statement(s) with the accounting system (project accounting and general ledger) as well as any proof that the amount invoiced by the third party did not include any profit; ○ if there is no reimbursement by the Beneficiary to the third party for the resource made available (in-kind contribution free of charge): a proof of the actual cost borne by the Third Party for the resource made available free of charge to the Beneficiary such as a statement of costs incurred by the Third Party and proof of the registration in the Third Party's accounting/payroll; 	18) Seconded personnel reported to the Beneficiary and worked on the Beneficiary's premises (unless otherwise agreed with the Beneficiary).	
		19) The results of work carried out belong to the Beneficiary, or, if not, the Beneficiary has obtained all necessary rights to fulfil its obligations as if those results were generated by itself.	
		<i>If personnel is seconded against payment:</i> 20) The costs declared were supported with documentation and recorded in the Beneficiary's accounts. The	

Ref	Procedures	Standard factual finding	Result (C / E / N.A.)
	<ul style="list-style-type: none"> any other document that supports the costs declared (e.g. invoices, etc.). 	third party did not include any profit.	
		<i>If personnel is seconded free of charge:</i> 21) The costs declared did not exceed the third party's cost as recorded in the accounts of the third party and were supported with documentation.	
A.2	PRODUCTIVE HOURS To confirm standard factual findings 22-27 listed in the next column, the Auditor reviewed relevant documents, especially national legislation, labour agreements and contracts and time records of the persons included in the sample, to verify that: <ul style="list-style-type: none"> the annual productive hours applied were calculated in accordance with one of the methods described below, the full-time equivalent (FTEs) ratios for employees not working full-time were correctly calculated. If the Beneficiary applied method B, the auditor verified that the correctness in which the total number of hours worked was calculated and that the contracts specified the annual workable hours. If the Beneficiary applied method C, the auditor verified that the 'annual productive hours' applied when calculating the hourly rate were equivalent to at least 90 % of the 'standard annual workable hours'. The Auditor can only do this if the calculation of the standard annual workable	22) The Beneficiary applied method [<i>choose one option and delete the others</i>] [A: 1720 hours] [B: the 'total number of hours worked'] [C: 'standard annual productive hours' used correspond to usual accounting practices]	
		23) Productive hours were calculated annually.	
		24) For employees not working full-time the full-time equivalent (FTE) ratio was correctly applied.	

Ref	Procedures	Standard factual finding	Result (C / E / N.A.)
	<p>hours can be supported by records, such as national legislation, labour agreements, and contracts.</p> <p><i>BENEFICIARY'S PRODUCTIVE HOURS' FOR PERSONS WORKING FULL TIME SHALL BE ONE OF THE FOLLOWING METHODS:</i></p> <p><i>A. 1720 ANNUAL PRODUCTIVE HOURS (PRO-RATA FOR PERSONS NOT WORKING FULL-TIME)</i></p> <p><i>B. THE TOTAL NUMBER OF HOURS WORKED BY THE PERSON FOR THE BENEFICIARY IN THE YEAR (THIS METHOD IS ALSO REFERRED TO AS 'TOTAL NUMBER OF HOURS WORKED' IN THE NEXT COLUMN). THE CALCULATION OF THE TOTAL NUMBER OF HOURS WORKED WAS DONE AS FOLLOWS: ANNUAL WORKABLE HOURS OF THE PERSON ACCORDING TO THE EMPLOYMENT CONTRACT, APPLICABLE LABOUR AGREEMENT OR NATIONAL LAW PLUS OVERTIME WORKED MINUS ABSENCES (SUCH AS SICK LEAVE OR SPECIAL LEAVE).</i></p> <p><i>C. THE STANDARD NUMBER OF ANNUAL HOURS GENERALLY APPLIED BY THE BENEFICIARY FOR ITS PERSONNEL IN ACCORDANCE WITH ITS USUAL COST ACCOUNTING PRACTICES (THIS METHOD IS ALSO REFERRED TO AS 'STANDARD ANNUAL PRODUCTIVE HOURS' IN THE NEXT COLUMN). THIS NUMBER MUST BE AT LEAST 90% OF THE STANDARD ANNUAL WORKABLE HOURS.</i></p> <p><i>'ANNUAL WORKABLE HOURS' MEANS THE PERIOD DURING WHICH THE PERSONNEL MUST BE WORKING, AT THE EMPLOYER'S DISPOSAL AND CARRYING OUT HIS/HER ACTIVITY OR DUTIES UNDER THE EMPLOYMENT CONTRACT, APPLICABLE COLLECTIVE LABOUR AGREEMENT OR NATIONAL WORKING TIME LEGISLATION.</i></p>	<p><i>If the Beneficiary applied method B.</i></p> <p>25) The calculation of the number of 'annual workable hours', overtime and absences was verifiable based on the documents provided by the Beneficiary.</p> <p>25.1) The Beneficiary calculates the hourly rates per full financial year following procedure A.3 (method B is not allowed for beneficiaries calculating hourly rates per month).</p>	
		<p><i>If the Beneficiary applied method C.</i></p> <p>26) The calculation of the number of 'standard annual workable hours' was verifiable based on the documents provided by the Beneficiary.</p>	

Ref	Procedures	Standard factual finding	Result (C / E / N.A.)
		27) The 'annual productive hours' used for calculating the hourly rate were consistent with the usual cost accounting practices of the Beneficiary and were equivalent to at least 90 % of the 'annual workable hours'.	
A.3	<p>HOURLY PERSONNEL RATES</p> <p><u>I) For unit costs calculated in accordance to the Beneficiary's usual cost accounting practice (unit costs):</u></p> <p>If the Beneficiary has a "Certificate on Methodology to calculate unit costs " (CoMUC) approved by the Commission, the Beneficiary provides the Auditor with a description of the approved methodology and the Commission's letter of acceptance. The Auditor verified that the Beneficiary has indeed used the methodology approved. If so, no further verification is necessary.</p> <p>If the Beneficiary does not have a "Certificate on Methodology" (CoMUC) approved by the Commission, or if the methodology approved was not applied, then the Auditor:</p> <ul style="list-style-type: none"> ○ reviewed the documentation provided by the Beneficiary, including manuals and internal guidelines that explain how to calculate hourly rates; ○ recalculated the unit costs (hourly rates) of staff included in the sample following the results of the procedures carried out in A.1 and A.2. <p><u>II) For individual hourly rates:</u></p> <p>The Auditor:</p> <ul style="list-style-type: none"> ○ reviewed the documentation provided by the Beneficiary, including manuals and internal guidelines that explain how to calculate hourly rates; ○ recalculated the hourly rates of staff included in the sample (recalculation of all hourly 	<p>28) The Beneficiary applied [<i>choose one option and delete the other</i>]:</p> <p>[Option I: "Unit costs (hourly rates) were calculated in accordance with the Beneficiary's usual cost accounting practices"]</p> <p>[Option II: Individual hourly rates were applied]</p> <p><i>For option I concerning unit costs and if the Beneficiary applies the methodology approved by the Commission (CoMUC):</i></p> <p>29) The Beneficiary used the Commission-approved methodology to calculate hourly rates. It corresponded to the organisation's usual cost accounting practices and was applied consistently for all</p>	

Ref	Procedures	Standard factual finding	Result (C / E / N.A.)
	<p>rates if the Beneficiary uses annual rates, recalculation of three months selected randomly for every year and person if the Beneficiary uses monthly rates) following the results of the procedures carried out in A.1 and A.2;</p> <ul style="list-style-type: none"> ○ (only in case of monthly rates) confirmed that the time spent on parental leave is not deducted, and that, if parts of the basic remuneration are generated over a period longer than a month, the Beneficiary has included only the share which is generated in the month. <p><u>“UNIT COSTS CALCULATED BY THE BENEFICIARY IN ACCORDANCE WITH ITS USUAL COST ACCOUNTING PRACTICES”:</u> <i>IT IS CALCULATED BY DIVIDING THE TOTAL AMOUNT OF PERSONNEL COSTS OF THE CATEGORY TO WHICH THE EMPLOYEE BELONGS VERIFIED IN LINE WITH PROCEDURE A.1 BY THE NUMBER OF FTE AND THE ANNUAL TOTAL PRODUCTIVE HOURS OF THE SAME CATEGORY CALCULATED BY THE BENEFICIARY IN ACCORDANCE WITH PROCEDURE A.2.</i> <u>HOURLY RATE FOR INDIVIDUAL ACTUAL PERSONAL COSTS:</u> <i>IT IS CALCULATED FOLLOWING ONE OF THE TWO OPTIONS BELOW:</i></p> <p>A) [OPTION BY DEFAULT] BY DIVIDING THE ACTUAL ANNUAL AMOUNT OF PERSONNEL COSTS OF AN EMPLOYEE VERIFIED IN LINE WITH PROCEDURE A.1 BY THE NUMBER OF ANNUAL PRODUCTIVE HOURS VERIFIED IN LINE WITH PROCEDURE A.2 (FULL FINANCIAL YEAR HOURLY RATE);</p> <p>B) BY DIVIDING THE ACTUAL MONTHLY AMOUNT OF PERSONNEL COSTS OF AN EMPLOYEE VERIFIED IN LINE WITH PROCEDURE A.1 BY 1/12 OF THE NUMBER OF ANNUAL PRODUCTIVE HOURS VERIFIED IN LINE WITH PROCEDURE A.2.(MONTHLY HOURLY RATE).</p>	<p>activities irrespective of the source of funding.</p> <p><i>For option I concerning unit costs and if the Beneficiary applies a methodology not approved by the Commission:</i></p> <p>30) The unit costs re-calculated by the Auditor were the same as the rates applied by the Beneficiary.</p> <p><i>For option II concerning individual hourly rates:</i></p> <p>31) The individual rates re-calculated by the Auditor were the same as the rates applied by the Beneficiary.</p> <p>31.1) The Beneficiary used only one option (per full financial year or per month) throughout each financial year examined.</p> <p>31.2) The hourly rates do not include additional remuneration.</p>	

Ref	Procedures	Standard factual finding	Result (C / E / N.A.)
A.4	TIME RECORDING SYSTEM To verify that the time recording system ensures the fulfilment of all minimum requirements and that the hours declared for the action were correct, accurate and properly authorised and supported by documentation, the Auditor made the following checks for the persons included in the sample that declare time as worked for the action on the basis of time records: <ul style="list-style-type: none"> ○ description of the time recording system provided by the Beneficiary (registration, authorisation, processing in the HR-system); ○ its actual implementation; ○ time records were signed at least monthly by the employees (on paper or electronically) and authorised by the project manager or another manager; ○ the hours declared were worked within the project period; ○ there were no hours declared as worked for the action if HR-records showed absence due to holidays or sickness (further cross-checks with travels are carried out in B.1 below) ; ○ the hours charged to the action matched those in the time recording system. <p><i>ONLY THE HOURS WORKED ON THE ACTION CAN BE CHARGED. ALL WORKING TIME TO BE CHARGED SHOULD BE RECORDED THROUGHOUT THE DURATION OF THE PROJECT, ADEQUATELY SUPPORTED BY EVIDENCE OF THEIR REALITY AND RELIABILITY (SEE SPECIFIC PROVISIONS BELOW FOR PERSONS WORKING EXCLUSIVELY FOR THE ACTION WITHOUT TIME RECORDS).</i></p>	32) All persons recorded their time dedicated to the action on a daily/ weekly/ monthly basis using a paper/computer-based system. <i>(delete the answers that are not applicable)</i>	
		33) Their time-records were authorised at least monthly by the project manager or other superior.	
		34) Hours declared were worked within the project period and were consistent with the presences/absences recorded in HR-records.	
		35) There were no discrepancies between the number of hours charged to the action and the number of hours recorded.	
	<u>If the persons are working exclusively for the action and without time records</u> For the persons selected that worked exclusively for the action without time records, the Auditor verified evidence available demonstrating that they were in reality exclusively dedicated to the action and that the Beneficiary signed a declaration confirming that they have worked exclusively for the action.	36) The exclusive dedication is supported by a declaration signed by the Beneficiary and by any other evidence gathered.	

Ref	Procedures	Standard factual finding	Result (C / E / N.A.)
B	COSTS OF SUBCONTRACTING		
B.1	<p>The Auditor obtained the detail/breakdown of subcontracting costs and sampled cost items selected randomly <i>(full coverage is required if there are fewer than 10 items, otherwise the sample should have a minimum of 10 item, or 10% of the total, whichever number is highest).</i></p> <p>To confirm standard factual findings 37-41 listed in the next column, the Auditor reviewed the following for the items included in the sample:</p> <ul style="list-style-type: none"> the use of subcontractors was foreseen in Annex 1; subcontracting costs were declared in the subcontracting category of the Financial Statement; supporting documents on the selection and award procedure were followed; the Beneficiary ensured best value for money (key elements to appreciate the respect of this principle are the award of the subcontract to the bid offering best price-quality ratio, under conditions of transparency and equal treatment. In case an existing framework contract was used the Beneficiary ensured it was established on the basis of the principle of best value for money under conditions of transparency and equal treatment). <p>In particular,</p> <ol style="list-style-type: none"> if the Beneficiary acted as a contracting authority within the meaning of Directive 2004/18/EC (or 2014/24/EU) or of Directive 2004/17/EC (or 2014/25/EU), the Auditor verified that the applicable national law on public procurement was followed and that the subcontracting complied with the Terms and Conditions of the Agreement. if the Beneficiary did not fall under the above-mentioned category the Auditor verified that the Beneficiary followed their usual procurement rules and respected the Terms and Conditions of the Agreement.. 	<p>37) The use of claimed subcontracting costs was foreseen in Annex 1 and costs were declared in the Financial Statements under the subcontracting category.</p> <p>38) There were documents of requests to different providers, different offers and assessment of the offers before selection of the provider in line with internal procedures and procurement rules. Subcontracts were awarded in accordance with the principle of best value for money.</p> <p><i>(When different offers were not collected the Auditor explains the reasons provided by the Beneficiary under the caption "Exceptions" of the Report. The JU will analyse this information to evaluate whether these costs might be accepted as eligible)</i></p> <p>39) The subcontracts were not awarded to other Beneficiaries</p>	

Ref	Procedures	Standard factual finding	Result (C / E / N.A.)
	For the items included in the sample the Auditor also verified that: <ul style="list-style-type: none"> ○ the subcontracts were not awarded to other Beneficiaries in the consortium; ○ there were signed agreements between the Beneficiary and the subcontractor; ○ there was evidence that the services were provided by subcontractor; 	of the consortium.	
		40) All subcontracts were supported by signed agreements between the Beneficiary and the subcontractor.	
		41) There was evidence that the services were provided by the subcontractors.	
C	COSTS OF PROVIDING FINANCIAL SUPPORT TO THIRD PARTIES		
C.1	<p>The Auditor obtained the detail/breakdown of the costs of providing financial support to third parties and sampled [] cost items selected randomly <i>(full coverage is required if there are fewer than 10 items, otherwise the sample should have a minimum of 10 item, or 10% of the total, whichever number is highest).</i></p> <p>The Auditor verified that the following minimum conditions were met:</p> <ul style="list-style-type: none"> a) the maximum amount of financial support for each third party did not exceed EUR 60 000, unless explicitly mentioned in Annex 1; b) the financial support to third parties was agreed in Annex 1 of the Agreement and the other provisions on financial support to third parties included in Annex 1 were respected. 	42) All minimum conditions were met	

D	OTHER ACTUAL DIRECT COSTS		
D.1	COSTS OF TRAVEL AND RELATED SUBSISTENCE ALLOWANCES The Auditor sampled [] cost items selected randomly <i>(full coverage is required if there are fewer than 10 items, otherwise the sample should have a minimum of 10 item, or 10% of the total, whichever number is the highest).</i> The Auditor inspected the sample and verified that: <ul style="list-style-type: none"> ○ travel and subsistence costs were consistent with the Beneficiary's usual policy for travel. In this context, the Beneficiary provided evidence of its normal policy for travel costs (e.g. use of first class tickets, reimbursement by the Beneficiary on the basis of actual costs, a lump sum or per diem) to enable the Auditor to compare the travel costs charged with this policy; ○ travel costs are correctly identified and allocated to the action (e.g. trips are directly linked to the action) by reviewing relevant supporting documents such as minutes of meetings, workshops or conferences, their registration in the correct project account, their consistency with time records or with the dates/duration of the workshop/conference; ○ no ineligible costs or excessive or reckless expenditure was declared (see Article 6.5 MGA). 	43) Costs were incurred, approved and reimbursed in line with the Beneficiary's usual policy for travels.	
		44) There was a link between the trip and the action.	
		45) The supporting documents were consistent with each other regarding subject of the trip, dates, duration and reconciled with time records and accounting.	
		46) No ineligible costs or excessive or reckless expenditure was declared.	
D.2	DEPRECIATION COSTS FOR EQUIPMENT, INFRASTRUCTURE OR OTHER ASSETS The Auditor sampled [] cost items selected randomly <i>(full coverage is required if there are fewer than 10 items, otherwise the sample should have a minimum of 10 item, or 10% of the total, whichever number is the highest).</i> For “equipment, infrastructure or other assets” [from now on called “asset(s)”] selected in the sample the Auditor verified that: <ul style="list-style-type: none"> ○ the assets were acquired in conformity with the Beneficiary's internal guidelines and procedures; ○ they were correctly allocated to the action (with supporting documents such as delivery 	47) Procurement rules, principles and guides were followed.	
		48) There was a link between the grant agreement and the asset charged to the action.	
		49) The asset charged to the action was traceable to the accounting records and the underlying documents.	

	<p>note invoice or any other proof demonstrating the link to the action)</p> <ul style="list-style-type: none"> ○ they were entered in the accounting system; ○ the extent to which the assets were used for the action (as a percentage) was supported by reliable documentation (e.g. usage overview table); <p>The Auditor recalculated the depreciation costs and verified that they were in line with the applicable rules in the Beneficiary's country and with the Beneficiary's usual accounting policy (e.g. depreciation calculated on the acquisition value).</p> <p>The Auditor verified that no ineligible costs such as deductible VAT, exchange rate losses, excessive or reckless expenditure were declared (see Article 6.5 GA).</p>	<p>50) The depreciation method used to charge the asset to the action was in line with the applicable rules of the Beneficiary's country and the Beneficiary's usual accounting policy.</p>	
		<p>51) The amount charged corresponded to the actual usage for the action.</p>	
		<p>52) No ineligible costs or excessive or reckless expenditure were declared.</p>	
D.3	<p>COSTS OF OTHER GOODS AND SERVICES</p> <p>The Auditor sampled [] cost items selected randomly (<i>full coverage is required if there are fewer than 10 items, otherwise the sample should have a minimum of 10 item, or 10% of the total, whichever number is highest</i>).</p> <p>For the purchase of goods, works or services included in the sample the Auditor verified that:</p> <ul style="list-style-type: none"> ○ the contracts did not cover tasks described in Annex 1; ○ they were correctly identified, allocated to the proper action, entered in the accounting system (traceable to underlying documents such as purchase orders, invoices and accounting); ○ the goods were not placed in the inventory of durable equipment; ○ the costs charged to the action were accounted in line with the Beneficiary's usual accounting practices; ○ no ineligible costs or excessive or reckless expenditure were declared (see Article 6 GA). <p>In addition, the Auditor verified that these goods and services were acquired in conformity with the Beneficiary's internal guidelines and procedures, in particular:</p> <ul style="list-style-type: none"> ○ if Beneficiary acted as a contracting authority within the meaning of Directive 	<p>53) Contracts for works or services did not cover tasks described in Annex 1.</p>	
		<p>54) Costs were allocated to the correct action and the goods were not placed in the inventory of durable equipment.</p>	
		<p>55) The costs were charged in line with the Beneficiary's accounting policy and were adequately supported.</p>	
		<p>56) No ineligible costs or excessive or reckless expenditure were declared. For internal invoices/charges only the cost element was charged, without any mark-ups.</p>	

	<p>2004/18/EC (or 2014/24/EU) or of Directive 2004/17/EC (or 2014/25/EU), the Auditor verified that the applicable national law on public procurement was followed and that the procurement contract complied with the Terms and Conditions of the Agreement.</p> <ul style="list-style-type: none"> ○ if the Beneficiary did not fall into the category above, the Auditor verified that the Beneficiary followed their usual procurement rules and respected the Terms and Conditions of the Agreement. <p>For the items included in the sample the Auditor also verified that:</p> <ul style="list-style-type: none"> ○ the Beneficiary ensured best value for money (key elements to appreciate the respect of this principle are the award of the contract to the bid offering best price-quality ratio, under conditions of transparency and equal treatment. In case an existing framework contract was used the Auditor also verified that the Beneficiary ensured it was established on the basis of the principle of best value for money under conditions of transparency and equal treatment); <p><i>SUCH GOODS AND SERVICES INCLUDE, FOR INSTANCE, CONSUMABLES AND SUPPLIES, DISSEMINATION (INCLUDING OPEN ACCESS), PROTECTION OF RESULTS, SPECIFIC EVALUATION OF THE ACTION IF IT IS REQUIRED BY THE AGREEMENT, CERTIFICATES ON THE FINANCIAL STATEMENTS IF THEY ARE REQUIRED BY THE AGREEMENT AND CERTIFICATES ON THE METHODOLOGY, TRANSLATIONS, REPRODUCTION.</i></p>	<p>57) Procurement rules, principles and guides were followed. There were documents of requests to different providers, different offers and assessment of the offers before selection of the provider in line with internal procedures and procurement rules. The purchases were made in accordance with the principle of best value for money.</p> <p><i>(When different offers were not collected the Auditor explains the reasons provided by the Beneficiary under the caption "Exceptions" of the Report. The JU will analyse this information to evaluate whether these costs might be accepted as eligible)</i></p>	
D.4	<p>AGGREGATED CAPITALISED AND OPERATING COSTS OF RESEARCH INFRASTRUCTURE</p> <p>The Auditor ensured the existence of a positive ex-ante assessment (issued by the EC Services) of the cost accounting methodology of the Beneficiary allowing it to apply the guidelines on direct costing for large research infrastructures in Horizon 2020.</p> <p><i>In the cases that a positive ex-ante assessment has been issued (see the standard factual findings 58-59 on the next column),</i></p>	<p>58) The costs declared as direct costs for Large Research Infrastructures (in the appropriate line of the Financial Statement) comply with the methodology described in the positive ex-ante assessment report.</p>	

	<p>The Auditor ensured that the beneficiary has applied consistently the methodology that is explained and approved in the positive ex ante assessment;</p> <p><i>In the cases that a positive ex-ante assessment has NOT been issued (see the standard factual findings 60 on the next column),</i></p> <p>The Auditor verified that no costs of Large Research Infrastructure have been charged as direct costs in any costs category;</p> <p><i>In the cases that a draft ex-ante assessment report has been issued with recommendation for further changes (see the standard factual findings 60 on the next column),</i></p> <ul style="list-style-type: none"> • The Auditor followed the same procedure as above (when a positive ex-ante assessment has NOT yet been issued) and paid particular attention (testing reinforced) to the cost items for which the draft ex-ante assessment either rejected the inclusion as direct costs for Large Research Infrastructures or issued recommendations. 	59) Any difference between the methodology applied and the one positively assessed was extensively described and adjusted accordingly.	
		60) The direct costs declared were free from any indirect costs items related to the Large Research Infrastructure.	
D.5	<p>Costs of internally invoiced goods and services</p> <p>The Auditor sampled cost items selected randomly (<i>full coverage is required if there are fewer than 10 items, otherwise the sample should have a minimum of 10 item, or 10% of the total, whichever number is highest</i>).</p> <p>To confirm standard factual findings 61-65 listed in the next column, the Auditor:</p> <ul style="list-style-type: none"> ○ obtained a description of the Beneficiary's usual cost accounting practice to calculate costs of internally invoiced goods and services (unit costs); ○ reviewed whether the Beneficiary's usual cost accounting practice was applied for the Financial Statements subject of the present CFS; ○ ensured that the methodology to calculate unit costs is being used in a consistent manner, based on objective criteria, regardless of the source of funding; ○ verified that any ineligible items or any costs claimed under other budget categories, in particular indirect costs, have not been taken into account when calculating the costs of internally invoiced goods and services (see Article 6 GA); ○ verified whether actual costs of internally invoiced goods and services were adjusted on 	<p>61) The costs of internally invoiced goods and services included in the Financial Statement were calculated in accordance with the Beneficiary's usual cost accounting practice.</p> <p>62) The cost accounting practices used to calculate the costs of internally invoiced goods and services were applied by the Beneficiary in a consistent manner based on objective criteria regardless of the source of funding.</p> <p>63) The unit cost is calculated using the actual costs for the good or service recorded in the Beneficiary's accounts, excluding any ineligible cost or</p>	

	<p>the basis of budgeted or estimated elements and, if so, verified whether those elements used are actually relevant for the calculation, and correspond to objective and verifiable information.</p> <ul style="list-style-type: none"> o verified that any costs of items which are not directly linked to the production of the invoiced goods or service (e.g. supporting services like cleaning, general accountancy, administrative support, etc. not directly used for production of the good or service) have not been taken into account when calculating the costs of internally invoiced goods and services. o verified that any costs of items used for calculating the costs internally invoiced goods and services are supported by audit evidence and registered in the accounts. o 	<p>costs included in other budget categories.</p> <p>64) The unit cost excludes any costs of items which are not directly linked to the production of the invoiced goods or service.</p> <p>65) The costs items used for calculating the actual costs of internally invoiced goods and services were relevant, reasonable and correspond to objective and verifiable information.</p>	
E	USE OF EXCHANGE RATES		
E.1	<p>a) For Beneficiaries with accounts established in a currency other than euros</p> <p>The Auditor sampled [] cost items selected randomly and verified that the exchange rates used for converting other currencies into euros were in accordance with the following rules established in the Agreement (<i>full coverage is required if there are fewer than 10 items, otherwise the sample should have a minimum of 10 item, or 10% of the total, whichever number is highest</i>):</p> <p><i>COSTS RECORDED IN THE ACCOUNTS IN A CURRENCY OTHER THAN EURO SHALL BE CONVERTED INTO EURO AT THE AVERAGE OF THE DAILY EXCHANGE RATES PUBLISHED IN THE C SERIES OF OFFICIAL JOURNAL OF THE EUROPEAN UNION (https://www.ecb.int/stats/exchange/eurofxref/html/index.en.html), DETERMINED OVER THE CORRESPONDING REPORTING PERIOD.</i></p> <p><i>IF NO DAILY EURO EXCHANGE RATE IS PUBLISHED IN THE OFFICIAL JOURNAL OF THE EUROPEAN UNION FOR THE CURRENCY IN QUESTION, CONVERSION SHALL BE MADE AT THE AVERAGE OF THE MONTHLY ACCOUNTING RATES ESTABLISHED BY THE COMMISSION AND PUBLISHED ON ITS WEBSITE (http://ec.europa.eu/budget/contracts_grants/info_contracts/inforeuro/inforeuro_en.cfm),</i></p>	<p>66) The exchange rates used to convert other currencies into Euros were in accordance with the rules established of the Grant Agreement and there was no difference in the final figures.</p>	

	<i>DETERMINED OVER THE CORRESPONDING REPORTING PERIOD.</i>		
	<p><u>b) For Beneficiaries with accounts established in euros</u></p> <p>The Auditor sampled [] cost items selected randomly and verified that the exchange rates used for converting other currencies into euros were in accordance with the following rules established in the Agreement (<i>full coverage is required if there are fewer than 10 items, otherwise the sample should have a minimum of 10 item, or 10% of the total, whichever number is highest</i>):</p> <p><i>COSTS INCURRED IN ANOTHER CURRENCY SHALL BE CONVERTED INTO EURO BY APPLYING THE BENEFICIARY'S USUAL ACCOUNTING PRACTICES.</i></p>	67) The Beneficiary applied its usual accounting practices.	

[legal name of the audit firm]

[name and function of an authorised representative]

[dd Month yyyy]

<Signature of the Auditor>

ANNEX 6

MODEL FOR THE CERTIFICATE ON THE METHODOLOGY

- For options [*in italics in square brackets*]: choose the applicable option. Options not chosen should be deleted.
- For fields in [grey in square brackets]: enter the appropriate data.

TABLE OF CONTENTS

TERMS OF REFERENCE FOR AN AUDIT ENGAGEMENT FOR A METHODOLOGY CERTIFICATE IN CONNECTION WITH ONE OR MORE GRANT AGREEMENTS FINANCED UNDER THE HORIZON 2020 RESEARCH AND INNOVATION FRAMEWORK PROGRAMME

INDEPENDENT REPORT OF FACTUAL FINDINGS ON THE METHODOLOGY CONCERNING GRANT AGREEMENTS FINANCED UNDER THE HORIZON 2020 RESEARCH AND INNOVATION FRAMEWORK PROGRAMME

**Terms of reference for an audit engagement for a methodology certificate
in connection with one or more grant agreements financed
by [Clean Sky 2] [Bio Based Industries][ECSEL][Fuel Cells and Hydrogen 2][Innovative
Medicines Initiative 2][Single European Sky Air Traffic Management Research
(SESAR)][Shift2Rail] JU under the Horizon 2020 Research and Innovation Framework
Programme**

This document sets out the ‘**Terms of Reference (ToR)**’ under which

[OPTION 1: *[insert name of the beneficiary]* (*‘the Beneficiary’*)] [OPTION 2: *[insert name of the linked third party]* (*‘the Linked Third Party’*), third party linked to the Beneficiary *[insert name of the beneficiary]* (*‘the Beneficiary’*)]

agrees to engage

[insert legal name of the auditor] (*‘the Auditor’*)

to produce an independent report of factual findings (*‘the Report’*) concerning the *[Beneficiary’s]* *[Linked Third Party’s]* usual accounting practices for calculating and claiming direct personnel costs declared as unit costs (*‘the Methodology’*) in connection with grant agreements financed under the Horizon 2020 Research and Innovation Framework Programme.

The procedures to be carried out for the assessment of the methodology will be based on the grant agreement(s) detailed below:

[title and number of the grant agreement(s)] (*‘the Agreement(s)’*)

The Agreement(s) has(have) been concluded between the Beneficiary and the *[Clean Sky 2][Bio Based Industries][ECSEL][Fuel Cells and Hydrogen 2][Innovative Medicines Initiative 2][Single European Sky Air Traffic Management Research (SESAR)][Shift2Rail]* Joint Undertaking (*‘the JU’*).

The JU is mentioned as a signatory of the Agreement with the Beneficiary only. The JU is not a party to this engagement.

1.1 Subject of the engagement

According to Article 18.1.2 of the Agreement, beneficiaries *[and linked third parties]* that declare direct personnel costs as unit costs calculated in accordance with their usual cost accounting practices may submit to the JU, for approval by the European Commission (*‘the Commission’*), a certificate on the methodology (*‘CoMUC’*) stating that there are adequate records and documentation to prove that their cost accounting practices used comply with the conditions set out in Point A of Article 6.2.

The subject of this engagement is the CoMUC which is composed of two separate documents:

- the Terms of Reference (*‘the ToR’*) to be signed by the *[Beneficiary]* *[Linked Third Party]* and the Auditor;
- the Auditor’s Independent Report of Factual Findings (*‘the Report’*) issued on the Auditor’s letterhead, dated, stamped and signed by the Auditor which includes; the standard statements (*‘the Statements’*) evaluated and signed by the *[Beneficiary]* *[Linked Third Party]*, the agreed-upon procedures (*‘the Procedures’*) performed by the Auditor and the standard factual findings (*‘the Findings’*) assessed by the Auditor. The Statements, Procedures and Findings are summarised in the table that forms part of the Report.

The information provided through the Statements, the Procedures and the Findings will enable the Commission to draw conclusions regarding the existence of the *[Beneficiary's] [Linked Third Party's]* usual cost accounting practice and its suitability to ensure that direct personnel costs claimed on that basis comply with the provisions of the Agreement. The Commission draws its own conclusions from the Report and any additional information it may require.

1.2 Responsibilities

The parties to this agreement are the *[Beneficiary] [Linked Third Party]* and the Auditor.

The *[Beneficiary] [Linked Third Party]*:

- is responsible for preparing financial statements for the Agreement(s) ('the Financial Statements') in compliance with those Agreements;
- is responsible for providing the Financial Statement(s) to the Auditor and enabling the Auditor to reconcile them with the *[Beneficiary's] [Linked Third Party's]* accounting and bookkeeping system and the underlying accounts and records. The Financial Statement(s) will be used as a basis for the procedures which the Auditor will carry out under this ToR;
- is responsible for its Methodology and liable for the accuracy of the Financial Statement(s);
- is responsible for endorsing or refuting the Statements indicated under the heading 'Statements to be made by the Beneficiary/ Linked Third Party' in the first column of the table that forms part of the Report;
- must provide the Auditor with a signed and dated representation letter;
- accepts that the ability of the Auditor to carry out the Procedures effectively depends upon the *[Beneficiary] [Linked Third Party]* providing full and free access to the *[Beneficiary's] [Linked Third Party's]* staff and to its accounting and other relevant records.

The Auditor:

- *[Option 1 by default: is qualified to carry out statutory audits of accounting documents in accordance with Directive 2006/43/EC of the European Parliament and of the Council of 17 May 2006 on statutory audits of annual accounts and consolidated accounts, amending Council Directives 78/660/EEC and 83/349/EEC and repealing Council Directive 84/253/EEC or similar national regulations].*
- *[Option 2 if the Beneficiary or Linked Third Party has an independent Public Officer: is a competent and independent Public Officer for which the relevant national authorities have established the legal capacity to audit the Beneficiary].*
- *[Option 3 if the Beneficiary or Linked Third Party is an international organisation: is an [internal] [external] auditor in accordance with the internal financial regulations and procedures of the international organisation].*

The Auditor:

- must be independent from the Beneficiary *[and the Linked Third Party]*, in particular, it must not have been involved in preparing the Beneficiary's *[and Linked Third Party's]* Financial Statement(s);
- must plan work so that the Procedures may be carried out and the Findings may be assessed;
- must adhere to the Procedures laid down and the compulsory report format;
- must carry out the engagement in accordance with these ToR;
- must document matters which are important to support the Report;
- must base its Report on the evidence gathered;
- must submit the Report to the *[Beneficiary] [Linked Third Party]*.

The Commission sets out the Procedures to be carried out and the Findings to be endorsed by the Auditor. The Auditor is not responsible for their suitability or pertinence. As this engagement is not an assurance engagement the Auditor does not provide an audit opinion or a statement of assurance.

1.3 Applicable Standards

The Auditor must comply with these Terms of Reference and with¹:

- the International Standard on Related Services ('ISRS') 4400 *Engagements to perform Agreed-upon Procedures regarding Financial Information* as issued by the International Auditing and Assurance Standards Board (IAASB);
- the *Code of Ethics for Professional Accountants* issued by the International Ethics Standards Board for Accountants (IESBA). Although ISRS 4400 states that independence is not a requirement for engagements to carry out agreed-upon procedures, the Commission requires that the Auditor also complies with the Code's independence requirements.

The Auditor's Report must state that there was no conflict of interests in establishing this Report between the Auditor and the Beneficiary *[and the Linked Third Party]* that could have a bearing on the Report, and must specify – if the service is invoiced - the total fee paid to the Auditor for providing the Report.

1.4 Reporting

The Report must be written in the language of the Agreement (see Article 20.7 of the Agreement).

Under Article 22 of the Agreement, the JU, the Commission, the European Anti-Fraud Office and the Court of Auditors have the right to audit any work that is carried out under the action and for which costs are declared from the European Union budget. This includes work related to this engagement. The Auditor must provide access to all working papers related to this assignment if the JU, the Commission, the European Anti-Fraud Office or the European Court of Auditors requests them.

1.5 Timing

The Report must be provided by [dd Month yyyy].

1.6 Other Terms

[The [Beneficiary] [Linked Third Party] and the Auditor can use this section to agree other specific terms, such as the Auditor's fees, liability, applicable law, etc. Those specific terms must not contradict the terms specified above.]

[legal name of the Auditor]
[name & title of authorised representative]
[dd Month yyyy]
Signature of the Auditor

[legal name of the [Beneficiary] [Linked Third Party]]
[name & title of authorised representative]
[dd Month yyyy]
Signature of the [Beneficiary] [Linked Third Party]

¹ Supreme Audit Institutions applying INTOSAI-standards may carry out the Procedures according to the corresponding International Standards of Supreme Audit Institutions and code of ethics issued by INTOSAI instead of the International Standard on Related Services ('ISRS') 4400 and the Code of Ethics for Professional Accountants issued by the IAASB and the IESBA.

**Independent report of factual findings on the methodology concerning grant agreements
financed by *[Clean Sky 2] [Bio Based Industries][ECSEL][Fuel Cells and Hydrogen
2][Innovative Medicines Initiative 2][Single European Sky Air Traffic Management Research
(SESAR)][Shift2Rail] JU*
under the Horizon 2020 Research and Innovation Framework Programme**

(To be printed on letterhead paper of the auditor)

To

[name of contact person(s)], [Position]
[[Beneficiary's] [Linked Third Party's] name]
[Address]
[dd Month yyyy]

Dear [Name of contact person(s)],

As agreed under the terms of reference dated [dd Month yyyy]

with [OPTION 1: *[insert name of the beneficiary]* ('the Beneficiary')] [OPTION 2: *[insert name of the linked third party]* ('the Linked Third Party'), third party linked to the Beneficiary *[insert name of the beneficiary]* ('the Beneficiary')],

we

[name of the auditor] ('the Auditor'),

established at

[full address/city/state/province/country],

represented by

[name and function of an authorised representative],

have carried out the agreed-upon procedures ('the Procedures') and provide hereby our Independent Report of Factual Findings ('the Report'), concerning the *[Beneficiary's] [Linked Third Party's]* usual accounting practices for calculating and declaring direct personnel costs declared as unit costs ('the Methodology').

You requested certain procedures to be carried out in connection with the grant(s)

[title and number of the grant agreement(s)] ('the Agreement(s)').

The Report

Our engagement was carried out in accordance with the terms of reference ('the ToR') appended to this Report. The Report includes: the standard statements ('the Statements') made by the *[Beneficiary] [Linked Third Party]*, the agreed-upon procedures ('the Procedures') carried out and the standard factual findings ('the Findings') confirmed by us.

The engagement involved carrying out the Procedures and assessing the Findings and the documentation requested appended to this Report, the results of which the European Commission ('the Commission') uses to draw conclusions regarding the acceptability of the Methodology applied by the *[Beneficiary] [Linked Third Party]*.

The Report covers the methodology used from [dd Month yyyy]. In the event that the [Beneficiary] [Linked Third Party] changes this methodology, the Report will not be applicable to any Financial Statement¹ submitted thereafter.

The scope of the Procedures and the definition of the standard statements and findings were determined solely by the Commission. Therefore, the Auditor is not responsible for their suitability or pertinence.

Since the Procedures carried out constitute neither an audit nor a review made in accordance with International Standards on Auditing or International Standards on Review Engagements, we do not give a statement of assurance on the costs declared on the basis of the [Beneficiary's] [Linked Third Party's] Methodology. Had we carried out additional procedures or had we performed an audit or review in accordance with these standards, other matters might have come to its attention and would have been included in the Report.

Exceptions

Apart from the exceptions listed below, the [Beneficiary] [Linked Third Party] agreed with the standard Statements and provided the Auditor all the documentation and accounting information needed by the Auditor to carry out the requested Procedures and corroborate the standard Findings.

List here any exception and add any information on the cause and possible consequences of each exception, if known. If the exception is quantifiable, also indicate the corresponding amount.

.....

Explanation of possible exceptions in the form of examples (to be removed from the Report):

- i. the [Beneficiary] [Linked Third Party] did not agree with the standard Statement number ... because...;
- ii. the Auditor could not carry out the procedure ... established because (e.g. due to the inability to reconcile key information or the unavailability or inconsistency of data);
- iii. the Auditor could not confirm or corroborate the standard Finding number ... because

Remarks

We would like to add the following remarks relevant for the proper understanding of the Methodology applied by the [Beneficiary] [Linked Third Party] or the results reported:

Example (to be removed from the Report):

Regarding the methodology applied to calculate hourly rates ...

Regarding standard Finding 15 it has to be noted that ...

The [Beneficiary] [Linked Third Party] explained the deviation from the benchmark statement XXIV concerning time recording for personnel with no exclusive dedication to the action in the following manner:

...

Annexes

Please provide the following documents to the auditor and annex them to the report when submitting this CoMUC to the JU:

¹ Financial Statement in this context refers solely to Annex 4 of the Agreement by which the Beneficiary declares costs under the Agreement.

1. Brief description of the methodology for calculating personnel costs, productive hours and hourly rates;
2. Brief description of the time recording system in place;
3. An example of the time records used by the [Beneficiary] [Linked Third Party];
4. Description of any budgeted or estimated elements applied, together with an explanation as to why they are relevant for calculating the personnel costs and how they are based on objective and verifiable information;
5. A summary sheet with the hourly rate for direct personnel declared by the [Beneficiary] [Linked Third Party] and recalculated by the Auditor for each staff member included in the sample (the names do not need to be reported);
6. A comparative table summarising for each person selected in the sample a) the time claimed by the [Beneficiary] [Linked Third Party] in the Financial Statement(s) and b) the time according to the time record verified by the Auditor;
7. A copy of the letter of representation provided to the Auditor.

Use of this Report

This Report has been drawn up solely for the purpose given under Point 1.1 Reasons for the engagement.

The Report:

- is confidential and is intended to be submitted to the JU by the [Beneficiary] [Linked Third Party] in connection with Article 18.1.2 of the Agreement;
- may not be used by the [Beneficiary] [Linked Third Party], by the JU or by the Commission for any other purpose, nor distributed to any other parties;
- may be disclosed by the JU or by the Commission only to authorised parties, in particular the European Anti-Fraud Office (OLAF) and the European Court of Auditors.
- relates only to the usual cost accounting practices specified above and does not constitute a report on the Financial Statements of the [Beneficiary] [Linked Third Party].

No conflict of interest² exists between the Auditor and the Beneficiary [and the Linked Third Party] that could have a bearing on the Report. The total fee paid to the Auditor for producing the Report was EUR [] (including EUR [] of deductible VAT).

We look forward to discussing our Report with you and would be pleased to provide any further information or assistance which may be required.

Yours sincerely

[legal name of the Auditor]

[name and title of the authorised representative]

[dd Month yyyy]

Signature of the Auditor

² A conflict of interest arises when the Auditor's objectivity to establish the certificate is compromised in fact or in appearance when the Auditor for instance:

- was involved in the preparation of the Financial Statements;
- stands to benefit directly should the certificate be accepted;
- has a close relationship with any person representing the beneficiary;
- is a director, trustee or partner of the beneficiary; or
- is in any other situation that compromises his or her independence or ability to establish the certificate impartially.

Statements to be made by the Beneficiary/Linked Third Party ('the Statements') and Procedures to be carried out by the Auditor ('the Procedures') and standard factual findings ('the Findings') to be confirmed by the Auditor

The European Commission ('the Commission') reserves the right to provide the auditor with guidance regarding the Statements to be made, the Procedures to be carried out or the Findings to be ascertained and the way in which to present them. The Commission reserves the right to vary the Statements, Procedures or Findings by written notification to the Beneficiary/Linked Third Party to adapt the procedures to changes in the grant agreement(s) or to any other circumstances.

If this methodology certificate relates to the Linked Third Party's usual accounting practices for calculating and claiming direct personnel costs declared as unit costs any reference here below to 'the Beneficiary' is to be considered as a reference to 'the Linked Third Party'.

<i>Please explain any discrepancies in the body of the Report.</i>	
Statements to be made by Beneficiary	Procedures to be carried out and Findings to be confirmed by the Auditor
A. Use of the Methodology I. The cost accounting practice described below has been in use since [dd Month yyyy]. II. The next planned alteration to the methodology used by the Beneficiary will be from [dd Month yyyy].	Procedure: ✓ The Auditor checked these dates against the documentation the Beneficiary has provided. Factual finding: 1. The dates provided by the Beneficiary were consistent with the documentation.
B. Description of the Methodology III. The methodology to calculate unit costs is being used in a consistent manner and is reflected in the relevant procedures. <i>[Please describe the methodology your entity uses to calculate <u>personnel</u> costs, productive hours and hourly rates, present your description to the Auditor and annex it to this certificate]</i> <i>[If the statement of section "B. Description of the methodology" cannot be endorsed by the Beneficiary or there is no written methodology to calculate unit costs it should be listed here below and reported as exception by the Auditor in the main Report of Factual Findings: - ...]</i>	Procedure: ✓ The Auditor reviewed the description, the relevant manuals and/or internal guidance documents describing the methodology. Factual finding: 2. The brief description was consistent with the relevant manuals, internal guidance and/or other documentary evidence the Auditor has reviewed. 3. The methodology was generally applied by the Beneficiary as part of its usual costs accounting practices.
C. Personnel costs	Procedure:

<i>Please explain any discrepancies in the body of the Report.</i>	
Statements to be made by Beneficiary	Procedures to be carried out and Findings to be confirmed by the Auditor
<u>General</u>	
IV. The unit costs (hourly rates) are limited to salaries including during parental leave, social security contributions, taxes and other costs included in the remuneration required under national law and the employment contract or equivalent appointing act;	<p><i>The Auditor draws a sample of employees to carry out the procedures indicated in this section C and the following sections D to F.</i> <i>[The Auditor has drawn a random sample of 10 employees assigned to Horizon 2020 action(s). If fewer than 10 employees are assigned to the Horizon 2020 action(s), the Auditor has selected all employees assigned to the Horizon 2020 action(s), complemented by other employees irrespective of their assignments until he has reached 10 employees.].</i> For this sample:</p> <ul style="list-style-type: none"> ✓ the Auditor reviewed all documents relating to personnel costs such as employment contracts, payslips, payroll policy (e.g. salary policy, overtime policy, variable pay policy), accounting and payroll records, applicable national tax, labour and social security law and any other documents corroborating the personnel costs claimed; ✓ in particular, the Auditor reviewed the employment contracts of the employees in the sample to verify that: <ul style="list-style-type: none"> i. they were employed directly by the Beneficiary in accordance with applicable national legislation; ii. they were working under the sole technical supervision and responsibility of the latter; iii. they were remunerated in accordance with the Beneficiary's usual practices; iv. they were allocated to the correct group/category/cost centre for the purposes of calculating the unit cost in line with the Beneficiary's usual cost accounting practices; ✓ the Auditor verified that any ineligible items or any costs claimed under other costs categories or costs covered by other types of grant or by other grants financed from the European Union budget have not been taken into account when calculating the personnel costs; ✓ the Auditor numerically reconciled the total amount of personnel costs used to calculate the unit cost with the total amount of personnel costs recorded in the statutory accounts and the payroll system. ✓ to the extent that actual personnel costs were adjusted on the basis of budgeted or estimated elements, the Auditor carefully examined those elements and checked the information source to confirm that they correspond to objective and verifiable information;
V. Employees are hired directly by the Beneficiary in accordance with national law, and work under its sole supervision and responsibility;	
VI. The Beneficiary remunerates its employees in accordance with its usual practices. This means that personnel costs are charged in line with the Beneficiary's usual payroll policy (e.g. salary policy, overtime policy, variable pay) and no special conditions exist for employees assigned to tasks relating to the European Union or Euratom, unless explicitly provided for in the grant agreement(s);	
VII. The Beneficiary allocates its employees to the relevant group/category/cost centre for the purpose of the unit cost calculation in line with the usual cost accounting practice;	
VIII. Personnel costs are based on the payroll system and accounting system.	
IX. Any exceptional adjustments of actual personnel costs resulted from relevant budgeted or estimated elements and were based on objective and verifiable information. <i>[Please describe the 'budgeted or estimated elements' and their relevance to personnel costs, and explain how they were reasonable and based on objective and verifiable information, present your explanation to the Auditor and annex it to this certificate].</i>	
X. Personnel costs claimed do not contain any of the following ineligible costs: costs related to return on capital; debt and debt service charges; provisions for future losses or debts; interest owed; doubtful debts; currency exchange losses; bank costs charged by the Beneficiary's bank for transfers from the JU; excessive or reckless expenditure; deductible VAT or costs incurred during suspension of the implementation of the action.	
XI. Personnel costs were not declared under another EU or Euratom grant (including grants awarded by a Member State and financed by the EU budget and grants awarded by bodies other than the JU for the purpose of implementing the EU or Euratom budget in the same period, unless the Beneficiary can demonstrate that the operating grant does not cover any costs of the action).	

<i>Please explain any discrepancies in the body of the Report.</i>	
Statements to be made by Beneficiary	Procedures to be carried out and Findings to be confirmed by the Auditor
<p><u>If additional remuneration as referred to in the grant agreement(s) is paid</u></p> <p>XII. The Beneficiary is a non-profit legal entity;</p> <p>XIII. The additional remuneration is part of the beneficiary's usual remuneration practices and paid consistently whenever the relevant work or expertise is required;</p> <p>XIV. The criteria used to calculate the additional remuneration are objective and generally applied regardless of the source of funding;</p> <p>XV. The additional remuneration included in the personnel costs used to calculate the hourly rates for the grant agreement(s) is capped at EUR 8 000 per full-time equivalent (reduced proportionately if the employee is not assigned exclusively to the action).</p> <p><i>[If certain statement(s) of section "C. Personnel costs" cannot be endorsed by the Beneficiary they should be listed here below and reported as exception by the Auditor in the main Report of Factual Findings:</i> - ...]</p>	<p>✓ if additional remuneration has been claimed, the Auditor verified that the Beneficiary was a non-profit legal entity, that the amount was capped at EUR 8 000 per full-time equivalent and that it was reduced proportionately for employees not assigned exclusively to the action(s).</p> <p>✓ the Auditor recalculated the personnel costs for the employees in the sample.</p> <p>Factual finding:</p> <ol style="list-style-type: none"> All the components of the remuneration that have been claimed as personnel costs are supported by underlying documentation. The employees in the sample were employed directly by the Beneficiary in accordance with applicable national law and were working under its sole supervision and responsibility. Their employment contracts were in line with the Beneficiary's usual policy; Personnel costs were duly documented and consisted solely of salaries, social security contributions (pension contributions, health insurance, unemployment fund contributions, etc.), taxes and other statutory costs included in the remuneration (holiday pay, thirteenth month's pay, etc.); The totals used to calculate the personnel unit costs are consistent with those registered in the payroll and accounting records; To the extent that actual personnel costs were adjusted on the basis of budgeted or estimated elements, those elements were relevant for calculating the personnel costs and correspond to objective and verifiable information. The budgeted or estimated elements used are: — (indicate the elements and their values). Personnel costs contained no ineligible elements; Specific conditions for eligibility were fulfilled when additional remuneration was paid: a) the Beneficiary is registered in the grant agreements as a non-profit legal entity; b) it was paid according to objective criteria generally applied regardless of the source of funding used and c) remuneration was capped at EUR 8 000 per full-time equivalent (or up to up to the equivalent pro-rata amount if the person did not work on the action full-time during the year or did not work

<i>Please explain any discrepancies in the body of the Report.</i>	
Statements to be made by Beneficiary	Procedures to be carried out and Findings to be confirmed by the Auditor
	exclusively on the action).
<p>D. Productive hours</p> <p>XVI. The number of productive hours per full-time employee applied is <i>[delete as appropriate]</i>:</p> <p>A. 1720 productive hours per year for a person working full-time (corresponding pro-rata for persons not working full time).</p> <p>B. the total number of hours worked in the year by a person for the Beneficiary</p> <p>C. the standard number of annual hours generally applied by the beneficiary for its personnel in accordance with its usual cost accounting practices. This number must be at least 90% of the standard annual workable hours.</p> <p><u>If method B is applied</u></p> <p>XVII. The calculation of the total number of hours worked was done as follows: annual workable hours of the person according to the employment contract, applicable labour agreement or national law plus overtime worked minus absences (such as sick leave and special leave).</p> <p>XVIII. 'Annual workable hours' are hours during which the personnel must be working, at the employer's disposal and carrying out his/her activity or duties under the employment contract, applicable collective labour agreement or national working time legislation.</p> <p>XIX. The contract (applicable collective labour agreement or national working time legislation) do specify the working time enabling to calculate the annual workable hours.</p> <p><u>If method C is applied</u></p> <p>XX. The standard number of productive hours per year is that of a full-time equivalent.</p> <p>XXI. The number of productive hours per year on which the hourly rate is based i) corresponds to the Beneficiary's usual accounting practices; ii) is at least 90% of the standard number of workable (working) hours per year.</p>	<p>Procedure (same sample basis as for Section C: Personnel costs):</p> <ul style="list-style-type: none"> ✓ The Auditor verified that the number of productive hours applied is in accordance with method A, B or C. ✓ The Auditor checked that the number of productive hours per full-time employee is correct. ✓ If method B is applied the Auditor verified i) the manner in which the total number of hours worked was done and ii) that the contract specified the annual workable hours by inspecting all the relevant documents, national legislation, labour agreements and contracts. ✓ If method C is applied the Auditor reviewed the manner in which the standard number of working hours per year has been calculated by inspecting all the relevant documents, national legislation, labour agreements and contracts and verified that the number of productive hours per year used for these calculations was at least 90% of the standard number of working hours per year. <p>Factual finding:</p> <p><u>General</u></p> <p>12. The Beneficiary applied a number of productive hours consistent with method A, B or C detailed in the left-hand column.</p> <p>13. The number of productive hours per year per full-time employee was accurate.</p> <p><u>If method B is applied</u></p> <p>14. The number of 'annual workable hours', overtime and absences was verifiable based on the documents provided by the Beneficiary and the calculation of the total number of hours worked was accurate.</p> <p>15. The contract specified the working time enabling to calculate the annual workable hours.</p> <p><u>If method C is applied</u></p> <p>16. The calculation of the number of productive hours per year corresponded</p>

Please explain any discrepancies in the body of the Report.	
Statements to be made by Beneficiary	Procedures to be carried out and Findings to be confirmed by the Auditor
<p>XXII. Standard workable (working) hours are hours during which personnel are at the Beneficiary's disposal performing the duties described in the relevant employment contract, collective labour agreement or national labour legislation. The number of standard annual workable (working) hours that the Beneficiary claims is supported by labour contracts, national legislation and other documentary evidence.</p> <p><i>[If certain statement(s) of section "D. Productive hours" cannot be endorsed by the Beneficiary they should be listed here below and reported as exception by the Auditor: - ...]</i></p>	<p>to the usual costs accounting practice of the Beneficiary.</p> <p>17. The calculation of the standard number of workable (working) hours per year was corroborated by the documents presented by the Beneficiary.</p> <p>18. The number of productive hours per year used for the calculation of the hourly rate was at least 90 % of the number of workable (working) hours per year.</p>
<p>E. Hourly rates</p> <p>The hourly rates are correct because:</p> <p>XXIII. Hourly rates are correctly calculated since they result from dividing annual personnel costs by the productive hours of a given year and group (e.g. staff category or department or cost centre depending on the methodology applied) and they are in line with the statements made in section C. and D. above.</p> <p><i>[If the statement of section 'E. Hourly rates' cannot be endorsed by the Beneficiary they should be listed here below and reported as exception by the Auditor: - ...]</i></p>	<p>Procedure</p> <ul style="list-style-type: none"> ✓ The Auditor has obtained a list of all personnel rates calculated by the Beneficiary in accordance with the methodology used. ✓ The Auditor has obtained a list of all the relevant employees, based on which the personnel rate(s) are calculated. <p>For 10 employees selected at random (same sample basis as Section C: Personnel costs):</p> <ul style="list-style-type: none"> ✓ The Auditor recalculated the hourly rates. ✓ The Auditor verified that the methodology applied corresponds to the usual accounting practices of the organisation and is applied consistently for all activities of the organisation on the basis of objective criteria irrespective of the source of funding. <p>Factual finding:</p> <p>19. No differences arose from the recalculation of the hourly rate for the employees included in the sample.</p>
<p>F. Time recording</p> <p>XXIV. Time recording is in place for all persons with no exclusive dedication to one Horizon 2020 action. At least all hours worked in connection with the grant agreement(s) are registered on a daily/weekly/monthly basis <i>[delete as appropriate]</i> using a paper/computer-based system <i>[delete as appropriate]</i>;</p> <p>XXV. For persons exclusively assigned to one Horizon 2020 activity the Beneficiary has either signed a declaration to that effect or has put</p>	<p>Procedure</p> <ul style="list-style-type: none"> ✓ The Auditor reviewed the brief description, all relevant manuals and/or internal guidance describing the methodology used to record time. <p>The Auditor reviewed the time records of the random sample of 10 employees referred to under Section C: Personnel costs, and verified in particular:</p>

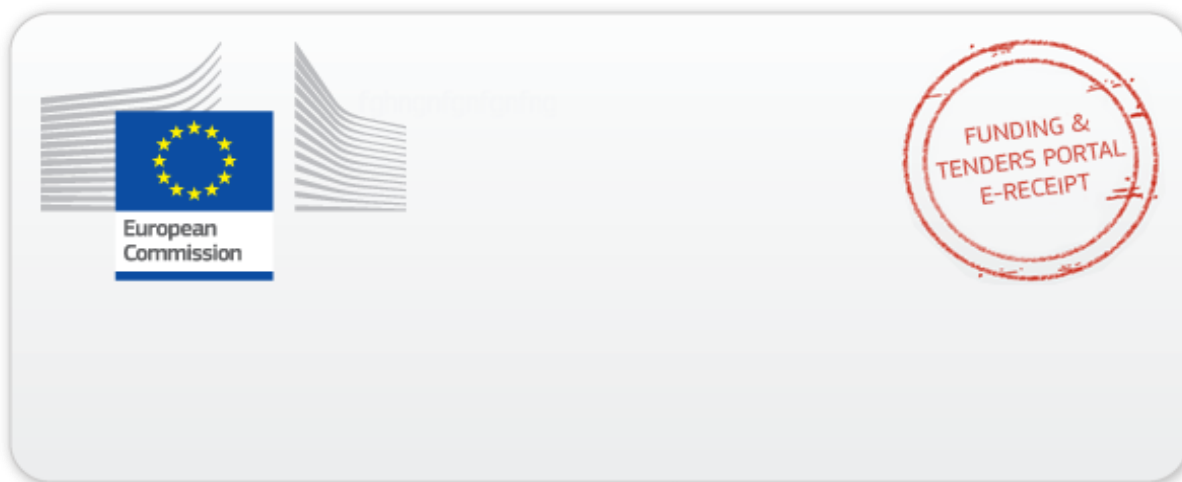
<i>Please explain any discrepancies in the body of the Report.</i>	
Statements to be made by Beneficiary	Procedures to be carried out and Findings to be confirmed by the Auditor
<p>arrangements in place to record their working time;</p> <p>XXVI. Records of time worked have been signed by the person concerned (on paper or electronically) and approved by the action manager or line manager at least monthly;</p> <p>XXVII. Measures are in place to prevent staff from:</p> <ul style="list-style-type: none"> i. recording the same hours twice, ii. recording working hours during absence periods (e.g. holidays, sick leave), iii. recording more than the number of productive hours per year used to calculate the hourly rates, and iv. recording hours worked outside the action period. <p>XXVIII. No working time was recorded outside the action period;</p> <p>XXIX. No more hours were claimed than the productive hours used to calculate the hourly personnel rates.</p> <p><i>[Please provide a brief description of the <u>time recording system</u> in place together with the measures applied to ensure its reliability to the Auditor and annex it to the present certificate¹].</i></p> <p><i>[If certain statement(s) of section “F. Time recording” cannot be endorsed by the Beneficiary they should be listed here below and reported as exception by the Auditor: - ...]</i></p>	<ul style="list-style-type: none"> ✓ that time records were available for all persons with not exclusive assignment to the action; ✓ that time records were available for persons working exclusively for a Horizon 2020 action, or, alternatively, that a declaration signed by the Beneficiary was available for them certifying that they were working exclusively for a Horizon 2020 action; ✓ that time records were signed and approved in due time and that all minimum requirements were fulfilled; ✓ that the persons worked for the action in the periods claimed; ✓ that no more hours were claimed than the productive hours used to calculate the hourly personnel rates; ✓ that internal controls were in place to prevent that time is recorded twice, during absences for holidays or sick leave; that more hours are claimed per person per year for Horizon 2020 actions than the number of productive hours per year used to calculate the hourly rates; that working time is recorded outside the action period; ✓ the Auditor cross-checked the information with human-resources records to verify consistency and to ensure that the internal controls have been effective. In addition, the Auditor has verified that no more hours were charged to Horizon 2020 actions per person per year than the number of productive hours per year used to calculate the hourly rates, and verified that no time worked outside the action period was charged to the action. <p>Factual finding:</p> <p>20. The brief description, manuals and/or internal guidance on time recording provided by the Beneficiary were consistent with management</p>

¹ The description of the time recording system must state among others information on the content of the time records, its coverage (full or action time-recording, for all personnel or only for personnel involved in H2020 actions), its degree of detail (whether there is a reference to the particular tasks accomplished), its form, periodicity of the time registration and authorisation (paper or a computer-based system; on a daily, weekly or monthly basis; signed and countersigned by whom), controls applied to prevent double-charging of time or ensure consistency with HR-records such as absences and travels as well as its information flow up to its use for the preparation of the Financial Statements.

<i>Please explain any discrepancies in the body of the Report.</i>	
Statements to be made by Beneficiary	Procedures to be carried out and Findings to be confirmed by the Auditor
	<p>reports/records and other documents reviewed and were generally applied by the Beneficiary to produce the financial statements.</p> <p>21. For the random sample time was recorded or, in the case of employees working exclusively for the action, either a signed declaration or time records were available;</p> <p>22. For the random sample the time records were signed by the employee and the action manager/line manager, at least monthly.</p> <p>23. Working time claimed for the action occurred in the periods claimed;</p> <p>24. No more hours were claimed than the number productive hours used to calculate the hourly personnel rates;</p> <p>25. There is proof that the Beneficiary has checked that working time has not been claimed twice, that it is consistent with absence records and the number of productive hours per year, and that no working time has been claimed outside the action period.</p> <p>26. Working time claimed is consistent with that on record at the human-resources department.</p>

[official name of the [Beneficiary] [Linked Third Party]]
[name and title of authorised representative]
[dd Month yyyy]
<Signature of the [Beneficiary] [Linked Third Party]>

[official name of the Auditor]
[name and title of authorised representative]
[dd Month yyyy]
<Signature of the Auditor>



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