



GRANT AGREEMENT

FOR MEMBERS² NUMBER — 734153 — PJ03a SUMO

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

on the one part,

The Single European Sky ATM (Air Traffic Management) Research Joint Undertaking ('the JU'), a joint undertaking within the meaning of Article 187 of the Treaty on the Functioning of the European Union¹, set-up by Council Regulation (EC) No 219/2007 of 27 February 2007 on the establishment of a Joint Undertaking to develop the new generation European air traffic management system², as amended by Council Regulation (EC) No 1361/2008 of 16 December 2008³ and by Council Regulation (EU) No 721/2014 of 16 June 2014⁴

represented for the purposes of signature of this Framework Partnership Agreement by its Executive Director M. Florian GUILLERMET,

and

on the other part,

1. 'the coordinator':

ENAV SPA (ENAV) SPA, 965162/CF97016000586, established in VIA SALARIA 716, ROMA 00138, Italy, IT02152021008 represented for the purposes of signing the Agreement by Chief Executive Officer, Roberta NERI

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

2. **AIRBUS SAS (AIRBUS)** SAS, 383474814, established in rd point Maurice Bellonte 1, BLAGNAC 31707, France, FR89383474814

3. **RIZENI LETOVEHO PROVOZU CESKE REPUBLIKY STATNI PODNIK (ANS CR (B4))** SP, 49710371, established in Navigacni 787, Jenec 25261, Czech Republic, CZ49710371

4. **AUSTRO CONTROL OSTERREICHISCHE GESELLSCHAFT FUR ZIVILLUFTFAHRT MBH (ACG/COOPANS)** GMBH, FN71000M, established in WAGRAMER STRASSE 19, WIEN 1220, Austria, ATU37259408

5. **DASSAULT AVIATION (DASSAULT)** FR39, 712042456, established in 9 ROND POINT CHAMPS-ELYSEES-MARCEL DASSAULT, PARIS 75008, France, FR73712042456

6. **DFS DEUTSCHE FLUGSICHERUNG GMBH (DFS)** GMBH, HRB34977, established in AM DFS CAMPUS 10, LANGEN 63225, Germany, DE114110232

² '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.

¹ OJ C 326, 26.10.2012, p. 47–390.

² OJ L 64, 2.3.2007, p. 1–11.

³ OJ L 352, 31.12.2008, p. 12–17.

⁴ OJ L 192, 1.7.2014, p. 1–8.



7. **ENTIDAD PUBLICA EMPRESARIAL ENAIRE (ENAIRE)**, established in CALLE ARTURO SORIA 109, MADRID 28043, Spain, ESQ2822001J
8. **EUROCONTROL - EUROPEAN ORGANISATION FOR THE SAFETY OF AIR NAVIGATION (EUROCONTROL)**, *N/A, established in Rue de la Fusée 96, BRUXELLES 1130, Belgium, not applicable as ‘beneficiary not receiving JU funding’ (see Article 9),*
9. **LEONARDO - FINMECCANICA SPA (FINMECCANICA)** SPA, 7031/CF00401990585, established in PIAZZA MONTE GRAPPA 4, ROMA 00195, Italy, IT00881841001
10. **HONEYWELL AEROSPACE (Honeywell SAS)** SAS, 340797919, established in 4 AVENUE SAINT GRANIER, TOULOUSE 31300, France, FR92340797919
11. **INDRA SISTEMAS SA (INDRA)** SA, M11339, established in AVENIDA DE BRUSELAS 35, ALCOBENDAS MADRID 28108, Spain, ESA28599033
12. **STIFTELSEN SINTEF (SINTEF (NATMIG))** NO1, 948007029, established in STRINDVEIEN 4, TRONDHEIM 7034, Norway, NO948007029MVA
13. **FLUGHAFEN MUNCHEN GMBH (MUC (SEAC2020))** GMBH, HRB5448, established in NORDALLEE 25, MUNCHEN 85326, Germany, DE129352365
14. **FREQUENTIS AG (FRQ (FSP))** AG, FN72115B, established in Innovationsstrasse 1, WIEN 1100, Austria, ATU14715600
15. **THALES AIR SYSTEMS SAS (THALES AIR SYS)** SAS, 319159877, established in AVENUE CHARLES LINDBERGH 3, RUNGIS 94150, France, FR15319159877
16. **STICHTING NATIONAAL LUCHT- EN RUIMTEVAARTLABORATORIUM (NLR (AT-One))** NL6, 41150373, established in Anthony Fokkerweg 2, AMSTERDAM 1059CM, Netherlands, NL002760551B01
17. **DIRECTION DES SERVICES DE LA NAVIGATION AERIENNE (DSNA)**, 120064019, established in 50 RUE HENRY FARMAN, PARIS 75720, France, FR29120064019
18. **THALES AVIONICS SAS (THALES AVIONICS)** SAS, 612039495, established in 19-21 AVENUE MORANE-SAULNIER, VELIZY-VILLACOUBLAY 78140, France, FR65612039495
19. **AIRTEL ATN LIMITED (AIRTEL (NATMIG))** LTD, 287698, established in 2 HARBOUR SQUARE CROFTON ROAD, DUN LOAGHAIRE DUBLIN A96D6R0, Ireland, IE8287698U
20. **FLUGHAFEN ZURICH AG (ZRH (SEAC2020))** AG, CHE101921104, established in FLUGHAFEN KLOTEN, ZURICH 8058, Switzerland, CHE101921104MWST
21. **HUNGAROCONTROL MAGYAR LEGIFORGALMI SZOLGALAT ZARTKORUEN MUKODO RESZVENYTARSASAG (HC (FSP))** RT, 0110045570, established in IGLO UTCA 33 35, BUDAPEST 1185, Hungary, HU13851325
22. **DEUTSCHES ZENTRUM FUER LUFT - UND RAUMFAHRT EV (DLR (AT-One))** EV, VR2780, established in Linder Hoehe, KOELN 51147, Germany, DE121965658
23. **POLSKA AGENCJA ZEGLUGI POWIETRZNEJ (PANSA (B4))**, 140886771, established in UL. WIEZOWA 8, WARSZAWA 02 147, Poland, PL5222838321
24. **LETOVE PREVADZKOVE SLUZBY SLOVENSKEJ REPUBLIKY, STATNY PODNIK (LPS SR (B4))** SK9, 35778458, established in IVANSKA CESTA 93, BRATISLAVA 823 07, Slovakia, SK2020244699
25. **VALSTYBES IMONE ORO NAVIGACIJA (ON (B4))** LT7, 210060460, established in RODUNIOS KEL 2, VILNIAUS 02188, Lithuania, LT100604610
26. **CROATIA CONTROL, CROATIAN AIR NAVIGATION SERVICES LTD (CCL/COOPANS)** DOO, 080328617, established in RUDOLFA FIZIRA 2, VELIKA GORICA 10410, Croatia, HR33052761319



27. **UDARAS EITLIOCHTA NA HEIREANN THE IRISH AVIATION AUTHORITY (IAA/COOPANS)** LTD, 211082, established in D'OLIER STREET 11-12 THE TIMES BUILDING, DUBLIN D02 T449, Ireland, IE8211082B
28. **LUFTFARTSVERKET (LFV/COOPANS)**, 2021000795, established in HOSPITALSGATAN 30, NORRKOPING 602 27, Sweden, SE202100079501
29. **NAVIAIR (Naviair/COOPANS)** DK18, 26059763, established in NAVIAIR ALLE 1, KASTRUP 2770, Denmark, DK26059763
30. **SAAB AKTIEBOLAG (SAAB (NATMIG))** AB, 5560360793, established in ., LINKOPING 58188, Sweden, SE556036079301
31. **AEROPORTS DE PARIS (ADP (SEAC2020))** FR39, 552016628, established in BOULEVARD RASPAIL 291, PARIS 75014, France, FR33552016628
32. **HEATHROW AIRPORT LIMITED (HAL (SEAC2020))** LTD, 1991017, established in NELSON ROAD THE COMPASS CENTRE HOUNSLOW, LONDON TW6 2GW, United Kingdom, GB927365404
33. **SCHIPHOL NEDERLAND B.V. (SNBV (SEAC2020))** BV, 34166584, established in EVERT VAN DE BEEKSTRAAT 202, LUCHTHAVEN SCHIPHOL 1118CP, Netherlands, NL810336406B01
34. **SWEDAVIA AB (Swed(SEAC2020))** AB, 5567970818, established in SWEDAVIA, STOCKHOLM ARLANDA 190 45, Sweden, SE556797081801
35. **AVINOR AS (AVINOR-SEAC2020)** AS, 985198292, established in DRONNING EUFEMIAS GATE 6, OSLO 2061, Norway
36. **ATOS BELGIUM (ATOS (FSP))** NV, 401848135, established in DA VINCILAAN 5, ZAVENTEM 1930, Belgium, BE0401848135

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
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

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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 ‘**Integrated Surface Management — PJ03a SUMO**’ (**‘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-2015-2.

ARTICLE 3 — DURATION AND STARTING DATE OF THE ACTION

The duration of the action will be **37 months** as of the first day of the month following the date the Agreement enters into force (see Article 58) (**‘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 contains 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 by transfers of amounts between beneficiaries or between budget categories (or both). This does not require an amendment according to Article 55, 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 2,621,601.23** (two million six hundred and twenty one thousand six hundred and one EURO and twenty three 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 18,464,908.73** (eighteen million four hundred and sixty four thousand nine hundred and eight EURO and seventy three 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 2 (**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**: 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 improper implementation or breach of other 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 improper implementation or breach of other 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 improper implementation of the action or to the seriousness of the 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 its improper implementation of the action or to the seriousness of its 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 2 or calculated by the beneficiary in accordance with its usual cost accounting practices (see Article 6.2, Point A)

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 entities⁵ 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 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:

$$\left\{ \left\{ \text{EUR } 8\,000 \right. \right.$$

divided by

$$\left. \left. \text{the number of annual productive hours (see below)} \right\} \right\},$$

multiplied by

$$\left. \left. \text{the number of hours that the person has worked on the action during the year} \right\} \right\}.$$

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 the beneficiary’s instructions and, unless otherwise agreed with the beneficiary, on the beneficiary’s premises;
- (b) the result of the work carried out belongs to the beneficiary, and

⁵ 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 2 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 2 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 is:

{the 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**: the hourly rate is the amount calculated as follows:

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

The beneficiaries must use the annual personnel costs and the number of annual productive hours for each financial year covered by the reporting period. 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;

- (b) for personnel costs declared on the basis of **unit costs**: 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 2 (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’⁶ 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 infrastructure⁷);
- (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.

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.

⁶ **‘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.

⁷ For the definition, see Article 2(6) of Regulation (EU) No 1291/2013 of the European Parliament and of the Council of 11 December 2013 establishing Horizon 2020 - the Framework Programme for Research and Innovation (2014-2020) (OJ L 347, 20.12.2013 p.104)-(**‘Horizon 2020 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’.

Beneficiaries receiving an operating grant⁸ financed by the EU or Euratom budget cannot declare indirect costs for the period covered by the operating grant.

F. Specific cost category(ies)

Not applicable

6.3 Conditions for costs of linked third parties to be eligible

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

⁸ 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 (OJ L 218, 26.10.2012, p.1) (‘**Financial Regulation No 966/2012**’): ‘**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.

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.

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).

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 not receiving JU funding must implement the action tasks attributed to them in Annex 1 according to 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 (with the exception of additional exploitation obligations), 28.2, 30.3, 31.5, 40, 42, 43, 44, 47 and 48 do not apply to these beneficiaries.

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

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.

9.2 Consequences of non-compliance

If a beneficiary not receiving JU funding breaches any of its obligations under this Article, its participation of 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/EC⁹ or ‘contracting entities’ within the meaning of Directive 2004/17/EC¹⁰ must comply with the applicable national law on public procurement.

⁹ 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

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.

¹⁰ 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).

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 ‘contracting entities’ within the meaning of Directive 2004/17/EC 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**¹² and **third parties with a legal link to a beneficiary**¹³ (**‘linked third parties’**) may implement the action tasks attributed to them in Annex 1:

- CONSORZIO SICTA SISTEMI INNOVATIVI PER IL CONTROLLO DEL TRAFFICO AEREO (sicta), affiliated or linked to ENAV, 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
- I.D.S. - INGEGNERIA DEI SISTEMI - S.P.A. (I.D.S.), affiliated or linked to ENAV
- NAV CANADA (NAV CANADA), affiliated or linked to ENAV
- AIRBUS OPERATIONS SAS (AI OPS), affiliated or linked to AIRBUS, if it has accepted joint and several liability with the beneficiary (see Annex 3a)

¹² For the definition, see Article 2.1(2) of the 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.

¹³ ‘**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.

- INGENIERIA Y ECONOMIA DEL TRANSPORTE S.A. (INECO), affiliated or linked to ENAIRE, if it has accepted joint and several liability with the beneficiary (see Annex 3a)
- INGENIERA DE SISTEMAS PARA LA DEFENSA DE ESPANA SA-ISDEFE (ISDEFE), affiliated or linked to ENAIRE, if it has accepted joint and several liability with the beneficiary (see Annex 3a)
- TELESPAZIO SPA (TELESPAZIO SPA), affiliated or linked to FINMECCANICA
- DARJAVNO PREDPRIYATIE RAKOVODSTVO NA VAZDUSHNOTO DVIJENIE TPP (BULATSA), affiliated or linked to FINMECCANICA
- SELEX ES GMBH (Selex ES GmbH), affiliated or linked to FINMECCANICA
- E-GEOS SPA (E-GEOS SPA), affiliated or linked to FINMECCANICA
- HONEYWELL INTERNATIONAL INC (HI inc), affiliated or linked to Honeywell SAS, if it has accepted joint and several liability with the beneficiary (see Annex 3a)
- HONEYWELL INTERNATIONAL SRO (HI sro), affiliated or linked to Honeywell SAS, if it has accepted joint and several liability with the beneficiary (see Annex 3a)
- INDRA NAVIA AS (Indra Navia), affiliated or linked to INDRA, if it has accepted joint and several liability with the beneficiary (see Annex 3a)
- FREQUENTIS ROMANIA SRL (FRQ RO), affiliated or linked to FRQ (FSP)
- THALES SYSTEMES AEROPORTES SAS (THALES-SYS-AER), affiliated or linked to THALES AIR SYS
- ECOLE NATIONALE DE L AVIATION CIVILE (ENAC), affiliated or linked to DSN

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 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 '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 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 Articles 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 **direct personnel costs declared as 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, Point A.

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 13
- RP2: from month 14 to month 25
- RP3: from month 26 to month 37

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 also 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**’;

- (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 key performance indicators and monitoring requirements of Horizon 2020 and the JU;

(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’** (see Annex 4), 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’** (see Annex 4), 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, Point A).

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 — Suspension of the payment deadline — Termination

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 sent by the JU, the Agreement may be terminated (see Article 50).



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 **2,097,280.98** (two million ninety seven thousand two hundred and eighty EURO and ninety eight 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 **131,080.06** (one hundred and thirty one thousand eighty EURO and six 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:

{final grant amount (see Article 5.3)

minus

{pre-financing and interim payments (if any) made}}.

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 beneficiary's consent — against any other amount owed by the 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) if the minimum number of beneficiaries set out in the call for proposals has acceded to the Agreement (see Article 56) and
- (b) 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: UNICREDIT SPA

Address of branch: 16, LARGO ANGELO FOCHETTI ROMA, Italy

Full name of the account holder: ENAV SPA

Full account number (including bank codes):

IBAN code: IT32L0200805346000500078681

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 883/2013¹⁸ and No 2185/96¹⁹, Article 110 of the Financial Rules of the JU²⁰ (and in accordance with their provisions and procedures), 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 Financial Rules of the JU, 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.

¹⁸ 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).

¹⁹ 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).

²⁰ The SESAR JU Financial Rules are made publicly available on the SESAR JU official website.

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’**).

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 amounts to be rejected will be determined on the basis of the revised financial statements, subject to their approval.

If the JU or the Commission 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, it will formally notify the beneficiary concerned the application of the initially notified correction rate for extrapolation.

If the JU or the Commission accepts the alternative correction method proposed by the beneficiary concerned, it will formally notify the application of the accepted alternative correction method.

22.5.3.2 If the findings concern **improper implementation** or a **breach of another obligation**: 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.

If the JU or the Commission does not receive any observations or does not accept the observations or the proposed alternative flat-rate, it will formally notify the beneficiary concerned the application of the initially notified flat-rate.

If the JU or the Commission accepts the alternative flat-rate proposed by the beneficiary concerned, it will formally notify the application of the accepted 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 activities²¹.

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.

²¹ 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.



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

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 entities²² established in an EU Member State or **‘associated country’**²³, 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 the complementary beneficiary²⁴ (see Article 2).

Not applicable

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

²² For the definition, see ‘affiliated entity’ footnote (Article 14.1).

²³ 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.

²⁴ **‘Complementary beneficiary’** means a beneficiary of the complementary grant agreement.



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).

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 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 FUNDING

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 funding

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 under grant agreement No 734153 under European Union’s Horizon 2020 research and innovation programme”.

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.



In addition, the beneficiaries must — up to four years after the period set out in Article 3 — comply with the additional exploitation obligations set out in Annex 1.

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 funding

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 under grant agreement No 734153 under European Union’s Horizon 2020 research and innovation programme”.

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 FUNDING

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).

In addition, the beneficiaries must comply with the additional dissemination obligations set out in Annex 1.

Moreover, the beneficiaries must — up to four years after the period set out in Article 3 — disseminate any technical specifications of the results that are needed for interoperability.

Moreover, the beneficiaries must — up to four years after the period set out in Article 3 — disseminate the deliverables relating to cross-border interoperability (see Annex 1) and any results needed for cross-border interoperability (in particular common technical specifications and software components).

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 funding — 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;
- (b) display the EU emblem and
- (c) include the following text:

“This project has received funding from the SESAR Joint Undertaking under grant agreement No 734153 under European Union’s Horizon 2020 research and innovation programme”.

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 or 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 rights under Article 31 and
- (b) the beneficiary complies with its additional exploitation obligations (see Article 28.1 and Annex 1).

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, EU institutions, bodies, offices or agencies and EU Member States

The beneficiaries must give access to their results — on a royalty-free basis — to EU institutions, 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 and 31.3 — access to their results to complementary beneficiaries²⁴, for the purposes of the complementary grant agreement(s) (see Article 2).

The beneficiaries must give third parties — up to four years after the period set out in Article 3 and under fair and reasonable conditions (see Article 25.3) — access to their results needed for interoperability.

The beneficiaries must give third parties — up to four years after the period set out in Article 3 and on a royalty-free basis — access to their results needed for interoperability, in particular for implementing the results in EU Member States or associated countries that are not participating in the action.

Beneficiaries must give access to software components under an EU public licence (or compatible licences) and must comply with any additional requirements set out in Annex 1.

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 Researchers²⁵, 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.

²⁴ ‘**Complementary beneficiary**’ means a beneficiary of a complementary grant agreement.

²⁵ 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).



32.2 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 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

34.1 Obligation to comply with ethical principles

The beneficiaries must carry out the action in compliance with:

- (a) ethical principles (including the highest standards of research integrity — as set out, for instance, in the European Code of Conduct for Research Integrity²⁶ — and including, in particular, avoiding fabrication, falsification, plagiarism or other research misconduct) 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.

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.

²⁶ The European Code of Conduct for Research Integrity of ALLEA (All European Academies) and ESF (European Science Foundation) of March 2011.

http://www.esf.org/fileadmin/Public_documents/Publications/Code_Conduct_ResearchIntegrity.pdf



34.2 Activities raising ethical issues

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

Before the beginning of an activity raising an ethical issue, the coordinator must submit (see Article 52) to the JU copy of:

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

If these documents are not in English, the coordinator must also submit an English summary of the submitted opinions, notifications and authorisations (containing, if available, the conclusions of the committee or authority concerned).

If these documents are specifically requested for the action, the request must contain an explicit reference to the action title. The coordinator must submit a declaration by each beneficiary concerned that all the submitted documents cover the action tasks.

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 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 or 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 results

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 FUNDING

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 funding — 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;
- (b) display the EU emblem and
- (c) include the following text:



For communication activities: *“This project has received funding from the SESAR Joint Undertaking under grant agreement No 734153 under European Union’s Horizon 2020 research and innovation programme”*.

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 under grant agreement No 734153 under European Union’s Horizon 2020 research and innovation programme”*.

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 or 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 that it receives 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.

However, 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.

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).

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.

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).

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 (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.

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 responsibilities 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 Articles 44, 45 and 46.

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 '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 the above-mentioned tasks to any other beneficiary or subcontract them to any third party.

41.3 Internal arrangements between beneficiaries — Consortium agreement

Not applicable

41.4 Relationship with complementary beneficiaries — Collaboration agreement

Not applicable

41.5 Relationship with partners of a joint action — Coordination agreement

Not applicable

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

SECTION 1 REJECTION OF COSTS — REDUCTION OF THE GRANT — RECOVERY **— PENALTIES**

ARTICLE 42 — REJECTION OF INELIGIBLE COSTS

42.1 Conditions

42.1.1 The JU will — 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).

42.1.2 The rejection may also be based on the **extension of findings from other grants to this grant**, under the conditions set out in Article 22.5.2.

42.2 Ineligible costs to be rejected — Calculation — Procedure

Ineligible costs will be rejected in full.

If the JU rejects costs **without reduction of the grant** (see Article 43) or **recovery of undue amounts** (see Article 44), it will formally notify the coordinator or beneficiary concerned 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 JU rejects costs **with reduction of the grant** or **recovery of undue amounts**, it will formally notify the rejection in the ‘**pre-information letter**’ on reduction or recovery set out in Articles 43 and 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 — **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

43.1.1 The JU may — **at the payment of the balance** or **afterwards** — reduce the maximum grant amount (see Article 5.1), if the action has not been implemented properly as described in Annex 1 or another obligation under the Agreement has been breached.

43.1.2 The JU may also reduce the maximum grant amount on the basis of the **extension of findings from other grants to this grant**, under the conditions set out in Article 22.5.2.

43.2 Amount to be reduced — Calculation — Procedure

The amount of the reduction will be proportionate to the improper implementation of the action or to the seriousness of the breach.

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 at the time of **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:

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).

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

{ { {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:

{ {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 AND FINANCIAL PENALTIES

45.1 Conditions

Under Articles 84 and 89 of the Financial Rules of the JU (read in conjunction with Articles 109 and 131(5) of the Financial Regulation No 966/2012) the JU may impose **administrative** and **financial penalties** if a beneficiary:

- (a) has committed substantial errors, irregularities or fraud or is in serious breach of its obligations under the Agreement or
- (b) has made false declarations about information required under the Agreement or for the submission of the proposal (or has not supplied such information).

Each beneficiary is responsible for paying the financial penalties imposed on it.

Under Articles 84 and 89 of the Financial Rules of the JU (read in conjunction with Article 109(3) of the Financial Regulation No 966/2012), the JU may — under certain conditions and limits — publish decisions imposing administrative or financial penalties.

45.2 Duration — Amount of penalty — Calculation

Administrative penalties exclude the beneficiary from all JU contracts and grants for a maximum of five years from the date the infringement is established by the JU.

If the beneficiary commits another infringement within five years of the date the first infringement is established, the JU may extend the exclusion period up to 10 years.

Financial penalties will be between 2% and 10% of the maximum JU contribution indicated, for the beneficiary concerned, in the estimated budget (see Annex 2).

If the beneficiary commits another infringement within five years of the date the first infringement is established, the JU may increase the rate of financial penalties to between 4% and 20%.

45.3 Procedure

Before applying a penalty, the JU will formally notify the beneficiary concerned:

- informing it of its intention to impose a penalty, its duration or amount and the reasons why and
- inviting it to submit observations within 30 days.

If the JU does not receive any observations or decides to impose the penalty despite of observations it has received, it will formally notify **confirmation** of the penalty to the beneficiary concerned and — in case of financial penalties — deduct the penalty from the payment of the balance or formally notify a **debit note**, specifying 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 may **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 **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.

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

46.2.1 Conditions

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.

Each beneficiary is responsible for paying the damages claimed from it.

46.2.2 Amount of damages - Calculation

The amount the JU can claim from a beneficiary will correspond to the damage caused by that beneficiary.

46.2.3 Procedure

Before claiming damages, the JU will formally notify the beneficiary concerned:

- informing it of its intention to claim damages, the amount and the reasons why and
- inviting it to submit observations within 30 days.

If the JU does not receive any observations or decides to claim damages despite the observations it has received, it will formally notify **confirmation** of the claim for damages and a **debit note**, specifying 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 may **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 **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.

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 reports 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, in whole or in part, the pre-financing payment and interim payments for one or more beneficiaries or the payment of the balance for all beneficiaries, if a beneficiary:

- (a) has committed or is suspected of having committed substantial errors, irregularities, fraud or serious breach of obligations in the award procedure or under this Agreement or
- (b) 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).

48.2 Procedure

Before suspending payments, the JU will formally notify the coordinator:

- 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.

During the suspension, the periodic report(s) (see Article 20.3) must not contain any individual financial statements from the beneficiary concerned and its linked third parties. When the JU resumes payments, the coordinator may include them in the next 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:

- (a) if a beneficiary has committed or is suspected of having committed substantial errors, irregularities, fraud or serious breach of obligations in the award procedure or under this Agreement;
- (b) if a beneficiary 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) if 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:

- 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 by the coordinator (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 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 and 40) 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 **calculate** — on the basis of the periodic reports, the termination report and the report on the distribution of payments — if the (pre-financing and interim) payments received by the beneficiary concerned exceed the beneficiary’s JU contribution (calculated by applying the reimbursement rate(s) to the eligible costs declared by the beneficiary and its linked third parties 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.

- 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 is 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 and 40) 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:

- one or more beneficiaries do not accede to the Agreement (see Article 56);
- 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;
- 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);
- implementation of the action is prevented by force majeure (see Article 51) or suspended by the coordinator (see Article 49.1) and either:
 - resumption is impossible, or
 - the necessary changes to the Agreement would call into question the decision awarding the grant or breach the principle of equal treatment of applicants;
- 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;
- 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 affecting the EU's or JU's financial interests;
- (l) a beneficiary (or a natural person who has the power to represent or take decisions on its behalf) has — in the award procedure or under the Agreement — committed:
 - (i) substantial errors, irregularities, fraud or
 - (ii) serious breach of obligations, including improper implementation of the action, submission of false information, failure to provide required information, breach of ethical principles;
- (m) a beneficiary 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'**).

50.3.2 Procedure

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

- 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 **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), and (l.ii) 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 by the coordinator.

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 the 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 and financial penalties (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 and 40) 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 **calculate** — on the basis of the periodic reports, the termination report and the report on the distribution of payments — if the (pre-financing and interim) payments received by the beneficiary concerned exceed the beneficiary's JU contribution (calculated by applying the reimbursement rate(s) to the eligible costs declared by the beneficiary and its linked third parties 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.

- 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 the amount unduly received, 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 and 40) 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.



Until the payment of the balance: all communication must be made through the electronic exchange system and using the forms and templates provided there.

After the payment of the balance: formal notifications must be made by registered post with proof of delivery ('formal notification on paper').

Communications in the electronic exchange system must be made by persons authorised according to the 'Terms and Conditions of Use of the electronic exchange system'. 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 Terms and Conditions of Use of the electronic exchange system).

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/research/participants/portal/desktop/en/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 following address:

SESAR Joint Undertaking
B-1049 Brussels Belgium

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 '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;

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).

- 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.

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.

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.



57.2 Dispute settlement

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 STIFTELSEN SINTEF, FLUGHAFEN ZURICH AG, AVINOR AS, 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.

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 or financial penalties 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.



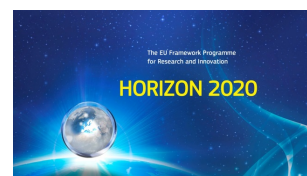
ARTICLE 58 — ENTRY INTO FORCE OF THE AGREEMENT

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 — 734153 — PJ03a SUMO

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1.1. The project summary

Project Number ¹	734153	Project Acronym ²	PJ03a SUMO
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One form per project

General information

Project title ³	Integrated Surface Management
Starting date ⁴	The first day of the month after the signature by the JU
Duration in months ⁵	37
Call (part) identifier ⁶	H2020-SESAR-2015-2
Topic	SESAR.IR-VLD.Wave1-05-2015 Integrated Surface Management
Fixed EC Keywords	APT Airport Traffic Management
Free keywords	Airport Operation, Predictability, Taxi time accuracy, Routing and Planning, SWIM, GNSS, Data Link Service, Virtual Stop Bars, AGL, Reduced visibility Conditions, RPAS.

Abstract ⁷

The project PJ.03a is part of the SESAR 2020 Multi Annual Program for the period 2016-2019. It is allocated to the Industrial Research & Validation phase, developed under the SJU Private Public Partnership and will contribute to the key feature High Performing Airport Operations. The future European ATM system relies on full integration of airports as nodes into the network. In this context, PJ.03a is intended to identify and validate operational and technological solutions aiming at enhancing airport operations.

One of the main objectives is to improve the predictability of ground operations in all weather conditions. The implementation of collaborative decision making process involving all relevant stakeholders will ensure an optimization of airport resources allocation. This feature will rely on enhanced integration between aircraft and ground systems which is expected to be achieved through the full implementation of the SWIM concept.

It is also important to increase the efficiency and safety of airport operations by improving the current infrastructures and CNS systems. The availability of more accurate navigation information through the use of GNSS (augmented) systems, an automated switching of taxiway lights and (virtual) stop bars according to the AGL service, data link information exchange between controllers and pilots/vehicle and the on-board availability of advanced vision systems will result in an increased situational awareness with an impact on safety.

PJ.03a will also focus on the integration of RPAS surface operations into airport operations to ensure, to the maximum extent possible, their compliance with the existing rules and regulations defined for an environment dominated by manned aviation.

All those aspects will be assessed through ad hoc validation activities (both FTS and RTS) in different airport environments with different validation platforms to increase the significance of the results based on a broad range of representative layouts.

1.2. List of Beneficiaries

Project Number ¹	734153	Project Acronym ²	PJ03a SUMO
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List of Beneficiaries

No	Name	Short name	Country	Project entry month ⁸	Project exit month
1	ENAV SPA	ENAV	Italy	1	37
2	AIRBUS SAS	AIRBUS	France	1	37
3	RIZENI LETOVEHO PROVOZU CESKE REPUBLIKY STATNI PODNIK	ANS CR (B4)	Czech Republic	1	37
4	AUSTRO CONTROL OSTERREICHISCHE GESELLSCHAFT FUR ZIVILLUFTFAHRT MBH	ACG/COOPANS	Austria	1	37
5	DASSAULT AVIATION	DASSAULT	France	1	37
6	DFS DEUTSCHE FLUGSICHERUNG GMBH	DFS	Germany	1	37
7	ENTIDAD PUBLICA EMPRESARIAL ENAIRE	ENAIRE	Spain	1	37
8	EUROCONTROL - EUROPEAN ORGANISATION FOR THE SAFETY OF AIR NAVIGATION	EUROCONTROL	Belgium	1	37
9	LEONARDO - FINMECCANICA SPA	FINMECCANICA	Italy	1	37
10	HONEYWELL AEROSPACE	Honeywell SAS	France	1	37
11	INDRA SISTEMAS SA	INDRA	Spain	1	37
12	STIFTELSEN SINTEF	SINTEF (NATMIG)	Norway	1	37
13	FLUGHAFEN MUNCHEN GMBH	MUC (SEAC2020)	Germany	1	37
14	FREQUENTIS AG	FRQ (FSP)	Austria	1	37
15	THALES AIR SYSTEMS SAS	THALES AIR SYS	France	1	37
16	STICHTING NATIONAAL LUCHT- EN RUIMTEVAARTLABORATORIUM	NLR (AT-One)	Netherlands	1	37
17	DIRECTION DES SERVICES DE LA NAVIGATION AERIENNE	DSNA	France	1	37
18	THALES AVIONICS SAS	THALES AVIONICS	France	1	37
19	AIRTEL ATN LIMITED	AIRTEL (NATMIG)	Ireland	1	37
20	FLUGHAFEN ZURICH AG	ZRH (SEAC2020)	Switzerland	1	37
21	HUNGAROCONTROL MAGYAR LEGIFORGALMI SZOLGALAT ZARTKORUEN MUKODO RESZVENYTARSASAG	HC (FSP)	Hungary	1	37
22	DEUTSCHES ZENTRUM FUER LUFT - UND RAUMFAHRT EV	DLR (AT-One)	Germany	1	37
23	POLSKA AGENCJA ZEGLUGI POWIETRZNEJ	PANSA (B4)	Poland	1	37

1.2. List of Beneficiaries

No	Name	Short name	Country	Project entry month ⁸	Project exit month
24	LETOVE PREVADZKOVE SLUZBY SLOVENSKEJ REPUBLIKY, STATNY PODNIK	LPS SR (B4)	Slovakia	1	37
25	VALSTYBES IMONE ORO NAVIGACIJA	ON (B4)	Lithuania	1	37
26	CROATIA CONTROL, CROATIAN AIR NAVIGATION SERVICES LTD	CCL/COOPANS	Croatia	1	37
27	UDARAS EITLIOCHTA NA HEIREANN THE IRISH AVIATION AUTHORITY	IAA/COOPANS	Ireland	1	37
28	LUFTFARTSVERKET	LFV/COOPANS	Sweden	1	37
29	NAVIAIR	Naviair/COOPANS	Denmark	1	37
30	SAAB AKTIEBOLAG	SAAB (NATMIG)	Sweden	1	37
31	AEROPORTS DE PARIS	ADP (SEAC2020)	France	1	37
32	HEATHROW AIRPORT LIMITED	HAL (SEAC2020)	United Kingdom	1	37
33	SCHIPHOL NEDERLAND B.V.	SNBV (SEAC2020)	Netherlands	1	37
34	SWEDAVIA AB	Swed(SEAC2020)	Sweden	1	37
35	AVINOR AS	AVINOR-SEAC2020	Norway	1	37
36	ATOS BELGIUM	ATOS (FSP)	Belgium	1	37

1.3. Workplan Tables - Detailed implementation

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 - ENAV	42.51	1	37
WP2	PJ.03a-01: Enhanced Guidance Assistance to Aircraft on the Airport Surface Combined with Routing	1 - ENAV	1,179.62	2	32
WP3	PJ.03a-03: Enhanced navigation and accuracy in low visibility conditions (LVC) on the airport surface	10 - Honeywell SAS	167.06	1	37
WP4	PJ.03a-04: Enhanced Visual Operations	10 - Honeywell SAS	326.01	1	37
WP5	PJ.03a-09: Surface operations by RPAS	1 - ENAV	107.36	4	36
WP6	Ethics requirements	1 - ENAV	N/A	1	37
Total			1,822.56		

1.3.2. WT2 list of deliverables

Deliverable Number ¹⁴	Deliverable Title	WP number ⁹	Lead beneficiary	Type ¹⁵	Dissemination level ¹⁶	Due Date (in months) ¹⁷
D1.1	Project Management Plan	WP1	1 - ENAV	Report	Public	5
D1.2	Final Project Report	WP1	1 - ENAV	Report	Public	35
D1.3	Q4 2016	WP1	1 - ENAV	Report	Public	2
D1.4	Q1 2017	WP1	1 - ENAV	Report	Public	5
D1.5	Q2 2017	WP1	1 - ENAV	Report	Public	8
D1.6	Q3 2017	WP1	1 - ENAV	Report	Public	11
D1.7	Q4 2017	WP1	1 - ENAV	Report	Public	14
D1.8	Q1 2018	WP1	1 - ENAV	Report	Public	17
D1.9	Q2 2018	WP1	1 - ENAV	Report	Public	20
D1.10	Q3 2018	WP1	1 - ENAV	Report	Public	23
D1.11	Q4 2018	WP1	1 - ENAV	Report	Public	26
D1.12	Q1 2019	WP1	1 - ENAV	Report	Public	29
D1.13	Q2 2019	WP1	1 - ENAV	Report	Public	32
D1.14	Q3 2019	WP1	1 - ENAV	Report	Public	35
D2.1	Solution PJ.03a-01: V2 Data Pack	WP2	1 - ENAV	Report	Public	30
D3.1	Solution PJ.03a-03: V2 Data Pack	WP3	10 - Honeywell SAS	Report	Public	35
D4.1	Solution PJ.03a-04: V3 Data Pack	WP4	10 - Honeywell SAS	Report	Public	35
D5.1	Solution PJ.03a-09: V1 Data Pack	WP5	1 - ENAV	Report	Public	17
D5.2	Solution PJ.03a-09: V2 Data Pack	WP5	1 - ENAV	Report	Public	34
D6.1	OEI - POPD - Requirement No. 1	WP6	1 - ENAV	Ethics	Confidential, only for members of the consortium (including the Commission Services)	5
D6.2	M - Requirement No. 2	WP6	1 - ENAV	Ethics	Confidential, only for members of the consortium (including the Commission Services)	5

1.3.3. WT3 Work package descriptions

Work package number ⁹	WP1	Lead beneficiary ¹⁰	1 - ENAV
Work package title	Project Management		
Start month	1	End month	37

Objectives

Coordination and monitoring of project's progress to accomplish the main objectives regarding time and resources. Coordinate with SESAR 2020 programme and fulfil the administrative requirements of the grant agreement.

Description of work and role of partners

WP1 - Project Management [Months: 1-37]

ENAV

This Work Package identifies all the management activities required to control project progress with respect to project objectives, timetable and acceptance of deliverables. The produced Project Management Plan is expected to include a project quality plan as well as a communication plan to manage the dissemination of the results and external communication. To summarize, the effort allocated to this Work Package will be used to manage the project according to the grant agreement.

ENAV

As Project Coordinator, ENAV will monitor project progress throughout its lifecycle. To this end, ENAV will be responsible for the elaboration of the Project Management Plan whose main scope is to define how the project is executed, monitored, controlled and closed. Furthermore, ENAV will produce quarterly reports to progressively monitor the status of the project and the Final Project Report to summarize project's goals and achievements.

SICTA

As a natural continuation, ENAV intends to propose its participation in the SESAR 2020 Programme jointly with SICTA which is managing also, on behalf of ENAV, a number of key SESAR projects thanks to its highly skilled professionals like project managers, Air Traffic Management experts as well as operational concept and simulation experts. whose contribution is envisaged to be provided in all projects where ENAV has expressed interest. Therefore, the participation of SICTA is quite significant from an ENAV Group perspective considering it brings an important piece of transversal technical, operational and management expertise. On the basis of the considerations and skills depicted above and taking into account that SICTA, as part of the ENAV Group, shall be considered to all effects an ENAV department, the ENAV and SICTA in kind contributions (equally shared) must be considered as a single block.

Participation per Partner

Partner number and short name	WP1 effort
1 - ENAV	5.02
sicta	37.49
Total	42.51

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 - ENAV	Report	Public	5
D1.2	Final Project Report	1 - ENAV	Report	Public	35

List of deliverables

Deliverable Number¹⁴	Deliverable Title	Lead beneficiary	Type¹⁵	Dissemination level¹⁶	Due Date (in months)¹⁷
D1.3	Q4 2016	1 - ENAV	Report	Public	2
D1.4	Q1 2017	1 - ENAV	Report	Public	5
D1.5	Q2 2017	1 - ENAV	Report	Public	8
D1.6	Q3 2017	1 - ENAV	Report	Public	11
D1.7	Q4 2017	1 - ENAV	Report	Public	14
D1.8	Q1 2018	1 - ENAV	Report	Public	17
D1.9	Q2 2018	1 - ENAV	Report	Public	20
D1.10	Q3 2018	1 - ENAV	Report	Public	23
D1.11	Q4 2018	1 - ENAV	Report	Public	26
D1.12	Q1 2019	1 - ENAV	Report	Public	29
D1.13	Q2 2019	1 - ENAV	Report	Public	32
D1.14	Q3 2019	1 - ENAV	Report	Public	35

Description of deliverables

The main expected deliverables refer to the delivery of the Project Management Plan (PMP) and of the quarterly reports to monitor project progress throughout its lifecycle. The elaboration of the Final Project Report is planned to summarize project's goals and achievements.

D1.1 : Project Management Plan [5]

The main scope of this deliverable is to define how the project is executed, monitored, controlled and closed

D1.2 : Final Project Report [35]

This document summarizes project's goals and achievements. The link between the project activities and SE\$AR outcomes are highlighted as well.

D1.3 : Q4 2016 [2]

PJ.03a Quarterly Report Q4 2016

D1.4 : Q1 2017 [5]

PJ.03a Quarterly Report Q1 2017

D1.5 : Q2 2017 [8]

PJ.03a Quarterly Report Q2 2017

D1.6 : Q3 2017 [11]

PJ.03a Quarterly Report Q3 2017

D1.7 : Q4 2017 [14]

PJ.03a Quarterly Report Q4 2017

D1.8 : Q1 2018 [17]

PJ.03a Quarterly Report Q1 2018

D1.9 : Q2 2018 [20]

PJ.03a Quarterly Report Q2 2018

D1.10 : Q3 2018 [23]

PJ.03a Quarterly Report Q3 2018

D1.11 : Q4 2018 [26]
 PJ.03a Quarterly Report Q4 2018
 D1.12 : Q1 2019 [29]
 PJ.03a Quarterly Report Q1 2019
 D1.13 : Q2 2019 [32]
 PJ.03a Quarterly Report Q2 2019
 D1.14 : Q3 2019 [35]
 PJ.03a Quarterly Report Q3 2019

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 - ENAV
Work package title	PJ.03a-01: Enhanced Guidance Assistance to Aircraft on the Airport Surface Combined with Routing		
Start month	2	End month	32

Objectives

The main objective of the Solution PJ.03a-01 is to provide both pilots and vehicle drivers with an enhanced guidance assistance to support their navigation on the airport surface. Guidance assistance encompasses the completeness of the services provided to the concerned stakeholders as well as the improvement of airport infrastructures.

Description of work and role of partners

WP2 - PJ.03a-01: Enhanced Guidance Assistance to Aircraft on the Airport Surface Combined with Routing

[Months: 2-32]

ENAV, AIRBUS, ANS CR (B4), ACG/COOPANS, DASSAULT, DFS, EUROCONTROL, FINMECCANICA, INDRA, SINTEF (NATMIG), MUC (SEAC2020), FRQ (FSP), THALES AIR SYS, NLR (AT-One), DSNA, THALES AVIONICS, ZRH (SEAC2020), HC (FSP)

The main topic expected to be addressed by the Solution PJ.03a-01 concerns the improvement of efficiency and predictability of surface operations. Starting from SESAR 1 outcomes, this Solution is expected to focus on the implementation of operational services (such as AGL, data link) to provide an enhanced guidance assistance to mobiles on the airport surface combined with routing.

ENAV

As Solution Leader, ENAV will be responsible for the coordination of all the planned activities. Furthermore, ENAV will contribute mainly to the production of the operational documents (as OSED and SPR) with a significant participation to the definition of operational and safety requirements. Furthermore, ENAV will participate to the preparation and execution of validation activities by providing its operational support as ANSP.

SICTA

SICTA will support ENAV mainly on the activities concerning the production of the operational documents (as OSED and SPR). That support will include also the identification of the related requirements as well as the definition of ad hoc use cases. Moreover SICTA will support ENAV in the execution of Validation activities. SICTA participation is quite significant from an ENAV perspective considering it brings an important piece of transversal technical, operational and management expertise. On the basis of the considerations and skills depicted above and taking into account that SICTA is the Research Branch of ENAV Group, ENAV and SICTA in kind contribution is to be considered as a single block.

NAV CANADA

NAV CANADA will support ENAV on the execution of the validation activities planned in the solution PJ.03a-01. In detail, NAV CANADA will contribute personnel to collaborate on the design and coding of the solution as well as the adaptation and simulated use of the proposed display. NAV CANADA would develop and integrate the following new prototype technologies into the ENAV TBA3D Tower Simulator platform.

NAIS

In the frame of Solution PJ.03a-01 NAIS will support ENAV validation activities by focusing on the design and development of 3D simplified perspective visualization with dynamically rendered information within the enhanced controller working position. They will also contribute to the definition of an Aerodrome Mapping Database (AMDB) and the analysis of interoperability and standardization aspects of the technical infrastructure (Ground/Ground and Air/Ground).

AIRBUS

AIRBUS SAS will manage globally the support to the PJ03a-01 by contributing to the definition of operational, safety and performance requirements mainly from airborne perspective. Furthermore, AIRBUS will contribute to the definition of the technical specifications which will guide the development of prototypes to be tested during planned validation activities.

The effort of the Beneficiary Airbus SAS is below the effort of its Linked Third Party Airbus Operations SAS for PJ03a. This results from the structure of the company splitted in various legal entities, where the management of Commercial Aircraft Division is handled by Airbus SAS while Airbus Operations SAS hosts the Centre of Competence dealing with ATM systems design.

Airbus Operations SAS

In the context of PJ03a-01 WP2, Airbus Operations SAS will design and test an airborne Taxi Routing solution to support pilot's navigation on the airport surface (AUO-0603-B).

ANS CR (B4)

ANS CR (B4) will contribute with its operational expertise in the planned validation of PJ.03a-01. This will include review of Technical Specifications, Validation Plan and Validation Reports, that will contribute to the system development. For validation activities the ANS CR (B4) will participate together with Eurocontrol and INDRA.

ACG/COOPANS

ACG will contribute to the Solution PJ03a-01 by providing ATM subject matter experts emphasizing on operational work, by focussing on concept and validation work, such as validation plans and reports, OSEDs, SPRs and INTEROPs.

DASSAULT

DASSAULT will mainly contribute to operational concept definition as well as to proof of concept validation by participating to validation exercises and to the analysis of results and preparation of validation reports.

DFS

DFS intends to contribute to the WP2 operational concepts and procedures development, its translation into technical solutions, and validation of the developed improvements. It is intended to continue the work started in SESAR 1 to improve the existing routing and guidance solutions. The routing and guidance information, planned and executed in the DFS A-CWP, will be shared to vehicle drivers and pilots via datalink and AGL services.

DFS will contribute to WP2, providing operational, validation, standardisation and technical expertise as well as validation platform infrastructure. DFS will actively engage in prototype development activities and will lead a V2 validation exercise conducted in collaboration with AIRBUS.

EUROCONTROL

EUROCONTROL will participate to the development of the operational concepts addressed by PJ03a-01 and validation by bringing operational, validation, standardisation and technical expertise as well as validation platform infrastructure.

LEONARDO-FINMECCANICA

In solution PJ03a-01, FINMECCANICA Ground Division will develop an integrated surface management system (including vehicles management) exploiting its experience in the field of airport management, Communication system, avionics systems and satellite applications, while aircraft Division will integrate the ANF prototype into the FINMECCANICA regional cockpit simulator. Through both Aircraft and Ground Divisions, FINMECCANICA will be involved in the execution of dedicated validation activities with the objective to verify and test the Airport Surface Management system (including routing function) and the aircraft guidance.

TELESPAZIO

In the framework of PJ03.a-1, Telespazio will contribute to the build- up of the current solution by prototyping and validating an airport vehicle management and guidance system using MC GNSS augmentation and airport wireless datalink. The solution, opportunely integrated with the FINMECCANICA prototype, will make use of a centralized GPS/EGNOS/GALILEO positioning and integrity system and wireless solution.

BULATSA

In PJ03a, subcontracted activities, focussed in Pj03a-1 solution, to be performed by BULATSA will comprise of validation platform (FINMECCANICA-BULATSA) set up and execution of phased validation activities related to the integrated surface management in airport operational environment.

e-GEOS

In the framework of PJ03.a-1, e-GEOS will be involved in the introduction of a 3D perspective interface for increasing the awareness of controllers in the management of operations based on dynamic rendered Airport Moving Maps on taxiways and runways. The solution will be opportunely integrated with the FINMECCANICA prototype.

INDRA

Indra global contribution will be focused on software and platform definition, development and configuration in order to be used in validation activities. Indra will also contribute in the definition of operational requirements and the validation activities. To summarize, INDRA will manage the contribution to PJ03a-01, coordinate and lead the system design, and support the platform development.

INDRA Navia

Indra Navia has the major role on the platform development for all the validation activities planned by Indra in the PJ03a-01. The platform to be used in this project will mainly build upon Indra Navia's work in SESAR1. Indra Navia will then lead the work on platform development, which is the work requiring most effort.

SINTEF

SINTEF (NATMIG) will prototype the optimization-based real-time routing and scheduling services to be tested during the planned validation activities.

MUC (SEAC2020)

Flughafen München GmbH (SEAC2020) will contribute to Solution PJ03a-01 by bringing in its knowledge and experience of current airport operations management and contributing to the concept development, preparation and execution of validation exercises. Where applicable Flughafen München GmbH (SEAC2020) will provide operational experts for simulation/gaming activities as part of the planned validation exercises.

FREQUENTIS AG

Frequentis AG will contribute essentially to solution PJ.03a-1 and will provide technical expertise to the technical specifications, platform development and configuration, in cooperation with EURCONTROL and NATMIG. Furthermore contribution with air traffic control operational and validation expertise and V2 validation exercise in partnership with HC (FSP), COOPANS members, EUROCONTROL and NATMIG members. Frequentis Romania S.R.L. is integrated into the research and development process of Frequentis AG, hence its development contribution is to be handled as a joint activity. In terms of effort, our specialized affiliates can be treated like departments of Frequentis AG and the contributions are complementary and vital to this project so that the total effort can be seen as joint contribution by the beneficiary.

FRQ RO

Frequentis Romania SRL (short name FRQ RO) is an affiliate of Frequentis AG and is specialised on software development providing support for the mother company in the safety-critical domains of air traffic control. The company has contributed to SESAR 1 projects in WP12 and will continue its contribution in the scope of related airport / Tower activities in SESAR 2020.

Thales Air Systems

Thales Air Systems will participate to the Solution PJ03a-01, mainly by focusing on Prototype development for the validation exercise but also by contributing to the definition of operational and technical requirements and the validation activities.

Thales Air Systems plans to subcontract to Edisoft, Portugal, some non-core activities typically related to low-level software design & coding, integration or verification tasks. Edisoft is a joint venture in which Thales has a majority share that is already developing some parts of Thales Air Systems products.

NLR (AT-One)

Based on results achieved during SESAR 1 Programme, the NLR (AT-One) company profile particularly fits to solution PJ03a-01 where NLR plans to contribute by providing specialists for prototype development and validation, experts for operations, technical architecture, operational performance, and also for human factors, safety and standardization.

DSNA

As ANSP, DSNA will contribute mainly to the production of operational documents such as OSED and SPR. In addition, DSNA will conduct ad hoc validation activities including a Fast Time Simulation focusing on the optimization of the routing algorithm taking into account also the scheduling constraints provided by DMAN and AMAN.

ENAC

A part of this FTS Simulation planned by DSNA in the Solution PJ03a-01 will be supported by the ENAC by providing its FTS prototype used in SESAR1 and customized for this activity.

THALES AVIONICS

THALES AVIONICS will contribute to the definition of operational concept and associated operational, safety and performance requirements. Furthermore, it will contribute to the development of technical specifications to guide development of prototypes to be tested during planned validation activities. In this context, the main objective is to develop V2 solution with regard to AUO-0603B (Airborne part)

ZRH (SEAC2020)

Flughafen Zürich AG (SEAC2020) will contribute to Solution PJ03a-01 by bringing in its knowledge and experience of current airport operations management as well as being service provider for ground control and contributing to the concept development, preparation and execution of validation exercises. Where applicable, Flughafen Zürich AG (SEAC2020) will provide operational experts for simulation/gaming activities as part of the planned validation exercises.

HC (FSP)

HC (FSP) will contribute essentially to solution PJ03a-1 and will provide technical expertise for the definition of technical specifications and to execute V2 validation exercise in partnership with Frequentis AG, COOPANS members,

EUROCONTROL and NATMIG members. To this end, HC (FSP) will provide its Air Traffic Control operational and validation expertise.

Participation per Partner

Partner number and short name	WP2 effort
1 - ENAV	13.64
sicta	15.51
NAIS	14.40
NAV CANADA	8.17
2 - AIRBUS	9.00
AI OPS	103.00
3 - ANS CR (B4)	8.37
4 - ACG/COOPANS	5.36
5 - DASSAULT	9.48
6 - DFS	34.00
8 - EUROCONTROL	42.00
9 - FINMECCANICA	138.60
TELESPAZIO SPA	24.00
BULATSA	4.00
E-GEOS SPA	15.70
11 - INDRA	66.09
Indra Navia	116.20
12 - SINTEF (NATMIG)	29.00
13 - MUC (SEAC2020)	8.20
14 - FRQ (FSP)	38.00
FRQ RO	106.00
15 - THALES AIR SYS	182.10
16 - NLR (AT-One)	32.70
17 - DSNA	33.60
ENAC	1.10
18 - THALES AVIONICS	102.00
20 - ZRH (SEAC2020)	5.40
21 - HC (FSP)	14.00
Total	1,179.62

List of deliverables

Deliverable Number¹⁴	Deliverable Title	Lead beneficiary	Type¹⁵	Dissemination level¹⁶	Due Date (in months)¹⁷
D2.1	Solution PJ.03a-01: V2 Data Pack	1 - ENAV	Report	Public	30

Description of deliverables

Starting from the elaboration of operational documents such as OSED, SPR as well as INTEROP, the identification and Technical Specification will guide the development of platforms / prototypes to be tested during planned V2 validation activities. Validation Plan as well as the outcomes of the executed validation activities will be detailed in dedicated deliverables (i.e. V2 VALP and V2 Validation Report). A Validation Roadmap for V3 is expected to prepare the activities in the following V3 phase.

D2.1 : Solution PJ.03a-01: V2 Data Pack [30]

Solution PJ.03a-01 V2 Data Pack including V2 OSED / SPR / INTEROP, V2 TS, V2 VALR and CBA. A roadmap for V3 Phase will be included as well. The whole data pack will be an input for the V2 Gate to assess if V2 maturity level has been successfully achieved.

Schedule of relevant Milestones

Milestone number¹⁸	Milestone title	Lead beneficiary	Due Date (in months)	Means of verification
MS1	V2 Gate for solution PJ.03a-01	1 - ENAV	32	Gate to confirm if the V2 maturity level has been successfully achieved for the Solution PJ.03a-01

Work package number ⁹	WP3	Lead beneficiary ¹⁰	10 - Honeywell SAS
Work package title	PJ.03a-03: Enhanced navigation and accuracy in low visibility conditions (LVC) on the airport surface		
Start month	1	End month	37

Objectives

Objective of Solution PJ.03a-03 'Enhanced navigation and accuracy in low visibility conditions on the airport surface' is to provide accurate and available navigation information with high integrity provided by aircraft systems.

Description of work and role of partners

WP3 - PJ.03a-03: Enhanced navigation and accuracy in low visibility conditions (LVC) on the airport surface

[Months: 1-37]

Honeywell SAS

Solution PJ.03a-03 will be executed as technological solution. The primary work will be performed by Honeywell focusing on technology development, and the other participants will provide and review requirements, verification objectives and results with effort allocated in Solution PJ.03a-01.

HONEYWELL

Honeywell SAS' Advanced Technology Director is finally responsible for the correctness and completeness of all deliverables with reviewing the project status on a regular basis (typically monthly reviews). Additional Honeywell SAS' Program Technology architects will be in charge of technical coordination, overview and alignment across the whole program.

Honeywell SaS has the role of beneficiary for the SESAR 2020. This fully corresponds with Honeywell's European R&D which is led from France by the Advanced Technology Director and the Technology Architects.

Honeywell's Advanced Technology Director is responsible for the global technology strategy, is to represent Honeywell in SESAR 2020 governing bodies and is finally responsible for the correctness and completeness of all deliverables with reviewing the project status on a regular basis (typically monthly reviews). Program Technology Architects are in charge of technical coordination, overview and alignment across the whole program. On the top of that, they are cooperating with the Advanced Technology Director on review and ensuring quality standards of all deliverables. Additionally, Honeywell's LTPs are responsible for all technical activities assigned to them, working closely with the Program Architects and Advanced Technology Director. The second reason is that France is also the center for Multisite projects with existing infrastructure to perform efficient administration of the program (including activities such as processing of international payments across the Honeywell entities).

HONEYWELL INTERNATIONAL s.r.o

Honeywell International, s.r.o (HI sro) will lead and be involved in all Honeywell technical activities described in the above work description.

HONEYWELL INTERNATIONAL inc.

Honeywell International Inc. (HI inc) will provide expertise required to investigate interoperability aspects of European and US operations and will support the coordination of standardization & regulation activities.

Participation per Partner

Partner number and short name	WP3 effort
10 - Honeywell SAS	5.85
HI inc	6.76
HI sro	154.45
Total	167.06

List of deliverables

Deliverable Number¹⁴	Deliverable Title	Lead beneficiary	Type¹⁵	Dissemination level¹⁶	Due Date (in months)¹⁷
D3.1	Solution PJ.03a-03: V2 Data Pack	10 - Honeywell SAS	Report	Public	35

Description of deliverables

Solution PJ.03a-03 is expected to produce the mandatory deliverables for technological solution including technical specifications definition, verification objectives, prototype developments and consolidation of the verification results collected during planned simulation activities.

D3.1 : Solution PJ.03a-03: V2 Data Pack [35]

Solution PJ.03a-03 V2 Data Pack for technological solution including V2 TS/IRS . The whole data pack will be an input for the V2 Gate to assess if V2 maturity level has been successfully achieved.

Schedule of relevant Milestones

Milestone number¹⁸	Milestone title	Lead beneficiary	Due Date (in months)	Means of verification
MS2	V2 Gate for solution PJ.03a-03	10 - Honeywell SAS	37	Gate to confirm if the V2 maturity level has been successfully achieved for the Solution PJ.03a-03

Work package number ⁹	WP4	Lead beneficiary ¹⁰	10 - Honeywell SAS
Work package title	PJ.03a-04: Enhanced Visual Operations		
Start month	1	End month	37

Objectives

Objective of Solution PJ.03a-04 'Enhanced Visual Operations' is to provide the flight crew with increased awareness of the terrain and enable the ability to land, taxi and take-off in low visibility conditions by providing visual references and/or flight guidance display technology without increased need for ground based infrastructure.

Description of work and role of partners

WP4 - PJ.03a-04: Enhanced Visual Operations [Months: 1-37]

Honeywell SAS, DASSAULT, FINMECCANICA, THALES AVIONICS

This Work Package is intended to assess the feasibility of the identified navigation solutions to improve accessibility to all airports without ground infrastructure requirements in low visibility conditions. Activities for system definition, definition of requirement for sensors, display and human factors concept will be performed.

DASSAULT

DASSAULT will mainly contribute to operational concept definition as well as to proof of concept validation by participating to validation exercises and to the analysis of results and preparation of validation reports.

Selex ES GMBH

In PJ03a-04 "Enhanced Visual operations", SELEX ES GmbH will support the validation activities as well as contribute to OSED (including requirement definition) and technical specification documents with the expertise related to MET application. The participation of SELEX ES GmbH in solution Pj03a-4 and the absence of the beneficiary FINMECCANICA is due to the fact that the contribution that FINMECCANICA intends to provide in Pj03a-4 is strictly related to meteorological aspects and in the LTP SELEX ES GmbH there are the right competences to approach this aspect.

HONEYWELL

Honeywell SAS' Advanced Technology Director is finally responsible for the correctness and completeness of all deliverables with reviewing the project status on a regular basis (typically monthly reviews). Additional Honeywell SAS' Program Technology architects will be in charge of technical coordination, overview and alignment across the whole program. Honeywell SAS will support coordination of standardization & regulation activities in EUROCAE Working Group 79.

Honeywell SaS has the role of beneficiary for the SESAR 2020. This fully corresponds with Honeywell's European R&D which is led from France by the Advanced Technology Director and the Technology Architects.

Honeywell's Advanced Technology Director is responsible for the global technology strategy, is to represent Honeywell in SESAR 2020 governing bodies and is finally responsible for the correctness and completeness of all deliverables with reviewing the project status on a regular basis (typically monthly reviews). Program Technology Architects are in charge of technical coordination, overview and alignment across the whole program. On the top of that, they are cooperating with the Advanced Technology Director on review and ensuring quality standards of all deliverables. Additionally, Honeywell's LTPs are responsible for all technical activities assigned to them, working closely with the Program Architects and Advanced Technology Director. The second reason is that France is also the center for Multisite projects with existing infrastructure to perform efficient administration of the program (including activities such as processing of international payments across the Honeywell entities).

HONEYWELL INTERNATIONAL Inc.

Honeywell International Inc. (HI inc) will provide expertise required to investigate interoperability aspects of European and US operations and will support the coordination of standardization & regulation activities. Honeywell International Inc. will support solution by sensor development, assist in validation of high mature system and flight testing.

HONEYWELL INTERNATIONAL s.r.o.

Honeywell International, s.r.o (HI sro) will lead and be involved in all Honeywell technical activities described in the above work description.

THALES AVIONICS

THALES AVIONICS will contribute to the definition of operational concept and associated operational, safety and performance requirements. Furthermore, it will contribute to the development of technical specifications to guide development of prototypes to be tested during planned validation activities. In this context, the main objective is to develop V3 solution with regard to AUO-0404, AUO-0405 and AUO-0406 (Airborne part).

Participation per Partner

Partner number and short name	WP4 effort
5 - DASSAULT	62.39
9 - FINMECCANICA	0.00
Selex ES GmbH	4.50
10 - Honeywell SAS	3.82
HI inc	6.94
HI sro	98.36
18 - THALES AVIONICS	150.00
Total	326.01

List of deliverables

Deliverable Number ¹⁴	Deliverable Title	Lead beneficiary	Type ¹⁵	Dissemination level ¹⁶	Due Date (in months) ¹⁷
D4.1	Solution PJ.03a-04: V3 Data Pack	10 - Honeywell SAS	Report	Public	35

Description of deliverables

The deliverables identified in the Solution PJ.03a-04 are intended to define the operational, safety and interoperability requirements for the enhanced visual services supporting landing, taxi and take-off operations. Furthermore, ad hoc deliverables are expected to identify concerned technical specifications as input for the development of prototypes to be validated during planned validation activities. The carried out assessment will be detailed in a dedicated Validation Report which will be considered as input to consolidate the identified requirements.

D4.1 : Solution PJ.03a-04: V3 Data Pack [35]

Solution PJ.03a-04 V2 Data Pack including V2 OSED / SPR / INTEROP, V2 TS, V2 VALR and CBA. A roadmap for V3 Phase will be included as well. The whole data pack will be an input for the V2 Gate to assess if V2 maturity level has been successfully achieved.

Schedule of relevant Milestones

Milestone number ¹⁸	Milestone title	Lead beneficiary	Due Date (in months)	Means of verification
MS3	V3 Gate for solution PJ.03a-04	10 - Honeywell SAS	37	Gate to confirm if the V3 maturity level has been successfully achieved for the Solution PJ.03a-04

Work package number ⁹	WP5	Lead beneficiary ¹⁰	1 - ENAV
Work package title	PJ.03a-09: Surface operations by RPAS		
Start month	4	End month	36

Objectives

Objective of Solution PJ.03a-09 is to determine the impact (in terms of rules and regulations) of Remotely Piloted Aircraft Systems (RPAS) integration in the ATM environment which is dominated by manned aviation.

Description of work and role of partners

WP5 - PJ.03a-09: Surface operations by RPAS [Months: 4-36]

ENAV, ENAIRE, FINMECCANICA, THALES AIR SYS, AIRTEL (NATMIG), DLR (AT-One)

Solution PJ.03a-09 is expected to investigate all the aspects concerning the integration of RPAS in the ATM domain. In detail, it will be investigated ways in which RPAS may be able to use a technical capability or procedural means to comply with ATC instructions, in particular for surface operations. This research may lead to changes required or clarifications needed for existing "Rules of the Air".

ENAV

As Solution Leader, ENAV will be responsible for the coordination of all the planned activities. Furthermore, ENAV will contribute mainly to the production of the operational documents (as OSED and SPR) with a significant participation to the definition of operational and performance requirements related to RPAS ground operations. Furthermore, ENAV will also lead planned validation activities by providing the concerned platforms, the operational personnel and will develop scenarios and procedures related to the validation exercise.

SICTA

SICTA will support ENAV mainly on the activities concerning the production of the operational documents (as OSED and SPR). That support will include also the identification of the related requirements as well as the definition of ad hoc use cases. Moreover SICTA will support ENAV in the execution of Validation activities. SICTA participation is quite significant from an ENAV perspective considering it brings an important piece of transversal technical, operational and management expertise. On the basis of the considerations and skills depicted above and taking into account that SICTA is the Research Branch of ENAV Group, ENAV and SICTA in kind contribution is to be considered as a single block.

IDS

IDS will contribute to RPAS solution by supporting the operational concept definition as well as the analysis and development of methods/models for RPAS mission description. Furthermore, IDS will contribute to ATC/RPAS simulation campaigns in terms of definition and design of the validation scenario (including traffic data and models), validation of the model and execution of simulation activities.

IDS participation is quite significant from an ENAV perspective considering that these activities will foresee the involvement of IDS RPAS operational staff, bringing its technical and operational expertise as RPAS manufacturer/operator. Moreover, IDS will make available its validation environment and will define/implement software adaptations in order to meet new operational requirements.

NAIS

In the frame of solution PJ.03a-09 NAIS will support ENAV validation activities by contributing to the development of test-tools (e.g. gaming and mock-ups) to be used in the frame of V1 and V2 validations.

ENAIRE

ENAIRE will contribute to the development of the operational concept in maturity level V1 (OSED) and also in maturity level V2 (OSED/SPR/INTEROP). ENAIRE will also contribute to the description of the solution, purpose, context, interfaces with other solutions and services needed in maturity level V2 (Technical Specifications) with the role of contributor as well as to the definition of the validation plans in both maturity levels V1 and V2 with the role of contributor. ENAIRE will conduct validation exercises, analyse the results and prepare validation reports in both maturity levels V1 and V2 with the role of leader.

INECO

Ineco will participate in the definition of the validation plans in both maturity levels V1 and V2 and also in the conduction of validation exercises, analysis of results and preparation of validation reports in both maturity levels V1 and V2.

ISDEFE

Isdefe will participate in the development of the operational concept in maturity level V1 (OSED) and also in maturity level V2 (OSED/SPR/INTEROP; in the definition of the validation plans in both maturity levels V1 and V2; and also in the conduction of validation exercises, analysis of results and preparation of validation reports in both maturity levels V1 and V2. Isdefe will undertake most of ENAIRE's contribution to PJ.03a-09. Isdefe has been working, together with ENAIRE, in several activities regarding RPAS in the past. Isdefe, in close collaboration with Ineco (Service Provider for ATS services in TWRs), will support ENAIRE to develop its contribution to this project.

LEONARDO-FINMECCANICA

In PJ.03a-09 "Surface Operations by RPAS", FINMECCANICA will develop systems and procedure for the RPAS application exploiting experience in the communication and meteorological systems

Thales Systèmes Aéroportés

Thales Systèmes Aéroportés plans to contribute to the OSED definition, SPR/INTEROP definition as well as to technical specifications and interfaces definition for the ATOL capability based on Radar tracker technology. Furthermore, Thales Systèmes Aéroportés plans to provide an overall contribution to investigations about ways in which RPAS may be able to use a technical capability for Automatic Take-Off and Landing based on Radar tracker technology to comply with ATC instructions. Thales Air Systems contributions to WP5 Pj03a-09 will actually be undertaken by Thales Systèmes Aéroportés, an affiliate company of Thales Air Systems within the Thales Group acting as Linked Third Party of Thales Air Systems in the context of this project. The Thales Group is organized as a number of companies addressing different domains of activities, gathering relevant skills and competences to address each specific domain. In the scope of WP5 Pj03a-09 Thales Air Systems is the beneficiary and has associated Thales Systèmes Aéroportés whose expertise in the area of RPAS operations is particularly demonstrated and recognized in the aeronautical community.

AIRTEL (NATMIG)

Airtel's contribution would be in the definition and prototyping of systems to enable data link route and clearance exchanges between ATC and the RPAS. This would include Airport Ground Data Link solution for RPAS & possibly GA/R and the investigation/prototyping of the use of alternative air-ground datalinks (GSM, SATCOM etc.).

DLR (AT-ONE)

The DLR (AT-One) company profile specifically fits to solution PJ03a-09 (Surface Operations by RPAS) where experience from RPAS projects and previous airport surface research will be combined. DLR (AT-One) is able to provide specialists for prototype development and validation, experts for operations, operational performance, and also for human factors, safety, and RPAS.

Participation per Partner

Partner number and short name	WP5 effort
1 - ENAV	6.23
sicta	11.63
NAIS	4.30
I.D.S.	11.85
7 - ENAIRE	2.00
INECO	6.50
ISDEFE	8.80
9 - FINMECCANICA	11.90
15 - THALES AIR SYS	0.00
THALES-SYS-AER	13.75
19 - AIRTEL (NATMIG)	12.00
22 - DLR (AT-One)	18.40
Total	107.36

List of deliverables

Deliverable Number¹⁴	Deliverable Title	Lead beneficiary	Type¹⁵	Dissemination level¹⁶	Due Date (in months)¹⁷
D5.1	Solution PJ.03a-09: V1 Data Pack	1 - ENAV	Report	Public	17
D5.2	Solution PJ.03a-09: V2 Data Pack	1 - ENAV	Report	Public	34

Description of deliverables

The planned deliverables are intended to identify operational, safety and interoperability requirements related to the operational concept associated to the RPAS integration in the ATM domain. Those requirements will be validated through ad hoc validation activities whose outcomes will be detailed in Validation Reports.

D5.1 : Solution PJ.03a-09: V1 Data Pack [17]

Solution PJ.03a-09 V1 Data Pack including OSED, VALP and VALR. This data pack will be used as input for the V1 Gate to assess if the V1 maturity level has been successfully achieved.

D5.2 : Solution PJ.03a-09: V2 Data Pack [34]

Solution PJ.03a-09 V2 Data Pack including V2 OSED / SPR / INTEROP, V2 TS, V2 VALR and CBA. A roadmap for V3 Phase will be included as well. The whole data pack will be an input for the V2 Gate to assess if V2 maturity level has been successfully achieved.

Schedule of relevant Milestones

Milestone number¹⁸	Milestone title	Lead beneficiary	Due Date (in months)	Means of verification
MS4	V1 Gate for Solution PJ.03a-09	1 - ENAV	19	Gate to confirm if the V1 maturity level has been successfully achieved for the Solution PJ.03a-09
MS5	V2 gate for solution PJ.03a-09	1 - ENAV	36	Gate to confirm if the V2 maturity level has been successfully achieved for the Solution PJ.03a-09

Work package number ⁹	WP6	Lead beneficiary ¹⁰	1 - ENAV
Work package title	Ethics requirements		
Start month	1	End month	37

Objectives

The objective is to ensure compliance with the 'ethics requirements' set out in this work package.

Description of work and role of partners

WP6 - Ethics requirements [Months: 1-37]

ENAV

This work package sets out the 'ethics requirements' that the project must comply with.

List of deliverables

Deliverable Number ¹⁴	Deliverable Title	Lead beneficiary	Type ¹⁵	Dissemination level ¹⁶	Due Date (in months) ¹⁷
D6.1	OEI - POPD - Requirement No. 1	1 - ENAV	Ethics	Confidential, only for members of the consortium (including the Commission Services)	5
D6.2	M - Requirement No. 2	1 - ENAV	Ethics	Confidential, only for members of the consortium (including the Commission Services)	5

Description of deliverables

The 'ethics requirements' that the project must comply with are included as deliverables in this work package.

D6.1 : OEI - POPD - Requirement No. 1 [5]

Applicants must provide details on personal data collection, incidental findings, protection, retention and destruction and the "data protection consent form" which regulates anonymity in a more stringent manner than that before, in full compliance with the national guidelines/law and new EU legislation.

D6.2 : M - Requirement No. 2 [5]

Applicants must provide specific and detailed risk mitigation measures to avoid potential data malevolent/criminal/terrorist misuse - Cyber threats is addressed in the proposal but risk mitigation strategies and specific measures to prevent malevolent abuse (e.g. regarding safety assessment for solutions) are not sufficiently addressed.

Schedule of relevant Milestones

Milestone number ¹⁸	Milestone title	Lead beneficiary	Due Date (in months)	Means of verification
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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	V2 Gate for solution PJ.03a-01	WP2	1 - ENAV	32	Gate to confirm if the V2 maturity level has been successfully achieved for the Solution PJ.03a-01
MS2	V2 Gate for solution PJ.03a-03	WP3	10 - Honeywell SAS	37	Gate to confirm if the V2 maturity level has been successfully achieved for the Solution PJ.03a-03
MS3	V3 Gate for solution PJ.03a-04	WP4	10 - Honeywell SAS	37	Gate to confirm if the V3 maturity level has been successfully achieved for the Solution PJ.03a-04
MS4	V1 Gate for Solution PJ.03a-09	WP5	1 - ENAV	19	Gate to confirm if the V1 maturity level has been successfully achieved for the Solution PJ.03a-09
MS5	V2 gate for solution PJ.03a-09	WP5	1 - ENAV	36	Gate to confirm if the V2 maturity level has been successfully achieved for the Solution PJ.03a-09

1.3.5. WT5 Critical Implementation risks and mitigation actions

Risk number	Description of risk	WP Number	Proposed risk-mitigation measures
1	DS16 requested changes of AC-02b and CTE-N07c from AUO-0406 to optional is rejected. Severity: Medium Likelihood: Very Low	WP3	Justify correctly the changes

1.3.6. WT6 Summary of project effort in person-months

	WP1	WP2	WP3	WP4	WP5	WP6	Total Person/Months per Participant
1 - ENAV	5.02	13.64	0	0	6.23		24.89
· sicta	37.49	15.51	0	0	11.63	0	64.63
· NAIS	0	14.40	0	0	4.30	0	18.70
· I.D.S.	0	0	0	0	11.85	0	11.85
· NAV CANADA	0	8.17	0	0	0	0	8.17
2 - AIRBUS	0	9	0	0	0		9
· AI OPS	0	103	0	0	0	0	103
3 - ANS CR (B4)	0	8.37	0	0	0		8.37
4 - ACG/COOPANS	0	5.36	0	0	0		5.36
5 - DASSAULT	0	9.48	0	62.39	0		71.87
6 - DFS	0	34	0	0	0		34
7 - ENAIRE	0	0	0	0	2		2
· INECO	0	0	0	0	6.50	0	6.50
· ISDEFE	0	0	0	0	8.80	0	8.80
8 - EUROCONTROL	0	42	0	0	0		42
9 - FINMECCANICA	0	138.60	0	0	11.90		150.50
· TELESPAZIO SPA	0	24	0	0	0	0	24
· BULATSA	0	4	0	0	0	0	4
· Selex ES GmbH	0	0	0	4.50	0	0	4.50
· E-GEOS SPA	0	15.70	0	0	0	0	15.70
10 - Honeywell SAS	0	0	5.85	3.82	0		9.67
· HI inc	0	0	6.76	6.94	0	0	13.70
· HI sro	0	0	154.45	98.36	0	0	252.81

	WP1	WP2	WP3	WP4	WP5	WP6	Total Person/Months per Participant
11 - INDRA	0	66.09	0	0	0		66.09
· Indra Navia	0	116.20	0	0	0	0	116.20
12 - SINTEF (NATMIG)	0	29	0	0	0		29
13 - MUC (SEAC2020)	0	8.20	0	0	0		8.20
14 - FRQ (FSP)	0	38	0	0	0		38
· FRQ RO	0	106	0	0	0	0	106
15 - THALES AIR SYS	0	182.10	0	0	0		182.10
· THALES-SYS-AER	0	0	0	0	13.75	0	13.75
16 - NLR (AT-One)	0	32.70	0	0	0		32.70
17 - DSN	0	33.60	0	0	0		33.60
· ENAC	0	1.10	0	0	0	0	1.10
18 - THALES AVIONICS	0	102	0	150	0		252
19 - AIRTEL (NATMIG)	0	0	0	0	12		12
20 - ZRH (SEAC2020)	0	5.40	0	0	0		5.40
21 - HC (FSP)	0	14	0	0	0		14
22 - DLR (AT-One)	0	0	0	0	18.40		18.40
23 - PANS (B4)	0	0	0	0	0		0
24 - LPS SR (B4)	0	0	0	0	0		0
25 - ON (B4)	0	0	0	0	0		0
26 - CCL/COOPANS	0	0	0	0	0		0
27 - IAA/COOPANS	0	0	0	0	0		0
28 - LFV/COOPANS	0	0	0	0	0		0
29 - Naviair/COOPANS	0	0	0	0	0		0
30 - SAAB (NATMIG)	0	0	0	0	0		0
31 - ADP (SEAC2020)	0	0	0	0	0		0
32 - HAL (SEAC2020)	0	0	0	0	0		0

	WP1	WP2	WP3	WP4	WP5	WP6	Total Person/Months per Participant
33 - SNBV (SEAC2020)	0	0	0	0	0		0
34 - Swed(SEAC2020)	0	0	0	0	0		0
35 - AVINOR-SEAC2020	0	0	0	0	0		0
36 - ATOS (FSP)	0	0	0	0	0		0
Total Person/Months	42.51	1179.62	167.06	326.01	107.36		1822.56

1.3.7. WT7 Tentative schedule of project reviews

Review number ¹⁹	Tentative timing	Planned venue of review	Comments, if any
RV1	13	TBD	First project control gate
RV2	25	TBD	Second project control gate
RV3	36	SJU, Brussels	Project close out gate

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 Commission). 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

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

VA if virtual 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.

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

Version	Date	Changes
00.00.01	19/07/2016	PART B: Table of Contents updated in accordance with the guidelines.
00.00.02	29/07/2016	PART B: PJ03a-03 updated to align the V2 Gantt date with the guidelines. Clarifications provided in the PJ03a-03 Description of work about the temporal link between PJ03a-01 and PJ03a-03
00.00.03	05/08/2016	<p>PART A: Deliverable (i.e. D.03a.0.04 - Q3 2016) has been deleted as not relevant though as the project is only planned to start in Q4 2016.</p> <p>The effort of each beneficiary and associated LTPs has been allocated separately for each WP</p> <p>PART B: Reference to Ethics Work Packages has been added according to the guidelines.</p> <p>Justifications for EU contribution for non-EU members provided in the section 3.3.</p>
00.00.04	09/09/2016	<p>PART A: Description of the contribution from beneficiaries and LTPs has been provided in the tables “Work Package Description” on the portal.</p> <p>Justification for starting the project on October 1st has been provided.</p> <p>Cost information has been updated to make it coherent with the proposal.</p> <p>PART B: Footer corrected on the basis of the comments received.</p> <p>Legal and Short names updated to ensure consistency throughout the proposal.</p> <p>Project Acronym has been modified to PJ03a SUMO.</p>
00.00.05	21/10/2016	<p>PART A: Description of the subcontracting activities planned by AIRBUS and THALES AIR SYS in the WP02 and their justification are reported in the “Work Package Description” on the portal.</p> <p>Starting date set to the default of the first day of the month following signature</p> <p>Contribution from Comsoft Solutions as LTP of FRQ (FSP) has been deleted.</p> <p>Respect to the original proposal, new subcontracting costs have been added by DASSAULT. It has an impact on the overall</p>

		<p>direct costs of subcontracting costs.</p> <p>PART B: A new subsection has been added to clarify the deliverables expected to be produced under the First SJU Contribution.</p> <p>Any contribution from Comsoft Solutions as LTP of FRQ (FSP) has been deleted. A dedicated justification is provided.</p> <p>Respect to the original proposal, subcontracting activities have been added by DASSAULT with the required details and justification. "Other direct costs" have been updated as well.</p>
00.00.06	09/11/2016	<p>PART A: Project duration has been updated assuming a start date 1st December 2016. The end month of each concerned WP has been updated accordingly.</p> <p>Change of AIRBUS and Honeywell costs from actual to unit.</p> <p>PART B: Duration of WP01 Project Management activities has been updated assuming a start date 1st December 2016</p> <p>Justifications about other direct costs exceeding the 15% of the personnel costs have been provided by NLR (AT-One), BULATSA (as FINMECCANICA LTP) and HI sro (as Honeywell LTP).</p> <p>Further details about the use of contributions in kind provided by third parties and the associated costs have been provided by ACG / COOPANS and ENAIRE in the corresponding 4.2.x section.</p>

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1. Excellence

This project is part of the SESAR 2020 Multi Annual Program for the period 2016-2019. It is part of the Industrial Research & Validation phase, developed under the SJU Private Public Partnership. In this context, PJ03a will contribute to the key feature High Performing Airport Operations. Therefore, this project is expected to address the main issues limiting airport operations as described in the Multi Annual Work Programme. In terms of infrastructure, enhanced guidance assistance to mobiles (i.e. aircraft and vehicles under ATC) based on the automated switching of taxiway lights and stop bars accomplished by the Airfield Ground Lighting (AGL) service will provide supplementary guidance means along the cleared taxi routes with no need of on-board equipment. A safer and smoother flow of traffic on the aerodrome surface is expected in all weather conditions with a consequent impact on predictability, efficiency and resilience.

In terms of services, coherency of the information shared by all the relevant partners will result in better resource allocation with a significant impact on the planning process. The implementation of the System Wide Information Management (SWIM) concept has the objective to ensure the sharing of all relevant information among interested stakeholders. The aim is that controllers on their own HMI (Human Machine Interface) will share the same information as the pilots / vehicle drivers on their on-board systems (e.g. Airport Moving Map). With regard to that, an integrated surface management data link will include the data link information exchange between tower controllers and flight crew / vehicle drivers as well as the on-board display of the airport layout (including taxiway / runways status, fixed obstacles, mobile own ship position and cleared taxi route) resulting in a reduction of potential misunderstandings on radiotelephony frequencies with a consequent increase of situational awareness of the involved stakeholders. In this context, PJ03a has the objective to validate the operational usability to exchange via data link further messages as contact and monitor.

Starting point concerning those aspects will be mainly the outcomes of SESAR 1 activities and, in particular, the ones related to SESAR 1 OFA04.02.01 – Integrated Surface Management. Therefore, PJ03a must be considered as follow-up of the activities started in SESAR 1 focusing mainly on the A-SMGCS services including routing, planning and guidance. The involvement of most of the partners contributing to SESAR 1 activities represents a great added value to achieve the identified objectives. As a consequence, there is quite a deep knowledge of what is still missing to achieve the expected maturity level at the end of Wave 1.

One of the key information for ensuring integrated surface management is the availability of accurate navigation information with high integrity provided by vehicles and aircraft systems. Enhanced positioning through the use of GNSS (including GBAS or SBAS) will improve surface movement navigation including take-off / landing operations.

From the on-board perspective, the efficiency of taxi and take-off operations will also benefit from the provision of a synthetic / graphical view of the environment, aerodrome surface information as well as position information. Flight crews will be provided with advanced vision systems to compensate the lack of natural vision especially in reduced visibility conditions. These activities will be a continuation of the related SESAR 1 activities within OFA 01.01.02 – Pilot Enhanced Vision. The evolution is based on the outcomes of SESAR project 9.29 and Large Scale Demonstrations project “Advanced Approaches to Land” (LSD.02.02) including the application of a lower decision height bringing benefits to taxi and take-off operations as well, on top of landing.

The project will also address the integration of Remotely Piloted Aircraft Systems (RPAS) into airport surface operations. It will be important to investigate operational procedures to handle remotely piloted operations in a context of manned operations. Accordingly, the main activity will be the identification of operational requirements to guide technological developments with the objective to ensure, to the maximum extent possible, the compliance of RPAS operations with existing rules and regulations. If further rules are required, their establishment will be part of this activity as well.

1.1 Objectives

PJ03a has the main objective to optimize the allocation of airport resources to make surface ground operations smoother and more predictable in all weather conditions. To this end, it is important that all airport stakeholders (including airlines / pilots, airport operators, controllers and vehicle drivers) share the same information.

The main objectives are as follows:

- Improve the predictability of surface ground operations with more accurate taxi times. The optimization of routing and planning is also based on the integration of the current and forecast traffic situation with the objective to predict and prevent potential conflicting situations when planning taxi routes. The integration with total airport management procedures including the ones related to the arrival and departure management (based, respectively, on AMAN and DMAN tools) will further contribute to the optimization of the planning process. The predictability of surface operations will benefit also from the use of the Airfield Ground Lighting (AGL) service to control the speed of mobiles in order to reduce their waiting time at intersections. Surface movement navigation will benefit also from the provision of more accurate navigation information through the use of GNSS (augmented) systems.
- Increase the situational awareness of all relevant airport stakeholders in all weather conditions. The exchange of information between controllers and pilots / vehicle drivers will be improved with the use of data link services. Flight crews will be provided with an enhanced vision aid to improve landing, taxi and take off operations especially in low visibility conditions. From controllers' perspective, it is required to further investigate how to ensure a user friendly integration of surface management tools (such as routing, planning and guidance) and their associated information. The implementation and the availability of those services will positively impact the Human Performance indicators from both the ground and on-board side.
- Improve resilience during low visibility conditions through the implementation of Dynamic Virtual Block Control, a more flexible form of procedural control and the identification of dynamic virtual stop bars (in addition to the ones already linked to intermediate holding positions). The related procedures are expected to limit the effect of adverse weather conditions on nominal capacity and to improve efficiency and predictability of surface operations.
- Sharing of same and more accurate information among all relevant stakeholders will improve the efficiency of surface operations with a direct impact on environmental sustainability. The availability of the required information at the right time and in the right place will be ensured through the implementation of SWIM concept and associated services. In this context it is important to ensure the availability of an up to date Aerodrome Mapping Database (AMDB) to all the relevant users.
- Investigate how to improve the Access KPA for Remotely Piloted Aircraft Systems (RPAS) in an environment characterized mainly by manned aviation. This investigation will also include the activities related to RPAS categorization and classification.

The following SESAR Solutions will be within the scope of our proposal for the PJ03a:

- **PJ03a-01 “Enhanced Guidance Assistance to Aircraft and Vehicles on the Airport Surface Combined with Routing”** – The high level objective for this solution is to increase pilots' and vehicle drivers' situational awareness by providing them with supplementary guidance means in all weather conditions. Both pilots and vehicle drivers will be provided with a display (Airport Moving Map) of airport layout (including taxiways, runways and fixed obstacles), status of stop bars and virtual stop bars, the own ship position as well as the taxi clearance as issued by ATC. The implementation of Dynamic Virtual Block Control by means of Virtual Stop Bars will make traffic flows smoother and more predictable during low visibility conditions. In this context, it is important to ensure the consistency of the information shared by all relevant stakeholders (such as controllers, pilots and vehicle drivers). Controllers will be supported by an enhanced controller working position based on 3D simplified perspective visualization with dynamically rendered information. To this end, centralized routing and planning optimization algorithms will be implemented, including GNSS positioning and integrity system, to provide accurate and available navigation information with high integrity provided by mobiles, in order to return consistent plans to all stakeholders with minimized conflicts.. The availability of timing information ensured through the integration of airport sequencing tools (such as AMAN and DMAN) and surface management tools will further improve

the efficiency of the planning process. In addition, potential misunderstandings when using radiotelephony will be further reduced through the implementation of data link services to exchange a specific set of clearances / instructions. A supplementary guidance means will be provided through the implementation and standardisation of the so called “Follow-The-Greens” procedures which is based on the of Airfield Ground Lighting service. With respect to SESAR 1 activities focused on aprons, PJ03a-01 is expected to also investigate the use of “Follow-The-Greens” on taxiways and runways. Furthermore, the AGL is intended to be used as speed control to minimise the holding of mobiles at intersections. Reduction of speed changes, fewer stops and re-starts during taxiing will result in less taxi time variability improving the predictability of surface operations.

- **PJ03a-03 “Enhanced navigation and accuracy in low visibility conditions (LVC) on the airport surface”** – The objective of this Solution is to provide accurate and available navigation information with high integrity provided by aircraft systems. This represents the key information for integrated surface management and will positively influence surface management as a whole. The specific objectives are:
 - Definition of requirements for navigation on the airport surface.
 - Assessment of feasibility, trade-off between benefits and complexity of possible combinations of enabling technologies.
 - Fast-time simulation, prototype development and verification execution.
- **PJ03a-04 “Enhanced Visual Operations”** – The objective of this solution is to improve accessibility to all airports without additional ground infrastructure requirements in low visibility conditions, as well as pilots’ situational awareness due to the visual reference and / or flight guidance provided to them. The solution aims at delivering Enhanced Vision System and Synthetic Vision System concepts that will enable more efficient landing, taxi and take-off operations. The solution includes assessment of feasibility of navigation solutions and trade-off between benefits and complexity of possible sensors, and navigation solutions used. Our novel concept is based on higher performance active sensors that can be used to augment navigation for landing in low visibility conditions. To validate the solution, we plan to use real time simulations as well as data collection flights with the Advanced Combined Vision System. Complementing validation activities, such as real time simulations and flight trials will be performed for landing, taxi and take-off operations, focusing on human factors aspects associated with Head Up Display (HUD) / Head Down Display (HDD) using legacy sensors to a reach V3 maturity level.
- **PJ03a-09 “Surface Operations by RPAS”** - Remotely Piloted Aircraft Systems (RPAS) that are to operate at airports will have to integrate into an environment which is dominated by manned aviation. To the maximum extent possible, RPAS will have to comply with the existing rules and regulations. Research needs to be conducted to investigate ways in which RPAS may be able to use a technical capability or procedural means to comply with ATC instructions. This research may lead to changes required or clarifications needed for existing “Rules of the Air”. In addition, research will also need to be conducted on surface operations.

It is important to highlight that the definition of high level objectives at PJ03a level as well as the objectives expected to be covered by each solution is fully compliant with what is reported in the Description of Work and in the resulting Multi Annual Work Programme.

1.2 Relation to the SESAR 2020 Work programme

In reference to the SESAR2020 Multi Annual Work Programme for the period 2016-2019, PJ03a focused on the integrated surface management within the scope of the key feature High-Performing Airport Operations. To this end, the following four SESAR Solutions will be within the scope of the PJ03a proposal:

PJ03a-01 “Enhanced Guidance Assistance to Aircraft and Vehicles on the Airport Surface Combined with Routing”

Today Airport performances are limited by the isolation between the relevant stakeholders and the lack of full integration among the surface management tools. Arriving and departing movements are handled as separate process resulting in an inefficient allocation of airport resources with a negative impact on the smoothness of the traffic flow. This leads to inaccuracy in the prediction of taxi times with less ability to react to unknown or unplanned constraints. In this context, low visibility conditions make surface ground

operations even more complicated and safety critical leading to a significant reduction of airport capacity. Further delays may be incurred due to use of voice as main communication means with the resulting potential misunderstanding between controllers and pilots.

Based on those considerations, the improvement of efficiency and predictability of surface operations is the main work programme topic that the solution PJ03a-01 is proposing to address. Based on SESAR 1 outcomes, the main way to ensure that improvement is to improve information sharing at airports which will ensure the development of collaborative recovery procedures in adverse conditions. In this context, this feature addresses the enhancement of integrated surface management and total airport management. In this context, an improved use of information provided by Arrival (AMAN) and Departure (DMAN) Manager and the integration with total airport management procedures will further contribute to the improvement of the planning process with an optimized allocation of airport resources. From the ATC side, an Advanced Controller Working Position (A-CWP) will integrate several functionalities, such as routing, planning and guidance, supported by GNSS positioning and integrity system. The same information is expected to be provided on-board to both pilots and vehicle drivers. In detail, they will be provided with a graphical representation (on their Airport Moving Map) of airport layout, taxiways / runways status, (virtual) stop bars status as well as taxi routes issued by the controllers. Further investigations on the implementation of SWIM will take place focusing on interoperability and standardization aspects of the technical infrastructure (Ground/Ground and Air/Ground) over which the data will be distributed. In this context, the definition of an Aerodrome Mapping Database (AMDB) to be shared between ground and on-board systems will be a relevant activity in this solution through the collaboration with the EUROCAE WG44.

Situational awareness is expected to increase as it will benefit from the exchange of data link clearances / instructions between controllers and pilots / vehicle drivers. In addition to the expected reduction of misunderstandings when using radiotelephony, the implementation of data link services and Follow-the-Greens will have a positive impact on R/T frequency congestion and workload. In this context, PJ03a will validate the operational utility to exchange via data link further instructions (such as contact, monitor) in addition to the “routine instructions” as taxi clearance, push-back already part of SESAR 1 activities. In this context, the solution will also investigate how to ensure secure air-ground data link and mobile airport instruction exchanges.

Low visibility conditions significantly affect ATM performance mainly in terms of safety and capacity. Safety performance will benefit from the display and sharing of common information on the concerned display. Capacity performance is expected to benefit from the implementation of Dynamic Virtual Block Control by means of Virtual Stop Bars (VSB) located at intermediate holding positions.

Regarding the infrastructures, the implementation of Airfield Ground Lighting will ensure the automatic switching of the taxiway centreline lights and stop bars in accordance with the route issued to each mobile. With respect to the SESAR 1 context where the use of AGL was mainly investigated for traffic on aprons, PJ03a-01 will also analyse that service for traffic on taxiways / runways. A safe longitudinal and lateral spacing between mobiles will be ensured on the aerodrome surface in all weather conditions. The coordination between controllers and pilots will be established through the use of the “follow-the-greens” procedure. In addition, it will be investigated the operational utility and usability of using the AGL as a way to control taxi speeds with the objective to reduce the waiting time of mobiles at intersections and, therefore, increase the predictability of surface operations.

The reason for having solution **PJ03a-03 “Enhanced navigation and accuracy in low visibility conditions (LVC) on the airport surface** in the DOW is the recognition by SJU that several key ATM improvements on the airport surface rely on high Navigation Performance.

The lack of sufficiently accurate navigation information represents a limit for the integration of surface management processes and for the safety of aircraft movements during taxi. Furthermore, poor weather conditions have a negative impact on traffic predictability and on overall airport capacity.

In this context, this solution will address the following challenges:

1. Definition of requirements for navigation on the airport surface. The solution will deliver concept description including updated system requirements.
2. Assessment of feasibility, trade-off between benefits and complexity of possible combinations of enabling technologies. We will analyse existing and new technologies with a focus on the

identification of benefits enabled by new technologies (mainly cost vs performance). We will also analyse the complexity of possible combinations of existing or new technologies (mainly from navigation performance perspective). The analysis will contain standalone and/or hybridized solutions of the enabling technologies. Preliminary identified technologies are Global Navigation Satellite Systems ‘GNSS’ including augmentation systems (GBAS or SBAS), inertial navigation system (INS) and other sources of navigation information such as odometers, vision based systems, millimetre wave radar and signals of opportunity.

3. Fast-time simulation, prototypes development and verification execution. Based on the analysis of existing or new technologies, prototypes development will be addressed in two stages. The first stage will be the development of simulation models of GNSS, INS and other sources of navigation information as standalone and/or hybridized systems and performing fast-time simulations on computers and simulation clusters to provide expected navigation performance and to identify the benefits. The second stage will be development of GNSS, INS and other sources of navigation information mock-ups.

The implementation of advanced aircraft automated systems and airborne surveillance on the airport surface will be limited by the navigation performance on the airport surface.

For example:

- Airborne surveillance services enabled by ADS-B on the airport surface are significantly limited today by the source of navigation information (GPS) used by transmitting aircraft.
- The levels of accuracy required for Taxi Monitoring and ultimately Automatic Taxi are far beyond the current navigation sources available

PJ03a-04 “Enhanced Visual Operations” is to provide the flight crew with increased awareness of the terrain. From on-board perspective, low visibility conditions negatively impact surface operations due to the reduction of pilots’ situational awareness. In detail, even if main airline platforms have auto-land capabilities to facilitate approaches in low visibility conditions, they have no capabilities to support taxi and take-off operations in order to maintain airport capacity. Furthermore, small airport are not generally equipped with systems enabling auto-land. In this context, the solution will improve landing, taxi and take-off in low visibility conditions by providing visual references and/or flight guidance display technology without increased need for ground based infrastructure. The current situation on European airports calls for further operational efficiency covering landing, taxi and take off during low visibility conditions.

The work will focus on a concept enabled by higher performance active sensors (for example, active radar based and/or LIDAR), that can be used to augment navigation and it will focus on the Human Factors aspects associated with HUD/HDD during taxi, T/O and landing operations, using legacy sensors (such as infrared, radar).

Enhanced vision sensors consist mainly of microwave radar, infrared camera and LIDAR. All these techniques suffer from different meteorological condition like for instance heavy rain, fog etc.. Therefore, we need to do an investigation into the performance of the proposed technologies in different meteorological conditions.

Furthermore, when future aircraft will be equipped with theses sensors, important meteorological information can be received similar to AMDAR (Aircraft Meteorological Data Relay) or Mode S data. “Aircraft as a sensor” is an important topic especially in the MET community. Therefore, these technologies offer a new opportunity to provide meteorological information for the approach phase of the flight.

The solution will cover all the needed Operational Improvement Steps with the goal to achieve a V3 maturity level. Further considerations and notes on the targeted and current maturity levels are explained below.

With respect to AUO-0404 “Synthetic Vision for the Pilot in Low Visibility Conditions”, this OI step is already included within AUO-0405 “Equivalent Visual Landing Operations in Low Visibility Conditions”.

With respect to AUO-0406 “Equivalent Visual Taxi operations in Low Visibility Conditions” and AUO-0407 “Equivalent Visual Take-off operations in Low Visibility Conditions” the project will directly proceed with V3 activities as V2 activities (indicated in the DOW) have already been achieved within different frameworks and do not need to be repeated here. Regarding the OI Taxiing, V2 activities are not needed because this maturity level has already been achieved thanks to other European studies, such as EMMA 2 or

TDS2 (Taxi Driver System 2). Regarding the OI Take-Off, the state of the art for LVTO (Low visibility take-off) with HUD is already at a V2 maturity level. The solution addresses A/C-23b1 (Combined Vision for Equivalent Visual Landing operations in LVC) in AUO-0405, A/C-23b2 (Combined Vision for Equivalent Visual Taxi operations in LVC) in AUO-0406 and A/C-23b3 (Combined Vision for Equivalent Visual Take-off operations in LVC) in AUO-0407 Operational Improvement Step.

Observed issues in the call documentation, with respect to the following enablers in AUO-0406 – A/C-02b (Enhanced positioning using multi constellation GNSS dual frequency) and CTE-N07c (GBAS CAT II/III based on Multi-Constellation/Multi-Frequency (MCMF) GNSS (GPS+Galileo /L1 + L5), marked as required, will be addressed in DS16. These enablers should be optional for the OI step, as the equivalent taxi operation can be achieved without them (they could enhance position in future solutions), and thus will not be addressed in wave 1.

PJ03a-09 “Surface operations by RPAS” solution will investigate ways in which RPAS may be able to use a technical capability or procedural means to comply with ATC instructions, in particular for surface operations. This research may lead to changes required or clarifications needed for existing “Rules of the Air”. Consequently, specific research needs to determine the impact of integration of RPAS on ATM in some areas, assuming RPAS may not be able to comply with all existing manned operations rules, especially in case of control & command data link loss between RPAS and the remote pilot, or other emergency cases.

PJ03a-9 should investigate RPAS airport integration aspects such as separation criteria, the impact of communications and data link latency, airport or airfield surface operational concepts, RPAS categorization/classification (including flight planning) and other ATM requirements.

1.3 Concept and approach

(a) Concept

At project level, the investigated operational concept focuses on the airport surface operations. Each identified SESAR Solution will contribute to a specific aspect as described here below.

PJ03a-01: Enhanced Guidance Assistance to Aircraft and Vehicles on the Airport Surface Combined with Routing

Starting point for that solution are the outcomes of SESAR 1 mainly related to the results achieved at OFA04.02.01 – Integrated Surface Management – level. In detail, this solution will further improve the functionalities and services partly investigated during SESAR 1 timeframe. Therefore, being a follow-up of SESAR 1 activities executed in the airport domain, the initial maturity level is beginning of the V2 phase with the objective to achieve complete V2 maturity at the end of Wave 1. To this end, the solution aims at providing enhanced guidance assistance to flight crews, vehicle drivers and controllers to handle airport operations. Therefore, both airborne and ground functions are expected to be further investigated on the basis of the needs and expectations of all relevant stakeholders:

- Optimization of routing and planning to deliver more accurate taxi times, and minimize delays and controllers' workload. Consolidation of all the required inputs / constraints is to be done with the objective to consider potential conflicting situations when planning taxi routes. Timing information provided by airport sequencing tools (as AMAN and DMAN) will further contribute to the optimization of the planning process.
- Provision of accurate and available mobiles navigation information with high integrity to increase safety and optimise turn-around processes.
- Usage of 3D simplified perspective visualization for supporting controllers operations on an enhanced controller working position with dynamic representation of objects.
- The VSB concept investigated in SESAR 1 was integrated with a concept for routing. Guidance was achieved via the Airfield Ground Lighting (AGL) in Follow-the-Greens operations. The focus of these investigations was on the controller side and showed that more investigations are necessary for efficiency of operations through automation (integration of electronic flight strips and advanced labelling). Aspects of the airside and especially the interoperability between ground and airside regarding the use of VSB with routing and AGL will have to be investigated as well. The interoperability aspects will regard also the contribution to the definition of an Aerodrome Mapping Database (AMDB) to be shared, via SWIM, between ground and on-board systems.

- D-TAXI service to ensure the exchange of clearances / instructions between flight crew and controllers. CPDLC standardisation has already been investigated during SESAR 1. Therefore, the main objective is to consolidate the set of instructions that produces relevant benefits when exchanged via data link. Therefore, Solution PJ03a-01 is proposing to validate the operational utility to exchange via data link other messages (such as contact, monitor) in addition to the “routine instructions” (such as taxi clearance, push-back). The maximum latency value which is considered acceptable for operational use will be part of the study as well.
- Data link service to ensure the exchange of VSB positions and statuses. In SESAR 1, CPDLC free text messages were assumed to be transmitted. These messages will have to be standardised.
- Definition of an Advanced Controller Working Position (A-CWP) increasing controllers’ productivity through an useful and usable integration of the investigate surface management tools and related information.
- Data link service to ensure the exchange of clearances / instructions between vehicle drivers and controllers. Even if, a first set of instructions has been already investigated during the SESAR 1 timeframe, the main objective is to further assess any related potential and performance issues. It will be important to check how these messages could be standardised similarly to the CPDLC messages for the aircraft.
- Navigation and guidance supporting means using Airfield Ground Lighting and the consolidation of the so called “Follow-The-Greens” procedures also on taxiways / runways. At the same time, the use of AGL as speed control will ensure the minimization of waiting time for mobiles at intersections. The validation of the operational usability of that procedure is proposed to be part of PJ03a-01.
- Guidance assistance to both pilots and vehicle drivers by providing them with an Airport Moving Map integrating information about the surrounding traffic and all the relevant guidance instructions.

PJ03a-03 “Enhanced navigation and accuracy in low visibility conditions (LVC) on the airport surface” The solution was not addressed in SESAR 1. State-of-the-art navigation solutions do not offer satisfactory performance for the envisioned automated operations on the airport surface. High accuracy and integrity of navigation data is required even during GNSS outages and in all weather conditions. An analysis of European research activities in the area of navigation on airport surface shows that the V1 maturity level of solution 03 was achieved outside of SESAR 1. Inputs that enable the solution to aim to achieve the V2 maturity level will be outputs of published research activities: [Schuster W. et al.: Airport Surface Movement: Performance Requirements & Navigation Algorithms], [Guilloton, A. et al. State of the art in airport navigation], and projects: ANASTASIA (Airborne New and Advanced Satellite techniques and Technologies in a System Integrated Approach) and ALICIA (All Conditions Operations and Innovative Cockpit Infrastructure) which were focused on the problem of aircraft localization on the airport surface will be used. The target for Wave 1 is to achieve maturity level V2, and V3 maturity level is the target in Wave 2.

The nature of PJ03a-03 is technological and aircraft focused.

For V2, because PJ03a team is able to make the link between the Operational Services (expressed in PJ03a-01 solution) and the navigation requirements (consolidated and verified in PJ30a-03), we consider this to be the optimal and strongly preferred approach, maximizing the coherence between the different PJ03a solutions, increasing the synergy and the most efficient use of the available resources.

We therefore propose to structure the project so that:

- The OSEDs developed by PJ03a-01 identifies high level navigation requirements
- PJ03a-03 delivers results in terms of achievable performance (accuracy and integrity in particular)
- The SPR(s) developed by PJ03a-01 integrates PJ03a-03 results in terms of navigation requirements

Therefore, the PJ03a consortium has decided to keep PJ03a-03 as a standalone solution, highlighting its technological nature, and clarifying the links to the PJ03a-01 solution as proposed above, execute it as technological solution and deliver mandatory deliverables for the technological solution in accordance with ‘Introduction to the SESAR 2020 Programme Execution’.

PJ03a-04 “Enhanced Visual Operations”

This solution will build on the outcomes of SESAR 1 with respect to landing, related mainly to achievements in OFA 01.01.02 Pilot Enhanced Vision, and contributing projects, such as SESAR 9.28 and 9.29 Enhanced and Synthetic Vision: and SESAR LSD.02.02: Augmented Approaches to Land. It will build on outputs from

other European or French studies, such as EMMA2 or TDS2 with respect to taxi and take-off operations. The objective is to reach a V3 maturity level in Wave 1 for all the Operational Improvements.

The list of outstanding R&D needs is the following:

- Assessment of feasibility and trade-off between benefits and complexity of operations and requirements on possible sensors to be considered. Legacy, as well as new higher performance active sensors that can be used to augment vision will be investigated.
- Update of operational concepts including navigation part and HMI part, for landing, taxi and take-off. Activities for system definition, definition of requirement for sensors, displays and human factors concept will be performed. The project will also study airport data in database system needs in cooperation with PJ18-04.
- Prototypes (avionics mock-ups) development is expected, covering human factors aspects associated with Head Up Display (HUD) / Head Down Display (HDD) during taxi, take-off and landing, as well as concept enabled by higher performance active sensors.
- Fast time simulations, as well as airborne performance prototype analysis based on air data collection with offline processing for the active sensors, and flight trial for legacy sensors is expected. Inputs to relevant standardization bodies, such as ICAO, Eurocae and RTCA will be provided.
- Studying the opportunity for new MET observations and MET needs for the safe operation of these systems.

PJ03a-09 : Surface operations by RPAS: It is very important in the frame of this solution to determine the impact of integration of RPAS on ATM in the some areas assuming RPAS may not be able to comply with all existing manned operations rules, especially in case of control & command data-link loss between RPAS and the remote pilot, or other emergency cases. According to the current European (EASA) and International (ICAO) RPAS –Roadmap, there is a strong need to work on identifying the particular requirements of remotely piloted surface operations in particular in relation to:

- Detect & Avoid (D&A);
- Automated landing and take-off;
- Platform operations;
- Ground movements;
- Contingency;

In addition in the frame of the solution, the following activities will be taken into account:

- Identifying technologies, in close coordination with PJ03b, that could support unmanned surface operations and working with PJ.13 to develop technical solutions.
- Investigating interoperability, in close coordination with PJ03b, between ATC surface safety nets (e.g. runway incursion tools) and RPAS safety nets (e.g. D&A).
- Investigating procedural issues to support unmanned surface operations, including RPAS pilots, RPAS operator and ATC.

b) Approach

PJ03a-01: Enhanced Guidance Assistance to Aircraft and Vehicles on the Airport Surface Combined with Routing

Before going into the details of the methodology, it is important to introduce what is the target maturity level for the Solution PJ03a-01 during the Wave 1 timeframe.

With respect to what is reported into the Multi Annual Work Programme, PJ03a-01 proposal envisages achieving the completion of the V2 maturity level at the end of Wave 1 and leave V3 activities for Wave 2. Here below the justifications endorsed by all PJ03a-01 partners are reported:

- The execution of both V2 and V3 activities within a period less than 3 years doesn't seem to be realistic also based on the SESAR 1 experience (where all V3 activities lasted roughly 2 years). The main issue concerns the execution of the complete V-phase cycle including preparation,

execution of the validation activities as well as the update of the operational documents (to be part of V phase data pack) based on the validation outcomes. Even if the validation activities are planned in parallel, the big effort will be dedicated to the consolidation of the results collected from the different validation activities. It is important to achieve common conclusions and recommendations about how to evolve / update the concerned operational concept into the following V-Phase.

- A complete update of the operational documents at the end of V2 (Wave 1) will allow starting V3 in optimal conditions with a concept defined on a wide variety of airport platforms
- reduce the step toward a future implementation since potential issues that will have to be solved for a future deployment will be explored and identified on various platforms.

Based on those considerations, the methodology here described here only refers to the V2 cycle. The main inputs for the execution of PJ03a-01 solution will be the outcomes of SESAR 1 OFA04.02.01 activities. Therefore, a preliminary analysis of the available operational documents (OSD, SPR and INTEROP) as well as of the technical ones (detailing technical specifications) will allow the identification of the main gaps with respect to SESAR2020 expectations. Then, a first draft of those documents (recognized through a milestone) will be used by each partner who has planned a validation activity to start platform development activities which will end with an availability note.

The main validation activities to assess the V2 maturity level are expected to be executed through real time simulations by means of Airport IBPs made available by each partner proposing a validation activity. In this context, the on-board part is expected to be properly represented through the connection to cockpit simulators.

Regarding the simulation of validation scenarios, the same approach adopted during SESAR 1 will be followed. This means that at least two different scenarios will be run:

- Reference scenario without the investigated solution;
- Solution scenario with the proposed solution.

It is important to highlight that the same functionalities / services will be investigated in different airport environments with different validation platforms with the objective to increase the significance of the results based on a broad range of representative layouts. The different validation platforms involved in V2 PJ03a-01 simulations are as follows:

- AIRBUS Cockpit simulator
- NLR (AT-One) NARSIM – Tower platform
- NLR (AT-One) GRACE flight simulator
- DFS Airport Simulator
- DSN Tower Simulator
- EUROCONTROL Tower Simulator at Bretigny Center integrating pre-operational prototypes provided by SINTEF (NATMIG) and FRQ (FSP);
- ENAV Airport IBP;
- FINMECCANICA Aircraft Division Cockpit Simulator
- FINMECCANICA Airport IBP
- INDRA Tower Platform integrated into the EUROCONTROL Tower Simulator at Brétigny
- Thales Air Sys (ground) and Thales Avionics (airborne) platforms.

The details about how those platforms will be used in the planned validation activities are reported here below:

- **ACG/COOPANS / EUROCONTROL/FRQ (FSP)/SINTEF (NATMIG) V2 Trials** – The V2 validation of ACG/COOPANS, ECTL, FRQ (FSP) and SINTEF (NATMIG) is based on a platform provided by Eurocontrol (eDEP simulation and CWP), FRQ (FSP) (CWP) and SINTEF (NATMIG) (routing and guidance services). Operational and validation expertise are provided by ACG/COOPANS, ECTL and HC (FSP). This exercise will simulate Budapest airport and propose to focus aspects related to on routing/guidance optimization, AGL control, ATCO CWP user interface, integration of AIM information via SWIM services. The validation exercise is planned to take place in Bretigny near Paris at the Eurocontrol Experimental Center.

- **ENAV / AIRBUS V2 Trials** – V2 Real Time simulation (RTS) focusing on the use of an integrated surface management data link to ensure the exchange of instructions between tower controller and pilots. The issued taxi route will be sent on-board for its graphical display on the Airport Moving Map. The on-board part will be represented by the AIRBUS Cockpit Simulator while the ENAV Airport IBP will represent the ATC side. At the same time, management of ground vehicles movements will be simulated by using pseudo-piloting position.
- **DSNA/AIRBUS V2 Trials** – V2 Real Time Simulation based on the validation platform provided by DSNA (Tower Simulator) and AIRBUS (Cockpit Simulator). This exercise will simulate Nice Côte d’Azur airport environment and propose to focus on surface routing integrated with AMAN/DMAN, ATCO CWP user interface, route uplink for on-board display.
- **FINMECCANICA Ground V2 Trials** – V2 Real Time Simulation (RTS) focusing on the innovative surface manager including the management of both aircraft and vehicles.
- **NLR (AT-One)/FINMECCANICA Aircraft Division/ENAV/Thales Avionics V2 Trials** – V2 Real Time Simulation (RTS) based on a platform provided by NLR (AT-One) NARSIM Tower platform and FINMECCANICA cockpit simulator. The validation will focus on the implementation of dynamic virtual block control integrated with data link service. From ATC side, the main operational expertise is provided by ENAV who will make available operational controllers for executing the simulation. From the on-board side, the validation aims to improve the aircrew situation awareness during the aircraft movement on the airport surface, reducing pilot workload. The ANF prototype developed by Thales Avionics will be integrated into the FINMECCANICA regional aircraft simulator focusing on the data exchange, message management, presentation to the pilots through the implementation of HMI in the avionics display system. In addition, the NLR (AT-One) GRACE flight simulator will be integrated in order to assess different flight deck aspects which are a consequence of the use of VSB control with guidance support.
- **DFS/AIRBUS V2 Trials** – The DFS/AIRBUS validation will address optimised routing, planning, guidance, and related aspects of the controller working position. It is planned as a real-time simulation using the Frankfurt Airport (EDDF) environment, involving active air traffic controllers from the DFS tower at Frankfurt. For validating guidance via datalink, the DFS Airport Simulator in Langen will be connected with the AIRBUS Cockpit Simulator in Toulouse and will exchange up-link messages.
- **ANS CR (B4)/INDRA V2 Trials** – V2 Real Time Simulation (RTS) using the existing Eurocontrol Tower Platform adapted to the Prague International Airport layout. Indra will develop the systems adapted to the requirements produced in this project and to the Prague International Airport operations. It is expected to use the SESAR1 Routing, Guidance and AMAN/DMAN systems to build upon;
- **Thales Air Sys / Thales Avionics / DASSAULT AVIATION trials** - It will address the validation of D-Taxi exchanges between pilots and controllers. The Validation platform will consist of Thales AIRLAB platform, made of a representative cockpit (including the airport navigation function) connected to the Thales Air Sys Tower control system. The Validation will involve participation of DASSAULT AVIATION.

Furthermore, a Fast Time Simulation (FTS) is planned by DSNA addressing Nice Côte-d’Azur airport routing constraints. This FTS routing prototype will give an evaluation of expected performance benefits in terms of predictability and environmental sustainability by the reduction of fuel consumption.

It will also simulate scheduling constraints set by DMAN and AMAN. Those possible optimisation schemes are:

- Lowest mean taxi time.
- Most obvious taxi route regarding standard ATC workings methods.
- Most accurate taxi speed adaptation to reduce conflicting situations.
- Then, the consolidated results of this FTS will give major information on:
- Performance areas impacted by the new concept assessed within PJ03a-01
- Level of these performance benefits.
- Level of taxi time milestones uncertainty to reach the expected performance goals.

In this context, it is important to highlight that only one consolidated V2 Validation Plan and V2 Validation Report will be produced with the contribution of all the partners. In such a way, based also on the experience

gained in SESAR 1, common conclusions and recommendations will be produced driving the roadmap for the following phases.

An overview of the methodology applied by the solution PJ03a-01 is illustrated in the Figure 1

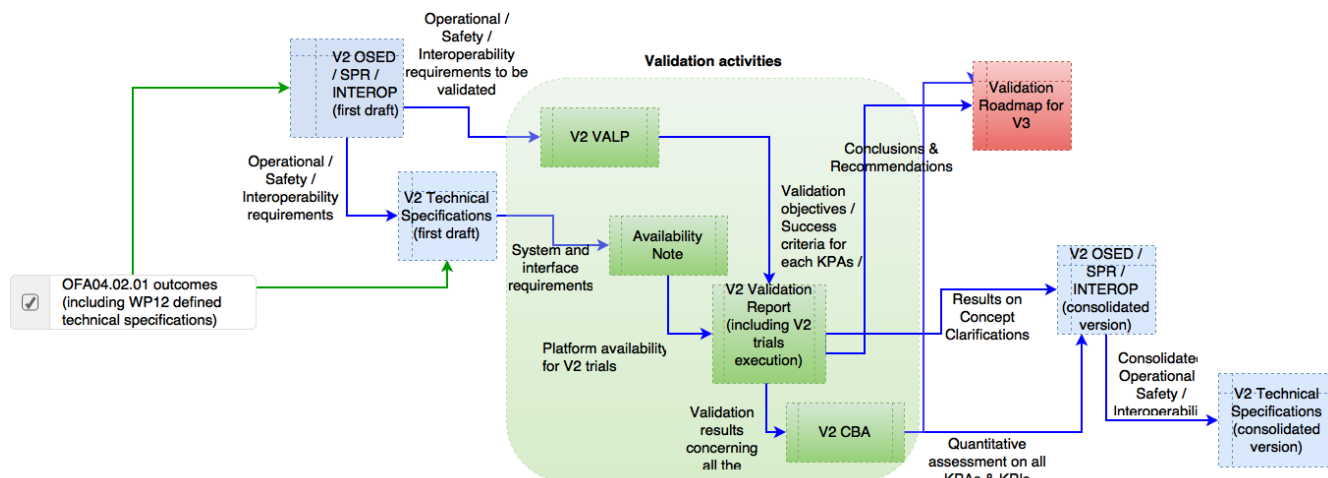


Figure 1: Overview of PJ03a-01 approach

The execution of PJ03a-01 activities implies a coordination with other projects / solutions:

- **PJ03b Airport Safety Nets** which will focus on the development of new Airport Safety support tools for pilots and controllers during airport operations. The Airport Surface Safety Nets will detect any mobiles deviation from the cleared taxi route and will notify it to the interested users.
- **PJ.04 Total Airport Management** which will focus on the implementation of an enhanced collaborative Airport Performance Planning, Monitoring and Management which is a pre-requisite for optimizing airport resources allocation.
- **PJ.19 Content Integration** in charge of supporting and guiding the process to ensure the completeness, consistency and coherence of the operational solutions with what is expressed in the SESAR CONOPS. That activity is ensured through the definition of the so called Project Content Integration Team.

PJ03a-03 “Enhanced navigation and accuracy in low visibility conditions (LVC) on the airport surface”

To quickly verify technical feasibility and navigation performance, we have chosen to use fast time simulations of selected navigation systems. After that, we will develop, for a selected solution, a mock-up navigation system which will undergo laboratory verification with real data (using fast time simulation) to achieve V2 maturity level in Wave 1. Simulation models will be developed in Matlab & Simulink, as well as Honeywell legacy simulation tools and run on a simulation cluster. We will use our own aircraft for data collection at airports equipped with a GBAS ground station (cooperation with PJ14-03-01).

An overview of the approach adopted by the solution PJ03a-03 is illustrated in the Figure 2.

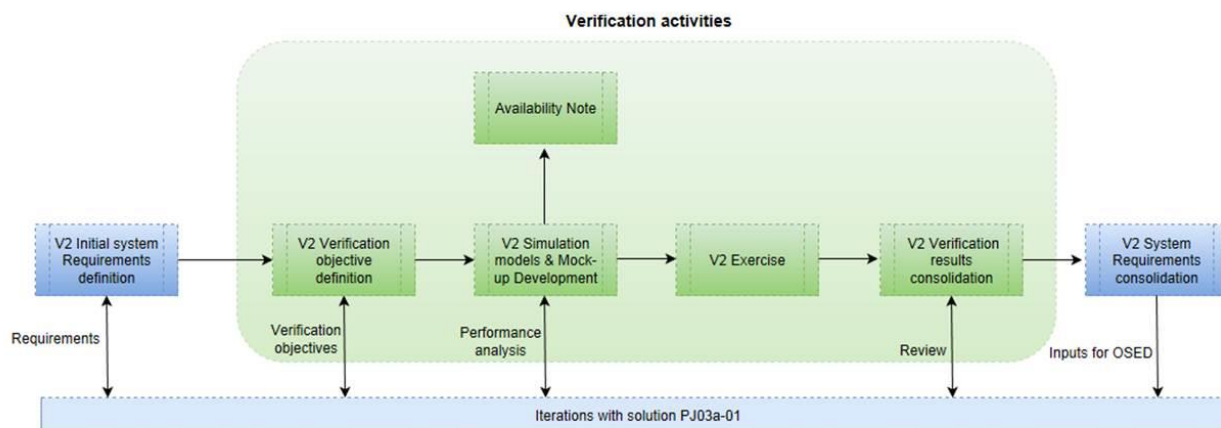


Figure 2: Overview of PJ03a-03 approach

The execution of PJ03a-03 activities implies the management of the dependencies identified with other SESAR solutions:

PJ14 – 03 – 01- GBAS – Required Inputs are coordination on MCMF messages. Coordination for possible data collection with MCMF ground station.

PJ14 – 03 – 04- APNT – Required Inputs are APNT requirements for ground navigation.

Outputs from identified SESAR 1 projects will be used, especially:

SESAR 9.12 GBAS – technical feasibility assessment of GBAS CAT II/III (based on GPS L1) and preliminary definition of multi-constellation multi-frequency GBAS, and GBAS prototype.

SESAR 9.27 GNSS - definition of the concept of operations for future dual frequency GPS/Galileo aviation receivers and GPS/Galileo/SBAS prototype

Also outputs from European research and innovation activities, especially: ANASTASIA (Airborne New and Advanced Satellite techniques and Technologies in A System Integrated Approach) and ALICIA (All Conditions Operations and Innovative Cockpit Infrastructure) which were focused on the problem of aircraft localization on airport surface will be used.

PJ03a-04 “Enhanced Visual Operations”

Starting from V2 maturity phase and with the objective to achieve V3 maturity at the end of Wave 1, the following validation approach is considered:

For AUO-0405 “Equivalent Visual Landing operations in Low Visibility Conditions”, real time simulations, bench testing, data collection during flight with representative aircraft and airborne prototypes; and flight trials are expected. Two areas will be investigated and verified – one will be a concept enabled by higher performance active sensors that can be used to augment the navigation, another one will focus on the Human Factors aspects associated with HUD/HDD using legacy sensors.

With respect to AUO-0406 “Equivalent Visual Taxi operations in Low Visibility Conditions” and AUO-0407 “Equivalent Visual Take-Off operations in Low Visibility Conditions”, real time simulations, bench testing and flight trials using legacy sensors is expected to achieve the required maturity level.

An overview of the approach adopted by the solution PJ03a-04 is illustrated in the Figure 3.

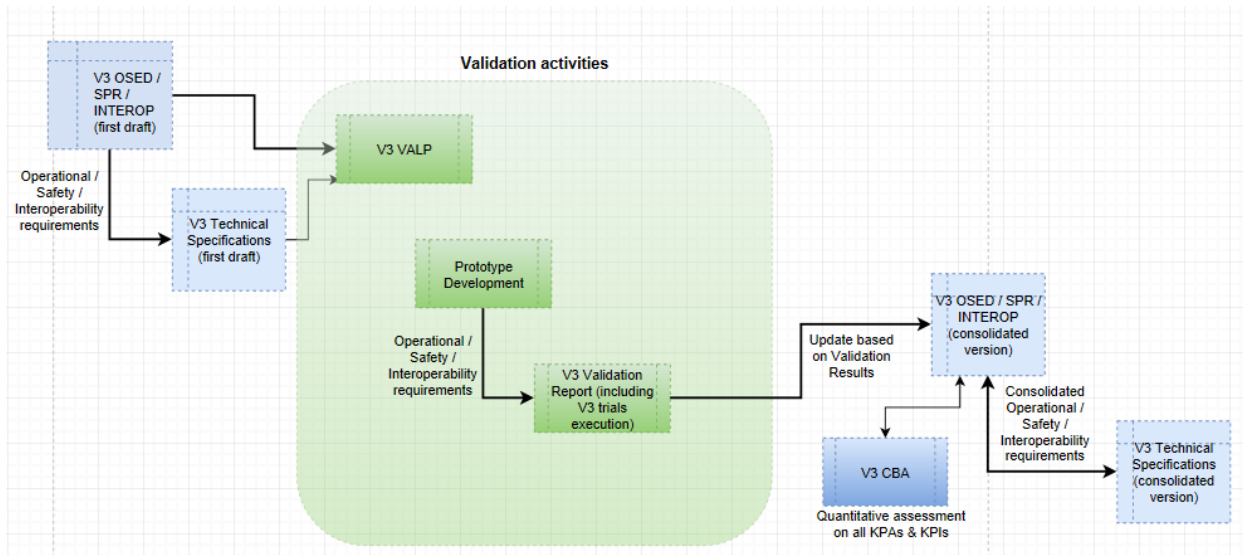


Figure 3: Overview of PJ03a-04 approach

The management of PJ03a-04 will also include dependencies and relationships with other SESAR solutions:

- ♦ **PJ18: The dependency and cooperation with PJ18-04 “Management and sharing of data used in trajectory (AIM, METEO)”** is expected with respect to airport data and database systems. The rationale for including dependency with PJ.18-04, even though not identified in the MAWP, is to enhance the proposed solution with respect to identification and formulation of requirement and provision of airport data (on Approach Lighting System) needed for the Combined Vision Systems validation exercise. To summarize, PJ18-04 is expected to support PJ-03a-04 in identifying and formulating the Information Exchange Requirements (IER) with respect to airport data, in the frame of the PJ-03a-04 OSED. PJ18-04 is also expected to support PJ-03a-04 by providing the airport data (through an information service) as necessary for the PJ-03a-04 validation exercise. Data from two EU airports and publishing Approach Lighting System (ALS) data under AIXM format is expected, the on-site survey for these airports may be needed to obtain the requested data.
- ♦ **PJ02-06: “Improved Access into Secondary Airports in Low Visibility Conditions”:** cooperation with respect to operational aspects including CVS (Equivalent Visual Operations), e.g. contribution to OSED. Therefore, the rationale for including dependency with PJ.02-06, even though not identified in the MAWP, is the fact that this solution addresses improved access into secondary airports in low visibility conditions, and as such is complementary to the activities proposed here to the Combined Vision Systems. By this coordination, this solution will benefit by securing inputs specific to secondary airports and thus will be able to provide more robust solution.

Outputs from identified SESAR 1 projects will be used, especially:

- ♦ **SESAR 9.28 Enhanced Vision Head Down and Head Up Solutions and 9.29: Enhanced and Synthetic Vision:** The activities in this solution present continuation and further extension of SESAR 09.29 worked on within SESAR 1, namely with respect to the use and evaluation of further active sensors and their use, as well as further focus on lowering decision height for landing, and new focus on taxi and take-off operations.
- ♦ **SESAR LSD.02.02: Augmented Approaches to Land-** There is also a link with LSD.02.02 project, which will be demonstrating similar technologies only for landing (e.g. SVGS enabling lowering of decision height by 50ft to 150ft). The differences in this proposed solution and LSD.02.02 include lower decision height achieved in this proposed solution bringing further benefits, as well as areas of focus – taxi and take-off operations are targeted.

Also, outputs from European studies, such as EMMAI or TDS2 will be used.

Recorded data from Enhanced vision sensors for MET investigations will be provided from external sources to guarantee a comprehensive dataset.

PJ03a-09 “Surface operations by RPAS”: According to the deliverables and validations that will be developed by the Project in W1, for both V1 and V2 will be produced OSEDs that will collect in particular the Operational Environment and procedures description, the use cases and system/operation requirements that are critical for developing a plan for the integration of RPAS in current manned surface operations.

The activities are linked to the work of Project 13.1.1 that is focused on Detect and Avoid. This function, according to the actual European (EASA) and ICAO rules is a fundamental requirement for a possible integration of Unmanned Aircraft in ATM, in the context of solution 9 to ensure safe ground operations.

Regarding validation activities, in the frame of this solution two V1 and three V2 validation exercises will be performed, one V1 VALP and one V1 VALR is expected for the V1 cycle and the same for the V2 cycle. It is important to underline that for some V2 validation activities, the human in the loop has been considered. ATCOs and RPAS pilots will participate during the real time simulation sessions in order to assess the impact of the concept analysed on their working method related to surface operations

For the simulation exercises, in line with solution activities the following potential enablers could be considered:

- ATC Procedures design
- ATC and remote pilots roles and responsibilities definition
- ATC and remote pilots working methods definition
- Detect & Avoid (D&A) system
- Definition criteria for take-off and landing
- Compliance with multiple ATC instructions
- Procedures in case of loss of voice communication, C2 or in an emergency
- Ground handling

In order to corroborate the analysis, a dedicated performance assessment that addresses the main KPAs (SAF-SEC-HP) and CBA will be developed by the Project.

An overview of the methodology applied by the solution PJ03a-09 is illustrated in the Figure 4.

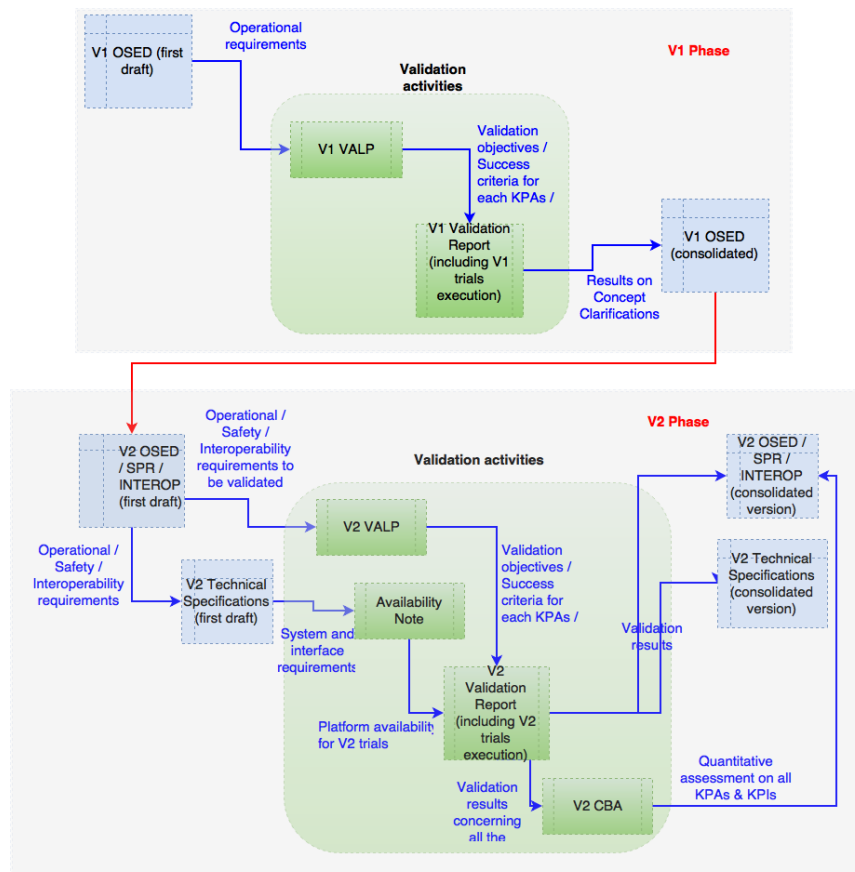


Figure 4: Overview of PJ03a-09 approach

1.4 Ambition

PJ03a-01: Enhanced Guidance Assistance to Aircraft and Vehicles on the Airport Surface Combined with Routing

Here below the main advances expected to be provided by the Solution PJ03a-01 with respect to the SESAR 1 achievements are listed:

- Implementation of Airfield Ground Lighting (AGL) service not only for traffic on aprons (which was the focus of SESAR 1 activities) but also for traffic on taxiways / runways;
- Need to check if and how the “follow-the-greens” procedure can be standardised. In this context, with respect to the SESAR 1 programme, Airfield Ground Lighting is expected to manage priorities to ensure also lateral separation between mobiles on the whole movement area in all weather conditions. In addition, the use of AGL and related procedures as a speed control will result in a reduction of speed changes, in a fewer start and stop cycles leading to a smoother traffic flow.
- Further investigations on the implementation of the SWIM concept to ensure the timely sharing of information among all interested stakeholders. In this context, the definition of an Aerodrome Mapping Database (AMDB) to be shared between ground and on-board systems will be a relevant activity in this solution.
- Data link service to ensure the exchange of VSB positions and statuses. In SESAR 1, CPDLC free text messages were assumed to be transmitted. These messages will have to be standardised.
- Fix all the instructions / clearances which are considered useful to be exchanged via data link between flight crews and controllers. A subset of further instructions (as contact, monitor) will be investigated to validate the operational utility to be exchanged via data link.
- Consolidation of data link messages referred to the vehicle drivers. Need to define a specific standard as already done for the communications involving pilots (i.e. CPDLC)
- Detection / resolution of conflicting situations that may occur when generating optimal routes and schedules in the planning phase.
- Introduction of an advanced surface manager, for the joint management of aircraft and vehicles, that allow to increase the safety and improve the airport efficiency, thanks to a better flow management
- Introduction of a 3D perspective interface for increasing the awareness of controllers in the management of operations based on dynamic rendered interface on taxiways and runways;
- Implementation and integration of a centralized GNSS positioning and integrity system.

PJ03a-03 “Enhanced navigation and accuracy in low visibility conditions (LVC) on the airport surface”

The ambition of Solution PJ03a-03 is to offer a technological enabler for the PJ03a project which will provide an increased accuracy of aircraft position minimizing the impact of bad weather conditions on surface operations. The solution will provide two approaches: the first approach is based on the GNSS (including GBAS and SBAS) and the second approach is based on hybridized solution INS and other sources of navigation information.

In Wave 1 maturity level V2 will be completed. This solution will continue in Wave 2 to achieve maturity level V3.

PJ03a-04 “Enhanced Visual Operations”

The main ambition of this solution with respect to achievements in SESAR 1 is to enable more landing operations in low visibility conditions, considering not only legacy sensors but also higher performance active sensors, as well as provide solutions with legacy sensors for taxi and take-off operations. The operational and meteorological aspects will also be investigated. The solution will enhance development of regional/smaller airports access in low visibility conditions.

PJ03a-09 “Surface operations by RPAS”

The main ambition of solution PJ03a-09 is to provide important input useful to contribute to the integration of RPAS in ATM, in particular relating to surface operations.

EASA and ICAO are working on RPAS regulations with detailed attention on the following points:

- Integration must be linked to the EU ATM Master Plan and the ICAO Global Plan/ASBU timeline

- RPAS has to fit into the ATM system with adaptations to enable a safe integration
- RPAS has to prove to be as safe as current manned vehicle operations and their behaviour to be equivalent to manned aviation

PJ03a-09 could provide useful contributions thanks to R&D and validation activities that will be conducted in the frame of the solution.

2. Impact

2.1 Expected impacts

The following table reports the main Key Performance Areas (KPA) and Transversal Areas impacted by each PJ03a Solution taking also into account the benefits outlined in the European ATM Master Plan.

Solution	Capacity	Efficiency	Resilience	Predictability	Flexibility	Safety	Human Performance	Security	Environmental Sustainability	Access and Equity	Participation	Interoperability	Cost effectiveness
PJ03a-01		H	M	H		H	M	M	H				
PJ03a-03	H	H	H	M		H							
PJ03a-04	M	M				M	H						M
PJ03a-09	M			M		H	H	H		H	M	H	

Table 1: PJ03a Performance Goals

Before detailing how each solution will contribute to each identified Key Performance Areas, it is important to highlight that ad hoc validation activities (e.g. as Real Time Simulations, Fast Time Simulations) will be executed. During those exercises, the identified expected impacts will be measured through both qualitative and quantitative analysis. In detail, the qualitative data collected mainly through observations, debriefings and questionnaires will be analysed by using the operational and Human Factor knowledge. About the quantitative analysis, it will be mainly based on system data logs of relevant metrics and indicators. This data will be used to conduct statistical analysis as well.

For **Solution PJ03a-01** the main Key Performance Areas (KPA) expected to be impacted are the following ones:

- **Predictability** – Reduction of surface operations variability will result from the provision of more accurate taxi times through optimized routing and planning algorithms. Less taxi time variability is a result of a smoother traffic flow expected to be achieved by implementing speed control through the use of AGL and related operational procedures. The resulting reduction of speed changes and fewer start-and-stop cycles will improve the predictability of surface ground operations. The implementation of those services and associated procedures is expected to ensure an increase of predictability by 10-15%;
- **Human Performance** – This KPA will be impacted from both the controllers' and pilots' / vehicle drivers' perspectives. On the ATC side, the integration of information coming from different services (including routing, planning and guidance) is expected to positively impact controllers' situation awareness. On the on-board side, pilots and vehicle drivers will be provided with an Airport Moving Map integrating information about airport layout, taxiways / runways status, (virtual) stop bars status as well as the cleared taxi routes. In such a way, both pilots and vehicle drivers will be able to build a complete and detailed picture of what is happening around them resulting in an increase of their situation awareness;
- **Security** – Secure exchange of data between ATC and pilots/drivers has to be considered as prerequisite for the operational use of data link services. Therefore, PJ03a-01 is expected to significantly contribute to the Security KPA.
- **Resilience** – The impact on this KPA has been added with respect to the information reported in the Multi Annual Work Programme. The implementation of Dynamic Virtual Block Control will allow the reduction of Airport capacity loss occurring mainly in adverse weather conditions.

- Environmental Sustainability – The impact on this KPA has been added with respect to the information reported in the Multi Annual Work Programme. This deviation is well justified by the fact that a smoother traffic flow with less starts and stops while taxiing has a positive impact on fuel burn and CO₂ emission indicators.
- Efficiency – this KPA is strictly linked to environmental sustainability. Flights and operations efficiency will benefit from a reduction of speed changes and more smoothness of the traffic flow achieved through the Airfield Ground Lighting service. An improved efficiency of surface operations will also be ensured through the exchange of instructions / clearances between tower controllers and pilots / vehicle drivers via data link resulting in a reduction of potential misunderstandings occurring via R/T.
- Safety – the improved situational awareness of the main relevant actors (i.e. tower controllers, flight crew and vehicle drivers) will reduce the probability of occurrence of hazardous situations. This is especially true in low visibility conditions where the availability of the Airfield Ground Lighting service will reduce route deviations with a consequent impact on safety.

For **Solution PJ03a-03** expected benefits are mostly in:

- Predictability maintained during low visibility conditions. The integration of more accurate aircraft position into the planning process is expected to ensure an increase of predictability by roughly 20%.
- Safety due to increased accuracy in aircraft position during non-nominal conditions or unexpected phenomena like jamming, interference, scintillation and multipath.
- Flight efficiency in terms of both reduction of fuel emissions on surface and reduction of pilot workload in LVC. This is expected to ensure an increase of efficiency by 2-5%.

Solution PJ03a-03 is LOCAL allowing an efficient taxiing in LVP.

For **solution PJ03a-04**, the expected benefits include increased capacity in low visibility conditions thanks to better access to all airports in low visibility conditions, keeping the same or increasing current level of safety, as well as improving pilot workload in critical situations by improving their situational awareness.

In this context, it is expected an increase by 15-20% on Safety thanks to the ability of Flight Crew to maintain an awareness of runway centreline.

Other benefits are reducing fuel burn and CO₂ emission thanks to minimizing delayed and diverted flights. These are caused by low visibility on destination airports. Cost is reduced for cancelled flights due to weather.

PJ03a-09 Surface Operations by RPAS - KPA / Performance impact: Access to airspace is the biggest benefit because there is a high demand for integrating RPAS in current ATM. High impact for ground separation provision and integration with manned traffic because of the inherent characteristics of RPAS: e.g. latency, different flight awareness of the crew, sensitivity to weather conditions, ability to comply with all existing manned operational rules. In terms of KPA, the impact to safety and capacity needs to be evaluated. The integration of RPAS in current ground operations with manned traffic might induce risks in terms of lack of compatibility between procedures. The handling of mixed traffic (regular and RPAS) might increase the complexity of the controller's monitoring tasks so Human Performance is impacted and need to be evaluated.

Regarding Interoperability: RPAS will need to integrate and consequently all CNS, Air-Ground and Ground-Ground issues will need to be re-assessed for unmanned flight (network level).

Predictability KPA is also impacted. The RPAS that have to perform ground /taxing operations should need an off block time and an ETD. Furthermore, KPA / predictability is also positively affected because of flight plans that have to be filed for RPAS.

a) Technical Impact

From a technical point of view, each solution is expected to provide inputs to related standardisation activities:

PJ03a-01 – The consolidation of clearances / instructions to be exchanged via data link between controllers and pilots could provide inputs to update the D-TAXI application standardised by RTCA SC214 /

EUROCAE WG-78. The identification of security requirements about air/ground data link communication will be part of the work as well. Regardless of the communication means, the routes (and associated taxi time) assigned to each mobile will be optimized thanks to the optimization of routing and planning algorithms. From this perspective, this solution will also contribute to the standardization activity executed by the EUROCAE WG41 dealing with A-SMGCS MASPS and MOPS for A-SMGCS Routing function.

As the solution PJ03a-01 requires a need for A/G integration and coordination for data exchange between controller and flight crew, it will have a Network dimension. Therefore, it is important to highlight that PJ03a-01 intends to establish collaboration with the EUROCAE WG44 for the definition of an Aerodrome Mapping Database (AMDB) to be shared between ground and on-board systems.

PJ03a-09 KPA / Performance impact: Access to airspace is the biggest benefit because there is a high demand for integrating RPAS in current ATM. High impact for ground separation provision and integration with manned traffic because of the inherent characteristics of RPAS: e.g. latency, different flight awareness of the crew, sensitivity to weather conditions, ability to comply with all existing manned operational rules. In terms of KPA, the impact to safety and capacity needs to be evaluated. The integration of RPAS in current ground operations with manned traffic might induce risks in terms of lack of compatibility between procedures. The handling of mixed traffic (regular and RPAS) might increase the complexity of the controller's monitoring tasks so Human Performance is impacted and needs to be evaluated. In this context, a collaboration with the EUROCAE WG73 dealing with the definition of standards and guidance for RPAS will be established.

Regarding Interoperability: RPAS will need to integrate and consequently all CNS, Air-Ground and Ground-Ground issues will need to be re-assessed for unmanned flight (network level). It is expected that KPA / predictability is also positively affected because of flight plans that have to be filed for RPAS.

PJ03a-03, especially with respect to GBAS will support ICAO NSP and its subgroups, working on SARPs updated with respect to GBAS CAT II/III Concept; RTCA SC 159 – Global Positioning System. The group develops MOPS for GPS for aircraft navigation receivers. Also the solution foresees to participate to LATO: Landing and take-off group of Eurocontrol. The group focuses on Precision approach, landing and guided take-off operations (for ILS, MLS and GBAS); the aspects discussed on EUROCAE WG-28 – Global Navigation Satellite Systems (GNSS) are relevant as well, as the group develops and updates Eurocae documents for GBAS ground subsystem (CAT I), CAT II/III systems are considered;

PJ03a-04 will support EUROCAE WG79 and related RTCA SC-213 in charge of developing MASPS-level guidance for Synthetic Vision Systems (SVS), Enhanced Vision Systems (EVS) and their combination (ESVS);

b) Economic Impact

PJ03a-01 and PJ03a-03 – With the target of achieving a more predictable and smoother traffic flow, one of the economic impacts associated to this solution is related to the taxi time reduction. This effect is strictly linked to the Fuel Efficiency in terms of fuel burn reduction which has a positive impact on airlines costs. A smoother traffic flow is expected also with low visibility conditions with a direct impact on airport capacity.

PJ03a-04- The increased capacity of secondary airports in low visibility conditions, thanks to equivalent visual operations, will bring economic benefits to the airport operators, as well as retail on these airports and neighbourhood areas.

PJ03a-09 - The use of RPAS can offer various advantages , not only in terms of environmental benefits – less fuel consumption, fewer CO₂ emissions, and reduced noise but also potential economic savings are expected. The wide array of civilian uses of RPAS currently includes a wide range of activities: environmental, agricultural and fishery operations, disaster response, border control, and many others that can be carried out with less costs comparing with manned aviation. The economic potential of RPAS and its development will be one of the most important future challenges as regards aviation industry, people and companies involved. The economic forecast of benefits for RPAS integration is very high, with the creation of job placements, of which a large portion being high -tech, high paying manufacturing jobs.

c) Social Impact

PJ03a-01 and PJ03a-03 – Taxi time reduction resulting from a smoother traffic flow will have a direct impact on Fuel Efficiency also in terms of CO₂ emissions. This is expected to contribute to the satisfaction of European standards set for noise, local air quality, emissions and contaminants at and around airports.

PJ03a-04 – The increased capacity of secondary airports in low visibility conditions has the potential to improve the attractiveness of a region for doing business, thus leading to the creation of jobs, especially in remote areas..

PJ03a-09 - The benefits the RPAS could ensure to the European Citizens represents one important cornerstone for their acceptance by the European people. Possible utilisations of RPAS were identified during the EC Panel Workshops, resumed in a quite large, despite non-exhaustive number of missions. Among these missions, citizens can see a number of them as having more direct benefits on their lives and we can classify them in three groups:

- Missions related to Civil Protection: RPAS could be used in monitoring, preventing and alert and post-crisis management system for natural disasters.
- Missions related to Security: RPAS could be used for coastal surveillance or sensitive sites (ports, airports, power plants) monitoring.
- Mission related to Environment Protection / Preservation: RPAS could be used in monitoring and protecting natural environment. RPAS could also ensure indirect benefits from the air vehicle platform by reducing carbon/noise footprint if compared with manned aviation.

For this reasons is important conduct R&D activities related to the integration of RPAS traffic in the European ATM

2.2 Measures to maximise impact

a) Dissemination and exploitation of results

The activities concerning the dissemination and exploitation of results refer mainly to the participation to international conferences in the context of the Air Traffic Management. As already occurred for SESAR 1, communication activities will take benefit from the involvement of project members in international organizations, associations and forums. Therefore, the schedule of the main events in the ATM domain will be monitored to identify the main suitable conferences and targeted audience where PJ03a results will be presented. In detail, ad hoc papers will be produced mainly after the execution of relevant validation activities to illustrate the main results and associated benefits.

It is also important to mention the contribution that PJ03a will provide to specific standardisation bodies by taking advantage of the involvement of project partners. That will be the case for specific EUROCAE, ICAO NPS, RTCA and related Working Groups:

- EUROCAE WG78 in charge of defining Standards for Air Traffic Data Communication Services
- EUROCAE WG79 and related RTCA SC-213 in charge of developing MASPS-level guidance for Synthetic Vision Systems (SVS), Enhanced Vision Systems (EVS) and their combination (ESVS);
- EUROCAE WG41 in charge of developing and updating MASPS, MOPS and Guidelines for A-SMGCS in alignment with EUROCONTROL A-SMGCS operational specifications and requirements.
- EUROCAE WG44 in charge of updating standards for aeronautical databases, terrain and obstacle, aerodrome mapping and also to develop “Guidelines for the Verification and Validation of Aerodrome Mapping Databases (AMDB) and Aerodrome Surface Routing Network (ASRN) for routing applications.
- ICAO NSP and its subgroups, working on SARPs updated with respect to GBAS CAT II/III Concept;
- RTCA SC 159 – Global Positioning System. The group develops MOPS for GPS for aircraft navigation receivers;
- LATO: Landing and take-off group of Eurocontrol. The group focuses on Precision approach, landing and guided take-off operations (for ILS, MLS and GBAS);
- EUROCAE WG-28 – Global Navigation Satellite Systems (GNSS). The group develops and updates Eurocae documents for GBAS ground subsystem (CAT I), CAT II/III systems are considered;

- EUROCAE WG73 is tasked to deliver standards and guidance that will ensure the safety and regularity of Unmanned Aircraft Systems (UAS) missions;

Following the SESAR 1 approach, PJ03a dissemination activities will be compliant with the related guidelines defined by the SJU. In this context, even if any partner could participate to the identified conference, the Project Manager will assume the role of Project Communications contact point. Therefore, he will be the responsible to ensure that those activities will be executed as recommended.

The following table summarizes the main envisaged activities to ensure the dissemination and exploitation of PJ03a results:

Goal	Message	Internal Dissemination	External Dissemination
Project Updates	Essential to have every partner connected and up to date, but also to explain better expected results to all stakeholders	<ul style="list-style-type: none"> ▪ S2020 Project Website ▪ Publications 	<ul style="list-style-type: none"> ▪ SJU public Website ▪ Conferences ▪ Workshops ▪ Publications
Archives & Reference documents	Keep past records for future needs and documents that might support the activities of any area.	<ul style="list-style-type: none"> ▪ S2020 Project Website ▪ Publications 	
Notices	News that can affect or help and develop the project	<ul style="list-style-type: none"> ▪ S2020 Project Website 	<ul style="list-style-type: none"> ▪ SJU public Website ▪ Conferences ▪ Publications
Schedule Updates	Updated calendar of events	<ul style="list-style-type: none"> ▪ S2020 Project Website ▪ Publications 	<ul style="list-style-type: none"> ▪ SJU public Website
Results	The need to verify projects outcome and effectiveness	<ul style="list-style-type: none"> ▪ S2020 Project Website 	<ul style="list-style-type: none"> ▪ SJU public Website ▪ Demonstrations ▪ Conferences ▪ Publications

Table 2: PJ03a dissemination activities Goals

b) Communication activities

Communication activities aim at ensuring wide external communication on the PJ03a across the whole air transport community (SESAR JU and SJU Members, Airspace Users, Industry, Military, Airports, National Aviation Authorities, Associations and their Members, Institutional Decision Makers and so forth). It will promote high visibility of the project, its objectives and major results.

Inside the SESAR 2020 Programme, the communication activities will also include the coordination with relevant on-going projects. PJ03a will share with PJ.19 the main results achieved on a yearly basis. The exchange of the information will ensure the coherency of the achieved results with the identified high-level objectives and expectations.

External communication activities include the attendance to specific events (such as the World ATM Congress, ATC Global) where ad hoc materials, flyers could be shared with the relevant stakeholders.

To summarize, three objectives have been identified which shall underpin PJ03a communication material:

- To create awareness and outreach about PJ03a;
- Showcasing the research outcomes and benefits that PJ03a will bring to the real day-to-day Air Traffic Management (ATM) operations;
- To accelerate the operational acceptance and subsequent deployment of PJ03a related solutions.

PJ03a communication plan will be maintained as part of project management activities which will include:

- A calendar of the key project milestones associated with communication activities (press and news material, videos, media event and magazine interview);
- Target audience (partners, associations and institutional entities)

In this context, communication activities will be associated with:

- Key milestones of PJ03a (such as contract signature, validation exercises and project conclusion)
- Major air transportation community events, such as ATC Global, World ATM congress, major air shows, national events.

As it is essential to ensure that communications are consistent with the SESAR brand, coordination will be organised with SJU communications to prepare and facilitate communication activities. This will help in:

- Validating SESAR related content;
- Developing possible joint activities through various communications channels;
- Benefiting from SJU messaging support;
- Securing SJU speakers if needed;
- Benefiting from SJU content support;
- Allowing the SJU to further cascade relevant content through its own existing channels.

3. Implementation

3.1 Work plan — Work packages and deliverables

3.1.1 Project Structure

The project is divided into 4 different Solutions; each split into a certain number of activities and to a certain extent, coordinated independently by its SL. A further Ethics Deliverables Work package has been introduced to address the handling of ethics requirements. The resulting project structure is displayed in Figure 5.

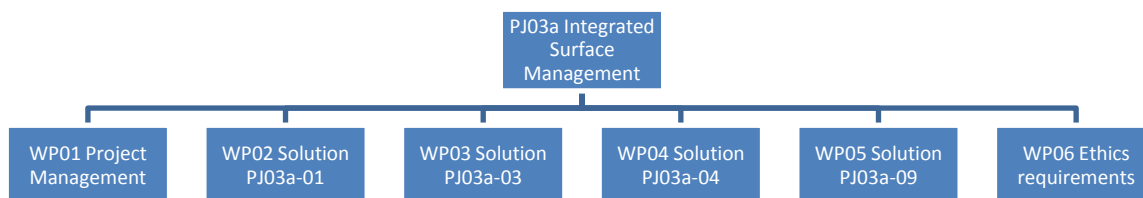


Figure 5: PJ03a Work Break Down Structure

In order to ensure the appropriate coordination and performance of the activities related to transversal activities, two additional roles are proposed at project level. It consists of two new roles: The Project Content Integration Team, (PCIT) which will be a subset of the ATM focal points led by the Project Content Integration Leader (PCIL). The PCIT will have in addition to the responsibilities as an ATM focal point, other duties related to the coordination with the transversal projects in order to ensure the suitability of the contributions generated by the different solutions. See more details of the responsibilities in section 3.2.

A detailed work package description follows in chapter 3.4.

Definitions:

'Work package' means a major sub-division of the proposed project i.e. SESAR Solutions.



'Deliverable' means a distinct output of the project, meaningful in terms of the project's overall objectives and constituted by a report, a document, a technical diagram, a software etc.

SESAR.IR-VLD.Wave1-05-2015 Integrated Surface Management

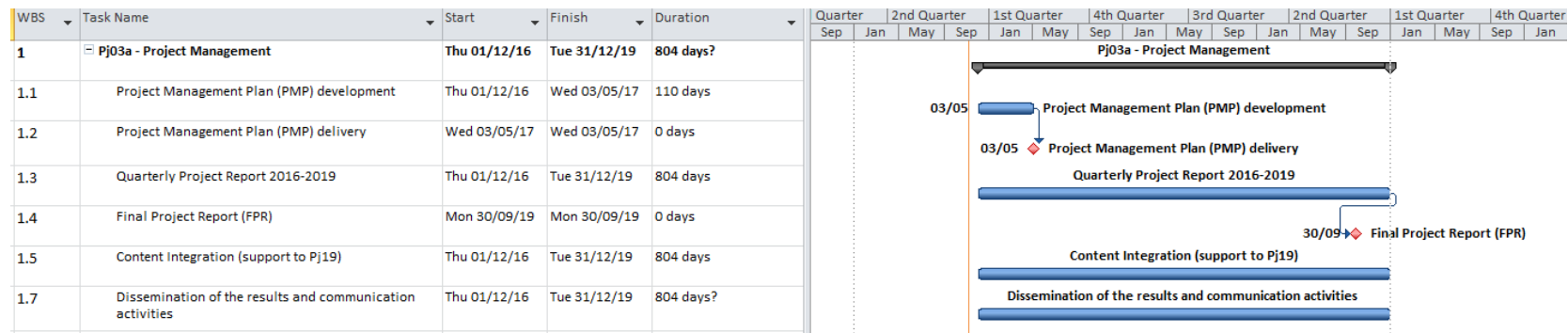


Figure 6: WP01 PJ03a Management – Gantt chart

SESAR.IR-VLD.Wave1-05-2015 Integrated Surface Management

WBS	Task Name	Start	Finish	Duration
2	PJ03a - Solution 01 - V2	Mon 05/12/16	Fri 29/11/19	780 days
2.1	Solution 01 Management	Mon 05/12/16	Fri 29/11/19	780 days
2.2	Development of PJ03a-01 V2 OSED / SPR / INTEROP	Mon 05/12/16	Thu 31/01/19	493 days
2.3	Availability of Sol1_V2_OSED / SPR / INTEROP first draft	Fri 17/03/17	Fri 17/03/17	0 days
2.4	PJ.03a-01 V2 OSED/SPR/INTEROP	Thu 31/01/19	Thu 31/01/19	0 days
2.5	Development of PJ.03a-01 V2 TS	Mon 09/01/17	Fri 26/04/19	534 days
2.6	Availability of Sol1_V2_TS first draft	Fri 19/05/17	Fri 19/05/17	0 days
2.7	PJ.03a-01 V2 TS	Fri 26/04/19	Fri 26/04/19	0 days
2.8	Development of PJ.03a-01 V2 VALP	Mon 09/01/17	Fri 29/09/17	190 days
2.9	PJ.03a-01 V2 VALP consolidated	Fri 29/09/17	Fri 29/09/17	0 days
2.10	Solution 01 - V2 Trials ACG / ECTL / FRQ / SINTEF	Mon 09/01/17	Fri 30/03/18	320 days
2.14	Solution 01 - V2 Trials DSNA / AIRBUS	Mon 09/01/17	Fri 25/05/18	360 days
2.18	Solution 01 - V2 Trials ENAV / AIRBUS	Mon 09/01/17	Fri 30/03/18	320 days
2.22	Solution 01 - V2 Trials LEONARDO FINMECCANICA	Mon 09/01/17	Fri 25/05/18	360 days
2.26	Solution 01 - V2 Trials AT-One / LEONARDO FINMECCANICA / ENAV / Thales Avionics	Mon 09/01/17	Fri 25/05/18	360 days
2.30	Solution 01 - V2 Trials DFS / AIRBUS	Mon 09/01/17	Fri 25/05/18	360 days
2.34	Solution 01 - V2 Trials ANS CR / INDRA	Mon 02/01/17	Fri 25/05/18	365 days
2.38	Solution 01 - V2 Trials Thales Air Sys / Thales Avionics / DASSAULT	Mon 13/02/17	Fri 25/05/18	335 days
2.42	Development of PJ03a-01 V2 VALR (integration of all the contributions)	Mon 06/11/17	Fri 31/08/18	215 days
2.43	Solution 01 - V2 VALR consolidated	Fri 31/08/18	Fri 31/08/18	0 days
2.44	Development of PJ03a-01 V2 CBA	Mon 06/11/17	Fri 02/11/18	260 days
2.45	Availability of PJ03a-01 V2 CBA	Fri 02/11/18	Fri 02/11/18	0 days
2.46	Development of PJ03a-01 V3 Validation Roadmap	Mon 05/02/18	Fri 30/11/18	215 days
2.47	Availability of PJ03a-01 V3 Validation Roadmap	Fri 30/11/18	Fri 30/11/18	0 days
2.48	Solution PJ03a-01 - V2 Data Pack	Fri 26/04/19	Fri 26/04/19	0 days
2.49	Solution PJ03a-01 - V2 Gate	Wed 26/06/19	Wed 26/06/19	0 days

The Gantt chart displays the project schedule for PJ03a - Solution 01 - V2. The timeline is divided into quarters from September to September. The main task, PJ03a - Solution 01 - V2, spans from Mon 05/12/16 to Fri 29/11/19. Subsequent tasks include Solution 01 Management, Development of PJ03a-01 V2 OSED / SPR / INTEROP, Availability of Sol1_V2_OSED / SPR / INTEROP first draft, PJ.03a-01 V2 OSED/SPR/INTEROP, Development of PJ.03a-01 V2 TS, Availability of Sol1_V2_TS first draft, PJ.03a-01 V2 TS, Development of PJ.03a-01 V2 VALP, PJ.03a-01 V2 VALP consolidated, and various trials (ACG / ECTL / FRQ / SINTEF, DSNA / AIRBUS, ENAV / AIRBUS, LEONARDO FINMECCANICA, AT-One / LEONARDO FINMECCANICA / ENAV / Thales Avionics, DFS / AIRBUS, ANS CR / INDRA, Thales Air Sys / Thales Avionics / DASSAULT). The chart concludes with the development and availability of PJ03a-01 V2 VALR, CBA, and the V3 Validation Roadmap, followed by the final V2 Data Pack and V2 Gate.

Figure 7: Project 03a-01. Gantt Chart

SESAR.IR-VLD.Wave1-05-2015 Integrated Surface Management



Figure 9: Project 03a-04. Gantt Chart

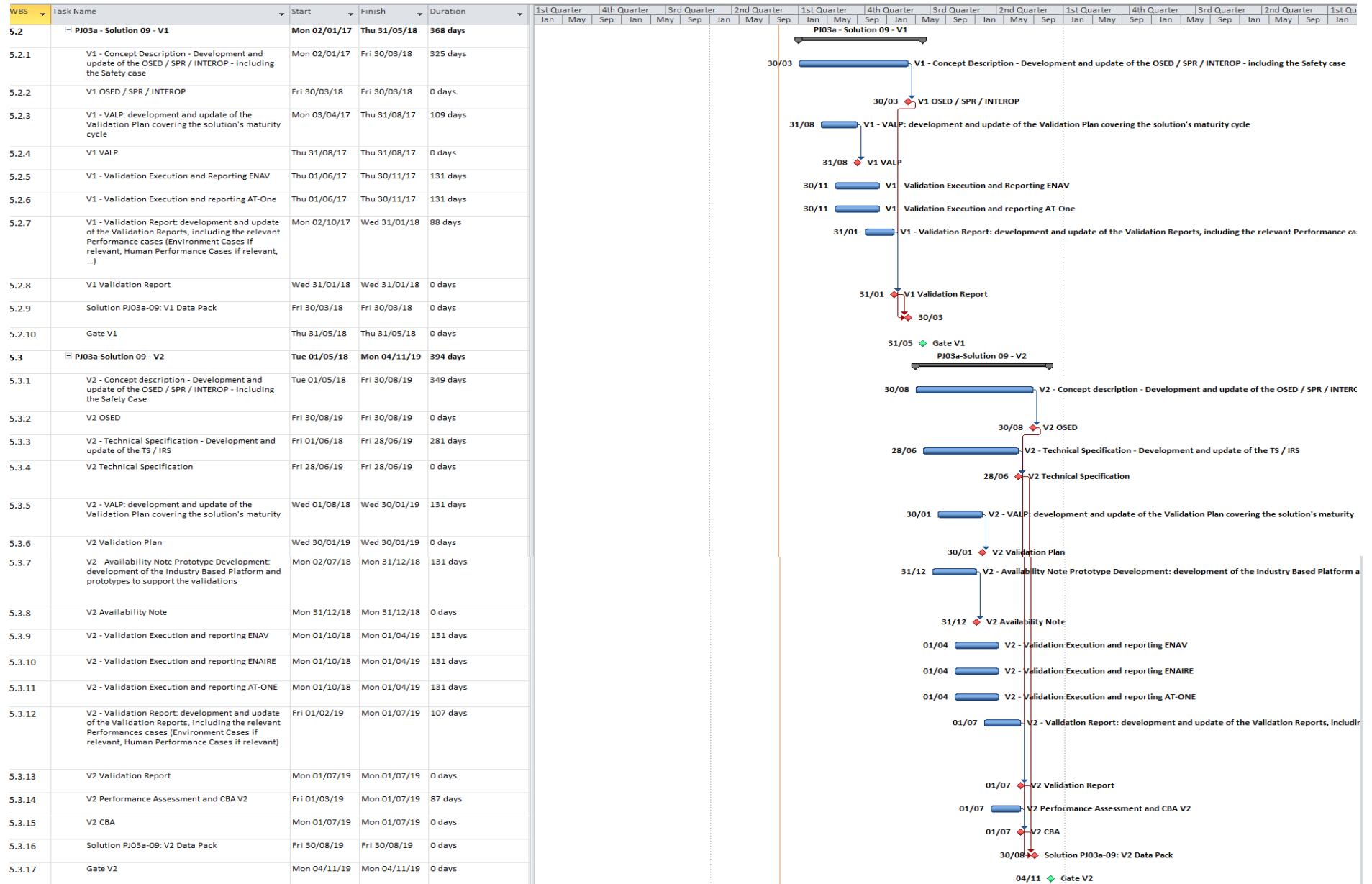


Figure 10: Project 03a-09. Gantt Chart

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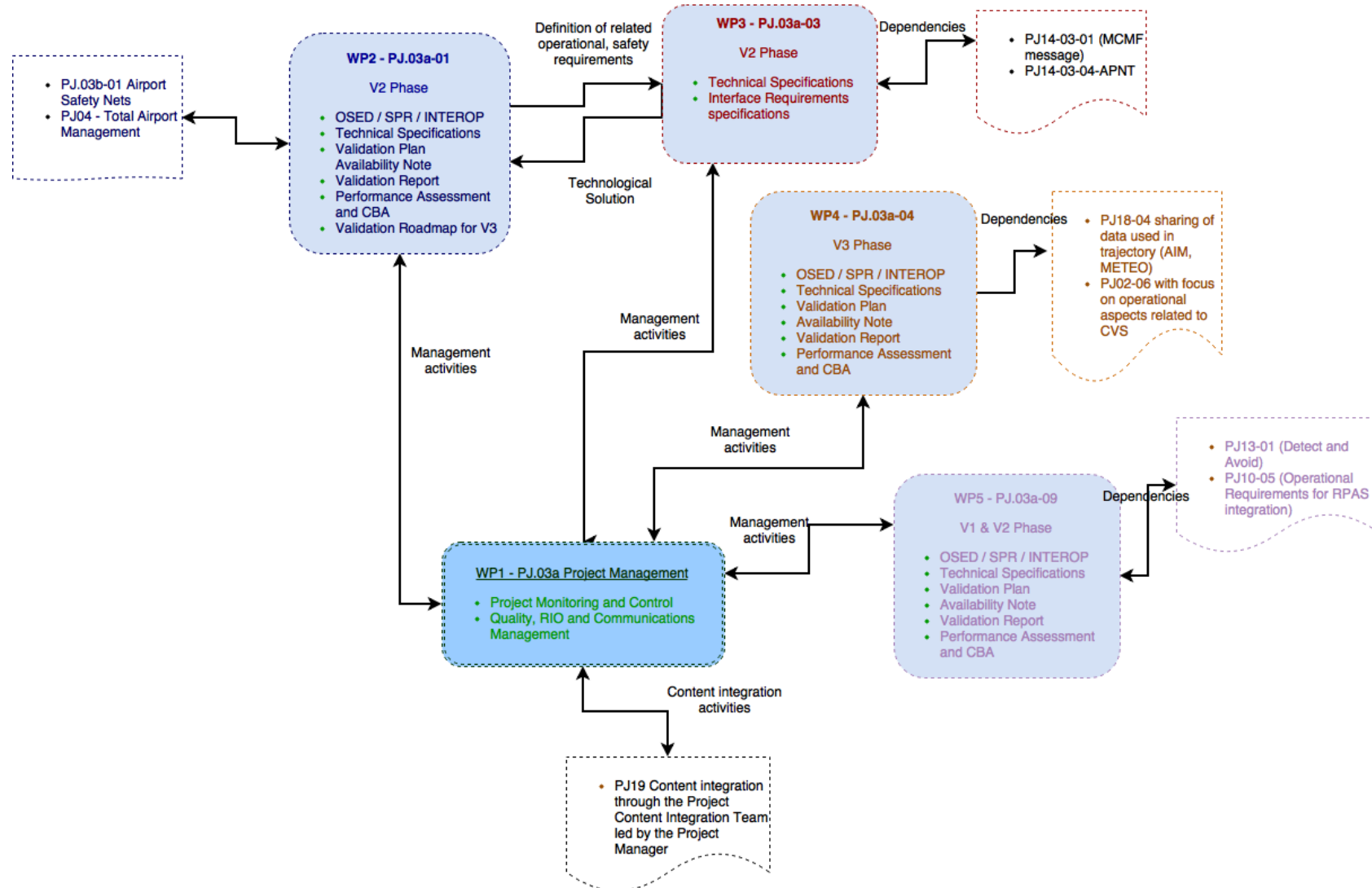


Figure 11: PJ03a Pert Diagram



3.2 Management structure 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 Project Management Plan will further refine management processes in line with the governance rules defined in the Grant Agreement and in the SJU Membership Agreement. 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 12.

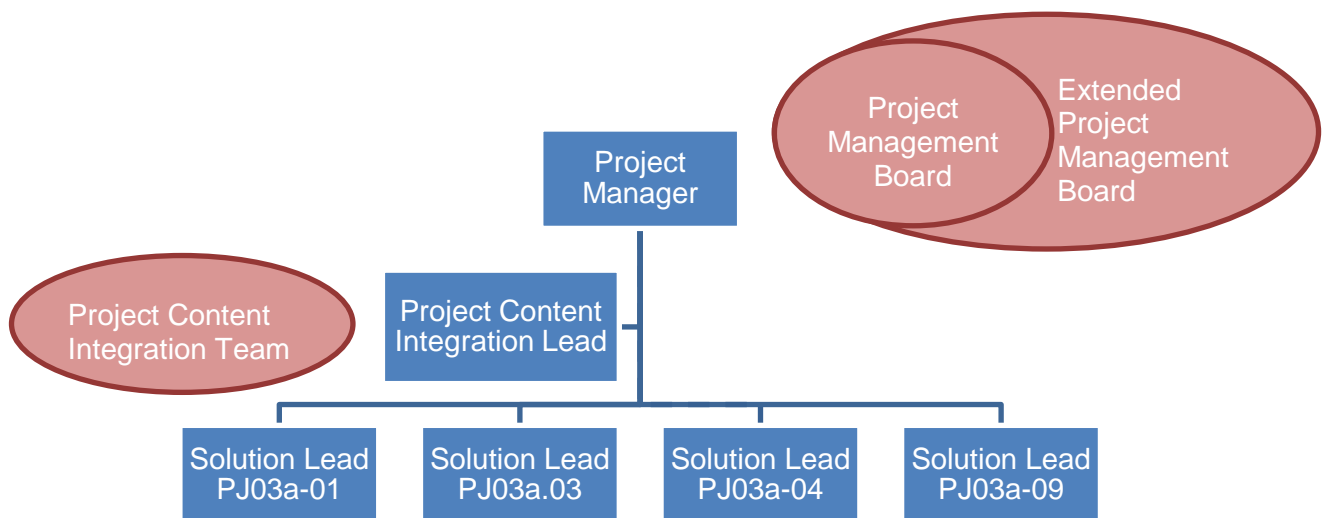


Figure 12: Project Structure for Solution/Enabling Project

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 (e.g. the quarterly project reports). The Project Content Integration Lead (PCIL) ensures that the project content information is consistent across solutions. At the implementation level Solution Leaders (SLs) manage the execution of technical development and control implementation steps.

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 program and management of changes to the Grant Agreement;
- 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 (e.g. progress reporting, corrective action implementation, project control gates);
- the provision of a comprehensive oversight of the Project and management of the operational relationship between the Members involved at the Project level;
- 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
- an appropriate preparation and contribution to the operational closure of the Project.

In the PJ03a, the role of Project Manager is taken by ENAV. Here below the related curriculum vitae.

Fabio Maria Donello (SICTA – ENAV Group) – male

Phone: +39 0815999447 Mobile: +39 3351773852; [Email: fabio.donello@sicta.it](mailto:fabio.donello@sicta.it)

Fabio Maria Donello was awarded Master degree in Engineering Telecommunication (2009) with honours at “Parthenope” University – Naples (Italy). . Principal subjects of study were Telecommunication Networks, Remote Sensing, Radio Navigation Systems, Air Navigation (Air Traffic Control).

He joined SICTA in 2009 to take the role of Air Traffic Management (ATM) Engineer. He has been involved into SESAR Programme since the beginning of his employment focusing on the Operational Concept Definition and Validation mainly pertaining to Airport operational environment. In detail, he was always involved in the Airport related projects dealing with Advanced Surface Movement, Guidance and Control Systems (A-SMGCS). In detail, he played an active role during SESAR 1 timeframe as contributor and task leader within P06.07.02, P06.07.03, P06.08.04 and P06.09.02). He is the current SESAR 1 P06.07.03 Project Manager expected to close during Q4 2016.

WORK EXPERIENCE

- From October 2013 to Today

Company: SICTA – Advanced Systems for Air Traffic Control – ENAV Group

Role: P06.07.03 Project Manager whose mainly responsibilities concern with the monitoring of the project execution to check the compliance with the expected objectives. Furthermore, a coordination with the SJU Airport Programme Manager was established to share the status project.

- From October 2009 to Today

Company: SICTA – Advanced Systems for Air Traffic Control – ENAV Group

Role: Validation Exercise Coordinator for the airport related simulations led by ENAV. In detail, he has taken the role of exercise coordinator of some validation activities (i.e. Real Time Simulations and Live Trials) executed in the context of SESAR 1 P06.yy.zz projects. The main responsibilities concern planning, preparation and execution phases of the exercises including the post-flight analysis.

3.2.2 Project Management Board (PMB)

The 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 SESAR Private Public Partnership Agreement will apply.

The Project Management Board should meet periodically (WebEx or Face to Face as required) to:

- review progress of the project;
- decide corrective actions;

- review project risks and associated mitigation actions;
- review any potential Change Request to the SGA when necessary.

The Project Management Board will be composed of:

- Project Manager (chairman);
- Project Content Integration Lead if any;
- Solution Leads or WP leads;
- Representatives of key contributor to the project (if not represented by above categories).

3.2.3 *Extended Project Management Board (EPMB)*

An Extended Project Management Board meeting (including all contributors of the project) will need to be convened annually at a minimum.

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.

Decision making principles are the same as for the Project Management Board.

3.2.4 *Solution Lead (SL)*

The Solution Lead is the person responsible for the operational and technical leading of the solution. He/She is responsible for the SESAR Solution refinement, the overall management of related validation activities and timely delivery of the Solution deliverables. In particular, the Solution Lead will:

- Organise and coordinate the activities of the Solution Team;
- Report to the Project Manager on progresses and issues;
- Make proposal for update and amendments of the validation roadmap, to be agreed at project level
- Ensure consistency within the solution and in particular of the different deliverables in support of the different maturity evolution/levels (V1, V2 and V3)
- Prepare and represent the solution at the maturity gate, notably responsible for producing the Maturity Report.
- Participate to the PMB;

3.2.5 *Solution Team*

The main role of the Solution Team is to:

- Define, validate the SESAR Solution and produce the associated deliverables and prototypes. A Project validation roadmap will be agreed at project level. The Solution Team will conduct validations according to the agreed roadmap.
- Identify and initiate required changes to the SESAR Solution, including the validation roadmap.
- Contribute, under the coordination of the Project Content Integration Lead, to update the relevant sections of Transversal Projects deliverables.
- The Solution Team is composed of all contributors to the work of a given Solution.

3.2.6 *Project Content Integration Lead (PCIL)*

As recommended, the role of Project Content Integration Lead for the PJ03a is taken by the Project Manager. Here below the main related aspects:

- Coordinates and organises the work of the Project Content Integration Team

- Acts as a focal point for interaction with the Transversal Projects, supported by the Project Content Integration Team. Is in particular the focal point for the project's change requests to the project content information.
- The effort of the PCIL is allocated to WP01.

In the context of the PJ03a, the role of Project Content Integration Lead will be taken by the Project Manager.

3.2.7 Project Content Integration Team (PCIT)

The Project Content Integration Team is a virtual team composed of the ATM Focal Points, relevant experts from the Solution Teams.

- The role of the Project Content Integration Team is to ensure the technical and operational consistency between the different solutions developed in one project, consistency with dependant Solutions in other Projects and to coordinate interactions with Transversal activities. It ensures that the outputs provided by the projects are compliant with the guidance material provided by Transversal Projects. It shall identify and seek for solutions for any gaps or conflicting choices between the solutions of the project in order to ensure the project fulfils its objectives. It also supports the Project Manager for the organisation of the technical gates, and for the communication of project results.

The work of the Project Content Integration Team will be ensured through the support of the selected experts ensuring the coherence of content produced across solutions and enabling projects.

Solution Focal Point Areas	PJ03a-01	PJ03a-03	PJ03a-04	PJ03a-09
ATM expert - Operations	ENAV AIRBUS DSNA ZRH (SEAC2020) MUC (SEAC2020) EUROCONTROL NLR (AT-One) ACG/COOPANS		DASSAULT AVIATION	ENAV ENAIRE DLR (AT-One)
Technical Architecture expert	EUROCONTROL INDRA THALES AIR SYS FINMECCANICA			Thales Air Sys
Safety	ZRH (SEAC2020) MUC (SEAC2020)			ENAV ENAIRE DLR (AT-One)
Security & Cyber security				ENAV DLR (AT-One)
Human Performance Expert	ENAV AIRBUS NLR (AT-One)		DASSAULT AVIATION Thales Avionics	ENAV DLR (AT-One)
Standardisation expert	EUROCONTROL DFS			

Operational Performance Assessment expert	NLR (AT-One) ZRH (SEAC2020) MUC (SEAC2020)			DLR (AT-One)
CNS		HONEYWELL	HONEYWELL Thales Avionics	
RPAS				ENAV ENAIRES DLR (AT-One) Thales Air Sys
METEO			FINMECCANICA	
PCI Leader	ENAV			

Definition:

'Milestones' means control points in the project that help to chart progress. Milestones may correspond to the completion of a key deliverable, allowing the next phase of the work to begin. They may also be needed at intermediary points so that, if problems have arisen, corrective measures can be taken. A milestone may be a critical decision point in the project where, for example, the consortium must decide which of several technologies to adopt for further development. Milestones must be defined in particular to synchronize activities across the project and with other projects.

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, Research Centres and EUROCONTROL hence providing a wide range of expertise covering all aspects of EUROPEAN ATM.

This consortium comprises 22 organisations from 12 member states of the European Union. 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.

In detail, PJ03a partners involved in Wave 1 are:

- Air Transport Industry,

represented by AIRBUS (France) as Aircraft Manufacturer, Finmeccanica (including both Ground and Aircraft divisions) (Italy), FRQ (FSP) (Austria), DASSAULT (France), Honeywell (France), Indra (Spain), Thales Air Sys and Thales Avionics (France), AIRTEL (NATMIG) (Ireland) and SINTEF (NATMIG) (Norway) as ATM ground equipment industries;

- Service Provider including both:

- Air Navigation Service Provider

represented by DFS (Germany), ANS CR (B4) (Czech Republic), ACG/COOPANS (Austria), DSN (France), ENAIRES (Spain), ENAV (Italy), HC (FSP) (Hungary), NLR (AT-One) (Netherlands), DLR (AT-One) (Germany)

- Service Provider

represented by ZRH (SEAC2020) (Switzerland) and MUC (SEAC2020) (Germany).

- European Bodies,

represented by EUROCONTROL (Belgium).

Therefore, it is clear that the consortium participating to the PJ03a has been built taking into account the expertise required to achieve the identified objectives on the basis of the relevant stakeholders' expectations. The operational expertise will be well represented by six Air Navigation Service Providers who, together with the Airport Consortium, will be the main contributors to the definition of the concerned operational concepts. In this context, the involvement of research centres will be a key factor for investigating new functionalities and main advances respect to SESAR 1.

The definition of system specifications starting from operational requirements will be ensured by the participation of nine Air Transport Industries which will develop both ground and on-board prototypes to be used for the planned validation activities.

The whole process will be supported by EUROCONTROL as a key player in Europe for A-SMGCS research and standardisation.

Detailed description of participants and of the related 3rd parties is provided in the corresponding section within chapter 4.1 of the S2020 RIA for IR sections 4-5.

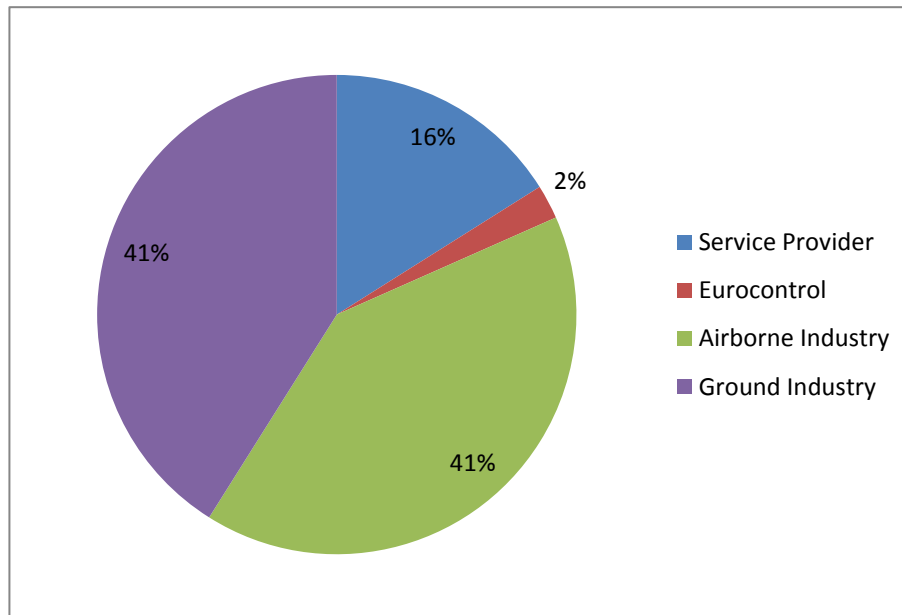


Figure 13: Effort share between stakeholder groups

The participation in the PJ03a of Eurocontrol is well clarified by the following text:

- EUROCONTROL will participate in the project actions with requesting funding only for Maastricht Upper Area Control Centre's activities. 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.

Furthermore, here below some justifications for EU contribution for non EU-members as Honeywell International Inc. (Honeywell SAS LTP) and NAV CANADA (ENAV LTP).

- A part of Honeywell's contribution will involve staff from non EU countries. This is duly justified and formally eligible for the following reasons:
 - There are scientific and technological agreements in place between Europe and the USA. Among others, there is the Framework Agreement between the FAA and the European Commission.
 - There are aviation agreements in place between the EU and USA. Reciprocity between SESAR and NextGen is in place.
 - Through Honeywell's work in SESAR so far, we have demonstrated proven added value through the expertise provided and successful project execution.

- Honeywell's non EU contribution is justified by the need for global harmonization and standards. Experience from SESAR 1 has proven how valuable this is.
 - By executing the vast majority of Honeywell's work in Europe, including Honeywell Advanced Technology organization and Honeywell Aerospace Engineering Europe organization, Honeywell is extremely proactive in enhancing European technological excellence.
- NAV CANADA is linked to ENAV through the sharing of a strategic plan for cooperation in several ATM related domains, as established in the framework of an Agreement for Cooperation (AfC) addressing various areas of development, such as Research & Development, Commercial Activities and Organizational Development (the AfC is attached to Appendix B – Technical Part of the ENAV application to the SJU Call for Final Membership – Ref. SJU/LC/0122-CFP). Such plans may well include joint and coordinated efforts to be injected in SESAR to foster the development of specific key features of the SESAR 2020 Programme.
 - ENAV and NAV CANADA have also a well-established commercial partnership in AIREON, a U.S. Company for the provision of global satellite-based surveillance. In the airport domain, NAV CANADA is supporting ENAV in the national deployment project on the TWR architecture renewal, where NAV CANADA will be providing the new TWR suite, as well as in the SESAR VLD RACOON on Remote Tower concept, a two-year very large scale demonstration project coordinated by ENAV aiming at demonstrating the feasibility and the applicability of remote tower operations in the Italian context. Following these collaborations mainly on the new TWR suite, NAV CANADA will support ENAV on the execution of the validation activities planned in the solution PJ03a-01 by integrating new prototypes technologies into the ENAV Tower Simulator platform.

3.4 Resources to be committed

Work package number	WP01	Start Date or Starting Event	T0: 01/12/2016
Work package title	Project Management		
Work Package Leader	ENAV		

Objectives

Coordination and monitoring of project's progress to accomplish the main objectives regarding time and resources. Coordinate with SESAR 2020 programme and fulfil the administrative requirements of the grant agreement.

Description of work

Project Management and Coordination (M1-M37). Day-to-day monitoring and control of project progress with respect to project objectives, timetable and acceptance of deliverables. Responsible to carry out the main management activities at project level and the reporting process, and assure timed delivery. Meetings to be organized: Review meeting with SJU (annual), PMB (monthly TelCo, on demand), EPMB (annual and on demand). The Project Manager (PM), together with the PMB and EPMB, will act as project steering committee. Change requests will be handled by the committee to allow flexibility. A management report will be produced every 6 months to document project progress. All the solution leaders will support the Project Manager in preparing the quarterly reports. However, according to the guidelines, the related effort is allocated over each corresponding Work Packages.

Project Quality Management and Standardisation (M1-M37). The coordinator is ISO – 9001 standard certified and will ensure the quality of the project. A project management handbook will be produced to establish a project quality plan.

Reporting and Communication with the SJU (M1-M37). In cooperation with all involved partners, the POC for Communication Activities is responsible to provide the required periodic and final reports to the SJU/EC.

Dissemination of the results and communication activities (M1-M37): The Project Manager will work in close coordination with the SJU for dissemination of the results and external communication, in accordance with the signed Membership Agreement, as described in the section 2.2.

Technical and Scientific Coordination (M1-M37). The Project Content Integration Leader (PCIL) will organise the technical and scientific conceptualisation of the project, the coordination of technical activities in the project, and the development of a common project understanding and vision across the timeline. He/she coordinates the PCIT (Project Content Integration Team). For the PJ03a, the role of Project Content Integration Leader (PCIL) will be assumed by the Project Manager.

Contribution to the SESAR2020 Program Management (M1-M37) i.e. Programme Committee and its sub-committees.

Administration of the project according to the grant agreement.

Deliverables

- The main expected deliverables refer to the delivery of the Project Management Plan (PMP) and of the quarterly reports to monitor project progress throughout its lifecycle. Project Management Plan – the main scope of this deliverable is to define how the project is executed, monitored, controlled and closed.
- Final Project Report – This document summarizes project's goals and achievements. The link between the project activities and SESAR outcomes are highlighted as well.
- Quarterly Project Report Q1 2016 – Q3 2019 – quarterly reports with the objective to progressively monitor the status of the project and its alignment to the planned expectations.

Work package number	WP02	Start Date or Starting Event	T0: 01/12/2016
Work package title	Solution PJ03a-01 Enhanced Guidance Assistance to Aircraft on the Airport Surface Combined with Routing		
Work Package Leader	ENAV		

Objectives

The main objective of the Solution PJ03a-01 is to provide both pilots and vehicle drivers with an enhanced guidance assistance to support their navigation on the airport surface. Guidance assistance encompasses the completeness of the services provided to the concerned stakeholders as well as the improvement of airport infrastructures.

Regarding the services, pilots and vehicle drivers will be provided on their on-board systems with graphical information about airport layout, taxiways / runways status, (virtual) stop bars status as well as cleared taxi routes. In such a way, they will be supported during their movements on the airport surface especially in case of low visibility conditions. The intention is to progress on the work started during SESAR 1 especially regarding the need to ensure the consistency and integrity (i.e. GNSS positioning data) of the information provided on both ground and airborne displays. It will be ensured through the use of an Aerodrome Mapping Database (AMDB) via SWIM. Concerning the management of vehicle drivers, it is important to check if the decision to equip vehicles with an airport moving map is really beneficial also in terms of costs. Another way to improve the situational awareness of the involved stakeholders is to reduce potential misunderstandings which could happen during voice communications. As a consequence, the Solution PJ03a-01 intends to further investigate the use of data link service to exchange clearances / instructions between pilots / vehicle drivers and controllers. At the same time, the controllers have to be provided, on the HMI, with a clear view of what is happening through a proper integration of surface management optimization tools. It is important that all the required inputs / constraints (also regarding timing) are taken into account by the routing and planning function to optimize the calculated routes in accordance with the target criteria. A major task of the optimization process is to detect potential conflicting situations and to return conflict-free taxi routes and schedules. The resulting accurate taxi times will improve also the predictability of surface movements.

Regarding the infrastructure, the Airfield Ground Lighting (AGL) represents an additional means of ground-based guidance through enhanced automation, coupled with route management. The added value with respect to SESAR 1 activities will be the management of priorities between mobiles ensuring adequate lateral separation between mobiles on the movement area in all weather conditions. A positive impact on safety as well as more predictable traffic flow will be the main expected benefits. At the same time, the use of AGL and associated procedures as speed control will result in a smoother traffic flow with less waiting time for mobiles at intersections. It means that fewer start and stop cycles are expected with a positive impact on the predictability of surface ground operations.

Description of work

Solution management: ENAV

In the frame of PJ03a-01, a full V2 maturity level is expected to be achieved at the end of Wave 1 through the production of the following deliverables:

- V2 OSED / SPR / INTEROP to be split into two phases including a first draft as input to plan V2 validation activities and a consolidated version after V2 validation activities.
- V2 TS to be split into two phases including a first draft as input to develop V2 platforms / prototypes and a consolidated version after V2 validation activities.
- V2 Validation Plan detailing how all the V2 validation activities are planned to be executed
- V2 Validation Report collecting and consolidating all the results coming from all the V2 validation activities
- CBA V2 to evaluate the potential economic and financial impact derived from the implementation of

the investigated functionalities. That cost assessment will be executed by taking into account the expected impacts for all the Key Performance Areas and associated Key Performance Indicators.

- Validation Roadmap for V3 to prepare the activities in the following V3 phase

The work will also include a contribution to Ethics requirements (WP06) by all the partners involved in WP02.

Regarding the validation activities, the following Real Time Simulation threads are envisaged:

- ACG/COOPANS / EUROCONTROL/FRQ (FSP)/SINTEF (NATMIG) V2 Trials
- ENAV / AIRBUS V2 Trials -
- DSN/AIRBUS V2 Trials
- FINMECCANICA Ground V2 Trials
- NLR (AT-One)/FINMECCANICA Aircraft Division/ENAV/Thales Avionics V2 Trials
- DFS/AIRBUS V2 Trials
- ANS CR (B4)/INDRA V2 Trials
- Thales Air Sys / Thales Avionics /DASSAULT AVIATION V2 trials.

Furthermore, a Fast Time Simulation will be executed by DSN/A focusing on the optimization of the routing algorithm taking into account also the scheduling constraints provided by DMAN and AMAN.

In addition to the OI Steps already mentioned in the MAWP, which are AUO-0603-B, AO-0206, AO-0215, the validation activities reported in this proposal will also address some follow-up OIs that will be created in the Data Set 16. In detail, those OIs will regard:

- Enhanced Guidance Assistance to mobiles based on the automated switching of Taxiway lights and Stop bars according to the "Airfield Ground Lighting" operational service – As illustrated in the MAWP, the AGL represents an additional guidance means based on automated switching of taxiway centre line lighting in accordance with the taxi route issued by ATC. Following the outcomes of SESAR 1, the AGL service will be further investigated during Solution PJ03a-01 to focus on the prioritisation aspects.;
- Automated Assistance to Controller for Surface Movement Planning and Routing – as mentioned in the MAWP, the optimization of routing and planning algorithm has the main objective to improve the reliability and predictability of the taxi times. In such a way, the controllers will be provided with the most suitable taxi route with the objective to avoid potential traffic conflicts. To this end, an enhanced A-SMGCS surveillance function is needed.

Furthermore, from a ground perspective, the controllers will be provided with a Human Machine Interface (HMI) integrating different surface management functionalities as routing, planning and guidance. Assessment of their integration in terms of usability will be part of the PJ03a-01 activities.

To summarize, the main deliverables planned for the Solution PJ03a-01 are reported in the table below.

Deliverable Name	Deliverable Description	Type of Deliverable	V level	Delivery Date
V2 OSED / SPR / INTEROP	<p>This task is aimed to consolidate the output of past projects (mainly SESAR 1 OFA04.02.01 operational documents), and at the same time, update the operational concepts taking into account SESAR2020 expectations. Therefore, this task is expected to be split into two phases:</p> <ul style="list-style-type: none"> ▪ First draft to analyse the gap of SESAR 1 outcomes respect to 	OSED-SPR-INTEROP	V2	January 2019

	<p>SESAR 2020 expectations. Those inputs will be taken into account for preparing V2 validation activities</p> <ul style="list-style-type: none"> Consolidated version to be updated after V2 validation activities. 			
V2 Technical Specification	<p>Description of the Solution, purpose, context, interfaces with other Solutions and services needed. Functional and non-functional requirements for the final system (not prototype related).</p> <p>Therefore, this task is expected to be split into two phases:</p> <ul style="list-style-type: none"> First draft to analyse the gap of SESAR 1 outcomes respect to SESAR 2020 expectations. Those inputs will be taken into account for preparing V2 validation platforms / prototypes Consolidated version to be updated after V2 validation activities 	TS/IRS	V2	April 2019
V2 VALP	Validation Plan for the execution of all the planned V2 validation activities	VALP	V2	September 2017
V2 Availability Note (the latest one)	Contains results on all technical works from TS to an IBP platform readiness, with all prototypes integrated and ready for a Validation	Availability Note	V2	March 2018
V2 Validation Report	Report of the results collected through the execution of all V2 validation activities	VALR	V2	August 2018

V2 CBA	Identification of all costs and benefits as well as the qualitative and quantitative results of Safety, Security, Environment, Human Performance and Strategic Fit assessments.	CBA	V2	November 2018
Validation Roadmap for V3 phase	Based on the outcomes of V2 validation activities,	Validation Roadmap	V2	November 2018
V2 Data Pack	Pack of mandatory deliverables required for the V2 Gate	V Data Pack	V2	April 2019

The roles taken by each partner over each task is illustrated in the table below.

Deliverable Name	Leader	Contributor
V2 OSED / SPR / INTEROP	ENAV	AIRBUS, DASSAULT AVIATION, DFS, DSNA, EUROCONTROL, FINMECCANICA, INDRA, SINTEF (NATMIG), ZRH (SEAC2020), MUC (SEAC2020), Thales Air Sys and Thales Avionics
V2 Technical Specification	INDRA	AIRBUS, DASSAULT AVIATION, DFS, DSNA, FINMECCANICA, FRQ (FSP), SINTEF (NATMIG), Thales Air Sys and Thales Avionics
V2 Validation Plan	ENAV	AIRBUS, NLR (AT-One), ANS CR (B4), ACG/COOPANS, DASSAULT AVIATION, DFS, DSNA, EUROCONTROL, FINMECCANICA, FRQ (FSP), INDRA, SINTEF (NATMIG), ZRH (SEAC2020), MUC (SEAC2020), Thales Air Sys and Thales Avionics
ACG/COOPANS/EUROCONTROL/FRQ (FSP)/SINTEF (NATMIG) V2 Trials – Availability Note	EUROCONTROL	ACG/COOPANS, FRQ (FSP), SINTEF (NATMIG)
ENAV/AIRBUS V2 Trials – Availability Note	AIRBUS	ENAV
DSNA/AIRBUS V2 Trials – Availability Note	DSNA	AIRBUS
FINMECCANICA Ground V2 Trials – Availability Note	FINMECCANICA	FINMECCANICA
AT-One/FINMECCANICA Aircraft Division/ENAV/Thales Avionics V2 Trials – Availability Note	NLR (AT-One)	ENAV, FINMECCANICA, Thales Avionics
DFS/AIRBUS – Availability Note	DFS	AIRBUS

ANS CR (B4)/INDRA – Availability Note	INDRA	ANS CR (B4)
Thales Air Sys / Thales Avionics /DASSAULT AVIATION V2 trials – Availability Note	Thales Air Sys	DASSAULT AVIATION, Thales Avionics
V2 Validation Report	NLR (AT-One)	ENAV, AIRBUS, ANS CR (B4), ACG/COOPANS, DASSAULT AVIATION, DFS, DSNA, EUROCONTROL, FINMECCANICA, FRQ (FSP), INDRA, SINTEF (NATMIG), ZRH (SEAC2020), MUC (SEAC2020), Thales Air Sys and Thales Avionics
V2 CBA	FRQ (FSP)	ENAV, AIRBUS, NLR (AT-One), ANS CR (B4), DASSAULT AVIATION, DSNA, FINMECCANICA, SINTEF (NATMIG), ZRH (SEAC2020), MUC (SEAC2020), Thales Avionics
Validation Roadmap for V3 phase	ENAV	AIRBUS, ECTL, FINMECCANICA, FRQ (FSP), SINTEF (NATMIG), INDRA, ZRH (SEAC2020), MUC (SEAC2020), Thales Air Sys and Thales Avionics

Deliverables

The deliverables planned to be produced in the Solution PJ03a-01 are the ones referred to the SGA contractual deliverables. In detail, the Solution PJ03a-01 plans to deliver V2 data pack whose assessment will confirm or not if the V2 maturity level has been successfully achieved.

Work package number	WP03	Start date or starting event	T0: 01/12/2016
Work package title	Solution PJ03a-03 Enhanced navigation and accuracy in low visibility conditions (LVC) on the airport surface		
Work package Leader	Honeywell		

Objectives

Objective of Solution PJ03a-03 ‘Enhanced navigation and accuracy in low visibility conditions on the airport surface’ is to provide accurate and available navigation information with high integrity provided by aircraft systems. The specific objectives are:

1. Definition of requirements for navigation on the airport surface.
2. Assessment of feasibility, trade-off between benefits and complexity of possible combinations of enabling technologies.
3. Fast-time simulation, prototypes development and verification execution.

Description of work

The PJ03a consortium has agreed that Solution PJ03a-03 will be executed as technological solution. The primary work will be performed by Honeywell focusing on technology development, and other participants (Airbus, ZRH (SEAC 2020), MUC (SEAC 2020)) will provide and review requirements, verification objectives and results with effort allocated in Solution PJ03a-01.

With respect to AUO-0613 “Enhanced navigation and accuracy in LVC on the airport surface”, the target of solution PJ03a-03 for Wave 1 is to achieve maturity level V2. Because V1 maturity level was achieved outside of SESAR 1. The solution addresses following enablers in AUO-0613 Operational Improvement Step: A/C-01 Enhanced positioning for LPV/RNP based on Single Frequency SBAS, A/C-02a Enhanced positioning using GBAS single frequency, A/C-02b Enhanced positioning using multi constellation GNSS dual frequency, CTE-N07b GBAS Cat II/III based on Single-Constellation / Single-Frequency GNSS (GPS L1), CTE-N13a A-PNT (Alternative Positioning Navigation and Timing).

Solution PJ03a-03 will be executed as technological solution according to ‘Introduction to the SESAR 2020 Programme Execution’ with the following tasks:

Solution Management: (Honeywell)

1. Initial System Requirements definition (Honeywell)

Operations and requirements for surface navigation from airborne and airport perspective (small and larger airports); ZRH (SEAC2020), MUC (SEAC2020) and Airbus will review and provide their specific requirements as a part of activities OSED and TS in Solution 01 with Honeywell support. Expected output: Absolute and relative navigation requirements (Accuracy, integrity, availability, continuity)

2. Verification objectives definition (Honeywell)

Definition of the verification objective in terms of typical surface operations and required navigation performance; ZRH (SEAC2020), MUC (SEAC2020) and Airbus will review the verification objectives and provide additional objectives if needed as a part of activities OSED and TS in Solution 01 with Honeywell support.

3. Prototype development (Honeywell)

- a. Design and development of simulation models of navigation system
- b. Design and development of mock-up of navigation system

4. Exercise (Honeywell)

- a. Fast-time simulation of navigation systems for surface navigation
- b. Lab tests, data collection on airport surface, post processing including fast time simulation with real data

5. Verification Results consolidation (Honeywell)

6. Systems Requirements consolidation (Honeywell)

The work will also include a contribution to Ethics requirements (WP06) by all the partners involved in WP03.

The proposed start of WP03 (PJ03a-03) is planned one month early compare to WP02. WP03 represents a new research topic and required more time for preparation and initial analysis of SESAR 1 outcomes. Based on the fact that PJ03a-03 Solution is considered as Technological Solution for PJ03a-01, the initial activities of both solutions (see Gantt charts in figure 7. and figure 8.) will be proceed in parallel. The activity 2.2 (Development of initial system requirements definition) and internal milestone 2.3 (Initial system requirements defined) represents basic system requirements analysis. This analysis is required for following task 2.4 Verification objective definition starting from 03/04/2017 and mainly for time demanding task 2.6 Simulation models and Mock-up development. According to PJ03a-03 Gantt chart depicted on figure 8, Development of TS/IRS will start from 03/04/2017 where outcomes from basic system requirements analysis and outcomes from solution PJ03a-01 (the first draft V2 OSED, SPR and INTEROP) will be used. The first draft of TS/IRS is planned on 31/12/2017 as is depicted on figure 8.

Deliverables

The PJ03a consortium has decided that Solution PJ03a-03 will be executed as technological solution and deliver mandatory deliverables for technological solution according to 'Introduction to the SESAR 2020 Programme Execution'. It was approved by BSC on 16th February 2016. In detail, Solution PJ03a-03 plans to deliver V2 Data Pack whose assessment will confirm or not if the V2 maturity level has been successfully achieved.

Work package number	WP04	Start Date or Starting event	T0: 01/12/2016
Work package title	Solution PJ03a-04 “Enhanced Visual Operations”		
Work Package Leader	Honeywell		

Objectives

Objective of Solution PJ03a-04 ‘Enhanced Visual Operations’ is to provide the flight crew with increased awareness of the terrain and enable the ability to land, taxi and take-off in low visibility conditions by providing visual references and/or flight guidance display technology without increased need for ground based infrastructure. The specific objectives are:

1. System definition, definition of requirements for sensors, databases, display hw, symbology, lighting, nav solutions (technical concept at aircraft level, requirements for monitors) and human factor concepts.
2. Assessment of feasibility, trade-off between benefits and complexity of possible sensors and navigation solutions to be used.
3. Fast-time simulation, prototypes development and verification/validation execution.

Description of work

V3 activities for **0405, 0406, 0407 (landing, taxi, takeoff)**.

With respect to AUO-0404 “Synthetic Vision for the Pilot in Low Visibility Conditions”, this OI step is already included within AUO-0405 “Equivalent Visual Landing Operations in Low Visibility Conditions”,

With respect to AUO-0406 “Equivalent Visual Taxi operations in Low Visibility Conditions” and AUO-0407 “Equivalent Visual Take-off operations in Low Visibility Conditions” the project will directly proceed with V3 activities as V2 activities (indicated in the DOW) have already been achieved within different frameworks and do not need to be repeated here. Regarding the OI Taxiing, V2 activities are not needed because this maturity level has already been achieved thanks to other European studies, such as EMMAI or TDS2 (Taxi Drive System 2). Regarding the OI Take-Off, the state of the art for LVTO with HUD is already V2.

The solution addresses A/C-23b1 (Combined Vision for Equivalent Visual Landing operations in LVC) in AUO-0405, A/C-23b2 (Combined Vision for Equivalent Visual Taxi operations in LVC) in AUO-0406 and A/C-23b3 (Combined Vision for Equivalent Visual Take-off operations in LVC) in AUO-0407 Operational Improvement Step.

Observed issues in the call documentation, with respect to the following enablers in AUO-0406 – A/C-02b (Enhanced positioning using multi constellation GNSS dual frequency) and CTE-N07c (GBAS CAT II/III based on Multi-Constellation/Multi-Frequency (MCMF) GNSS (GPS + Galileo /L1 + L5), marked as required, will be addressed in DS16. These enablers should be optional for the OI step, as the equivalent taxi operation can be achieved without them (they could enhance position in future solutions), and thus will not be addressed in wave 1.

The work will also include a contribution to Ethics requirements (WP06) by all the partners involved in WP04.

Solution Management: Honeywell.

- **OSD-SPR-INTEROP**

Leader DASSAULT

Contributors: Honeywell, THAV, FINMECCANICA

- Expected outputs: Updated operational concepts, procedures, and interoperability spec for Advanced combined vision landing (HON, DAS, THAV), taxi and take off (DAS, THAV, HON – review). Cooperation with PJ18-04, with respect to airport data in database systems.

- Input to OSED. Cooperation with PJ02-06 is foreseen with respect to additional operational aspects including CVS (Equivalent Visual Operations).
 - Planned Delivery Date: July 2019
- **Technical Specification**
 Leader THAV
 Contributors: DASSAULT, Honeywell, FINMECCANICA
 - ♦ Expected outputs:
 - Honeywell: System definition, definition of requirements for sensors, databases, display hw, symbology, lighting, nav solutions (technical concept at aircraft level, requirements for monitors) and human factor concepts.
 - THAV: System definition, definition of requirements for sensors, databases, display hw, symbology and human factor concepts.
 - FINMECCANICA: MET requirements definition
 - Planned Delivery Date: July 2019
- **Validation plan**
 Leader Honeywell
 Contributors: DASSAULT, THAV, FINMECCANICA
 - Expected outputs: validation scenarios for V3
 - Planned Delivery Date: February 2018
- **Validation execution (& performance assessment) and reporting**
 Leader Honeywell
 Contributors: DASSAULT, THAV, FINMECCANICA
 - Expected Outputs:
 - HON: Real time simulations, Airborne prototype performance analysis, air data collection, offline processing
 - THAV: Real time simulations
 - DASSAULT AVIATION: flight trials, validation report. DASSAULT AVIATION plans to support Aircraft avionics manufacturers to study HUD/HDD technologies added values on Business aircraft concept of operations in all weather conditions, and perform several flight tests on available airport. Advantage will be taken from participation in PJ02-06 to efficiently gather the needed conditions to operate Business Aircraft on secondary to small airport.
 - Technology Decision Gate for continuation to full V3
 - Cooperation with PJ18-04, with respect to airport data in database system – provision of data.
 - Planned Delivery Date: June 2019
- **Cost Benefits analysis**
 Leader: THAV
 Contributors: DASSAULT, Honeywell
 Planned Delivery Date: September 2019

Prototype Development with respect to avionics mock-ups is performed by Honeywell and THAV, with review of DASSAULT to enable execution of the validation exercises and in order to provide validation report.

Deliverables

The deliverables planned to be produced in the Solution PJ03a-04 are the ones referred to the SGA

contractual deliverables. In detail, the Solution PJ03a-04 plans to deliver V3 data pack whose assessment will confirm or not if the V3 maturity level has been successfully achieved.

Work package number	WP05	Start Date or Starting Event	T0: 02/01/2017
Work package title	Solution PJ03-09:Surface operations by RPAS		
Work package Leader	ENAV		

Objectives

Remotely Piloted Aircraft Systems (RPAS) that are to operate at airports will have to integrate into an environment which is dominated by manned aviation. To the maximum extent possible, RPAS will have to comply with the existing rules and regulations.

Research needs to be conducted to investigate ways in which RPAS may be able to use a technical capability or procedural means to comply with ATC instructions. This research may lead to changes required or clarifications needed for existing “Rules of the Air”. In addition, research will also need to be conducted on surface operations.

Consequently, specific research needs to determine the impact of integration of RPAS on ATM in the some areas presuming RPAS may not be able to comply with all existing manned operations rules, especially in case of control & command data-link loss between RPAS and the remote pilot, or other emergency cases.

Furthermore, the performance characteristics of RPAS flying in controlled airspace could be different from manned aircraft flying today.

These performance differences can also influence surface operation (e.g. taxiing) and landing and departing phase.

PJ03a-09 should work in cooperation with PJ.13 in order to investigate RPAS airport integration aspects such as separation criteria, the impact of communications and datalink latency, airport or airfield surface operational concepts, RPAS categorization/classification (including flight planning) and other ATM requirements.

The Operating Environment addressed is represented by airports with concurrent manned operations

This solution addresses the Airspace Users’ needs according the following objectives:

- Identifying the particular requirements of remotely piloted surface operations taking into account that in accordance with the European-RPAS-Roadmap the requirements related to airport and surface operations are:
 - Detect & Avoid (D&A);
 - Automated landing and take-off;
 - Platform operations;
 - Ground movements;
 - Contingency;
- Identifying technologies, in close coordination with PJ03b, that could support unmanned surface operations and working with PJ.13 to develop technical solutions.
- Investigating interoperability, in close coordination with PJ03b, between ATC surface safety nets (e.g. runway incursion tools) and RPAS safety nets (e.g. D&A).
- Investigating procedural issues to support unmanned surface operations, including RPAS pilots, RPAS operator and ATC.

In line with solution activities the following potential enablers could be considered:

- ATC Procedures design
- ATC and remote pilots roles and responsibilities definition
- ATC and remote pilots working methods definition

- Detect & Avoid (D&A) system
- Definition criteria for take-off and landing
- Compliance with multiple ATC instructions
- Procedures in case of loss of voice communication, C2 or in an emergency
- Ground handling

According to the deliverables and validations that will be developed by the Project in W1, for both V1 and V2 will be produced OSEDs that will collect in particular the Operational Environment and procedures description, the use cases and system/operation requirements that are critical for developing a plan for the integration of RPAS in current manned surface operations.

The activities are linked to the work of Project 13.1.1 that is focused on Detect and Avoid, this function, according to the actual European (EASA) and ICAO rules is a fundamental requirement for a possible integration of Unmanned Aircraft in ATM, in the context of solution 9 for ensuring safe ground operations.

Regarding validation activities, in the frame of this solution 2 V1 and 3 V2 validation exercises will be performed, one V1 VALP and one V1 VALR is expected for V1 cycle and the same for V2 cycle.

Is important to underline that for some V2 validation activities, the human in the loop has been considered. ATCOs and RPAS pilots will participate during the Real Time Simulation sessions in order to assess the impact of the concept analysed on their working method related to surface operations. ATCOs that are needed for the V1 and V2 validation exercises will be provided by the ANSPs that are involved in solution PJ03a-09.

In order to corroborate the analysis, a dedicated Performance assessment that address the main KPAs (SAF-SEC-HP-CAP-PRED) and CBA will be developed by the Project.

Description of work

In the frame of the project will be produced for V1&V2 Maturity cycle a total of 9 deliverables and 5 validation exercise. The details about each task including the roles of each participant are provided in the following table:

Solution management: ENAV

V Phase	Deliverable Name	Deliverable Description	Role (L as Leader ; C as Contributor)						
			Delivery Date	ENAV	DLR (AT-One)	ENAIRE	Finmeccanica	Thales Air Sys	AIRTEL (NAT MIG)
V1	V1 OSED / SPR / INTER OP	Development and update of the OSED/SPR/INTER OP including the Safety case: this task is aimed to consolidate the output of past projects and on-going operations, in order to identify and fix any possible	31/03/2018	L	C	C		C ¹	C

¹ contribution to OSED/SPR/INTEROP definition for the ATOL capability based on Radar tracker technology

		requirements gaps towards the detailed concepts of operation.							
	V1 Validation Plan	Development and update of the Validation Plan covering the solution's maturity cycle: This task is aimed at definition of the V1 validation plan. It is based on the validation strategy addressing all the activities and resources needed to meet the validation objectives. It will also produce detailed plan of the validation exercises to be performed via experts group supported by mock-ups.	31/08/2017	L	C	C			
	V1 Validation Report	Development and update of the Validation Reports, including the relevant Performances cases (Environment Cases if relevant, Human Performance Cases if relevant, ..): The task will cover the conduction of the V1 validation exercises to perform validation of the requirements determined during the OSED definition. Moreover, this task will cover the analysis of results and the preparation of validation report that documents the validation findings including issues and recommendations	31/01/2018	C	C	L			

V2	V2 OSED / SPR / INTER OP	Development and update of the OSED/SPR/INTER OP – including the Safety case: This task is aimed to consolidate the output of past projects and on-going operations, in order to identify and fix any possible requirements gaps towards the detailed concepts of operation.	31/08/2019	L	C	C	C	C ²	C
	V2 Techni cal Specifi cations	Development and update of the TS/IRS: Description of the Solution, purpose, context, interfaces with other Solutions and services needed. Functional and non-functional requirements for the final system (not prototype related).	31/08/2019	L	C	C	C	C ³⁴	C
	V2 Validat ion Plan	Development and update of the Validation Plan covering the solution's maturity cycle: This task is aimed at definition of the V2 validation plan. It is based on the validation strategy addressing all the activities and resources needed to meet the validation objectives. It will also produce detailed plan of the validation exercises to be performed via experts group	31/01/2019	L	C	C			C

² contribution to OSED/SPR/INTEROP definition for the ATOL capability based on Radar tracker technology

³ contribution to Technical Specification for the ATOL capability based on Radar tracker technology

⁴ contribution to Interfaces definition for the ATOL capability based on Radar tracker technology

		supported by mock-ups.							
	V2 Performance Assessment and CBA	Identification of all costs and benefits as well as the qualitative and quantitative results of Safety, Security, Environment, Human Performance and Strategic Fit assessments.	31/06/2019	L	C				C
	V2 Validation Report	Development and update of the Validation Reports, including the relevant Performances cases (Environment Cases if relevant, Human Performance Cases if relevant, etc.). The task will cover the conduction of the V2 validation exercises to perform validation of the requirements determined during the OSED definition. Moreover, this task will cover the analysis of results and the preparation of validation report that documents the validation findings including issues and recommendations.	31/06/2019	C	C	L	C		
	V2 Availability Note	Prototype Development: development of the Industry Based Platform and prototypes to support the validations: This task will prepare the platforms adapting them to the specific project needs. Each partner involved into a validation activity will produce	31/12/2018	C	C		C		

		the corresponding availability note							
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The work will also include a contribution to Ethics requirements (WP06) by all the partners involved in WP05.

Regarding the validation activities are planned:

V1 Validation exercises:

- V1 - Validation Execution ENAV
- V1 - Validation Execution DLR (AT-One)

V2 Validation exercises:

- V2 - Validation Execution ENAV
- V2 - Validation Execution ENAIRE
- V2 - Validation Execution DLR (AT-One)

Vx/ Rel.	Type (live-trial, RTS etc.)	OI-Steps	Validation objectives and addressed operational problems (compliant with MAWP DoW)	Host and platform)	Interested parties (contribution/ role)
V1	Gaming/ FTS	AUO-0617	Definition of concepts and procedures for the proper reception of the RPAS in different conditions of mixed traffic, in view of their special features and performance.	ENAV	ENAV (concept, test-tool), ENAV (validation plan), ENAIRE (support)
V1	Gaming/ Workshop	AUO-0617	Identification of additional information management needed for RPAS taxiing – specifically the considerations of non-nominal situations, e.g. contingency operations	DLR (AT-One)	DLR (AT-One)
V2	RTS	AUO-0617	Definition and Validation of concepts and procedures for the proper reception of the RPAS in different conditions of mixed traffic, in view of their special features and performance. Validation scenario focused on medium/low density airport.	ENAV RPAS National facility Asset	ENAV (mock up), ENAV (concept, test-tool), ENAV (validation plan)

V2	FTS	AUO-0617	Experimentations to determine the impact of integration of RPAS on ATM V2 validation to provide an assessment of the impact from integrating RPAS on surface operations	Host: ENAIRE Platform: ENAIRE's Simulation Platform	ENAIRE (Contribute to Validation Plan, Perform Fast Time Simulation)
V2	RTS	AUO-0617	Experiment to analyse appropriate HMIs for ground controllers to handle RPAS considering manned aviation on airport surface	DLR (AT-One) Simulation platform	DLR (AT-One)

Deliverables

The deliverables planned to be produced in the Solution PJ03a-09 are the ones referred to the SGA contractual deliverables. In detail, the Solution PJ03a-09 plans to deliver both V1 and V2 data packs whose assessment will confirm or not if the corresponding V1 and V2 maturity level have been successfully achieved.

Work package number	WP06	Start Date or Starting Event	T0: 01/11/2016
Work package title	Ethics requirements		
Work package Leader	ENAV		

Objectives

The objective is to ensure compliance with the “ethics requirements” set out in this work package.

Description of work

This work package sets out the “ethics requirements” that the project must comply with.

Deliverables

The deliverables planned in the Work Package “Ethics requirements” are expected to address the key ethics issues identified in the “Ethics Summary Report”:

- Human subject enrolment in live flight trials and other project activities with no informed consent form as regulated by the new EC Directive
- Personal data protection and processing not in full compliance with the new EC-Directive
- Lack of risk mitigation specific measures to prevent data malevolent misuse
- Justification and further explanation of the noted budget issues

Table 3.4b: ‘Other direct cost’ items (travel, equipment, other goods and services, large research infrastructure)

The tables below are fulfilled only for those participants whose sum of the costs for ‘travel’, ‘equipment’, and ‘goods and services’ exceeds 15% of their personnel costs (according to the budget table in section 3 of the proposal administrative forms).

Participant Number 3 / ANS CR (B4) (PJ03A)	Cost (€)	Justification
Travel	€ 27 000,00	The amount of the costs covers, exercises preparation, project meetings, coordination meetings at solution level, validation coordination meetings, and international workshop/conference participation.
Equipment	€	
Other goods and services	€ 2 000,00	Auditing Costs
Total	€ 29 000,00	

Participant Number 4 / ACG/COOPANS (PJ03A)	Cost (€)	Justification
Travel	11261,25 €	Standard travel cost
Equipment	13106,41 €	Adaptation of tower systems for routing/guidance functions
Other goods and services	397,35 €	Audit cost
Total	24765 €	

Participant Number 5 / DASSAULT AVIATION (PJ03A)	Cost (€)	Justification
Travel	28 628 €	16 travels in Europe (2 people including one night previous the meeting)
Equipment	327418€	Purchases equipment/wiring for Aircraft installation
Other goods and services		
Total	356 046 €	

Participant Number 9 / FINMECCANICA (PJ03A)	Cost (€)	Justification
Travel	30256,60 €	Travel Expenses
Equipment	188535,40 €	The cost is <ul style="list-style-type: none"> for the equipment for the setup of test bed in the airport for the

		validation: <ul style="list-style-type: none"> relevant to the purchase of technical documentation and to the purchase of a digital map of the airport. For the equipment for the communication test bed
Other goods and services	2.869,00 €	Costs relevant to external audits
Total	221.661,00 €	

Participant Number 9.2 / BULATSA (PJ03A)	Cost (€)	Justification
Travel	5000,00 €	Travel Expenses
Equipment	0 €	N/A
Other goods and services	0 €	N/A
Total	5000,00 €	

Participant Number 10.1 / HI sro (PJ03A)	Cost (€)	Justification
Travel	100866,70 €	Travel expenses reflect the fact that Honeywell is involved in two solutions as a leader and will perform multiple validation activities including internal flight tests which will require considerable coordination & direct support.
Equipment	0 €	N/A
Other goods and services	60008, 62 €	Honeywell is involved in two solutions which require other costs and services (material, audits). Especially for validation of operational concept, system verification, systems development and test-bed integration of multi-technology platforms which provide sufficient air-ground interoperability, including multiple airborne functions.
Total	160875,32 €	

Participant Number 16 / NLR (AT-One) (PJ03A)	Cost (€)	Justification
Travel	16.500,00 €	Coordinating and carrying out validation work on related or connected validation platforms at other locations.
Equipment	82.150,00€	Use of NARSIM Tower as HMI development and real-time simulation component in validation exercises involving ATC tower operations. Use of the GRACE generic research aircraft cockpit environment for simulation and validation of air-ground communication as well as airport navigation related operations.
Other goods and services	0	N/A
Total	98.650,00 €	

Participant Number 21 / HC (FSP) (PJ03A)	Cost (€)	Justification
Travel	13.000,00 €	Travels for PJ03a-01 <ul style="list-style-type: none"> • Preparation for Verification and Validation Exercises • Verification and Validation Exercises • - Project Meetings
Equipment		
Other goods and services		
Total	13.000,00 €	

3.4.1 Annex 1 PART B of the Grant Agreement

As per Section 3.5 of the amended Annual Work Programme, due to annual budget constraints of the SJU, the SJU contribution to the Action shall be broken down into several instalments. The first instalment (“First SJU Contribution” of the Action), corresponding to the initial “maximum grant amount” as per Article 5.1 of the Grant Agreement, will be calculated in proportion of:

- The maximum grant amount after evaluation for the Action,
- The number of grants awarded under the IR call, and
- The 50M€ SJU budget available.

On the basis of the First SJU Contribution for this Action established at a maximum grant amount of 2,621,601.23 EUR, it is clarified that as a consequence, at the date of signature of the Grant Agreement and without prejudice to the total amount of the budget agreed for this Action, notwithstanding the activities described in the Annex 1, the work to be performed under the First SJU Contribution as per Article 5.1 of the Grant Agreement is summarized below:

- D1.1 Project Management Plan
- D1.3 Q4 2016
- D1.4 Q1 2017
- D6.1 OEI – POPD – Requirement No.1
- D6.2 M – Requirement No. 2

Any further SJU contribution resulting from further budget availability will be implemented through a Grant Amendment as per Section 3.5 of SJU amended AWP and will result in an update of the Maximum Grant Amount in Article 5.1 of the Grant Agreement. The Grant Amendment shall also modify article 21 of the Grant Agreement with an update of the pre-financing payment for the Action.

The level of SJU contributions and pre-financing of the grant amendments will be established in accordance with the SJU Single Programming Document (SPD) as approved by the Administrative Board.

In the event of unavailability of further SJU budget, beneficiaries may terminate their participation in the action as per article 50.2 and this shall not be regarded as a case of improper termination.

4. Members of the consortium

4.1 Participants (applicants)

4.1.1 Companies profile

4.1.1.1 ENAV – Company 1 (coordinator)

Organisation	1 ENAV – Company 1	Air Navigation Service Provider
Description	<p>ENAV is one of the major European Air Navigation Service Providers in terms of volume of controlled airspace, number of flights managed, investments in technology innovation and R&D.</p> <p>ENAV is a Joint-Stock Company, 100% owned by the Italian Ministry of Economy and Financial Planning, in charge of the provision of air navigation services within the airspace and the airports placed under its own responsibility by the Italian Government.</p> <p>In particular, the Company has the responsibility for the provision of the following institutional services:</p> <ul style="list-style-type: none"> • Air Traffic Control; • Aeronautical communications and radio-navigation; • Aeronautical Information Service and Management, • Aeronautical cartography and obstacle charts; • Airspace and flight procedure design; • Airport air-side operations design; • Aeronautical meteorology; • Maintenance and logistics management of CNS/ATM systems; • Flight inspection; • Recruitment, Training and Licensing of ANS Personnel; • R&D and studies on any matter related to ATS. <p>Staffed by more than 4.100 people, its H.Q. are located in Rome; Its ATS infrastructure includes 4 ACC, 19 APP units, 27 TWR units and 20 AFIS units plus a broad variety of CNS/ATM systems and assets spread all over the country to guarantee continuous operations, extensive service cover and adequate systems redundancy.</p> <p>About 2.0 million flights per year are safely managed in a complex operating scenario with significant operational and economic performance results internationally acknowledged.</p> <p>ENAV has an outstanding expertise in Air Traffic Management operations and services, in the development and validation of concepts, system prototypes and procedures for the continuous improvement of its operational performance, in providing its staff with a continuous competency up-dating and operational training, in assisting the supply industry to design and engineer new systems to safely support the ATM operational personnel in their highly demanding tasks.</p> <p>About its involvement in international activities/panels, ENAV is member of SJU since 2007, member of the SDA Consortium in charge of the SESAR Deployment management, member of A6 Group (strategic alliance amongst some of the largest and most influential European ANSP), member of CANSO (Civil Air Navigation Services Organization), member of European CANSO CEO Committee (EC3) as well as member of ESSP (European Satellite Services Provider).</p> <p>In addition to the above participation, ENAV experts are actively involved in the</p>	

	<p>most important committees, working groups, expert panels dealing with CNS/ATM matters with special regard to ADS, ASAS, A-SMGCS, VHF digital communication systems, Satellite Navigation Systems (e.g. EGNOS and Galileo), advanced automated Flight Data Processing Systems and Surveillance Data Processing Systems (e.g. 4-Flight/Coflight).</p> <p>In line with its mission, ENAV, through its participation in the BLUE MED FAB, is playing a leading role in the Mediterranean Area by promoting synergies with other Service Providers and of neighbouring regions in support of the Single European Sky Implementation.</p> <p>ENAV Group includes the three 100% controlled companies: Techno Sky S.r.l., SICTA and ENAV Asia-Pacific.</p> <p>More recently, ENAV invested 61M\$ by purchasing 12,5% of Aireon, a U.S. Company, founded by Iridium group and owned 51% by NAVCANADA. The company intends to deploy the first global surveillance satellite system by 2018, exploiting ADS-B OUT technology and the mandates which will impose, to most commercial aviation around the world, to equip their aircraft with ADS-B OUT transponders.</p>
Previous experience	<p>ENAV is involved in R&D, strategic planning, technical co-operation and service provision programs with international organizations (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>Previous R&D projects:</p> <ul style="list-style-type: none"> • SESAR 1 (WPB, WPC, WP3, WP4, WP5, WP6, WP7, WP8, WP10, WP12, WP13, WP14, WP15, WP16) • SESAR 1 Very 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) • SAOSAC (FP7, 2013-2016) • GAMMA (FP7, 2013-2017) • FUTURE SKY SAFETY (H2020, 2015-2019) • OPTIMAL (FP6, 2004-2008) • AD4 (FP6, 2005-2007)
Entity Profile matching the task	<p>ENAV profiles matching the tasks include:</p> <ul style="list-style-type: none"> ▪ ATM Operational expert ▪ Tower Air Traffic Controllers ▪ Human factors expert ▪ RPAS expert ▪ Safety expert

	All those skills will be made available by ENAV to prepare and conduct ad hoc validation activities (as Real Time Simulation)
Contribution	ENAV will coordinate the project. Furthermore, ENAV will be also the Solution Leader of both Solution PJ03a-01 and Solution PJ03a-09. Therefore, ENAV will monitor the whole lifecycle of the PJ03a to ensure that the execution is in line with what was planned. In addition to the management related activities, ENAV will contribute mainly to the production of the operational documents (as OSED and SPR) with a significant participation to the definition of operational and safety requirements. Furthermore, ENAV will participate to the preparation and execution of validation activities by providing its operational support as ANSP.

4.1.1.2 AIRBUS – Company 2

Organisation	2	AIRBUS SAS – Company 2	Industry
Description	<p>Airbus is a leading global manufacturer of the most innovative commercial aircraft. Its comprehensive product line comprises highly successful families of aircraft, from the single-aisle A320 Family to the double-deck A380.</p> <p>Over the last 45 years, Airbus has built a reputation on reacting to market demands, developing and evolving its products to meet the needs of customers and the wider world. As such, technological innovation has been at the core of Airbus' strategy since its creation.</p> <p>The A320neo (new engine option) is the latest upgrade to the A320 Family. These new A319, A320 and A321 models feature new engines and large wingtip devices known as Sharklets. Together they result in a 15% fuel-burn reduction, corresponding to an annual CO2 reduction of 3,600 tonnes per aircraft.</p> <p>In the wide-body segment, the A350 XWB brings together the very latest in aerodynamics, design and advanced technologies to shape the efficiency of medium-to long-haul operations. The aircraft's innovative all-new carbon fibre reinforced plastic fuselage results in lower fuel burn as well as easier maintenance. Meanwhile, the combination of low operating costs, flexibility and optimised performance makes the A330 Family popular with an ever-increasing operator base.</p> <p>The A380 provides airlines with the best opportunities to optimise revenue across their networks, with more seats for growth, connecting traffic and higher yields by offering more capacity when and where people want to fly.</p>		
Previous experience	<p>In the frame of SESAR 1, Airbus has been deeply involved in many activities related to the on-board taxi route management (D-TAXI) through the following projects:</p> <ul style="list-style-type: none"> • Project leader of the Avionics definition & Development for D-TAXI - project 09.13 • Key contributor for operational definition and validations in projects 06.07.02, 06.07.03, and 06.03.01 		
Entity Profile matching the task	As the leader aircraft manufacturer, capable of managing large complex programmes. AIRBUS staffs are highly skilled professionals, competent and motivated in their fields and well accustomed to working within an international, multicultural environment.		
Contribution	<p>AIRBUS will contribute to solution PJ03a-01.</p> <p>For detailed Airbus contribution description, please refer to section 3 of this Technical Annex.</p> <p>Of course, as the major global aircraft manufacturer, capable of managing large</p>		

complex programmes, Airbus is also ready and willing to lead the Airborne Industry Coordination.

4.1.1.3 ANS CR (B4)– Company 3

Organisation	3 RIZENI LETOVEHO PROVOZU CESKE Air Navigation REPUBLIKY STATNI PODNIK – Company 3 Service Provider
Description	<p>Air Navigation Services of the Czech Republic (ANS CR), the state enterprise provides public Air Traffic Services in the airspace of the Czech Republic, at Prague Airport and 3 regional Airports of Brno, Ostrava and Karlovy Vary. En route services are provided as integrated with the MIL.</p> <p>It provides specialized aviation training in its own Training Centre of ANS CR/Czech Air Navigation Institute (CANI) and offers also the training for pilots in its subsidiary company the Czech Aviation Training Centre (CATC) on aircraft simulators, both units being part of the Aviation Academy Group.</p> <p>The part of ANS CR organization is the Flight Inspection Service Unit providing the flight checking within Czech Airspace as well as outside on a commercial basis.</p> <p>ANS CR is a member of the FAB Central Europe (FAB CE).</p> <p>ANS CR is constituent entity of B4 Consortium.</p>
Previous experience	<p>EMMA project:</p> <ul style="list-style-type: none"> Project number: TREN/04/FP6AE/SI2.374991/503192. Project sponsored by EC (Sixth Framework Programme), 24 partners, 9 countries, 3 international airports, 2004-2006. ANS CR supported the operational concept, user requirements, data provision, validation test preparation and also provided test platform. <p>EMMA2 project:</p> <ul style="list-style-type: none"> Project number: TREN/04/FP6AE/SI2.374991/503192 Project sponsored by EC (Sixth Framework Programme), 21 partners, 9 countries, 4 international airports, 2006-2009. ANS CR supported the operational concept, user requirements, data provision, validation test preparation and also provided test platform. <p>Malorca project:</p> <ul style="list-style-type: none"> Project Proposal number: 698824 Project sponsored by Horizon 2020 (EU Research and Innovation programme), 5 partners, 4 countries, 2016-2017 Malorca - Machine Learning of Speech Recognition Models for Controller Assistance ANS CR is responsible for Operational Concept Document, data provision to build improved Assistant Based Speech Recognizer prototype and evaluation of the proposed. ANS CR already participated on the validation trials for AcListant® system in Braunschweig in 2014 and 2015. The main goal was to prove that the ASR components improve the assistant planning system. <p>INSuRE project:</p> <ul style="list-style-type: none"> Project Number: RPAS.02, SESAR 1 Demonstration Activities. October 2013 – December 2015. ANS CR led the operational activities at the selected aerodrome and the dedicated safety analysis.
Entity Profile matching the	ANS CR (B4) has a vast expertise in ATM operational and technical domains, performance management and analysis, business case and information management.

task	Experience relevant to the Project PJ03a include ATM Operational services (Airport), development, prototyping and operation of specific technical tools (Airport system), System architecture design, Project management, validation (RTS, Live Trials), CDM implementation at LKPR.
Contribution	ANS CR (B4) will contribute with its operational expertise in integrated validation of PJ03a-01 and PJ03b-01. This will include review of Technical Specifications, Validation Plan and Validation Reports, that will contribute to the system development. For validation activities the ANS CR (B4) will participate together with Eurocontrol and INDRA.

4.1.1.4 ACG/COOPANS – Company 4

Organisation	4 Austro Control Österreichische Gesellschaft für Air Navigation Zivilluftfahrt MBH – Company 4 Air Navigation 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 is 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). 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>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> <p>WP00 SESAR2020 preparation: 00.15</p> <p>WP3 Validation infrastructure adaptation and integration: 03.03.02, 03.03.03</p> <p>WP5 TMA Operations: 05.03.00, 05.06.02, 05.06.04, 05.06.07, 05.07.02, 05.09</p> <p>WP6 Airport Operations: 06.05.05, 06.06.01, 06.07.01, 06.08.08, 06.09.03</p> <p>WP7 Network Operations: 07.05.04</p>

	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
Entity Profile matching the task	During the development of Airport CDM at Wien Schwechat ACG has gained substantial experience in the routing and guidance of aircraft on the surface. Specific expertise relevant for the project: <ul style="list-style-type: none"> • 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 • Development and implementation of ATM systems & Tools (common development and implementation of TopSky) • Trajectory management (core functionality in TopSky) • Flight procedures, special approach procedures (incl. RNAV) • Performance Based Navigation • Validation and Integration • Participation in European deployment activities (IDSG & SDM) • Human Performance Assessment
Contribution	ACG will contribute to the project by providing ATM subject matter experts emphasizing on operational work, by focussing on concept and validation work, such as validation plans and reports, OSEDs, SPRs and INTEROPs and by participating in validations with the goal to: <ul style="list-style-type: none"> • Increase a common situational awareness between the ATCOs, the flight crew and vehicle drivers • Increase efficiency to reduce both ATC and cockpit workload and R/T • Improve safety in low visibility conditions. • Manage security credentials for aircraft and ground

4.1.1.5 DASSAULT – Company 5

Organisation	5	DASSAULT – Company 5	Industry
Description	With more than 8000 military and civil aircraft delivered to 83 countries over the past 60 years and having logged nearly 28 million flight hours to date, Dassault Aviation is a major player in the Aeronautics field. On the one hand, more than 2,200 Falcons are today in operation worldwide, for the benefit of companies, major economic magnates and governments; they cover from 3350nm (Falcon 2000 S) up to 6450nm (Falcon 8X can connect Paris to Singapore). On the other hand, over 1000 combat aircraft produced by Dassault Aviation, ranging from the Mirage III to the Rafale, are currently in service in nearly thirty countries.		

	<p>Dassault Aviation is also fully involved in UAV/UCAV programs as:</p> <p>Main contractor of nEUROn, a European UCAV technology demonstrator program, which successfully completed its maiden flight on December, 1st 2012 and has completed its demonstration program; Co-developper, with BAE, of the Future Combat Air System decided by French and British Governments at the Brize Norton Summit on January, 31st 2014; Initiator of the joint proposal, with AIRBUS DEFENCE and SPACE and FINMECCANICA, for the development of a Male System called MALE 2020, for Medium Altitude long-range surveillance missions.</p> <p>The Research and Development employs nearly one quarter of the 9000 people company's workforce. Fundamental and pre-competitive research is usually carried out in close co-operation with universities, research institutes and other industrial partners via a wide international network.</p> <p>Dassault Aviation is part of ACARE and is a founding member of the JU Clean Sky and member of its Governing Board.</p> <p>Within European framework research programs, Dassault Aviation has led numerous PCRD projects.</p> <p>Within National context, Dassault Aviation is member of CORAC (Council for Civil Aeronautics Research), created in July 2008 following commitments made in late 2007 during the Grenelle Environment Forum and is member of the Steering Committee.</p>
Previous experience	<p>Dassault Aviation has a long experience on the user side of ATM, designing, integrating and certificating avionics systems to allow safe and efficient operations and traffic insertion (within their respective requirements) of civil aircraft, military aircraft, and even UAVs.</p> <p>Dassault Aviation has been the first to receive CAT III operational qualification on the Falcon 900EX equipped with Head-Up Guidance System and is also pioneer in innovation on flight controls (Fly by wire systems).</p> <p>Dassault Aviation has also developed large relationships with airports and National ANSPs, to evaluate new types of approaches (e.g. CDA, SBAS based) and has been the first in Europe to use published LPV (Pau – France).</p> <p>Dassault Aviation has developed a good knowledge of many ATM stakeholders, mainly through the participation in standardisation working groups (EUROCAE...), standards harmonisation of operations working groups, implementation of regulatory guidance and procedures that will support the introduction of new concepts and in the validation of safety compliance of the systems.</p> <p>Dassault Aviation participates to ASD ATM committee, ICB SES, GIFAS ATM.</p> <p>Dassault Aviation participated, as Airspace user representative, to SESAR definition phase and SESAR 1, through EBAA consortium.</p> <p>Dassault Aviation participates to SESAR 1 open call AAL project.</p>
Entity Profile matching the task	<p>Technical Directorate and Flight Test Directorate will contribute to project. In those Directorates, expertise will mainly be through, Avionics and systems Department, Navigation and Flight Guidance Systems Department, Certification Department.</p>
Contribution	<p>Dassault Aviation will mainly contribute to:</p> <ul style="list-style-type: none"> • PJ03a-1 “Enhanced Guidance assistance to Aircraft and Vehicles on the Airport Surface combined with routing” • PJ03a-4 “Enhanced visual operations” <p>Dassault Aviation will contribute to the project by:</p>

	<ul style="list-style-type: none"> • Bringing expertise and knowledge in the field of business aircraft operational and technical needs, business aircraft performances and capabilities, navigation system engineering and integration, human/machine interface • Participating to operational concept definition • Participating to proof of concept validation • Conduction of validation exercises, analysis of results and preparation of validation report.
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4.1.1.6 DFS – Company 6

Organisation	6	DFS – Company 6	Air Navigation Service Provider
Description	<p>DFS Deutsche Flugsicherung GmbH (DFS) is responsible for air traffic control in Germany and is headquartered in the town of Langen. It is a company organised under private law and 100% owned by the Federal Republic of Germany.</p> <p>The main business of air navigation services provided by DFS is defined by the tasks set out in Section 27c of the German Aviation Act (LuftVG). DFS provides air traffic services as a sovereign function, coordinates the air traffic flow and manages airspace utilisation (as a company entrusted with State functions). For this purpose, it develops and operates air traffic service systems as well as communications, surveillance and navigation systems. DFS operates control centres in Langen, Bremen, Karlsruhe and Munich, a unit within the Maastricht Upper Area Control Centre of EUROCONTROL as well as 16 control towers at Germany's designated international airports. With its approximately 5,900 operational and administrative staff, DFS ensures that approximately three million flights under instrument flight rules (IFR) reach their destinations safely and on time each year.</p>		
Previous experience	<p>DFS operates A-SMGCS systems at several of its control towers.</p> <p>DFS has extensive expertise in the specification of operational procedures, in research and development of ATM systems, and in operational validation. Within SESAR1, DFS has developed an A-SMGCS routing, planning and guidance prototype based on its operational Tower ATM systems. DFS has contributed to the validation exercise EXE-06.09.02-VP-678 in 2014 and led the validation exercise EXE-06.09.02-VP-679 in 2015, both of which addressed (among other objectives) the routing, planning and guidance functions. For these validations, the DFS routing, planning and guidance prototype had been integrated into the EUROCONTROL eDEP IBP (Brétigny) and into the DFS TOWER IBP (Langen).</p>		
Entity Profile matching the task	<p>DFS has experience in the complete cycle of ATM solution development, including operational requirements specification, in-house software development, and validation in the DFS simulator facilities. Close cooperation of operational and technical staff allows fitting the solutions to the exact needs of the DFS ATCOs.</p>		
Contribution	<p>DFS will contribute to solution PJ03A-01, providing operational, validation, standardisation and technical expertise as well as validation platform infrastructure. DFS will actively engage in prototype development activities and will lead a V2 validation exercise conducted in collaboration with AIRBUS.</p>		

4.1.1.7 ENAIRE – Company 7

Organisation	7	ENAIRE – Company 7	Air Navigation Service Provider
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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 7 En-route/TMA ATC Centres and 22 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 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>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 7 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 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. As a quantitative illustration of this commitment, the more than ninety SESAR projects in which ENAIRE has been involved up to the present could be mentioned, playing a leading role in sixteen of them.</p> <p>ENAIRE has also participated in different projects related to Surface Management in SESAR developing concepts and participating in validation activities, including Fast Time Simulations. ENAIRE has a vast experience with simulation tools to model airport layout and usage with considerations for ATC procedures in different operational environments, including surface operations.</p> <p>ENAIRE has participated in two RPAS demonstration projects within SESAR, with RPAS flying in controlled airspace in both cases:</p> <ul style="list-style-type: none"> ▪ DEMORPAS (Demonstration Activities for Integration of RPAS in SESAR), playing ENAIRE a leading role.

	<ul style="list-style-type: none"> ARIADNA (Activities on RPAS Integration Assistance and Demonstration for operations in Non-segregated Airspace).
Entity Profile matching the task	<p>ENAIRE profiles matching the tasks include:</p> <ul style="list-style-type: none"> Operational expert CNS expert ATC system expert Human factors expert Environment expert Safety expert Security expert
Contribution	<p>The contribution of ENAIRE to this PJ03a Project will be limited to the solution PJ03a-09 Surface Operations by RPAS, with the participation in the following activities:</p> <ul style="list-style-type: none"> Development of the operational concept in maturity level V1 (OSED) and also in maturity level V2 (OSED/SPR/INTEROP) with the role of contributor. Description of the solution, purpose, context, interfaces with other solutions and services needed in maturity level V2 (Technical Specifications) with the role of contributor. Definition of the validation plans in both maturity levels V1 and V2 with the role of contributor. <p>Conduction of validation exercises, analysis of results and preparation of validation reports in both maturity levels V1 and V2 with the role of leader. ENAIRE proposes Fast Time Simulations in V2 maturity level to determine the impact of the integration of RPAS in surface operations.</p>

4.1.1.8 EUROCONTROL – Company 8

Organisation	8	EUROCONTROL – Company 8	International 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 an air traffic control service for the Netherlands, Belgium, Luxembourg and northern Germany. The Central Route Charges Office handles billing, collection and redistribution of aviation charges. The Organisation is developing the Centralised Services initiative, which will open up some services to market competition on a pan-European level, generating significant savings and making for greater operational efficiency. It supports the European Commission, EASA and National Supervisory Authorities in their regulatory activities. 		

	<ul style="list-style-type: none"> ▪ It provides a unique platform for civil-military aviation coordination in Europe. • Finally, EUROCONTROL is a major player in European ATM research, development and validation and <i>in this respect makes the largest contribution to the SESAR Joint Undertaking.</i>
Previous experience	<p>Publications:</p> <p>Definition of A-SMGCS implementation levels (June 2010)</p> <p>Functional requirements for A-SMGCS implementation level 1 (June 2010)</p> <p>Operational concept and requirements for A-SMGCS implementation level 1 (June 2010)</p> <p>Functional requirements for A-SMGCS implementation level 2 (June 2010)</p> <p>Operational concept and requirements for A-SMGCS implementation level 2 (June 2010)</p> <p>Previous projects:</p> <p>SESAR 1 (WP6, WP12): Airport Operations and Systems</p> <p>EMMA (FP6, 2002-2004), EMMA2 (FP6, 2006-2009): A-SMGCS</p> <p>EUROCONTROL A-SMGCS Specifications (2010): Standardisation</p> <p>Integrated Controller Working Position (2006-2009): Human Machine Interface Definition</p>
Entity Profile matching the task	EUROCONTROL is a key player in Europe for A-SMGCS research and standardisation.
Contribution	EUROCONTROL will co-ordinate the project and will participate to the development of the project concepts and validation by bringing operational, validation, standardisation and technical expertise as well as validation platform infrastructure.

4.1.1.9 FINMECCANICA – Company 9

Organisation	9	FINMECCANICA – Company 9	Industry
Description	<p>Finmeccanica is a global player in the high-tech sectors and a major operator worldwide in the Aerospace, Defence and Security sectors. Finmeccanica is based in Italy, has about 47,000 employees (latest updates 11/30/2015), of whom about 37% abroad, and in 2014 recorded 14.6 billion euro in revenues and received orders in the amount of 15.6 billion. Gianni De Gennaro has been the President since 4 July 2013 and Mauro Moretti has been the CEO and General Manager since 15 May 2014.</p> <p>Finmeccanica 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 Finmeccanica 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, Finmeccanica 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>Finmeccanica 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. The new Finmeccanica 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 ▪ Electronics Defence and Security Systems ▪ Space <p>Finmeccanica 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>Finmeccanica also retains Parent Company and Corporate Centre functions for participated companies and joint ventures not included in the divisional scope. 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>Previous projects:</p> <ul style="list-style-type: none"> • SESAR1: WP3, WP4, WP5, WP6, WP7, WP8, WP9, WP10, WP12, WP13, WP14, WP15, WP16 and WPB
Entity Profile matching the task	<p>Airport Surface Management Engineers, WP12 (Airport related projects) co-Leader for SESAR 1, Project Leaders in different SESAR 1 project (Airport surface management, Communication service, SWIM, Airborne experience).</p>
Contribution	<p>FINMECCANICA will participate to the 3 following solutions :</p> <p>PJ03a-01 “Enhanced guidance assistance to Aircraft and Vehicles on the airport Surface combined with surface routing”: to develop an integrated surface management system (including vehicles management) exploiting its experience in the field of airport management, Communication system, avionics systems and satellite applications.</p> <p>PJ03a-04 “Enhanced Visual operations”: Support the validation activities (including the requirement definition) with the expertise related to MET application</p> <p>PJ03a-09 “Surface Operations by RPAS”: to develop systems and procedure for the RPAS application exploiting experience in the communication and meteorological</p>

systems

4.1.1.10 Honeywell SAS – Company 10

Organisation	10 Honeywell SAS – Company 10	Industry
Description	<p>Last year Honeywell celebrated its 100 years of product innovation in the Aerospace market. Honeywell Aerospace is now manufacturer and Tier 1 supplier of all CNS avionics and cockpits to almost every aircraft manufacturer and airlines worldwide. Honeywell belongs to the global market leaders in all the product categories provided by the aviation industry community. Honeywell Aerospace provides integrated avionics, engines, electrical and mechanical systems, and service solutions to aircraft manufacturers, airlines, military, and space and airport operations. It serves aerospace customers all over the world and provides products for any type of aircraft (from small and unmanned, over business jets and regional aircraft, to large long range aircraft like the Airbus 380).</p> <p>Recently Honeywell solidified its European footprint and focus by creating the Aerospace Engineering Europe (AEE) division. This division has the clear mission to intensify the cooperation with European customers, to build strategic partnerships in Europe and strengthen the European supply chain (currently almost 50% of Honeywell Aerospace suppliers are European companies including many SMEs). This mission will translate in a stronger European led Engineering and Technology decision chain, a higher level of market engagement of the European research and development teams, and an overall even stronger company.</p> <p>Honeywell Aerospace SAS, located in Toulouse (France), together with Honeywell International, s.r.o., with sites in Prague and Brno (Czech Republic), and Honeywell EMS Satcom UK, LTD located in Tewkesbury (UK) form the Aerospace Advanced Technology Europe (ATE) organization. These facilities are equipped with state of the art research and test laboratories enabling research, development, integration, verification and validation of various aircraft systems.</p> <p>Worldwide, Honeywell is investing heavily in ATM related developments, notably through participation in the US NextGen programme. Also, Honeywell has established an ATM laboratory in Beijing, China in partnership with China's Avic. These activities add value to our SESAR work by ensuring global harmonization and a global impact of SESAR solutions.</p>	
Previous experience	<p>The innovation proposed in this proposal will rely on the extensive research and product development experience gained through the development of Honeywell product families. Honeywell is a well-established avionics manufacturer (GNSS receivers, GBAS air and ground equipment, FMS, displays, etc.) with strong expertise in navigation, sensors and human factors for air transport, regional and business jet platforms.</p> <p>Honeywell participates to a number of research and development projects in the solution PJ03a-03 & PJ03a-04 relevant technical areas, including:</p> <ul style="list-style-type: none"> ▪ SESAR 9.29 (AdvCVS – Advanced Combined Vision System, concept definition, validation) – Honeywell is the Project Manager, focusing on Enhanced Vision Systems (EVS), Synthetic Vision Systems (SVS) and their combination (ESVS). ▪ Honeywell lead ESA projects, such as User Autonomous Integrity Monitoring or EGNOS v3 Demonstrator (future SBAS) and national project with Technology Agency of the Czech Republic named RESPOL (Position, Attitude & Heading Reference System). ▪ SESAR 9.27 (GNSS Receiver, system development and validation, 	

	hybridization INS&GNSS) , <ul style="list-style-type: none"> ▪ SESAR 9.12 (GBAS CAT II/III Airborne, system development, validation for business aircraft, flight tests), ▪ SESAR 15.3.7 (MCMF GBAS System & ground), ▪ LSD02.02 AAL (Augmented Approaches to Land) - Honeywell is a key member of Large Scale Demonstration Project, focusing also on RNP to xLS and increased glideslope benefit demonstration and flights. <p>Honeywell actively participates to standardization activities within ICAO NSP (Navigation Systems Panel), ICAO IFPP (Instrument Flight Procedures Panel) and RTCA (SC-159/WG4 - GBAS), Eurocae WG68 (GBAS) and Eurocae WG28 (GNSS) and EUROCAE WG79/RTCA SC213 (Vision Systems).</p>
Entity Profile matching the task	<p>The Honeywell Aerospace facility located in Brno in the Czech Republic hosts close to 600 world class aerospace engineers and is equipped with the state of the art research and test laboratories including radio frequency research lab, Human Factors and avionic simulators and mock-ups as well as data link and other product test facilities. This extensive and innovative workforce would be a key enabler to perform the proposed activities. Honeywell Aerospace SAS, located in Toulouse (France), will provide ATM Architects support to the solutions.</p>
Contribution	<p>Honeywell will lead Solution PJ03a-03 ‘Enhanced navigation and accuracy in low visibility conditions (LVC) on the airport surface’, and contribute with its expertise and knowledge towards V2 solution.</p> <p>Honeywell will lead Solution PJ03a-04 ‘Enhanced Visual Operations’ and contribute with its expertise with respect to work on advanced CVS for landing operations.</p> <p>Honeywell will also participate to standardization activities.</p>

4.1.1.11 INDRA – Company 11

Organisation	11 INDRA – Company 11	Industry
Description	Indra is a leading European IT & Defence company with over 95 years’ experience in ATM. Indra’s ATC, Surveillance Systems, Navaids, Communications and Airports Systems are operational in all continents, in over 160 countries with over 4,000 ATM system installations. The extensive product portfolio of Indra includes forefront technology applications of ATM Automation systems for en-route, approach and airport control, as well as A-SMGCS and Remote Towers solutions, GAREX and COMETA Voice Communication Systems, the NORMARC Navaids (ILS, DVOR, DME and GBAS), Surveillance systems (PSR, MSSR mode S, SMR, ADS-B, MLAT and WAM) and Aeronautical Information Systems (AIS, AIM, SWIM and AMHS). Indra provides country-wide systems on a turnkey basis, having over 39,000 employees all over the world, a local presence in 46 countries, investing 6-8% of annual revenue in R&D and playing a leading role in SESAR.	
Previous experience	Contribution to SESAR projects: <ul style="list-style-type: none"> ▪ Leader of projects 12.03.03, 12.04.03 and 12.05.04 ▪ Contributed to operational projects 06.07.02, 06.07.03, and to system projects 12.03.02, 12.03.04, 12.03.05, 12.04.04, 10.09.01 ▪ Contributor to relevant EU projects: ▪ BETA (operational Benefit Evaluation by Testing A-SMGCS) in the 5th Framework Programme ▪ EMMA and EMMA2 (European airport Movement Management by A-SMGCS) in the 6th Framework Programme ▪ Active role in EUROCAE working group WG-41 on A-SMGCS since 1996 ▪ Contributed to ED-87, ED-87A, ED-87B, ED-87C, ED-116, ED-117, ED- 	

	117A and ED-128. Member of EUROCONTROL's previous "A-SMGCS Coordination Group" and current "Airport Operations Team" (AOT). Participant in EUROCONTROL's "A-SMGCS Task Force" responsible for development of the A-SMGCS Specification
Entity Profile matching the task	Indra is a ground industry providing Tower ATC systems. Indra will use the work done in SESAR OFA 04.02.01 "Integrated Surface Management" as the baseline to build upon.
Contribution	Indra contribution will be focused on software and platform definition, development and configuration in order to be used in validation activities. Indra will also contribute in the definition of operational requirements and the validation activities.

4.1.1.12 SINTEF (NATMIG) – Company 12

Organisation	12	Stiftelsen SINTEF – Company 12	Ground Industry
Description	<p>SINTEF is a part of North European ATM Industry Group (NATMIG, http://www.natmig.eu/) is a consortium and consists of Airtel ATN (SME - Ireland), Saab AB (multinational industrial concern - Sweden) and Stiftelsen SINTEF (non-profit research foundation - Norway), where the latter one will be the coordinator. The NATMIG partners has worked together for many years, and has in total contributed to approximately 40 SESAR 1 projects, including Exploratory Research (WP E) and contributions through Associated Members. All companies have a considerable competence and involvement in the ATM environment outside SESAR as well.</p> <p>SINTEF (http://www.sintef.no/) is the largest independent research organization in Scandinavia, and is a non-profit research foundation. We employ 2100 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 ICT has gained competence in state of the art ATM research for several decades, the increased focus through the SESAR 1 involvement (32 projects) has substantially improved our technology and aligned it further to the needs of the aviation industry and airspace users. The Activity in SESAR 1 has also increased SINTEFs aeronautical research portfolio outside SESAR. SINTEF is a multidisciplinary research foundation, 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, Harbors, and Resilience etc.</p> <p>SINTEF Optimization Group has a very high international level of competence</p>		

	<p>within optimisation and simulation. For the past 20 years, its optimisation group has been developing optimisation methods, software prototypes, libraries and components, and it has built a strong international research network. Our main research focus is on applied optimization for industrial planning and scheduling tasks, such as Air Traffic Control. The optimization group at SINTEF has the appropriate expertise and knowledge of the mathematical and algorithmic tools mandatory to develop such optimization algorithms. This is certified also by a long record of prestigious publications, international awards and real-life implementations obtained by the group in routing and scheduling problems.</p>
Previous experience	<p>Publications:</p> <p>L. Lamorgese, C. Mannino, M. Piacentini, Optimal Train Dispatching by Benders'-like reformulation, Transportation Science to appear, 2015. Relevance: Introduces novel decomposition techniques to tackle conflict detection and resolution in automated route-setting systems.</p> <p>C. Mannino, A. Mascis, Optimal Real-Time Traffic Control in Metro Stations, Operations Research, 57 (4), pp 1026-1039, 2009, EURO Excellence in Practice Award 2009. Relevance: Shows how branch-and-bound can be applied to automatic routing and conflict resolution systems.</p> <p>D. Kjenstad, C. Mannino, P. Schittekat, and M. Smedsrud, Integrated surface and departure management at airports by optimization, IEEE Xplore Digital Library, 5th International Conference on Modeling, Simulation and Applied Optimization (ICMSAO), Hammamet 2013. Relevance: Shows the benefits of minimizing decomposition of the routing problem of airplanes when optimise their trajectories on ground and within the TMA.</p> <p>D. Kjenstad, C. Mannino, T. Nordlander, P. Schittekat, M. Smedsrud, (2013), 'Optimizing AMAN-SMAN-DMAN at Hamburg and Arlanda airport', Third SESAR INNOVATION DAYS (SID), November 2013. Relevance: Shows the benefits of minimizing decomposition of the routing problem of airplanes when optimise their trajectories on ground and within the TMA.</p> <p>D. Kjenstad. "Coordinated Supply Chain Scheduling", Ph.D. Thesis and NTNU Report 1998:24, Norwegian University of Science and Technology (NTNU), Trondheim, November 1998. Relevance: In the thesis coordination in distributed multi-agent systems was studied, i.e., collaboration trough lateral and vertical coordination in a decentralized systems of self-interested and rational entities.</p> <p>Previous projects:</p> <ul style="list-style-type: none"> 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 SESAR 10.9.2: in this project SINTEF developed a Coupled Arrival Management and Departure Management decision support component that connects Thales MAESTRO and SAAB Tower Planner prototypes in order to find the best possible runway sequence for mixed mode operations. It is based on SINTEF ATC Optimization library (see section Relevant software) that was

	<p>extended to handle optimised conflict-free air and ground trajectory within TMA. It works for multiple airports and multiple runways.</p> <ul style="list-style-type: none"> Project SESAR 12.3.3: this project focused on “Enhanced surface routing” and we extended SINTEF ATC Optimization library (see section Relevant software) for conflict-free surface routing that will be used to ensure conflict-free trajectories. The developments of this project were the basis for producing conflict-free trajectories in the air used in SESAR 10.9.2. Project NSB: in this industrial optimisation and transport simulation project we improved our discrete event, agent-based simulator to handle large traffic flows in a dense transport network in order to suggest improvements to the transport Project Widerøe: In this project, we worked with a Norwegian airline company, Widerøe, where we analysed the crew pairing process. This is the process of combining an airline’s flights into trips so that crew can start and end their work at the crew base. After analysing the manual crew pairing process, we later assessed and recommend a tool for automating this pairing process. This project provided us a basis for understanding airline operations.
Entity Profile matching the task	<p>SINTEF is part of Solution 1 in PJ03a. The main focus here will be in developing optimization algorithms for route planning and scheduling of taxing airplanes and vehicles in the airdrome. Such plans should be compliant or coordinated with the scheduling decision from other AMAN and DMAN systems, and possibly interact with such systems. SINTEF has the mathematical and industrial experience to support the development of effective optimization algorithms capable to solve in real-time these complex planning tasks in order to send the correct instructions to pilots and vehicle drivers.</p>
Contribution	<p>SINTEF (NATMIG) will prototype the Optimal Real-Time router and schedule</p>

4.1.1.13MUC (SEAC2020) – Company 13

Organisation	13	Flughafen München GmbH – Company 13	Service Provider
Description	<p>Flughafen München GmbH (SEAC2020) is the operating company of Munich Airport. Within just a few years of opening in 1992, the airport's outstanding growth performance elevated it to join the ranks of Europe's busiest passenger airports.</p> <p>Munich Airport is a 20-year success story. It has a track record for steady growth, from 12 million to 38 million passengers per year, and from an airport to a self-contained city. Our company has significantly expanded its business activities: We're not only an international hub, but rather an urban centre offering a wide range of goods and services. More and more, we're marketing the airport as a world of experience or offering real estate and consulting services. Services are now offered far beyond Munich. The essence of our brand, Living ideas – Connecting lives, sums up everything that Munich Airport stands for and is an ideal expression of the multifaceted character of the airport.</p> <p>We connect people in every sense of the word: As an international hub we connect people on every continent. As a high-efficiency cargo airport we connect global markets. Together with our partners we connect strengths, competencies and innovations. And internally we are connected within the airport family. But Living ideas – Connecting lives means more than that: The core of our brand stands for a spirit of partnership in dealings with external parties, not only with our business partners, but also with the airport's neighbours and the people of Munich. It also stands for the commitment of all employees to the way we, as the FMG Group, intend to behave in the future, both internally and externally – to an inner attitude.</p>		

Previous experience	<p>Flughafen München GmbH (SEAC2020) was involved in SESAR 1 with a focus on concept development and validation activities. This is reflected with a participation in the 6.2, operational concept definition where we have put an emphasis on Validation Strategy and DoD. Furthermore we participated in 6.5.2, Airport Operations Plan Validation and 6.5.4, APOC Definition.</p> <p>Another strong focus was projects 6.6.1, CDM in adverse conditions and 6.7.2/6.7.3 ASMGCS Routing , Planning and Guidance.</p> <p>The main focus, however, was in 6.3 projects on validation, where we had placed most of our effort. In April 2015 we have hosted our own validation exercise on “Follow-the-Greens” (FtG) which turned out to be very successful with FtG established as a standard solution in the ATM Masterplan later on.</p> <p>Particular attention was also made to transversal activities with participation in C2 in various work packages and being the airport representative in the Masterplan campaign.</p>
Entity Profile matching the task	<p>In addition to managing the operations on a day-to-day basis, Flughafen München GmbH (SEAC2020) has unique skills, knowledge and experience with respect to airport operations including:</p> <ul style="list-style-type: none"> • Operating a large and busy hub airport, • Integrated Airside & Landside Operations, • Strategic Planning & Forecasting, • Performance Management, • Information Technology, • Contingency & Crisis Management.
Contribution	<p>Flughafen München GmbH (SEAC2020) will contribute to project PJ03a by bringing in its knowledge and experience of current airport operations management, A-SMGCS, airside procedures and airside infrastructure as well as its knowledge and experience from SESAR 1 and knowledge of future developments.</p> <p>Active contribution will be provided in the concept development, preparation and execution of validation exercises. Where applicable Flughafen München GmbH (SEAC2020) will provide operational experts for simulation/gaming activities as part of the planned validation exercises.</p>

4.1.1.14 FRQ (FSP) – Company 14

Organisation	14	Frequentis AG – Company 14	Industry
Description	<p>Frequentis AG, member of SESAR1, 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.</p> <p>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 visualisation part of the independent CWP; based on service oriented and open, standardised architecture.</p> <p>In SESAR1 we have demonstrated remarkable achievements towards the next generation ATM system architecture. Special interest is given to the users of ATM systems. Our expertise and tooling guarantees early indications of the future user acceptance.</p>		

	<p>Frequentis AG is member of the Frequentis SESAR Partners consortium together with the companies HUNGAROCNTRIL MAGYAR LEGIFORGALMI SZOLGALAT ZARTKORUEN MUKODO RESZVENYTARSASAG and Atos Belgium 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>
Previous experience	<p>Frequentis AG will bring to this project its 15 years' experience of developing and commissioning ATC products for aerodromes. As such, Frequentis AG ATC portfolio will be used as a baseline for its platform development.</p> <p>In SESAR1, Frequentis AG contributed in particular to tower related projects:</p> <ul style="list-style-type: none"> • platform and prototypes providers (WP 12.05.04, 12.05.02, B.4.4) • plan and run validations (EXE-VP-569, EXE-VP-678, EXE-VP-679) • analysis of validation results (in WP 06.09.02) <p>Furthermore, Frequentis AG participated to several research programmes such as FP6/7 (CATS, SWIM-SUIT, NEWSKY, DEDISYS), TakeOff (FISN, CDM@Airports).</p>
Entity Profile matching the task	<p>Frequentis AG will bring the following expertise:</p> <ul style="list-style-type: none"> • Experience and technical know-how in development of safety critical systems for air traffic control towers (user interfaces and backend services). • ATCO expertise available for validation task • Service oriented architectures • Expertise in IT infrastructure and cyber-security • Strong competence in SWIM infrastructure and SWIM services • Strong AIM know-how (including D-NOTAM)
Contribution	<p>Frequentis AG will contribute essentially to solution PJ03a-1 and will provide technical expertise to contribute to:</p> <ul style="list-style-type: none"> • technical specifications • platform development and configuration, in cooperation with EURCONTROL and NATMIG • Air traffic control operational and validation expertise • V2 validation exercise in partnership with HC (FSP), COOPANS members, EUROCONTROL and NATMIG members.

4.1.1.15 THALES AIR SYS – Company 15

Organisation	15 THALES AIR SYS – Company 15	Industry
Description	<p>Thales ATM, from takeoff to touchdown and everything in between.</p> <p>World leader in ATM, for over 40 years, Thales Air Systems 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 Air Systems 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.</p>	

	<p>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> <p>At the forefront of all major modernisation initiatives around the world</p> <p>Growing aircraft numbers make Air Traffic Management more complex. Thales' ATM solutions help to make the skies safer, greener and more efficient.</p> <p>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. Thales is a key player of SESAR1 and is involved in many WP (especially in WP 6 Airport operations and WP 12 Airport Systems).</p> <p>As a result, Thales Air Systems can bring to SESAR2020 a first class capacity to develop and integrate the future European ATM system architectures, and to provide the essential link between civil and military airspace control and air traffic management systems.</p>
Previous experience	<p><u>Previous main projects:</u></p> <p>SESAR 1: THALES has been involved in <u>all</u> SESAR 1 WorkPackages. THALES has been Co-Leader for:</p> <ul style="list-style-type: none"> ➤ WP 10 En-Route & Approach ATC Systems; ➤ WP 14 SWIM technical architecture ➤ WP 15 (Communication, Navigation, Surveillance) <p>4-FLIGHT: Thales is delivering the future innovative Air Traffic Management system for France, 4-Flight. DSNF will enjoy a new generation ATM system to respond to the increasing complexity and density of air traffic:</p> <ul style="list-style-type: none"> - 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 <p>COFLIGHT: Coflight is a new advanced Flight Data Processing System (FDPS), jointly developed by DSNF and ENAV and Skyguide ANSPs, together with industrial partners Thales and Selex. Designed to meet SESAR performance objectives, Coflight is a unique product, a fundamental enabler to achieve interoperability throughout Europe.</p> <p>COOPANS (CO-Operation of Air Navigation Service providers) is a unique innovative partnership, between five major ANSPs together with Thales as industry provider. IAA, LFV, Naviar, 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> <p>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, with TopSky - ATC (potentially) deployed in 15 interconnected civil and military ATC centres.</p> <p>LORADS III: LORADS III integrates state of the art multi-sensor tracking</p>

technology, capable of fusing data from radars, ADS-B, Wide Area Multilateration (WAM) and ground sensors with multi-hypothesis filtering, to give controllers a holistic and highly accurate picture of the current operating environment. The system also provides an ADS-C surveillance capability for remote and oceanic areas. The centrepiece of the system is Thales's award-winning Java Human Machine Interface (JHMI) Engine – an advanced display designed in collaboration with air traffic controllers. The high performance configurable software reduces controllers' workload through new ways of viewing, organising and interacting with flight information. Another key feature is Thales's next generation Flight Data Processing, which manages gate to gate flight trajectories in 4D, based on aircraft performance.

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:

- 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

TAAATS provides the Air Traffic Management Service (En-Route and Approach) for the whole of Australia and for the related oceanic areas as well as the civil-military co-ordination. It is the only system in the world that simultaneously provides fully integrated ADS/CPDLC facilities and allows integrated display of radar tracks, ADS-C tracks, ADS-B tracks and Flight Plan tracks.

NESACC aims at providing the Air Traffic Management Service (En-Route and Approach) for the whole north east of China controlling around 60% of Chinese total air traffic. Air traffic control of areas outside radar coverage is also provided. The Beijing, Shanghai and Guangzhou ATC centres are connected to the three (3) control towers of the largest Chinese airports.

MODERNISATION INITIATIVES

➤ NextGen

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.

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

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.

Entity Profile
matching the
task

Platform development expert;
Validation expert;
Technical architecture expert;
PoC for communication activities (for coordination needs with SESAR2020

	partners); Project Manager (project management for Thales software development).
Contribution	Thales Air Systems will participate to the Solution PJ03a-01, mainly by focusing on Prototype development for the validation exercise but also by contributing to the definition of operational and technical requirements and the validation activities Thales Air Systems will also participate to the Solution PJ03a-09 by contributing to the definition of operational and technical requirements of the ATOL capability based on Radar tracker technology.

4.1.1.16 NLR (AT-One) – Company 16

Organisation	16 STICHTING NATIONAAL LUCHT- EN Air Navigation RUIMTEVAARTLABORATORIUM – Company 16 Service Provider
Description	<p>Stichting Nationaal Lucht en Ruimtevaartlaboratorium (Netherlands Aerospace Centre) is participating in the AT-One Consortium, NLR (AT-One). The AT-One consortium is formed by the German Aerospace Center (DLR) and the Netherlands Aerospace Centre (NLR). AT-One combines the strength of DLR and NLR by joining their capabilities with respect to innovative and independent Air Traffic Management research and implementation support.</p> <p>NLR (AT-One) is the Netherlands Aerospace Centre for identifying, developing and applying advanced technological knowledge in the area of aerospace. NLR (AT-ONE) activities are relevant to society. They are market-oriented and carried out on a non-profit basis. NLR (AT-One) strengthens the innovativeness, competitiveness and effectiveness of government and business.</p> <p>The mission of NLR (AT-One) is to increase the sustainability, safety and efficiency of air transport. NLR is renowned for its leading expertise, professional approach and independent consultancy. NLR moreover possesses an impressive array of high quality research facilities. The activities of NLR span the full spectrum of Research Development Test & Evaluation. NLR thereby bridges the gap between research and practical applications, while working for both government and industry. Founded in 1919, and employing some 650 people.</p> <p>NLR (AT-One) is participating with two divisions in SESAR which are shortly introduced in the following:</p> <p>The division Aerospace Operations of NLR (AT-One) supports its customers – worldwide- with the realization of an excellent operation. With our extensive expertise and unique simulation facilities we contribute to the sustainable performance of air traffic: futureproof, safer, more efficient and more environmentally friendly. Through consultancy and R&D our flexible and state-of-the-art activities find their way to customers such as airlines, air traffic control, airports, ATM industry and governments. We find our customers both in The Netherlands and beyond its borders and also contribute to European programmes such as SESAR and CleanSky. From the integration of drones in civil airspace to new airport concepts, with our passion for aerospace and our excellence and extensive knowledge of air traffic we always strive for the best result for the customer.</p> <p>The division Aerospace Systems of NLR (AT-One) is active in several domains: avionics technology, definition and flight testing of aircraft systems, application and testing of military systems, and application of space systems. Experts are active in the recent developments of RPAS technology, their certification and integration into non-segregated airspace. Furthermore the division is active in defining and facilitating experimental flight testing. The division has wide expertise in the certification of civil and military aircraft and systems. In the field of navigation NLR</p>

	(AT-One) has deep expertise in GNSS.
Previous experience	<p>Publications:</p> <p>Rouwhorst, W.F.J.A., and Marsman, A.P.L.A. (2006), <i>A piloted investigation of an Integrated Situation Awareness System (ISAS)</i>, AIAA Modeling and Simulation Technologies Conference and Exhibit, Keystone, CO, 24-26 August 2006.</p> <p>Jakobi, Jörn and Teutsch, Jürgen (2007) <i>A-SMGCS VERIFICATION AND VALIDATION RESULTS FROM THE PROJECT EMMA (LEVEL 1 and 2)</i>. In: 7th USA - EUROPE ATM R&D Seminar (55). 7th USA - EUROPE ATM R&D Seminar, 2007-07-02 - 2007-07-05, Barcelona, Spain</p> <p>Jakobi, Joern and Röder, Michael and Biella, Marcus and Teutsch, Jürgen (2009) <i>Economic Aspects of Advanced Surface Movement Guidance and Control Systems (A-SMGCS)</i>. CEAS 2009 European Air and Space Conference, 26.-29. Okt 2009, Manchester</p> <p>Teutsch, Jürgen and Mollwitz, Vilmar (2009), <i>Virtual Block Control and Separation Bubbles in ATC Low Visibility Operations</i>, Research Paper for 9th Integrated CNS Conference, Arlington, IEEE, 2009</p> <p>Mollwitz, Vilmar and van Schaik, Frans J. and Teutsch, Jürgen (2009), <i>Virtual Block Control and Separation Bubbles – Evaluations in Cockpit Simulator Trials</i>, Research Paper for German Aerospace Congress 2009, Aachen, DGLR, 2009</p> <p>Jakobi, Jörn (2010) <i>Foreword - Airports II: Surface Operations Towards Increased Automation Support</i>. Air Traffic Control Quarterly, Volume 18 (Number 2), Page 109-112. Air Traffic Control Association Institute, Inc.. ISSN 1064-3818.</p> <p>Arents, R.R.D., Verhoeven, R.P.M., Zon, G.D.R. (2010), <i>Adaptive Pilot Assistant for Taxiing</i>, NLR TP-2010-183</p> <p>Hakkeling-Mesland, M.Y.; Beek, B. van; Bussink, F.J.L.; Mulder, M.; Paassen, M.M. van (2011), <i>Evaluation of an Autonomous Taxi Solution for Airport Operations during Low Visibility Conditions</i>, Ninth USA/Europe Air Traffic Management Research and Development Seminar (ATM 2011), June 13-16, 2011, Berlin, Germany</p> <p>Teutsch, Jürgen and Postma-Kurlanc, Anna (2014), <i>Enhanced Virtual Block Control for Milan Malpensa Airport in Low Visibility</i>, Research Paper for 14th Integrated CNS Conference, Herndon, IEEE, 2014</p> <p>Previous projects:</p> <p>SESAR 1 WP3, WP4, WP5, WP6, WP10, WP-E</p> <p>DEFAMM (FP4, 1995-1998): ground movement, vehicle HMI</p> <p>BETA (FP5, 1999-2002): ground movement, Tower CWP, vehicle & A/C HMI</p> <p>EMMA (FP6, 2004–2006): ground movement, Tower CWP, A/C HMI</p> <p>EMMA2 (FP6, 2006–2008): ground movement, Tower CWP, A/C HMI</p> <p>Taipei Taoyuan International Airport A-SMGCS Enhancements (2007-2009): evaluation of operational solutions during reconstruction</p> <p>EUROCONTROL APR (Procedural Improvements in Visibility Condition 3, 2007-2009): ground movement, Tower CWP, pilot response</p> <p>Increased Sustainability Schiphol (2009-2010): implementation of technical and</p>

	operational solutions for adverse weather conditions Autonomous Taxi (Internal project of NLR, 2011)
Entity Profile matching the task	Based on an extensive knowledge and long lasting experience in the field of surface operations, NLR (AT-One) is able to provide significant contributions in ATC operational concept development & validation to the project in order to bring integrated surface management closer to its deployment. To that end, the whole operational chain starting from the airport operational center, air traffic control on the airport including the apron, approach and departure control up to the aircraft and the information exchange between air and ground, has to be taken into account. Over the last decades, NLR (AT-One) contributed to many ATM projects in European and national frameworks. Innovative air traffic guidance and control concepts were developed and validated making use of the unique facilities of NLR (AT-One) for ATC and flight simulation regarding topics such as A-SMGCS components for surveillance, safety nets, route planning and guidance (e.g. Virtual Stop Bars), as well as the use of AMAN and DMAN products in the approach and departure phases.
Contribution	The NLR (AT-One) company profile particularly fits to solution PJ03a-01 (Enhanced Guidance Assistance to Aircraft and Vehicles on the Airport Surface Combined with Routing) where airport surface research is continued on the basis of SESAR results. NLR (AT-One) is able to provide specialists for prototype development and validation, experts for operations, technical architecture, operational performance, and also for human factors, safety and standardization.

4.1.1.17 DSNA – Company 17

Organisation	17 DSNA – Company 17	Air Navigation Service Provider
Description	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 a member of A6, FABEC and SESAR JU. DSNA has supported the principle of the SESAR programme since its inception, has participated as a major contributor to its definition phase study and is a major active contributor to the current development phase.	
Previous experience	Previous projects: In SESAR 1 DSNA lead more particularly the Integrated Surface Management Operational Focus Area (OFA04.02.01) and P06.07.02 (A-SMGCS Routing and planning functions). DSNA was also involved or lead various projects in WP3, WP4, WP5, WP6, WP7/13, WP12, WP B, WP C... Publications: SESAR 1 P06.07.02 D46 OFA04.02.01 (Integrated Surface Management) Final OSED. SESAR 1 P06.07.02 D78 Final INTEROP.	
Entity Profile matching the task	DSNA has extensive experience of research, development and validation of the Integrated Surface Management concepts. This is a key topic where DSNA has played a significant role in the current SESAR 1 programme and currently leads OFA 04.02.01 Integrated Surface Management.	

Contribution	<p>DSNA will contribute to solution PJ03a-01.</p> <p>As an ANSP, DSNA can provide operational and to some extent technical experts (incl. regulation experts). DSNA has an extensive knowledge of the Integrated Surface Management concepts and has experience from development and validation of concepts involving management of surface operations (e.g. apron management, ground control, runway management).</p>
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4.1.1.18 THALES Avionics – Company 18

Organisation	18 THALES Avionics – Company 18	Industry
Description	<p>Thales regroups its competences in ATM, avionics, CNS, and space through Thales Air Systems, Thales Avionics, Thales Communications, Thales Systèmes Aéroportés and through its subsidiary Thales Alenia Space. Its multi-segment platforms and its outstanding expertise in CNS/ATM, ideally places Thales as a key partner for the R&D contributing to the definition and validation of the ATM operational improvements. Thales is fully involved in worldwide standardisation activities essential for European and worldwide ATM interoperability; inter alia ICAO, support to SES regulation, EUROCAE/RTCA, ARINC, EASA CNS/ATM, ASAS RFG and AEEC.</p> <p>With over 50 years' experience, Thales Avionics is today a global market leader in CNS/ATM airborne equipment and systems, present on all major aircraft platforms: commercial aviation (Airbus, Boeing), business jets (Bombardier, Dassault, Embraer, Gulfstream), military transport aircrafts (Airbus, Casa), Helicopters (EADS, Bell, Sikorsky) and regional aviation (Bombardier, ATR, Embraer, Sukhoi). Thales Avionics is also a key participant in the Clean Sky JTI programme and as a result, will contribute to coordinating SESAR with Clean Sky to bring the best value for money.</p> <p>Thales Avionics has been a key contributor in maturing new capability concepts such as I4D/CTA concept. It has participated strongly to the validation of the concept by supporting many Real Time Simulations and flight trials performed as part of SESAR 1. It has developed product prototypes (notably FMS) using the most up-to-date technologies. One of the main objectives of the supported validations was to measure the benefits that could be brought by the use of ADS-C EPP information in enhancing ground trajectory prediction in the context of arrival management. The final results showed that using airborne data in the ground systems brings measurable benefits to the ATM systems as a whole.</p>	
Previous experience	<p><u>Previous main projects:</u></p> <p>SESAR 1: Thales is a key player of SESAR1 and is involved in many WP</p> <p>CLEANSKY (2008-2016) : Green trajectories and electrical conversion</p> <p>CLEANSKY2 (2014-2023) : ITD system coordinator and member of governing board</p> <ul style="list-style-type: none"> • Cockpit improvements • New architecture for inertial and positioning systems • Head Up Display / Head Mounted Display • New communication architecture 	
Entity Profile matching the task	<p>THALES Avionics is one of the few companies to innovate throughout the full operational chain of aerospace activities. It covers a wide range of onboard electronic equipment and functions. The company is active in a number of research areas:</p>	

	<ul style="list-style-type: none"> • Human factors and display • Real-time processing and embedded middleware • Navigation, communication and surveillance • System and software engineering <p>THALES Avionics will support the project with staff knowledge and capabilities in:</p> <ul style="list-style-type: none"> • Research analysts experienced in Airport navigation function and in enhanced visual operations • R&D concept development, including operational expertise • Software and system engineering expertise to support the integration of developed building blocks into simulation facilities. • Validation and verification expertise • Standardization experience <p>THALES Avionics will support the project with means :</p> <ul style="list-style-type: none"> • Real Time Simulation environments, with full airborne and ground ATC representativeness, integrating industrial versions of navigation equipment, cockpit displays and communication devices up to physical RF link. • Avionics validation benches
Contribution	<p>Thales Avionics will participate to the 2 following solutions :</p> <ul style="list-style-type: none"> ▪ PJ03a-01 “Enhanced guidance assistance to Aircraft and Vehicles on the airport Surface combined with surface routing” : to develop V2 solution with regard to AUO-603B (Airborne part) • PJ03a-04 “Enhanced Visual operations” : to develop V3 solution with regard to AUO-404, AUO-045 and AUO-0406 (Airborne part)

4.1.1.19 AIRTEL (NATMIG) – Company 19

Organisation	19 Airtel ATN Ltd – Company 19	Ground Industry
Description	<p>AIRTEL is a part of North European ATM Industry Group (NATMIG, http://www.natmig.eu/) is a consortium and consists of Airtel ATN (SME - Ireland), Saab AB (multinational industrial concern - Sweden) and Stiftelsen SINTEF (non-profit research foundation - Norway), where the latter one will be the coordinator. The NATMIG partners has worked together for many years, and has in total contributed to approximately 40 SESAR 1 projects, including Exploratory Research (WP E) and contributions through Associated Members. All companies have a considerable competence and involvement in the ATM environment outside SESAR as well.</p> <p>Airtel 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 2,500 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 is providing Test and Monitoring equipment to the FAA DCIS program. It has</p>	

	<p>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 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>Previous projects:</p> <p>Project SESAR 12.3.4: in this project Airtel provided airborne and ground CM/CPDLC data link to support the D-TAXI service. Airtel provided a mobile data link system, including ATN CPDLC, located on an airport vehicle. This was connected, over a mobile network, to a basic ATN network and an Air/Ground Data Link Server (AGDLS). The ATC system was connected to the network using the AGDLS. This was used in several trials including one trials in Riga airport using a 4G network, rather than an ATN VDLM2, providing the physical connection.</p>
Entity Profile matching the task	<p>Airtel is part of Solution 9 in PJ03a. Airtel provide data link communications systems including airborne systems, air/ground networking systems and ground systems supporting CPDLC and ADS-C using ATN/OSI, ATN/IPS and FANS over VDLM2, SATCOM and AeroMACS. Airtel's contribution would be in the provision of the data link systems.</p>
Contribution	<p>Airtel's contribution would be in the definition and prototyping of systems to enable data link route and clearance exchanges between ATC and the RPAS. This would include Airport Ground Data Link solution for RAPS & possibly GA/R and the investigation/prototyping of the use of alternative air-ground datalinks (GSM, SATCOM etc.). This will involve the definition and prototyping of a ground CPDLC/ADS-C Server/Gateway which would connect to the RPAS and/or ground based pilot as needed using whatever available datalink.</p>

4.1.1.20 ZRH (SEAC2020) – Company 20

Organisation	20 Flughafen Zürich AG – Company 20	Service Provider
Description	<p>According to the terms agreed with the Swiss Confederation in 2001, Flughafen Zürich AG (SEAC2020) has the right and obligation to operate Zurich Airport and maintain its infrastructure for the duration of the 50-year concession. The 2004 aviation policy report summarised the Federal Council's position: "Because Zurich Airport is a key infrastructure, it is vital for Switzerland that it runs smoothly. It must continue to provide the infrastructure that airlines need to maintain the best possible direct connections between Zurich and Europe and the world's major cities and to thereby satisfy the needs of the market".</p> <p>Flughafen Zürich AG (SEAC2020) has around 1,600 employees across four business areas. The company focuses on its core activities: national and international airport operator, operation of the commercial centres in the landside and airside areas, as well as income-oriented management and further development of real estate at the Zurich location.</p> <p>In the formulation and implementation of its strategy, Flughafen Zürich AG (SEAC2020) underpins the three aspects of cost-efficiency, environment and social responsibility. In this way it aims to increase the company's competitiveness and credibility and achieve sustainable value creation. It constantly has to strike a balance between capacity, complexity and noise.</p>	

Previous experience	<p>Flughafen Zürich AG (SEAC2020) participates to SESAR through the SESAR European Airports Consortium and was mainly involved in WP6 Projects; 6.8.4 Coupled AMAN DMAN, 6.5.3 Airport-DCB, 6.5.1 Airport Operations Plan Definition, 6.5.4 Airport Operations Centre definition and the OFA 5.1.1, as well as in the projects 6.7.1. and 6.7.2 and the Validations of 6.3.1 and 6.3.2.</p> <p>Additionally Flughafen Zürich AG (SEAC2020) provided effort to the management of WP6 and to the federating 6.2 project to ensure consistency of results being passed to transversal documents to determine performance goals and inform other ATM stakeholders.</p> <p>Additionally Flughafen Zürich AG (SEAC2020) took part in WP12 “Airport Systems” project 12.06.02 Airport Operations Plan and several environmental projects. Furthermore Flughafen Zürich AG (SEAC2020) has been involved in the BAFO III project 6.8.8 and in several AIRE projects (AIRE 1 and AIRE 2) covering ground aspects and the LSD projects iStream & AAL.</p>
Entity Profile matching the task	<p>As the main hub- airport in Switzerland, Zurich Airport has extensive experience with respect to Airport Operations and Air Traffic Management, including;</p> <ul style="list-style-type: none"> • (Integrated) Airside & Landside Operations, • Capacity Management & Enhancement, • Infrastructure Design & Construction, • Strategic Planning & Forecasting, • Performance Management, • Information Technology, • Safety Management, • Environmental Management in varying weather conditions, • Political and Regulatory Affairs, • Contingency & Crisis Management. <p>Flughafen Zürich AG (SEAC2020) employs skilled staff with a wide variety of expertise in operating a complex and busy airport. Skills vary from day-to-day operational management to implementing new or improved infrastructure and procedures in a complex operational environment.</p>
Contribution	<p>Flughafen Zürich AG (SEAC2020) will contribute to project PJ03a by bringing in its knowledge and experience of current airport operations management, A-SMGCS, airside procedures and airside infrastructure as well as its knowledge and experience from SESAR 1 and knowledge of future developments.</p> <p>Active contribution will be provided in the concept development, preparation and execution of validation exercises. Where applicable Flughafen Zürich AG (SEAC2020) will provide operational experts for simulation/gaming activities as part of the planned validation exercises.</p>

4.1.1.21 HC (FSP) – Company 21

Organisation	21 HUNGAROCNTRAL LEGIFORGALMI MAGYAR Air Navigation ZARTKORUEN SZOLGALAT Service Provider RESZVENYTARSASAG – Company 21 MUKODO
Description	HUNGAROCNTRAL MAGYAR LEGIFORGALMI SZOLGALAT ZARTKORUEN MUKODO RESZVENYTARSASAG 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

	<p>air control personnel and conducts air navigation research and development.</p> <p>HC (FSP) is member of the Frequentis SESAR Partners consortium together with the companies Atos Belgium 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>
Previous experience	<p>HC (FSP) has more than 50 years of experience in ATM and it has implemented several technical and operational updates for the entire Hungarian airspace. Since its foundation, it has a very strong relation with universities and scientific centres.</p> <p>HC (FSP) is active in ATM research, in SESAR 1 demonstration activities (REACT-Plus), won a grant of SESAR JU for a Large Scale Demonstration project (Budapest 2.0).</p>
Entity Profile matching the task	<p>HC (FSP) will bring the following expertise:</p> <ul style="list-style-type: none"> • ATCO expertise available for validation task
Contribution	<p>HC (FSP) will contribute essentially to solution PJ03a-1 and will provide technical expertise to contribute to:</p> <ul style="list-style-type: none"> • specifications • Air traffic control operational and validation expertise • V2 validation exercise in partnership with Frequentis AG, COOPANS members, EUROCONTROL and NATMIG members

4.1.1.22 DLR (AT-One) – Company 22

Organisation	22 DEUTSCHES ZENTRUM FUER LUFT - UND RAUMFAHRT EV – Company 22	Air Navigation Service Provider
Description	<p>Deutsches Zentrum für Luft-und Raumfahrt e. V. (German Aerospace Center) is coordinating the AT-One Consortium, DLR (AT-One). The AT-One consortium is formed by the German Aerospace Center (DLR) and the Netherlands Aerospace Centre (NLR). AT-One combines the strength of DLR and NLR by joining their capabilities with respect to innovative and independent Air Traffic Management research and implementation support.</p> <p>DLR (AT-One) is the national aeronautics and space research centre of the Federal Republic of Germany. Its extensive research and development work in aeronautics, space, energy, transport and security is integrated into national and international cooperative ventures. In addition to its own research, as Germany's space agency, DLR has been given responsibility by the federal government for the planning and implementation of the German space programme. DLR is also the umbrella organisation for the nation's largest project management agency. DLR has approximately 8000 employees at 16 locations.</p> <p>Several DLR (AT-One) research institutes are participating in SESAR which are shortly introduced in the following:</p> <p>DLR (AT-One) Institute of Flight Guidance develops innovative air traffic concepts – from the idea towards the implementation. The goal is to ensure an air transport system that is safe, efficient, environmentally friendly and reliable. In the field of air</p>	

traffic management (ATM) and airports, the institute acts as a supplier of know-how and ideas while balancing the conflicting interests between fundamental research and applied science. As the largest German research facility for flight guidance, it strives to validate and deliver solutions to one of the greatest challenges in aviation – how to increase the efficiency and capacity of air transport in a safe and green way. Key tasks of the institute are to explore how the interplay of flight guidance on board and on the ground is optimized and how the complex interdependencies between the increasingly optimized aviation systems can be handled in a robust and resilient manner.

DLR (AT-One) Institute of Communications and Navigation develops and investigates new systems and methods for radio transmission and positioning. Its work in aviation focusses on enabling technologies for air-traffic management. The Institute has a profound expertise in communications, navigation, and surveillance (CNS) technologies. It actively performs research and development in air-ground, air-air, and satellite communications as well as on the networking concept for the future communications infrastructure. In navigation, the Institute has largely contributed to the development of GBAS as well as future ARAIM. It has developed means to protect navigation systems from harmful interference, spoofing and space weather effects and conceptualized integrity monitoring standards for all phases of flight.

The DLR (AT-One) Institute of Atmospheric Physics focusses on the research of the physical and chemical processes of the atmosphere and meteorological applications. On both regional and global scales, the relevant processes and changes of the state of the atmosphere are quantified and systematically investigated using remote sensing, research aircraft and computational models. The knowledge of dynamical, cloud physical, and chemical processes constitute the basis for many aeronautical applications.

DLR (AT-One) Institute of Flight Systems is active in the topics of flight mechanics and measurement and system technology of all flying systems. The Institute has extensive knowledge in wake turbulence and aviation flight safety, originating from numerous wake-vortex related research projects.

DLR (AT-One) Air Transport Systems is conducting research in the field of understanding the system complexity in air transportation. The portfolio comprises of concepts, preliminary designs and the optimization of sub systems, as well as the simulation and assessment of entire air transportation systems with respect to economic and ecological sustainability. DLR Air Transportation Systems has several years of experience with the design and the assessment of new concepts and technologies for future air transportation.

Previous experience

Publications:

Lorenz, B. und Biella, M. und Jakobi, J. (2004) *Enhancing pilot situation awareness by using an onboard taxi guidance system: an empirical study*. In: Enhanced and Synthetic Vision 2004, 5424, Seiten 125-133. SPIE - The International Society for Optical Engineering. Enhanced and Synthetic Vision 2004, Orlando, FL, USA, 12.4.2004, SPIE, 12.4.2004, Orlando, FL, USA. ISBN 0-8194-5347-1. ISSN 0277-786X

Jakobi, J. and Lorenz, B. and Biella, M. (2004) *Evaluation of an Onboard Taxi Guidance System*. In: Human Performance, Situation Awareness and Automation: Current Research and Trends, I, Seiten 143-149. Lawrence Erlbaum Associates, Inc., Publishers. Human performance, situation awareness and automation technology conference, HPSAA II, 22.-25.03.2004, 22.-25.03.2004, Daytona Beach. ISBN 0-8058-5341-3.

	<p>Meier, Christoph and Jakobi, Jörn (2005) <u>Verification and Validation Results from the Operational A-SMGCS Field Trials of the Project BETA</u>. FAA-EUROCONTROL ATM-R&D Seminar, Baltimore, USA</p> <p>Röder, Michael (2005) <u>Managing Movements</u>. International Airport Review Magazine, Issue 4/2005, Page 61-64. Russell Publishing Limited.</p> <p>Lorenz, Bernd and Biella, Marcus (2006) <u>Evaluation of onboard taxi guidance support on pilot performance in airport surface navigation</u>. In: Proceedings of the 50th Annual Meeting of the Human Factors and Ergonomics Society, 2006-10-16 - 2006-10-20, San Francisco, CA (USA)</p> <p>Jakobi, Jörn (2006) <u>Operational Concept for a Complete A-SMGCS</u>. In: 2nd International Conference on Research in Air Transportation, Page 51-56. "DS PUBLIC", d.o.o.. ICRA 2006, 2006-06-24 - 2006-06-28, Belgrade. ISBN 86-7395-210-7</p> <p>Jakobi, Jörn (2010) <u>Foreword - Airports II: Surface Operations Towards Increased Automation Support</u>. Air Traffic Control Quarterly, Volume 18 (Number 2), Page 109-112. Air Traffic Control Association Institute, Inc.. ISSN 1064-3818.</p> <p>Röder, Michael and Jakobi, Jörn and Biella, Marcus (2010) <u>Higher-Level Services of an Advanced Surface Movement Guidance and Control System (A-SMGCS)</u>. In: Proceedings CD. ICAS 2010, 27th International Congress of the Aeronautical Sciences, 19.-24. September 2010, Nizza, France</p> <p>Ludwig, Thomas and Korn, Bernd and Geister, Robert (2011) <u>Towards Higher Levels of Automation in Taxi Guidance: Using GBAS Terminal Area Path (TAP) Messages for Transmitting Taxi Routes</u>. 30th DASC, 16.-20. Okt. 2011, Seattle, USA.</p> <p>Previous projects:</p> <p>SESAR 1 WP3, WP4, WP5, WP6, WP10, WP-E</p> <p>DEFAMM (FP4, 1995-1998): ground movement, vehicle HMI</p> <p>BETA (FP5, 1999-2002): ground movement, Tower CWP, vehicle & A/C HMI</p> <p>EMMA (FP6, 2004–2006): ground movement, Tower CWP, A/C HMI</p> <p>EMMA2 (FP6, 2006–2008): ground movement, Tower CWP, A/C HMI</p> <p>D-TAXI (Eurocontrol, 2006): Data link taxi service, trials at Brussels airport</p> <p>EUROCONTROL APR (Procedural Improvements in Visibility Condition 3, 2007-2009): ground movement, Tower CWP, pilot response</p> <p>Unmanned Freight Operations (Internal project of DLR, 2014-2017)</p>
Entity Profile matching the task	<p>With its long lasting experiences in surface operations, DLR (AT-One) is able to provide significant contributions in concept development and validation to bring integrated surface management closer to its deployment. For that purpose the whole operational chain from the airport operation center, air traffic control on the airport including the apron, and also approach and departure control right up to the cockpit and its information exchange has to be taken into account. DLR (AT-One) contributed over the last decades to many ATM projects in European and national frameworks. Innovative air traffic guidance concepts are elaborated and validated them in the DLR (AT-One) facilities and in the field regarding A-SMGCS components surveillance, control, route planning and guidance including the approach/departure area of A&D-MAN. DLR (AT-One) also draws from experience</p>

	regarding validation activities of RPAS related projects, e.g. maritime flight missions using unmanned aircraft systems (project DeSIRE, an ESA demonstration project under the ARTES programme) that were also already hosted and conducted in the Air Traffic Validation Center in Braunschweig, Germany. As a research organization DLR (AT-One) is able to contribute fundamentally to solution PJ03a-09 by developing and validating concepts to integrate RPAS into airport surface operations starting at validation level V1.
Contribution	The DLR (AT-One) company profile specifically fits to solution PJ03a-09 (Surface Operations by RPAS) where experience from RPAS projects and previous airport surface research will be combined. DLR (AT-One) is able to provide specialists for prototype development and validation, experts for operations, operational performance, and also for human factors, safety, cyber security and RPAS.

4.1.1.23 PANSA (B4) – Company 23

Organisation	23 POLSKA AGENCJA ZEGLUGI POWIETRZNEJ – Air Navigation Service Provider Company 23
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, Kraków, Poznań) and 14 tower units at Polish international airports. Each year PANSA, being one of the biggest ANSPs in the Central and Eastern part of Europe, provides safe, effective and highly efficient air traffic control services to almost 700 thousands 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>
Previous experience	Not applicable
Entity Profile matching the task	Not applicable, PANSA initially will not participate directly in this action.
Contribution	Support to participating members of B4 Consortium if required.

4.1.1.24 LPS SR (B4) – Company 24

Organisation	24 Letové prevádzkové služby Slovenskej republiky Air Navigation Service Provider štátny podnik – Company 24
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 495 (including 114 ATCOs) and altogether nine Operational</p>

	<p>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>In 2015, LPS SR provided services to 467,863 IFR flights, marking an annual 7.2% increase, which was preceded by a 9.8% increase in 2014 caused by substantial re-routings due to total closure of parts of the neighbouring Ukraine's airspace, while ensuring the highest standards of safety (acceptable level of safety for incidents of the severity A and B in 2014: 0.35 ALS/TLS) and minimal average delays (average en-route ATFM delay per flight in 2014: 0.14 min/flight) without significant additional costs or increases in number of ATCOs.</p> <p>PS SR (B4) is constituent entity of B4 Consortium, composed of four ANSPs from Central and Eastern part of Europe and their Linked Third Parties.</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 initially will not participate directly in this action.
Contribution	Support to participating members of B4 Consortium if required.

4.1.1.25 ON (B4) – Company 25

Organisation	25	Valstybes imone "Oro navigacija" – Company 25	Air Navigation Service Provider
Description	<p>Valstybes imone "Oro navigacija", Air Navigation Service provider in Lithuania, was founded in 1995 as independent, 100% State owned enterprise. It operates under the supervision of the Ministry of Transport and Communications.</p> <p>Valstybes imone "Oro navigacija" provides air navigation services in Lithuanian airspace and in airspace over the part of Baltic Sea offering its users air traffic management services, communication, navigation and surveillance services as well as an aeronautical information services. It operates one combined En-route/TMA control centre at Vilnius, 3 TMA control centres at Lithuania's international airports, each year providing safe and efficient air traffic control services to almost 230 thousands movements. It continues to maintain 0 min/flight delays level and to meet users expectations while flexibly and in cost effective way accommodating increase of the traffic up to 10%.</p> <p>Valstybes imone "Oro navigacija" is constituent entity of B4 Consortium, composed of four ANSPs from Central and Eastern part of Europe and their Linked Third Parties (further - L3Ps). B4 Consortium is a member of A6+ on SESAR 2020 Programme content.</p> <p>Valstybes imone "Oro navigacija" together with Polish ANSP PANSA forms Baltic FAB, and it is also a member of GATE ONE (joining 11 ANSPs), a regional platform of Central and Eastern European ANSPs.</p>		
Previous experience	Not applicable		
Entity Profile	Not applicable, Valstybes imone "Oro navigacija" initially will not participate		

matching the task	directly in this action.
Contribution	Support to participating members of B4 Consortium if required.

4.1.1.26 CCL/COOPANS – Company 26

Organisation	26 Croatia Control, Croatian Air Navigation Services Ltd (CCL) – Company 26 Air Navigation Service Provider
Description	<p>Croatia Control is a state-owned limited liability company.</p> <p>Location: The company headquarters is located in Velika Gorica and the subsidiaries (regional ATC centres) are located in Pula, Rijeka, Lošinj, Split/Brač, Zadar, Dubrovnik and Osijek.</p> <p>Divisions: Air Traffic Management, Technical Division, Aeronautical Meteorology, Military Operations and Human Resources Management, Legal and Financial Affairs.</p> <p>Governance structure: Company Assembly, Supervisory Board and Management-Director General. The Company Assembly consists of the Minister of the Maritime Affairs, Transport and Infrastructure – Chairman, Minister of Finance and the Minister of Defence. The Supervisory Board monitors the activities of the organization. The 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 Alliance consisting of 5 Air Navigation Service Providers: Austro Control (ACG), Croatia Control (CCL), Irish Aviation Authority (IAA), Naviar and LFV. The cooperation between COOPANS partners goes beyond SESAR – partners have 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 ATM systems harmonisation. This cooperation 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 and the design of concepts as in the development, validation and implementation of Air Traffic Management tools.</p> <p>Croatia Control is ISO 9001, ISO 14001 and BS OHSAS 18001 certified.</p>
Previous experience	General experience from service provision, MET and ATS, and development of ATM systems. Participation in SESAR TOPLINK and Free Route Airspace projects.
Entity Profile matching the task	Not applicable, Croatia Control will not initially participate in this action
Contribution	Support to participating COOPANS members if required

4.1.1.27 IAA/COOPANS – Company 27

Organisation	27	Irish Aviation Authority (IAA)– Company 27	Air Navigation 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), Naviair 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>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:</p> <p>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>		
Entity Profile matching the task	Not applicable, Irish Aviation Authority (IAA) will not initially participate directly in this action		
Contribution	Support to participating COOPANS members if required		

4.1.1.28 LFV/COOPANS – Company 28

Organisation	28	Luftfartsverket (LFV) – Company 28	Air Navigation Service Provider
Description	<p>Luftfartsverket (LFV) is a state enterprise with headquarter located in Norrköping, Sweden. LFV has subdivisions located in 22 different sites, most important being in Stockholm (Arlanda) and Malmö (Sturup), where the two area control centres are located.</p> <p>LFV has three main divisions:</p> <ul style="list-style-type: none"> Operational Systems & Development 		

	<ul style="list-style-type: none"> • ATM Operations • Sales, International Affairs & Business Development <p>All supported by corporate services.</p> <p>Governance Structure:</p> <p>LFV has a Board of Directors having responsibility for the corporate governance. The Director general is appointed by the Board of Directors.</p> <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 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 now 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>LFV has participated, contributing to and also been leading projects in SESAR 1 via NORACON Consortium in the following WPs:</p> <p>WP00 SESAR2020 preparation: 00.14, 00.15</p> <p>WP3 Validation infrastructure adaptation and integration: 03.01.01, 03.02.01, 03.02.02, 03.03.02, 03.03.03</p> <p>WP4 En-route Operations : 04.08.04, 04.10</p> <p>WP5: TMA Operations 05.03.00, 05.06.01 (Lead), 05.06.02, 05.06.04, 05.06.07, 05.07.02, 05.09</p> <p>WP6 Airport Operations: 06.06.02, 06.07.01, 06.08.01, 06.08.02, 06.08.04, 06.08.08, 06.09.03(Lead)</p> <p>WP7 Network Operations: 07.05.02, 07.05.03, 07.05.04</p> <p>WP8 Information Management: 08.00 (Lead), 08.01.03, 08.01.04, 08.01.05, 08.01.06, 08.01.09, 08.03.00, 08.03.03, 08.03.04, 08.03.06, 08.03.10</p> <p>WP9 Aircraft Systems: 09.48</p> <p>WP10 En-Route & Approach ATM Systems: 10.02.01, 10.02.03, 10.03.01, 10.03.08, 10.04.04, 10.07.01, 10.09.04, 10.10.03</p> <p>WP12 Airport Systems : 12.02.01, 12.04.06, 12.04.07, 12.04.08, 12.04.10</p> <p>WP14 SWIM Technical Architecture: 14.01.03, 14.04</p> <p>WP15 Non-Avionic CNS System: 15.01.06, 15.01.07, 15.02.04, 15.04.05.a, 15.04.05.b</p> <p>WP16 R&D Transversal Areas: 16.01.02, 16.04.01, 16.04.03, 16.04.04, 16.05.04,</p>

	16.06.01.b WP B Target Concept and Architecture Maintenance: B.04.01, B.04.02, B.04.03, B.04.05 WPC Master Plan Maintenance: C.02, C.03
Entity Profile matching the task	Not applicable, LFV will not initially participate directly in this action
Contribution	Support to participating COOPANS members if required

4.1.1.29 Naviair/COOPANS – Company 29

Organisation	29 Naviair – Company 29	Air Navigation Service Provider
Description	<p>Naviair is a 100% state owned company originating in “Statens Luftfartsvæsen” founded in 1938. Headquarter is located in Copenhagen (TWR/APP/En-route) and subdivisions are located in Roskilde, Billund, Århus, Rønne and Ålborg (TWR/APP) and in Vagar & Nuuk (FIS/FIC).</p> <p>Naviair has three main divisions - Operations, Technical Maintenance and ATM Projects & Engineering supported by Corporate Services.</p> <p>Naviair is a member of COOPANS Consortium consisting of 5 Air Navigation Service Providers: Austro Control (ACG), Croatia Control (CCL), Irish Aviation Authority (IAA), Luftfartsverket (LFV) and Naviair. 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.</p> <p>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>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.</p>	
Previous experience	<p>Naviair has participated in SESAR via NORACON consortium in the following WPs:</p> <p>WP00 SESAR2020 preparation 00.14, 00.15</p> <p>WP3 Validation infrastructure adaptation and integration: 3.2.1, 3.2.2, 3.3.2, 3.3.3</p> <p>WP5 TMA Operations: 5.3, 5.6.1, 5.6.4, 5.6.7, 5.9</p> <p>WP6 Airport Operations: 6.8.4</p> <p>WP7 Network Operations: 7.5.4</p> <p>WP 8 Information Management: 08.1.3, 8.1.5, 8.1.9, 8.3.4, 8.3.10</p> <p>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</p> <p>WP 14 SWIM Technical Architecture: 14.1.3, 14.4</p> <p>WP 16 R&D Transversal Areas: 16.2.3, 16.6.2</p> <p>WP B Target Concept and Architecture Maintenance: B4.2, B4.3, B4.5</p>	

	<p>WP C Master Plan Maintenance: C2 & C3</p> <p>Of special relevance to this project is WP5.6.1 Ground and Airborne Capabilities to Implement Sequence, WP5.6.4 Tactical TMA and En-route Queue Management, WP5.6.7 Integrated Sequence Building/Optimization of Queues and WP6.8.4 Coupled AMAN-DMAN.</p> <p>Naviar has since 1997 experience with arrival/departure management through the development of the Maestro arrival manager which is now an integrated part of the ATM-system.</p>
Entity Profile matching the task	Not applicable, Naviar will not initially participate directly in this action
Contribution	Support to participating COOPANS members if required

4.1.1.30 SAAB (NATMIG) – Company 30

Organisation	30 SAAB AKTIEBOLAG - Company 30	Ground Industry
Description	<p>Saab is part North European ATM Industry Group (NATMIG) Consortium. NATMIG is a member of SESAR 1. The NATMIG consortium consists of Airtel ATN (SME - Ireland), Saab AB (multinational industrial concern - Sweden) and Stiftelsen SINTEF (non-profit research foundation - Norway), where the latter one will be the coordinator.</p> <p>While Saab 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'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 is a global supplier in the ATM domain and Saab has a long history of developing and delivering ATM solutions. Saab 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 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 ATM systems guide 2 million aircraft movements each month via our airport surface safety systems.</p> <p>Saab's main areas of interest are:</p> <ul style="list-style-type: none"> • RPAS • Remote Tower 	
Previous experience	Not applicable.	
Entity Profile	Not applicable, Saab (NATMIG) initially will not participate directly in this action.	

matching the task	
Contribution	Support to participating NATMIG members if required

4.1.1.31 ADP (SEAC 2020) – Company 31

Organisation	31	Aéroports de Paris - Company 31	Service Provider
Description	<p>Aéroports de Paris S.A (SEAC2020) operates the 3 Paris airports:</p> <ul style="list-style-type: none"> • Paris-Charles de Gaulle, 2nd largest airport in Europe and 9th worldwide, • Paris-Orly, 2nd largest airport in France, dedicated to point to point traffic, • Paris-le Bourget, the leading business airport in Europe. <p>and 10 aerodromes in Paris area plus one heliport. Paris airports welcomed 95.4 million of passengers in 2015, serving 365 destinations in 121 countries thanks to 168 airlines. The 3 Paris airports account for 1.7% of French GDP (6% of regional GDP).</p> <p>Aéroports de Paris S.A. (SEAC2020) also manages directly or indirectly 37 airports worldwide and exports its talent and expertise to 4 continents.</p> <p>Aéroports de Paris S.A. (SEAC2020) is ranked among the 100 most sustainable companies in the world (Global 100) and wants to become the benchmark for airport CSR (Corporate Social Responsibility), basing its efforts on the ISO 26000 standard.</p>		
Previous experience	Not applicable.		
Entity Profile matching the task	Not applicable, Aéroports de Paris S.A (SEAC2020) initially will not participate directly in this action.		
Contribution	Support to participating SEAC2020 members when required.		

4.1.1.32 HAL (SEAC2020) – Company 32

Organisation	32	Heathrow Airport Limited - Company 32	Service Provider
Description	<p>Heathrow is the UK's premier international airport and one of the world's major hub airports flying people for business, tourism and to visit friends and relatives around the world . We provide the infrastructure and services for over 80 airlines flying 75 million passengers a year to over 180 destinations worldwide. Heathrow is also an important national economic asset for London and the UK, supporting our capital city and contributing an estimated £3.3 billion annually to the UK economy. As one of the largest single site employers, there are over 76,000 people working at Heathrow for over 400 companies, and we are the UK's largest port by value too, with around £86 billion of UK goods exported annually through the airport.</p> <p>Heathrow sits within the largest long-haul travel market in the world connecting business and people across the UK to growing economies around the world and is the UK's gateway for international tourism and travellers. We offer excellent passenger service through our two newest Terminals – Terminal 5 and Terminal 2 – and through upgrades to Terminals 3 and 4. We are currently voted by passengers through Skytrax as the Best Airport in Western Europe and are the highest rated European hub airport in the benchmark passenger satisfaction survey ASQ with 81% of passengers rating Heathrow as 'very good' or 'excellent'. This combined with our commitment to being a responsible airport, being a good neighbour to our</p>		

	local communities and taking a lead on environmental measures, gives passengers a strong reason to keep choosing Heathrow.
Previous experience	Not applicable.
Entity Profile matching the task	Not applicable, Heathrow Airport Limited (SEAC2020) initially will not participate directly in this action.
Contribution	Support to participating SEAC2020 members when required.

4.1.1.33 SNBV (SEAC 2020) – Company 33

Organisation	33 Schiphol Nederland B.V. - Company 33	Service Provider
Description	<p>Schiphol Nederland B.V. (SEAC2020) is the operator of Schiphol Airport; one of the busiest and largest hub airports in Europe. Started in 1916 as a small military airfield, Schiphol Airport has evolved towards a world class airport by continuous adaption to and initiation of new and innovative process developments in the Air Transport Industry.</p> <p>In 2015 Schiphol Airport welcomed over 58 million passengers, using 450.000 flights to/from 322 destinations worldwide. For this Amsterdam Airport consists of a complex system of terminals, concourses, aircraft parking aprons and runways.</p> <p>Schiphol Airport has a complex infrastructure lay-out consisting of six runways, many of them converging or even crossing. The operating environment is unique in such that runway combination changes take place 15 to 20 times a day. Not only dictated by a pronounced demand asking the full capacity of three runways simultaneously (2 landing + 1 take-off runway during inbound peak periods and 1 landing + 2 take-off runways during outbound peak periods), but also dictated by strict environmental regulations limiting the use of certain runways.</p> <p>Schiphol Nederland B.V. (SEAC2020) is part of the Schiphol Group. Next to Schiphol Airport, the smaller Dutch airports of Rotterdam, Eindhoven and Lelystad are part of the group. Schiphol Group also operates the International terminal T-4 at New York- JFK airport.</p>	
Previous experience	Not applicable.	
Entity Profile matching the task	Not applicable, Schiphol Nederland B.V. (SEAC2020) initially will not participate directly in this action.	
Contribution	Support to participating SEAC2020 members when required.	

4.1.1.34 Swed (SEAC 2020) – Company 34

Organisation	34 Swedavia AB – Company 34	Service Provider
Description	<p>Swedavia AB (SEAC2020) task is to own, operate and develop ten strategically located airports all over Sweden. Together, the airports constitute a network that links Sweden's regions together, while also serving as a bridge to and from the world beyond. Swedavia's vision is "Together we bring the world closer". That means Swedavia shall help to make air travel and cargo transport – regionally, but also to and from Sweden – as accessible, efficient and attractive as possible.</p>	

	<p>In 2014, Swedavia AB (SEAC2020) had a net revenue of SEK 5.7 billion and some 3,500 employees. The Swedavia group of airports served in 2014 around 35,7 million passengers.</p> <p>Stockholm-Arlanda Airport is Sweden's largest airport (23,1 aircraft movements 2015) and acts as an important domestic and international hub for the Stockholm region and for Scandinavia – owing to flights to 180 destinations around the globe, and good ground transportation to and from other parts of the Stockholm region.</p> <p>Stockholm-Arlanda Airport operates three runways which are subject to strict environmental conditions. Capacity is in 2016 84 aircraft movements per hour. In total some 20000 people work at the airport.</p>
Previous experience	Not applicable.
Entity Profile matching the task	Not applicable, Swedavia AB (SEAC2020) initially will not participate directly in this action.
Contribution	Support to participating SEAC2020 members when required.

4.1.1.35 Avinor (SEAC 2020) – Company 35

Organisation	35 Avinor AS – Company 35	Service Provider
Description	<p>Avinor AS (SEAC2020) is a public limited company that operates a nationwide combined network of airports and navigation system in Norway. This includes towers and control centres, ground services and the development of commercial services at the airports. The 3000 employees and 46 airports in the network handled approximately 50 million passengers and around 830000 aircraft movements in 2014. Avinor AS (SEAC2020) has well-established experience in safe airport operations at airports of different sizes and traffic volumes; and with different weather conditions. The company is used to implementing multi-airport solutions in a cost-efficient way.</p> <p>Oslo Airport, the largest airport in Avinor AS (SEAC2020) network, has been in operation since 1998 and welcomed 24.3 million passengers in 2014. Oslo Airport has two parallel runways that are utilised for mixed mode parallel operations. Oslo Airport is currently expanding its capacity to be able to handle 28 million passengers in 2017.</p>	
Previous experience	Not applicable.	
Entity Profile matching the task	Not applicable, Avinor AS (SEAC2020) initially will not participate directly in this action.	
Contribution	Support to participating SEAC2020 members when required.	

4.1.1.36 ATOS (FSP) – Company 36

Organisation	36 Atos Belgium – Company 36	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</p>	

	<p>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 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>
Previous experience	Not applicable
Entity Profile matching the task	Not applicable, Atos Belgium initially will not participate directly in this action
Contribution	Support to participating members of Frequentis SESAR Partners if required.

4.1.2 Main profiles/CV (they may be the same person for more than one role)

This section reports the CVs of the following roles:

- Project Manager;
- SGA Coordinator;
- Transversal Activity Coordinator.

In the PJ03a, all those roles are taken by the Project Manager. Therefore, here below the requested CV.

Fabio Maria Donello (SICTA – ENAV Group) – male

Phone: +39 0815999447 Mobile: +39 3351773852; [Email: fabio.donello@sicta.it](mailto:fabio.donello@sicta.it)

Fabio Maria Donello was awarded Master degree in Engineering Telecommunication (2009) with honours at “Parthenope” University – Naples (Italy). . Principal subjects of study were Telecommunication Networks, Remote Sensing, Radio Navigation Systems, Air Navigation (Air Traffic Control).

He joined SICTA in 2009 to take the role of Air Traffic Management (ATM) Engineer. He has been involved into SESAR Programme since the beginning of his employment focusing on the Operational Concept Definition and Validation mainly pertaining to Airport operational environment. In detail, he was always involved in the Airport related projects dealing with Advanced Surface Movement, Guidance and Control Systems (A-SMGCS). In detail, he played an active role during SESAR 1 timeframe as contributor and task leader within P06.07.02, P06.07.03, P06.08.04 and P06.09.02). He is the current SESAR 1 P06.07.03 Project Manager expected to close during Q4 2016.

WORK EXPERIENCE

- From October 2013 to Today

Company: SICTA – Advanced Systems for Air Traffic Control – ENAV Group

Role: P06.07.03 Project Manager whose mainly responsibilities concern with the monitoring of the project execution to check the compliance with the expected objectives. Furthermore, a coordination with the SJU Airport Programme Manager was established to share the status project.

- From October 2009 to Today

Company: SICTA – Advanced Systems for Air Traffic Control – ENAV Group

Role: Validation Exercise Coordinator for the airport related simulations led by ENAV. In detail, he has taken the role of exercise coordinator of some validation activities (i.e. Real Time Simulations and Live Trials) executed in the context of SESAR 1 P06.yy.zz projects. The main responsibilities concern planning, preparation and execution phases of the exercises including the post-flight analysis.

4.2 Third parties involved in the project (including use of third party resources)

4.2.1 Linked to ENAV – Company 1

Objective	
Does the participant plan to subcontract certain tasks (please note that core tasks of the project should not be sub-contracted)	N
Does the participant envisage that part of its work is performed by linked third parties ⁵	Y
<p>ENAV contribution in the project is complemented by the following LTPs: IDS, NAIS, NAV CANADA and SICTA</p> <p>IDS INGEGNERIA DEI SISTEMI S.p.A.</p> <p>IDS INGEGNERIA DEI SISTEMI S.p.A. is based in Pisa (Italy) but also has a branch office in Rome and subsidiaries in four other countries abroad (UK, Brazil, Canada and Australia). It has around 500 employees worldwide with experience and expertise in the most sophisticated technologies. IDS's roots date back to 1980. Today, IDS is a world leading provider of high-tech solutions in selected niche defence and civil market sectors. Its Quality System is certified ISO 9001:2008.</p> <p>IDS provides unrivalled solutions across defence and civil markets, managed by 4 different divisions, in the Naval, Aeronautical & Unmanned Systems, Air Navigation and Radar sectors.</p> <p>The Air Navigation division, involved in this project, works globally with both civil and military aviation agencies and air navigation service providers to address their needs in the aeronautical fields of communication, navigation, surveillance and air traffic management.</p> <p>Since its creation IDS has been investing more than 20% of its turnover in research and development programmes to guarantee its competitive margin. 9 laboratories are responsible for R&D activities. Serving more than 50 customers in over 20 countries, IDS Air Navigation Division is recognised as a leading solution and service provider in the Air Navigation market.</p> <p>Since 1992, IDS has been working globally with both civil and military aviation agencies and air navigation</p>	

⁵ 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).

service providers to address their needs in the aeronautical fields of communication, navigation, surveillance and air traffic management. IDS provides COTS (Commercial Off-The-Shelf) solutions and highly customizable commercial software products aimed at supporting the transition from Aeronautical Information Services (AIS) to Aeronautical Information Management (AIM) in full compliance with the ICAO and Eurocontrol mandates for data quality and ready for future challenges in data interoperability domains.

About the involvement into PJ03a, IDS will contribute mainly to the solution PJ03a-09. Therefore, IDS can contribute to RPAS solution in terms of:

- Operational concept definition;
- Analysis and development of methods/models for trajectory description;
- Operational validation of minimum performance requirements for RPAS IFR/VFR flights and separation criteria;
- Sensitivity of RPAS to severe conditions (e.g. weather) and assessment of contingency situations (e.g. data-link loss);
- RPAS Systems Engineering (Air and Ground Segment) and performances definition;
- Provision of RPAS Operational staff (remote pilots).

Moreover, IDS can contribute to ATC/RPAS simulation campaigns in terms of:

- Definition and design of the validation scenario (including traffic data and models);
- Validation of the model through comparison with real data;
- Simulation activities. With regard to that, IDS could make available its validation platform including an Aircraft Cockpit Simulator, a Tower Simulator and the capability to simulate and control RPAS vehicles in the validation scenario.
- Post processing and result data analysis/evaluation.

Finally, IDS can contribute to IFR procedures design and development in terms of:

- specific trajectories characterization, not defined in the existing B/MT format;

flight preparation, requiring information management for flight planning, compatible with the ATM Network.

NEXTANT APPLICATIONS & INNOVATIVE SOLUTION SRL

Established at the end of 2006, NEXTANT APPLICATIONS & INNOVATIVE SOLUTION SRL (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 the frame of Solution PJ03a-01 NAIS will support ENAV validation activities by focusing on airport-related graphical information on-board of vehicles (moving maps) with special attention to the consistency and quality of geo-spatial information on-board of both aircraft and vehicles and the analysis of security aspects.

In the frame of solution PJ03a-09 NAIS will support ENAV validation activities by contributing to the development of test-tools (e.g. gaming and mock-ups) to be used in the frame of V1 and V2 validations.

NAV CANADA

NAV CANADA is the world's second largest ANSP with the responsibility to provide ANS to over 19 million km² of domestic airspace handling over 12 million aircraft movements each year. Much of the vast area that has to be managed is remote, sparsely populated and has limited infrastructure.

NAV CANADA has a long term program to evaluate and install advanced technology to improve Air Navigation Service (ANS) performance and efficiency. To this end we have invested over \$2B in new technology, including remote services, since 1996 when NAV CANADA first took over operation of domestic ANS.

NAV CANADA provides ATS at the following domestic facilities:

- 7 Area Control Centres (ACC), 1 for each Flight Information Region (FIR) across 5 time zones
- 41 Control Towers
- 56 Flight Service Stations (FSS)
- 8 Flight Information Centres (FIC)
- 51 Community Aerodrome Reporting Services (CARS)

In addition

- Remote Advisory Service (RAAS) is provided from 23 of 56 FSS to 38 aerodromes (see figure aside)
- Automated Weather Observation & Reporting (AWOS) supply remote observations
 - 77 AWOS (Automated Weather Information System)
 - 5 LWIS (Limited Weather Information System)
 - 148 Weather Cameras

To date, NAV CANADA has supported SESAR related activities on tower operations with ENAV and enroute/oceanic operations with NATS.

Concerning the PJ03a, NAV CANADA will support ENAV on the execution of the validation activities planned in the solution PJ03a-01. In detail, NAV CANADA will contribute personnel to collaborate on the design and coding of the solution as well as the adaptation and simulated use of the proposed display. NAV CANADA would develop and integrate the following new prototype technologies into the ENAV TBA3D Tower Simulator platform:

- A-SMGCS planning, routing and guidance functions (also for vehicles management)
- Data link service as main communication mean to reduce potential misunderstanding and workload related to the use of R/T

Consorzio SICTA (Sistemi Innovativi per il Controllo del Traffico Aereo)

SICTA - Advanced Systems for Air Traffic Control - is the Research Branch of ENAV Group. SICTA is an internal subsidiary company, namely the SICTA Consortium, which is 100% controlled by ENAV Group as of July 2012.

SICTA's staff is made up of highly skilled professionals like Air Traffic Management experts, Systems experts, Systems and software engineers, operational concept and simulation experts (both fast and real time), validation and demonstration experts.

Established in 1993 SICTA boasts a solid tradition of research and applied studies in ATM/CNS. It conducts research, development, validation and demonstration activities related to the Innovation in the Air Traffic Management domain participating in National and European research projects, playing an important role in the European field as the Italian R&D lab for ATM/CNS.

The multi-year experience gained on ATC/ATM topics both in operational as well in innovative contexts makes of SICTA a dynamic company ready to act as a joining link between today operations and future solutions. The daily proximity with ENAV operational staff allows SICTA's resources to full understand key issues in the ATC/ATM domain and to strongly contribute into the investigation of solutions addressing them.

SICTA participation is quite significant from an ENAV perspective considering it brings an important piece of transversal technical, operational and management expertise.

On the basis of the considerations and skills depicted above and taking into account that SICTA, as part of the ENAV Group, is to all effects same as an ENAV department, the ENAV and SICTA in kind contribution is to be considered as a single block.

SICTA will support ENAV mainly on the activities concerning the production of the operational documents (as OSED and SPR). That support will include also the identification of the related requirements as well as the definition of ad hoc use cases. Moreover SICTA will support ENAV in the execution of Validation activities.

The above LTP(s) are Companies which are either bound to ENAV through shared ownership (i.e. our affiliate SICTA) or are linked to ENAV through the sharing of a strategic plan for cooperation in several ATM related domains, as established in the framework of an Agreement for Cooperation (AfC) addressing various areas of development, such as Research & Development, Commercial Activities and Organisational Development (the AfC is attached to Appendix B – Technical Part of the ENAV application to the Call for Final SJU Membership). Such plans may well include joint and coordinated efforts to be injected in SESAR to foster the development of specific key features of the SESAR 2020 Programme.

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
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4.2.2 Linked to AIRBUS – Company 2

Objective

Does the participant plan to subcontract certain tasks (please note that core tasks of the project should not be sub-contracted)	Y
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Airbus SAS and Airbus Operations SAS will subcontract part of their contribution. The activities subcontracted in the framework of PJ03a will consist of support to AIRBUS SAS and Airbus Operations SAS for design and test of avionics equipment. The subcontracted part of the activities is in full consistency with the make or buy policy applicable at Airbus ensuring that core activities and expertise is kept internally and respecting H2020 rules as well as any relevant legislation with regards to subcontracting. In

<p>particular, Airbus SAS and Airbus Operations SAS representative will be internal AIRBUS staff. The subcontractors will be selected after competitive calls for tender and relevant selection processes ensuring the best value for money or, if appropriate, the lowest price and avoiding any conflict of interests. These subcontracting agreements are not placed only for SESAR tasks although they include specific work packages for SESAR and are renegotiated on a periodic basis. Airbus will however check and ensure the consistency of the existing subcontracting agreement with the H2020 requirements.</p>	
Does the participant envisage that part of its work is performed by linked third parties ⁶	Y
<p>For the present proposal, Airbus Operations SAS is linked third party of Airbus SAS, as declared in the Airbus Proposal for Membership Accession -REF. SJU/LC/0122-CFP.</p> <p>Airbus Operations SAS</p> <p>Airbus Operations SAS designs and manufactures aircraft, aircraft parts, systems, equipment and derivative products, and also provides services in the field of aeronautics. Airbus Operations SAS Engineering is operated in one major design office in Toulouse. It gathers top-level competencies such as integrator architecture, general design, integration tests and systems, propulsion, structural design and computation.</p> <p>The Toulouse Design Office has dealt with systems design and development for many years and acquired a large expertise in this area.</p> <p>Airbus Operations SAS will perform the design work in solution PJ03a-01 whereas Airbus SAS will concentrate on programme management and transversal ATM engineering contributions.</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

4.2.3 Linked to ANS CR (B4) – Company 3

No subcontractors or third parties involved.

4.2.4 Linked to ACG/COOPANS – Company 4

Objective	
Does the participant plan to subcontract certain tasks (please note that core tasks of the project should not be sub-contracted)	N
No subcontractors involved	
Does the participant envisage that part of its work is performed by linked third parties ⁷	N

⁶ 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).

⁷ 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 the use of contributions in kind provided by third parties (Articles 11 and 12 of the General Model Grant Agreement)	Y
<p>ACG intends to additionally draw on the experience of MeteoServe, a 100% subsidiary. Originally founded to provide meteorological services, MeteoServe has expanded its coverage into the ATM domain and can today provide sound knowledge and specific expertise in technical and operational aspects of MET and ATM.</p> <p>Specifically, MeteoServe shall contribute human resources with an operational background that provide expertise regarding design of operational procedures and validations. MeteoServe will second personnel against payment, which will be working on ACG premises like own staff. Therefore, MeteoServe personnel cost will be subsumed in ACG/COOPANS direct personnel cost according to Article 11 in conjunction with Article 6, paragraph 6.2, bullet A.3 of the Model Grant Agreement. This staff will contribute with know-how regarding design of operational procedures and statistical methods.</p> <p>Organizational data:</p> <p><i>MeteoServe Wetterdienst GmbH</i></p> <p><i>Wagramer Straße 19</i></p> <p><i>1220 Wien</i></p> <p><i>Austria</i></p>	

4.2.5 Linked to DASSAULT – Company 5

Objective	
Does the participant plan to subcontract certain tasks (please note that core tasks of the project should not be sub-contracted)	Y
<p>While refining the work to be done for PJ03a, it was found a wiring task that cannot be performed by Dassault Aviation and thus has to be subcontracted. The wiring task that needs to be subcontracted is essential to achieved the work although minor in terms of effort. DASSAULT AVIATION intends to subcontract the wiring tasks (such as definition, manufacturing) needed in PJ03a-04. The wiring tasks need dedicated knowledge that DASSAULT AVIATION does not have internally. The subcontractor will be LABINAL company. DASSAULT AVIATION and this company, which is the only one having some facilities in the area of the flight test centre, have developed over the years common processes and qualification methodologies enabling an efficient work together.</p>	
Does the participant envisage that part of its work is performed by linked third parties ⁸	N
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

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).

4.2.6 Linked to DFS – Company 6

Objective	
Does the participant plan to subcontract certain tasks (please note that core tasks of the project should not be sub-contracted)	Y
Parts of the development of the validation platform are planned to be subcontracted. A subcontractor will extend the existing tower simulation platform in order to enable the validation of the new surface management functions.	
Does the participant envisage that part of its work is performed by linked third parties ⁹	N
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

4.2.7 Linked to ENAIRE – Company 7

Objective	
Does the participant plan to subcontract certain tasks (please note that core tasks of the project should not be sub-contracted)	N
Does the participant envisage that part of its work is performed by linked third parties ¹⁰	Y
<ul style="list-style-type: none"> Ineco (Ingeniería y Economía del Transporte, S.A.) is an engineering and consulting Public Entity 45,85% owned by ENAIRE, focused on the transport sector in general, and also in the air transport field in particular, including ATM and airport operations and management. Ineco will participate in the definition of the validation plans in both maturity levels V1 and V2 and also in the conduction of validation exercises, analysis of results and preparation of validation reports in both maturity levels V1 and V2. Isdefe (Ingeniería de Sistemas para la Defensa de España, S.A.) is a State-owned company that offers consulting and engineering services for Spanish public administration and public international agencies, addressing the definition, implementation, operation, evolution and regulation of CNS/ATM aspects. 	

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).

Isdefe is (and of course has been) providing support to ENAIRE in a wide range of areas and projects. It is here worth to mention its support for more than 25 years now in the development, verification, validation and deployment of the Spanish ATC system. Isdefe will participate in the development of the operational concept in maturity level V1 (OSED) and also in maturity level V2 (OSED/SPR/INTEROP; in the definition of the validation plans in both maturity levels V1 and V2; and also in the conduction of validation exercises, analysis of results and preparation of validation reports in both maturity levels V1 and V2

Isdefe will undertake most of ENAIRE's contribution to PJ03a-09. Isdefe has been working, together with ENAIRE, in several activities regarding RPAS in the past. Isdefe, in close collaboration with Ineco (Service Provider for ATS services in TWRs), will support ENAIRE to develop its contribution to this project.

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
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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 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 3.000 € (direct costs) for the work developed on ENAIRE's premises.

4.2.8 *Linked to EUROCONTROL – Company 8*

Objective

Does the participant plan to subcontract certain tasks (please note that core tasks of the project should not be sub-contracted)	Y
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EUROCONTROL will sub-contract part of the technical development for the Tower Simulator that will be used to perform V2 validation activities planned in the project. 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 PJ03a.

Does the participant envisage that part of its work is performed by linked third parties ¹¹	N
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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
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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).

4.2.9 Linked to FINMECCANICA – Company 9

Objective	
Does the participant plan to subcontract certain tasks (please note that core tasks of the project should not be sub-contracted)	Y
<p>Activities could be subcontracted to the “Airspace Users”, i.e. pilots of civil airlines that will participate and provide support during the Validation and Verification phases.</p> <p>Activities could be subcontracted for the support to the evolution of e-GEOS 3D platform to the new version of Unity3D and enrichment of 3D object library.</p> <p>Activities could be subcontracted for the support in the development of specific SW tools for the surface management, which expertise is not present in the Company</p>	
Does the participant envisage that part of its work is performed by linked third parties ¹²	Y
<p>Selex ES GmbH</p> <p>Selex ES GmbH, formerly known as Selex Systems Integration GmbH or Gematronik Weather Radar Systems, is a German engineering company and is one of the top companies in the meteorological market. Selex ES GmbH is a 100% affiliated company of Finmeccanica and will be renamed to Finmeccanica likely also in 2016.</p> <p>More than 50 years of experience, reliability and a professional approach to challenges have contributed to the company's excellent reputation among experts in meteorology, the aviation sector and other related fields.</p> <p>Worldwide, Selex ES GmbH has a leading position in the design, manufacturing and installation of weather radar systems and holistic adverse weather monitoring solutions for aviation applications comprising of radar, lidar and ground based wind shear systems (LLWAS).</p> <p>Up to now, close to 400 systems have been successfully put into operation in 75 different countries all over the world. Today, Selex ES GmbH focuses on providing customized systems, turn-key solutions for aviation applications and integrated information systems while also being sensitive to individual customer needs.</p> <p>Telespazio SpA</p> <p>Telespazio, a joint venture between Finmeccanica and Thales, is one of the world's leading players in satellite services. The company relies on an international network of space centres and teleports and operates worldwide through many subsidiaries and joint ventures. Telespazio now covers the whole space market value chain through its four business units: Satellite Systems & Applications, Satellite Operations, Geoinformation, and Networks & Connectivity.</p> <p>Telespazio participates to the SESAR Development Phase, leveraging on a wealth of experience of the highest level, stemming from technological expertise acquired over 50 years of business practice. The Company's experience is also drawn from the management of space infrastructure - including the Fucino Space Centre, the world's largest civilian teleport - as well as from its involvement in major space</p>	

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).

programmes, including: Galileo, EGNOS, Copernicus, COSMO-SkyMed, SICRAL and Göktürk.

For EGNOS, Telespazio performs system maintenance, telecommunications and logistics services, also developing new services in various public and private sectors (aviation, road, rail, maritime). For several years, Telespazio has participated in projects in the field of satellite navigation and communication applied to the aviation domain. Among these, the SENECA programme, developed by the ASI and ENAV, to facilitate the dissemination of satellite navigation based on EGNOS in the Italian air traffic sector, the MEDUSA project, a European programme that aims to introduce such services in the countries of the Mediterranean basin, and the DESIRE2, ESA/EDA programme to develop and demonstrate a service based on a Remotely Piloted Aircraft (RPA) flying in Beyond Radio Line of Sight (BRLOS) using space assets (SatCom, SatNav).

In the framework of PJ03.a-1, Telespazio will contribute to the build up of the current solution by prototyping and validating an airport vehicle management and guidance system using MC GNSS augmentation and airport wireless datalink.

The solution, opportunely integrated with the FNM prototype, will make use of a centralized GPS/EGNOS/GALILEO positioning and integrity system and wireless solution.

Participation and contribution to the relevant validation exercise is also envisaged.

e-GEOS SpA

e-GEOS, an ASI (20%) / Telespazio (80%) company, is a leading international player in the geo-spatial business. e-GEOS offers a complete range of products and services in the Earth Observation and in the geo-spatial application domains, based on both optical and radar satellites as well as on aerial surveys. The company employs more than 300 people and operates through the Earth Observation centres in Matera (Italy) and Neustrelitz (Germany). As the European hub for VHR (Very High Resolution) data, e-GEOS grants unique access to the COSMO-SkyMed and distributes also GeoEye-1, IKONOS, Radarsat, QuickBird and WorldView and IRS satellites.

COSMO-SkyMed earth observation programme of the Italian Space Agency and the Italian Ministry of Defence, based on a constellation of four VHR SAR satellites, provides all-weather, day and night, world-wide radar data acquisitions.

e-GEOS exploits COSMO-SkyMed data to offer near-real-time monitoring services and large-area mapping capabilities, in combination with its existing product and services portfolio, which comprises solutions for key vertical markets including emergency management, maritime surveillance, agriculture & forestry, cadastre, environmental protection, oil & gas, utilities and industries.

e-GEOS is one of the main industrial players in the European Copernicus Program, and today is a world leader in environmental and maritime monitoring and in rapid mapping for the management of natural disasters and humanitarian crises, cooperating with EMSA (European Maritime Safety Agency), EU SatCen (European Union Satellite Centre) / EUSC (European Union Satellite Centre), JRC (Joint Research Centre of the European Commission), various UN Organizations and the Italian Civil Defence.

The company serves national and international clients, in the public and private sectors, including customers such as the Italian Ministry of Agriculture, the Italian Ministry of the Environment for the interferometric processing of SAR data, major international oil & gas companies and railroads.

“Bulgarian Air Traffic Services Authority” (BULATSA)

State Enterprise “Bulgarian Air Traffic Services Authority” (BULATSA) is a legal entity, established in 1969, which holds a certificate for the provision of air navigation services and fulfils State functions for the provision of ANS in the controlled civil airspace of the Republic of Bulgaria. BULATSA provides continuous air traffic services (ATS) in the airspace over the territory and the territorial waters of the Republic of Bulgaria (including a cross border sector established within the scope of Danube FAB in 2014) and in that part of the airspace over the Black Sea according to a regional agreement.

BULATSA mission is: “Provision of high quality Air Navigation Services, ensuring reliable and efficient service maintaining the highest levels of safety and diminishing the impact on the environment”. Among

<p>BULATSA's main activities are ATM, CNS, MET, AIS, management of the air traffic safety system within its assigned powers and planning, provision, implementation, operation and maintenance of facilities, systems and equipment as well as supporting infrastructure.</p> <p>BULATSA has implemented the most up to date version of the ATM automated system - SATCAS. New functions of the system are being implemented in accordance with the ATM Master Plan's requirements and European Regulations.</p> <p>BULATSA has and maintains one of the most developed COM infrastructures in Europe in the area of ANS telecommunications. BULATSA maintains NAV infrastructure, including en-route NAV facilities and approach and landing systems. BULATSA has 5 radar complexes and one secondary en-route radar. BULATSA operates several simulators of different kinds addressing specific operational contexts for the different ATC units.</p> <p>BULATSA has implemented Quality Management System (QMS) as part of the Integrated Management System (IMS), covering the areas of quality, health and safety, information security and environment in compliance with the international standards ISO 9001, BS OHSAS 18001, ISO/IEC 27001 and ISO 14001.</p> <p>BULATSA has experience in SESAR related projects. BULATSA was an active member of the SESAR concepts – NASCIO project - LOT2 to validate APV SBAS procedures (developed under SHERPA project) for BURGAS airport. BULATSA past activities include participation in SESAR Interim Deployment Steering Group (IDSG) and the "ANSPs coordination within IDSG" project in the field of the trans-European transport networks (TEN-T)</p> <p>Following successful submission of application for TEN-T funds in the field of ATM, DANUBE FAB continues with the implementation of elements of Free route airspace and Datalink services that are part of the SESAR Interim Deployment Program (IDP).</p> <p>BULATSA follows closely the SESAR Deployment activities. BULATSA submitted application to the CEF Call 2015 in the field of ATM with 3 projects to implement elements of the Deployment program v.1. BULATSA is an active participant in the DM consultation process.</p> <p>The achievements of BULATSA over the last few years have resulted in enhanced safety, a modernised route network, considerable growth in the air traffic volume handled, improved quality of service with great attention to environment related issues.</p> <p>In PJ03a, subcontracted activities to be performed by BULATSA will comprise of validation platform (FINMECCANICA-BULATSA) set up and execution of phased validation activities related to the integrated surface management in airport operational environment.</p> <p>PJ03a-01 Enhanced guidance assistance to aircraft and vehicle on the airport surface combined with routing by providing the necessary operational expertise for the platform validation and prototype development in airport operational environment.</p> <p>The above LTP(s) are Companies that are linked to FINMECCANICA in the following way:</p> <ul style="list-style-type: none"> o BULATSA link is a cooperation agreement between FINMECCANICA and Bulatsa o SELEX ES Gmbh, e-GEOS and TELESPIAZIO are Finmeccanica subsidiaries 	
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

4.2.10 Linked to Honeywell – Company 10

Objective

Does the participant plan to subcontract certain tasks (please note that core tasks of the project should not be sub-contracted)	N
Does the participant envisage that part of its work is performed by linked third parties ¹³	Y
<p>Work provided under SESAR 2020 will be coordinated and performed by Honeywell Aerospace SAS, located in Toulouse (France) together with Honeywell International, s.r.o., with sites in Prague and Brno (Czech Republic) and Honeywell EMS Satcom UK, LTD located in Tewkesbury (UK). These legal entities form the Aerospace Advanced Technology Europe (ATE) organization. These facilities are equipped with state of the art research and test laboratories enabling research, development, integration, verification and validation of various aircraft systems. Special subject matter expertise and specific experience with development of high-maturity level product and service prototypes will be provided by Honeywell International Inc. (USA) and Honeywell spol. s.r.o. (Czech Republic).</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

4.2.11 Linked to INDRA – Company 11

Objective	
Does the participant plan to subcontract certain tasks (please note that core tasks of the project should not be sub-contracted)	N
Does the participant envisage that part of its work is performed by linked third parties ¹⁴	Y
<p>For the present proposal, INDRA NAVIA AS is a linked third party of Indra, as declared in the Indra Proposal for Membership Accession -REF. SJU/LC/0122-CFP, dated 28-January-2016</p> <p>Indra Navia is a dedicated air traffic management technology company that designs, produces, and integrates communication, navigation, and surveillance technology for the world's leading airports and air traffic control organizations. Specializing in highly configurable and customized solutions, the company works with customers deliver products and equipment in line with customer's needs. More than 1200 airports around the world rely on GAREX, NORMARC and InNOVA, amongst them the major European hubs such as Paris Charles de Gaulle, London Heathrow and Amsterdam Schiphol.</p> <p>Through continuous technological development, Indra Navia facilitates the modernisation of air traffic</p>	

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).

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).

<p>management capabilities and ensures state-of-the-art technology. The company uses its ongoing experience with over 1,000 diverse customers to adapt and enhance effective support to meet all customers' needs. Compliance with ISO 9001 reflects the company's high quality management system, placing the customer first at all times.</p> <p>Indra Navia has decades of experience in supplying highly safety-critical equipment, and thereby in-depth knowledge and understanding of the applicable regulations and requirements, in particular related to safety assessment and process/verification requirements to various levels of safety critical equipment development and implementation. Indra Navia therefore has a very good fundament for understanding the implications of bringing new equipment through approval processes to the market in the ATM domain.</p> <p>Indra Navia was also a partner in SESAR1, through NATMIG. In SESAR1, Indra Navia participated in projects 06.07.03, 12.03.02, 12.03.03 and 12.03.04 as a ground industry.</p> <p>All the work to be done in this project will be shared between Indra Sistemas in Spain and Indra Navia in Norway.</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

4.2.12 Linked to SINTEF (NATMIG) – Company 12

No subcontractors or third parties involved.

4.2.13 Linked to MUC (SEAC2020) – Company 13

No subcontractors or third parties involved.

4.2.14 Linked to FRQ (FSP) – Company 14

Objective	
Does the participant plan to subcontract certain tasks (please note that core tasks of the project should not be sub-contracted)	N
Does the participant envisage that part of its work is performed by linked third parties ¹⁵	Y
<p>The affiliate / Linked 3rd party to Frequentis AG, the Frequentis Romania SRL is contributing to this action. Frequentis Romania SRL is integrated into the research and development process of Frequentis AG, hence its contribution is to be seen as a joint activity.</p> <p>Frequentis Romania SRL (short name FRQ RO) is an affiliate of Frequentis AG and is specialised on software development providing support for the mother company in the safety-critical domains of air traffic control, public safety, public transport and maritime. The company has contributed to SESAR 1 projects in</p>	

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).

WP12 and will continue its contribution in the scope of related airport / Tower activities in SESAR 2020.	
When drafting the proposal it was envisaged to have Comsoft Solutions as linked third party to FRQ (FSP). During proposal review it has been clarified that the contribution of Comsoft Solutions will be too limited in size and the content shall be covered by FRQ (FSP). For this reason the LTP Comsoft Solutions was dropped. FRQ (FSP) would like to confirm that this change does not modify the general terms of the proposal. All contributions of FRQ (FSP) are well covered and do not represent a substantial change to the proposal.	
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

4.2.15 Linked to THALES AIR SYS – Company 15

Objective	
Does the participant plan to subcontract certain tasks (please note that core tasks of the project should not be sub-contracted)	Y
Thales envisages to sub contract software to a Joint Venture (Edisoft, Portugal) that is currently developing some parts of Thales Air Systems products.	
Does the participant envisage that part of its work is performed by linked third parties ¹⁶	Y
<p>Thales envisages to have part of its work performed by the linked third party Thales Systèmes Aéroportés (TSA) as follows:</p> <p>Thales Systèmes Aéroportés is the European leader and ranks third worldwide in the market for airborne and naval defence mission systems and equipment. The company designs, develops and manufactures technologically innovative systems and equipment for combat aircraft, unmanned air vehicles (UAVs), special-mission aircraft, helicopters and naval platforms, and provides a complete range of through-life support services. Drawing on advanced collaborative tools, TSA works with its customers from the earliest stages in the development of its systems and subsystems to ensure the deployment of optimal solutions.</p> <p>Thales Systèmes Aéroportés actively participated to European initiatives for RPAS, is currently participating to numerous standardization working groups and contributes to bring this new RPAS view for future evolutions of the standards.</p> <ul style="list-style-type: none"> TSA took a major role in EDA's MIDCAS contract, preparing the integration of RPAS in civilian airspace. TSA has been strongly involved in the "Sense" function and was responsible for work on the cooperative sensors (Interrogator, TCAS compatibility, etc.), as well as fusion of data from all sensors. Within the scope of this work, TSA also specified and designed a future D&A generic radar sensor and provided a radar prototype for the flight demonstrations. TSA takes also a major role in EDA's ERA contract, preparing the integration of RPAS for surface operations. TSA will manage the support to regulatory authorities to issue international applicable standards and will focus its technical contribution to ERA on Automatic Take-off and Landing capability based on MAGIC ATOLS product which records proven high performance on UK 	

¹⁶ 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).

Watchkeeper program. MAGIC ATOLS is using patented Radar technology and will be improved for more flexible use and enhanced safety of Automatic Take-off and Landing phases for RPAS.	
<ul style="list-style-type: none"> • TSA expertise in these areas supports its contribution to the development of D&A and ATOL concept of operation, interoperability requirements, and technical specification of cooperative and non-cooperative sensors focusing on the Radar technologies. 	
<u>For all contribution to solution PJ03a-09, Thales Systèmes Aéroportés</u> proposes its expertise on following roles:	
<ul style="list-style-type: none"> • Overall contribution to investigations about ways in which RPAS may be able to use a technical capability for Automatic Take-Off and Landing based on Radar tracker technology to comply with ATC instructions. • Contribution to OSED definition, SPR/INTEROP definition for the ATOL capability based on Radar tracker technology. • Contribution to Technical specification and Interfaces definition for the ATOL capability based on Radar tracker technology. 	
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

4.2.16 Linked to NLR (AT-One) – Company 16

No subcontractors or third parties involved.

4.2.17 Linked to DSNA – Company 17

Objective	
Does the participant plan to subcontract certain tasks (please note that core tasks of the project should not be sub-contracted)	Y
DSNA has in house expert engineers for Airport traffic management. They have the ability to develop new concepts and define specifications for new ATM tools. But, in order to fulfil its prospective studies, DSNA needs additional expertise. In PJ03a, subcontracted activities will encompass the support to: platform maintenance and configuration in preparation of validation exercises, collect of the data steaming from the validations, and the analysis of the results through specific tooling.	
DSNA Subcontracts allow DSNA/DTI to buy these necessary 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 Public	
Does the participant envisage that part of its work is performed by linked third parties ¹⁷	Y
DSNA will perform a Fast Time Simulation (FTS) in PJ03a-01. A part of this activity will be supported by the ENAC by providing its FTS prototype used in SESAR1 and customized for this activity.	
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

¹⁷ 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).

4.2.18 Linked to THALES Avionics – Company 18

No subcontractors or third parties involved.

4.2.19 Linked to AIRTEL (NATMIG) – Company 19

No subcontractors or third parties involved.

4.2.20 Linked to ZRH (SEAC2020) – Company 20

No subcontractors or third parties involved.

4.2.21 Linked to HC (FSP) – Company 21

No subcontractors or third parties involved.

4.2.22 Linked to DLR (AT-One) – Company 22

No subcontractors or third parties involved.

4.2.23 Linked to PANSA (B4) – Company 23

No third parties involved.

4.2.24 Linked to LPS SR (B4) – Company 24

No third parties involved.

4.2.25 Linked to ON (B4) – Company 25

No third parties involved.

4.2.26 Linked to CCL/COOPANS – Company 26

No third parties involved.

4.2.27 Linked to IAA/COOPANS – Company 27

No third parties involved.

4.2.28 Linked to LFV/COOPANS – Company 28

No third parties involved.

4.2.29 Linked to Naviair/COOPANS – Company 29

No third parties involved.

4.2.30 Linked to SAAB (NATMIG) – Company 30

No third parties involved.

4.2.31 Linked to ADP (SEAC 2020) – Company 31

No third parties involved.

4.2.32 Linked to HAL (SEAC2020) – Company 32

No s third parties involved.

4.2.33 Linked to SNBV (SEAC 2020) – Company 33

No third parties involved.

4.2.34 Linked to Swed (SEAC 2020) – Company 34

No third parties involved.

4.2.35 Linked to Avinor (SEAC 2020) – Company 35

No third parties involved.

4.2.36 Linked to ATOS (FSP) – Company 36

No third parties involved.

4.3 Global budget approach taken by the SJU Members

The SJU Members comprising EUROCONTROL and the 19 Members selected as a result of the Membership Accession Process have actively participated to the SESAR2020 dialogue phase, launched by SESAR JU, considering the 28 Projects (18 IR, 3 Transversal and 7 VLD) as part of a unique Work Programme.

During the dialogue phase the SJU Members, have supported SESAR JU both in DoW preparation and in the estimation of the effort per project.

Then SESAR JU published, in the SESAR2020 Multi-annual Work Programme, an indicative co-financing estimation per Project, per Stakeholder Group (Service Providers, Airborne Manufacturing Industry, Ground Manufacturing Industry) and per Wave (Waves 1 and 2).

In view of the response to be given in a short period, the SJU Members decided to start the preparation activities before the official launch of the call for proposal, using the available documents published by SESARJU (i.e. SESAR2020 Multi-annual Work Programme) in order to have more available time for the proposal preparation.

A deep and comprehensive analysis of the required work was done, bringing to a revision of the estimated effort necessary to perform the activities. In such analysis also the interests to invest from both Service Providers and Manufacturing Industries were taken into account.

The result was a limited different co-financing distribution among the 28 Projects.

The SJU Members have collectively decided to maintain these limited differences because the revised values were more close to the described activities while keeping the overall maximum co-financing for W1 and per Stakeholder group.

The rationale for maximum co-financing deviation is explained at project level.

The following table contains the allocation of co-financing required to support Wave 1 (extracted from the SESAR2020 Multi-annual Work Programme) and the co-financing distribution agreed by the SJU Members for the 28 Projects for Wave 1:

SESAR.IR-VLD.Wave1-05-2015 Integrated Surface Management

Topic	NAME OF PROJECT	Max Co-financing Value Wave 1	Co-financing agreed by Candidate Members
1	PJ.19 Content Integration	€8.320.000	€7.395.141
2	PJ.20 Master plan maintenance	€3.510.000	€3.327.673
3	PJ.22 Validation and Demonstration Engineering	€4.940.000	€2.051.363
	TOTAL TRANSVERSAL WAVE 1	€16.770.000	€12.774.177
4	PJ.02 Increased Runway and Airport Throughput	€13.845.000	€15.592.847
5	PJ.03a Integrated Surface Management	€12.220.000	€12.925.438
6	PJ.03b Airport Safety Nets	€8.125.000	€8.228.635
7	PJ.04 Total Airport Management	€10.465.000	€8.909.071
8	PJ.05 Remote Tower for Multiple Airports	€6.630.000	€9.013.622
9	PJ.07 Optimised Airspace Users Operations	€3.640.000	€2.247.337
10	PJ.08 Advanced Airspace Management	€2.730.000	€2.738.354
11	PJ.09 Advanced DCB	€7.020.000	€7.153.377
12	PJ.01 Enhanced arrivals and departures	€17.680.000	€17.521.365
13	PJ.06 Trajectory Based Free Routing	€6.045.000	€6.029.406
14	PJ.10 Separation Management En-Route and TMA	€25.935.000	€26.388.527
15	PJ.11 Enhanced Air and Ground Safety Nets	€5.265.000	€5.478.828
16	PJ.13 Air Vehicle Systems	€10.140.000	€9.251.386
17	PJ.14 CNS	€22.880.000	€23.213.553
18	PJ.15 Common Services	€6.435.000	€5.784.518
19	PJ.16 CWP - HMI	€11.635.000	€12.861.755
20	PJ.17 SWIM Infrastructures	€9.490.000	€9.754.600
21	PJ.18 4D Trajectory Management	€21.125.000	€22.193.942
	TOTAL SESAR 2020 PROJECTS WAVE 1	€201.305.000	€205.286.559
	TOTAL TRANSVERSAL & PROJECTS WAVE 1	€218.075.000	€218.060.736
22	PJ.28 Integrated Airport Operations (incl. TBS)	€4.300.000	€4.001.243
23	PJ.24 Network Collaborative Management	€3.600.000	€4.759.841
24	PJ.23 Flexible Airspace Management and Free Route	€4.400.000	€1.443.374
25	PJ.25 Arrival Management extended to en-route Airspace	€4.000.000	€3.914.104
26	PJ.26 Enhanced Terminal Airspace using RNP-Based Operations	€2.400.000	€539.333
27	PJ.27 Flight Information Exchange	€6.100.000	€6.079.367
28	PJ.31 Initial Trajectory Information Sharing	€17.200.000	€18.955.119
	TOTAL VLD WAVE 1	€42.000.000	€39.692.380
	TOTAL SESAR 2020 PPP (TRANSVERSAL, IR & VLDs) WAVE 1	€260.075.000	€257.753.116

5. Ethics and Security

5.1 Ethics

All participants of the PJ03a Integrated Surface Management 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
- 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

During the project WP06 will ensure compliance with ethics. This means that WP06 will verify that all documents from the PJ03a Integrated Surface Management project are following European ethical rules and the ethical rules of the concerned country. Furthermore WP06 will provide support for all WPs regarding ethical issues.

During project Kick-off Meeting, WP06 will conduct an information session in order to draw attention to, and inform partners of all relevant ethical issues. Furthermore, WP06 will provide publicly available literature to provide all participants with the opportunity to learn more about appropriate ethical standards and practices in research.

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 PJ03a Integrated Surface Management project.

5.1.1 Humans

In PJ03a project, validation activities will be conducted to achieve the required maturity for all Operational Improvements addressed by the project, and in particular to gain knowledge about human-machine interaction.

These activities will involve Air Traffic Controllers, Pilots or other operational staff of the entities participating to the project. Participants will be selected through the management of operational divisions of the involved partners, depending on the requirements for the specific validation exercise (e.g. air traffic controller licence for specific sectors or type of airspace), availability, and willingness to contribute to the SESAR programme. Within these activities, observations, instantaneous self-assessments and interviews may be conducted in all PJ.XX solutions.

Participants of these validation activities will be clearly informed of the research goals, the methodology of data protection in a presentation of the project and in interviews at the beginning of the study. According to the declaration of Helsinki, subjects are free to leave any validation activities 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.

Section: Humans	YES	NO	Information to be provided	Documents to be provided
Does your research involve human participants?	X		Confirmation about obtained Informed consent of the participants.	Examples of “informed consent form”
If YES: Are they volunteers for social or human sciences research?		X		
Are they persons unable to give informed consent		X		

Section: Humans	YES	NO	Information to be provided	Documents to be provided
(including children/minors)?				
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		

To ensure that participants in validation exercises or demonstrations are aware of their position and rights from an ethical perspective, they will be asked to review and sign the following form:

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 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.

5.1.2 Protection of Personal Data

In advance and during the action execution, 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. These personal data will be collected and processed fully in accordance with the Directive 95/46/EC of the European Parliament on the protection of individuals with regard to the processing of personal data and on the free movement of such data.

Personal data collected and further processed concern mainly all the technical and/or operational experts contributing to the action, either during its whole duration or playing a punctual or temporal role, for the purpose of the needed mutual contact among involved parties, exercises preparation and execution, meeting and logistic arrangements and communication activities. For the latter, personal data collection from the people to which communication is aimed at, is also envisaged.

In the context of this action, collected personal data would comprise information identifying the person designated by its organization. Typically, personal data would relate to the following:

- Name;
- Identification Number (ID);
- Company position / action role;
- Business contact details (e-mail address, business telephone number, mobile telephone number, fax number, postal address, company and department);
- Level of qualification, professional experience.

Under no circumstances these personal data will refer to racial or ethnic origin, political opinions, economical situation, religious or philosophical beliefs, trade-union membership, physical and mental health, sex life, or any other sensitive data.

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			
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, MACs, cookies, etc.)?		X		

Section: Protection of Personal Data	YES	NO	Information to be provided	Documents to be provided
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		

5.1.3 Misuse

The PJ03a Integrated Surface Management project is part of the SESAR 2020 program and as such will be supervised by the SESAR Joint Undertaking and its members of the Administration Board. Several independent advisors are included in that body: e.g. Staff Representative, Airspace User, Military, and Scientific Community Representative. The SJU has or will expand on the development of a strategy on how to deal with possible risks regarding misuse and possible consequences during the project execution inside of SESAR 2020.

In the case that ethical issues arise unexpectedly during the project, the project coordinator will contact the Commission immediately and provide detailed information on the issue and how the project team intend to handle it.

5.1.4 Other Ethics Issues

At this stage of the project proposal there are no other ethics issues that should be taken into consideration. In the case that other ethical issues arise unexpectedly during the project, the project coordinator will contact the Commission immediately and provide detailed information on the issue and how the project team intend to handle it.

5.2 Security¹⁸

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		

¹⁸ Article 37.1 of the Model Grant Agreement: *Before disclosing results of activities raising security issues to a third party (including affiliated entities), a beneficiary must inform the coordinator — which must request written approval from the Commission/Agency.* Article 37.2: *Activities related to 'classified deliverables' must comply with the 'security requirements' until they are declassified. Action tasks related to classified deliverables may not be subcontracted without prior explicit written approval from the Commission/Agency. The beneficiaries must inform the coordinator — which must immediately inform the Commission/Agency — of any changes in the security context and — if necessary — request for Annex 1 to be amended (see Article 55).*

References

- [1] European Commission: **H2020 CALL: SESAR2020 IR-VLD WAVE1**, <http://ec.europa.eu/research/participants/portal/desktop/en/opportunities/h2020/calls/h2020-sesar-2015-2.html#c,topics=callIdentifier/t/H2020-SESAR-2015-2/1/1/1&callStatus/t/Forthcoming/1/1/0&callStatus/t/Open/1/1/0&callStatus/t/Closed/1/1/0&+identifier/desc>, Brussels, 22 October 2015.
- [2] SESAR Joint Undertaking: **SESAR 2020 Multi Annual Work Program**, Edition 1.0, Brussels, 01 July 2015.
- [3] SESAR Joint Undertaking: **Annual Work Programme* 2015**, Amendment n°1 Edition 00.01.01, Brussels, 20 October 2015.
- [4] SESAR Joint Undertaking: **Introduction to the SESAR 2020 Programme Execution**, Edition 01.00.01, Brussels, 12th October 2015.

Abbreviations

This list extends the list given in [2] and [3].

AGL	Airfield Ground Lighting
AMAN	Arrival Manager
AMDB	Aerodrome Mapping Database
A-SMGCS	Advanced – Surface Movement, Guidance and Control Systems
ATM	Air Traffic Management
CBA	Cost Benefit Analysis
CPDLC	Controller Pilot Data Link Communication
CNS	Communication, Navigation and Surveillance
DMAN	Departure Manager
DoW	Description of Work
EC	European Commission
EPMB	Extended Project Management Board
EU	European Union
GBAS	Ground Based Augmentation System
GNSS	Global Navigation Satellite System
H2020	HORIZON 2020 (research and innovation program of the EU, 2014-2020)
HDD	Head Down Display
HMI	Human Machine Interface
HUD	Head Up Display
IP	Internet Protocol
IR	Industrial Research project
KPA	Key Performance Area
LVC	Low Visibility Conditions
LVP	Low Visibility Procedures
MAWP	Multi Annual Work Programme [2]
PCIL	Project Content Integration Lead
PCIT	Project Content Integration Team
PEG	Programme Execution Guidance [4]
PJ03a	Project No. 03a described in [2] corresponds to the Topic of the call
PJ03a-01	Solution No 01 in PJ03a
PM	Project Manager (is used as synonym for SGA coordinator [SESAR] as well as for Action Coordinator [H2020; PPP Membership Agreement Appendix E] in this proposal)
PMB	Project Management Board
RPAS	Remotely Piloted Aircraft Systems
RTS	Real Time Simulation
SBAS	Satellite Based Augmentation System
SJU	SESAR Joint Undertaking



SL	Solution Lead
SWIM	System Wide Information Management
TA	Transversal Action
TS	Technical Specification
VLD	Very Large Demonstration
VSB	Virtual Stop Bar
WAN	Wide Area Network
WP	Work Package

ESTIMATED BUDGET FOR THE ACTION (page 1 of 4)

Estimated eligible ¹ costs (per budget category)										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	Total costs	Reimbursement rate %	Maximum EU contribution ³	Maximum grant amount ⁴	Information for indirect costs	Information for auditors	Other information:
A.1 Employees (or equivalent) A.2 Natural persons under direct contract A.3 Seconded persons [A.6 Personnel for providing access to research infrastructure]		A.4 SME owners without salary A.5 Beneficiaries that are natural persons without salary					D.1 Travel D.2 Equipment D.3 Other goods and services D.4 Costs of large research infrastructure					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 EU funding
Form of costs ⁶	Actual	Unit ⁷	Unit ⁸		Actual	Actual	Actual	Flat-rate ⁹							
								25%							
	(a)	Total (b)	No hours	Total (c)	(d)	(e)	(f)	(g)=0,25x ((a)+(b)+(c)+(f) +[(h1)+(h2)]-(m))	(i)= (a)+(b)+(c)+(d)+(e)+(f)+(g)+(h1)+(h2)+(h3)	(j)	(k)	(l)	(m)	Yes/No	
1. ENAV	276008.88	0.00	0	0.00	0.00	0.00	31708.32	76929.30	384646.50	70.00	269252.55	54611.10	0.00	No	
- sicta ¹⁴	492945.12	0.00	0	0.00	0.00	0.00	54771.68	136929.20	684646.00	70.00	479252.20	97204.35	0.00	No	
- NAIS ¹⁴	121680.00	0.00	0	0.00	0.00	0.00	13520.00	33800.00	169000.00	70.00	118300.00	23994.19	0.00	No	
- I.D.S. ¹⁴	86400.00	0.00	0	0.00	0.00	0.00	9600.00	24000.00	120000.00	70.00	84000.00	17037.30	0.00	No	
- NAV CANADA ¹⁴	108000.00	0.00	0	0.00	0.00	0.00	12000.00	30000.00	150000.00	70.00	105000.00	21296.62	0.00	No	
Total beneficiary 1	1085034.00	0.00	0.00	0.00	0.00	0.00	121600.00	301658.50	1508292.50		1055804.75	214143.56	0.00		
2. AIRBUS	0.00	88750.00	0	0.00	0.00	0.00	7250.00	24000.00	120000.00	70.00	84000.00	17037.30	0.00	No	
- AI OPS ¹⁴	0.00	316712.00	0	0.00	430000.00	0.00	43288.00	90000.00	880000.00	70.00	616000.00	124940.18	0.00	No	
Total beneficiary 2	0.00	405462.00			430000.00	0.00	50538.00	114000.00	1000000.00		700000.00	141977.48	0.00		
3. ANS CR (B4)	74870.00	0.00	0	0.00	0.00	0.00	29000.00	25967.50	129837.50	70.00	90886.25	18434.00	0.00	No	
4. ACG/COOPANS	75075.00	0.00	0	0.00	0.00	0.00	24765.00	24960.00	124800.00	70.00	87360.00	17718.79	0.00	No	
5. DASSAULT	799929.00	0.00	0	0.00	21000.00	0.00	356046.00	288993.75	1465968.75	70.00	1026178.13	208134.55	0.00	No	
6. DFS	345387.00	0.00	0	0.00	90000.00	0.00	25000.00	92596.75	552983.75	70.00	387088.63	78511.24	0.00	No	
7. ENAIRE	9765.53	0.00	0	0.00	0.00	0.00	735.03	2625.14	13125.70	70.00	9187.99	1863.55	0.00	No	
- INECO ¹⁴	27643.63	0.00	0	0.00	0.00	0.00	2080.81	7431.11	37155.55	70.00	26008.89	5275.25	0.00	No	
- ISDEFE ¹⁴	46499.84	0.00	0	0.00	0.00	0.00	3500.16	12500.00	62500.00	70.00	43750.00	8873.59	0.00	No	
Total beneficiary 7	83909.00	0.00			0.00	0.00	6316.00	22556.25	112781.25		78946.88	16012.39	0.00		
8. EUROCONTROL ¹															1300505.00
9. FINMECCANICA	705901.00	0.00	0	0.00	78000.00	0.00	221661.00	231890.48	1237452.48	70.00	866216.74	175690.39	0.00	No	
- TELESPAZIO SPA ¹⁴	116960.00	0.00	0	0.00	0.00	0.00	17000.00	33490.00	167450.00	70.00	117215.00	23774.13	0.00	No	
- BULATSA ¹⁴	32143.00	0.00	0	0.00	0.00	0.00	5000.00	9285.75	46428.75	70.00	32500.13	6591.84	0.00	No	
- Selex ES GmbH ¹⁴	37303.00	0.00	0	0.00	0.00	0.00	5040.00	10585.75	52928.75	70.00	37050.13	7514.69	0.00	No	
- E-GEOS SPA ¹⁴	73684.00	0.00	0	0.00	10000.00	0.00	9000.00	20671.00	113355.00	70.00	79348.50	16093.86	0.00	No	

ESTIMATED BUDGET FOR THE ACTION (page 2 of 4)

	Estimated eligible ¹ costs (per budget category)								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	Total costs	Reimbursement rate %	Maximum EU contribution ³	Maximum grant amount ⁴	Information for indirect costs	Information for auditors	Other information:
	A.1 Employees (or equivalent) A.2 Natural persons under direct contract A.3 Seconded persons [A.6 Personnel for providing access to research infrastructure]		A.4 SME owners without salary A.5 Beneficiaries that are natural persons without salary				D.1 Travel D.2 Equipment D.3 Other goods and services D.4 Costs of large research infrastructure					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 EU funding	
Form of costs ⁶	Actual	Unit ⁷	Unit ⁸		Actual	Actual	Actual	Flat-rate ⁹							
								25%							
	(a)	Total (b)	No hours	Total (c)	(d)	(e)	(f)	(g)=0,25x ((a)+(b)+(c)+(f) +[(h1)+(h2)]-(m))	(i)= (a)+(b)+(c)+(d)+(e)+(f)+ (g)+(h1)+(h2)+(h3)	(j)	(k)	(l)	(m)	Yes/No	
Total beneficiary 9	965991.00	0.00			88000.00	0.00	257701.00	305922.98	1617614.98		1132330.50	229664.91	0.00		
10. Honeywell SAS	0.00	84793.82	0	0.00	0.00	0.00	0.00	21198.46	105992.28	70.00	74194.60	15048.52	0.00	No	
- HI inc ¹⁴	0.00	206179.66	0	0.00	0.00	0.00	0.00	51544.92	257724.58	70.00	180407.21	36591.09	0.00	No	
- HI sro ¹⁴	0.00	880771.19	0	0.00	0.00	0.00	160875.32	260411.63	1302058.14	70.00	911440.70	184862.94	0.00	No	
Total beneficiary 10	0.00	1171744.67	0.00	0.00	0.00	0.00	160875.32	333155.01	1665775.00		1166042.51	236502.55	0.00		
11. INDRA	309632.00	0.00	0	0.00	0.00	0.00	16296.00	81482.00	407410.00	70.00	285187.00	57843.05	0.00	No	
- Indra Navia ¹⁴	1198077.00	0.00	0	0.00	0.00	0.00	105637.00	325928.50	1629642.50	70.00	1140749.75	231372.54	0.00	No	
Total beneficiary 11	1507709.00	0.00			0.00	0.00	121933.00	407410.50	2037052.50		1425936.75	289215.59	0.00		
12. SINTEF (NATMIG)	343571.00	0.00	0	0.00	0.00	0.00	27857.00	92857.00	464285.00	70.00	324999.50	65918.01	0.00	No	
13. MUC (SEAC2020)	115200.00	0.00	0	0.00	0.00	0.00	12800.00	32000.00	160000.00	70.00	112000.00	22716.40	0.00	No	
14. FRQ (FSP)	267855.71	0.00	0	0.00	0.00	0.00	35230.00	75771.43	378857.14	70.00	265200.00	53789.19	0.00	No	
- FRQ RO ¹⁴	192307.29	0.00	0	0.00	0.00	0.00	9750.00	50514.32	252571.61	70.00	176800.13	35859.48	0.00	No	
Total beneficiary 14	460163.00	0.00			0.00	0.00	44980.00	126285.75	631428.75		442000.13	89648.67	0.00		
15. THALES AIR SYS	1421956.00	0.00	0	0.00	450000.00	0.00	185785.00	401935.25	2459676.25	70.00	1721773.38	349218.64	0.00	No	
- THALES-SYS-AER ¹⁴	167544.00	0.00	0	0.00	0.00	0.00	19000.00	46636.00	233180.00	70.00	163226.00	33106.31	0.00	No	
Total beneficiary 15	1589500.00	0.00			450000.00	0.00	204785.00	448571.25	2692856.25		1884999.38	382324.95	0.00		
16. NLR (AT-One)	294336.00	0.00	0	0.00	0.00	0.00	98650.00	98246.50	491232.50	70.00	343862.75	69743.95	0.00	No	
17. DUNA	315460.00	0.00	0	0.00	162000.00	0.00	13500.00	82240.00	573200.00	70.00	401240.00	81381.49	0.00	No	
- ENAC ¹⁴	8000.00	0.00	0	0.00	0.00	0.00	0.00	2000.00	10000.00	70.00	7000.00	1419.77	0.00	No	
Total beneficiary 17	323460.00	0.00			162000.00	0.00	13500.00	84240.00	583200.00		408240.00	82801.26	0.00		

ESTIMATED BUDGET FOR THE ACTION (page 3 of 4)

	Estimated eligible ¹ costs (per budget category)									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	Total costs	Reimbursement rate %	Maximum EU contribution ³	Maximum grant amount ⁴	Information for indirect costs	Information for auditors	Other information:
	A.1 Employees (or equivalent) A.2 Natural persons under direct contract A.3 Seconded persons [A.6 Personnel for providing access to research infrastructure]		A.4 SME owners without salary A.5 Beneficiaries that are natural persons without salary				D.1 Travel D.2 Equipment D.3 Other goods and services D.4 Costs of large research infrastructure								
Form of costs ⁶	Actual	Unit ⁷	Unit ⁸		Actual	Actual	Actual	Flat-rate ⁹							
								25%							
	(a)	Total (b)	No hours	Total (c)	(d)	(e)	(f)	(g)=0,25x ((a)+(b)+(c)+(f) +[(h1)+(h2)]-(m))	(i)= (a)+(b)+(c)+(d)+(e)+(f)+ (g)+(h1)+(h2)+(h3)	(j)	(k)	(l)	(m)	Yes/No	
18. THALES AVIONICS	2041000.00	0.00	0	0.00	0.00	0.00	111000.00	538000.00	2690000.00	70.00	1883000.00	381919.42	0.00	No	
19. AIRTEL (NATMIG)	98607.00	0.00	0	0.00	0.00	0.00	8363.00	26742.50	133712.50	70.00	93598.75	18984.16	0.00	No	
20. ZRH (SEAC2020)	86400.00	0.00	0	0.00	0.00	0.00	9600.00	24000.00	120000.00	70.00	84000.00	17037.30	0.00	No	
21. HC (FSP)	61286.00	0.00	0	0.00	0.00	0.00	13000.00	18571.50	92857.50	70.00	65000.25	13183.67	0.00	No	
22. DLR (AT-One)	143184.00	0.00	0	0.00	0.00	0.00	9000.00	38046.00	190230.00	70.00	133161.00	27008.38	0.00	No	
23. PANSA (B4)	0.00	0.00	0	0.00	0.00	0.00	0.00	0.00	0.00	70.00	0.00	0.00	0.00	No	
24. LPS SR (B4)	0.00	0.00	0	0.00	0.00	0.00	0.00	0.00	0.00	70.00	0.00	0.00	0.00	No	
25. ON (B4)	0.00	0.00	0	0.00	0.00	0.00	0.00	0.00	0.00	70.00	0.00	0.00	0.00	No	
26. CCL/ COOPANS	0.00	0.00	0	0.00	0.00	0.00	0.00	0.00	0.00	70.00	0.00	0.00	0.00	No	
27. IAA/ COOPANS	0.00	0.00	0	0.00	0.00	0.00	0.00	0.00	0.00	70.00	0.00	0.00	0.00	No	
28. LFV/ COOPANS	0.00	0.00	0	0.00	0.00	0.00	0.00	0.00	0.00	70.00	0.00	0.00	0.00	No	
29. Naviair/ COOPANS	0.00	0.00	0	0.00	0.00	0.00	0.00	0.00	0.00	70.00	0.00	0.00	0.00	No	
30. SAAB (NATMIG)	0.00	0.00	0	0.00	0.00	0.00	0.00	0.00	0.00	70.00	0.00	0.00	0.00	No	
31. ADP (SEAC2020)	0.00	0.00	0	0.00	0.00	0.00	0.00	0.00	0.00	70.00	0.00	0.00	0.00	No	
32. HAL (SEAC2020)	0.00	0.00	0	0.00	0.00	0.00	0.00	0.00	0.00	70.00	0.00	0.00	0.00	No	
33. SNBV (SEAC2020)	0.00	0.00	0	0.00	0.00	0.00	0.00	0.00	0.00	70.00	0.00	0.00	0.00	No	
34. Swed(SEAC2020)	0.00	0.00	0	0.00	0.00	0.00	0.00	0.00	0.00	70.00	0.00	0.00	0.00	No	
35. AVINOR- SEAC2020	0.00	0.00	0	0.00	0.00	0.00	0.00	0.00	0.00	70.00	0.00	0.00	0.00	No	
36. ATOS (FSP)	0.00	0.00	0	0.00	0.00	0.00	0.00	0.00	0.00	70.00	0.00	0.00	0.00	No	
Total consortium	10494611.00	1577206.67		0.00	1241000.00	0.00	1707309.32	3444781.74	18464908.73		12925436.16	2621601.23	0.00		1300505.00

ESTIMATED BUDGET FOR THE ACTION (page 4 of 4)

- (1) See Article 6 for the eligibility conditions
- (2) The indirect costs covered by the operating grant (received under any EU or Euratom funding programme; see Article 6.5.(b)) are ineligible under the GA. Therefore, a beneficiary 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 (see Article 6.2.E).
- (3) This is the theoretical amount of EU 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 Commission/Agency decided to grant for the action) (see Article 5.1).
- (4) The 'maximum grant amount' is the maximum grant amount decided by the Commission/Agency. 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 beneficiary's usual accounting practice
- (8) See Annex 2a 'Additional information on the estimated budget' for the details (costs per hour (hourly rate)).
- (9) 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
- (10) See Annex 2a 'Additional information on the estimated budget' for the details (units, costs per unit).
- (11) See Annex 2a 'Additional information on the estimated budget' for the details (units, costs per unit, estimated number of units, etc)
- (12) Only specific unit costs that do not include indirect costs
- (13) See Article 9 for beneficiaries not receiving EU funding
- (14) Only for linked third parties that receive EU funding



ANNEX 3

ACCESSION FORM FOR BENEFICIARIES

AIRBUS SAS (AIRBUS) SAS, 383474814, established in rd point Maurice Bellonte 1, BLAGNAC 31707, France, VAT number FR89383474814, ('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 734153 ('the Agreement')

between ENAV SPA **and** the Single European Sky ATM Research Joint Undertaking ('the JU'),

for the action entitled 'Integrated Surface Management (PJ03a SUMO)'.

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)) SP, 49710371, established in Navigacni 787, Jenec 25261, Czech Republic, VAT number CZ49710371, ('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 734153 ('the Agreement')

between ENAV SPA **and** the Single European Sky ATM Research Joint Undertaking ('the JU'),

for the action entitled 'Integrated Surface Management (PJ03a SUMO)'.

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) GMBH, FN71000M, 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 734153 ('the Agreement')

between ENAV SPA and the Single European Sky ATM Research Joint Undertaking ('the JU'),

for the action entitled 'Integrated Surface Management (PJ03a SUMO)'.

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

DASSAULT AVIATION (DASSAULT) FR39, 712042456, established in 9 ROND POINT CHAMPS-ELYSEES-MARCEL DASSAULT, PARIS 75008, France, VAT number FR73712042456, ('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 734153 ('the Agreement')

between ENAV SPA **and** the Single European Sky ATM Research Joint Undertaking ('the JU'),

for the action entitled 'Integrated Surface Management (PJ03a SUMO)'.

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) GMBH, HRB34977, 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 ('6')

in Grant Agreement No 734153 ('the Agreement')

between ENAV SPA **and** the Single European Sky ATM Research Joint Undertaking ('the JU'),

for the action entitled 'Integrated Surface Management (PJ03a SUMO)'.

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

ENTIDAD PUBLICA EMPRESARIAL ENAIRE (ENAIRe), established in CALLE ARTURO SORIA 109, MADRID 28043, Spain, VAT number ESQ2822001J, ('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 734153 ('the Agreement')

between ENAV SPA **and** the Single European Sky ATM Research Joint Undertaking ('the JU'),

for the action entitled 'Integrated Surface Management (PJ03a SUMO)'.

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

EUROCONTROL - EUROPEAN ORGANISATION FOR THE SAFETY OF AIR NAVIGATION (EUROCONTROL), N/A, established in Rue de la Fusée 96, BRUXELLES 1130, Belgium, VAT number not applicable, ('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 734153 ('the Agreement')

between ENAV SPA **and** the Single European Sky ATM Research Joint Undertaking ('the JU'),

for the action entitled 'Integrated Surface Management (PJ03a SUMO)'.

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 - FINMECCANICA SPA (FINMECCANICA) SPA, 7031/CF00401990585, 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 ('9')

in Grant Agreement No 734153 ('the Agreement')

between ENAV SPA and the Single European Sky ATM Research Joint Undertaking ('the JU'),

for the action entitled 'Integrated Surface Management (PJ03a SUMO)'.

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

HONEYWELL AEROSPACE (Honeywell SAS) SAS, 340797919, established in 4 AVENUE SAINT GRANIER, TOULOUSE 31300, France, VAT number FR92340797919, ('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 734153 ('the Agreement')

between ENAV SPA and the Single European Sky ATM Research Joint Undertaking ('the JU'),

for the action entitled 'Integrated Surface Management (PJ03a SUMO)'.

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) SA, M11339, 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 ('11')

in Grant Agreement No 734153 ('the Agreement')

between ENAV SPA **and** the Single European Sky ATM Research Joint Undertaking ('the JU'),

for the action entitled 'Integrated Surface Management (PJ03a SUMO)'.

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

STIFTELSEN SINTEF (SINTEF (NATMIG)) NO1, 948007029, established in STRINDVEIEN 4, TRONDHEIM 7034, Norway, VAT number NO948007029MVA, ('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 734153 ('the Agreement')

between ENAV SPA **and** the Single European Sky ATM Research Joint Undertaking ('the JU'),

for the action entitled 'Integrated Surface Management (PJ03a SUMO)'.

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

FLUGHAFEN MUNCHEN GMBH (MUC (SEAC2020)) GMBH, HRB5448, established in NORDALLEE 25, MUNCHEN 85326, Germany, VAT number DE129352365, ('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 734153 ('the Agreement')

between ENAV SPA **and** the Single European Sky ATM Research Joint Undertaking ('the JU'),

for the action entitled 'Integrated Surface Management (PJ03a SUMO)'.

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)) AG, FN72115B, 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 ('14')

in Grant Agreement No 734153 ('the Agreement')

between ENAV SPA **and** the Single European Sky ATM Research Joint Undertaking ('the JU'),

for the action entitled 'Integrated Surface Management (PJ03a SUMO)'.

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 AIR SYSTEMS SAS (THALES AIR SYS) SAS, 319159877, established in AVENUE CHARLES LINDBERGH 3, RUNGIS 94150, France, VAT number FR15319159877, ('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 734153 ('the Agreement')

between ENAV SPA and the Single European Sky ATM Research Joint Undertaking ('the JU'),

for the action entitled 'Integrated Surface Management (PJ03a SUMO)'.

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

STICHTING NATIONAAL LUCHT- EN RUIMTEVAARTLABORATORIUM (NLR (AT-One)) NL6, 41150373, established in Anthony Fokkerweg 2, AMSTERDAM 1059CM, Netherlands, VAT number NL002760551B01, ('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 734153 ('the Agreement')

between ENAV SPA **and** the Single European Sky ATM Research Joint Undertaking ('the JU'),

for the action entitled 'Integrated Surface Management (PJ03a SUMO)'.

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), 120064019, 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 ('17')

in Grant Agreement No 734153 ('the Agreement')

between ENAV SPA **and** the Single European Sky ATM Research Joint Undertaking ('the JU'),

for the action entitled 'Integrated Surface Management (PJ03a SUMO)'.

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 AVIONICS SAS (THALES AVIONICS) SAS, 612039495, established in 19-21 AVENUE MORANE-SAULNIER, VELIZY-VILLACOUBLAY 78140, France, VAT number FR65612039495, ('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 734153 ('the Agreement')

between ENAV SPA and the Single European Sky ATM Research Joint Undertaking ('the JU'),

for the action entitled 'Integrated Surface Management (PJ03a SUMO)'.

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)) LTD, 287698, 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 ('19')

in Grant Agreement No 734153 ('the Agreement')

between ENAV SPA and the Single European Sky ATM Research Joint Undertaking ('the JU'),

for the action entitled 'Integrated Surface Management (PJ03a SUMO)'.

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

FLUGHAFEN ZURICH AG (ZRH (SEAC2020)) AG, CHE101921104, established in FLUGHAFEN KLOTEN, ZURICH 8058, Switzerland, VAT number CHE101921104MWST, ('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 734153 ('the Agreement')

between ENAV SPA **and** the Single European Sky ATM Research Joint Undertaking ('the JU'),

for the action entitled 'Integrated Surface Management (PJ03a SUMO)'.

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 LEGIFORGALMI SZOLGALAT ZARTKORUEN MUKODO RESZVENYTARSASAG (HC (FSP)) RT, 0110045570, 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 ('21')

in Grant Agreement No 734153 ('the Agreement')

between ENAV SPA **and** the Single European Sky ATM Research Joint Undertaking ('the JU'),

for the action entitled 'Integrated Surface Management (PJ03a SUMO)'.

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

DEUTSCHES ZENTRUM FUER LUFT - UND RAUMFAHRT EV (DLR (AT-One)) EV, VR2780, established in Linder Hoehe, KOELN 51147, Germany, VAT number DE121965658, ('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 734153 ('the Agreement')

between ENAV SPA **and** the Single European Sky ATM Research Joint Undertaking ('the JU'),

for the action entitled 'Integrated Surface Management (PJ03a SUMO)'.

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)), 140886771, 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 ('23')

in Grant Agreement No 734153 ('the Agreement')

between ENAV SPA **and** the Single European Sky ATM Research Joint Undertaking ('the JU'),

for the action entitled 'Integrated Surface Management (PJ03a SUMO)'.

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)) SK9, 35778458, 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 ('24')

in Grant Agreement No 734153 ('the Agreement')

between ENAV SPA **and** the Single European Sky ATM Research Joint Undertaking ('the JU'),

for the action entitled 'Integrated Surface Management (PJ03a SUMO)'.

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

VALSTYBES IMONE ORO NAVIGACIJA (ON (B4)) LT7, 210060460, established in RODUNIOS KEL 2, VILNIAUS 02188, Lithuania, VAT number LT100604610, ('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 734153 ('the Agreement')

between ENAV SPA **and** the Single European Sky ATM Research Joint Undertaking ('the JU'),

for the action entitled 'Integrated Surface Management (PJ03a SUMO)'.

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) DOO, 080328617, 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 ('26')

in Grant Agreement No 734153 ('the Agreement')

between ENAV SPA **and** the Single European Sky ATM Research Joint Undertaking ('the JU'),

for the action entitled 'Integrated Surface Management (PJ03a SUMO)'.

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) LTD, 211082, 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 ('27')

in Grant Agreement No 734153 ('the Agreement')

between ENAV SPA **and** the Single European Sky ATM Research Joint Undertaking ('the JU'),

for the action entitled 'Integrated Surface Management (PJ03a SUMO)'.

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), 2021000795, 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 ('28')

in Grant Agreement No 734153 ('the Agreement')

between ENAV SPA **and** the Single European Sky ATM Research Joint Undertaking ('the JU'),

for the action entitled 'Integrated Surface Management (PJ03a SUMO)'.

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) DK18, 26059763, 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 ('29')

in Grant Agreement No 734153 ('the Agreement')

between ENAV SPA **and** the Single European Sky ATM Research Joint Undertaking ('the JU'),

for the action entitled 'Integrated Surface Management (PJ03a SUMO)'.

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)) AB, 5560360793, established in ., LINKOPING 58188, Sweden, VAT number SE556036079301, ('the beneficiary'), represented for the purpose of signing this Accession Form by the undersigned,

hereby agrees

to become beneficiary No ('30')

in Grant Agreement No 734153 ('the Agreement')

between ENAV SPA **and** the Single European Sky ATM Research Joint Undertaking ('the JU'),

for the action entitled 'Integrated Surface Management (PJ03a SUMO)'.

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

AEROPORTS DE PARIS (ADP (SEAC2020)) FR39, 552016628, established in BOULEVARD RASPAIL 291, PARIS 75014, France, VAT number FR33552016628, ('the beneficiary'), represented for the purpose of signing this Accession Form by the undersigned,

hereby agrees

to become beneficiary No ('31')

in Grant Agreement No 734153 ('the Agreement')

between ENAV SPA **and** the Single European Sky ATM Research Joint Undertaking ('the JU'),

for the action entitled 'Integrated Surface Management (PJ03a SUMO)'.

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

HEATHROW AIRPORT LIMITED (HAL (SEAC2020)) LTD, 1991017, established in NELSON ROAD THE COMPASS CENTRE HOUNSLOW, LONDON TW6 2GW, United Kingdom, VAT number GB927365404, ('the beneficiary'), represented for the purpose of signing this Accession Form by the undersigned,

hereby agrees

to become beneficiary No ('32')

in Grant Agreement No 734153 ('the Agreement')

between ENAV SPA and the Single European Sky ATM Research Joint Undertaking ('the JU'),

for the action entitled 'Integrated Surface Management (PJ03a SUMO)'.

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

SCHIPHOL NEDERLAND B.V. (SNBV (SEAC2020)) BV, 34166584, established in EVERT VAN DE BEEKSTRAAT 202, LUCHTHAVEN SCHIPHOL 1118CP, Netherlands, VAT number NL810336406B01, ('the beneficiary'), represented for the purpose of signing this Accession Form by the undersigned,

hereby agrees

to become beneficiary No ('33')

in Grant Agreement No 734153 ('the Agreement')

between ENAV SPA **and** the Single European Sky ATM Research Joint Undertaking ('the JU'),

for the action entitled 'Integrated Surface Management (PJ03a SUMO)'.

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

SWEDAVIA AB (Swed(SEAC2020)) AB, 5567970818, established in SWEDAVIA, STOCKHOLM ARLANDA 190 45, Sweden, VAT number SE556797081801, ('the beneficiary'), represented for the purpose of signing this Accession Form by the undersigned,

hereby agrees

to become beneficiary No ('34')

in Grant Agreement No 734153 ('the Agreement')

between ENAV SPA **and** the Single European Sky ATM Research Joint Undertaking ('the JU'),

for the action entitled 'Integrated Surface Management (PJ03a SUMO)'.

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

AVINOR AS (AVINOR-SEAC2020) AS, 985198292, established in DRONNING EUFEMIAS GATE 6, OSLO 2061, Norway, ('the beneficiary'), represented for the purpose of signing this Accession Form by the undersigned,

hereby agrees

to become beneficiary No ('35')

in Grant Agreement No 734153 ('the Agreement')

between ENAV SPA **and** the Single European Sky ATM Research Joint Undertaking ('the JU'),

for the action entitled 'Integrated Surface Management (PJ03a SUMO)'.

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)) NV, 401848135, 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 ('36')

in Grant Agreement No 734153 ('the Agreement')

between ENAV SPA **and** the Single European Sky ATM Research Joint Undertaking ('the JU'),

for the action entitled 'Integrated Surface Management (PJ03a SUMO)'.

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

CONSORZIO SICTA SISTEMI INNOVATIVIPER IL CONTROLLO DELTRAFFICO AEREO (sicta) IT4, 516936/CF02790511212, established in VIA FULCO RUFFO DI CALABRIA, NAPOLI 80144, Italy, VAT number IT02790511212, ('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 1 **ENAV SPA (ENAV)** SPA, 965162/CF97016000586, established in VIA SALARIA 716, ROMA 00138, Italy, VAT number IT02152021008, represented for the purposes of signing the Agreement by ('the beneficiary'),

hereby accepts joint and several liability with the beneficiary

for any amount owed to the Commission by the beneficiary under Grant Agreement No 734153 (PJ03a SUMO), up to the maximum EU 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 Commission, immediately and at first demand.

For the linked third party
[forename/surname/function]

Done in English at [place], on [date]



ANNEX 3a

DECLARATION ON JOINT AND SEVERAL LIABILITY OF LINKED THIRD PARTIES

AIRBUS OPERATIONS SAS (AI OPS) SAS, 420916918, established in ROUTE DE BAYONNE 316, TOULOUSE 31060, France, VAT number FR13420916918, ('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 2 **AIRBUS SAS (AIRBUS) SAS**, 383474814, established in rd point Maurice Bellonte 1, BLAGNAC 31707, France, VAT number FR89383474814, ('the beneficiary'),

hereby accepts joint and several liability with the beneficiary

for any amount owed to the Commission by the beneficiary under Grant Agreement No 734153 (PJ03a SUMO), up to the maximum EU 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 Commission, immediately and at first demand.

For the linked third party
[forename/surname/function]

Done in English at [place], on [date]

ANNEX 3a

DECLARATION ON JOINT AND SEVERAL LIABILITY OF LINKED THIRD PARTIES

INGENIERIA Y ECONOMIA DEL TRANSPORTE S.A. (INECO) SA, M85151, established in Paseo de la Habana 138, MADRID 28036, Spain, VAT number ESA28220168, ('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 7 **ENTIDAD PUBLICA EMPRESARIAL ENAIRE (ENAIRE)**, established in CALLE ARTURO SORIA 109, MADRID 28043, Spain, VAT number ESQ2822001J, ('the beneficiary'),

hereby accepts joint and several liability with the beneficiary

for any amount owed to the Commission by the beneficiary under Grant Agreement No 734153 (PJ03a SUMO), up to the maximum EU 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 Commission, immediately and at first demand.

For the linked third party
[forename/surname/function]

Done in English at [place], on [date]



ANNEX 3a

DECLARATION ON JOINT AND SEVERAL LIABILITY OF LINKED THIRD PARTIES

INGENIERA DE SISTEMAS PARA LA DEFENSA DE ESPANA SA-ISDEFE (ISDEFE) SA, 67309-1, established in CALLE BEATRIZ DE BOBADILLA 3, MADRID 28040, Spain, VAT number ESA78085719, ('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 7 **ENTIDAD PUBLICA EMPRESARIAL ENAIRE (ENAIRE)**, established in CALLE ARTURO SORIA 109, MADRID 28043, Spain, VAT number ESQ2822001J, ('the beneficiary'),

hereby accepts joint and several liability with the beneficiary

for any amount owed to the Commission by the beneficiary under Grant Agreement No 734153 (PJ03a SUMO), up to the maximum EU 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 Commission, immediately and at first demand.

For the linked third party
[forename/surname/function]

Done in English at [place], on [date]



ANNEX 3a

DECLARATION ON JOINT AND SEVERAL LIABILITY OF LINKED THIRD PARTIES

HONEYWELL INTERNATIONAL INC (HI inc) CORP, 222640650, established in CENTERVILLE 2711, Wilmington 19808, United States, ('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 **HONEYWELL AEROSPACE (Honeywell SAS)** SAS, 340797919, established in 4 AVENUE SAINT GRANIER, TOULOUSE 31300, France, VAT number FR92340797919, ('the beneficiary'),

hereby accepts joint and several liability with the beneficiary

for any amount owed to the Commission by the beneficiary under Grant Agreement No 734153 (PJ03a SUMO), up to the maximum EU 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 Commission, immediately and at first demand.

For the linked third party
[forename/surname/function]

Done in English at [place], on [date]



ANNEX 3a

DECLARATION ON JOINT AND SEVERAL LIABILITY OF LINKED THIRD PARTIES

HONEYWELL INTERNATIONAL SRO (HI sro) SRO, 27617793, established in V PARKU CHODOV 2325/16, PRAHA 148 00, Czech Republic, VAT number CZ27617793, ('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 **HONEYWELL AEROSPACE (Honeywell SAS)** SAS, 340797919, established in 4 AVENUE SAINT GRANIER, TOULOUSE 31300, France, VAT number FR92340797919, ('the beneficiary'),

hereby accepts joint and several liability with the beneficiary

for any amount owed to the Commission by the beneficiary under Grant Agreement No 734153 (PJ03a SUMO), up to the maximum EU 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 Commission, immediately and at first demand.

For the linked third party
[forename/surname/function]

Done in English at [place], on [date]



ANNEX 3a

DECLARATION ON JOINT AND SEVERAL LIABILITY OF LINKED THIRD PARTIES

INDRA NAVIA AS (Indra Navia) AS, 914785200, established in OLAF HELSETS VEI 6, OSLO 0619, Norway, VAT number NO914785200MVA, ('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 11 **INDRA SISTEMAS SA (INDRA)** SA, M11339, established in AVENIDA DE BRUSELAS 35, ALCOBENDAS MADRID 28108, Spain, VAT number ESA28599033, ('the beneficiary'),

hereby accepts joint and several liability with the beneficiary

for any amount owed to the Commission by the beneficiary under Grant Agreement No 734153 (PJ03a SUMO), up to the maximum EU 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 Commission, immediately and at first demand.

For the linked third party
[forename/surname/function]

Done in English at [place], on [date]

print format A4
landscape

MODEL ANNEX 4 FOR H2020 GENERAL MGA — MULTI

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	Reimbursement rate %	Maximum EU contribution ³	Requested EU contribution	Information for indirect costs : Costs of in-kind contributions not used on premises	
	A.1 Employees (or equivalent)		A.4 SME owners without salary				D.1 Travel	[D.4 Costs of large research infrastructure]		[F.1 Costs of ...]			Receipts of the action, to be reported in the last reporting period, according to Article 5.3.3						
	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]																			
Form of costs ⁴	Actual	Unit	Unit		Actual	Actual	Actual	Actual	Flat-rate ⁵	Unit		Unit							
									25%										
	a	Total b	No hours	Total c	d	[e]	f	[g]	h=0,25 x (a+b+c+f+[g] + [i1] ⁶ +[i2] ⁶ - o)		No units	Total [i1]	Total [i2]	j = a+b+c+d+[e] +f+[g] +h+[i1] +[i2]	k	l	m	n	o
[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 any indirect costs.

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 have to be less (e.g. if you and the other beneficiaries are above budget, if the 90% limit (see Article 21) is reached, etc).

⁴ See Article 5 for the form 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

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Terms of Reference for an Independent Report of Factual Findings on costs declared under a Grant Agreement financed by the [BBI][Clean Sky 2][ECSEL][FCH][IMI2] Joint Undertaking 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 Commission.

The Agreement has been concluded under the Horizon 2020 Research and Innovation Framework Programme (H2020) between the Beneficiary and [the [Bio Based Industries][Clean Sky 2][ECSEL][Fuel Cells and Hydrogen 2][Innovative Medicines Initiative 2] Joint Undertaking (*‘the JU’*)], which receives funding under the Horizon 2020 Research and Innovation Framework Programme (H2020)].

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;
- 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.

¹ By which costs under the Agreement are declared (see template ‘Model Financial Statements’ in Annex 4 to the Grant Agreement).

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 [BBI][Clean Sky 2][ECSEL][FCH][IMI2] 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 'direct personnel costs declared as 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

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.

³ By which the Beneficiary declares costs under the Agreement (see template 'Model Financial Statement' in Annex 4 to the Agreement).

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 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] or 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]

[name and function of an authorised representative]

[dd Month yyyy]

Signature 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.

Agreed-upon procedures to be performed and standard factual findings to be confirmed by the Auditor

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...);</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, etc.) 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'). 	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><i>IF ANY PART OF THE REMUNERATION PAID TO THE EMPLOYEE IS NOT MANDATORY ACCORDING TO THE NATIONAL LAW OR THE EMPLOYMENT CONTRACT ("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>	8) The criteria used to calculate the additional remuneration were objective and generally applied by the Beneficiary regardless of the source of funding used.	
		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><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>	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	

Ref	Procedures	Standard factual finding	Result (C / E / N.A.)
	factual findings 10-13 listed in the next column:	used in all H2020 actions.	
	<ul style="list-style-type: none"> obtained a description of the Beneficiary's usual cost accounting practice to calculate unit costs; 	11) The employees were charged under the correct category.	
	<ul style="list-style-type: none"> reviewed whether the Beneficiary's usual cost accounting practice was applied for the Financial Statements subject of the present CFS; 	12) Total personnel costs used in calculating the unit costs were consistent with the expenses recorded in the statutory accounts.	
	<ul style="list-style-type: none"> 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; 		
	<ul style="list-style-type: none"> 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; 	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.	
	<ul style="list-style-type: none"> 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. 		
	<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 14-18 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, 	14) The natural persons reported to the Beneficiary (worked under the Beneficiary's instructions).	
		15) They worked on the Beneficiary's premises (unless otherwise agreed with the Beneficiary).	
		16) The results of work carried out belong to the Beneficiary.	

Ref	Procedures	Standard factual finding	Result (C / E / N.A.)
	accounting records, etc.).	17) Their costs were not significantly different from those for staff who performed similar tasks under an employment contract with the Beneficiary.	
		18) The costs were supported by audit evidence and registered in the accounts.	
	<p><u>For personnel seconded by a third party and included in the sample (not subcontractors)</u></p> <p>To confirm standard factual findings 19-22 listed in the next column, the Auditor reviewed following information/documents provided by the Beneficiary:</p> <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; ○ any other document that supports the costs declared (e.g. invoices, etc.). 	19) Seconded personnel reported to the Beneficiary and worked on the Beneficiary's premises (unless otherwise agreed with the Beneficiary).	
		20) The results of work carried out belong to the Beneficiary.	
		<i>If personnel is seconded against payment:</i>	
		21) The costs declared were supported with documentation and recorded in the Beneficiary's accounts. The third party did not include any profit.	
		<i>If personnel is seconded free of charge:</i>	
		22) The costs declared did not exceed the third party's cost as	

Ref	Procedures	Standard factual finding	Result (C / E / N.A.)
		recorded in the accounts of the third party and were supported with documentation.	
A.2	PRODUCTIVE HOURS To confirm standard factual findings 23-28 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 hours can be supported by records, such as national legislation, labour agreements, and contracts. <i>BENEFICIARY'S PRODUCTIVE HOURS' FOR PERSONS WORKING FULL TIME SHALL BE ONE OF THE FOLLOWING METHODS:</i> <i>A. 1720 ANNUAL PRODUCTIVE HOURS (PRO-RATA FOR PERSONS NOT WORKING FULL-TIME)</i> <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</i>	23) The Beneficiary applied method [choose one option and delete the others] [A: 1720 hours] [B: the ‘total number of hours worked’] [C: ‘annual productive hours’ used correspond to usual accounting practices]	
		24) Productive hours were calculated annually.	
		25) For employees not working full-time the full-time equivalent (FTE) ratio was correctly applied.	
		<i>If the Beneficiary applied method B.</i> 26) The calculation of the number of ‘annual workable hours’, overtime and absences was verifiable based on the documents provided by the Beneficiary.	

Ref	Procedures	Standard factual finding	Result (C / E / N.A.)
	<p><i>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 'TOTAL 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 C.</i></p> <p>27) The calculation of the number of 'standard annual workable hours' was verifiable based on the documents provided by the Beneficiary.</p> <p>28) 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'.</p>	
A.3	<p>HOURLY PERSONNEL RATES</p> <p><u>D) 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>	<p>29) 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>	

Ref	Procedures	Standard factual finding	Result (C / E / N.A.)
	<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 following the results of the procedures carried out in A.1 and A.2. <p><u>“UNIT COSTS CALCULATED BY THE BENEFICIARY IN ACCORDANCE WITH ITS USUAL COST ACCOUNTING PRACTICES”:</u></p> <p><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></p> <p><u>HOURLY RATE FOR INDIVIDUAL ACTUAL PERSONAL COSTS:</u></p> <p><i>IT IS CALCULATED BY DIVIDING THE TOTAL 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.</i></p>	<p><i>For option I concerning unit costs and if the Beneficiary applies the methodology approved by the Commission (CoMUC):</i></p> <p>30) 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 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>31) 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>32) The individual rates re-calculated by the Auditor were the same as the rates applied by the Beneficiary.</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. 	33) 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>	
		34) Their time-records were authorised at least monthly by the project manager or other superior.	
		35) Hours declared were worked within the project period and were consistent with the presences/absences recorded in HR-records.	
		36) There were no discrepancies between the number of hours charged to the action and the number of hours recorded.	
	<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> <p><u>If the persons are working exclusively for the action and without time records</u></p> <p>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.</p>	37) The exclusive dedication is supported by a declaration signed by the Beneficiary's 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 38-42 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 of Directive 2004/17/EC, 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.. 	38) The use of claimed subcontracting costs was foreseen in Annex I and costs were declared in the Financial Statements under the subcontracting category.	
		39) 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. <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>	
		40) The subcontracts were not awarded to other Beneficiaries	

Ref	Procedures	Standard factual finding	Result (C / E / N.A.)
	<p>For the items included in the sample the Auditor also verified that:</p> <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.	
		41) All subcontracts were supported by signed agreements between the Beneficiary and the subcontractor.	
		42) 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 (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).</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. 	43) 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. 	44) Costs were incurred, approved and reimbursed in line with the Beneficiary's usual policy for travels.	
		45) There was a link between the trip and the action.	
		46) The supporting documents were consistent with each other regarding subject of the trip, dates, duration and reconciled with time records and accounting.	
		47) 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 	48) Procurement rules, principles and guides were followed.	
		49) There was a link between the grant agreement and the asset charged to the action.	
		50) 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>51) 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>52) The amount charged corresponded to the actual usage for the action.</p>	
		<p>53) 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 [REDACTED] 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>54) Contracts for works or services did not cover tasks described in Annex 1.</p>	
		<p>55) Costs were allocated to the correct action and the goods were not placed in the inventory of durable equipment.</p>	
		<p>56) The costs were charged in line with the Beneficiary's accounting policy and were adequately supported.</p>	
		<p>57) 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 of Directive 2004/17/EC, 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>58) 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 59-60 on the next column),</i></p>	<p>59) 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 61 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 61 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. 	<p>60) Any difference between the methodology applied and the one positively assessed was extensively described and adjusted accordingly.</p>	
		<p>61) The direct costs declared were free from any indirect costs items related to the Large Research Infrastructure.</p>	
E	USE OF EXCHANGE RATES		
E.1	<p><u>a) For Beneficiaries with accounts established in a currency other than 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 (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):</p> <p><i>COSTS INCURRED IN ANOTHER CURRENCY 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), DETERMINED OVER THE CORRESPONDING REPORTING PERIOD.</i></p>	<p>62) 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>	

	<p>b) For Beneficiaries with accounts established in 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 INCURRED IN ANOTHER CURRENCY SHALL BE CONVERTED INTO EURO BY APPLYING THE BENEFICIARY'S USUAL ACCOUNTING PRACTICES.</i></p>	<p>63) The Beneficiary applied its usual accounting practices.</p>	
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[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.

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Terms of reference for an audit engagement for a methodology certificate in connection with one or more grant agreements financed by [BBI][Clean Sky 2][ECSEL][FCH][IMI2] 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 [Bio Based Industries][Clean Sky 2][ECSEL][Fuel Cells and Hydrogen 2][Innovative Medicines Initiative 2] 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 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 claimed 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 the [BBI][Clean Sky 2][ECSEL][FCH][IMI2] 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 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 Statement² 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. Brief description of the methodology for calculating personnel costs, productive hours and hourly rates;

² Financial Statement in this context refers solely to Annex 4 of the Agreement by which the Beneficiary declares costs under the Agreement.

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 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 interest³ 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

³ 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 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 <u>General</u>	Procedure: <i>The Auditor draws a sample of employees to carry out the procedures indicated in</i>

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>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> <p>V. Employees are hired directly by the Beneficiary in accordance with national law, and work under its sole supervision and responsibility;</p> <p>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);</p> <p>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;</p> <p>VIII. Personnel costs are based on the payroll system and accounting system.</p> <p>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></p> <p>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.</p> <p>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 budget).</p> <p><u>If additional remuneration as referred to in the grant agreement(s) is paid</u></p>	<p><i>this section C and the following sections D to F.</i> <i>[The Auditor has drawn a random sample of 10 full-time equivalents made up of employees assigned to the action(s). If fewer than 10 full-time equivalents are assigned to the action(s), the Auditor has selected a sample of 10 full-time equivalents consisting of all employees assigned to the action(s), complemented by other employees irrespective of their assignments.]. For this sample:</i></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;

<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>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>- ...]</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

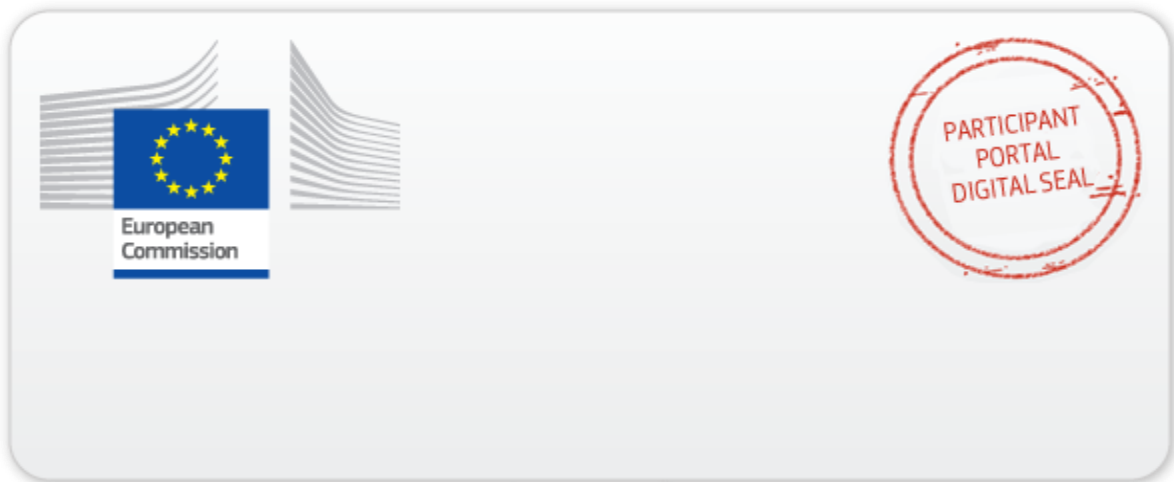
<i>Please explain any discrepancies in the body of the Report.</i>	
Statements to be made by Beneficiary	Procedures to be carried out and Findings to be confirmed by the Auditor
	action full-time during the year or did not work exclusively on the action).
<p>D. Productive hours</p> <p>XVI. The number 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; for employees not assigned exclusively to the action(s) this number is reduced proportionately.</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 and that it is reduced proportionately for employees not exclusively assigned to the action(s). ✓ 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 and was proportionately reduced for employees not working full-time or exclusively for the action.</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>

<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>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><u>If method C is applied</u></p> <p>16. The calculation of the number of productive hours per year corresponded 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 full-time equivalent 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 arrangements in place</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 full-time equivalents referred to under Section C: Personnel costs, and verified in particular:</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>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 certificate⁴].</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>

⁴ 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>
<i>[official name of the [Beneficiary] [Linked Third Party]]</i>	<i>[official name of the Auditor]</i>
<i>[name and title of authorised representative]</i>	<i>[name and title of authorised representative]</i>
<i>[dd Month yyyy]</i>	<i>[dd Month yyyy]</i>
<i><Signature of the [Beneficiary] [Linked Third Party]></i>	<i><Signature of the Auditor></i>



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