



GRANT AGREEMENT FOR MEMBERS¹

NUMBER 101017626 — PJ38-W3-ADSCENSIO

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

on the one part,

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

and

on the other part,

1. 'the coordinator':

DIRECTION DES SERVICES DE LA NAVIGATION AERIEENNE (DSNA), established in 50 RUE HENRY FARMAN, PARIS 75720, France, VAT number: FR29120064019, represented for the purposes of signing the Agreement by Maurice GEORGES

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

2. **AIRBUS (AIRBUS)**, established in 2 ROND POINT EMILE DEWOITINE, BLAGNAC 31700, France, VAT number: FR89383474814,

3. **AIRTEL ATN LIMITED (AIRTEL)**, established in 2 HARBOUR SQUARE CROFTON ROAD, DUN LOAGHAIRE DUBLIN A96D6R0, Ireland, VAT number: IE8287698U,

4. **DFS DEUTSCHE FLUGSICHERUNG GMBH (DFS)**, established in AM DFS CAMPUS 10, LANGEN 63225, Germany, VAT number: DE114110232,

5. **ENAIRES (ENAIRES)**, established in AVENIDA DE ARAGON S/N BLOQUE 330, PORTAL 2 PARQUE EMPRESARIAL LAS MERCEDES, MADRID 28022, Spain, VAT number: ESQ2822001J,

6. **ENAV SPA (ENAV)**, established in VIA SALARIA 716, ROMA 00138, Italy, VAT number: IT02152021008,

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

7. **EUROCONTROL - EUROPEAN ORGANISATION FOR THE SAFETY OF AIR NAVIGATION (EUROCONTROL)**, established in Rue de la Fusée 96, BRUXELLES 1130, Belgium, VAT number: not applicable,
8. **HONEYWELL AEROSPACE (HONEYWELL SAS)**, established in 4 AVENUE SAINT GRANIER, TOULOUSE 31300, France, VAT number: FR92340797919,
9. **HUNGAROCONTROL MAGYAR LEGIFORGALMISZOLGALAT ZARTKORUEN MUKODO RESZVENYTARSASAG (HC (FSP))**, established in IGLO UTCA 33 35, BUDAPEST 1185, Hungary, VAT number: HU13851325,
10. **INDRA SISTEMAS SA (INDRA)**, established in AVENIDA DE BRUSELAS 35, ALCOBENDAS MADRID 28108, Spain, VAT number: ESA28599033,
11. **LEONARDO - SOCIETA PER AZIONI (LEONARDO)**, established in PIAZZA MONTE GRAPPA 4, ROMA 00195, Italy, VAT number: IT00881841001,
12. **NATS (EN ROUTE) PUBLIC LIMITED COMPANY (NATS)**, established in 4000 PARKWAY WHITELEY, FAREHAM PO15 7FL, United Kingdom, VAT number: GB440379456,
13. **POLSKA AGENCJA ZEGLUGI POWIETRZNEJ (PANSA (B4))**, established in UL. WIEZOWA 8, WARSZAWA 02 147, Poland, VAT number: PL5222838321,
14. **SKYGUIDE, SA SUISSE POUR LES SERVICES DE LA NAVIGATION AERIENNE CIVILS ET MILITAIRES (SKYGUIDE)**, established in ROUTE DE PRE BOIS 15-17, GENEVA 1215, Switzerland, VAT number: CH514204,
15. **RIZENI LETOVEHO PROVOZU CESKE REPUBLIKY STATNI PODNIK (ANS CR (B4))**, established in JENEC NAVIGACNI 787, JENEC 252 61, Czech Republic, VAT number: CZ699004742, as ‘beneficiary not receiving JU funding’ (see Article 9),
16. **LETOVE PREVADZKOVE SLUZBY SLOVENSKEJ REPUBLIKY, STATNY PODNIK (LPS SR (B4))**, established in IVANSKA CESTA 93, BRATISLAVA 823 07, Slovakia, VAT number: SK2020244699, as ‘beneficiary not receiving JU funding’ (see Article 9),
17. **VALSTYBES IMONE ORO NAVIGACIJA (ON (B4))**, established in BALIO KARVELIO G. 25, VILNIUS LT-02184, Lithuania, VAT number: LT100604610, as ‘beneficiary not receiving JU funding’ (see Article 9),
18. **ATOS BELGIUM (ATOS (FSP))**, established in DA VINCILAAN 5, ZAVENTEM 1930, Belgium, VAT number: BE0401848135, as ‘beneficiary not receiving JU funding’ (see Article 9),
19. **FREQUENTIS AG (FRQ (FSP))**, established in Innovationsstrasse 1, WIEN 1100, Austria, VAT number: ATU14715600, as ‘beneficiary not receiving JU funding’ (see Article 9),
20. **SAAB AKTIEBOLAG (SAAB)**, established in .., LINKOPING 581 88, Sweden, VAT number: SE556036079301, as ‘beneficiary not receiving JU funding’ (see Article 9),
21. **SINTEF AS (SINTEF)**, established in STRINDVEGEN 4, TRONDHEIM 7034, Norway, VAT number: NO919303808MVA, as ‘beneficiary not receiving JU funding’ (see Article 9),

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

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

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

The Agreement is composed of:

Terms and Conditions

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

TERMS AND CONDITIONS

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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 ‘**ADS-C ENables and Supports Improved ATM Operations**’ — ‘**PJ38-W3-ADSCENSIO**’ (‘**action**’), as described in Annex 1.

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

ARTICLE 3 — DURATION AND STARTING DATE OF THE ACTION

The duration of the action will be **26 months** as of 1 November 2020 (‘**starting date of the action**’).

ARTICLE 4 — ESTIMATED BUDGET AND BUDGET TRANSFERS

4.1 Estimated budget

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

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

4.2 Budget transfers

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

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

CHAPTER 3 GRANT

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

5.1 Maximum grant amount

The ‘**maximum grant amount**’ is **EUR 6 759 968.53** (six million seven hundred and fifty nine thousand nine hundred and sixty eight EURO and fifty three eurocents).

5.2 Form of grant, reimbursement rates and forms of costs

The grant reimburses **70.00% 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 10 751 364.11** (ten million seven hundred and fifty one thousand three hundred and sixty four EURO and eleven eurocents).

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

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

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

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

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

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

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

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

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

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

5.3 Final grant amount — Calculation

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

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

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

Step 2 — Limit to the maximum grant amount

Step 3 — Reduction due to the no-profit rule

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

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

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

5.3.2 Step 2 — Limit to the maximum grant amount

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

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

The grant must not produce a profit.

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

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

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

The following are considered **receipts**:

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

The following are however not considered receipts:

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

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

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

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

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

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

5.4 Revised final grant amount — Calculation

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

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

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

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

ARTICLE 6 — ELIGIBLE AND INELIGIBLE COSTS

6.1 General conditions for costs to be eligible

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

(a) for **actual costs**:

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

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

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

(b) for **unit costs**:

- (i) they must be calculated as follows:

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

multiplied by

the number of actual units};

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

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

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

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

6.2 Specific conditions for costs to be eligible

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

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

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

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

A. Direct personnel costs

Types of eligible personnel costs

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

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

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

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

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

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

{EUR 8 000

divided by

the number of annual productive hours (see below)},

multiplied by

the number of hours that the person has worked on the action during the year}.

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

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

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

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

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

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

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

Calculation

Personnel costs must be calculated by the beneficiaries as follows:

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

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

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

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

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

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

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

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

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

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

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

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

plus

overtime worked

minus

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

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

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

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

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

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

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

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

divided by

{number of annual productive hours / 12}}}

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

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

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

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

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

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

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

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

and

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

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

C. Direct costs of providing financial support to third parties

Not applicable

D. Other direct costs

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

E. Indirect costs

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

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

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

F. Specific cost category(ies)

Not applicable

6.3 Conditions for costs of linked third parties to be eligible

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

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

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

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

6.5 Ineligible costs

‘**Ineligible costs**’ are:

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

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

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

6.6 Consequences of declaration of ineligible costs

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

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

CHAPTER 4 RIGHTS AND OBLIGATIONS OF THE PARTIES

SECTION 1 RIGHTS AND OBLIGATIONS RELATED TO IMPLEMENTING THE ACTION

ARTICLE 7 — GENERAL OBLIGATION TO PROPERLY IMPLEMENT THE ACTION

7.1 General obligation to properly implement the action

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

7.2 Consequences of non-compliance

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

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

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

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

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

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

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

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

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

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

Their costs are estimated in Annex 2 but:

- will not be reimbursed and

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

Chapter 3, Articles 10 to 15, 18.1.2, 20.3(b), 20.4(b), 20.6, 21, 23a, 26.4, 27.2, 28.1, 28.2, 30.3, 31.5, 40, 42, 43, 44, 47 and 48 do not apply to 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.

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

9.2 Consequences of non-compliance

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

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

ARTICLE 10 — PURCHASE OF GOODS, WORKS OR SERVICES

10.1 Rules for purchasing goods, works or services

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

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

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

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

10.2 Consequences of non-compliance

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

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

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

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

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.

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

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

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

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

12.2 Consequences of non-compliance

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

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

ARTICLE 13 — IMPLEMENTATION OF ACTION TASKS BY SUBCONTRACTORS

13.1 Rules for subcontracting action tasks

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

Subcontracting may cover only a limited part of the action.

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

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

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

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

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

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

13.2 Consequences of non-compliance

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

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

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

ARTICLE 14 — IMPLEMENTATION OF ACTION TASKS BY LINKED THIRD PARTIES

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

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

- EUROPEAN SATELLITE SERVICES PROVIDER SAS (ESSP), affiliated or linked to DSNA
- AIRBUS OPERATIONS SAS (AI OPS), affiliated or linked to AIRBUS, if it has accepted joint and several liability with the beneficiary (see Annex 3a)
- AIRBUS DEFENCE AND SPACE SAS (AI DS Space), affiliated or linked to AIRBUS
- CENTRO DE REFERENCIA INVESTIGACION DESARROLLO E INNOVACION ATM, A.I.E. (CRIDA), affiliated or linked to ENAIRE
- TECHNO SKY SRL TECHNOLOGIES FOR AIR TRAFFIC MANAGEMENT (TECHNO SKY), affiliated or linked to ENAV
- DARJAVNO PREDPRIYATIE RAKOVODSTVO NA VAZDUSHNOTO DVIJENIE TPP (BULATSA), affiliated or linked to ENAV
- DEEP BLUE SRL (DEEP BLUE), affiliated or linked to ENAV
- HONEYWELL INTERNATIONAL SRO (HIIsro), affiliated or linked to HONEYWELL SAS
- HONEYWELL INTERNATIONAL INC (HIinc), affiliated or linked to HONEYWELL SAS

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

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

‘Control’ may take any of the following forms:

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

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

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

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

- SKYSOFT-ATM SA (SKYSOFT), affiliated or linked to SKYGUIDE

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

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

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

14.2 Consequences of non-compliance

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

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

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

ARTICLE 14a — IMPLEMENTATION OF ACTION TASKS BY INTERNATIONAL PARTNERS

Not applicable

ARTICLE 15 — FINANCIAL SUPPORT TO THIRD PARTIES

15.1 Rules for providing financial support to third parties

Not applicable

15.2 Financial support in the form of prizes

Not applicable

15.3 Consequences of non-compliance

Not applicable

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

16.1 Rules for providing trans-national access to research infrastructure

Not applicable

16.2 Rules for providing virtual access to research infrastructure

Not applicable

16.3 Consequences of non-compliance

Not applicable

SECTION 2 RIGHTS AND OBLIGATIONS RELATED TO THE GRANT ADMINISTRATION

ARTICLE 17 — GENERAL OBLIGATION TO INFORM

17.1 General obligation to provide information upon request

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

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

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

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

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

17.3 Consequences of non-compliance

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

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

ARTICLE 18 — KEEPING RECORDS — SUPPORTING DOCUMENTATION

18.1 Obligation to keep records and other supporting documentation

The beneficiaries must — for a period of five years after the payment of the balance — keep records

and other supporting documentation in order to prove the proper implementation of the action and the costs they declare as eligible.

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

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

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

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

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

18.1.2 Records and other documentation to support the costs declared

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

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

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

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

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

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

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

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

18.2 Consequences of non-compliance

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

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

ARTICLE 19 — SUBMISSION OF DELIVERABLES

19.1 Obligation to submit deliverables

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

19.2 Consequences of non-compliance

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

ARTICLE 20 — REPORTING — PAYMENT REQUESTS

20.1 Obligation to submit reports

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

20.2 Reporting periods

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

- RP1: from month 1 to month 14
- RP2: from month 15 to month 26

20.3 Periodic reports — Requests for interim payments

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

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

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

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

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

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

The report must indicate the communication activities;

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

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

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

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

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

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

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

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

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

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

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

20.4 Final report — Request for payment of the balance

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

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

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

20.5 Information on cumulative expenditure incurred

Not applicable

20.6 Currency for financial statements and conversion into euro

Financial statements must be drafted in euro.

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

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

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

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

20.7 Language of reports

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

20.8 Consequences of non-compliance

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

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

ARTICLE 21 — PAYMENTS AND PAYMENT ARRANGEMENTS

21.1 Payments to be made

The following payments will be made to the coordinator:

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

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

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

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

The amount of the pre-financing payment will be EUR **5 407 974.82** (five million four hundred and seven thousand nine hundred and seventy four EURO and eighty two 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 **337 998.43** (three hundred and thirty seven thousand nine hundred and ninety eight EURO and forty three eurocents), corresponding to 5% of the maximum grant amount (see Article 5.1), is retained by the JU from the pre-financing payment and transferred into the ‘**Guarantee Fund**’.

21.3 Interim payments — Amount — Calculation

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

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

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

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

Step 1 — Application of the reimbursement rates

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

21.3.1 Step 1 — Application of the reimbursement rates

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

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

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

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

minus

{pre-financing and previous interim payments} }.

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

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

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

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

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

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

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

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

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

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

21.5 Notification of amounts due

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

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

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

21.6 Currency for payments

The JU will make all payments in euro.

21.7 Payments to the coordinator — Distribution to the beneficiaries

Payments will be made to the coordinator.

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

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

Pre-financing may however be distributed only:

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

21.8 Bank account for payments

All payments will be made to the following bank account:

Name of bank: BANQUE DE FRANCE

Full name of the account holder: ACCT AGENT COMPTABLE DU BUDGET ANNEXE DE L'AVIATION CIVILE

IBAN code: FR7630001000640000009021622

21.9 Costs of payment transfers

The cost of the payment transfers is borne as follows:

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

21.10 Date of payment

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

21.11 Consequences of non-compliance

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

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

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

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

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

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

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

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

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

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

22.1.1 Right to carry out checks

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

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

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

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

22.1.2 Right to carry out reviews

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

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

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

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

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

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

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

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

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

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

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

22.1.3 Right to carry out audits

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

22.4 Checks, reviews, audits and investigations for international organisations

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

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

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

22.5.1 Findings in this grant

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

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

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

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

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

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

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

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

22.5.2 Findings in other grants

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

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

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

22.5.3 Procedure

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

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

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

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

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

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

or

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

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

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

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

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

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

22.6 Consequences of non-compliance

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

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

ARTICLE 23 — EVALUATION OF THE IMPACT OF THE ACTION

23.1 Right to evaluate the impact of the action

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

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

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

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

23.2 Consequences of non-compliance

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

SECTION 3 RIGHTS AND OBLIGATIONS RELATED TO BACKGROUND AND RESULTS

SUBSECTION 1 GENERAL

ARTICLE 23a — MANAGEMENT OF INTELLECTUAL PROPERTY

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

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

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

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

23a.2 Consequences of non-compliance

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

SUBSECTION 2 RIGHTS AND OBLIGATIONS RELATED TO BACKGROUND

ARTICLE 24 — AGREEMENT ON BACKGROUND

24.1 Agreement on background

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

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

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

24.2 Consequences of non-compliance

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

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

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

ARTICLE 25 — ACCESS RIGHTS TO BACKGROUND

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

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

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

Waivers of access rights are not valid unless in writing.

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

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

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

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

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

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

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

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

25.4 Access rights for affiliated entities

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

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

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

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

25.5 Access rights for third parties

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

25.6 Consequences of non-compliance

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

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

SUBSECTION 3 RIGHTS AND OBLIGATIONS RELATED TO RESULTS

ARTICLE 26 — OWNERSHIP OF RESULTS

26.1 Ownership by the beneficiary that generates the results

Results are owned by the beneficiary that generates them.

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

26.2 Joint ownership by several beneficiaries

Two or more beneficiaries own results jointly if:

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

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

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

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

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

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

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

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

26.3 Rights of third parties (including personnel)

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

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

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

26.4 JU ownership, to protect results

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

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

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

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

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

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

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

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

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

26.5 Consequences of non-compliance

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

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

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

27.1 Obligation to protect the results

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

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

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

27.2 JU ownership, to protect the results

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

27.3 Information on JU funding and support from JU members

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

“The project leading to this application has received funding from the SESAR Joint Undertaking (JU) under grant agreement No 101017626. The JU receives support from the European Union’s Horizon 2020 research and innovation programme and the SESAR JU members other than the Union”.

27.4 Consequences of non-compliance

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

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

ARTICLE 28 — EXPLOITATION OF RESULTS

28.1 Obligation to exploit the results

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

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

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

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

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

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

“Results incorporated in this standard received funding from the SESAR Joint Undertaking (JU) under grant agreement No 101017626. The JU receives support from the European Union’s Horizon 2020 research and innovation programme and the SESAR JU members other than the Union”.

28.3 Consequences of non-compliance

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

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

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

29.1 Obligation to disseminate results

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

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

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

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

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

29.2 Open access to scientific publications

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

In particular, it must:

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

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

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

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

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

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

29.3 Open access to research data

Not applicable;

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

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

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

“This project has received funding from the SESAR Joint Undertaking (JU) under grant agreement No 101017626. The JU receives support from the European Union’s Horizon 2020 research and innovation programme and the SESAR JU members other than the Union”.

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

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

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

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

29.5 Disclaimer excluding JU responsibility

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

29.6 Consequences of non-compliance

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

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

ARTICLE 30 — TRANSFER AND LICENSING OF RESULTS

30.1 Transfer of ownership

Each beneficiary may transfer ownership of its results.

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

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

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

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

30.2 Granting licenses

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

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

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

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

30.3 JU right to object to transfers or exclusive licensing

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

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

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

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

The JU may request additional information.

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

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

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

30.4 Consequences of non-compliance

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

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

ARTICLE 31 — ACCESS RIGHTS TO RESULTS

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

The conditions set out in Article 25.1 apply.

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

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

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

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

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

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

31.4 Access rights of affiliated entities

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

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

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

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

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

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

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

31.6 Access rights for third parties

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

31.7 Consequences of non-compliance

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

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

SECTION 4 OTHER RIGHTS AND OBLIGATIONS

ARTICLE 32 — RECRUITMENT AND WORKING CONDITIONS FOR RESEARCHERS

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

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

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

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

32.2 Consequences of non-compliance

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

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

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

ARTICLE 33 — GENDER EQUALITY

33.1 Obligation to aim for gender equality

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

33.2 Consequences of non-compliance

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

ARTICLE 34 — ETHICS AND RESEARCH INTEGRITY

34.1 Obligation to comply with ethical and research integrity principles

The beneficiaries must carry out the action in compliance with:

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

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

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

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

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

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

This implies compliance with the following fundamental principles:

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

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

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

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

34.2 Activities raising ethical issues

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

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

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

needed for implementing the action tasks in question.

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

34.3 Activities involving human embryos or human embryonic stem cells

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

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

34.4 Consequences of non-compliance

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

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

ARTICLE 35 — CONFLICT OF INTERESTS

35.1 Obligation to avoid a conflict of interests

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

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

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

35.2 Consequences of non-compliance

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

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

ARTICLE 36 — CONFIDENTIALITY

36.1 General obligation to maintain confidentiality

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

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

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

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

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

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

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

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

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

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

The confidentiality obligations no longer apply if:

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

36.2 Consequences of non-compliance

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

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

ARTICLE 37 — SECURITY-RELATED OBLIGATIONS

37.1 Results with a security recommendation

Not applicable

37.2 Classified information

Not applicable

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

Not applicable

37.4 Consequences of non-compliance

Not applicable

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

38.1 Communication activities by beneficiaries

38.1.1 Obligation to promote the action and its results

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

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

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

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

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

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

For communication activities:

“This project has received funding from the SESAR Joint Undertaking (JU) under grant agreement No 101017626. The JU receives support from the European Union’s Horizon 2020 research and innovation programme and the SESAR JU members other than the Union”.

For infrastructure, equipment and major results:

“This *[infrastructure]**[equipment]**[insert type of result]* is part of a project that has received funding from the SESAR Joint Undertaking (JU) under grant agreement No 101017626. The JU receives support from the European Union’s Horizon 2020 research and innovation programme and the SESAR JU members other than the Union”.

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

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

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

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

38.1.3 Disclaimer excluding JU responsibility

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

38.2 Communication activities by the JU

38.2.1 Right to use beneficiaries’ materials, documents or information

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

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

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

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

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

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

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

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

38.3 Consequences of non-compliance

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

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

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

ARTICLE 39 — PROCESSING OF PERSONAL DATA

39.1 Processing of personal data by the JU and the Commission

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

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

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

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

39.2 Processing of personal data by the beneficiaries

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

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

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

39.3 Consequences of non-compliance

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

ARTICLE 40 — ASSIGNMENTS OF CLAIMS FOR PAYMENT AGAINST THE JU

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

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

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

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

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

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

41.1 Roles and responsibility towards the JU

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

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

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

41.2 Internal division of roles and responsibilities

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

(a) Each **beneficiary** must:

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

(b) The **coordinator** must:

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

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

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

41.3 Internal arrangements between beneficiaries — Consortium agreement

Not applicable

41.4 Relationship with complementary beneficiaries — Collaboration agreement

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

- efficient decision making processes and
- settlement of disputes.

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

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

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

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

41.5 Relationship with partners of a joint action — Coordination agreement

Not applicable

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

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

ARTICLE 42 — REJECTION OF INELIGIBLE COSTS

42.1 Conditions

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

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

42.2 Ineligible costs to be rejected — Calculation — Procedure

Ineligible costs will be rejected in full.

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

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

42.3 Effects

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

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

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

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

ARTICLE 43 — REDUCTION OF THE GRANT

43.1 Conditions

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

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

43.2 Amount to be reduced — Calculation — Procedure

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

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

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

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

43.3 Effects

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

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

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

ARTICLE 44 — RECOVERY OF UNDUE AMOUNTS

44.1 Amount to be recovered — Calculation — Procedure

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

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

44.1.1 Recovery after termination of a beneficiary's participation

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

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

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

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

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

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

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

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

44.1.2 Recovery at payment of the balance

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

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

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

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

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

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

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

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

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

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

plus

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

divided by

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

multiplied by

the final grant amount (see Article 5.3)},

minus

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

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

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

divided by

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

multiplied by

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

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

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

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

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

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

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

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

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

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

44.1.3 Recovery of amounts after payment of the balance

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

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

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

plus

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

divided by

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

multiplied by

the final grant amount (see Article 5.3) }.

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

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

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

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

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

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

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

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

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

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

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

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

ARTICLE 45 — ADMINISTRATIVE SANCTIONS

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

SECTION 2 LIABILITY FOR DAMAGES

ARTICLE 46 — LIABILITY FOR DAMAGES

46.1 Liability of the JU

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

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

46.2 Liability of the beneficiaries

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

SECTION 3 — SUSPENSION AND TERMINATION

ARTICLE 47 — SUSPENSION OF PAYMENT DEADLINE

47.1 Conditions

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

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

47.2 Procedure

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

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

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

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

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

ARTICLE 48 — SUSPENSION OF PAYMENTS

48.1 Conditions

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

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

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

48.2 Procedure

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

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

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

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

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

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

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

ARTICLE 49 — SUSPENSION OF THE ACTION IMPLEMENTATION

49.1 Suspension of the action implementation, by the beneficiaries

49.1.1 Conditions

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

49.1.2 Procedure

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

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

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

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

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

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

49.2 Suspension of the action implementation, by the JU

49.2.1 Conditions

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

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

49.2.2 Procedure

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

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

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

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

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

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

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

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

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

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

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

50.1 Termination of the Agreement, by the beneficiaries

50.1.1 Conditions and procedure

The beneficiaries may terminate the Agreement.

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

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

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

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

50.1.2 Effects

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

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

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

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

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

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

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

50.2.1 Conditions and procedure

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

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

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

The notification must include:

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

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

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

50.2.2 Effects

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

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

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

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

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

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

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

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

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

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

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

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

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

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



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

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

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

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

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

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

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

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

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

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

50.3.1 Conditions

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

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

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

50.3.2 Procedure

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

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

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

The termination will **take effect**:

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

50.3.3 Effects

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

- if termination takes effect during the period set out in Article 3 and the request for amendment is accepted, the beneficiary concerned must repay to the coordinator the amount unduly received. The JU will formally notify the amount unduly received and request the beneficiary concerned to repay it to the coordinator within 30 days of receiving notification. If it does not repay the coordinator, the JU will draw upon the Guarantee Fund to pay the coordinator and then notify a **debit note** on behalf of the Guarantee Fund to the beneficiary concerned (see Article 44);
- in all other cases, in particular if termination takes effect after the period set out in Article 3, the JU will formally notify a **debit note** to the beneficiary concerned. If payment is not made by the date in the debit note, the Guarantee Fund will pay to the JU the amount due and the JU will notify a debit note on behalf of the Guarantee Fund to the beneficiary concerned (see Article 44);
- if the beneficiary concerned is the former coordinator, it must repay the new coordinator according to the procedure above, unless:
 - termination takes effect after an interim payment and
 - the former coordinator has not distributed amounts received as pre-financing or interim payments (see Article 21.7).

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

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

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

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

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

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

SECTION 4 FORCE MAJEURE

ARTICLE 51 — FORCE MAJEURE

'Force majeure' means any situation or event that:

- prevents either party from fulfilling their obligations under the Agreement,
- was unforeseeable, exceptional situation and beyond the parties' control,
- was not due to error or negligence on their part (or on the part of third parties involved in the action), and
- proves to be inevitable in spite of exercising all due diligence.

The following cannot be invoked as force majeure:

- any default of a service, defect in equipment or material or delays in making them available, unless they stem directly from a relevant case of force majeure,
- labour disputes or strikes, or
- financial difficulties.

Any situation constituting force majeure must be formally notified to the other party without delay, stating the nature, likely duration and foreseeable effects.

The parties must immediately take all the necessary steps to limit any damage due to force majeure and do their best to resume implementation of the action as soon as possible.

The party prevented by force majeure from fulfilling its obligations under the Agreement cannot be considered in breach of them.

CHAPTER 7 FINAL PROVISIONS

ARTICLE 52 — COMMUNICATION BETWEEN THE PARTIES

52.1 Form and means of communication

Communication under the Agreement (information, requests, submissions, 'formal notifications', etc.) must:

- be made in writing and
- bear the number of the Agreement.

All communication must be made through the Participant Portal **electronic** exchange system and using the forms and templates provided there.

If — after the payment of the balance — the JU finds that a formal notification was not accessed, a second formal notification will be made by registered post with proof of delivery ('formal notification on **paper**'). Deadlines will be calculated from the moment of the second notification.

Communications in the electronic exchange system must be made by persons authorised according to the Participant Portal Terms & Conditions. For naming the authorised persons, each beneficiary must have designated — before the signature of this Agreement — a 'legal entity appointed representative

(LEAR)'. The role and tasks of the LEAR are stipulated in his/her appointment letter (see Participant Portal Terms & Conditions).

If the electronic exchange system is temporarily unavailable, instructions will be given on the JU and Commission websites.

52.2 Date of communication

Communications are considered to have been made when they are sent by the sending party (i.e. on the date and time they are sent through the electronic exchange system).

Formal notifications through the **electronic** exchange system are considered to have been made when they are received by the receiving party (i.e. on the date and time of acceptance by the receiving party, as indicated by the time stamp). A formal notification that has not been accepted within 10 days after sending is considered to have been accepted.

Formal notifications **on paper** sent by **registered post** with proof of delivery (only after the payment of the balance) are considered to have been made on either:

- the delivery date registered by the postal service or
- the deadline for collection at the post office.

If the electronic exchange system is temporarily unavailable, the sending party cannot be considered in breach of its obligation to send a communication within a specified deadline.

52.3 Addresses for communication

The **electronic** exchange system must be accessed via the following URL:

<https://ec.europa.eu/info/funding-tenders/opportunities/portal/screen/myarea/projects>

The JU will formally notify the coordinator and beneficiaries in advance any changes to this URL.

Formal notifications on paper (only after the payment of the balance) addressed **to the JU** must be sent to the official mailing address indicated on the JU's website.

Formal notifications on paper (only after the payment of the balance) addressed **to the beneficiaries** must be sent to their legal address as specified in the Participant Portal Beneficiary Register.

ARTICLE 53 — INTERPRETATION OF THE AGREEMENT

53.1 Precedence of the Terms and Conditions over the Annexes

The provisions in the Terms and Conditions of the Agreement take precedence over its Annexes.

Annex 2 takes precedence over Annex 1.

53.2 Privileges and immunities

Nothing in the Agreement may be interpreted as a waiver of any privileges or immunities accorded

to the *EUROCONTROL - EUROPEAN ORGANISATION FOR THE SAFETY OF AIR NAVIGATION* by its constituent documents or international law.

ARTICLE 54 — CALCULATION OF PERIODS, DATES AND DEADLINES

In accordance with Regulation No 1182/71³⁰, periods expressed in days, months or years are calculated from the moment the triggering event occurs.

The day during which that event occurs is not considered as falling within the period.

ARTICLE 55 — AMENDMENTS TO THE AGREEMENT

55.1 Conditions

The Agreement may be amended, unless the amendment entails changes to the Agreement which would call into question the decision awarding the grant or breach the principle of equal treatment of applicants.

Amendments may be requested by any of the parties.

55.2 Procedure

The party requesting an amendment must submit a request for amendment signed in the electronic exchange system (see Article 52).

The coordinator submits and receives requests for amendment on behalf of the beneficiaries (see Annex 3).

If a change of coordinator is requested without its agreement, the submission must be done by another beneficiary (acting on behalf of the other beneficiaries).

The request for amendment must include:

- the reasons why;
- the appropriate supporting documents, and
- for a change of coordinator without its agreement: the opinion of the coordinator (or proof that this opinion has been requested in writing).

The JU may request additional information.

If the party receiving the request agrees, it must sign the amendment in the electronic exchange system within 45 days of receiving notification (or any additional information the JU has requested). If it does not agree, it must formally notify its disagreement within the same deadline. The deadline may be extended, if necessary for the assessment of the request. If no notification is received within the deadline, the request is considered to have been rejected.

An amendment **enters into force** on the day of the signature of the receiving party.

³⁰ Regulation (EEC, Euratom) No 1182/71 of the Council of 3 June 1971 determining the rules applicable to periods, dates and time-limits (OJ L 124, 8.6.1971, p. 1).

An amendment **takes effect** on the date agreed by the parties or, in the absence of such an agreement, on the date on which the amendment enters into force.

ARTICLE 56 — ACCESSION TO THE AGREEMENT

56.1 Accession of the beneficiaries mentioned in the Preamble

The other beneficiaries must accede to the Agreement by signing the Accession Form (see Annex 3) in the electronic exchange system (see Article 52) within 30 days after its entry into force (see Article 58) and for beneficiaries for which the JU has requested joint and several liability of a linked third party, by also submitting — at accession — a declaration on joint and several liability (see Annex 3a) signed by the third party.

They will assume the rights and obligations under the Agreement with effect from the date of its entry into force (see Article 58).

If a beneficiary does not accede to the Agreement within the above deadline, the coordinator must — within 30 days — request an amendment to make any changes necessary to ensure proper implementation of the action. This does not affect the JU's right to terminate the Agreement (see Article 50).

56.2 Addition of new beneficiaries

In justified cases, the beneficiaries may request the addition of a new beneficiary which must be a Leader or a Core Partner¹ of the JU.

For this purpose, the coordinator must submit a request for amendment in accordance with Article 55. It must include an Accession Form (see Annex 3) signed by the new beneficiary in the electronic exchange system (see Article 52).

New beneficiaries must assume the rights and obligations under the Agreement with effect from the date of their accession specified in the Accession Form (see Annex 3).

ARTICLE 57 — APPLICABLE LAW AND SETTLEMENT OF DISPUTES

57.1 Applicable law

The Agreement is governed by the applicable EU law, supplemented if necessary by the law of Belgium.

As an exception, the Agreement is governed by a different applicable law for the following beneficiaries:

- EUROCONTROL - EUROPEAN ORGANISATION FOR THE SAFETY OF AIR NAVIGATION: by the general principles governing the law of international organisations and the rules of general international law

57.2 Dispute settlement

¹ As defined under Article 1 of the Statutes, Annex I to Council Regulation (EU) No 558/2014 of 6 May 2014 (OJ L 169/77).

If a dispute concerning the interpretation, application or validity of the Agreement cannot be settled amicably, the General Court — or, on appeal, the Court of Justice of the European Union — has sole jurisdiction. Such actions must be brought under Article 272 of the Treaty on the Functioning of the EU (TFEU).

As an exception, if such a dispute is between the JU and SKYGUIDE, SA SUISSE POUR LES SERVICES DE LA NAVIGATION AERIENNE CIVILS ET MILITAIRES, SINTEF 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. Each party must formally notify to the other party its intention of resorting to arbitration and the identity of the arbitrator. The Permanent Court of Arbitration Optional Rules for Arbitration Involving International Organisations and States in force at the date of entry into force of the Agreement will apply. The appointing authority will be the Secretary-General of the Permanent Court of Arbitration following a written request submitted by either party. The arbitration proceedings must take place in Brussels and the language used in the arbitral proceedings will be English. The arbitral award will be binding on all parties and will not be subject to appeal.

If a dispute concerns administrative sanctions or offsetting, the beneficiaries must bring action before the General Court — or, on appeal, the Court of Justice of the European Union — under Article 263 TFEU.

ARTICLE 58 — ENTRY INTO FORCE OF THE AGREEMENT

The Agreement will enter into force on the day of signature by the JU or the coordinator, depending on which is later.

SIGNATURES

For the coordinator

For the JU



ANNEX 1 (part A)

Innovation action

NUMBER — 101017626 — PJ38-W3-ADSCENSIO

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1.1. The project summary

Project Number ¹	101017626	Project Acronym ²	PJ38-W3-ADSCENSIO
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One form per project

General information

Project title ³	ADS-C ENables and Supports Improved ATM Operations
Starting date ⁴	01/11/2020
Duration in months ⁵	26
Call (part) identifier ⁶	H2020-SESAR-2020-2
Topic	SESAR-WAVE3-07-2020 Downlinking Flight Trajectory to improve ATM performance
Fixed EC Keywords	
Free keywords	Trajectory Based Operations TBO 4D ADS-C Common Service Datalink Satcom Conflict Detection and resolution Consistency check flight trajectory prediction conformance monitoring AMAN CPDLC ATS B2

Abstract ⁷

The proposal is part of the general principle of Trajectory Based Operations, aiming at improving various features of Air Traffic Control thanks to a better anticipation of how flights would behave.

During the execution of a flight, major elements to feed an accurate and reliable trajectory prediction -or alternate scenarios- can be provided by the aircraft itself. These elements can be: wind conditions, speed schedule or the trajectory prediction computed by the aircraft navigation system itself, which consists in a suite of positions, altitude and time ("4 Dimensions").

Some aircraft operated by European airlines already have the capacity to send those elements via a datalink communication application.

The objectives of the proposal are to demonstrate both:

- the improvements that can be achieved in many common operational situations that Air Traffic Controllers have to manage, and
- the efficiency and robustness of a technological infrastructure to support the datalink communications between the aircraft and various ground consumers for trajectory related exchanges.

Implementation of technical and operational solutions will primarily induce a reduction of Controllers' workload in high traffic condition, hence enhancing airspace capacity. Another effect resulting from earlier and assisted Controllers decision will allow to reduce flight delays, fuel burn and CO2 emissions. They are key to reach the target set for aviation industry in the perspective of reducing its environmental impact.

PJ38 continues previous SESAR initiatives and is the main contributor to prepare the industrial implementation as required by the Common Project #1. The associated implementing rule demands by 2027:

- the European Air Navigation Service Providers' ground systems to be capable to make use of aircraft trajectory data
- 45% of flights in Europe to have the capacity to share trajectory.

1.2. List of Beneficiaries

 Associated with document Ref. Ares(2020)7661305 - 16/12/2020

Project Number ¹	101017626	Project Acronym ²	PJ38-W3-ADSCENSIO
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List of Beneficiaries

No	Name	Short name	Country	Project entry month ⁸	Project exit month
1	DIRECTION DES SERVICES DE LA NAVIGATION AERIENNE	DSNA	France	1	26
2	AIRBUS	AIRBUS	France	1	26
3	AIRTEL ATN LIMITED	AIRTEL	Ireland	1	26
4	DFS DEUTSCHE FLUGSICHERUNG GMBH	DFS	Germany	1	26
5	ENAIRES	ENAIRES	Spain	1	26
6	ENAV SPA	ENAV	Italy	1	26
7	EUROCONTROL - EUROPEAN ORGANISATION FOR THE SAFETY OF AIR NAVIGATION	EUROCONTROL	Belgium	1	26
8	HONEYWELL AEROSPACE	HONEYWELL SAS	France	1	26
9	HUNGAROCNTRL MAGYAR LEGIFORGALMISZOLGALAT ZARTKORUEN MUKODO RESZVENYTARSASAG	HC (FSP)	Hungary	1	26
10	INDRA SISTEMAS SA	INDRA	Spain	1	26
11	LEONARDO - SOCIETA PER AZIONI	LEONARDO	Italy	1	26
12	NATS (EN ROUTE) PUBLIC LIMITED COMPANY	NATS	United Kingdom	1	26
13	POLSKA AGENCJA ZEGLUGI POWIETRZNEJ	PANSA (B4)	Poland	1	26
14	SKYGUIDE, SA SUISSE POUR LES SERVICES DE LA NAVIGATION AERIENNE CIVILS ET MILITAIRES	SKYGUIDE	Switzerland	1	26
15	RIZENI LETOVEHO PROVOZU CESKE REPUBLIKY STATNI PODNIK	ANS CR (B4)	Czech Republic	1	26
16	LETOVE PREVADZKOVE SLUZBY SLOVENSKEJ REPUBLIKY, STATNY PODNIK	LPS SR (B4)	Slovakia	1	26
17	VALSTYBES IMONE ORO NAVIGACIJA	ON (B4)	Lithuania	1	26
18	ATOS BELGIUM	ATOS (FSP)	Belgium	1	26
19	FREQUENTIS AG	FRQ (FSP)	Austria	1	26
20	SAAB AKTIEBOLAG	SAAB	Sweden	1	26
21	SINTEF AS	SINTEF	Norway	1	26

1.3. Workplan Tables - Detailed implementation

Associated with document Ref. Ares(2020)7661305 - 16/12/2020

1.3.1. WT1 List of work packages

WP Number ⁹	WP Title	Lead beneficiary ¹⁰	Person-months ¹¹	Start month ¹²	End month ¹³
WP1	Project Management	1 - DSNA	11.00	1	26
WP2	Data Collection	7 - EUROCONTROL	87.76	1	26
WP3	Data Analysis	6 - ENAV	195.19	1	26
WP4	Operational evaluations	2 - AIRBUS	244.08	1	26
WP5	ADS-C Common Service (ACS)	4 - DFS	220.48	1	26
WP6	VDL - SATCOM interoperability	12 - NATS	60.43	1	26
Total			818.94		

1.3.2. WT2 list of deliverables

Deliverable Number¹⁴	Deliverable Title	WP number⁹	Lead beneficiary	Type¹⁵	Dissemination level¹⁶	Due Date (in months)¹⁷
D1.1	Demonstration Plan	WP1	1 - DSNA	Report	Public	6
D1.2	Demonstration Report	WP1	2 - AIRBUS	Report	Public	25
D1.3	2021 Annual report	WP1	1 - DSNA	Report	Confidential, only for members of the consortium (including the Commission Services)	12
D1.4	2022 Annual report	WP1	1 - DSNA	Report	Confidential, only for members of the consortium (including the Commission Services)	24
D2.1	Data Collection platform	WP2	7 - EUROCONTROL	Demonstrator	Confidential, only for members of the consortium (including the Commission Services)	11
D3.1	contribution of Data analysis to Project Report	WP3	6 - ENAV	Report	Confidential, only for members of the consortium (including the Commission Services)	23
D4.1	Availability Note SKYGUIDE IBP	WP4	14 - SKYGUIDE	Demonstrator	Confidential, only for members of the consortium (including the Commission Services)	16
D4.2	Availability Note DSNA IBP	WP4	1 - DSNA	Demonstrator	Confidential, only for members of the consortium (including the Commission Services)	16
D4.3	Availability Note DFS iCAS platform	WP4	4 - DFS	Demonstrator	Confidential, only for members of the consortium (including the Commission Services)	16
D4.4	Availability Note PANSA iTEC	WP4	13 - PANSA (B4)	Demonstrator	Confidential, only for members of the consortium	16

Deliverable Number¹⁴	Deliverable Title	WP number⁹	Lead beneficiary	Type¹⁵	Dissemination level¹⁶	Due Date (in months)¹⁷
					(including the Commission Services)	
D4.5	Availability Note TESLA integration	WP4	2 - AIRBUS	Demonstrator	Confidential, only for members of the consortium (including the Commission Services)	16
D4.6	Availability Note ENAV PJ38 Demonstration Platform	WP4	6 - ENAV	Demonstrator	Confidential, only for members of the consortium (including the Commission Services)	16
D5.1	- Availability Note for ADS-C Common Service platform	WP5	4 - DFS	Demonstrator	Confidential, only for members of the consortium (including the Commission Services)	14
D6.1	Availability note of IRIS Space-Ground infrastructure	WP6	12 - NATS	Demonstrator	Confidential, only for members of the consortium (including the Commission Services)	6
D6.2	Availability note of Honeywell flight test aircraft	WP6	8 - HONEYWELL SAS	Demonstrator	Confidential, only for members of the consortium (including the Commission Services)	14
D6.3	Availability note of Airbus flight test aircraft	WP6	2 - AIRBUS	Demonstrator	Confidential, only for members of the consortium (including the Commission Services)	17

1.3.3. WT3 Work package descriptions

Work package number ⁹	WP1	Lead beneficiary ¹⁰	1 - DSNA
Work package title	Project Management		
Start month	1	End month	26

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: 1-26]

DSNA, AIRBUS

This work package is managed by DSNA, with the support of Airbus.

Two kinds of activities are described hereafter:

- activities that are solely of the responsibility of DSNA, the Coordinator;
- activities that will be managed by a coordination team.

The coordination team is composed of project management experts and senior technical experts, working for DSNA and Airbus entities.

The Coordinator is solely responsible for the following activities:

- funding collection and distribution, and coordination with the SJU for these matters;
- approves for distribution to SJU the deliverables of the project;
- is responsible for the activities carried out by the coordination team;
- is responsible of the management of the Grant Agreement and possible amendment and interface with the Project Officer,
- provides input to the Programme Committee and its sub-committees meetings and supports discussions through the participating Members of the committee.

The coordination team:

- Ensures the day-to-day monitoring and controls the project progress with respect to project objectives, timetable and acceptance of deliverables.
- Carries out the main management activities at project level such as reporting process and ensures on time deliveries.
- Organizes meetings review meeting with SJU (annual), PMB, EPMB. The coordination team, together with the PMB and EPMB, will act as project steering committee. Change requests will be handled by the committee to allow flexibility.
- Ensures the project progress will be continuously reported in STELLAR register. It will include any feature of the project: Exercise, platform availability, planning, deliverable, Communication action, RIO,... for which up-to-date information will be retrieved in STELLAR as soon as identified. It will include the preparation and supply of two Annual Reports providing a snapshot in October 2021 and October 2022.
- Ensures the quality of the project based on the project management handbook produced by SJU.
- Organises 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.
- Promotes, animates and reports on advertisement of PJ38 activities in cooperation with all involved partners. It will look for opportunities in international fora within or outside of Europe.
- Is responsible for dissemination of results and achievements beyond the perimeter of the project. An Open Day will be organized at the end of the Project. A specific Video will be produced (potentially for WAC2022 or other event).

Participation per Partner

Partner number and short name	WP1 effort
1 - DSNA	4.00

Partner number and short name	WP1 effort
2 - AIRBUS	7.00
Total	11.00

List of deliverables

Deliverable Number ¹⁴	Deliverable Title	Lead beneficiary	Type ¹⁵	Dissemination level ¹⁶	Due Date (in months) ¹⁷
D1.1	Demonstration Plan	1 - DSNA	Report	Public	6
D1.2	Demonstration Report	2 - AIRBUS	Report	Public	25
D1.3	2021 Annual report	1 - DSNA	Report	Confidential, only for members of the consortium (including the Commission Services)	12
D1.4	2022 Annual report	1 - DSNA	Report	Confidential, only for members of the consortium (including the Commission Services)	24

Description of deliverables

- Demonstration Plan (M 6)
- Demonstration Report (M25)
- Annual report 2021
- Annual report 2022

D1.1 : Demonstration Plan [6]

This document will describe how all Work Packages will perform their demonstration activities including their interactions and synergies.

D1.2 : Demonstration Report [25]

The Demonstration Report gathers the results of activities performed in all work packages.

D1.3 : 2021 Annual report [12]

Report of activities at mid-term of project lifecycle.

D1.4 : 2022 Annual report [24]

Annual report October 2022

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	7 - EUROCONTROL
Work package title	Data Collection		
Start month	1	End month	26

Objectives

This work package will (1) identify and define (in collaboration with the other WPs) the data elements to be collected, (2) define and provision platforms to collect and store the collected data and (3) ensure smooth data collection and access to the data.

Description of work and role of partners

WP2 - Data Collection [Months: 1-26]

EUROCONTROL, DSNA, AIRBUS, DFS, ENAIRE, ENAV, HONEYWELL SAS, LEONARDO, NATS, SKYGUIDE, ANS CR (B4)

Task 2.1: Data definition and Infrastructure Provisioning (M1-M6).

Using, one side, previous work like PEGASE data dictionary, DIGITS definition of technical and operational metrics, and, on the other side, the requirements specific to this VLD, the task will identify and define the data elements that will be collected during the demonstration. This definition work will result in a Data Dictionary identifying the data elements and formally defining their sources, formats and availability.

A series of metrics allowing to monitor Data Collection as whole will also be defined.

The Data Dictionary will be used in the design of a Data Collection Architecture: this architecture will identify the collection, storage and dissemination functions, their relationships and the ways they can be allocated. This architecture will depend on the way the different partners establish ADS-C dialogue with the ATN B2 equipped fleet and take in account the VLD's work on an ADS-C Common Service.

The required machines and storage will be provisioned to implement of Data Collection Architecture.

Note that the DIGITS data collection infrastructure will be kept running and allow (partial) data collection while the Pj38 data collection infrastructure is setup.

Task 2.2: Data collection (M1-M26).

DIGITS' data collection infrastructure will be available to collect data (possibly partial data considering Pj38 data needs) from the start of the VLD.

As the elements of Pj38 Data Collection Infrastructure (defined in Task 2.1) becomes available, data will be collected by the different partners using the Pj38 data collection infrastructure (expected deadline: M6, end of Task 2.1).

The Data Collection process will be monitored along the metrics defined in Task 2.1 and a monthly (weekly?) Data collection dashboard will be provided.

Task 2.3: Data access (M1-M26).

Provided the required data sharing agreements are put in place, access to the data collected by DIGITS' data collection infrastructure will be available from the start of demonstration.

With the time, Pj38 data collection sharing infrastructure and rules will be put in place and will replace the DIGITS infrastructure and rules (expected deadline: M6, end of Task 2.1).

For the data elements identified as shared in Task 2.1 (possibly governed by specific "sharing agreements"), Task 2.3 will maintain the required infrastructure and ensure it is fed with correct and up-to-date data.

Participation per Partner

Partner number and short name	WP2 effort
1 - DSNA	1.00
2 - AIRBUS	1.00
AI OPS	7.00
4 - DFS	3.06
5 - ENAIRE	0.80

Partner number and short name	WP2 effort
CRIDA	2.20
6 - ENAV	2.00
TECHNO SKY	1.50
7 - EUROCONTROL	11.00
8 - HONEYWELL SAS	20.00
HI sro	24.00
HI inc	1.00
11 - LEONARDO	4.00
12 - NATS	5.70
14 - SKYGUIDE	2.00
SKYSOFT	0.50
15 - ANS CR (B4)	1.00
Total	87.76

List of deliverables

Deliverable Number ¹⁴	Deliverable Title	Lead beneficiary	Type ¹⁵	Dissemination level ¹⁶	Due Date (in months) ¹⁷
D2.1	Data Collection platform	7 - EUROCONTROL	Demonstrator	Confidential, only for members of the consortium (including the Commission Services)	11

Description of deliverables

This work package will deliver artefacts internal to the demonstration:

- The Data Dictionary (M5) and Sharing agreements.
- The Data Collection Architecture document (M6).
- Pj38 data collection and sharing platforms availability notes (M11)
- Periodic reports on data collection and data sharing.

These internal deliverables will contribute to VLD official deliverables: Demonstration Plan (DEMOP), Demonstration Report (DEMOR) and Availability Notes (AN).

D2.1 : Data Collection platform [11]

Availability Note of Pj38 data collection and sharing platforms, supported by internal documentation (Data dictionary, sharing agreements and Data Collection Architecture).

Schedule of relevant Milestones

Milestone number ¹⁸	Milestone title	Lead beneficiary	Due Date (in months)	Means of verification
MS2	Data Collection Platform	7 - EUROCONTROL	11	Experience gained while collecting data in PEGASE

Schedule of relevant Milestones

Milestone number¹⁸	Milestone title	Lead beneficiary	Due Date (in months)	Means of verification
				and DIGITS has shown that the analysis of collected ADS-C data requires the simultaneous collection contextual information. This contextual information might include, amongst others, planning information (flight plan, NM data...), position data (Radar or ADS-B tracks), A/C state vector information (FDR data), controller instructions... Before the availability of such platform, data collection infrastructure setup by the DIGITS partners will be used.

Work package number ⁹	WP3	Lead beneficiary ¹⁰	6 - ENAV
Work package title	Data Analysis		
Start month	1	End month	26

Objectives

- Analyse performance of ADS-C data exchange from a technical perspective
- Analyse characteristics and behaviour of ADS-C data contents from an operational perspective
- Support common data analysis efforts and establish common analysis platform

Description of work and role of partners

WP3 - Data Analysis [Months: 1-26]

ENAV, **DSNA**, **AIRBUS**, **AIRTEL**, **DFS**, **ENAI**, **EUROCONTROL**, **HONEYWELL SAS**, **INDRA**, **LEONARDO**, **NATS**, **PANSA (B4)**, **SKYGUIDE**, **ANS CR (B4)**

In wave#1 PJ31 DIGITS has laid foundations for ADS-C Data Analysis both from a technical and operational perspective. PJ38 will further refine the metrics and tools to go to a common Data Analysis Platform. It will also adapt and extent them to the new concepts and technologies trialled in PJ38, in particular ADS-C Common Service and SATCOM aspects. Due to the increasing number of ground partners with interest and dependencies on the analysis results, PJ38 will enforce efforts to communalize data analysis efforts where appropriate and investigate the potential of a common analysis platform to support awareness, communication and visibility of results. The task will not rely only on ADS-C data but also several kinds of flight context information, see WP "Data Collection".

Tasks:

- Task 3.1: Technical data analysis:

This task will analyse ADS-C communication performance at dialogue level. Topics will be monitoring of ADS-C data collection, Success of ADS-C dialogues and connection, user abort by connection loss and user abort analysis also in relation to flight context, Load and Bandwidth Usage and others. Beyond metrics already developed in PJ31, ADS-C Common Service Performance, Performance of SWIM Data Distribution and SATCOM specific metrics are expected to be new topics.

- Task 3.2: Operational data analysis:

This task will look into ADS-C contents and characteristics from on operational perspective. Example topics are expected to be EPP prediction stability, variability, ATC Impact on EPP and EPP vs Ground Trajectory Predictions. The focus will be set to support the operational benefit demonstrations and quantifications of the different partners also in relation to their ATS system prototypes

- Task 3.3: Common analysis platform:

This task will investigate the potential communalization of data analysis efforts which would otherwise be redundant for the multitude of partners. It will consider common infrastructure options to support visibility, access to data and communication around results. With the growing number of partners, the objective is also to speed up the integration of additional partners. Data analysis efforts will be addressed to develop a common analysis platform to support awareness, communication and visibility of results. The task will not rely only on ADS-C data but also several kinds of flight context information, see WP "data collection"

Background:

The task will rely on the approach for data analysis applied in the PJ31 DIGITS.

Dependencies:

- This work package has internal dependencies with all other WPs such as Data Collection, ADS-C Common Service, SATCOM/VDL Interop, Operational Benefits Demonstration.

Participation per Partner

Partner number and short name	WP3 effort
1 - DSNA	2.00
2 - AIRBUS	1.00
AI OPS	9.00

Partner number and short name	WP3 effort
3 - AIRTEL	3.00
4 - DFS	8.00
5 - ENAIRE	0.00
CRIDA	1.50
6 - ENAV	2.50
TECHNO SKY	3.00
7 - EUROCONTROL	23.00
8 - HONEYWELL SAS	20.00
HIIsro	74.00
HIinc	1.00
10 - INDRA	13.69
11 - LEONARDO	4.00
12 - NATS	19.20
13 - PANS (B4)	4.80
14 - SKYGUIDE	4.00
SKYSOFT	1.00
15 - ANS CR (B4)	0.50
Total	195.19

List of deliverables

Deliverable Number ¹⁴	Deliverable Title	Lead beneficiary	Type ¹⁵	Dissemination level ¹⁶	Due Date (in months) ¹⁷
D3.1	contribution of Data analysis to Project Report	6 - ENAV	Report	Confidential, only for members of the consortium (including the Commission Services)	23

Description of deliverables

- Demonstration Plan – Contribution for Data Analysis Method/Approach/Objectives (M6)
- Demonstration Report – Contribution for Data Analysis Results (M25)

D3.1 : contribution of Data analysis to Project Report [23]

This document describes the way Data analysis activities contribute to the results displayed in Demonstration Report. Emphasize is put on methodology to support results, potentially tailored to the specificities of an operational evaluation.

Schedule of relevant Milestones

Milestone number¹⁸	Milestone title	Lead beneficiary	Due Date (in months)	Means of verification
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Work package number ⁹	WP4	Lead beneficiary ¹⁰	2 - AIRBUS
Work package title	Operational evaluations		
Start month	1	End month	26

Objectives

Objectives: This work package will demonstrate operational benefits brought by improved ATC tools with the use of ADS-C (EPP) data, in particular:

- Flight plan Consistency check
- Instruction Conformance monitoring
- Facilitating Airspace user's preferred trajectory (Top of Descent)
- Conflict Detection and Resolution
- Traffic sequencing

Description of work and role of partners

WP4 - Operational evaluations [Months: 1-26]

AIRBUS, DSN, DFS, ENAV, EUROCONTROL, HC (FSP), INDRA, LEONARDO, NATS, PANSA (B4), SKYGUIDE, ANS CR (B4)

AIRBUS will coordinate the overall Work Package which will be focused on operations and centred on the role of ANSPs accordingly.

The basic breakdown is composed of 3 successive tasks:

1. Preparation of the demonstration platforms
2. Execution of operational evaluations
3. Analysis of the collected data and conclusions on operational benefits

This scheme will be applied for each individual thread focussed on a single ANSP or a group of ANSPs, so that each task is composed of a number of sub-tasks corresponding to the number of threads.

Task 4.1: Preparation of the demonstration platforms

Task 4.1.1: HC, BULATSA (LTP to ENAV), Airbus Defence and Space

Preparation and specification of the two scenarios:

- Reference scenario: fed by recorded data from real traffic;
- Solution scenario: showcasing the benefits from TESLA tool to interact with traffic. In this scenario, on top of real ADS-C data, the traffic generator (GENETICS) can be set to emulate more 4D capable aircraft (i.e. GENETICS is powered by a/c performance models more realistic than pure tabulated BADA models generally used by common Traffic generator and Trajectory prediction).

APP and ACC ATCOs will be involved in the test.

Task 4.1.2 : DSN

Operational evaluation will focus on traffic flow management and arrival sequencing improvements in En-route thanks to the use of ADS-C data.

In preparation of the evaluation, DSN will upgrade its industrial-based platform with the integration of ADS-C data made available via the ADS-C common server. This include the evolution of innovative ATM2 interfaces, e.g. including IODA for traffic sequencing in Paris ACC and innovative interface for tactical ATFCM (4ME) in COFLIGHT Based Platform in Reims ACC, enriched with the display/integration of ADS-C data for improved trajectory Prediction.

Task 4.1.3 : SKYGUIDE

SKYGUIDE will upgrade its industrial-based platform with the connection to the ADS-C common server. Live data received via the ADS-C common server will be merged with additional simulated ADS-C equipped flights using the Airbus Genetics traffic generator.

Task 4.1.4 : EUROCONTROL (MUAC)

MUAC will continue to use its Pre-Operational set-up as developed under Wave 1 PJ31 DIGITS. Some evolution via improvements/enhancements on the applications for the display of the EPP and the automatic 2D Route Conformance Monitoring are going to be implemented during this project. More ATCO's will be trained to support the pre-operational demonstrations.

For PJ38-W3-ADSCENSIO MUAC will maintain its own data link connection with each of the 4D capable aircraft flights, i.e. those contributing previously to wave#1 VLD DIGITS and eventually new ones. MUAC will continue to use its specific "B2 Approved" list to identify which a/c are equipped with ATS-B2. The activities under this WP4 are completely independent from the WP5 ACS, for which an off-line test set-up will be developed.

Task 4.1.5 DFS

Upgrade of iCAS Platform to connect to ADS-C Common Service via SWIM Interface.

Task 4.1.6 ENAV

ENAV will contribute to assess the operational benefits resulting from the use of ADS-C data by performing ad-hoc demonstration campaign using live/real ADS-C data integrated into controller end systems. ADS-C data will be retrieved by subscribing the ATC test platform to “use interfaces” of the ACS distribution module.

ENAV will upgrade its own industrial-based platform with the connection to the ADS-C common server. Live data received via the ADS-C common server will be used to perform a shadow mode demonstration exercise.

Task 4.1.7 PANSA

PANSA will upgrade its iTEC platform with CD&R tools evaluated in PJ18 W2 supporting use of ADS-C data and connect iTEC platform to ADS-C Common Service.

Task 4.1.8 NATS

Based on the data collection, analysis and validation work carried out by NATS during the SESAR Wave 1 research in the PJ31 DIGITS project, the capability of the platforms used (the ground platform used for data collection and the RTS platform for the demonstration activity) will be assessed for any further developments to support the proposed analysis activities.

Task 4.2: Execution of operational evaluations

Task 4.2.1: HC, BULATSA (ENAV LTP)

Preparation and conduct of the post-flight Real time simulations with the participation of licenced ATCOs/pseudo-pilots. HungaroControl is considering the possibility of having a live trial also with Airbus Defence and Space with the usage of TESLA tool, involving APP and ACC controllers. During the VLD controllers would continue to use the main ATC system to handle the traffic, but on a separate screen the TESLA tool would be running real time. Whenever workload allows, supposing there is any ADS-C equipped aircraft under control, the EPP information displayed on TESLA tool would be used to solve potential conflicts. It is important to highlight that the information derived from TESLA tool would only be one aspect of the many variables in deciding how to solve any given traffic situation.

However this live trial is depending on several conditions. One essential is that the main ATM system of HungaroControl should be interfaced with TESLA tool during the project timeframe. In this matter TESLA tool would be an auxiliary system of the main ATC system, this means it would receive all relevant FPLs (via AFTN), radar data and controller inputs performed on the flight plan records. In addition to this, it is also essential to establish an ADS-C live connection with one of the future ACS servers in order to receive live ADS-C data via this interface. These conditions are the technical enablers of a VLD. On the other hand it is also a key factor to get the Hungarian NSA approval for a live trial such this.

Task 4.2.2: DSN

DSNA plans to perform the shadow-mode evaluation with the participation of OPS staff from the Flow Management Positions and ATCOs:

- Live trials focussing on the update of the Trajectory prediction for extended Arrival Management using EPP air data will take place in Paris ACC, in coordination with CDG and Orly approaches;
- Live trials focussing on the enhancement of flow management by using both EPP air data and COFLIGHT Trajectory Prediction will take place in Reims ACC.

Task 4.2.3: SKYGUIDE

SKYGUIDE plans to perform the real time evaluation including ADS-C live aircraft data in an environment with a large percentage of ADS-C flights (simulated) in order to compare and assess the use of EPP data in particular in route conformance monitoring and also in CD&R tools. This will include participation of ATCOs to assess the operational feasibility and benefit of improved airborne data use in the ground system.

Task 4.2.4 : EUROCONTROL (MUAC)

In the pre-operational set-up a sub-set of ATCOs will have access to the ADS-C application to display of the EPP and the automatic 2D Route Conformance Monitoring. ATCO's will provide feedback on their experience as well as possible “wrong behaviour”. Additionally there will be daily and weekly checks on the PJ38-W3-ADSCENSIO flights by Operational experts as well as data link experts.

Task 4.2.5 DFS

- Operational Benefit Demonstration of ADS-C based ATCO Assistance Functions in iCAS, with focus on CP1 functional scope (ADS-C Display, 2D-Discrepancy Monitoring) and selected functions from PJ18 wave#2 (e.g. TP enhancements, Mid-Term Conflict Detection improvements)
- Shadow Mode Demonstrations connected to ADS-C Common Service
- Refinement of ATCo User Requirements for iCAS

Task 4.2.6 ENAV

ENAV plans to perform a shadow mode demonstration including ADS-C live aircraft data in a test environment with the support of the industrial partner LEONARDO in order to compare and assess the use of EPP data showed to ATCOS on the CWP. CD&R tools will be used to increase the ATCO awareness of potential conflicts with the use of EPP too. This will include participation of ATCOs to assess the operational feasibility and benefit of improved airborne data use in the ground system.

Task 4.2.7 PANSA

PANSA plans to run shadow-mode/recorded exercise to show benefits of ADS-C data provided via Common service to CD&R tools and TP in ATC system. ACC ATCO's will be involved in exercise.

Task 4.2.8 NATS

In order to develop a methodological approach for the NATS analysis activity, this task will involve evaluating the findings from the SESAR2020 PJ31 DIGITS initial analysis carried out on Metering Point Accuracy as well as the datasets used. In the PJ31 analysis, the accuracy of the AMAN metering point was compared to the predicted time of arrival within the EPP. The accuracy and stability of the recordings were investigated and compared against the actual time of arrival from radar. Based on the learnings from this analysis in PJ31 DIGITS project, this task will seek to identify if the data available is adequate or we need additional data which will then guide and refine our methodological approach for the analysis to be carried out. Building on the learnings and tools developed within the SESAR Wave 1 research, the analysis activity to be carried out could involve investigation of the Estimated Time of Arrival (ETA) min-max study, with the aim of answering the research question of whether these can enhance AMAN calculations.

Task 4.3: Analysis of the collected data and conclusions on operational benefits

Task 4.3.1: HC, BULATSA

Analysis of the collected data and summary of the conclusions will be presented in the final report. Several metrics will be measured in particular linked to safety, human performance, predictability, airspace capacity and flight efficiency.

Task 4.3.2: DSN

The operational data collected will be analysed during the shadow-mode demonstration, to better characterise the operational benefits that can be expected from enhanced local traffic flow and sequence management using ADS-C data in terms of e.g. safety, predictability, airspace capacity and flight efficiency. A summary of the conclusions will also be produced for the Demo Report

Task 4.3.3: SKYGUIDE

The live operational data collected and the data collected from the real time evaluation will be analysed (with a capability of replay) in order to characterise the operational benefits that can be expected from the more accurate airborne data received via ADS-C.

Several metrics will be measured in particular linked to safety, predictability, airspace capacity and flight efficiency.

Task 4.3.4 : EUROCONTROL (MUAC)

The results from the task 2 will be used by both operational as well as technical experts, to detect technical issues and to define a further evolution of applications. Proposals to improve the ATS-B2 standard might be one of the outcomes as well.

It is expected that the first two applications, with some further improvements, will be mature enough for a full operational use during this PJ38-W3-ADSCENSIO or closely after the conclusion.

Task 4.3.5 DFS

Big Data Analysis with Fast Time Check for Discrepancy Monitoring.

Task 4.3.6 ENAV

The operational data collected during the demonstration exercise will be further analysed in order to characterise the operational benefits that can be expected from the more accurate airborne data received via ADS-C with particular regard to Safety and Human factor.

Task 4.3.7 PANSA

Analysis of collected data and operational evaluation.

Task 4.3.8 NATS

Based on the development of a suitable methodology and carrying out the analysis, it is expected that this task will involve identifying the potential operational benefits and how these can be quantified by working with the other partners on the project. This could potentially lead to an early framework of benefit areas and suitable metrics (e.g. operational ones and technical performance metrics which were used during the SESAR2020 PJ31 DIGITS VLD project). This would include conclusions regarding any achieved benefits to AMAN sequencing, and other related tools.

Dependencies:

The demonstration platform preparation will be initiated using the ADS-C data accessible through the WP "Data collection". It will then evolve to use the SWIM client interface to be developed in the WP "ADS-C common service". The outcomes of the WP "Data analysis" will be used to get a deeper analysis of the demonstrated benefits.

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Participation per Partner	
Partner number and short name	WP4 effort
1 - DSNA	18.00
2 - AIRBUS	7.00
AI OPS	25.00
AI DS Space	31.00
4 - DFS	12.00
6 - ENAV	5.50
TECHNO SKY	2.00
BULATSA	18.56
DEEP BLUE	7.20
7 - EUROCONTROL	4.00
9 - HC (FSP)	30.20
10 - INDRA	22.82
11 - LEONARDO	10.00
12 - NATS	10.60
13 - PANS (B4)	14.70
14 - SKYGUIDE	16.50
SKYSOFT	8.00
15 - ANS CR (B4)	1.00
Total	244.08

List of deliverables					
Deliverable Number ¹⁴	Deliverable Title	Lead beneficiary	Type ¹⁵	Dissemination level ¹⁶	Due Date (in months) ¹⁷
D4.1	Availability Note SKYGUIDE IBP	14 - SKYGUIDE	Demonstrator	Confidential, only for members of the consortium (including the Commission Services)	16
D4.2	Availability Note DSNA IBP	1 - DSNA	Demonstrator	Confidential, only for members of the consortium (including the Commission Services)	16
D4.3	Availability Note DFS iCAS platform	4 - DFS	Demonstrator	Confidential, only for members of the consortium (including	16

List of deliverables

Deliverable Number ¹⁴	Deliverable Title	Lead beneficiary	Type ¹⁵	Dissemination level ¹⁶	Due Date (in months) ¹⁷
				the Commission Services)	
D4.4	Availability Note PANS <i>i</i> TEC	13 - PANS <i>A</i> (B4)	Demonstrator	Confidential, only for members of the consortium (including the Commission Services)	16
D4.5	Availability Note TESLA integration	2 - AIRBUS	Demonstrator	Confidential, only for members of the consortium (including the Commission Services)	16
D4.6	Availability Note ENAV PJ38 Demonstration Platform	6 - ENAV	Demonstrator	Confidential, only for members of the consortium (including the Commission Services)	16

Description of deliverables

Analysis of the results and conclusions will be reported in the PJ38 Demonstration Report

Contribution to:

- DemoPlan (M6),
- Availability notes of upgraded Operational platforms (M11 to M16)
 - o SKYGUIDE industrial-based platform (skysim)
 - o DSNA industrial-based platform
 - o DFS iCAS platform
 - o ENAV demonstration platform
 - o PANS*A* iTEC
 - o TESLA demonstration platform
- DemoReport (M25)

D4.1 : Availability Note SKYGUIDE IBP [16]

Readiness of SkyGuide ATC platform to start its Operational evaluations.

D4.2 : Availability Note DSNA IBP [16]

Readiness of DSNA Industrial Based Platform to support Operational evaluations.

D4.3 : Availability Note DFS iCAS platform [16]

Readiness of DFS Industrial Based Platform (iCAS) to support Operational evaluations.

D4.4 : Availability Note PANS*A* iTEC [16]

Readiness of PANS*A* Industrial Based Platform (iTEC) to support Operational evaluations.

D4.5 : Availability Note TESLA integration [16]

Readiness of BULATSA/HUNGAROC*ON*TROL Industrial Based Platform provided by Airbus Defence and Space to support Operational Evaluations

D4.6 : Availability Note ENAV PJ38 Demonstration Platform [16]

Readiness of ENAV Industrial Based Platform to support Operational evaluations

Schedule of relevant Milestones

Milestone number¹⁸	Milestone title	Lead beneficiary	Due Date (in months)	Means of verification
MS4	Readiness for Operational Evaluations	2 - AIRBUS	14	As a ground ATC Industrial Based Platform is available, Operational evaluations of ATC function can take place.

Work package number ⁹	WP5	Lead beneficiary ¹⁰	4 - DFS
Work package title	ADS-C Common Service (ACS)		
Start month	1	End month	26

Objectives

Objectives :

- Develop, test and accept one or more ADS-C Common Service (ACS) prototypes
- Develop, test and accept one or more ADS-C Common Service Client prototypes
- Demonstrate the ACS prototypes, clients and CONOPS in flight trials
- Make ADS-C data from ACS available to all project partners via SWIM online distribution interface
- Support ADS-C data collection activities in the project
- Refine the ACS specification and CONOPS drafted in wave#1
- Analyse safety and performance requirements, regulatory and certification requirements and software assurance needs to proceed to industrialization and operational deployment of ACS

Description of work and role of partners

WP5 - ADS-C Common Service (ACS) [Months: 1-26]

DFS, DSNA, AIRBUS, AIRTEL, ENAIRE, ENAV, EUROCONTROL, HC (FSP), INDRA, LEONARDO, NATS, PANSO (B4), SKYGUIDE

Description of work

Lead partner DFS

This work package will demonstrate the concept of ADS-C Common Service (ACS) in live flight trials. It will proof ACS suitability to provide easy access to ADS-C data to a large range of ground users and support their needs for operational benefits demonstration.

Background:

During wave 1 PJ31 DIGITS ADS-C data collection architecture featured mainly a one to one relationship of ADS-C end systems and ASD-C users.

In wave 3 it will be demonstrated how an ADS-C Common Service can serve the information needs of a large group of users via a SWIM interface, saving scarce A/G link bandwidth and costs. As the ACS can be decomposed in several Functional Blocks, multiple PJ38 beneficiaries may partner to host respective parts of the infrastructure and provide one ACS together.

Tasks:

- Task 5.1: Develop, test and accept one or more ADS-C Common Service (ACS) prototypes
- In this task, PJ38 consortium, with the help of participating industry, will develop one or more prototypes of ACS in the first part of the project. Testing & accepting activities will be carried out (including simulation tests and if needed dedicated flight tests) to prove that the prototype is fit for purpose and can be declared available for the flight trials / demonstration phase.

- Task 5.2: Demonstrate the ADS-C Data Collection Capability in flight trials

In the second part of the project, the ACS prototype(s) will be demonstrated with real-world traffic generated by cooperating Airspace Users. In task 2 the focus will be on the airborne interface and the data collection capability of the service, i.e. the successful management of ADS-C connections to receive ADS-C data.

- Task 5.3: Demonstrate the ADS-C data distribution capability via SWIM in real time

In task 3, the focus will be on demonstrating the data distribution capability of the service and communication with ground clients via the SWIM interface. From the start of demonstration of the ACS prototype in the flight trial, the received ADS-C data shall be available to all interested project partners via the online distribution interface of the ACS (i.e. including partners not hosting part of the ACS infrastructure themselves). Project partners can connect to this interface and use the online data stream for their operational benefit demonstrations. ACS will also support the data collection work package of PJ38. The task will include the development of one or more test clients which will be made available to all partners to connect to the SWIM interface. Integration of client interfaces in ATC end systems is also within scope depending on bilateral agreements of ANSPs and supporting ground industry.

- Task 5.4: ADS-C Common Service Requirements and CONOPS

PJ38 will build on the results of an ad-hoc working group on ADS-C Common Service started by PJ31 DIGITS demo partners which drafted an initial set of ACS requirements. PJ38 will take over the management and elaboration of the CONOPS, system requirements and ICDs with the partners contributing to PJ38 ACS activity. This task will

include analysing safety, security and performance requirements, regulatory and certification requirements and software assurance needs necessary to proceed to the industrialization and operational deployment of ACS.

Dependencies:

This work package has internal dependencies with WPs for Operational Benefits Demonstration, Data Collection and VDL/SATCOM interop, which are expected to use ACS infrastructure.

Participation per Partner

Partner number and short name	WP5 effort
1 - DSNA	3.00
ESSP	32.00
2 - AIRBUS	1.00
AI OPS	1.00
3 - AIRTEL	40.00
4 - DFS	14.00
5 - ENAIRE	2.00
CRIDA	4.00
6 - ENAV	5.50
TECHNO SKY	1.50
7 - EUROCONTROL	18.00
9 - HC (FSP)	2.00
10 - INDRA	54.78
11 - LEONARDO	20.00
12 - NATS	16.20
13 - PANS (B4)	3.50
14 - SKYGUIDE	2.00
Total	220.48

List of deliverables

Deliverable Number ¹⁴	Deliverable Title	Lead beneficiary	Type ¹⁵	Dissemination level ¹⁶	Due Date (in months) ¹⁷
D5.1	- Availability Note for ADS-C Common Service platform	4 - DFS	Demonstrator	Confidential, only for members of the consortium (including the Commission Services)	14

Description of deliverables

- Availability Note for ACS platform (M14)
- DemoP Contribution for ACS Objectives (M6)
- DemoR Contribution for ACS Results (M25)

The work package will produce and document ACS service requirements and specification material. These will be published as part of the “Input to standardization and industrialization” results of the Demonstration Report in the form of an appendix.

D5.1 : - Availability Note for ADS-C Common Service platform [14]

Readiness of ADS-C Common Service.

Schedule of relevant Milestones

Milestone number ¹⁸	Milestone title	Lead beneficiary	Due Date (in months)	Means of verification
MS1	ADS-C Common Service requirements	4 - DFS	5	Functional and System requirements to develop the ADS-C Common Service prototype.
MS3	Readiness of ADS-C Common Service	4 - DFS	14	ADS-C Common Service prototype will allow several ground customers to establish ADS-C connection with 4D capable aircraft. The received ADS-C data shall be available to all interested project partners via the online distribution interface of the ACS (This shall include partners not hosting part of the ACS infrastructure themselves).

Work package number ⁹	WP6	Lead beneficiary ¹⁰	12 - NATS
Work package title	VDL - SATCOM interoperability		
Start month	1	End month	26

Objectives

1. Demonstrate VDL and SATCOM complementarity in providing ATN connectivity.
2. Demonstrate an extension of the use of datalink beyond current VDL coverage thanks to SATCOM.

Description of work and role of partners

WP6 - VDL - SATCOM interoperability [Months: 1-26]

NATS, DSN, AIRBUS, AIRTEL, DFS, ENAIRE, ENAV, EUROCONTROL, HONEYWELL SAS

Lead Partner: NATS

This work package will demonstrate that VHF Datalink (VDL) and SATCOM-based ATN can work together to seamlessly deliver ADS-C data.

Background:

PJ31 in SESAR Wave 1 equipped Airbus A320 family aircraft with ATN B2-capable avionics and demonstrated the downlinking of ADS-C data via VDL mode 2.

Project IRIS (funded by European Space Agency) will equip up to 20 Airbus A320 family aircraft with an avionics upgrade that will enable ATN B2 datalink (both CPDLC and ADS-C) connection over SATCOM. This will extend the geographic scope of ATN operations, complementing VDL coverage. The project timeframes for IRIS and PJ38 overlap for a wide part. While IRIS focus on preparation of the SATCOM infrastructure enabling continental datalink over SATCOM, PJ38 will bring the concept one step further towards deployment by demonstrating the end to end performance achieved by ATN B2 applications over this infrastructure.

Flight test aircraft from Airbus and Honeywell, fitted with ATN B2 capable avionics and SATCOM capacity, will be used in order to secure a minimum validation of objectives. In particular, Honeywell owned Embraer jet will allow to evaluate variability of EPP information generated from different aircraft / FMS. The Honeywell owned Embraer jet will allow to generate EPP over a SATCOM system dissimilar to the A320 equipment. The generated data will allow to evaluate variability of the results relative to the A320 baseline, in view of the future mixed fleet environment.

In addition, flights operated through revenue service in the frame of IRIS project will contribute to feed WP6 with complementary data.

Tasks:

- Task 6.1: Demonstrate seamless ATN connection throughout transition between VDL to SATCOM

It is proposed to demonstrate the uninterrupted transition of ATN connections from VDL to SATCOM datalink and vice versa, transparent to ground data consumers. This may include catering for small gaps in VDL coverage extending geographical coverage, and providing redundancy for failure of SATCOM or VDL. Note that the precise scenarios that are demonstrated will be dependent on the flight patterns of aircraft in revenue service. M0-26

- Task 6.2: Demonstrate the consistency of ADS-C data received via VDL and SATCOM communication

PJ38 will assess the content of ADS-C data received via both VDL and SATCOM and demonstrate that the data can be used in ground systems interchangeably. This may include assessment of functional and performance aspects. M0-26

- Task 6.3: Demonstrate operational benefits of VDL-SATCOM datalink complementarity

Qualitatively demonstrate the operational benefits of complementing VDL datalink with SATCOM, for example the impact on operational applications of increased and uninterrupted coverage over a larger geographical area and greater vertical extent. The impact of any identified behaviours associated with the VDL-SATCOM transition (see task 6.1) will be considered. M0-26

- Task 6.4: Provide evidence or recommendations for initial multilink deployment, if relevant.

PJ38 will report any findings that can add value to the future development of CONOPS, system requirements and standards for multilink deployment. M0-26

Dependencies:

This work package is dependent on the ANSP approval, under project IRIS, for operational use of CPDLC over SATCOM. Additionally, the availability of avionics on board revenue aircraft (through the same project) is to provide additional data for a more representative validation.

If either the approvals process proves to be an obstacle, or there is a significant delay to the availability of revenue aircraft to support the WP, then a mitigation option is to exploit an existing Iris Test Platform which should be fully featured with inputs from ANSPs, avionics providers and use of the real Iris satellite link. This should still be able to provide valuable results to meet these objectives.

Participation per Partner

Partner number and short name	WP6 effort
1 - DSNA	0.50
ESSP	3.50
2 - AIRBUS	4.00
AI OPS	6.00
3 - AIRTEL	2.00
4 - DFS	6.00
5 - ENAIRE	5.00
6 - ENAV	2.20
TECHNO SKY	0.73
7 - EUROCONTROL	7.00
8 - HONEYWELL SAS	0.00
HI sro	10.00
12 - NATS	13.50
Total	60.43

List of deliverables

Deliverable Number ¹⁴	Deliverable Title	Lead beneficiary	Type ¹⁵	Dissemination level ¹⁶	Due Date (in months) ¹⁷
D6.1	Availability note of IRIS Space-Ground infrastructure	12 - NATS	Demonstrator	Confidential, only for members of the consortium (including the Commission Services)	6
D6.2	Availability note of Honeywell flight test aircraft	8 - HONEYWELL SAS	Demonstrator	Confidential, only for members of the consortium (including the Commission Services)	14
D6.3	Availability note of Airbus flight test aircraft	2 - AIRBUS	Demonstrator	Confidential, only for members of the consortium (including the Commission Services)	17

Description of deliverables

Availability note of IRIS Space-Ground infrastructure readiness (Q1/Q2 2021)

Availability note of Honeywell flight test aircraft (Q3/Q4 2021)

Availability note of Airbus flight test aircraft (Q1/Q2 2022)

Description will be done in PJ38 Demonstration Plan

Results and Conclusions will be reported in the PJ38 Demonstration Report.

D6.1 : Availability note of IRIS Space-Ground infrastructure [6]

Availability note for readiness of Space and Ground segment of Air/Ground SATCOM link.

D6.2 : Availability note of Honeywell flight test aircraft [14]

Readiness of Honeywell owned Embraer fitted with ATN B2 capable avionics and SATCOM capacity.

D6.3 : Availability note of Airbus flight test aircraft [17]

Readiness of Airbus flight test aircraft fitted with ATN B2 and SATCOM capacity.

Schedule of relevant Milestones

Milestone number ¹⁸	Milestone title	Lead beneficiary	Due Date (in months)	Means of verification
MS5	readiness of SATCOM/VDL interoperability test	12 - NATS	14	When both Ground/Space and Air/Ground segments will be ready (i.e. at the first available aircraft having SATCOM and ATN B2 capacity), it will be possible to start SATCOM/VDL2 interoperability tests.

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	ADS-C Common Service requirements	WP5	4 - DFS	5	Functional and System requirements to develop the ADS-C Common Service prototype.
MS2	Data Collection Platform	WP2	7 - EUROCONTROL	11	Experience gained while collecting data in PEGASE and DIGITS has shown that the analysis of collected ADS-C data requires the simultaneous collection contextual information. This contextual information might include, amongst others, planning information (flight plan, NM data...), position data (Radar or ADS-B tracks), A/C state vector information (FDR data), controller instructions... Before the availability of such platform, data collection infrastructure setup by the DIGITS partners will be used.
MS3	Readiness of ADS-C Common Service	WP5	4 - DFS	14	ADS-C Common Service prototype will allow several ground customers to establish ADS-C connection with 4D capable aircraft. The received ADS-C data shall be available to all interested project partners via the online distribution interface of the ACS (This shall include partners not hosting part of the ACS infrastructure themselves).
MS4	Readiness for Operational Evaluations	WP4	2 - AIRBUS	14	As a ground ATC Industrial Based Platform is available, Operational evaluations of ATC function can take place.
MS5	readiness of SATCOM/VDL interoperability test	WP6	12 - NATS	14	When both Ground/Space and Air/Ground segments will be ready (i.e. at the first available aircraft having SATCOM and ATS B2 capacity), it will be possible to start SATCOM/VDL2 interoperability tests.

1.3.5. WT5 Critical Implementation risks and mitigation actions

Risk number	Description of risk	WP Number	Proposed risk-mitigation measures
1	IRIS project (funding by European Space Agency) aims at providing a Space-Ground infrastructure as well as fitting some airliners with a certified avionics capacity. The project initially targets the overall feature to be available end 2021, but there is a risk not to have neither a Ground/Space infrastructure (Low) nor certified avionics (High) before end 2022.	WP6	The risk regarding Avionics is mitigated by the provision of flight test aircraft which will secure a minimum of flight tests hours. For the Ground/Space segment, it is proposed -if necessary- to make use of evolving IRIS test platform.
2	Number of flights operated by 4D capable aircraft not sufficient to perform relevant live trials (Low)	WP4	The methodology based on post-flight simulations allow to address objectives with evaluations by licensed operators. In addition, in synergy with WP18, the traffic generators used to support post-flight real-time simulations will give possibility to explore situations with the required number of 4D-capable simulated aircraft in a realistic manner.
3	Impact of Covid-19 crisis in 2021 and 2022	WP1, WP4	The impact of Covid-19 in the next 2 years can affect a lot of parameters. Planning can be shifted, and some re-organisations within Beneficiaries company can affect available resources. For ADS-C Common Service, in order to secure planning; it is proposed to start the activities on operational requirements as soon as possible (ie. Nov.2020). For Operational evaluations, should an objective be affected by the impact of the crisis, the opportunity to have many threads provides some flexibility to eventually modify the scope of some evaluations. It is not relevant to project any scenario at the start of the project. For VLD2/SATCOM interoperability, the mitigation already envisaged for the specific risk identified in the possible shift of IRIS project can also encompass Covid-19 risk.

1.3.6. WT6 Summary of project effort in person-months

	WP1	WP2	WP3	WP4	WP5	WP6	Total Person/Months per Participant
1 - DSNA	4	1	2	18	3	0.50	28.50
· ESSP	0	0	0	0	32	3.50	35.50
2 - AIRBUS	7	1	1	7	1	4	21
· AI OPS	0	7	9	25	1	6	48
· AI DS Space	0	0	0	31	0	0	31
3 - AIRTEL	0	0	3	0	40	2	45
4 - DFS	0	3.06	8	12	14	6	43.06
5 - ENAIRE	0	0.80	0	0	2	5	7.80
· CRIDA	0	2.20	1.50	0	4	0	7.70
6 - ENAV	0	2	2.50	5.50	5.50	2.20	17.70
· TECHNO SKY	0	1.50	3	2	1.50	0.73	8.73
· BULATSA	0	0	0	18.56	0	0	18.56
· DEEP BLUE	0	0	0	7.20	0	0	7.20
7 - EUROCONTROL	0	11	23	4	18	7	63
8 - HONEYWELL SAS	0	20	20	0	0	0	40
· HIsro	0	24	74	0	0	10	108
· Hlinc	0	1	1	0	0	0	2
9 - HC (FSP)	0	0	0	30.20	2	0	32.20
10 - INDRA	0	0	13.69	22.82	54.78	0	91.29
11 - LEONARDO	0	4	4	10	20	0	38
12 - NATS	0	5.70	19.20	10.60	16.20	13.50	65.20
13 - PANSA (B4)	0	0	4.80	14.70	3.50	0	23
14 - SKYGUIDE	0	2	4	16.50	2	0	24.50

	WP1	WP2	WP3	WP4	WP5	WP6	Total Person/Months per Participant
· SKYSOFT	0	0.50	1	8	0	0	9.50
15 - ANS CR (B4)	0	1	0.50	1	0	0	2.50
16 - LPS SR (B4)	0	0	0	0	0	0	0
17 - ON (B4)	0	0	0	0	0	0	0
18 - ATOS (FSP)	0	0	0	0	0	0	0
19 - FRQ (FSP)	0	0	0	0	0	0	0
20 - SAAB	0	0	0	0	0	0	0
21 - SINTEF	0	0	0	0	0	0	0
Total Person/Months	11	87.76	195.19	244.08	220.48	60.43	818.94

1.3.7. WT7 Tentative schedule of project reviews

Review number ¹⁹	Tentative timing	Planned venue of review	Comments, if any
RV1	16	Brussels	Intermediate Review Meeting

1. Project number

The project number has been assigned by the Commission as the unique identifier for your project. It cannot be changed. The project number **should appear on each page of the grant agreement preparation documents (part A and part B)** to prevent errors during its handling.

2. Project acronym

Use the project acronym as given in the submitted proposal. It can generally not be changed. The same acronym **should appear on each page of the grant agreement preparation documents (part A and part B)** to prevent errors during its handling.

3. Project title

Use the title (preferably no longer than 200 characters) as indicated in the submitted proposal. Minor corrections are possible if agreed during the preparation of the grant agreement.

4. Starting date

Unless a specific (fixed) starting date is duly justified and agreed upon during the preparation of the Grant Agreement, the project will start on the first day of the month following the entry into force of the Grant Agreement (NB : entry into force = signature by the JU). Please note that if a fixed starting date is used, you will be required to provide a written justification.

5. Duration

Insert the duration of the project in full months.

6. Call (part) identifier

The Call (part) identifier is the reference number given in the call or part of the call you were addressing, as indicated in the publication of the call in the Official Journal of the European Union. You have to use the identifier given by the Commission in the letter inviting to prepare the grant agreement.

7. Abstract

8. Project Entry Month

The month at which the participant joined the consortium, month 1 marking the start date of the project, and all other start dates being relative to this start date.

9. Work Package number

Work package number: WP1, WP2, WP3, ..., WPn

10. Lead beneficiary

This must be one of the beneficiaries in the grant (not a third party) - Number of the beneficiary leading the work in this work package

11. Person-months per work package

The total number of person-months allocated to each work package.

12. Start month

Relative start date for the work in the specific work packages, month 1 marking the start date of the project, and all other start dates being relative to this start date.

13. End month

Relative end date, month 1 marking the start date of the project, and all end dates being relative to this start date.

14. Deliverable number

Deliverable numbers: D1 - Dn

15. Type

Please indicate the type of the deliverable using one of the following codes:

R	Document, report
DEM	Demonstrator, pilot, prototype
DEC	Websites, patent filings, videos, etc.
OTHER	
ETHICS	Ethics requirement
ORDP	Open Research Data Pilot
DATA	data sets, microdata, etc.

16. Dissemination level

Please indicate the dissemination level using one of the following codes:

- PU Public
- CO Confidential, only for members of the consortium (including the Commission Services)
- EU-RES Classified Information: RESTREINT UE (Commission Decision 2005/444/EC)
- EU-CON Classified Information: CONFIDENTIEL UE (Commission Decision 2005/444/EC)
- EU-SEC Classified Information: SECRET UE (Commission Decision 2005/444/EC)

17. Delivery date for Deliverable

Month in which the deliverables will be available, month 1 marking the start date of the project, and all delivery dates being relative to this start date.

18. Milestone number

Milestone number: MS1, MS2, ..., MSn

19. Review number

Review number: RV1, RV2, ..., RVn

20. Installation Number

Number progressively the installations of a same infrastructure. An installation is a part of an infrastructure that could be used independently from the rest.

21. Installation country

Code of the country where the installation is located or IO if the access provider (the beneficiary or linked third party) is an international organization, an ERIC or a similar legal entity.

22. Type of access

- TA-uc if trans-national access with access costs declared on the basis of unit cost,
- TA-ac if trans-national access with access costs declared as actual costs, and
- TA-cb if trans-national access with access costs declared as a combination of actual costs and costs on the basis of unit cost,
- VA-uc if virtual access with access costs declared on the basis of unit cost,
- VA-ac if virtual access with access costs declared as actual costs, and
- VA-cb if virtual access with access costs declared as a combination of actual costs and costs on the basis of unit cost.

23. Access costs

Cost of the access provided under the project. For virtual access fill only the second column. For trans-national access fill one of the two columns or both according to the way access costs are declared. Trans-national access costs on the basis of unit cost will result from the unit cost by the quantity of access to be provided.

Page/section	Nature of change and reason
Part B	
1.1	Reference to SESAR Solutions #109, #115 and Wave 1 (10-2a and 18-6) (ref. to Shortcoming 5 from evaluation report)
1.3.a	Additional element on the added-value of data collection (ref. to Shortcoming 1 from evaluation report)
1.3.a	Clarification of VDL/SATCOM interoperability (ref. to Shortcoming 3 from evaluation report)
1.3.b	Additional element on the added-value of data collection (ref. to Shortcoming 1 from evaluation report)
1.3.b	Removal of confusion in the work package numbering.
2.1	An emphasize is put on the necessity to have a structured approach to assess performance benefits (ref. to Shortcoming 6 from evaluation report)
2.2.a	Additional information about the way coordination with standardization body (EUROCAE WG78) is to be done (ref. to Shortcoming 7 from evaluation report).
3.1.1	A Note introduced below Pert diagram clarifies synergy with PJ18W2 (ref. to Shortcoming 14 from evaluation report).
3.1.1	Name of Work Package "Project Management" updated in the Project structure.
3.2	Removal of confusion in the work package numbering.
3.2.2	Introduction of initial Risk assessment by Project Management Board (ref. to Shortcoming 9 from evaluation report).
3.2.2	Removal of confusion in the work package numbering.
3.2.6	Introduction of a dedicated paragraph to describe Project management process (ref. to Shortcoming 11 from evaluation report).
3.4.b	Clarification about misleading information on Airbus Other goods and services (ref. to Shortcoming 8 and 13 from evaluation report).
3.4.b	Removal of confusion in the work package numbering.
3.4.b	Clarification about the calculation of travel costs for Hungarocontrol, ESSP, Airbus, Airbus Operations and Airbus Defence and Space (ref. to Shortcoming 13 from evaluation report).
3.4.b	Introduction of "Other Direct Costs" table for Honeywell
4.1	Removal of confusion in the work package numbering.
4.1.1.1	Contribution of DSNA updated to consider Project coordination role
4.1.1.2	Contribution of AIRBUS updated to consider change in Project coordination compared to Proposal.
4.1.1.15	ANS CR change from Silent partner to "Not receiving EU funding" partner, also the description of the activity has been introduced.
4.1.2	CV of Project Manager completed (ref. to Shortcoming 12 from evaluation report) and including the transfer of leadership from Airbus to DSNA

4.2.1	Additional information about foreseen activity Airbus is likely to subcontract for communication purpose (ref. to Shortcoming 8 from evaluation report).
4.2.2	Removal of confusion in the work package numbering.
4.2.3	Additional description element about activity to be subcontracted by DFS.
4.2.4	Additional description element about activity to be subcontracted by DSN
4.2.14	Additional description element about activity to be subcontracted by SkyGuide.
5.1	Removal of confusion in the work package numbering.
5.1.2	Introduction of paragraphs describing Personal data storage, protection, exchange and destruction.

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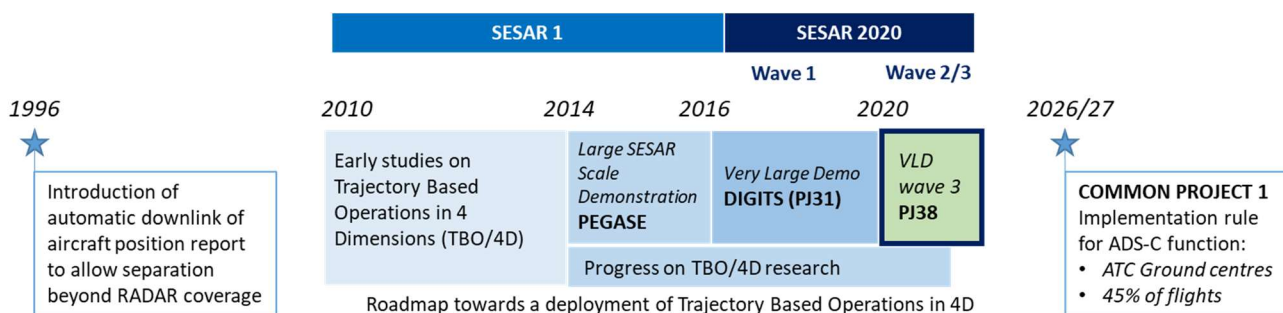
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1. Excellence

This project is part of the SESAR JU Single Programming Document 2020-2022. It is part of the Very Large Scale Demonstrations in the Industrial Research & Validation phase, developed under the SJU Private Public Partnership. This proposal addresses the topic “Downlinking Flight Trajectory to improve ATM performance” under the ident. SESAR-WAVE3-07-2020 of Technical Specification.

It is proposed in the continuity of initiatives aiming at making use of air-ground datalink technology to improve ATM functions and operations, in particular trajectory prediction.



1.1 Objectives

This project aims at completing the operational demonstrations of the usage of ADS-C and evaluating the appropriateness of proposed infrastructure to convey and share ADS-C data.

More in detail, the objectives of the project are to:

- Continue the data collection of ADS-C reports and related data sent by airline's aircraft equipped with the capacity to downlink flight trajectory information,
- Analyse characteristics, performance and behaviour of ADS-C Data Contents from operational and technical perspectives
- Perform operational evaluations to demonstrate and characterize the benefit of integrating ADS-C data in ATC systems, with a specific focus on the integration of SESAR Solution#115 (according to ATM Master Plan reference) in the continuity of initial works performed in Wave 1 (in particular 10-2a and 18-6),
- Demonstrate the feasibility of an efficient distributed ADS-C service ("ADS-C Common Service") on the ground, and
- Demonstrate the use of SATCOM link to complement VDL2 technology to ensure Air-Ground ATN connectivity (SESAR Solution #109 from European Master Plan).

Nota: the Automatic Dependant Surveillance – Contract (ADS-C) application on which PJ38 is based is a datalink Air-Ground application conveying a lot of flight information, such as trajectory prediction in 4 dimensions. The downlink of information is done automatically, i.e. without any flight crew specific action. It is generally completed by the suffix "ATS-B2" (Air Traffic Services Baseline 2) or "ATN-B2" (Air Telecommunication Network) indicating that it is designed to satisfy safety and performance requirements demanded by operations in continental airspace. This must not be mistaken with the original ADS-C version used to convey position report in oceanic airspace, neither with ADS-B (Broadcast) function, which permanently broadcasts aircraft position in a limited range (main feeder of flightradar24.com website).

1.2 Relation to the work programme (SESAR JU Single Programming Document 2020-2022)

Each individual objective defined in the paragraph above will be addressed by a dedicated Work Package. The following table indicates the contribution of each Work Package to achieve items listed in the "Wave 3 Call Technical Specification":

contribution of Work Packages to achieve items of technical specification	Continue the ADS-C data collection campaign Improve offline analysis of data to quantify the operational benefits Demonstrate in a live environment the use of new applications from Wave 1 IR and, potentially, also applications developed in Wave 2 Demonstrate the feasibility of ADS-C collection and distribution service Demonstrate the use, in real-time, of data provided via a common service architecture (Network Manager) Demonstrate the easy access to ADS-C data to consumers (e.g. in providing ATN connectivity) Demonstrate VDL and SATCOM complementarity beyond current VDL2 coverage thanks to SATCOM							
	Data Collection							
	Data Analysis							
	Operational evaluations							
	ADS-C Common Service							
	VDL/SATCOM interoperability							
<div>Prime contribution</div> <div>Enabling contribution</div>								

These Work Packages are set to ultimately contribute to the evidence of operational benefits, interact and cooperate to demonstrate together that:

- improvements are achievable on many operational aspects of ATM, -in particular in En-Route segment of flight executions-, and
- those improvements can be supported by a robust Air-Ground enabling datalink infrastructure, based on VDL & SATCOM technologies and a common service architecture for ADS-C data collection and distribution.

The goal is to improve situations that occur everywhere in Europe in daily operations in normal conditions of traffic.

Beyond the strict answer to SESAR-WAVE3-07-2020 item of the Technical Specification, this proposal comes within SESAR2020 programme in continuity of Wave 1 activities (PJ10.2a, PJ10.2b, PJ18.6, PJ31-DIGITS, PJ25-XTREAM) and in complement of Wave 2 solutions (PJ01-W2-08, PJ18-W2-53/56/57).

1.3 Concept and methodology

(a) Concept

For the Work Package “Data collection”:

During both PEGASE (Large Scale SESAR Demo) and DIGITS VLD (SESAR 2020 Wave 1 Very Large Demo) special attention has been paid to collecting and processing relevant data (including ADS-C reports) for the flights performed by the ATN-B2

equipped fleet, PJ38 will continue this activity and collect the data required to support its demonstration objectives (in particular, the quantification of the operational benefits and the development of ADS-C Common Service). The collected data may also support the SESAR programme and deployment activities.

Data collection will also provide evidence of the significance of the demonstration and monitor the correct behaviour of the air and ground systems and their conformance to the relevant standards.

For the Work Package “Data Analysis”:

During PJ31 DIGITS VLD (SESAR 2020 Wave 1 Very Large Demo) after having collected data (including ADS-C reports downlinked by the ATN-B2 equipped fleet), a special attention has been paid to their processing and analysis.

PJ38 will continue the activity of data analysis to support the demonstration of some objectives (in particular, the quantification of the operational benefits).

PJ38 will further refine the metrics and tools resulting from early inputs (PJ31 DIGITS) to go to a common Data Analysis Platform. It will also adapt and extend them to the new concepts and technologies which will be tested in PJ38, in particular ADS-C Common Service and SATCOM ATN connectivity aspects. Data analysis efforts will be addressed to develop a common analysis platform to support awareness, communication and visibility of results. The task will not rely only on ADS-C data but also several kinds of flight context information, see WP “data collection”.

For the Work Package “Operational evaluations”

They will be performed independently by each individual ANSP in its own environment and focussed on the specific operational use-case to be improved.

Overall, the following use-cases have been identified for evaluation by one or several ANSP:

2D Flight Plan consistency check:

Before the arrival of flight in a given airspace, and before coordination with upstream ATC Centre which is to transfer the responsibility of the flight, the goal is to automatically detect any discrepancy between the flight plan as perceived on-board the aircraft and the flight plan as expected on ground, based on the normal exchange of information (i.e. validated Flight plan and Letter of Agreement between ATC Centres), in order to avoid undesired nuisances.

Facilitate airline’s preferred trajectory (use of Top of Descent information)

Air Traffic Controller in En-Route airspace are responsible for authorizing flight crews to start their descent to destination. It is a tricky operation because, separation is more difficult to maintain when a flight is in vertical evolution. However, it can have a significant impact of fuel efficiency: for a given flight, starting the descent too early could result in levelling at a lower altitude – not optimal for engines consumption in particular-while starting the descent too late will require to use degraded aerodynamic configuration (speed brakes). The goal is to use the information of preferred Top of Descent available in ADS-C report to give visibility to the Controller so that she/he can manage the instruction the closer to the optimal, hence reducing fuel burn and CO₂ emission.

Conflict Detection

This is the core of the Separation task of the Air Traffic Controller. The Controller can be assisted by a system capable to identify potential conflict based on a prediction of flights behaviours. The goal is to improve the trajectory prediction of each flight, in particular by using elements from ADS-C for capable aircraft (e.g. accurate Trajectory prediction), in order to improve this automated detection. This a twofold goal: detecting the real conflicts earlier, and reducing the number of spurious detections. This feature is key to improve airspace capacity. Promising trials have been done in the frame of Wave 1 (Solution 10-2a) and the ratio of capable aircraft is key to allow airspace capacity increase.

Conflict Resolution

As a step just beyond the Detection task, a better Ground trajectory prediction can be also used to assist the Controller to take the best resolution decision when a conflict is detected.

Thanks to an earlier detection and a better anticipation, this feature allows to improve flight efficiency and to avoid “snowball effect” induced by inadequate resolution.

Conformance Monitoring (i.e. checking the compliance with an ATC instruction)

Aligned with the 2D Flight Plan consistency check, and after a Controller has instructed to a flight crew to modify its trajectory, the ADS-C report can be used to identify when this instruction has been actually input in the flight management system. This feature is all the more so powerful that Controller / Flight crew exchanges are done via datalink messages (i.e. CPDLC application).

Traffic sequencing in TMA

The Time of Arrival Range ADS-C message may be requested by an arrival manager (AMAN) system to enhance its calculation of arrival sequence, by taking into account the aircraft system's calculation of achievable window of arrival time at a metering point.

Traffic flow management and arrival sequencing in En-Route

Managing traffic flows and arrival sequences towards destination airports in En-route is key to dynamically balance airspace demand and capacity. In particular, the concepts related to extended arrival management (E-AMAN) have been demonstrated in SESAR Wave 1 (xStream/PJ25 VLD)

The integration of ADS-C data to enrich the traffic picture of local ATFCM tools and extended-AMAN system can improve further traffic flow and sequence management processes by better taking into account the aircraft intended/preferred trajectory (e.g. Top Of Descent, speed profile and Estimated Times Over fix). Improved arrival management tools will allow reducing the operational measures to absorb delays. Besides, Integrating airspace user's preferences for better flow management and sequencing will also increase flight efficiency and enhance predictability of trajectories and arrival sequences.

For the Work Package “ADS-C Common Service”

The project will build on the results of an ad-hoc working group on ADS-C Common Service started by PJ31 DIGITS demo partners which drafted an initial set of ACS requirements.

Background Wave 1:

PJ31 DIGITS featured the first large-scale demonstration of ADS-C data exchange and enabled a collection of real-world ADS-C data at an unprecedented scale. While EUROCONTROL prototyped the online distribution of ADS-C reports, DIGITS wave#1 data collection architecture however is to a large extent based on one-to-one relationships of ADS-C end systems and ADS-C data users. Several ANSPs operated ADS-C test platforms covering their respective Areas of Interest, with considerable overlaps for neighbouring airspaces, requiring multiple parallel ADS-C connection. Scaling up this approach to a larger number of partners would increase this problem and redundancy. There is agreement among the current PJ31 partners as well as prospective PJ38 partners that a “one ADS-C end system per ANSP” would be an inefficient and inappropriate architecture choice for deployment. Instead an ADS-C Common Service Architecture is proposed and shall be demonstrated in this project. The ADS-C Common service aims at downloading relevant ADS-C data once on the A/G link and then serving it via SWIM and a G/G link to all entitled and interested ground actor. A key contribution of the activity will be to document mature and demonstrated ADS-C Common Service as part of a dedicated DemoR appendix, which can build the basis of subsequent standardization and industrial procurement activities.

For the Work Package “VDL/SATCOM interoperability”

PJ38 is primarily planning to make use of the opportunity given by the project IRIS (managed by the European Space Agency) that will equip up to 20 Airbus A320 family aircraft with an avionics upgrade that will enable ATN B2 datalink (both CPDLC and ADS-C) connection over SATCOM.

The project timeframes for IRIS and PJ38 overlap. Should IRIS planning shift (for instance as crisis aftermath) and jeopardize the possibility to match with 2022 target, some flight tests with Honeywell and Airbus aircraft will secure a minimum of trials data.

The VDL/SATCOM interoperability will be demonstrated from a Ground perspective: for a given aircraft, a single communication means can be used at a given time. The configuration of the demonstration will be set to make sure that SATCOM link will be tested with capable aircraft.

It has to be noted that no other terrestrial means (such as LDACS) can be demonstrated in the time frame of the Project.

Nota: Airborne industry partners will support ANSP operational analysis by investigating any limitation observed in the collected data, and by recommending ways to use the 4D trajectory so as to optimize overall performance. In addition, improvements of the airborne system will be studied, aiming at reducing further the uncertainty on the aircraft intent: solutions to increase availability of a trajectory (e.g. reduce occurrence of discontinuities), improvement in prediction accuracy, elaboration of a more realistic trajectory when the aircraft is radar vectored.

(b) Methodology

Various technics and methodologies will be used though the individual Work Packages and eventually according to the specific targeted operational improvement.

The validation platforms involved are:

- SKYGUIDE industrial-based platform (skysim) deployed for PJ18-W2 solutions 53 and 56 and extended with additional PJ38 capabilities.
- DSNIA industrial-based platform for tactical Air Traffic Flow and Capacity Management (ATFCM) in REIMS ACC and Extended Arrival Management (E-AMAN) in PARIS ACC
- MUAC Pre-Operational platform (continuous evolution all along the project lifecycle)
- DFS iCAS platform, supplied by Indra and currently deployed in KRH Operation Centre, upgraded with ADS-C prototypes.
- ENAV PJ38 demonstration platform (upgrading ENAV PJ31 DIGITS platform and complemented by Controller Working Position and ATC tools resulting from PJ18-W2 Sol. 53)
- PANSA iTEC Test and Validation platform with tools from PJ18 W2 and support for ADS-C
- NATS platform for operational evaluations (based on evolution of ATN Baseline 2 test platform used for live ADS-C data collection during the PJ31 DIGITS project, including prototyped functions for real-time simulations)
- TESLA platform supplied by Airbus Defence and Space to support exercises with HungaroControl and BULATSA
- Airtel will provide the Common ADS-C Server but it will be hosted by other partners (ANSP) to be further defined (during “Technical and architecture option” task)
- IRIS Space/Ground infrastructure (deployed by the ESA Iris programme external to Pj38)
- Airbus will provide a flight test aircraft from A320 family, equipped with 4D capable avionics combined with SATCOM capacity.
- Honeywell will provide a flight test Embraer ERJ 170-100LR aircraft (matriculation N170EH), equipped with latest EPIC avionics suite software upgrades. To support the validation, this aircraft will be fitted with SATCOM, Datalink and FMS prototypes enabling downlink of the extended projected profile using ATN B2 ADS-C.

For the Work Package “data collection”:

A sound data collection process is a prerequisite to many activities both in PJ38 (e.g. quantification of the operation benefits and the study of the safety aspects) and in the SESAR programme as whole (e.g. PJ18 W2 needs). The collected data might also feed other future more exploratory research. The detailed and complete datasets will also support future deployment activities including the development of safety cases.

Given PJ38’s partners it will be possible to conduct data collection at an unprecedented scale covering most of Europe’s core traffic area.

Experience gained while collecting data in PEGASE and DIGITS has shown that the analysis of collected ADS-C data requires the simultaneous collection contextual information. This contextual information might include, amongst others, planning information (flight plan, NM data...), position data (Radar or ADS-B tracks), A/C state vector information (FDR data), controller instructions...

The availability of representative operation contexts will also support the framing of safety case arguments and provide a basis for evidence.

To fulfil the VLD data collection objective, the following methodology will be applied:

- Identification and definition of the collected elements:
 - A *Data Dictionary* of the elements collected by the different partners will be elaborated:
 - The data dictionary will document the type of data, its format...
- Definition and provisioning of the *Data Collection Platforms*
- Definition and provisioning of Data Repositories (local/central)

- Data collection and monitoring

All partners will record the relevant ADS-C data received during the ADS-C dialogues they will establish with the equipped A/C. The identification and definition of the collected elements will allow each partner to determine the additional information it needs to fulfil its objectives in the VLD. Moreover, the identification phase will determine the requirements in term of data collection and sharing as well as the possible restrictions to the use of data by other partners or within the SESAR Programme and the need to setup specific sharing agreements when required.

The collection of the necessary data and its storage require dedicated processes and the provisioning of platforms and storage.

Data collection will start with the current ATN B2 equipped fleet and will be able to accommodate any new Aircraft delivered with ATN B2 avionics or existing Aircraft retrofitted to be ATN B2 compatible. The data collection infrastructure setup by the DIGITS partners will be available from the start of the project in order to maximise the amount of data collected. Along the progress of Work Package , data collection will evolve as the PJ38 infrastructure becomes available.

For the Work Package “data analysis”:

PJ38 will further refine the metrics and tools resulting from early inputs (PJ31 DIGITS). It will also adapt and extend them to the new concepts and technologies tested in PJ38, in particular distributed ADS-C Service and SATCOM ATN connectivity aspects. Due to the increasing number of ground partners with interest and dependencies on the analysis results, PJ38 will enforce efforts to communalize data analysis efforts where appropriate and investigate the potential of a common analysis platform to support awareness, communication and visibility of results. The task will not rely only on ADS-C data but also several kinds of flight context information, see WP “data collection”.

For the Work Package “Operational evaluation”:

The preferred option to demonstrate benefits is by measuring in shadow mode or real operations live trial the ultimate effect in terms of:

- Safety indications (capacity of ATC operators to manage situations, positive effects on traffic separation),
- Airspace capacity (ATC/flight crew workload),
- Flight efficiency (flown track distance, Vertical trajectory profile, delay/predictability).

This is possible for some use-cases, that can be achieved with simple modifications to ATC working position and that do not depend on the ratio of capable aircraft. Based on real recorded traffic situations, various methodologies and technics will be used to demonstrate other operational use-cases. The table here below indicates the preferred technic according to operational use-case:

Operational use-case	Methodology to be used
2D Flight Plan consistency check	<p>Shadow mode/ real operations live trial</p> <p>Flight Plan consistency check has already been tested in the frame of DIGITS project by Maastricht Upper Airspace Centre. A notable feature is that it provided an obvious safety improvement for each individual aircraft downlinking the information.</p> <p>On top of the pure display of discrepancy warning between:</p> <ul style="list-style-type: none"> • what the flight is expected to do (from the ground perspective) and

	<ul style="list-style-type: none"> what the flight is projecting to do, <p>it has been observed that the application can also give to Air Traffic Controller an invaluable level of awareness with regard to the trajectory to be flown by airlines operating “free routing” flights. These new types of operations where flight plan are more direct and more efficient do not necessarily adhere to defined waypoints, which reduces the predictability of trajectories as seen by the Air Traffic Controllers without the information of aircraft flight intent.</p> <p>Several other ANSPs will proceed with evaluation in Shadow mode and real operations.</p> <p>As any new function introduced on the Controller Working Position, a training is required, which makes Shadow mode a good candidate to start.</p>
Stick to airline’s preferred trajectory (use of Top of Descent information)	<p>Shadow mode/ real operations live trial</p> <p>The information of ideal “Top of Descent” (as per FMS¹ computation) is downlinked by the aircraft via the ADS-C application.</p> <p>The display of such information on the Controller Working Position implies a training, which makes Shadow mode a good candidate to start. It is envisaged to rapidly introduce this feature in real operations as a “quick wins” for inciting airlines to operate 4D capable aircraft the soonest.</p>
Conflict Detection	<p>Shadow mode and Real operations live trial are considered under conditions to be further determined, in low traffic situation and pending impact on controllers’ ways of working.</p> <p>Enhanced Conflict Detection tools impact significantly the interface of Air Traffic Controller, resulting in an important associated training. The effect resulting from a Conflict Detection function is the resolution decision from the Air Traffic Controller. Shadow mode could have a limited interest because the interaction with traffic is not feasible. However, it is envisaged to assess the operational use of Enhanced Conflict Detection tools in a pre-operational environment with real traffic data.</p> <p>In order to address widely the targeted objectives, the most adapted methodology is the post-flight replay in real time:</p> <ol style="list-style-type: none"> Record real situations Abstract samples where conflicts have been managed with current ATC tools (preferably implicating 4D capable aircraft) Re-play those situations (in <i>real time</i> a priori but could be accelerated) with Air Traffic Controller benefitting from an improved Conflict Detection function.

¹ FMS : Flight Management System
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	<p>4. Compare the two cases (real vs. with upgraded tools) in order to:</p> <ol style="list-style-type: none"> Evaluate how many spurious conflicts have been solved unnecessarily (i.e. having induced a workload while the conflict detection was resulting purely from inaccurate predictions) Measure the “time before conflict” at the moment an actual risk of conflict has been detected. The idea is that, the earlier it is anticipated, the better it can be managed. Measure the resulting impacts on the distribution of tasks between the Planner and the Executive controllers (it is anticipated that the Planner will have better anticipated views on the conflicts) <p>Nota: by the using an advanced Traffic Generator emulating realistic flight behaviour, it is possible to produce scenarios including virtually additional 4D-capable aircraft in order to reach a ratio of e.g. 45% of traffic equipped (= target Common Project 1). The main parameters driving the flight prediction from an aircraft that cannot be known accurately by a Ground system are the following:</p> <ul style="list-style-type: none"> actual weight (depending on payload), airline strategy setting (i.e. time vs. fuel), weather forecast used by the aircraft system as computation input (wind and weather predictions) actual wind/temperature condition the aircraft is facing, limited accuracy of the aircraft performance of ground model.
Conflict Resolution	<p>Shadow mode and Real operations live trial are considered potentially in relation with Conflict Detection (see above).</p> <p>Conflict Resolution implies a direct interaction with the traffic because in case of detected conflict, the Air Traffic Controller will give an instruction to modify the trajectory of at least one aircraft involved in the conflicting situation.</p> <p>To cover the overall objectives, the most adapted methodology is the post-flight replay in real time:</p> <ol style="list-style-type: none"> Record real situations Abstract samples where conflicts have been managed with current ATC tools (preferably implicating 4D capable aircraft) Re-play those situations with Air Traffic Controller benefitting from an improved Conflict Detection function. Compare the two cases (real vs. with upgraded tools) in order to measure: <ol style="list-style-type: none"> The Air Traffic Controller workload variation (e.g. number of interventions actually made the Air Traffic Controller in a given period of time),

	<p>b. In particular, the resulting impacts on the distribution of tasks between the Planner and the Executive controllers (it is anticipated that the Planner will have more often the means to solve conflicts with confidence)</p> <p>c. The overall effect on flight efficiency (i.e. mainly global distance and time flown by flights considered in the scenarios).</p> <p>Shadow Mode is considered useful as well as other methodologies to assess the operational use of Conflict Resolution tools in a pre-operational environment with real traffic data.</p>
Conformance Monitoring (i.e. checking the compliance with an ATC instruction)	<p>Shadow mode/ real operations live trial</p> <p>The same technic as for “2D Flight Plan consistency check” can be used, when an instruction is provided to a flight crew operating a 4D capable aircraft.</p> <p>Post-flight replay in real time will also be used when function is associated to an advanced “Conflict resolution” tool, in particular when Controller to Pilot DataLink Communication (CPDLC) is used to uplink the instruction to solve a conflict.</p>
Traffic sequencing in TMA	<p>Shadow mode</p> <p>The controllers will benefit from assistance to build robust and efficient Arrival sequence in dense TMA. PJ38 will build on wave#1-PJ31 outcomes and investigate offline what the benefits are of adding further ADS-C data downlinked from aircraft (such as ETA min/max indications) into Arrival Manager systems to improve the accuracy and stability of arrival sequences.</p> <p>This will be based upon a comparison with actual recorded AMAN operations, in an offline mode, in order to assess a quantifiable improvement to the operation from integrating this data.</p>
Traffic flow management and arrival sequencing in En-Route	<p>Shadow mode and Real Operations live trial are considered for demonstration methodology.</p> <p>Extended Arrival Management (E-AMAN) to initiate traffic sequencing in Upper Area Control, including in cross-border operations (XMAN), have been demonstrated PJ25 XSTREAM, but without the use of ADS-C data . The integration of ADS-C data into an innovative interface for local traffic flow management and sequence management (IODA) have been investigated in Wave 1 Solution PJ.01-03B — Dynamic and Enhanced Routes and Airspace Studying the feasibility and evaluating the benefits of ADS-C (in particular the EPP - Extended Projected Profile) provision to the ground, to facilitate efficient climbs and descents in Paris ACC. This evaluation will be further progressed in PJ38 with the use of ADS-C data collected from real operations (instead of simulated data).</p>

For the Work Package “ADS-C Common Service” (ACS):

Proposed approach for Wave 3:

Initial ACS requirements have been drafted in Wave 1 in the frame of PJ31 DIGITS project. PJ38 will take over the management and elaboration of these requirements and corresponding CONOPS with the partners contributing to PJ38 ACS activity. This will include the definition of functional service evolution and agreement of ADS-C contract settings (settings to support the user needs in terms of operational benefit demonstration).

PJ38 consortium, with the help of participating industry, will develop one or more prototypes of ACS in the first part of the project. Necessary testing & accepting activities will be carried out to prove that the prototype is fit for purpose and can be declared available for the flight trials / demonstration phase. (Note that until this stage is reached, the wave#1 infrastructure is planned to stay in place to continue to collect data, see data collection activity).

In the second part of the project, the ACS prototype(s) will be demonstrated with real-world traffic generated by cooperating Airspace Users. As the ACS can be decomposed in several Functional Blocks, multiple PJ38 beneficiaries may partner to host respective parts of the infrastructure and provide one ACS together.

Link with other Work Packages and other Projects:

From the start of demonstration of the ACS prototype in the flight trial, the received ADS-C data shall be available to all interested project partners via the online distribution interface of the ACS (This shall include partners not hosting part of the ACS infrastructure themselves). For the ground partners (ANSPs and NM) the access is expected to cover all ADS-C related data, for cooperating airlines, dedicated profiles with access to their own data only is expected (as in PJ31 DIGITS, due to commercial reasons). The users of the ACS (ANSPs, Network Manager, Airspace Users...) will take the responsibility of implementing the client-side interfaces (as defined in the applicable ICDs).

For the Work Package “VDL/SATCOM interoperability”:

PJ38 is to make use of the opportunity given by the project IRIS (managed by the European Space Agency) that will equip up to 20 Airbus A320 family aircraft with an avionics upgrade that will enable ATN B2 datalink (both CPDLC and ADS-C) connection over SATCOM.

The project timeframes for IRIS and PJ38 overlap. While Iris focus on preparation of the SATCOM infrastructure enabling continental datalink over SATCOM, PJ38 will bring the concept one step further towards deployment by demonstrating the end to end performance achieved by ATN B2 applications over this infrastructure.

To ensure a wider interoperability assessment, a Honeywell owned Embraer test aircraft and an Airbus flight test aircraft will also demonstrate ATN B2 datalink exchanges over SATCOM in Europe. It also provides a means to mitigate the risk of a possible shift of IRIS project planning.

1.4 Ambition

The *operational evaluation* activities will provide ANSPs and system suppliers with:

- An opportunity to evaluate advanced prototypes, for several ATC functions,
- The means to specify accurately the operational requirements of those ATC functions that can benefit from TBO/4D data, and
- Performance indicators that will help decision making for industrialisation.

This later item will be supported by *data collection and analysis*. On top, *data collection* will help to monitor the correct implementation and functioning of the systems.

The development and testing of the *ADS-C Common Service* will allow:

- Facilitating the access to ADS-C for data in real time,
- Anticipating the certification of such a system (including analysis of Regulatory and Safety aspects), and
- Preparing the industrialization of an efficient means of ADS-C data distribution.

Globally, the implementation of an ADS-C Common Service is a means to optimize costs and the use of VHF DataLink.

On this last aspect, *VDL/SATCOM interoperability* is to complement the current infrastructure with a robust and reliable datalink means.

2. Impact

2.1 Expected impacts

a) Technical Impact

With such a wide panel of ANSPs and industry leaders working together on the pre-deployment of a common ADS-C service, PJ38-W3-ADSCENSIO brings Europe one step further towards harmonization of ATM systems and processes.

- This first air /ground machine-to-machine implementation opens the door for more automation to assist humans, and paves the way to future automatic air ground processes.

Data collection is an “enabler” of the VLD. It is a pre-requisite to the analysis and quantification of the operational benefits. Data collection is also central in proving the significance of the demonstration and monitoring its correct execution

- Integration of ADS-C in ATC systems and local Air Traffic Flow Centralized Management (ATFCM) tool

The first step in implementing ADS-C is establishing and handling the ADS-C connection and Contracts. After the ADS-C data has become available in the ground systems a multitude of sub-systems and applications can start using this ADS-C data. It is important to know that the different applications can start using the ADS-C in their own way independently with regard to the time line and depending on the maturity of the application available. This allows an evolutionary roadmap which cover many years in a mix of different application maturities and individual timelines for each ANSP.

For each individual case, -i.e. ATC usage (e.g. monitoring a trajectory, detecting a conflict, checking conformance with ATC instructions or anticipating/organizing a traffic sequence on a bottle-neck airspace) in a specific operational environment-, what is at stake is to identify the relevant level of complexity of data integration.

- The ADS-C Common service provides a unique opportunity to deploy standard services and tools enabled by aircraft trajectory downlink.
- The ADS-C Common service is a key precursor to Air Traffic Management digitalization. As opposed to basing flight trajectory prediction updates on verbal reports from the crew, the ADS-C Common service provides European ATM

services with online access to timely, accurate and comprehensive aircraft intent information. One of the main technical impact of the implementation of an ADS-C Common Service is the saving of the air/ground bandwidth thanks to the centralised ADS-C Common Service; instead of having a peer-to-peer connection between the aircraft and the ANSPs where most likely the same information will be exchanged, there will be a single connection between the aircraft and the centralised server on the ground. This will have a positive impact on air/ground subnetworks with limited bandwidth such as VDL Mode 2. In terms of capture of downlinked information, the most visible aspect will settle in the technical capacity to manage ADS-C connections with many aircraft and distribution of data, -hence reducing the required number of ground systems interfaced with air traffic-. But an important task will be to define the most balanced settings to optimize ADS-C connections so that the data required for ATC systems will be available while alleviating overall datalink demands.

In terms of distribution of the information, dissemination via SWIM compliant protocols will enable an extension of users beyond the current planned ANSPs focus. Allowing an easy access for many applications, e.g. AOCs, Meteorological institutes. It will improve efficiency for the ANSPs avoiding the need to establish individual ADS-C contracts with the aircraft.

- VDL/SATCOM interoperability:
Proving the efficiency of using SATCOM, which will be a complementary technology to VDL Mode 2 and, somehow, will alleviate VDL frequency congestion, mainly, in the centre of Europe.

b) Economic Impact

There are economic impacts at 3 levels: i) during the execution of the project, ii) as a result of the project and iii) at the application of targeted improvements.

- i. During project execution:
 - a. By ensuring the online data access for all project members according to their needs (enabler for Operational Benefits Demonstrations)
 - b. By enabling the data collection without overloading the network
- ii. As project result:
 - a. By providing mature system specification, safety and regulatory analysis, as input to service industrialization, procurement and certification
 - b. By making the bar lower for any new partner interested
- iii. At the application of improvements:
 - a. Reduction of fuel costs by allowing flights to closer stick to their preferred trajectory
 - b. Optimize Air Navigation Services efficiency by increased automation in ATC processes
 - c. Increase airspace capacity based on a better and more efficient routing for the aircraft.

c) Social Impact

The application of improvements targeted to be demonstrated by the project will drive to:

- Enhance safety by providing more visibility and anticipation to ATC,
- Reduce flight delays, thanks to an increased airspace capacity combined with the use of assistance tools for controllers to sequence traffic on hot spots,
- Reduce CO2 emissions by allowing flights to closer stick to their preferred trajectory.

The Project members will study a structured approach to provide a synthesis allowing an assessment of the overall benefits resulting from the combination of various demonstration activities.

2.2 Measures to maximise impact

a) Dissemination and exploitation² of results

PJ38-W3-ADSCENSIO stakeholders will directly exploit the results

The prime audience with regard to the results of the PJ38 are the Air Navigation Service Providers; in particular because it allows them to evaluate some prototypes and specify more accurately the ATC functions taking benefit from ADS-C data.

At a second rank, ATC systems and service suppliers also benefit from the PJ38 results as it gives the means to test pre-industrial prototypes in real environment.

EUROCONTROL will benefit from PJ38 to assess ways to make ADS-C data available to Network Management systems.

PJ38 includes precisely among its members 11 major European ANSP, EUROCONTROL and major actors of the Air-Ground segment, so that the main beneficiaries of the Project activities are the members themselves, but noting that the results will be equally applicable and available to stakeholders beyond the PJ38 partners.

PJ38-W3-ADSCENSIO will disseminate results through SESAR community

On top, the Data collected in the frame of PJ38 will be disseminated to SESAR Projects from Industrial Research Wave 2, in particular PJ18 Solutions 53 and 56 to be exploited in their own validation activities. Several PJ38 actors are also in PJ18 and will then participate to respective Exercises Open-Days to present PJ38 observations, achievements and progress.

PJ38-W3-ADSCENSIO will enforce standardisation

The final version of Demonstration Report, which will be published at the end of the Project, will provide recommendations that will facilitate other ANSPs to apply functions based on implementation of Air Traffic Baseline 2 standard (EUROCAE ED-228A / RTCA DO-350A). Should implementing suggestions be identified during the execution of the project, they will be communicated at standardisation level for integration in an eventual updated version. It will be decided in Project Management Board and documented in yearly report. In addition, -at least as far as Airbus is concerned-, the individual in charge of representing Airbus in standardization body (i.e. EUROCAE WG78/RTCA SC214) also participate to Work Package “Data Analysis”.

The Work Package dealing with prototyping and testing an ADS-C Common Service will also lead to the production of implementation guidelines.

PJ38-W3-ADSCENSIO have interest to maximize its impact

² See participant portal FAQ on how to address [dissemination and exploitation](#) in Horizon 2020

Dissemination of PJ38 results will target a worldwide audience, because their application will also provide and answer to Air Traffic Management issues in other areas handling an important air traffic (e.g. North America, China, Japan, Middle East...). European systems and service suppliers can then have opportunity to extend their market.

PJ38-W3-ADSCENSIO can energize other projects

PJ38-W3-ADSCENSIO is autonomous to achieve its objectives. On top, it can develop synergies with projects likely to be awarded in the frame of Open VLD 2 Call, especially with those addressing Topics 2 (Trajectory Based Operations) or 4 (Protection of Green flights). Combined working sessions, -in particular if airlines participate to those projects-, would create additional value for operational topics and accelerate the dissemination of results.

b) Communication activities^{3,4}

The Work Package “Project Management” will host communication activities

A PJ38 event (1 or 2 days) will be organized, likely in Q3 or Q4 2022 in the premises of one of the partners in order to showcase achievements of the project.

Multimedia materials, including videos will be done, collecting the interviews from various stakeholders, and highlighting end-users benefits. Formats will be adapted according to the audience: short format (below 5 minutes) for publication in social media, while more pedagogic ones will be done for specialized audience. Yearly World ATM Congress is targeted to be also the opportunity of specific demonstrations.

Press released will be attached to major demonstration milestones.

Each partner of PJ38 will also communicate through its own corporate intranet.

3. Implementation

3.1 Work plan — Work packages, deliverables

Definitions:

‘Work package’ means a major sub-division of the proposed project.

‘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.

The consortium proposes to initiate some activities on **1st November 2020**, in particular to allow partners not currently involved in wave 1 PJ31-DIGITS to be acquainted in detail with the features of this project.

³ See participant portal FAQ on how to address [communication activities](#) in Horizon 2020

⁴ For further guidance on communicating EU research and innovation for project participants, please refer to the [H2020 Online Manual](#) on the Participant Portal.

3.1.1 Project Structure

The project is divided into 6 different Work Packages; each split into a certain number of activities and to a certain extent, coordinated independently by its WP. The project structure is displayed in Figure 1.

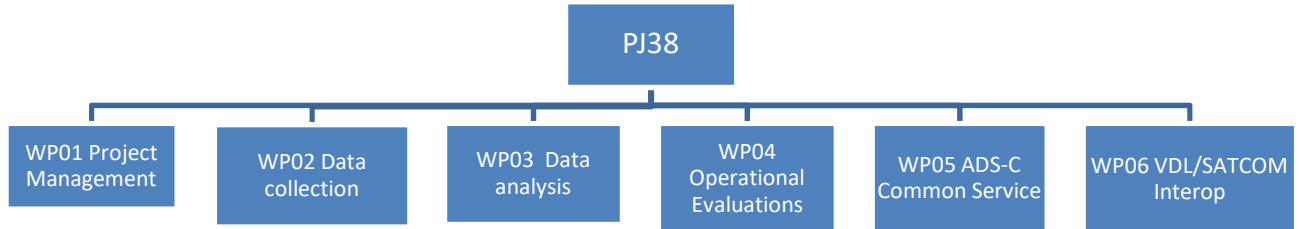


Figure 1: ADSCENSIO Work Break Down Structure

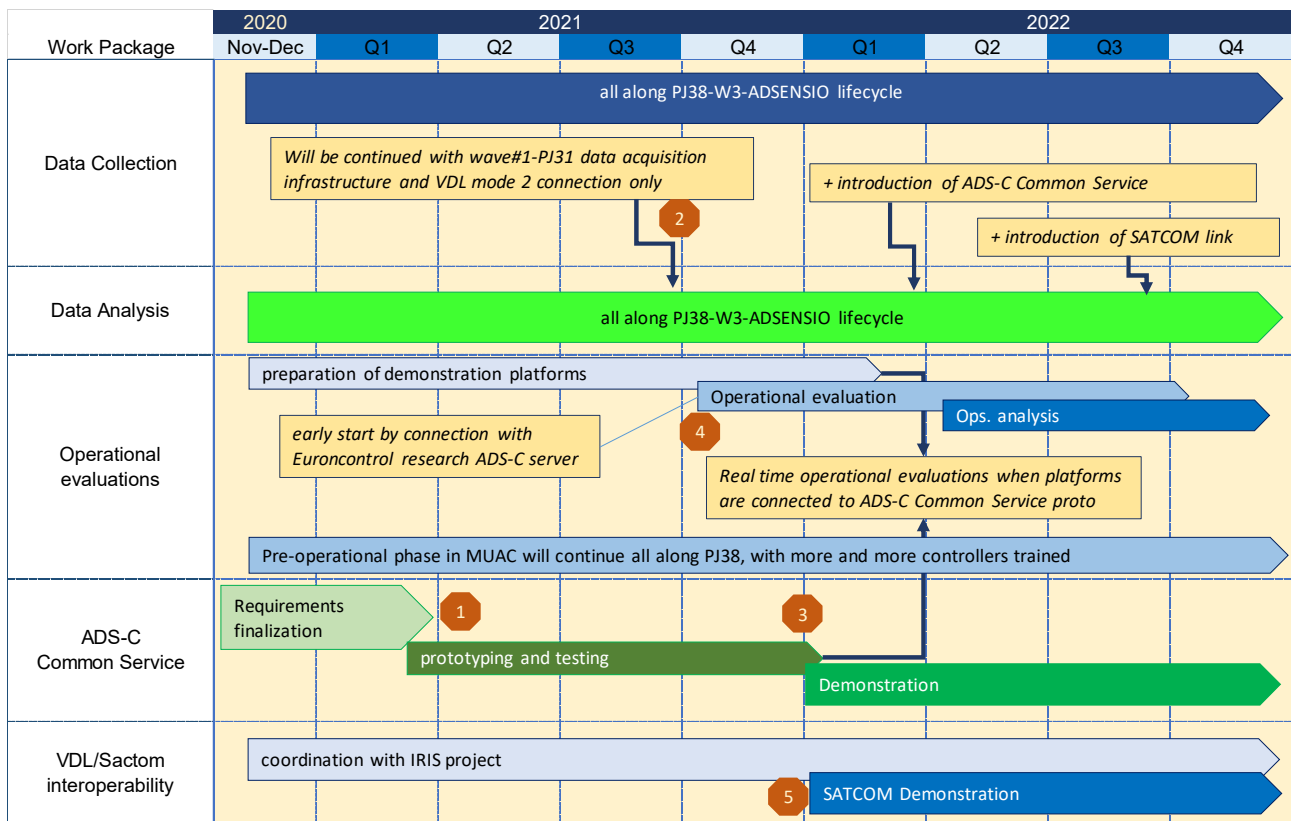


Figure 2: PJ38-W3-ADSCENSIO Gantt Chart

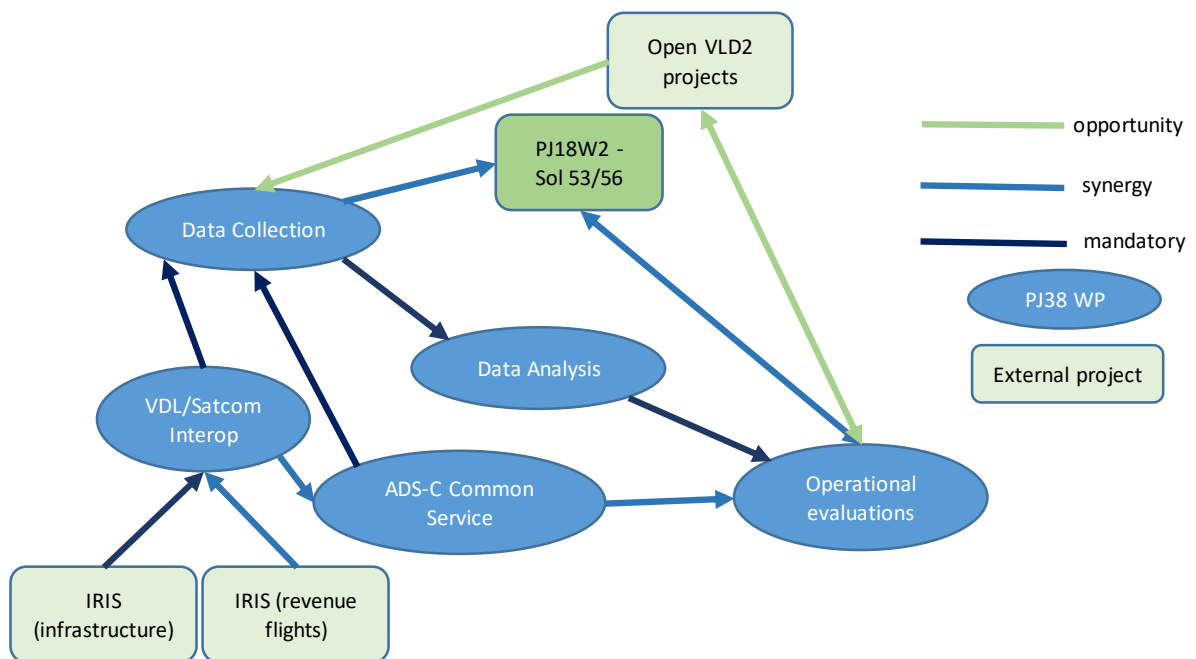


Figure 3: PJ38-W3-ADSCENSIO Pert Diagram

Nota: Synergy with PJ18W2 (specially Solutions 53 and 56) is supported by common partners, -and sometimes same experts- using potentially common platforms but in different contexts and operational environment. Solutions 53 and 56 will be able to use data collected and shared by PJ38. However, there is no strict dependency as none project is to deliver an output expected as an output for the other.

3.2 Management structure, milestones and procedures

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.

A lean and efficient management structure will be applied that allows for fast decision making to ensure that the pursued objectives are met. The SESAR2020 Membership Agreement (SMA) specifies management rules that govern the project’s workflow as well as all responsibilities and duties of the partners during the course of the project. The administrative and organisational management activities are hosted in WP Project Management. This approach will allow an effective and efficient assignment of partner contributions, while facilitating separation of operational and technical 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 4.

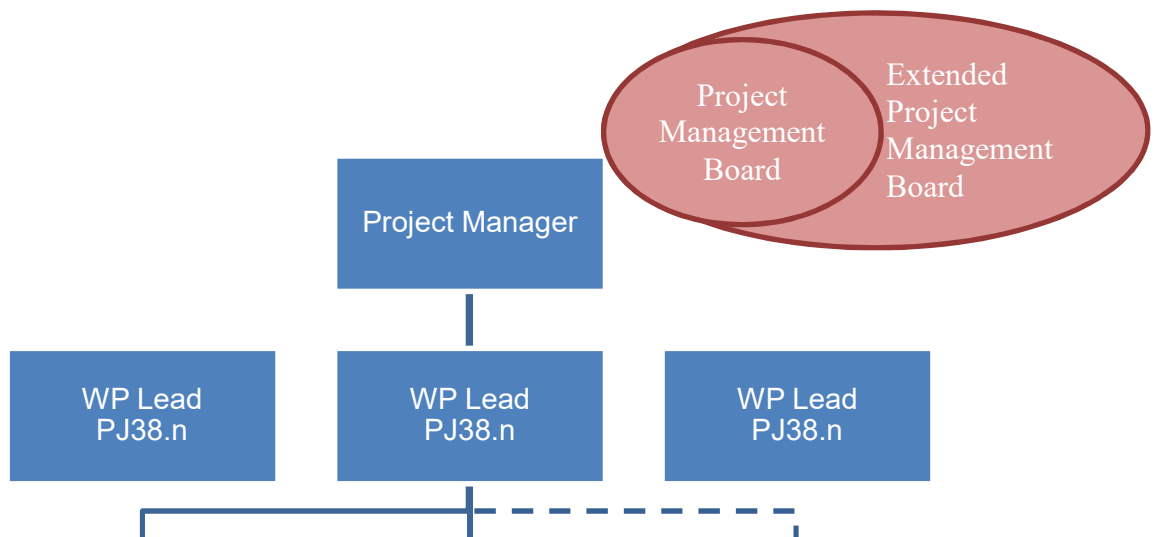


Figure 4: Project Structure for VLD Project

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. At the implementation level Work Package Leaders (WPLs) 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 Programme 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 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;
- ensuring with partners the engagement of 3rd parties (such as but not limited to airspace users, staff associations, etc.), where applicable;
- 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.

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 work package, or in the project if the decision applies to the whole project. In case of disagreement, the escalation process foreseen in Appendix F of the SJU Membership Agreement will apply.

The 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.

A specific attention will be paid to the assessment of risks identified at the start of the project:

- availability of Space-Ground infrastructure for Work Package VDL – SATCOM interoperability;
- impact of Covid-19 crisis on traffic operated by 4D-capable aircraft for operational evaluations (Work Package Operational evaluations).

The Project Management Board will be composed of:

- Project Manager (chairman);
- WP leaders;
- Representatives of key contributor to the project (if not represented by above categories).

SJU may be invited for specific agenda items.

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. SJU may be invited for specific agenda items.

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:
 - VLD Demonstration Plan
 - VLD Demonstration Report
- Change Request to the SGA.

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

3.2.4 Work Package Leader (WPL)

The Work Package Leader is the person responsible for the operational and technical leading of the Work Package. He/She is responsible for the SESAR Work Package refinement, the overall management of related validation activities and timely delivery of the Work Package contribution to deliverables. In particular, the Work Package Leader will:

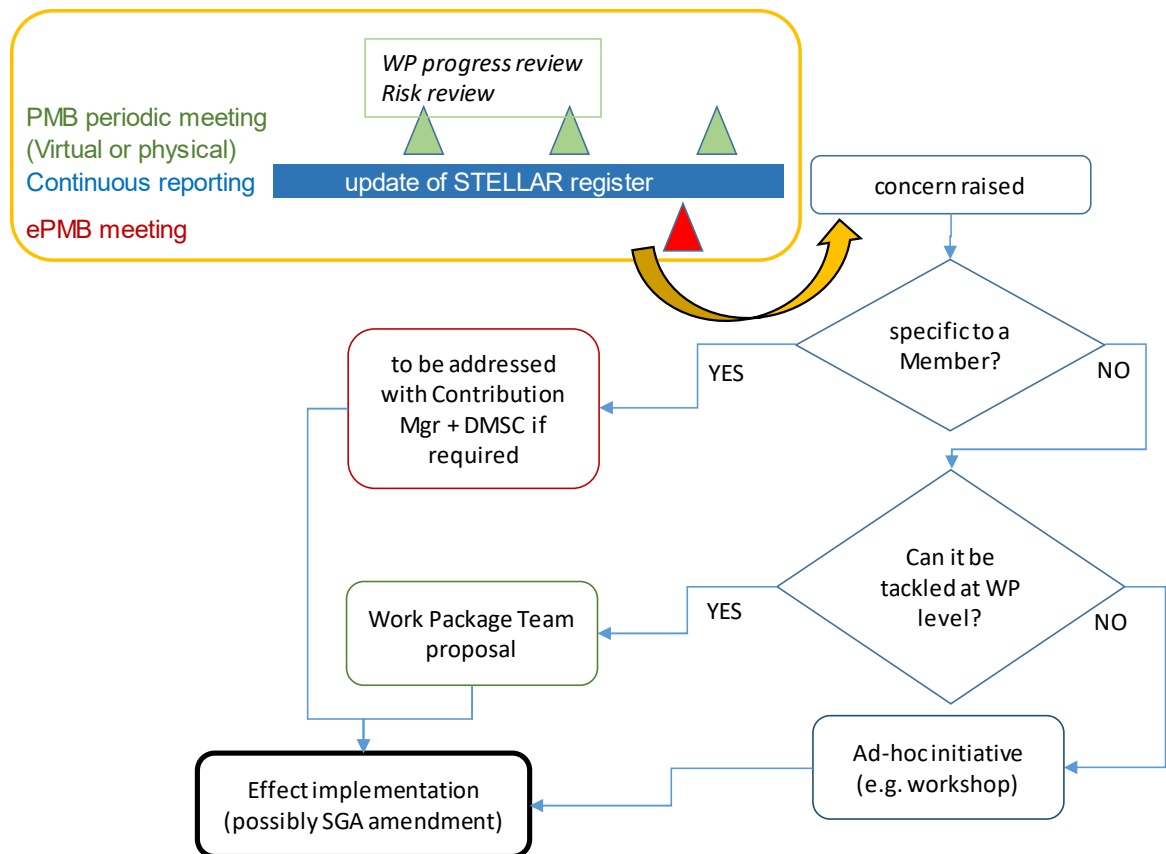
- Organise and coordinate the activities of the Work Package Team;
- Report to the Project Manager on progresses and issues;
- Make proposal for update and amendments of the validation roadmap, to be agreed at project level;
- Participate to the PMB/EPMB.

3.2.5 Work Package Team

The main role of the Work Package Team is to:

- Define, validate the SESAR Work Package and produce the associated deliverables and prototypes. A Project validation roadmap will be agreed at project level. The Work Package Team will conduct validations according to the agreed roadmap.
- Identify and initiate required changes to the SESAR Work Package, including the validation roadmap.
- The Work Package Team is composed of all contributors to the work of a given Work Package.

3.2.6 Project management process



The central element of Project management process is the reporting of:

- Work Package activity progress
- Risk review

A concern can be raised and formally addressed at any stage: during PMB meeting, extended-PMB meeting, or as it appears if required.

According to the nature of the concern, the relevant body (i.e. a beneficiary, a Work Package team, an ad-hoc constituted group) will make a proposal to propose a solution.

The solution will be implemented as per the appropriate process (consortium approval required if any).

Any Project progress feature (Exercise, platform availability, planning, deliverable, Communication action, RIO,...) will be documented as soon as possible in STELLAR to reflect faithfully the current situation.

3.3 Consortium as a whole

- The members of the SESAR Joint Undertaking PPP work and cooperate together to the best of their abilities with a view of implementing SESAR 2020 in a correct, efficient, open and timely manner and of attaining the objectives and the deliverables as envisaged by the ATM Master Plan. The Consortium involves key stakeholders of the Airborne Systems, Ground ATM Systems, Service Provision and

EUROCONTROL hence providing a wide range of expertise covering all aspects of EUROPEAN ATM.

- This consortium comprises 15 organisations from 9 member states of the European Union, and 2 organisations from 2 nations beyond the EU. The consortium was carefully selected according to the skills and experiences required to accomplish the proposed work. The operational expertise, which is crucial for the conceptualisation and implementation phase of the project, is found in the strong representation of end-user organisations in the consortium. The work is structured in a very collaborative way throughout all work packages and will ensure the transfer of knowledge and know-how between all participants.
- The consortium (members and Linked Third Parties) gathers 11 ANSPs, covering a wide part of European Airspace, making the proposal all the more so consistent to emphasize coordination between European ANSPs. It also indicates the level of interest in terms of expected operational improvement.

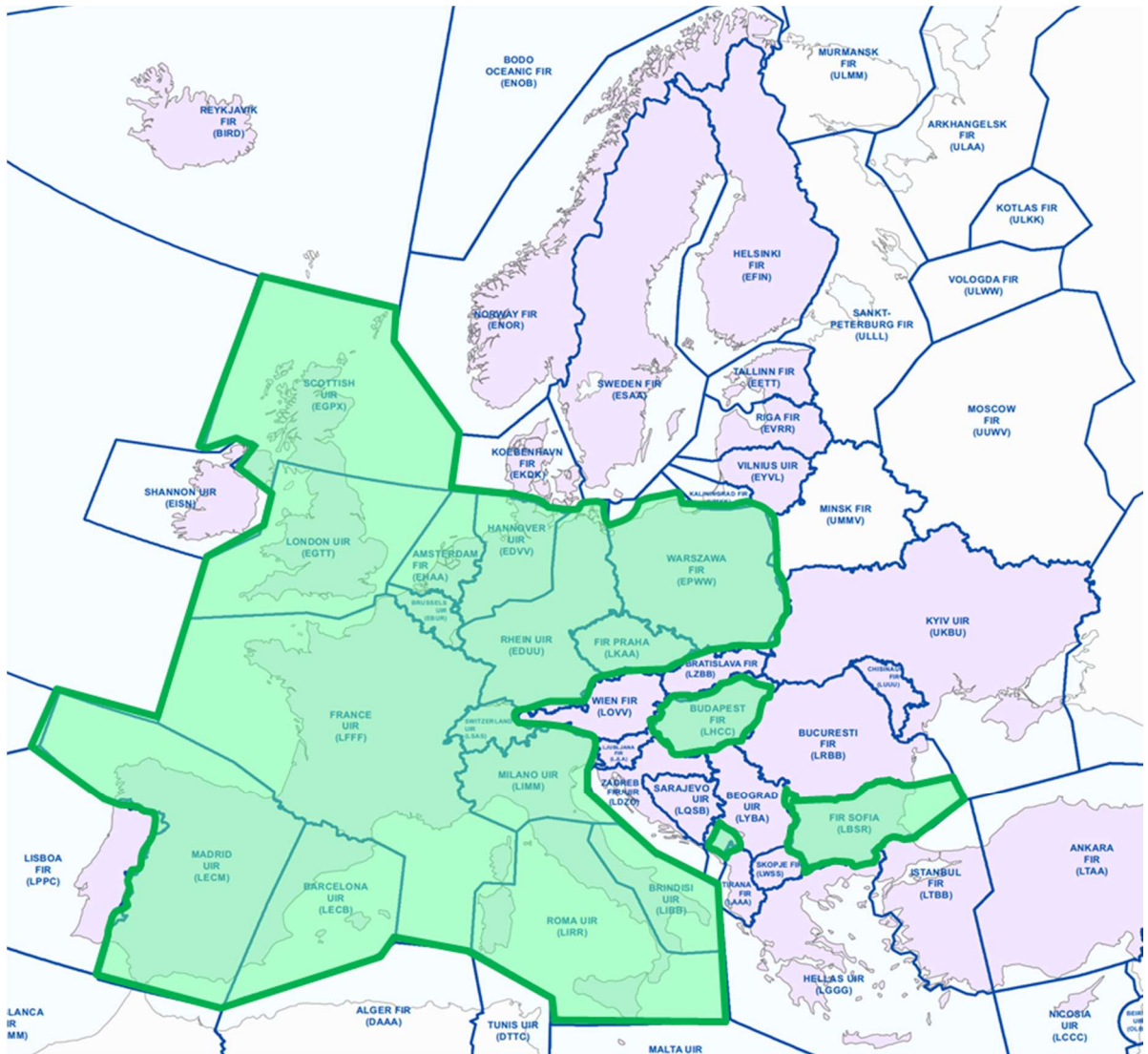


Figure 5: Highlighted in green: airspace controlled by ANSPs from PJ38-ADSCENSIO

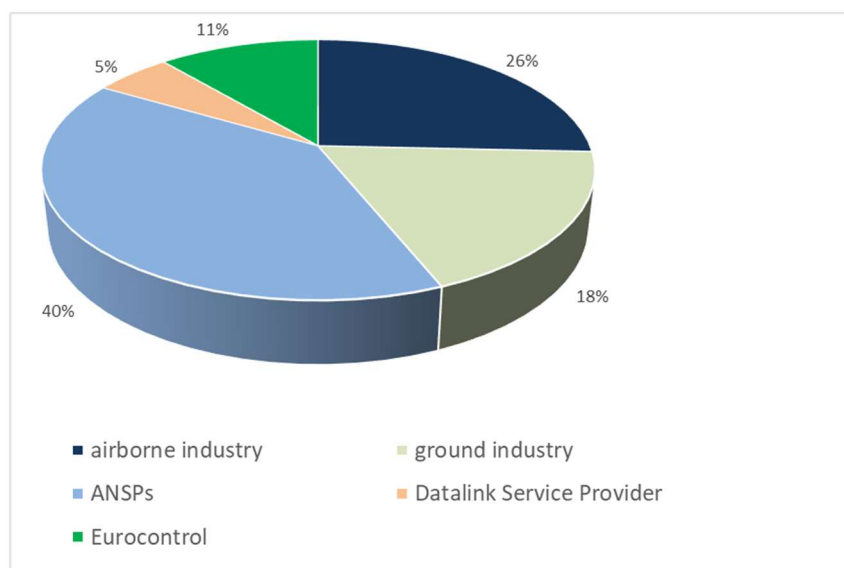


Figure 6: Budget share between stakeholder groups

3.4 Resources to be committed

Explain consistency between the expected project/each Work Package(s) results and the estimated budget.

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

AIRBUS	Cost (€)	Justification
Travel	10,000	<p>Travels for Project management, coordination of WP Operational evaluations, participation to workshops and preparation/participation to Open Day event.</p> <p>10 individual trips are anticipated (including generally 2 staff members travelling together) with an average cost of 1,000 € per trip.</p>
Equipment		
Other goods and services	300,000	<ul style="list-style-type: none"> 10 hours of flight test equipped with SATCOM and 4D function (270 k€) to contribute to Work Package <i>VDL-SATCOM interoperability</i> Budget dedicated to make a video to promote Project achievements for public relation communication purpose (30k€), ref. to 2.2.b. Work Package Project Management.
Total	310,000	

AIRBUS Operations SAS (LTP to AIRBUS SAS)	Cost (€)	Justification
Travel	10,000	<p>Travels for participation to workshops and contribution to WP Data Collection/Analysis and support to Operational evaluation.</p> <p>10 individual trips are anticipated (including generally 2 staff members travelling together) with an average cost of 1,000 € per trip.</p>
Equipment		
Other goods and services		

Total	10,000
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AIRBUS Defence and Space (LTP to AIRBUS SAS)	Cost (€)	Justification
Travel	17,000	Travels for participation to WP Operational evaluations (exercise preparation workshops and platform installation), participation to Open Day event. 10 individual travels are anticipated (up to 3 staff members are expected to sometimes travel together) with an average cost of 1,700 € per trip.
Equipment		
Other goods and services		
Total	17,000	

ESSP (LTP to DSNA)	Cost (€)	Justification
Travel	56,000	ESSP will be significantly involved in WP <i>ADS-C Common Services</i> which will bring the need to participate in some coordination missions for project management and the participation in some technical missions, which could even be coordinated by ESSP. For WP <i>VDL – SATCOM interoperability</i> , the possibility to participate in some workshops has also been estimated when defining the cost requested for travels. ESSP will be involved in the project with numerous different expertises: certification, operation, service provision, and IT. Missions will required the participation of ESSP's experts from one expert, for coordination missions, up to four experts for the workshops and the most specific technical meetings. Overall, around 20 missions have been estimated for both work packages and for the two years, with an average travel cost of 2,800 € per mission.
Equipment		
Other goods and services		
Total	56,000	

HONEYWELL	Cost (€)	Justification
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Travel	11,545	Travel for Project management board meetings, coordination, participation to workshops and participation to Open Day event. 8 trips are anticipated for 2 staff members with an approximate mission cost of 720 € per person.
Equipment		
Other goods and services	343,246	Flight test costs. Estimated flight hours: 80. Aircraft operating costs, handling fees, ATC and Nav fees.
Total	354,791	

HC	Cost (€)	Justification
Travel	25,000	<p>Travels</p> <p>Travels</p> <ul style="list-style-type: none"> - Preparation for Verification and Validation Exercises - Verification and Validation Exercises - Project Meetings - Workshops Travels - workshops and preparation for Verification and Validation Exercises - Verification and Validation Exercises - Project Meetings <p>In total 4 trips/year for 8 persons to be able to participate on exercise or solution meetings, workshops and open days for the duration of Wave 3 activities. The planned trips to other countries usually require to travel one day prior to the meeting to be there in time. Approximate cost is EUR 782/trip/person.</p>
Equipment	20,000	LAN infrastructure, Controller Working Position, Displays
Other goods and services	2,500	Publicity for the results of the Project/Work Package (electronic press, social media etc)
Total	47,500	

4 Members of the consortium

4.1 Participants (applicants)

4.1.1 Companies profile

4.1.1.1 DIRECTION DES SERVICES DE LA NAVIGATION AERIENNE

Organisation	1 DSNA	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 member of A6, FABEC and SESAR JU. DSNA has supported the principle of the SESAR program since its inception and has participated as a major contributor to its definition phase study, has been a major active contributor to the SESAR 1 development phase, to SESAR2020 wave 1 and is an active contributor to SESAR2020 wave 2. DSNA is also involved in the deployment of many PCP and non PCP SESAR solutions.	
Previous experience	<p>Previous projects connected to the Wave 3 research areas:</p> <ul style="list-style-type: none"> • SESAR 2020 W1 PJ16 - Controller Working Position / Human Machine Interface; • SESAR 2020 W1 PJ25 – xStream; • SESAR 2020 W2 PJ13 - IFR Remote piloted aircraft system (RPAS); • SESAR 2020 W2 PJ01 - Enhanced Arrivals and Departures; • SESAR 2020 Wave 1 PJ10 – Separation Management En-Route & TMA • SESAR 2020 W2 PJ18 - 4D Skyways. 	
Entity Profile matching the task	<p>Through different demonstration projects in SESAR and live trials exercises such as XSTREAM in Paris ACC or XMAN in Reims ACC, DSNA has demonstrated its ability to address these new concepts in live trial environment integrating the ATM solutions, and involving the key stakeholders. DSNA staff working on this project will include:</p> <ul style="list-style-type: none"> • Operational ATC staff for demonstrations; • Engineers and technical experts involved in the deployment of arrival management systems; • Engineers and technical experts involved FDP systems; • Concept staff involved in developing extended AMAN concepts. 	
Contribution	<p>DSNA will drive the Work Package Project Management. DSNA is willing to demonstrate operational benefit of EPP Data in both Traffic flow management and Arrival Management Extended to En Route Airspace concepts. DSNA will lead the project activities and take part in live demonstrations.</p>	

Live trials focussing on the update of the Trajectory prediction for extended Arrival Management using EPP air data will take place in Paris ACC, in coordination with CDG and Orly approaches.

Live trials focussing on the enhancement of flow management by using both EPP air data and COFLIGHT Trajectory Prediction will take place in Reims ACC.

4.1.1.2 AIRBUS SAS

Organisation	2 AIRBUS	Airborne/Ground 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 A220 Family to the double-deck A380.</p> <p>Over the last 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 A320 is one aircraft in four sizes (A318, A319, A320 and A321), representing the most successful and versatile jetliner family ever. Seating from 100 to 240 passengers and flying throughout the world – and landing on every continent – an A320 takes off or lands every 1.6 seconds. 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. The A220 expand the Airbus single-aisle family to cover the 100-150 seat segment – and respond to a worldwide market demand for smaller single-aisle jetliners.</p> <p>In the wide-body segment, the A330neo is powered by high-bypass ratio, new generation engines and designed with an advanced high-span wing vastly improving the aerodynamics. New materials have also been used across the wing including titanium pylon and composite nacelle. All these features combined, ensures that the A330neo has the lowest seat-mile cost of any mid-size widebody and burns 25% less fuel burn than the previous generation A330.</p> <p>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>	
Previous experience	<p>AIRBUS has thorough ATM knowledge of commercial air transport operations. More specifically for this VLD project:</p> <ul style="list-style-type: none"> AIRBUS has been a key player of 4D trajectory R&T activities, in particular through the leadership of projects SESAR 1 projects 09.01 “Airborne Initial 4D Trajectory Management” and 09.02 “Airborne Full 4D Trajectory Management & 4D contract capability”, achieved by the development of the avionics prototypes used by the Large Scale SESAR Demonstration Activity “PEGASE (Providing Effective Ground and Air Data Sharing via EPP (EPP Extended Projected Profile))”. AIRBUS is leading the SESAR 2020 wave 1 VLD PJ 31 (DIGITS) that aims at validating the certified i4D functions in an operational environment with revenue flights (through the lead of the “sister” project DIGITS-AU awarded in the frame of Open VLD 1Call) 	

	<ul style="list-style-type: none"> AIRBUS has a solid expertise of FANS B1 & B2 CPDLC operations, having played a central role in their development and standardization. Knowledge of current operational capabilities and limitations and identification of potential enhancements in the Air/Ground coordination will be key to contribute to the definition of Trajectory Based Operations. AIRBUS role in the standardization of above functions was central. AIRBUS has a key expertise with regard to aircraft behaviour according to various separation technics (i.e. lateral, vertical, speed adjustments) that can be selected by the ATC, and promoted the airborne functionalities (ADS-C, ETA Min/Max) needed for enhancing the ground Trajectory Predictors. In the frame of SESAR 2020 wave 1, Airbus developed a variety of tools to simulate i4D Aircraft, be such tools connected to an Air Traffic Simulator, or integrated within an Air Traffic Generator In the frame of SESAR, AIRBUS has fully designed and V3-validated the initial-4D airborne functionalities (ADS-C, ETA Min/Max) needed for enhancing the ground Trajectory Predictors. AIRBUS plays a key role in wave 2 PJ18 to contribute to several validations to be done in solutions 53, 56 and 57 focused on operational ATC functions based on Trajectory prediction. <p>Previous ATM projects (details): SESAR 1 (WP 9.1, WP 4.7.2, WP 5.6.1): SESAR 2020 W1 (PJ01, PJ 10, PJ 18, PJ31)</p>
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 support DSN for the overall Project Management.</p> <p>In Work Packages Data Collection and Data Analysis, AIRBUS will provide its laboratory means for data analysis and investigation to replay situations when required.</p> <p>In Work Package Operational Evaluations, AIRBUS will provide multiple expertise:</p> <ul style="list-style-type: none"> airborne system (in particular Cockpit operations, Navigation and Communication systems) and aircraft Performance in order to evaluate operational benefits. Ground system – AIRBUS will supply the ground platform TESLA to support evaluations on Conflict Detection and Resolution with HUNGAROCNTROL and BULATSA via its Linked Third Party Airbus Defence & Space. In addition, AIRBUS will coordinate the overall Work Package with all the ANSPs involved in the Project, in the continuity of DIGITS project. <p>In Work Package ADS-C Common Service6, AIRBUS will mainly participate to concept definition with a focus on operational criteria that will trigger the update of ADS-C Event contract.</p> <p>In Work Package VDL-SATCOM interoperability, AIRBUS will perform flight tests to validate the end-to-end performance of the use of SATCOM to convey ADS-C datalink message.</p> <p>AIRBUS will contribute to all the deliverables of the Project.</p>

4.1.1.3 AIRTEL ATN LIMITED

Organisation	3	Airtel (NATMIG)	Ground Industry
Description	<p>AIRTEL ATN LTD is a part of North European ATM Industry Group (NATMIG) Consortium. NATMIG is a member of SESAR 1. The NATMIG consortium consists of Airtel ATN (SME - Ireland), Saab AB (multinational industrial concern - Sweden) and SINTEF AS (non-profit research organisation - Norway).</p> <p>AIRTEL ATN LTD is an SME which has an extensive line of ATN & FANS data link products and technology used in 35 countries worldwide. Its operational systems include ATN/OSI routers deployed on more than 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 ATN LTD is providing Test and Monitoring equipment to the FAA DCIS program. It has extended its research collaboration to include organisations in China. It is also providing Data Link networking equipment in collaboration with Russian companies.</p> <p>AIRTEL ATN LTD also provides Data Link test services and products in support of Aircraft Data Link certification for ACARS, FANS and ATN/OSI, in particular EU Data Link and US DCIS aircraft testing.</p>		
Previous experience	<p>Airtel is involved in R&D projects with international organizations and it is a member of SESAR JU.</p> <p>Previous projects:</p> <ul style="list-style-type: none"> • SESAR 1 • IRIS Precursors • ANTARES • SESAR ELSA • SESAR 2020 Wave1: PJ.14 EECNS, PJ.17 SWIM-TI, PJ.03 SUMO • CEF 2017 IP1: Airtel is leader of WP1.2 and WP1.3 <p>Current projects:</p> <ul style="list-style-type: none"> • SESAR 2020 Wave1: PJ.31 DIGITS • SESAR 2020 Wave2: <ul style="list-style-type: none"> ○ PJ.14-W2 I-CNSS (PJ.14-W2-60, PJ.14-W2-77, PJ.14-W2-100, PJ.14-W2-107) ○ PJ.18-W2 4DTM (PJ.18-W2-56) • COMET • IRIS IOC <p>Airtel actively participates to standards groups in different organizations such as ICAO, AEEC, EUROCAE.</p>		
Entity Profile matching the task	<p>Airtel will support the project providing our expertise in the following area:</p> <ul style="list-style-type: none"> • Software development team 		

Organisation	3	Airtel (NATMIG)	Ground Industry
		<ul style="list-style-type: none"> • Validation expertise • Data Link expertise • ADS-C expertise 	
Contribution		<p>The main contributions of Airtel in PJ.38 will be:</p> <ul style="list-style-type: none"> • Contribute to the elaboration of the requirements and specification for the Common ADS-C Service • Development of the Common ADS-C Server based on the agreed requirements and specifications • Deployment of the Common ADS-C Server in the selected ANSP development platforms • Contribute to the test and acceptance of the Common ADS-C Server 	

4.1.1.4 DFS DEUTSCHE FLUGSICHERUNG GMBH

Organisation	4	DFS	Service Provider
Description		<p>DFS Deutsche Flugsicherung GmbH, the German air navigation service provider, is a State-owned company under private law with 5,600 employees as at 31/12/2019. DFS ensures the safe and punctual flow of air traffic over Germany. Around 2,200 air traffic controllers guide up to 10,000 flights in German airspace every day, more than three million movements every year. This makes Germany the country with the highest traffic volume in Europe. The company operates control centres in Langen, Bremen, Karlsruhe and Munich as well as control towers at the 16 designated international airports in Germany. The subsidiary DFS Aviation Services GmbH markets and sells products and services related to air navigation services, and provides air traffic control at nine regional airports in Germany and at London Gatwick Airport and Edinburgh Airport in the UK. DFS has been working on the integration of drones into air traffic since 2016 and has set up a joint venture, Droniq GmbH, with Deutsche Telekom.</p>	
Previous experience		<p>DFS introduced the 4D-trajectory based VAFORIT System in operations of its UAC Centre Karlsruhe in December 2010 and its successor iCAS in 2017. The 4D-planning capabilities of this ATS system on the ground build an important technical basis for the additional use of the airborne trajectory data that will be received and integrated in PJ38. Since 2012, DFS has ATN Baseline 1 applications in operation in the UAC Karlsruhe. DFS therefore brings significant practical experience in the area of datalink to the project.</p> <p>In SESAR 2020 wave#1, DFS contributed to ADS-C R&D in PJ31 DIGITS where it operated its own ADS-C datalink test platform, developed together with Airtel. With this platform it contracted and collected ADS-C data from airline revenue flights for German airspace. It hosted a Context Management Service Functionality distributing</p>	

Organisation	4 DFS	Service Provider
	<p>Logon information to other ground partners. DFS contributed actively to operational and technical analysis of ADS-C data and chaired the ADS-C Common Service requirements group building the basis for PJ38 activities. Together with Indra, several prototypes for ADS-C usage in the iCAS platform were developed, tested and validated, on the topics of 2D-Discrepancy Monitoring and ADS-C Display.</p> <p>In SESAR wave#1, DFS also contributed to PJ18#6, demonstrating enhancements of ground trajectory planning through the use of ADS-C data in the iCAS platform.</p> <p>In the ongoing SESAR wave#2, DFS is a partner of PJ18 Sol 53, 56 and 57. As part of these activities, improvements of Conflict Detection through ADS-C as well as development of Vertical Discrepancy Monitoring functions based on ADS-C are pursued.</p>	
Entity Profile matching the task	<p>DFS will support the project with the following expertise:</p> <p>System Engineering experience in areas such as Flight Data Processing Systems, datalink and core infrastructure services</p> <p>ATC expertise to assess demonstrated functionality;</p> <p>Expertise in Human Performance assessment for initial assessment of operational usage of enhanced tools.</p> <p>Data analysis expertise to evaluate the quality and usefulness of the received downlink trajectory data.</p> <p>Safety assessment expertise to demonstrate that the VLD platform does not endanger in any way the operation of real world flight traffic)</p>	
Contribution	<p>DFS will take the following role and responsibility in the project:</p> <p>DFS plans to contribute to ADS-C Common Service activity as lead of the corresponding work package and as host of parts of the service infrastructure to provide data to all project partners via SWIM . DFS goal will be to support the specification and demonstration of the ADS-C Common Service and to prepare subsequent standardization and European procurement activities.</p> <p>DFS will be active in operational benefits demonstration activities, further advancing topics such as ADS-C HMI display, Discrepancy Monitoring and Trajectory Prediction Enhancements, with a focus on CP1 scope functionalities in iCAS. Together with Indra, it will establish connectivity of iCAS Platform with ADS-C common service for the purpose of shadow mode demonstrations.</p> <p>DFS will take an active role in operational and technical analysis of ADS-C data, will support the development of a common analysis platform for ADS-C and contribute to the demonstration of VDL and SATCOM complementarity.</p>	

4.1.1.5 ENTIDAD PUBLICA EMPRESARIAL ENAIRE

Organisation	5 ENAIRE	Service Provider
Description	<p>The Spanish Business Public Entity “Entidad Pública Empresarial ENAIRE”, hereinafter referred to as “ENAIRE”, is the entity designated by the Spanish State to provide Air Navigation Services for En-Route and Approach phases, ruling 5 ATC Centres and 21 Control Towers, being one of the major Air Navigation Service Providers in Europe.</p> <p>Airspace under ENAIRE control includes the Peninsula Ibérica (except Portugal), Balearic and Canary Island, and part of North Atlantic, West Mediterranean and West Sahara.</p> <p>ENAIRE manages the air traffic control and aeronautical information services, as well as the communication, navigation and surveillance networks required so that airlines and their fleet can fly safely and smoothly throughout the Spanish airspace.</p> <p>ENAIRE is the leading air navigation and aeronautical information service provider in Spain, the fourth largest in Europe by traffic volume and one of the most important in the world. As a public business entity reporting to the Ministry of Public Works, we manage the Spanish airspace over a territory of 2.190.000 square kilometres. ENAIRE provides air traffic services to 2 million flights carrying over 250 million passengers each year. Through our five control centres, 21 control towers and a comprehensive network of aeronautical infrastructure and equipment, we provide en-route, approach and aerodrome ATC services, as well as flight information, alerts and consulting services. We are the communications, navigation and surveillance service provider across the whole of the Spanish airspace and at airports in Aena network</p> <p>ENAIRE is a major European company in ATM, R&D and project management in the field of Airspace and Air Navigation and a founding member of the A6 alliance, which represents the ANSPs common view within SESAR Programme.</p> <p>ENAIRE has already been an active part of SESAR Programme from the very beginning and has substantially contributed as a SJU member in the different fields of airport and air navigation services management, planning and provision, and other ATM R&D related activities, in order to support the cooperative accomplishment of the European ATM Target Network and the associated European ATM Master Plan.</p> <p>As a services provider and also as owner of related systems and infrastructure, proactive promoter of research and development activities which are at the leading edge and highly experienced executor of validation and system integration processes, ENAIRE expects to maintain its participation in the SJU as one of its major members in those areas of activity where its technical and managerial expertise and know-how, systems and projects can bring the most added value to the deployment of the European ATM Master Plan.</p> <p>The added value provided to SESAR 2020 by ENAIRE and its linked third parties is based in the large set of available assets:</p> <ul style="list-style-type: none"> Up to 5 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; 	

	<ul style="list-style-type: none"> • 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; • Paving the way for deployment of mature concepts, especially those included in the PCP, will constitute a paramount and permanent priority for ENAIRE.
Previous experience	<p>ENAIRE has been an active part of the SESAR from the very beginning of the Programme, contributing substantially as a SJU member in different fields (airports, ANS management, ANS planning and provision, etc.). This has been done in order to support the cooperative accomplishment of the European ATM Master Plan. The participation within the SESAR Programme began with SESAR 1, where ENAIRE took an active role in several projects, being the project leader in some of them. After the work performed in SESAR 1, ENAIRE has contributed in the great majority of the projects launched in SESAR 2020 Wave 1 programme, being an important part of the Service Providers Stakeholder group.</p> <p>Participation in SESAR 1 projects:</p> <ul style="list-style-type: none"> • WP3 – Validation infrastructure adaptation and management • WP4 – En route Operations • WP5 - TMA Operations • WP6 – Airport Operations (taking the leadership of the work package) • WP7 – Network Operations • WP8 – Information Management • WP10 – En-Route & Approach ATC Systems • WP12 – Airport system • WP13 – Network Information Management System • WP15 – Non-Avionics Communication, Navigation, Surveillance (CNS) System • WP16 – R&D Transversal Areas • WPB – Target Concept and Architecture Maintenance • WPC – Master Plan Maintenance <p>Within these projects, ENAIRE has participated in the operational concept development and has been also responsible for the execution of several validations.</p> <p>Participation in SESAR 2020 Wave 1:</p> <ul style="list-style-type: none"> • PJ01: Enhanced Arrivals and Departures • PJ02: Increased Runway and Airport Throughput • PJ03a: Integrated Surface Management • PJ04: Total Airport Management • PJ06: Trajectory based Free Routing

- PJ07: Optimised Airspace Users Operations
- PJ08: Advanced Airspace Management
- PJ09: Advanced DCB
- PJ10: Controller Tools and Team Organisation for the Provision of Separation in Air Traffic Management
- PJ11: Enhanced Air and Ground Safety Nets
- PJ14: Essential and Efficient Communication Navigation and Surveillance Integrated System
- PJ15: Common Services
- PJ16: Controller Working Position / Human Machine Interface - CWP/HMI
- PJ17: SWIM Technical Infrastructure
- PJ18: 4D Trajectory Management
- PJ19: Content Integration
- PJ20: Master Plan Maintenance
- PJ24: Network Collaborative Management
- PJ27: Flight Object Interoperability VLD Demonstration

Participation in SESAR 2020 Wave 2 projects:

- PJ02-w2: Airport airside and runway throughput
- PJ04-w2: Total Airport Management
- PJ05-w2: Digital technologies for Tower
- PJ07-w2: Optimised airspace users operations
- PJ09-w2: Digital Network Management Services
- PJ10-w2: Separation Management and Controller Tools
- PJ13-w2: IFR RPAS
- PJ14-w2: Integrated CNSS
- PJ18-w2: 4D skyways
- PJ19-w2: Content Integration, Performance Management and Business Case Development
- PJ20-w2: Master Planning

Other projects managed by the SESAR Joint Undertaking:

- DEMORPAS (Demonstration Activities for Integration of RPAS in SESAR), playing ENAIRE a leading role.
- ARIADNA (Activities on RPAS Integration Assistance and Demonstration for operations in Non-segregated Airspace).

Previous participation in EC projects:

- OPTIMAL – Optimized Procedures and Techniques for Improvement of Approach and Landing
- RESET – Reduced separation minima
- GIANT – GNSS Introduction In the Aviation sector & GIANT 2 – GNSS Introduction In the Aviation sector -2
- ACCEPTA – ACCelerating EGNOS adoPTion in Aviation
- FilGAPP – Filling the Gap in GNSS Advanced Procedures and Operations
- HEDGE Next – Helicopter Deploy GNSS in Europe – NEXT
- CREDOS – Crosswind Reduced Separations for Departure Operations

	<p>Additionally, ENAIRE and its linked third parties has contributed to several Framework Programme (FP) projects such as:</p> <ul style="list-style-type: none"> • EPISODE 3, Single European Sky Implementation support through validation, FP6, 2004-2010, Key Performance Targets for the future ATM system. • GATE TO GATE, Validation of a European ATM gate to gate operational concept for 2005 – 2010, FP5, 2002-2005, operational concept development and validation. <p>Regarding deployment activities, the Spanish Automated Air Traffic Control System (SACTA) has been continuously evolved. One example could be the following TENT-T project:</p> <ul style="list-style-type: none"> • FRASAI, TENT-T, 2014, Free Routing concept implementation in Santiago – Asturias sector. <p>In addition to these projects, ENAIRE is currently carrying out the following research projects related to RPAS:</p> <ul style="list-style-type: none"> • DOMUS <p>SAFEDRONE</p>
Entity Profile matching the task	<p>ENAIRE plus its Linked Third Parties will contribute with their long experience like ANSP, and R&D entities, matching the task with the following profiles:</p> <ul style="list-style-type: none"> • CNS Expertise: <ul style="list-style-type: none"> – Communication networks, – Communication protocols, – Communication technologies (G/G and A/G), – Standardisation activities, – Service Provision • Environment expert • Performance expert <p>Platform integration/maintenance</p>
Contribution	<p>ENAIRE plans to participate in the following WPs:</p> <ul style="list-style-type: none"> • Data Collection: ENAIRE will participate in the so-called activity <i>Data Dictionary</i> reviewing the data elements and formally defining their sources, formats and availability. ENAIRE will help define the required architecture for the expected ADS-C Common Service. Additionally, ENAIRE will also collect ADS-C EPP data from the aircrafts overflying ENAIRE's airspace following the approach agreed within this VLD. • Data Analysis: ENAIRE will mainly participate in the task proposed for the technical analysis of the data. ENAIRE will help analyse ADS-C Communication performance at dialogue level. In this context, ENAIRE will monitor success of ADS-C dialogues and connection, Provider Abort and User Abort rates and causes, Load and Bandwidth Usage and others. • DS-C Common Service: ENAIRE plans to participate in some of the threads already identified within this WP, namely: <ul style="list-style-type: none"> ○ Requirements definition: ENAIRE will participate as much actively as possible with a contributor role defining important topics like, for instance, CONOPS, System

	<p>Requirements, ADS-C Contract Settings, Safety Requirements, etc.</p> <ul style="list-style-type: none"> ○ Use of Online Data Distribution: ENAIRE plans to connect and to use the online data distribution of ACS. The purpose is to feed a local data collection / repository although this is still under investigation. ENAIRE will not make any use in real time of these data, e.g., in shadow mode demonstration. ENAIRE will connect to the ACS as soon as it is available. In this respect, ENAIRE also plans to contribute to test and evaluate the service from a client perspective. ● VDL/Satcom interoperability: ENAIRE plans to contribute actively to demonstrate the seamless ATN connection throughout transition from VDL to SATCOM and vice versa, which should be transparent for the end users. ENAIRE's objective is to contribute to the assessment of the consistency of ADS-C data received via VDL and SATCOM communication paths, to demonstrate that the data can be used regardless of the A/G technology used at all times. ENAIRE will also contribute, as much as we can, to provide evidences and recommendations for initial multilink deployment since ENAIRE is also an active contributor in SESAR W2 Sol. 77, which addresses the Future Communication Infrastructure.
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4.1.1.6 ENAV SPA

Organisation	6 ENAV	Service Provider
Description	<p>ENAV S.p.A. (ENAV) is one of the 5 largest European Air Navigation Service Provider in terms of traffic managed, investments in innovation technology and R&D and is one of the top performers in terms of quality of services provided.</p> <p>ENAV is fully committed to the Single European Sky and, since 2006, operates under the Common Requirement for ANS provision and from 2012 is subject to the European Performance Scheme, as all other European ANSPs.</p> <p>ENAV is a Joint-Stock Company, the only ANSP worldwide listed on a stock exchange, 53% of the share capital is held by the Italian Government, in charge of the provision of air traffic control and navigation services within the airspace and the airports placed under its own responsibility by national law without time limit.</p> <p>ENAV core business is to manage the regulated Air Traffic Control Services (ATCS), for which it is entrusted, allowing aircraft to fly within the assigned airspace with constantly enhanced levels of safety, optimizing the effectiveness of the service provided and the efficiency of the company, in particular:</p> <ul style="list-style-type: none"> ● “En route” services: handling of air traffic crossing Italian airspace managed from 4 Areas Control Centres located in Rome, Milan, Padua and Brindisi; 	

- “Terminal” services: assistance during the phases of approach, takeoff and landing from 45 Control Towers located throughout Italy and divided into 3 charging zones.

Thanks to these complex operational units, ENAV provides around the clock air traffic services ensuring air traffic flow and regularity, with absolute safety.

ENAV provides ATCS to more than 1.8 million flights per year, with peaks of up to 6,575 per day.

ENAV provides also supporting services to other ANSP on a commercial basis, forming an independent source of revenue which is not regulated. ENAV leverages its significant experience and reputation for promoting development projects worldwide, pursuing further opportunities for growth: currently delivers services in Malaysia, Saudi Arabia, Kenya, Morocco, Albania, UAE and Libya.

As in all highly complex sectors, constant and consistent technological innovation has to be placed side by side to human skills and experience. For this reason, ENAV continues to invest in modernisation, new technologies and professional training. ENAV is a component of the European ATM (Air Traffic Management) system and participates with full rights in all the activities of development, operational validation, research and coordination with systems that are perfectly integrated within the international technological context.

The ENAV Group consists of:

- Techno Sky, responsible for the operational management, the support, the maintenance and the hardware/software development of the entire range of systems and equipment used to provide flight assistance services.
- IDS AIRNAV is the company of the ENAV Group that serves the world of Air Traffic Management (ATM) and airports with Commercial Off-The-Shelf (COTS) solutions and software products aimed at supporting the transition from Aeronautical Information Services (AIS) to Aeronautical Information Management (AIM) in full compliance with the ICAO and EUROCONTROL mandates for Aeronautical Data Quality (ADQ).
- D-Flight is the first public-private partnership created by ENAV and its partners for the timely development and deployment of U-space, in order to safely and seamlessly integrate complex drone operations within the civil aviation airspace. The company is controlled by ENAV, with a 60% stake, with the remainder of the share capital held by a group of leading Italian technological partners.
- ENAV Asia Pacific, set up in 2013 with head office in Kuala Lumpur, provides air traffic control management and consultancy services, as part of marketing and sales activity, as well as other essential air navigation services.
- ENAV North Atlantic is a company established in USA in January 2014 for the purpose of managing the acquisition of 12.5% of the Aireon LLC share capital. Aireon is the company responsible for

	<p>the development, financing and deployment of a global satellite surveillance system.</p> <ul style="list-style-type: none"> • ESSP - with a 16.6% stake in the Company, ENAV provides the European satellite navigation service EGNOS. <p>The services delivered by the Company are Planning, management and provision of Air Navigation Services (ANS) including:</p> <ul style="list-style-type: none"> • Air Traffic Services (ATS), including Air Traffic Control Service (ATC), Flight Information Service (FIS) and Alerting Service (ALRS); • Aeronautical Information Service and related publications (AIS); • Meteorological Services for Air Navigation (MET); • Communication, Navigation, Surveillance Services (CNS); • Airspace Management; • Airspace design and air traffic capacity planning; • Flight procedures design and obstacles analysis; • ATM system definition, acquisition, operation and maintenance of operational infrastructures; • Flight inspection services of radio navaids, broadcasting and surveillance systems for Air Traffic Services; • Training of ATM personnel. <p>ENAV is among the main players in SESAR (Single European Sky ATM Research), the ambitious initiative launched by the European Commission to implement the Single European Sky (SES) by supporting technical developments for fully interconnected and interoperable systems at European level.</p> <p>ENAV is also a member of the SESAR Joint Undertaking (SJU), created under European Community law on 27 February 2007, with EUROCONTROL and the European Union as founding members, in order to manage the SESAR Development Phase. ENAV contributes to SJU in a lot of projects providing technical and operational expertise and infrastructures necessary to develop and validate the evolution of the operational concepts.</p>
Previous experience	<p>ENAV is involved in R&D, strategic planning, technical co-operation and service provision programmes with international organisations (e.g. SESAR Joint Undertaking, EUROCONTROL, European Commission, ESSP) and foreign countries, aiming at contributing to the advancement of ATM technology and processes and at improving the service level provided.</p> <p>ENAV has a long-lasting experience in international initiatives and has been participating, managing, coordinating and actively contributing to several international projects and large scale research, developments and validations.</p> <p>ENAV has been participating in the SESAR Programme since its very beginning (SESAR1 and SESAR2020) and is strongly determined to support the successful outcome of the initiative in line with its strategic objectives.</p> <p>Previous R&D projects:</p>

	<ul style="list-style-type: none"> • SESAR2020 Wave 1 IR Projects (H2020, 2016-2019): PJ01, PJ02, PJ03a, PJ03b, PJ05, PJ06, PJ08, PJ09, PJ10, PJ15, PJ16, PJ19, PJ20, PJ22 • DIODE VLD (SJU/CEF2017, 2018-2020) • CORUS ER (H2020, 2017-2019) • SESAR1 (2009-2016): WPB, WPC, WP3, WP4, WP5, WP6, WP7, WP8, WP10, WP12, WP13, WP14, WP15, WP16 • SESAR1 Large Scale Demonstrations: <ul style="list-style-type: none"> ○ ATC Full Datalink (AFD) ○ WE-FREE ○ MEDALE ○ RACOON ○ FREE SOLUTIONS • BEYOND (H2020, 2015-2017) • DARWIN (H2020, 2015-2018) • SAWSOC (FP7, 2013-2016) • GAMMA (FP7, 2013-2017) • FUTURE SKY SAFETY (H2020, 2015-2019) • OPTIMAL (FP6, 2004-2008) • AD4 (FP6, 2005-2007) • RETINA (H2020, 2016-2018) • BLUEGNSS (H2020, 2016-2018) <p>Current R&D projects:</p> <ul style="list-style-type: none"> • SESAR2020 Wave 1 IR PJ18 Project (H2020, 2016-2020) • SESAR2020 Wave 1 VLD PJ31 DIGITS (H2020, 2016-2020) • SESAR2020 Wave 2 IR Projects (H2020, 2019-2022): PJ01, PJ02, PJ05, PJ07, PJ09, PJ10, PJ13, PJ14, PJ18, PJ19, PJ20 • ECARO - Egnos Civil Aviation ROadmap project (European GNSS Agency, 2019-2021) • CRUISE - Cyber secuRity in Uas mISSIONS by SatellitE link (ESA, 2019-2022) • RPASinAir - IFR RPAS integration into controlled airspace (Italian Ministry of Education, University and Research, 2018-2021)
Entity Profile matching the task	<p>ENAV profiles matching the tasks include:</p> <ul style="list-style-type: none"> • ATM Operational expert • ATM R&D expert • Infrastructure and ADS-C expert • Air Traffic Controller • KPA expert • Project manager • Validation expert and engineer <p>All those skills will be made available by ENAV to support the project developments and conduct demonstration activities.</p>
Contribution	<p>ENAV is fully committed to the development of ADS-C capability, strongly convinced on the operational benefits resulting from the use of ADS-C data into the ATM operational environment.</p>

As a follow up of the work successfully done by ENAV in VLD PJ31-W1 DIGITS, ENAV intends to contribute to this project to further progress on ADS-C implementation and foster its deployment and integration into operations.

Specifically, ENAV will contribute with its ATN-B2 infrastructure to the ADS-C data collection campaign, also integrating the satellite link to demonstrate VDL and SATCOM complementarity, and will support the relevant data analysis and performance assessment.

ENAV is also available to host part of the distributed architecture of the ADS-C Common Service (ACS) and will support the development of an ACS system to demonstrate the feasibility of ADS-C collection and distribution service and the use, in real-time, of data provided via a common service architecture.

Moreover, ENAV will also contribute to assess the operational benefits resulting from the use of ADS-C data by performing ad-hoc demonstration campaign using live/real ADS-C data integrated into controller end systems.

ADS-C data will be retrieved by subscribing the ATC test platform to “use interfaces” of the ACS distribution module.

4.1.1.7 EUROCONTROL - EUROPEAN ORGANISATION FOR THE SAFETY OF AIR NAVIGATION

Organisation	7 EUROCONTROL	Intergovernmental Organisation
Description	<p>EUROCONTROL, the European Organisation for the Safety of Air Navigation, is an intergovernmental Organisation with 41 Member States, committed to building, together with its partners, a Single European Sky that will deliver the ATM performance required for the 21st century. EUROCONTROL employs more than 1,900 highly qualified professionals spread over four European countries. Their expertise is deployed to address ATM challenges in a number of key roles:</p> <ul style="list-style-type: none"> • The Network Manager has extended the role of the former Central Flow Management Unit to proactively manage the entire ATM Network (nearly ten million flights every year), in close liaison with ANSPs, airspace users, the military and airports. • The Maastricht Upper Area Control Centre (MUAC) provides air traffic control services for the Netherlands, Belgium, Luxembourg and northern Germany. • The Central Route Charges Office handles billing, collection and redistribution of aviation charges. • It provides a unique platform for civil-military aviation coordination in Europe. • EUROCONTROL is a major player in European ATM research, development and validation and in this respect makes the largest contribution to the SESAR Joint Undertaking. • EUROCONTROL is supporting the deployment through contributions to the Deployment Programme and is supporting the European Commission, EASA and National Supervisory Authorities in their regulatory activities. 	

Organisation	7 EUROCONTROL	Intergovernmental Organisation
Previous experience	<p>Previous projects:</p> <p>SESAR 1:</p> <ul style="list-style-type: none"> • i4D (e.g. 10.10.2, 10.7.1, 4.3) • PEGASE <p>SESAR 2020 W1:</p> <ul style="list-style-type: none"> • Pj18-06a/b • PJ31/DIGITS 	
Entity Profile matching the task	<p>EUROCONTROL has, through its previous experience (see above), built substantial expertise to participate to the success of this demonstration. Namely, it will bring the following profiles:</p> <ul style="list-style-type: none"> • ATM Experts with experience on the collection and analysis of ADS-C data and EPP trajectories. • Datalink Experts with long term experience with development and validation of the ATN B1 and B2 infrastructure. • SWIM Experts having developed SWIM prototypes to share and distribute ground and air data. <p>Maastricht UAC has, through its previous experience, built substantial expertise to participate to the success of this demonstration. It will bring the following profiles:</p> <ul style="list-style-type: none"> • Operational expertise of (ex)ATCOs used to working with datalink operationally and with experience of previous SESAR1 & SESAR2020 Wave 1 validations, pre-operational demonstrations and technology; • Engineering expertise for data communication system experts with knowledge of the ATN Baseline 1 and Baseline 2 standards and SESAR1 prototypes and SESAR2020 Wave 1 prototypes and the pre-operational implementations; • Validation and analysis expertise with knowledge of the ATN Baseline 1 and Baseline 2 standards and SESAR1 and SESAR2020 Wave 1 validation and demonstration's analysis. 	
Contribution	<p>EUROCONTROL will contribute to the following activities listed in the call:</p> <ul style="list-style-type: none"> • Continue the ADS-C data collection campaign (Item 1. in the call) • Improve offline analysis of data to quantify the operational benefits (Item 2.) • Demonstrate VDL Mode 2 and SATCOM complementarity in providing ATN connectivity from the aircraft (Item 3.) • Demonstrate an extension of the use of datalink beyond current VDL2 coverage thanks to SATCOM (item 4.) • Demonstrate the feasibility of ADS-C collection and distribution service (Item 5.) 	

Organisation	7	EUROCONTROL	Intergovernmental Organisation
		<ul style="list-style-type: none"> • Demonstrate the use, in real-time, of data provided via a common service architecture (Item 6.) • Demonstrate the easy access to ADS-C data to consumers (Item 7.) <p>Data collection</p> <p>Located at EUROCONTROL Experimental Centre (EEC) in Brétigny, the data collection infrastructure setup for PEGASE and Pj31-DIGITS will remain available for PJ38. As in the previous demonstrations, EUROCONTROL will focus on the collection of “long” (Gate-To-Gate) EPPs.</p> <p>EUROCONTROL also makes its Datalink and ATM expertise available to the VLD and, in particular, Pj38 will have access to EEC Datalink Test Facility hosting air and ground CM, CPDLC, and ADS-C test tools compliant with ATS B2 Rev A.</p> <p>The collected ADS-C data will be shared with the Pj38 partners through a EUROCONTROL’s One Sky Team (OST) site. Pending NM authorisation, the ADS-C data will be complemented with planning data (e.g. the last filed flight plan).</p> <p>MUAC will, as in the previous ADS-C demonstration PJ31/DIGITS, continue with its pre-operational demonstrations, including the overall data collection for the flights that are in its Area of Responsibility via tools developed under PJ31/DIGITS, which are planned to evolve to support further automation.</p> <p>Data analysis</p> <p>In Pj31, EUROCONTROL conducted extensive analyses of the collected data in order to monitor the ATS B2 operations and show the significance of the collected data. More operationally focused analyses (e.g. related to EPP estimates variability) were also conducted.</p> <p>These analyses will continue in PJ38: the current analysis platform will continue to be used and will be extended.</p> <p>Moreover, in Pj18W2, EUROCONTROL runs a study focussing on the prediction of conflict free aircraft trajectories using supervised machine learning. The motivation is to investigate the feasibility of conflict resolution based on historical data, mimicking controller resolution patterns from similar traffic situations (imitation learning). The addressed case study is to identify conflict free trajectories up to 5 to 10 minutes look ahead, based on past track and flight plan data, and on contextual information (military areas, geographical sectors...).</p> <p>In Pj38, this work will be extended to study if and how airborne trajectories (downlinked in ADS-C EPP) can be used to further improve the prediction of conflict free trajectory. This study will contribute to activity 2 (“Improve offline analysis of data to quantify the operational benefits”) of the list of items mentioned in the call as to be addressed in the frame of the VLD.</p>	

Organisation	7	EUROCONTROL	Intergovernmental Organisation
		<p>MUAC will, as in the previous ADS-C demonstration PJ31/DIGITS, continue with its pre-operational demonstrations, including the operational and technical analysis of the data from the flights in its Area of Responsibility, via tools developed under PJ31/DIGITS, which are planned to evolve to support further automation. The operational analysis will focus on those aspects that were not yet analysed completely under PJ31.</p> <p>Operational benefits</p> <p>MUAC will, as in the previous ADS-C demonstration PJ31/DIGITS, continue with its pre-operational demonstrations, which include the display of the EPP and the automatic discrepancy indication for a sub-set of the controllers. Feedback will be gathered on a bigger number of flights since the number of equipped a/c will have increased over 2020 and more controllers will get access to the specific ADS-C functionality. Evolutions of both the display and algorithm are planned.</p> <p>SATCOM</p> <p>EUROCONTROL participates to the IRIS IOC project. The reception, storage and analysis of SATCOM ADS-C exchanges setup in the frame of the IRIS IOC will be done with the same Datalink and analysis infrastructure as Pj38. The end-to-end path between the EEC platforms and the avionics connected over SATCOM is expected to be achieved through the interconnection established between INMARSAT and existing ATN/VDL2 Communications Service Providers (CSPs). No change is assumed on EEC side regarding current connectivity to the ATN operational infrastructure, EEC being connected to SITA CSP on 24/7 basis.</p> <p>MUAC is participating in the IRIS IOC project and will under this PJ38 make the link with SESAR and the use of ATS-B2 (CPDLC and ADS-C). It will support with both the test facilities available at MUAC, but highly likely also support the SATCOM trials with the (pre-)operational system. MUAC will perform the operational and technical analysis on these specific flights, with a focus on the communication link aspects.</p> <p>ADS-C Common service</p> <p>In PJ31, EUROCONTROL developed an online distribution system using Web-based technologies compatible with SWIM Yellow Profile. This system will continue to run in Pj38 at least until an ADS-C Common Service prototype is available. The online distribution will be accessible to interested Pj38 partners.</p> <p>EUROCONTROL will contribute with its Datalink and SWIM expertise in the development of the specifications of an ADS-C Common Service. A</p>	

Organisation	7	EUROCONTROL	Intergovernmental Organisation
		<p>special attention will be put on the potential use of such service by NM (this will complement the work done wave 1 in Pj18-06b and Pj18 wave 2 Sol#53 on the use of ADS-C data elements to improve ETFMS profiles).</p> <p>Specifically, EUROCONTROL will develop an ADS-C Common Service client prototyping anticipated NM needs.</p> <p>If in scope and feasible at acceptable cost, EUROCONTROL might adapt the current online distribution to become an ADS-C Common Service compliant prototype and participate in possible multi-server demonstrations.</p> <p>MUAC will support the definition of the ADS-C Common Service. MUAC will support the testing of a prototype by interfacing via with the server via the Yellow SWIM and assessing the data (interface). There is no plan to use the data received via the ADS-C Common Server for the (pre-)operational system.</p>	

4.1.1.8 HONEYWELL AEROSPACE

Organisation	8	HONEYWELL	Airborne Industry
Description		<p>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 350). Worldwide, Honeywell is investing heavily in ATM (Air Traffic Management) related developments, notably through participation in the European SESAR programme and the US NextGen programme. These activities add value to our SESAR work by ensuring global harmonization and a global impact of SESAR solutions.</p> <p>In this Project we will contribute via the Honeywell Aerospace SAS site located in Toulouse (France), together with its Linked Third Parties Honeywell Inc, Honeywell International s.r.o., with sites in Prague and Brno (Czech Republic). These facilities are equipped with state-of-the-art research and test laboratories enabling research, development, integration, verification and validation of various aircraft systems. Honeywell possesses also its own fleet of test aircraft, which will support the project wherever needed, as they did ever since Honeywell became a Member of the SJU (SESAR Joint Undertaking) in 2007.</p>	
Previous experience		<p>The innovation proposed in this proposal will benefit from the extensive research and product development experience gained through the development of Honeywell product families. Honeywell is a well-established avionics manufacturer with strong expertise in voice and data communications and flight management systems for air transport, regional and business jet platforms.</p> <p>Honeywell participated to several research and development projects in technical areas relevant to this proposal, being a key player in 4D trajectory R&D activities, including the following projects:</p> <ul style="list-style-type: none"> • SESAR 9.1 Initial 4D, SESAR 9.2 Full 4D • SESAR 2020 PJ18 4D Trajectory Management 	

	<ul style="list-style-type: none"> • SESAR 2020 PJ31 & DIGITS AU that aims at validating the certified i4D functions in an operational environment with revenue flights. • SESAR 15.2.5 – ATN/OSI over SATCOM early validation • ESA Iris – Number of projects addressing mid-term and long-term SATCOM evolution for ATM. <p>Relying on the positive SESAR 1 and SESAR 2020 outcomes, Honeywell is in best position to pursue the validation of the air-ground 4D trajectory exchanges, supporting the development of airborne demonstration platforms.</p>
Entity Profile matching the task	<p>The project is executed under the authority of the Advanced Technology Director for Europe based in Honeywell Aerospace SAS, located in Toulouse (France). The site will provide FMS system engineers and the system architect in charge of the overall project.</p> <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, SATCOM and other product test facilities. This extensive and innovative workforce would be a key enabler to perform the proposed activities.</p> <p>Honeywell International Inc Flight Operation team in Phoenix USA, acting as Contractor, will operate Honeywell flight test Embraer aircraft during the flight campaign in Europe. This Contractor Service will enable PJ38 partners to collect data from the Embraer aircraft platform.</p> <p>Data analysis will be supported by Honeywell Aerospace SAS in Toulouse and Honeywell Aerospace in Czech Republic.</p>
Contribution	<p>As a follow up of the work successfully done by Honeywell in VLD PJ31 DIGITS, Honeywell intends to contribute to this project to further progress on ADS-C implementation and foster its deployment and integration into operation, providing wide expertise in Flight Management System, 4D trajectory-based operation, and ATM domain, supporting ground partners in the analysis and validation of data sharing (Work Package « data collection & analysis »)</p> <p>Honeywell will also support the flight campaign by bringing to Europe the Honeywell's Embraer E-Jet test aircraft, equipped with an EPP capable FMS prototype B2 and ATN dual link (SATCOM + VDL) capability. The test aircraft is being equipped and verified under the ESA Iris program. The PJ.38 will only address the EU flight demonstration preparation, execution and subsequent data analysis (Work Packages "Data Collection", "Data Analysis" and "VDL/SATCOM interoperability").</p>

4.1.1.9 HUNGAROCNTRCL MAGYAR LEGIFORGALMI SZOLGALAT ZARTKORUEN MUKODO RESZVENYTARSASAG

Organisation	9 HC (FSP)	Ground Industry
Description	<p>Hungarocontrol Zrt. is a state-owned company in Hungary, which provides air navigation services in the Hungarian airspace and (on a NATO assignment) in the upper airspace over Kosovo, trains air control personnel and conducts air navigation research and development.</p> <p>Hungarocontrol Zrt. is member of the Frequentis SESAR Partners consortium together with the companies Atos Belgium SA/NV and Frequentis AG and was founded in 2014 for the main purpose of joining SESAR2020 activities. Frequentis SESAR Partners is member of the SESAR Joint Undertaking.</p> <p>The consortium is comprised of companies having a variety of complementary capabilities. Having former SESAR1 experience within its framework, an ANSP whose expertise will result in early feedback loops during certain projects, and the wide range IT, data management and security expertise of the consortium forming entities, Frequentis SESAR Partners believes in the high added value of its participation in SESAR2020 efforts.</p> <p>HC (FSP) has more than 50 years of experience in ATM and is committed to implementing and deploying state-of-the-art technology. HC has a well-established relationship with universities and scientific centers and is active in ATM R&D&I activities. HC has participated in SESAR 1 demonstration activities such as REACT-Plus and has also received EU co-funding from the SESAR JU for a Large Scale Demonstration project, Budapest 2.0.</p>	
Previous experience	<p>HungaroControl Zrt. has participated in SESAR 2020 Wave 1& Wave 2 as a member of FSP Consortium in the following projects, solutions or VLDs:</p> <p>Wave 1</p> <p>PJ.03-A</p> <p>PJ.05-02</p> <p>PJ.05-03</p> <p>PJ.10-01B</p> <p>PJ.16-03</p> <p>PJ.16-04</p> <p>PJ.28 (as a linked third-party)</p> <p>SESAR Exploratory research - USIS project</p> <p>Wave 2</p> <p>PJ02-21</p>	

Organisation	9 HC (FSP)	Ground Industry
	PJ05-35&97 PJ10 PJ13-115&117 PJ20	
Entity Profile matching the task	<p>Air Navigation Service Providers including the profiles:</p> <p>ATM Operational expertise,</p> <p>ATM System expertise</p> <p>Simulation expertise (Simulation HUB)</p> <p>En-Route and Approach Air Traffic Controllers,</p> <p>Human Factors expertise,</p> <p>Safety expertise</p> <p>Methodology expertise</p> <p>Experience relevant to the project as a remote air navigation service provider. HC participated in Wave 1 and Wave 2 activities and have relevant background and knowledge about the conflict detection tools as an ATM expert and intend to deepen that expertise and knowledge to be able to improve the air navigation services.</p>	
Contribution	<p>HungaroControl Zrt. (as member of FSP) will contribute to the Work Package Operational evaluations in the frame of PJ38.</p> <p>HungaroControl is planning to have a common operational validation exercise with Airbus Defence and Space with the usage of TESLA tool and Genetics. Form of validation will be: Simulation (with reference scenarios) with GENETICS and possible Live Trial with real radar data with installation of computers in operational room to establish the radar and FPL (AFTN) connections depending on the technical conditions. The place of validation is Budapest, HungaroControl HQ.</p> <p>HungaroControl will also review the internal documents related to Work Package ADS-C Common Service.</p> <p>The main contribution of HungaroControl Zrt., as ANSP, will be:</p> <ul style="list-style-type: none"> • Support with ATCOs • ATM system experts • Airspace Design Specialists • Methodology expertise • Human Factor expertise • Safety expert 	

4.1.1.10 INDRA SISTEMAS SA

Organisation	10 INDRA	Ground Industry
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Description	<p>Indra is one of the leading global technology and consulting companies and the technological partner for core business operations of its customers world-wide. It is a world-leader in providing proprietary solutions in specific segments in Transport and Defence markets, and the leading firm in Digital Transformation Consultancy and Information Technologies in Spain and Latin America through its affiliate Minsait. Its business model is based on a comprehensive range of proprietary products, with a high-value innovation component. In the 2017 financial year, Indra achieved revenue of €3.011 billion, with 40,000 employees, a local presence in 46 countries and business operations in over 140 countries. Indra ranks second in Europe by R&D spent. .</p> <p>With the aim to provide our Customers with comprehensive, full and turnkey solutions, Indra product range covers the whole range of Air Traffic Management Systems, including Surveillance, Automation, Communications, Simulators and NAVAIDs.</p> <p>At Indra we have developed air traffic management systems that are deployed across the world, with over 4,000 installations in 160 countries. We are positioned as the market's leading supplier of air traffic management and communications, navigation and surveillance (ATM-CNS) systems. In the field of R&D, we are one of the leading companies in the SESAR program, the key technology behind the Single European Sky initiative.</p> <p>Indra has the in-depth experience and products necessary to undertake any Air Traffic Management programme, with both a proven international management approach and a history of responsible program execution. That experience, together with a solid technology base, permanent innovations and quality in processes and projects are the pillars sustaining Indra leadership position in Air Traffic Management, completely oriented towards Customer needs and aimed to provide our Customers with the highest level of service.</p> <p>Indra is the world leader for Flight Data Processing Systems, having supplied over 40 installations worldwide and has grown to be leader Air Traffic Management system supplier in Europe. In December 2008, Indra supplied EUROCONTROL with the new next-generation interoperable Flight Data Processing System at Maastricht Upper Area Control Centre, one of the busiest and most complex en-route Air Traffic Control Centres in Europe.</p> <p>The implementation of this Flight Data Processing System is a high technological advance directed to improve the safety, capacity, efficiency and environmental performance of Air Traffic management in Europe, and actively contributing to achieving the European's Commission Single European Sky objectives.</p> <p>Indra has been selected by the most advanced European Air Navigation Service Providers to develop the future Air Traffic Management systems following the Single Sky Concept, through the iTEC Program (Interoperability Through European Collaboration). This is currently formed by ENAIRE (Spain), DFS (Germany), NATS (United Kingdom) and LVNL (The Netherlands), with Indra as industrial partner. New partners are PANSA (Poland), AVINOR (Norway), Oro Navigacija (Lithuania). iTEC is currently the most advanced next-generation air</p>
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	traffic management system, after entering full operational service at the Prestwick control center in Scotland
Previous experience	<p>Since 2009, Indra is full member of the SESAR Joint Undertaking. In SESAR 1 Indra participated in more than 120 projects within the Programme and co-leading both WP10 (En Route and Approach ATC) and WP12 (Airports) Work Packages, as well as playing a key role in many projects under WP14 (SWIM), WP15 (Non-Avionics CNS) and WP13 (NIMS). Indra has also participated in SESAR Demonstration projects.</p> <p>In SESAR2020 Wave 1, Indra participated in IR/VLD Projects 01, 02, 03a, 03b, 04, 05, 06, 07, 08, 09, 10, 11, 14, 15, 16, 17, 18, 19, 20, 22, 24, 25, 27, 28 and 31, being Project Coordinator in PJ15 and PJ18. We have been involved also in SESAR RPAS Demonstration projects SAFEDRONE and DOMUS.</p> <p>In SESAR2020 Wave 2, Indra is participating in IR/VLD Projects 01, 02, 04, 05, 09, 10, 13, 14, 18, 19, 20 and VLD1 (this last, under signature at the time of preparing the current Bid). Indra is also participating in Exploratory Research 4 projects TAPAS (ATM) and BUBLES (RPAS). In the H2020 ECSEL JU framework, Indra is leading the RPAS project COMP4DRONES.</p>
Entity Profile matching the task	<p>As explained in the previous sections, Indra has a solid entity profile in ATM Research due to the background knowledge, human resources and facilities to perform the R&D activities. The ATM background has continuously grown from the 80's first developments for the Spanish ATM system, to joint ventures with other ATM worldwide companies, until alliances with key European ANSPs (iTEC). In term of human resources, hundreds of skilled personnel support the activities, while in terms of facilities, a significant number of laboratories and hardware resources equipped with the latest technology are used.</p>
Contribution	<p>The main contribution of Indra, as Ground Industry Supplier, will be:</p> <ul style="list-style-type: none"> • Support to the elaboration of the common specifications for the ADS-C Common Service, from service user perspective. • Development and Testing (at Indra premises) of a client interfacing the ADS-C Common Service, following the commonly agreed specifications. • Specification, Development and Testing (at Indra premises) of some adaptations on our FDP ATN B2 supported functionalities in order to use the ADS-C Common Service client to get access to the ADS-C data from revenue flights. • Integration, Deployment and Testing (on ANSPs site) of the Industrial Based Platforms to be used by DFS & PANSAs during their Demonstration exercises, where the platform will integrate the above mentioned FDP adaptation (for accessing the ADS-C common service), together with the prototypes developed within SESAR PJ18 wave 2 solutions 53 and 56 (when available). • Specification, Development and Testing (at Indra premises) of a SW Application able to analyse in fast time the recorded EPPs and planned trajectories, to search for discrepancies, facilitating the selection of the most relevant/interesting flights for subsequent replay in our Industrial Based Platform.

- Integration, Deployment and Testing (on DFS site) of the above mentioned fast time application, for its usage.
- Support to DFS & PANSA in the Demonstrations and in the elaboration of the conclusions.

4.1.1.11 LEONARDO - SOCIETA PER AZIONI

Organisation	11 LEONARDO - SPA	Ground Industry
Description	<p>LEONARDO is a global player in the high-tech sectors and a major operator worldwide in the Aerospace, Defence and Security sectors. LEONARDO is based in Italy, has over 45,000 employees, of whom about 36% abroad, and in 2017 recorded 11.5 billion euro in revenues and received orders in the amount of 11.5 billion. Luciano Carta has been the President since May 2020 and Alessandro Profumo has been the CEO since May 2017. LEONARDO designs and creates products, systems, services and integrated solutions both for the defence sector and for public and private customers of the civil sector, both in Italy and abroad.</p> <p>The wide range of defence and security solutions that LEONARDO offers Governments, private citizens and institutions includes every possible intervention scenario: airborne and terrestrial, naval and maritime, space and cyberspace. In close contact with local customers and partners, LEONARDO works every day to strengthen global security, provide essential physical protection and cybersecurity services for people, territories and infrastructure networks and supports scientific and technological research.</p> <p>LEONARDO operates in about 20 countries with offices and industrial plants in all of the five continents and can rely on a very large network of subsidiaries, joint ventures and international partnerships, with significant industrial presence in three main markets, United Kingdom, Poland and United States and structured partnerships in the most important high potential markets in the world.</p> <p>The new LEONARDO is the culmination of a radical renewal and transformation process: from a financial holding company to a great integrated industry focused on four activity sectors:</p> <ul style="list-style-type: none"> • Helicopters • Aeronautics • Aerostructures • Electronics Defence and Security Systems • Space <p>LEONARDO operates through seven divisions that have inherited the activities of its 100% owned companies (AgustaWestland, Alenia Aermacchi, Selex ES, OTO Melara and WASS):</p> <ul style="list-style-type: none"> • Helicopters • Aircraft • Aerostructures • Airborne & Space Systems • Land & Naval Defence Electronics • Defence Systems 	

	<ul style="list-style-type: none"> Security & Information Systems <p>LEONARDO also retains Parent Company and Corporate Centre functions for participated companies and joint ventures not included in the divisional scope.</p> <p>These are: the US subsidiary DRS Technologies, which deals with the supply of products, services and integrated support for the military, intelligence agencies and defence companies; ATR, the joint venture established with Airbus Group for the manufacture of regional aircraft; MBDA, the joint venture established with BAE Systems and Airbus Group for missile systems; Telespazio and Thales Alenia Space, the two joint ventures established with Thales as part of the Space Alliance, for satellite services and the manufacture of satellites and orbiting infrastructures, respectively.</p>
Previous experience	<p>Leonardo is a member of the SESAR Joint Undertaking, participating in a lot of projects of SESAR1, like WP3, WP4, WP5, WP6, WP7, WP8, WP9, WP10, WP12, WP13, WP14, WP15, WP16 and WPB.</p> <p>Leonardo contributed also in SESAR 2020 WAVE1 with the following projects PJ02, PJ03a, PJ3b, PJ04, PJ05, PJ10, PJ11, PJ15, PJ14, PJ16, PJ17, PJ18, PJ19, PJ20, PJ22.</p> <p>Leonardo is actually involved in SESAR WAVE2, as Coordinator in PJ.14 and PJ.13, as member in PJ01, PJ02, PJ04, PJ05, PJ10, PJ14, PJ18, PJ19, PJ20.</p> <p>Further, Leonardo has been participating to the following international programme:</p> <ul style="list-style-type: none"> ELSA to analyse and optimise the VDL2 Infrastructure communication network for the Europe) GAMMA to study and develop a global ATM solution in order to cope with cyber-security aspects SANDRA to study, implement and demonstrate in flight a new digital communication system that will lead pilots into the digital world of the 21st century, where a single device transmits communications with the ground and via satellite, digitally at high speed. Detailed information, such as the weather, flight plan or the traffic situation can be exchanged between the tower and the aircraft quickly and reliably, increasing the air traffic safety
Entity Profile matching the task	<p>Leonardo has relevant profiles and experts in order to support and manage all the activities needed to carry on the PJ 38 since it is working in this domain from long time ago, with an active participation to international working group (see also the “previous experience” paragraph) starting from these activities</p> <p>Leonardo can provide a large numbers of experts for the following categories:</p> <ul style="list-style-type: none"> ATC and UTM Control System experts Surveillance experts Cyber security experts.
Contribution	<p>Leonardo will contribute in 3 Work Packages of PJ.38:</p> <ul style="list-style-type: none"> In the WP “Operational evaluation”, supporting to ENAV during the demonstration; In the WP “ADS-C common service”, contributing to the elaboration of the common specifications for the ADS-C Common Service, contributing to the development and testing of the ADS-C Common Service and developing and testing of a client interfacing the ADS-C Common Service;

- In the WP “Data analysis” and “Data Collection”, supporting to ENAV in the Demonstrations and in the elaboration of the conclusions.

4.1.1.12 NATS (EN ROUTE) PUBLIC LIMITED COMPANY

Organisation	12 NATS	Service Provider
Description	<p>NATS (En Route) plc is the core business and the sole provider of ATC services for aircraft flying ‘en route’ in UK airspace and the eastern part of the North Atlantic. NATS manages 11% of Europe’s airspace and circa 25% of Europe’s traffic. It is regulated by the UK Civil Aviation Authority (CAA) within the framework of the European Commission’s (EC) Single European Sky (SES) and operates under licence from the UK Secretary of State for Transport. It operates from two ATC centres at Swanwick in Hampshire (England) and Prestwick in Ayrshire (Scotland).</p> <p>NATS (En Route) plc purpose is to provide safe, efficient and effective air traffic control services to aircraft operating within airspace where such services are either required or provided, specifically providing:</p> <ul style="list-style-type: none"> • En-route and Terminal Air Traffic Control (ATC) for all UK airspace under a 30 year operating licence to UK Government. In 2017, NATS handled over 2.5 million flights, carrying more than 200 million passengers safely through some of the busiest and most complex airspace in the world. • The design and management of airspace, engineering project and maintenance activities for ANS communications, navigation and surveillance systems, and IT and network management. • Cross business support to UK Ministry of Defence (MoD) which includes the provision of a joint ATC service in the UK FIR, and support to communications systems, radar, facilities and training. • Provision of Instrument Flight Procedure design services, publication of the International Air Pilot Publication (IAIP), Notice to Airmen (NOTAM) documentation, data management and charting services for the UK. • Consultancy services to UK and overseas customers in air traffic management, airspace design, instrument flight procedures, control tower system integration and transition, safety management, engineering, project management. • Training of ATC staff, both as ab-initio controllers, for transition to new airspace or facilities and via supplementary courses including Supervisor Management, On Job Training (OJTI) and Incident Management. • Training of engineering staff. 	
Previous experience	<p>Through our previous work, NATS has developed the expertise and experience in understanding the characteristics of the airborne trajectory and the implications for integrating it into ground applications, as well as</p>	

	<p>the datalink test infrastructure required to downlink ADS-C data. As an ANSP that handles traffic in high-density airspace, NATS is well positioned to further demonstrate the improvements that sharing of the aircraft trajectory can bring to operations.</p> <p>Relevant past projects and activities:</p> <ul style="list-style-type: none"> • In SESAR 1, NATS conducted collaborative research with Airbus on the integration of ADS-C trajectory data in trajectory-based separation provision tools. • In SESAR 1, NATS was a partner in the SESAR 1 Large Scale Demonstration of sharing the airborne trajectory (PEGASE). • In SESAR 2020 Wave 1, NATS is a partner in PJ31 DIGITS ADS-C VLD. NATS has established ground datalink ATN B2 test infrastructure at its Corporate and Technical Centre (CTC) in Hampshire, UK. NATS undertook data analysis tasks to explore the applications of downlinked ADS-C data and conducted a simulation-based demonstration of EPP display and 2D FMS route discrepancy check capabilities, developed jointly with DFS, ECTL and Indra. • In SESAR 2020 Wave 1, NATS was a partner in PJ18-06, and undertook research into ground trajectory prediction performance enhancements using ADS_C data. This covered both planning and tactical trajectory prediction (solutions 18-06a and 18-06b respectively). <p>Relevant Products and Services:</p> <ul style="list-style-type: none"> • Establishment of an ATN baseline 2 test datalink platform to enable ADS-C downlink as part of wave1 PJ31.
Entity Profile matching the task	<p>NATS will support the project with staff knowledge and capabilities in:</p> <ul style="list-style-type: none"> • Validation expertise and research analysts to support the design, execution and reporting of the demonstration; • System Engineering with experience in areas such as Flight Data Processing Systems, datalink (both SATCOM and VDL), core infrastructure services and technical safety assurance. <p>These capabilities have been demonstrated throughout NATS' participation in SESAR 1 and SESAR 2020 Wave 1.</p>
Contribution	<p>NATS contribution to the project will comprise the following:</p> <ul style="list-style-type: none"> • Contribution to the definition of ADS-C Common Service requirements • Specification and deployment of ground infrastructure required to enable NATS to assume a Common Service consumer role • Specification and deployment of associated ground-ground communications infrastructure to support Common Service demonstration • The planning and execution of ADS-C data analysis tasks

- Operational evaluations of Traffic Sequencing in TMA by making use of additional information from ADS-C (ETA min/max)
- Coordination with Project IRIS as required to fulfil the SATCOM-related objectives of PJ38

4.1.1.13 POLSKA AGENCJA ZEGLUGI POWIETRZNEJ

Organisation	13 PANSА (B4)	Service Provider
Description	<p>PANSА (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. PANSА 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. In 2019 PANSА handled over 910 thousands IFR movements.</p> <p>PANSА 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>PANSА is a Member of the Baltic FAB and Gate One, a regional platform of Central and Eastern European ANSPs.</p> <p>PANSА is also a founding member of the SESAR Deployment Alliance that was mandated by the European Commission to perform functions of the SESAR Deployment Manager that is responsible for synchronisation and coordination of PCP-related implementation projects.</p>	
Previous experience	<p>Previous and current projects:</p> <ul style="list-style-type: none"> ▪ SESAR 2020 Wave 1 Solution PJ.10.02a (Improved Performance in the Provision of Separation) under which PANSА together with its Industrial Business Partner (INDRA) developed and validated a new MTCD (Medium-Term Conflict Detection) solution using ADS-C EPP (Extended Projected Profile) data. ▪ SESAR 2020 Wave 2 Solutions PJ.18-W2-53 and PJ.18-W2-56 under which PANSА together with its Industrial Business Partner (INDRA) will develop and validate solution aimed at improving ground trajectory prediction as a part of continuous improvement of CD&R (Conflict Detection and Resolution) tools. ▪ iTEC Collaboration initiative 	
Entity Profile matching the task	<p>Air Navigation Service Providers including the profiles:</p> <ul style="list-style-type: none"> ▪ ATM Operational expertise, ▪ ATM System expertise, ▪ En-Route and Approach Air Traffic Controllers, 	

Organisation	13 PANS (B4)	Service Provider
	Experience relevant to the project PJ.38-W3 includes ATM Operational services (En-Route, TMA), development of ATM Systems functionalities supporting trajectory prediction and management using EPP and ADS-C data.	
Contribution	<p>PANS (B4) will participate in demonstration of project PJ38-W3 objectives, focused around use of ADS-C data in ATM system and tools for ATCOs. PANS will participate in presenting operational benefits coming from usage of the ADS-C data, including analysis of benefits for Conflict Detection and Resolution Tools and demonstration of real use of ADS-C data in ATM system. Also PANS will participate in defining of Common services and demonstration of ADS-C- data distribution with such common service.</p> <p>PANS (B4) will contribute to all project deliverables.</p>	

4.1.1.14 SKYGUIDE, SA SUISSE POUR LES SERVICES DE LA NAVIGATION AERIEENNE CIVILS ET MILITAIRES

Organisation	14 SKYGUIDE	Air Navigation Service Provider
Description	<p>SKYGUIDE is the Swiss Civil and Military Air Navigation Services Provider.</p> <p>They are located in the European Core Area. 59% of the services are provided within the national boundaries and 41% within airspace delegated from European neighbours. SKYGUIDE operates one airspace from two Area Control Centres, situated in Geneva and in Wangen in the Zurich area. As a fully integrated Civil and Military Service provider, they operate the Swiss Air Defence & Direction Centre (ADDC) for the OAT operations. SKYGUIDE is also present on 12 regional civilian and military airfields throughout the country. Skyguide is setting up the capability of running a virtual centre, i.e. operating one centre from two locations and setting the premises for future sector-exchange capabilities with foreign ANSPs. SKYGUIDE was core member of the EUROCONTROL FASTI (First ATC Support Tools Implementation) programme as from 2005 and declared as a FASTI pioneer, at the time already making use of fully electronic environment. Operations are equipped with CPDLC capability and make use on a daily basis of 4d Trajectory based ATC Support tools (conflict detection and conflict resolution tools, monitoring aids, inter-sector coordination tools). In addition, SKYGUIDE has set up an advanced R&D platform equipped with new functionalities such as “what-if” and “what-else” functions or 4D-trajectory management including datalink exchange capabilities (CPDLC ATN-B1 & ATN-B2, ADS-C EPP).</p> <p>SKYGUIDE has a dedicated an operational R&D platform based on the operational system architecture that permit to perform operational validation in an environment very close to the operational environment in service. Up to 16 Controller Working Positions are available.</p>	

	<p>SKYGUIDE is fully committed to its public service mandate. Switzerland's air navigation service provider is an entrepreneurially-minded and customer focused joint-stock company under Swiss private law, which has its head office in Geneva.</p> <p>Located in the middle of the European ATM Network, SKYGUIDE is able to provide front-end expertise of a dynamic ANSP, dealing with the highest density and complexity airspace of Europe (EUROCONTROL Performance Review Unit assessment). In 2019, SKYGUIDE handled 1.3 Million Civil IFR flights and, for the Airforce, conducted 289 hot missions and 2019 tactical missions with a very high safety and punctuality levels. In order to ensure the required level of performance in this really specific operational environment, SKYGUIDE adopts innovative approaches in various domains like new technologies (e.g. CPDLC, satellite navigation), advanced automated ATC support tools and HMIs, centralised ATC data processing systems.</p> <p>As confirmed by the European air traffic control agency EUROCONTROL, SKYGUIDE has continuously both increased airspace capacity and enhanced the punctuality of the flights over the past 10 years.</p> <p>SKYGUIDE is joining with SkySoft-ATM (as LTP), allowing the provision of a RTD with advanced functionalities, replicating the SKYGUIDE HMI and allowing additional ATC Functions to be included.</p>
Previous experience	<p>In SESAR 1, SKYGUIDE has been an associate partner of DSNA and DFS and contributed in numerous Work Packages and participating to several Large Scale Demonstrations as consortium member.</p> <p>In particular, activities of SKYGUIDE in SESAR 1 linked to PJ.38 objectives have been:</p> <ul style="list-style-type: none"> • Pegase (Airbus) Large Scale Demonstration: "Providing Effective Ground & Air data Sharing via Extended Projected Profile" addressing the use of EPP) in the ground Trajectory Prediction tools therefore with the aim of improving controller support tools reliability • ODP (DFS) Large Scale Demonstration: "Optimised Descent Profile" • SKYGUIDE is full member of SESAR 2020 <p>In SESAR 2020 Wave 1, the Activities of SKYGUIDE linked to PJ.38 solutions objectives have been:</p> <ul style="list-style-type: none"> • PJ.18 : 4D Trajectory Management <ul style="list-style-type: none"> ○ Solution 18-02a - Trajectory Management Processes <ul style="list-style-type: none"> ▪ SKYGUIDE has contributed to the 4D Trajectory Management concept definition ▪ SKYGUIDE in partnership with Eurocontrol, Airbus and Dassault has led a V2 validation with the aim of validating complex/in advance CPDLC clearances, use of downlinked EPP data (route conformance check and monitoring) • PJ.10 : PROSA <ul style="list-style-type: none"> ○ Solution 10-02a - Improved performance in the provision of separation <ul style="list-style-type: none"> ▪ SKYGUIDE has contributed operational concept of the solution

	<ul style="list-style-type: none"> ▪ SKYGUIDE has performed a V3 validation with the aim of validating improved controller support tools including Conflict & Resolution Advisory tools which will serve PJ.38 objectives. • PJ.16 : CWP-HMI <ul style="list-style-type: none"> ○ Solution 16-03 - Service Interface Definition & Virtual Centre Concept <ul style="list-style-type: none"> ▪ SKYGUIDE has contributed to the definition of (centralised) services in the frame of Virtual Centre Concept. ▪ SKYGUIDE has performed a V2 validation involving centralized services • PJ.19 : Content Integration <ul style="list-style-type: none"> ○ WP 19-02 - ATM Operation <ul style="list-style-type: none"> ▪ SKYGUIDE has contributed to SESAR 2020 Concept of Operations including 4D trajectory management <p>In SESAR 2020 Wave 2, the Activities of SKYGUIDE linked to PJ.38 solutions objectives are:</p> <ul style="list-style-type: none"> • PJ.18 Wave 2 : 4D Skyways <ul style="list-style-type: none"> ○ PJ.18-53 - Improved ground trajectory prediction enabling future automation tools <ul style="list-style-type: none"> ▪ SKYGUIDE intends to improve Trajectory Prediction and controller support tools with additional data such as weather data, Aircraft Derived Data (Mode-S, ADS-C) etc... SKYGUIDE will contribute to the Operational Concept definition and Technical Specifications and will perform a V3 validation exercise with new Trajectory Predictor and advanced Conflict Detection tools and monitoring tools. ○ PJ.18-56 - Air/Ground Trajectory Synchronisation via lateral and vertical complex CPDLC clearances to support TBO <ul style="list-style-type: none"> ▪ SKYGUIDE continue activities performed in Wave 1 PJ.18-02a. SKYGUIDE will contribute to Operational Scenarios Definitions providing operational, Human Performance, and Safety expertise. SKYGUIDE will led a V2 validation exercise bringing new functionalities linked to CPDLC and using advanced Trajectory Prediction
Entity Profile matching the task	<p>The SKYGUIDE Air Navigation Service Provider expertise includes the following profiles :</p> <p>Operational Expertise :</p> <ul style="list-style-type: none"> • En-route and TMA Air Traffic Controllers acting in one of the most complex ATC environment • Ops experts : experts already contributing to SESAR 2020 Wave 1 and Wave 2 <p>Technical Development expertise :</p> <ul style="list-style-type: none"> • Major software developments of the operational system • Dedicated software development team for R&D.

	<ul style="list-style-type: none"> • System Engineering: Platform development, integration and validation <p>Technical Expertise :</p> <ul style="list-style-type: none"> • Technical experts in Air/Ground datalink communication • Technical experts in Service Oriented Architecture <p>Simulator expertise :</p> <ul style="list-style-type: none"> • Simulator team use to prepare and run R&D simulation <p>Safety expertise :</p> <ul style="list-style-type: none"> • Safety expertise – operation expertise <p>Human Performance expertise : HP team expertise – operation expertise</p>
Contribution	<p>Being in charge of the most complex airspace in Europe (EUROCONTROL Performance Review Unit assessment), SKYGUIDE shall be innovative in all fields of ATM in order to provide required performance to the ATM network. Therefore, SKYGUIDE is already operating ATC/ATM with advanced ATC tools and is willing to further investigate new system functionalities and new steps of automation and working methods in particular linked to advanced datalink functions and data exchange with aircraft (e.g. ADS-C).</p> <p>As described above, SKYGUIDE is strongly involved in SESAR2020 activities and in particular in activities related to 4D Trajectory management, air/ground data exchange. Therefore, SKYGUIDE is using an advanced R&D platform based on the operational system architecture equipped with advanced functionalities as Conflict Detection tools, Route monitoring tools, 4D trajectory management tools (e.g. graphic trajectory editor), advanced CPDLC, use of ADS-C data (CPDLC ATN-B1 & ATN-B2, ADS-C EPP) etc... The platform is also connected to the Airbus traffic generator Genetics which should also allow use of additional simulated EPP data. Some shadow mode operation should also be considered for conformance monitoring with EPP</p> <p>SKYGUIDE will put in place infrastructure to connect to the centralised ADS-C EPP service and therefore to use live ADS-C EPP allowing to perform live analysis and some shadow mode operations.</p> <p>This will also permits to perform operational validation (Trajectory Predictor improved with ADS-C EPP data, route conformance monitoring, conflict detection tools...) in an environment very close to the operational environment in service.</p> <p>The SKYGUIDE industrial-based platform (skysim) has been set-up to integrate advanced ATC functions using downlinked airborne data including Mode-S and ADS-C. PJ.18-53 and PJ.18-56 are using this platform for their operational validation and therefore experience gained will be a starting point for the PJ.38 operational validation activities. Trajectory Prediction, CD&R and route conformance monitoring tools are including some ADS-C data in their processes. This will be further enhanced with connection to real data coming from the ADS-C equipped aircraft, part of the PJ.38 VLD.</p>

4.1.1.15 RIZENI LETOVEHO PROVOZU CESKE REPUBLIKY STATNI PODNIK

ANS CR is a “NOT RECEIVING EU FUNDING” PARTNER in this proposal

Organisation	15 ANS CR (B4)	Service Provider
Description	<p>Air Navigation Services of the Czech Republic (ANS CR) is a progressive provider of safe and cost-effective air traffic services designated by Czech Ministry of Transport. Its task is to provide services to airspace users within the Czech airspace and at 4 international airports - Prague, Brno, Ostrava and Karlovy Vary. Covering rather small but very complex airspace, the company handled more than 850.000 flights in 2017, reaching to 900.000 flights in 2018, with minimal level of delay. Operating fleet of jet and propeller calibration aircraft, ANS CR offers wide range of flight inspection services. In addition, ANS CR provides specialized aviation training. The portfolio includes ATC training, pilot and other aviation staff training using its own facilities including ATC and aircraft simulators. The above-mentioned activities together with ATM consultancy services are provided to international customers on commercial basis by subsidiary companies CANI (Czech Air Navigation Institute) and CATC (Czech Aviation Training Centre).</p> <p>Being member of SESAR Joint Undertaking via B4 Consortium, ANS CR actively contributes to SESAR 2020 Programme. Participation in SESAR Deployment Programme is ensured by involvement in several implementation projects. Together with other central European countries, the Functional Airspace Block Central Europe (FAB CE) was formally established. All such activities contribute to implementation of the Single European Sky (SES) legislation.</p>	
Previous experience	<p>General SESAR experience:</p> <p>ANS CR was actively involved in SESAR 2020 Wave 1 Solutions and has a lot of experience not only with the SESAR requirements and methodology, but also with various research and development topics being content of SESAR. ANS CR was actively involved in following solutions:</p> <p>PJ.01-02, PJ.01-3b, PJ.03a, PJ.03b, PJ.07-03, PJ.10-1b, PJ.10-2a, PJ.10-2b, PJ.16-04, PJ.18-06 and PJ.28.</p> <p>ANS CR has experience with contribution and development of all main project deliverables and with a preparation of big validation exercises. ANS CR has a skilled internal team to coordinate the SESAR projects/contribution of ANS CR to the SESAR projects. ANS CR has also internal team of experts and well developed network of cooperating LTPs. This experience will be utilised in the Wave 2 and Wave 3.</p>	
Entity Profile matching the task	<p>Thanks to active participation in the W1 Solutions PJ10-2a, PJ10-2b and PJ18-06, there is a lot of experience not only with the topic itself, but also with the preparation of VAL EXE, contribution to deliverables etc. ANS CR is also actively involved in W2 projects, especially in PJ18 W2-53, which is linked to PJ38.</p> <p>There are also lessons learnt from current cooperation with the partners. All this experience will be used as a basis for the cooperation in PJ38-W3-ADSCENSIO.</p>	
Contribution	<p>ANS CR intends to contribute to following activities:</p> <ul style="list-style-type: none"> Work Package Data Collection 	

	<ul style="list-style-type: none"> Task 2.1 – review of deliverables Task 2.2 – active data collection Task 2.3 – active data access ▪ Work Package Data Analysis <ul style="list-style-type: none"> Task 3.1 – support / limited involvement Task 3.2 – support / limited operational analysis Task 3.3 – review of deliverables ▪ Work Package Operational evaluations <ul style="list-style-type: none"> Task 4.1 – limited demonstration platform Task 4.2 – limited operational evaluations Task 4.3 – limited analysis
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4.1.1.16 LETOVE PREVADZKOVE SLUZBY SLOVENSKEJ REPUBLIKY, STATNY PODNIK

LPS SR is a SILENT PARTNER in this proposal

Organisation	16 Letové prevádzkové služby Slovenskej republiky, štátny podnik	Service Provider
Description	<p>Founded by the Ministry of Transport, Construction and Regional Development of the Slovak Republic in January 2000, LPS SR (Letové prevádzkové služby Slovenskej republiky, štátny podnik) is a state enterprise providing Air Navigation Services, including Air Traffic Services, Aeronautical Telecommunication Services, Aeronautical Information Services, as well as Search and Rescue, in the Slovak Republic.</p> <p>With a total staff of 500 (including 118 ATCOs) and altogether nine Operational units, among them one ACC (Bratislava), two APPs (Bratislava, Košice), five TWRs (Bratislava, Košice, Piešťany, Poprad, Žilina) and Central ATS Reporting Office (Bratislava), LPS SR controls the Slovak airspace (Bratislava FIR) of the total size of 48,800 km² and provides ATC services at five designated Slovak international airports as well as within small parts of the Hungarian airspace.</p> <p>The European-wide trend in air traffic in the last decade, is also reflected in the evolution seen in the Slovak airspace. In recent years, a significant increase in traffic was seen in the FIR Bratislava. As far as provision of air traffic control is concerned, there were no delays which would exceed the determined limit of 0.5 minute per 1 flight.</p> <p>LPS SR is a part of B4 Consortium, Member of SESAR Joint Undertaking.</p> <p>LPS SR is a Member of the FAB CE and a founding member of the Gate One, a regional platform of Central and Eastern European ANSPs.</p>	
Previous experience	Not applicable	
Entity Profile matching the task	Not applicable, LPS SR (B4) initially will not participate directly in this action.	
Contribution	Support to participating members of B4 Consortium if required.	

4.1.1.17 VALSTYBES IMONE ORO NAVIGACIJA

ON is a SILENT PARTNER in this proposal

Organisation	17 Valstybes imone "Oro navigacija"	Service Provider
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Description	<p>Founded by the Ministry of Transport and Communications of the Republic of Lithuania in 1995, valstybes imone Oro navigacija (ON) is a state-owned enterprise providing Air Navigation Services, including Air Traffic Management Services, Communication, Navigation and Surveillance Services, Aeronautical Information Services, as well as Search and Rescue, in the airspace of Republic of Lithuania and over the part of Baltic Sea.</p> <p>With a total staff of 290 (including 90 ATCOs) and altogether five operational units, among them one ACC (Vilnius), three APPs (Vilnius, Kaunas, Palanga), one TWR (Siauliai), ON (B4) controls the airspace of Republic of Lithuania and over the part of Baltic Sea (Vilnius FIR) of the total size of 76 126 km² and provides ATC services at four designated Lithuanian international airports. Each year providing safe and efficient air traffic control services to more than 250 thousand flights ON continues to maintain zero delays level and to meet users' expectations.</p> <p>ON (B4) is a Member of Baltic FAB, a part of B4 Consortium composed of four ANSPs from Central and Eastern European countries and a Member of SESAR Joint Undertaking. Being a member of SESAR Joint Undertaking via B4 Consortium, ON (B4) actively participates in the industrial and transversal projects by SESAR 2020 Programme while participation in SESAR Deployment Programme allows to implement several projects. In 2017, ON (B4) officially joined the European iTEC (Interoperability Through European Collaboration) alliance developing a high-end air traffic management system for busy and complex airspace.</p>
Previous experience	Not applicable
Entity Profile matching the task	Not applicable, ON (B4) initially will not participate directly in this action.
Contribution	Support to participating members of B4 Consortium if required.

4.1.1.18 ATOS BELGIUM

ATOS is a SILENT PARTNER in this proposal

Organisation	18 ATOS (FSP)	Ground Industry
Description	<p>Atos Belgium is a company within Atos SE (Societas Europaea) group. Atos is a leader in digital services with 2014 pro forma annual revenue of €10 billion and 86,000 employees in 66 countries. Serving a global client base, the Group provides Consulting & Systems Integration services, Managed Services, Cloud operations, Big Data & Security solutions, as well as transactional services. Throughout Europe, more than 300 Atos ATM experts provide solutions and architecture support to Air Navigation Service Providers, Airports, Airlines and Eurocontrol Network Manager.</p> <p>Atos Belgium is member of the Frequentis SESAR Partners consortium together with the companies HUNGAROCONTROL MAGYAR LEGIFORGALMI SZOLGALAT ZARTKORUEN MUKODO RESZVENYTARSASAG and Frequentis AG which was founded in 2014 for the main purpose of joining SESAR2020 activities. Frequentis SESAR Partners is member of the SESAR Joint Undertaking.</p>	
Previous experience	Not applicable.	

Organisation	18 ATOS (FSP)	Ground Industry
Entity Profile matching the task	Not applicable, ATOS (FSP) initially will not participate actively in this action.	
Contribution	Support to participating members of Frequentis SESAR Partners if required.	

4.1.1.19 FREQUENTIS AG

FRQ is SILENT PARTNER in this proposal

Organisation	19 FRQ (FSP)	Ground Industry
Description	<p>Frequentis AG, member of SESAR1 and SESAR 2020, is an international expert for communication and information systems for control centres with safety-critical tasks. Frequentis AG maintains a worldwide network of subsidiaries and local representatives in more than 50 countries to ensure closeness to our customers.</p> <p>Frequentis AG successfully designs and supplies systems and solutions for the domains of communication, network infrastructure, SWIM, aeronautical information management, and airport traffic optimization. Important focus lies in the future communication infrastructure domain and new technologies for visualisation. Frequentis is a strong supporter of service oriented and open, standardised architecture. In SESAR 1 and SESAR 2020 Wave 1 and 2 we effectively demonstrated remarkable achievements towards the next generation ATM system architecture. Special attention is given to the users of ATM systems. Our expertise and tooling guarantees early indications of the future user acceptance. Frequentis is also involved in forward-thinking and innovative R&D activities such as implementation of U-space solutions for the safer management of drones.</p> <p>Frequentis AG is member of the Frequentis SESAR Partners consortium together with the companies HUNGAROCNTRIL MAGYAR LEGIFORGALMI SZOLGALAT ZARTKORUEN MUKODO RESZVENYTARSASAG and Atos Belgium, founded in 2014 for the main purpose of joining SESAR 2020 activities. Frequentis SESAR Partners is member of the SESAR Joint Undertaking.</p> <p>The consortium is consisting of three companies has a variety of complementary capabilities. Having a long SESAR history within its framework, an ANSP whose expertise will result in early feedback loops together with IT and data management know how, Frequentis SESAR Partners believes in the high added value of its participation in SESAR 2020 wave 3 efforts.</p>	
Previous experience	Not applicable.	
Entity Profile matching the task	Not applicable, FRQ (FSP) initially will not participate actively in this action.	
Contribution	Support to participating members of Frequentis SESAR Partners if required.	

4.1.1.20 SAAB AKTIEBOLAG

SAAB is a SILENT PARTNER in this proposal

Organisation	20 SAAB (NATMIG)	Ground Industry
Description	<p>SAAB AKTIEBOLAG is part of the North European ATM Industry Group (NATMIG) Consortium. The NATMIG consortium consists of Airtel ATN (SME - Ireland), Saab AB (multinational industrial concern - Sweden) and SINTEF AS (non-profit research organisation - Norway).</p> <p>While SAAB AKTIEBOLAG originates in military and civil aircraft manufacturing and is one of the few companies in the world with the ability to develop, integrate and maintain complete aircraft systems, we are today active in several transport modes and a global supplier in the ATM domain.</p> <p>SAAB AKTIEBOLAG's over 75 years of history in aeronautics, over 4000 civil and military aircraft produced and as well as our broad involvement in ATM businesses, provide a solid background and deep competence in aeronautics in general and RPAS in specific. For the future we plan to continue to be able to provide market-leading aeronautical products including manned and unmanned (RPAS) products that can operate safely in civil airspace, as well as solutions to facilitate others to allow safe RPAS operations in their airspace, whether it's an RPA, a Detect & Avoid system or related ATM components.</p> <p>SAAB AKTIEBOLAG is a global supplier in the ATM domain and Saab has a long history of developing and delivering ATM solutions. SAAB AKTIEBOLAG has pioneered future concepts such as the Remote Tower, which in operational use in Sweden and is undergoing trials in several other countries. In total, SAAB AKTIEBOLAG has deployed 240 ATM systems and subsystems to serve over 60 customers in 40 countries. Our air traffic management systems and tools serve 18 of the 20 busiest airports in the world, 10 of the 12 largest Air Navigation Service Providers (ANSPs), and the 3 largest airlines by passenger count. SAAB AKTIEBOLAG ATM systems guide 2 million aircraft movements each month via our airport surface safety systems. SAAB AKTIEBOLAG's main areas of interest are:</p> <ul style="list-style-type: none"> • RPAS • Remote Tower 	
Previous experience	<p>Saab (NATMIG) has been a SESAR member from the start with the SESAR project experience:</p> <p>SESAR 1 (WP05, WP06, WP10, WP12 and WP16): The main areas of contribution were in AMAN/DMAN, Remote Tower and safety.</p> <p>SESAR 2020 W1 (PJ05): The main area of contribution is in Remote Tower</p>	
Entity Profile matching the task	N/A	
Contribution	N/A	

4.1.1.21 SINTEF AS

SINTEF is a SILENT PARTNER in this proposal

Organisation	21 SINTEF (NATMIG)	Ground Industry
Description	<p>SINTEF is a part of North European ATM Industry Group (NATMIG) Consortium. The NATMIG consortium consists of Airtel ATN (SME - Ireland), Saab AB (multinational industrial concern - Sweden) and SINTEF AS (non-profit research organisation - Norway).</p> <p>SINTEF (http://www.sintef.no/) is the largest independent research organisation in Scandinavia and is a non-profit research organisation. We employ 2000 people most of whom are located in Trondheim and Oslo (Norway). More than 90% of our annual turnover derives from contract research for industry and the public sector in Norway and internationally, and we receive minimal state funding (around 6%). Contract research carried out by SINTEF covers all scientific and technical areas, and ranges from basic research through applied research to commercialisation of results into new products and business ideas, for both the domestic and international markets.</p> <p>Although SINTEF DIGITAL has gained competence in state-of-the-art ATM research for several decades, the increased focus through the SESAR 1 (32 projects) and SESAR 2020 involvement has substantially improved our technology and aligned it further to the needs of the aviation industry and airspace users. The activity in SESAR has also increased SINTEF's aeronautical research portfolio outside SESAR. SINTEF is a multidisciplinary research organisation, and can still bring added value to the ATM domain through our state-of-the-art research in other domains like Oil & Gas, Space, Health & Medicine, Constructions, Energy, Marine, Railway, Roads, Harbours, and Resilience etc.</p> <p>The SINTEF contribution to SESAR is focused around optimisation, (traffic sequencing, routing, taxiing, dynamic airspace, A-CDM), Human Computer Interface, system architecture and development, Digitalisation, Automation, 3D modelling, Safety, Resilience, Cyber Security and navigation (GBAS).</p>	
Previous experience	SINTEF (NATMIG) has been a SESAR member from the start with the SESAR project experience in SESAR 1 and SESAR2020 wave 1.	
Entity Profile matching the task	N/A	
Contribution	N/A	

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

The Project Manager will be Didier VELAY from DSNA.

Didier currently coordinates trajectory based operations research activities at DSNA/DTI. Prior to that, Didier worked in a variety of positions over the past 25 years, covering ATCo experience, development and specification of controller working position, exploitation of

real-time ATC simulators at the ENAC, project management in DSNA/DTI and management of ATC Services at Montpellier Airport.

Involved in different SESAR activities, he has developed a large experience in European ATM research and validation activities (SESAR 1 projects 6.7.2, 6.9.2 and ongoing SESAR 2020 project PJ18W2).

Didier has good relational capacities and communication skills and is keen to support a collective and collaborative approach.

He has in addition a lot of areas of interest, from hiking to sailing and reading.

Didier will be assisted in Project management tasks by Raphaël PASCAL from Airbus.

Raphaël works for Airbus ATM programme for 10 years and is involved in Trajectory Based Operations since SESAR 1 (Work Package 9 “Aircraft systems” deputy leader), and managing the contribution of Airbus to projects focussed on air-ground synchronization in SESAR2020.

He had previously contributed to datalink communication FANS function design (representing notably Airbus in EUROCAE Working Group for updating ARINC623 Departure Clearance and D-ATIS) and has also a strong background in Flight Operations:

- As support engineer in technical office of late French airline “Air Liberté – AOM” (specialist in Take-off performance and Procedures for MD-80 fleet) and having lead the compliance dossier with RVSM (Reduced Vertical Separation Minima) operations.
- As marketing manager of Flight Operations software applications in Airbus Customer Services, encompassing in particular the digitalisation of documentation (Operating manuals on Electronic Flight Bag) and performance computation. He has also played an active role in early initiatives to identify fuel inefficiencies by synergy with Flight Operations Monitoring tool.

Raphaël has a strong conscience of general interest, is keen to support collective undertaking and reasonably reluctant to make self-promotion.

He has in addition a lot of areas of interest, from sport to poesy, philosophy and astrophysics.

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

4.2.1 Linked to DSNA

Objective	
Does the participant plan to subcontract certain tasks (please note that core tasks of the project should not be sub-contracted)	Y
<p>DSNA intends to subcontract a set of tasks, for support and expertise in the domain of ATM. DSNA subcontracts allow DSNA/DTI to buy these required studies/services. These subcontracts are a framework for placing specific purchase orders and have been attributed in accordance to the French "Code des Marchés Publics".</p> <p>The detailed information is not yet defined; it will be related to various tasks: support to activity management, support to test platform preparation and configuration, data collection and analysis, and assistance to demonstration report.</p>	

Does the participant envisage that part of its work is performed by linked third parties ⁵	Y
<p>ESSP</p> <p>European Satellite Service Provider (ESSP) is a company specialized in the operations and provision of satellite-based services for aviation. Its core activities are the operations and service provision of EGNOS, the European Geostationary Navigation Overlay Service. The EGNOS Service Provision contract is funded by the European Union and managed through the European Global Navigation Satellite Systems (GNSS) Agency (GSA), with a clear mandate to help foster the use of satellite navigation within Europe and particularly in the domain of aviation. In addition to the provision of EGNOS Services, experience and expertise allows ESSP to start a phase in which new activities and projects are foreseen in the field of provision of Pan-European Safety-Critical Services and provision of global, satellite-based Communication, Navigation and Surveillance (CNS) services for the connected aircraft. ESSP foresees to become the IRIS service provider and has been/is involved in development projects regarding data link (DLK) and ADS-B. In the Datalink domain in particular it has been involved in the following projects: Path II, IP1 and the IRIS IOC project funded by ESA. The ESSP also participates actively to the European Datalink Support Group (DSG) and Datalink Performance Monitoring Group (DPMG).</p> <p>ESSP will contribute/give support to Work Package "ADS-C Common Service", under two roles: the Service Provisioning role and the Requirements Definition Role contributing to the definition of requirements and supporting the development of the architecture and functional service from the service provision perspective.</p> <p>ESSP will also contribute/give support to Work Package "VDL/SatCom interoperability" providing expertise on the SatCom domain through its participation to the IRIS development.</p>	
Does the participant envisage the use of contributions in kind provided by third parties (Articles 11 and 12 of the General Model Grant Agreement)	N
N/A	
Does the participant envisage that part of the work is performed by International Partners ⁶ (Article 14a of the General Model Grant Agreement)?	N
N/A	

4.2.2 Linked to Airbus SAS

Objective	
Does the participant plan to subcontract certain tasks (please note that core tasks of the project should not be sub-contracted)	Y
<p>AIRBUS SAS and Airbus Operations SAS will subcontract part of their contribution. 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. 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</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).

⁶ 'International Partner' is any legal entity established in a non-associated third country which is not eligible for funding under Article 10 of the Rules for Participation Regulation No 1290/2013.

<p>renegotiated on a periodic basis. AIRBUS will however check and ensure the consistency of the existing subcontracting agreement with the H2020 requirements.</p> <p>In particular, it is anticipated that AIRBUS will subcontract the direction of a video promoting activities and achievements of the Project.</p>	
Does the participant envisage that part of its work is performed by linked third parties ⁷	Y
<p>For the present proposal, Airbus Operations SAS and Airbus Defence and Space SAS are linked third parties 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 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 provide support on data collection, analysis and benefits characterization whereas AIRBUS SAS will concentrate on Project and Work Package management, flight tests and provide expertise to contribute to Operational Benefits demonstration.</p> <p>Airbus Defence and Space SAS</p> <p>Airbus Defence and Space SAS benefits from more than 20 years experience in developing solutions for Air Traffic Control Centres and Airports Towercab, directly supporting Air Navigation Services Providers (ANSP):</p> <ul style="list-style-type: none"> • Maintenance and improvement of operational systems: CAUTRA: En Route system in 4 French ACCs and Approaches (80 sites Airports towercab) • Programme Management: Lead in SESAR programmes • System Engineering, System Integration, Validation & Deployment: System Engineering or system Architecture role in SESAR programmes, and with ANSPs (ENAV, DSN, BULATSA) • Development of new systems: development of the ERATO and ELISA software (MTCD for France and Italy), TESLA (Short Term Conflict Detection), UTM solutions (Drone-it!, URTAS, UP...) <p>Airbus Defence and Space will contribute to Work Package Operational evaluations providing in particular advanced ATC tools for separation management (TESLA) in integration with to HungaroControl and BULATSA (LTP to ENAV).</p>	
Does the participant envisage the use of contributions in kind provided by third parties (Articles 11 and 12 of the General Model Grant Agreement)	N
N/A	
Does the participant envisage that part of the work is performed by International Partners ⁸ (Article 14a of the General Model Grant Agreement)?	N

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).

⁸ 'International Partner' is any legal entity established in a non-associated third country which is not eligible for funding under Article 10 of the Rules for Participation Regulation No 1290/2013.

N/A

4.2.3 *Linked to AIRTEL ATN LIMITED*

No third Party involved

4.2.4 *Linked to DFS*

Objective	
Does the participant plan to subcontract certain tasks (please note that core tasks of the project should not be sub-contracted)	Y
<i>As part of the project, extensive data analysis of ADS-C data and context data will need to be carried to support technical and operational assessments and benefit demonstrations. DFS plans to subcontract parts of the statistical analysis, big data handling, data preparation and visualization and the implementation of necessary data processing routines for this purpose. In terms of WPs, this subcontract will thus be central to support Work PackageData Analysis and subtasks T4.1 (Technical Analysis) T4.2 (Operational Analysis) and T4.3. Common Analysis Platform. Examples are analysis of ATN and SWIM communication performance, ATC impact on downlinked trajectory, and implementation of common analysis procedures.</i>	
Does the participant envisage that part of its work is performed by linked third parties ⁹	N
N/A	
Does the participant envisage the use of contributions in kind provided by third parties (Articles 11 and 12 of the General Model Grant Agreement)	N
N/A	
Does the participant envisage that part of the work is performed by International Partners ¹⁰ (Article 14a of the General Model Grant Agreement)?	N
N/A	

4.2.5 *Linked to ENAIRE*

Objective	
Does the participant plan to subcontract certain tasks (please note that core tasks of the project should not be sub-contracted)	No
N/A	

⁹ A third party that is an affiliated entity or has a legal link to a participant implying a collaboration not limited to the action. (Article 14 of the Model Grant Agreement).

¹⁰ 'International Partner' is any legal entity established in a non-associated third country which is not eligible for funding under Article 10 of the Rules for Participation Regulation No 1290/2013.

Does the participant envisage that part of its work is performed by linked third parties ¹¹	Yes
<p>CRIDA</p> <p>CRIDA (Centro de Referencia de Investigación, Desarrollo e Innovación ATM, A.I.E.) is a not-for-profit Research Entity established by ENAIRE (the Spanish ATM and Airport Services provider), the Technical University of Madrid "Universidad Politécnica de Madrid – UPM" and INECO. CRIDA was created on the 27th of February of 2008.</p> <p>CRIDA's mission is to improve the efficiency and performance of the Spanish Air Traffic Management (ATM) system through the development of ideas and projects that provide quantifiable solutions based on system performance indicators, considering the Spanish system as an integral part of a global networked system. To achieve this goal, CRIDA must analyse quantitative and systematically the benefits from the system, diagnose problems and identify their causes, propose and design innovative solution alternatives, identify and validate the best alternatives, and collaborate actively in the process of implementation of the selected solution. The analysis of the system is done in direct collaboration with ENAIRE (Spanish Air Navigation Service Provider), as its main partner, contributing to ENAIRE's mission of providing air navigation services safely, efficiently and with the adequate levels of quality respect for the environment.</p> <p>CRIDA is strongly focused on performing R&D+I; its partners and shareholders (ENAIRE, INECO and UPM) are tasked with the commercial exploitation of CRIDA's results. This dichotomy allows CRIDA to focus on the pursuit of knowledge whilst maintaining a strong connection with the real world problems.</p> <p>CRIDA has identified as a research priority the development of operational concepts and supporting tool prototypes that enhance and make more efficient the operation of the air navigation system. As part of this priority, CRIDA research addresses how to improve planning (as related to the DCB operations) and how to increase the automation of the system (aiming to increase the productivity of its actors). The research performed by CRIDA includes its participation in leading research and implementation programmes such as SESAR. The results obtained so far, have allowed the development of complexity management tools already in operation within the Spanish airspace (eCOMMET).</p> <p>The second strategic line of R&D in CRIDA consists in the study and validation of R&D+i solutions assessing their operational impact and quantifying the economic benefits derived from either or both the ATM system's performance improvements and/or the cost reduction associated with its implementation. To do this, CRIDA researches and develops innovative validation techniques and methodologies to respond to the needs of its partners.</p> <p>This strategic line ensures that the evaluation of new solutions is based on the same principles and methods as the system performance measurements to facilitate comparative analyses. It also offers the possibility of carrying out evaluations at both conceptual (based on the conceptual definition of the solution and without the need for any development) as pre-industrialization (based on prototypes) levels. Most of the activities performed in this area are included in the SESAR programme.</p> <p>CRIDA will contribute in PJ38 processing and analyzing ADS-C data in order to evaluate its applicability in a real-time, decision-making support with enhanced predictability features to be applied either in pre-tactical (preferred) or even tactical phase outside the ATCO position.</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)	Yes
<p>INECO and ISDEFE 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</p>	

¹¹ A third party that is an affiliated entity or has a legal link to a participant implying a collaboration not limited to the action. (Article 14 of the Model Grant Agreement).

SESAR1 and in SESAR 2020 Wave 1 and Wave 2 activities and the results have become optimal in terms of efficiency and mutual collaboration.

The use of this in kind contribution is identified as a key factor for the proper development of the activities under this project. The complementarity of the know-how and expertise profile obtained by this form of collaboration is necessary to achieve the targets with the expected level of quality.

This contribution corresponds to the one referred to in Art. 11 of the AMGA (in-kind contributions against payment), in turn corresponding to category “A.3- seconded persons” of the Annex 2 of the Grant Agreement , and currently is estimated to amount to around 16.900€ (direct costs) for the work developed on ENAIRE’s premises (since there is no specific place in Annex 2 to indicate these costs).

The estimated amount of 16.900€ associated to these works has been already considered in ENAIRE’s budget figure.

Does the participant envisage that part of the work is performed by International Partners ¹² (Article 14a of the General Model Grant Agreement)?	No
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N/A

4.2.6 Linked to ENAV SPA

Objective

Does the participant plan to subcontract certain tasks (please note that core tasks of the project should not be sub-contracted)	N
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N/A

Does the participant envisage that part of its work is performed by linked third parties ¹³	Y
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ENAV contribution in the project is complemented by the following LTPs: Techno Sky, BULATSA and Deep Blue.

Techno Sky

Techno Sky S.r.l. (Techno Sky) is an ENAV Group Company having the responsibility for the management and maintenance of systems and equipment used for Air Navigation Services in Italy as well as for the support to the ATM operational innovation and for all relevant ENAV Group R&D activities.

As ENAV mission critical systems integrator, Techno Sky controls the full value chain, i.e. Research and Development, System Engineering, Design, ATM Software Development, Weather System Development, Verification, Validation, Installation, Integration, Training, Logistics and Maintenance.

In 2017, Techno Sky extended its background of knowledge and expertise on R&D following the transfer of competences and experts coming from SICTA, the former ATM R&D branch of ENAV Group.

¹² ‘International Partner’ is any legal entity established in a non-associated third country which is not eligible for funding under Article 10 of the Rules for Participation Regulation No 1290/2013.

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).

The acquisition of ATM R&D experts is showing the Techno Sky constant commitment and focus on technological innovation, as a key factor for its continuous improvement and increased competitiveness on the market.

In addition, by investing in the study and implementation of new and more effective products and applications, Techno Sky acts significantly within the value chain of the ENAV Group and contributes to the efficiency, regularity and safety of Air Traffic Management operations.

Special care is devoted to the study of innovative systems to be used in the Company core business. These studies and surveys are intended to improve the innovative operational services supported by several simulators, platforms, tools and advanced methodologies.

Techno Sky, working in close cooperation with ENAV, has also gained an outstanding expertise in the development of innovative Air Traffic Management operations, in the development and validation of new concepts and procedures for the continuous improvement of performances, in assisting the supply industry to design and engineer new systems to safely support Air Traffic Controllers in their highly demanding tasks.

Techno Sky, as ENAV Linked Third Party, is involved in ENAV ATM strategic planning, technical co-operation and service provision programmes with international organizations (e.g. SESAR Joint Undertaking, SESAR Deployment Manager, EUROCONTROL, European Commission, etc.) and foreign countries, aiming at contributing to the advancement of ATM technology and processes and at improving all linked services.

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

Moreover, Techno Sky is currently extensively contributing to SESAR 2020 Programme as ENAV LTP by complementing ENAV activities and expertise in 14 W1 projects and 9 W2 projects including Industrial Research, Transversal Activities and Very Large scale Demonstrations.

Based on the considerations and skills depicted above, ENAV and Techno Sky, as part of the ENAV Group, can be considered as a single entity.

Techno Sky contribution in this project is intended to be provided in all activities where ENAV has expressed interest. Specifically, Techno Sky, in continuity with the work done in PJ31-W1 DIGITS as ENAV LTP, will support ENAV with its technical expertise in the governance and coordination of the project, infrastructure development, ADS-C data collection and analysis as well as in the demonstration campaign preparation and execution.

BULATSA

The Bulgarian Air Traffic Services Authority (BULATSA) is a legal entity based in Sofia and performing state functions for the provision of air navigation services in the controlled civil airspace of the Republic of Bulgaria, in line with the international agreements in the field of civil aviation signed and ratified by the Republic of Bulgaria.

BULATSA consists of central headquarters and several air traffic control centres – an Area Control Centre (ACC) in Sofia and APP/TWR Centres in Varna, Burgas, Plovdiv and Gorna Oryahovitsa. The scope of BULATSA activities encompasses all aircraft departing from and arriving at civil airports and overflying the controlled civil airspace of the Republic of Bulgaria. BULATSA successfully fulfils the functions delegated by the Bulgarian state, namely the provision of air traffic services, and follows its development strategy. A pro-active stand to the Single European Sky initiative is in place. The SATCAS ATM System has been recently updated, equipped with state-of-the-art hi-tech functionalities anticipating the future needs of air traffic service provision.

Bulgaria constantly promotes and boosts the co-operation in the region through their active participation in several regional initiatives and agreements. BULATSA is an active partner in ATM Co-operation in South Eastern Europe and is a key partner along with ROMATSA in the DANUBE FAB.

Moreover, BULATSA is currently participating in SESAR 2020 Wave 1 and Wave 2 as ENAV LTP with special focus on SESAR projects addressing ADS-C capabilities and applications (PJ10-W1 and PJ18-W2).

In line with this work, BULATSA will contribute to the ADS-C operational benefits demonstration campaign with an ad-hoc exercise that will integrate real and emulated ADS-C data into a simulation environment. The exercise will rely on BULATSA work on ADS-C capabilities performed in the context of PJ18-W2 Sol 53 and is going to further use the TESLA tool to demonstrate the operational benefits when ADS-C data is used to improve the TP, thus the CD&R functionalities.

Also route conformance check is further investigated and developed in PJ18 SESAR Wave 2 and will contribute to further validation with live data environment.

Deep Blue

Deep Blue is an Italian research and consultancy SME specialised in safety, human factors, validation and dissemination. The company operates in the domain of transportation dealing with the design, analysis and evaluation of interactive systems, especially in Aviation and Air Traffic Management (ATM).

The company's main area of activity is the analysis and evaluation of interactive complex systems, with particular focus on interactions, integration and allocation of functions between humans, procedures and equipment. Deep Blue services range from concept design to system evaluation and validation.

Deep Blue research activity is concentrated on the following main areas:

- Evaluation and validation of air traffic and aviation concepts and systems;
- Evaluation of dependability of interactive systems;
- Methodologies and techniques for design, analysis and validation of air traffic and aviation concepts and systems.

A highly qualified multidisciplinary team skilled in Cognitive Science, Psychology, Safety, Engineering, Interaction Design, Computer Science and Mathematics leads Deep Blue in delivering innovative and highly professional results. Deep Blue staff is highly qualified and research-oriented and about 70% of the personnel own PhD and many of them collaborate with or teach at Italian Universities. The research activity is carried out mainly through the participation in cooperation projects both at national and international level which are co-funded by public organisations and through the involvement in some of the most important Research Networks in the domains of interest.

Finally, Deep Blue is already significantly participating in several SESAR 2020 Wave 1 and Wave 2 projects as ENAV LTP by supporting ENAV validation activities and relevant ATM performance assessment. Particularly, the areas of investigation are: workload, situation awareness, need for training, usage and requirements identification of new tools, applying a wide range of both-standard and tailored methodologies.

In line with their expertise and according to the work already performed, as ENAV LTP, in PJ31-W1 DIGITS, Deep Blue will support ENAV in the demonstration campaign for ADS-C operational benefits evaluation, with special focus on KPA performance assessment.

Does the participant envisage the use of contributions in kind provided by third parties (Articles 11 and 12 of the General Model Grant Agreement) N

N/A

Does the participant envisage that part of the work is performed by International Partners ¹⁴ (Article 14a of the General Model Grant Agreement)?	N
N/A	

4.2.7 *Linked to EUROCONTROL - - EUROPEAN ORGANISATION FOR THE SAFETY OF AIR NAVIGATION*

No third Party involved

4.2.8 *Linked to Honeywell Aerospace*

Objective	
Does the participant plan to subcontract certain tasks (please note that core tasks of the project should not be sub-contracted)	N
All Honeywell specific activities will be provided by Honeywell Aerospace SAS and its affiliates.	
Does the participant envisage that part of its work is performed by linked third parties	Y
<p>Work provided under SESAR 2020 will be coordinated and performed by Honeywell Aerospace SAS, located in Toulouse (France) together with Honeywell Inc, Honeywell International, s.r.o., with sites in Prague and Brno (Czech Republic). 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> <p>A part of Honeywell's contribution will involve staff from non-EU countries. This is duly justified and formally eligible for the following reasons:</p> <ul style="list-style-type: none"> ○ 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 our work in SESAR so far, we have demonstrated proven added value through the expertise provided and successful project execution. ○ Our non-EU contribution is justified by the need for global harmonization and standards. Experience from SESAR 1 has proven how valuable this is. ○ The test aircraft to be used to support the campaign is operated primarily by a US team. <p>The Honeywell's test aircraft handling services (fuel, fees, flight planning and dispatch) will be mostly provided by the local European companies selected based on the detailed campaign plans managed by the Honeywell's Flight Test team.</p>	

¹⁴ 'International Partner' is any legal entity established in a non-associated third country which is not eligible for funding under Article 10 of the Rules for Participation Regulation No 1290/2013.

By executing most of our work in Europe, including our Honeywell Advanced Technology organization and our Honeywell Aerospace Engineering Europe organization, we are extremely proactive in enhancing European technological excellence	
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
Honeywell does not envisage the use of such contributions at this point.	
Does the participant envisage that part of the work is performed by International Partners (Article 14a of the General Model Grant Agreement)?	N
N/A	

4.2.9 Linked to HUNGAROCONTROL MAGYAR LEGIFORGALMI SZOLGALAT ZARTKORUEN MUKODO RESZVENYTARSASAG

No third Party involved

4.2.10 Linked to INDRA SISTEMAS SA

No third Party involved

4.2.11 Linked to LEONARDO - SOCIETA PER AZIONI

No third Party involved

4.2.12 Linked to NATS (EN ROUTE) PUBLIC LIMITED COMPANY

No third Party involved

4.2.13 Linked to POLSKA AGENCJA ZEGLUGI POWIETRZNEJ

No third Party involved

4.2.14 Linked to SKYGUIDE, SA SUISSE POUR LES SERVICES DE LA NAVIGATION AERIENNE CIVILS ET MILITAIRES

Objective	
Does the participant plan to subcontract certain tasks (please note that core tasks of the project should not be sub-contracted)	Y
<p>Skyguide will subcontract some part of its contribution in order to fulfil its tasks; Skyguide needs additional expertise in specific domains. Subcontractor support will be provided on Performance, Human Performance, Safety activities as well as in the production of some deliverables.</p> <p>This subcontract is within framework agreement in place in Skyguide with subcontractors (EGIS).</p> <p>The following tasks will be performed by the subcontractor :</p> <ul style="list-style-type: none"> • Analysis of data – trajectory comparison (ground system, EPP, flown trajectory) • Contribution to Demonstration Report 	

Does the participant envisage that part of its work is performed by linked third parties ¹⁵	Y
<p>In the framework of PJ.38, SKYGUIDE is willing to entrust to SKYSOFTATM for the update of the ground platform with the necessary functionalities to perform PJ.38 validations. The following tasks will be performed by the Linked Third Party :</p> <ul style="list-style-type: none"> • Programming and system implementation of new functionalities required for PJ.38 • Operational platform set-up for replay of PJ.38 flights (based on skysim platform used for PJ.18-53/56) 	
Does the participant envisage the use of contributions in kind provided by third parties (Articles 11 and 12 of the General Model Grant Agreement)	N
N/A	
Does the participant envisage that part of the work is performed by International Partners ¹⁶ (Article 14a of the General Model Grant Agreement)?	N
N/A	

4.2.15 Linked to RIZENI LETOVEHO PROVOZU CESKE REPUBLIKY STATNI PODNIK

No third Party involved

4.2.16 Linked to LETOVE PREVADZKOVE SLUZBY SLOVENSKEJ REPUBLIKY, STATNY PODNIK

No third Party involved

4.2.17 Linked to VALSTYBES IMONE ORO NAVIGACIJA

No third Party involved

4.2.18 Linked to ATOS BELGIUM

No third Party involved

4.2.19 Linked to FREQUENTIS AG

No third Party involved

4.2.20 Linked to SAAB AKTIEBOLAG

No third Party involved

4.2.21 Linked to SINTEF AS

No third Party involved

5 Ethics and Security

5.1 Ethics

All participants of the PJ38-W3-ADSCENSIO project will conform to national and European legislation and regulations. In relation to this project these include:

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).

¹⁶ ‘International Partner’ is any legal entity established in a non-associated third country which is not eligible for funding under Article 10 of the Rules for Participation Regulation No 1290/2013.

- 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, the Work Package Project Management will ensure compliance with ethics. This means that Project Management will verify that all documents from the PJ38-W3-ADSCENSIO project are following European ethical rules and the ethical rules of the concerned country.

During project Kick-off Meeting, Project Management will conduct an information session in order to draw attention to, and inform partners of all relevant ethical issues.

In Work Package Operational evaluations experimental studies will be conducted to gain knowledge about human-machine interaction and crew performance. Studies will take place in several ACC in Europe. For these experimental studies healthy adults (licensed Air Traffic Controllers notably) from ANSP staff will participate on a voluntary basis to perform ATC operations.

During the study performance only necessary data will be acquired and stored electronically. This data will be password protected and only accessible to authorised researchers. All data will be stored in a strict anonymous way. Subjects are allocated a unique subject number. It will not be possible to somehow associate the data to individual persons.

Thus, the data will not be used to judge or assess the professional capabilities of the participating individual persons. The data is purely a means to investigate general cognitive processes. It is a fundamental assumption of the project that not the operators are to blame for human errors but that the system design has to be optimized to better fit the pilots' needs.

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 PJ38-W3-ADSCENSIO project.

5.1.1 Humans

In the project experimental studies will be conducted to gain knowledge about human-machine interaction. For these experimental studies healthy adults (no vulnerable adults), like Pilots or Air Traffic Controllers, will be recruited on a voluntary basis. Participants of these studies will be clearly informed of the research goals, the methodology of data protection and possible adverse events in a presentation of the research project and in interviews at the beginning of the study. According to the declaration of Helsinki, subjects are free to leave any test at any time without giving any reason and without raising any disadvantages – the project thereby complies with standard protocols surrounding a participant having the right to withdraw from the study. This will be ensured by a written agreement between the experimenter and the test subject (see questionnaire below).

Participant Agreement Form SESAR 2020 Validation/Demonstration activities

Full title of project/solution:

Full title of validation/demonstration activity and dates:

Name and contact details of project/solution leader:

Please Initial
or
Tick Here

I am aware of the main aspects of the Validation/Demonstration Plan for the above SESAR 2020 activity.	
I confirm that I have had the opportunity to ask questions.	
I understand that my participation is voluntary.	
I understand that my answers to any questionnaire related to human factors aspects (evaluation of workload, situational awareness, human machine interface usability...) will remain anonymous.	
Should I not wish to answer any particular question(s), I am free to decline.	
I give permission for members of the research team to have access to my anonymised responses. I understand that my name will not be linked with the research materials, and I will not be identified or identifiable in the outputs that result from the research without my agreement.	
I agree to take part in the above validation/demonstration activity.	

Name of Participant

Date

Signature

Name of Project/Solution Leader

Date

Signature

This form should be signed and dated by all parties after the participant receives a copy of the participant information sheet and any other written information provided to the participants. A copy of the signed and dated participant agreement form should be kept with the project's main documents which must be kept in a secure location.

Section: Humans	YES	NO	Information to be provided	Documents to be provided
Does your research involve human participants?	X		Confirmation about obtained Informed	

Section: Humans		YES	NO	Information to be provided	Documents to be provided
				consent of the participants.	
If YES:	Are they volunteers for social or human sciences research?		X		
	Are they persons unable to give informed consent (including children/minors)?		X		
	Are they vulnerable individuals or groups?		X		
	Are they children/minors?		X		
	Are they patients?		X		
	Are they healthy volunteers for medical studies		X	Note: The project will use healthy volunteers, but in the project no medical studies are foreseen.	
Does your research also involve physical interventions on the study participants?			X		

5.1.2 Protection of Personal Data

In advance and during the study personal data will be acquired. This data will be protected regarding article 8 – protection of personal data – of the European Charter of Fundamental Rights and the Treaty on the Functioning of the European Union. Furthermore, a strategy and methodology based on the Data Protection Directive will be developed and implemented to ensure the integrity and security of data during the project.

During the recruitment of subjects for the study, some necessary personal information relevant to the study (e.g. experience of work, age, gender) will be stored electronically in computers on a hard drive. This data will not be stored in a cloud solution or portable hard drives or USB sticks. This data will be password protected and only accessible to authorised researchers.

During the study performance only necessary data will be acquired and stored electronically. This data will be password protected and only accessible to authorised researchers. All data will be stored in a strict anonymous way. Subjects are allocated a unique subject number instead of their first- or surname. The subject number will be assigned randomly at the beginning of the study. This procedure ensures that it will not be possible to somehow associate the data to individual persons. Thus, the data will not be used to judge or assess the professional capabilities of the recruited subjects. The data is purely a means to investigate general cognitive processes.

Section: Protection of Personal Data		YES	NO	Information to be provided	Documents to be provided
Does your research involve personal data collection and/or processing?		X			Free and fully Informed consent sheets (see section 2) of the persons concerned (data subjects) will be obtained
If YES:	Does it involve the collection or processing of sensitive personal data (e.g. health, sexual lifestyle, ethnicity, political opinion, religious or philosophical conviction)?		X		
	Does it involve processing of genetic information?		X		
	Does it involve tracking or observation of participants (e.g. surveillance or localization data, and WAN data such as IP address, cookies, etc.)?		X		
Does your research involve further processing of previously collected personal data (secondary use) (including use of pre-existing data sets or sources, merging existing data sets, sharing data with non-EU member states)?			X		

The Beneficiaries participating to PJ38-ADSCENSIO have implemented a Data Protection Policy.

1. Retention policy

For security reason and as prevention measure (security clearance, post-event security checks in case of post-event incident and required investigation), personal data will be retained during three (03) years after the end of PJ38-ADSCENSIO project (end of PJ38-ADSCENSIO project is scheduled on 31/12/2022).

2. Data minimization

The use of data will be limited to what is strictly relevant to the purpose of the Project. Only information identified to perform analysis required by the objectives of the Project will be collected and processed.

As an example, (in addition to basic personal information such as name, surname, e-mail address), during the operational evaluation of an ATC function in a given situation, the kind of data that will be of interest can be:

- The time required for an event detection or resolution by the human,
- The number and the nature of actions undertaken by the human,
- Instrument to assess the effect on human workload (e.g. a human factor's measurement questionnaire).

Those data are relevant for the sake of project studies, because they are directly correlated with the performance areas targeted by the demonstration: effect on safety, airspace capacity and flight efficiency.

They cannot be repurposed (for instance in another project) without further consent.

3. Storage policy and protection

Personal data that may be collected for the PJ38-ADSCENSIO project will be stored only under collecting partner's secured server and according to existing process that guarantee personal data protection (organisation's Security IT Department). Files are always saved under highly secured servers (e.g. Airbus internal server) and on dedicated folder (only accessible to PJ38-ADSCENSIO team members, which are automatically recognised when logging in with their individual login and password).

4. Exchange method

No exchange of personal data will be performed within PJ38-ADSCENSIO partners or with third parties external to PJ38-ADSCENSIO. Only processed results (trend) may be shared, in either internal reports (confidential documents available only to the PJ38-ADSCENSIO team) or deliverables (public documents). Such processed results will not include any personal information that allows the re-identification of participants' views and opinions.

5. Destruction policy or re-use

Personal data will be destroyed three (03) years after the end of PJ38-ADSCENSIO project (end of PJ38-ADSCENSIO project is scheduled on 31/12/2022). No re-use of personal data will be done.

5.1.3 Misuse

The PJ38-W3-ADSCENSIO project is part of the SESAR 2020 Programme 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.

5.1.3.1 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 Security¹⁷

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		

6 Abbreviations

ACC	Airspace Control Centre
ACS	ADS-C Common Service
ADS-B	Automatic Dependence Surveillance - Broadcast
ADS-C	Automatic Dependence Surveillance – Contract
ATFCM	Air Traffic Flow Centralized Management
ATM	Air Traffic Management
ATN	Aeronautical Telecommunication Network
ATN-B2	Aeronautical Telecommunication Network – Baseline 2
ATCo	Air Traffic Controller
ATS	Air Traffic Services
ATS-B2	Air Traffic Services – Baseline 2
CPDLC	Controller to Pilot Data Link Communication
CWP	Controller Working Position
EC	European Commission
EPMB	Extended Project Management Board
EPP	Extended Project Profile
ETA	Estimated Time of Arrival
EU	European Union
FANS	Future Air Navigation System
FDR	Flight Data Recorder
H2020	HORIZON 2020 (research and innovation programme of the EU, 2014-2020)
IBP	Industrial Based Platform
IP	Internet Protocol
IR	Industrial Research project
IT	Information Technologies
PCIL	Project Content Integration Lead
PCIT	Project Content Integration Team
PEG	Programme Execution Guidance
PJ00-W3	Project No. 00 described in [2] corresponds to the Topic of the call
PJ00-W3-01	Solution No 01 in PJ00
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
SJU	SESAR Joint Undertaking
SPD	Single Programming Document

¹⁷ See article 37 of the [Model Grant Agreement](#). For more information on the classification of Information, please refer to the Horizon 2020 guidance: https://ec.europa.eu/research/participants/data/ref/h2020/other/hi/secur/h2020-hi-guide-classif_en.pdf.

TA	Transversal Action
TBO	Trajectory Based Operations
TMA	Terminal Manoeuvring Area
TP	Trajectory Prediction
VLD	Very Large Demonstration
WAN	Wide Area Network
WP	Work Package

ESTIMATED BUDGET FOR THE ACTION

	Estimated eligible ¹ costs (per budget category)										JU contribution			Additional information		
	A. Direct personnel costs				B. Direct costs of subcontracting	[C. Direct costs of fin. support]	D. Other direct costs		E. Indirect costs ²	Total costs	Reimbursement rate %	Maximum JU contribution ³	Maximum grant amount ⁴	Information for indirect costs	Information for auditors	Other information:
	A.1 Employees (or equivalent)		A.4 SME owners without salary				D.1 Travel	D.5 Costs of internally invoiced goods and services						Estimated costs of in-kind contributions not used on premises	Declaration of costs under Point D.4	Estimated costs of beneficiaries/ linked third parties not receiving JU funding/ international partners
Form of costs ⁶	Actual	Unit ⁷	Unit ⁸		Actual	Actual	Actual	Unit ⁹	Flat-rate ¹⁰							
									25%							
	a	Total b	No hours	Total c	d	[e]	f	Total g	h = 0,25 x (a +b+c+f+g +[i1] ¹³ + [i2] ¹³ -n)	j = a+b+c+d +[e]/+f+g+h +[i1]/+[i2]	k	l	m	n	Yes/No	
1. DSNA	302 720.00	0.00	0.00	0.00	300 000.00	0.00	0.00	0.00	75 680.00	678 400.00	70.00	474 880.00	474 880.00	0.00	No	n/a
- ESSP	256 000.00	0.00	0.00	0.00	0.00	0.00	56 000.00	0.00	78 000.00	390 000.00	70.00	273 000.00	273 000.00	0.00	No	n/a
Total beneficiary	558 720.00	0.00			300 000.00	0.00	56 000.00	0.00	153 680.00	1 068 400.00		747 880.00	747 880.00	n/a	n/a	0.00
2. AIRBUS	271 023.97	0.00	0.00	0.00	25 000.00	0.00	310 000.00	0.00	145 255.99	751 279.96	70.00	525 895.97	525 895.97	0.00	No	n/a
- AI OPS	460 800.00	0.00	0.00	0.00	0.00	0.00	10 000.00	0.00	117 700.00	588 500.00	70.00	411 950.00	411 950.00	0.00	No	n/a
- AI DS Space	370 097.00	0.00	0.00	0.00	0.00	0.00	17 000.00	0.00	96 774.25	483 871.25	70.00	338 709.88	338 709.88	0.00	No	n/a
Total beneficiary	1 101 920.97	0.00			25 000.00	0.00	337 000.00	0.00	359 730.24	1 823 651.21		1 276 555.85	1 276 555.85	n/a	n/a	0.00
3. AIRTEL	373 781.00	0.00	0.00	0.00	0.00	0.00	27 352.00	0.00	100 283.25	501 416.25	70.00	350 991.38	350 991.38	0.00	No	n/a
4. DFS	549 800.00	0.00	0.00	0.00	50 000.00	0.00	79 000.00	0.00	157 200.00	836 000.00	70.00	585 200.00	585 200.00	0.00	No	n/a
5. ENAIRE	67 635.00	0.00	0.00	0.00	0.00	0.00	2 000.00	0.00	17 408.75	87 043.75	70.00	60 930.63	60 930.63	0.00	No	n/a
- CRIDA	49 200.00	0.00	0.00	0.00	0.00	0.00	3 450.00	0.00	13 162.50	65 812.50	70.00	46 068.75	46 068.75	0.00	No	n/a
Total beneficiary	116 835.00	0.00			0.00	0.00	5 450.00	0.00	30 571.25	152 856.25		106 999.38	106 999.38	n/a	n/a	0.00
6. ENAV	196 458.00	0.00	0.00	0.00	0.00	0.00	21 828.00	0.00	54 571.50	272 857.50	70.00	191 000.25	191 000.25	0.00	No	n/a
- TECHNO SKY	72 000.00	0.00	0.00	0.00	0.00	0.00	8 000.00	0.00	20 000.00	100 000.00	70.00	70 000.00	70 000.00	0.00	No	n/a
- BULATSA	152 440.00	0.00	0.00	0.00	0.00	0.00	7 560.00	0.00	40 000.00	200 000.00	70.00	140 000.00	140 000.00	0.00	No	n/a
- DEEP BLUE	50 400.00	0.00	0.00	0.00	0.00	0.00	5 600.00	0.00	14 000.00	70 000.00	70.00	49 000.00	49 000.00	0.00	No	n/a
Total beneficiary	471 298.00	0.00	0.00	0.00	0.00	0.00	42 988.00	0.00	128 571.50	642 857.50		450 000.25	450 000.25	n/a	n/a	0.00
7. EUROCONTROL	1 161 270.00	0.00	0.00	0.00	0.00	0.00	57 000.00	0.00	304 567.50	1 522 837.50	70.00	1 065 986.25	300 000.00	0.00	No	n/a
8. HONEYWELL SAS	372 874.45	0.00	0.00	0.00	0.00	0.00	354 791.72	0.00	181 916.54	909 582.71	70.00	636 707.90	636 707.90	0.00	No	n/a
- HIsro	0.00	388 112.25	0.00	0.00	0.00	0.00	0.00	0.00	97 028.06	485 140.31	70.00	339 598.22	339 598.22	0.00	No	n/a
- HIinc	0.00	27 575.90	0.00	0.00	0.00	0.00	0.00	0.00	6 893.98	34 469.88	70.00	24 128.92	24 128.92	0.00	No	n/a
Total beneficiary	372 874.45	415 688.15	0.00	0.00	0.00	0.00	354 791.72	0.00	285 838.58	1 429 192.90		1 000 435.04	1 000 435.04	n/a	n/a	0.00
9. HC (FSP)	181 072.00	0.00	0.00	0.00	0.00	0.00	47 500.00	0.00	57 143.00	285 715.00	70.00	200 000.50	200 000.50	0.00	No	n/a
10. INDRA	384 615.00	0.00	0.00	0.00	0.00	0.00	15 384.00	0.00	99 999.75	499 998.75	70.00	349 999.13	349 999.00	0.00	No	n/a
11. LEONARDO	213 575.00	0.00	0.00	0.00	0.00	0.00	15 000.00	0.00	57 143.75	285 718.75	70.00	200 003.13	200 003.13	0.00	No	n/a
12. NATS	569 000.00	0.00	0.00	0.00	0.00	0.00	23 000.00	0.00	148 000.00	740 000.00	70.00	518 000.00	518 000.00	0.00	No	n/a
13. PANSA (B4)	149 278.00	0.00	0.00	0.00	0.00	0.00	15 298.00	0.00	41 144.00	205 720.00	70.00	144 004.00	144 004.00	0.00	No	n/a
14. SKYGUIDE	446 600.00	0.00	0.00	0.00	15 000.00	0.00	11 000.00	0.00	114 400.00	587 000.00	70.00	410 900.00	410 900.00	0.00	No	n/a
- SKYSOFT	131 000.00	0.00	0.00	0.00	0.00	0.00	5 000.00	0.00	34 000.00	170 000.00	70.00	119 000.00	119 000.00	0.00	No	n/a
Total beneficiary	577 600.00	0.00			15 000.00	0.00	16 000.00	0.00	148 400.00	757 000.00		529 900.00	529 900.00	n/a	n/a	0.00
15. ANS CR (B4) ¹⁴	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	0.00
16. LPS SR (B4) ¹⁴	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	0.00

ESTIMATED BUDGET FOR THE ACTION

	Estimated eligible ¹ costs (per budget category)										JU contribution			Additional information		
	A. Direct personnel costs				B. Direct costs of subcontracting	<i>[C. Direct costs of fin. support]</i>	D. Other direct costs		E. Indirect costs ²	Total costs	Reimbursement rate %	Maximum JU contribution ³	Maximum grant amount ⁴	Information for indirect costs	Information for auditors	Other information:
	A.1 Employees (or equivalent)		A.4 SME owners without salary				D.1 Travel	D.5 Costs of internally invoiced goods and services						Estimated costs of in-kind contributions not used on premises	Declaration of costs under Point D.4	Estimated costs of beneficiaries/ linked third parties not receiving JU funding/ international partners
A.2 Natural persons under direct contract		A.5 Beneficiaries that are natural persons without salary		D.2 Equipment												
A.3 Seconded persons				D.3 Other goods and services												
	<i>[A.6 Personnel for providing access to research infrastructure]</i>						<i>[D.4 Costs of large research infrastructure]</i>									
Form of costs ⁶	Actual	Unit ⁷	Unit ⁸		Actual	Actual	Actual	Unit ⁹	Flat-rate ¹⁰							
									25%							
	a	Total b	No hours	Total c	d	<i>[e]</i>	f	Total g	$h = 0,25 \times (a + b + c + f + g + [i1]^{13} + [i2]^{13} \cdot n)$	$j = a + b + c + d + [e] + f + g + h + [i1] + [i2]$	k	l	m	n	Yes/No	
17. ON (B4) ¹⁴	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	0.00
18. ATOS (FSP) ¹⁴	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	0.00
19. FRQ (FSP) ¹⁴	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	0.00
20. SAAB ¹⁴	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	0.00
21. SINTEF ¹⁴	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	0.00
Total consortium	6 781 639.42	415 688.15		0.00	390 000.00	0.00	1 091 763.72	0.00	2 072 272.82	10 751 364.11		7 525 954.91	6 759 968.53			0.00

¹ See Article 6 for the eligibility conditions.

² Indirect costs already covered by an operating grant (received under any EU or Euratom funding programme; see Article 6.5.(b)) are ineligible under the GA. Therefore, a beneficiary/linked third party that receives an operating grant during the action's duration cannot declare indirect costs for the year(s)/reporting period(s) covered by the operating grant, unless it can demonstrate that the operating grant does not cover any costs of the action (see Article 6.2.E).

³ This is the theoretical amount of JU contribution that the system calculates automatically (by multiplying all the budgeted costs by the reimbursement rate). This theoretical amount is capped by the 'maximum grant amount' (that the JU decided to grant for the action) (see Article 5.1).

⁴ The 'maximum grant amount' is the maximum grant amount decided by the JU. It normally corresponds to the requested grant, but may be lower.

⁵ Depending on its type, this specific cost category will or will not cover indirect costs. Specific unit costs that include indirect costs are: costs for energy efficiency measures in buildings, access costs for providing trans-national access to research infrastructure and costs for clinical studies.

⁶ See Article 5 for the forms of costs.

⁷ Unit : hours worked on the action; costs per unit (hourly rate) : calculated according to the beneficiary's usual accounting practice.

⁸ See Annex 2a 'Additional information on the estimated budget' for the details (costs per hour (hourly rate)).

⁹ Unit and costs per unit : calculated according to the beneficiary's usual accounting practices.

¹⁰ Flat rate : 25% of eligible direct costs, from which are excluded: direct costs of subcontracting, costs of in-kind contributions not used on premises, direct costs of financial support, and unit costs declared under budget category F if they include indirect costs (see Article 6.2.E).

¹¹ See Annex 2a 'Additional information on the estimated budget' for the details (units, costs per unit).

¹² See Annex 2a 'Additional information on the estimated budget' for the details (units, costs per unit, estimated number of units, etc).

¹³ Only specific unit costs that do not include indirect costs.

¹⁴ See Article 9 for beneficiaries not receiving JU funding.

¹⁵ Only for linked third parties that receive JU funding.

ANNEX 2a

ADDITIONAL INFORMATION ON THE ESTIMATED BUDGET

- Instructions and footnotes in blue will not appear in the text generated by the IT system (since they are internal instructions only).
- For options [in square brackets]: the applicable option will be chosen by the IT system. Options not chosen will automatically not appear.
- For fields in [grey in square brackets] (even if they are part of an option as specified in the previous item): IT system will enter the appropriate data.

⚠ Transitory period: Until SyGMA fully supports Annex 2a, you must prepare it manually (using this template by choosing and deleting the options/entering the appropriate data).
For the 'unit cost tables': either fill them out manually or use currently existing tables from Annex 1 or the proposal.
The document can then be uploaded in SyGMA and attached to the grant agreement.

Unit cost for SME owners/natural beneficiaries without salary

1. Costs for a [SME owner]/beneficiary that is a natural person/ not receiving a salary

Units: hours worked on the action

Amount per unit ('hourly rate'): calculated according to the following formula:

{the monthly living allowance for researchers in MSCA-IF actions / 143 hours}
multiplied by
{country-specific correction coefficient of the country where the beneficiary is established}

The monthly living allowance and the country-specific correction coefficients are set out in the Work Programme (section 3 MSCA) in force at the time of the call:

- for calls *before* Work Programme 2018-2020:
 - for the monthly living allowance: **EUR 4 650**
 - for the country-specific correction coefficients: see Work Programme 2014-2015 and Work Programme 2016-2017 (available on the [Participant Portal Reference Documents](#) page)
- for calls *under* Work Programme 2018-2020:
 - for the monthly living allowance: **EUR 4 880**
 - for the country-specific correction coefficients: see Work Programme 2018-2020 (available on the [Participant Portal Reference Documents](#) page)

[additional OPTION for beneficiaries/linked third parties that have opted to use the unit cost (in the proposal/with an amendment): For the following beneficiaries/linked third parties, the amounts per unit (hourly rate) are fixed as follows:

- beneficiary/linked third party [short name]: EUR [insert amount]
 - beneficiary/linked third party [short name]: EUR [insert amount]
- [same for other beneficiaries/linked third parties, if necessary]]

Estimated number of units: see Annex 2

Energy efficiency measures unit cost**2. Costs for energy efficiency measures in buildings**

Unit: m² of eligible ‘conditioned’ (i.e. built or refurbished) floor area

Amount per unit*: see (for each beneficiary/linked third party and BEST table) the ‘unit cost table’ attached

* Amount calculated as follows:
{EUR 0.1 x estimated total kWh saved per m² per year x 10}

Estimated number of units: see (for each beneficiary/linked third party and BEST table) the ‘unit cost table’ attached

Unit cost table (energy efficiency measures unit cost)¹

Short name beneficiary/linked third party	BEST No	Amount per unit	Estimated No of units	Total unit cost (cost per unit x estimated no of units)

¹ Data from the ‘building energy specification table (BEST)’ that is part of the proposal and Annex 1.

Research infrastructure unit cost

3. Access costs for providing trans-national access to research infrastructure

Units²: see (for each access provider and installation) the ‘unit cost table’ attached

Amount per unit^{*}: see (for each access provider and installation) the ‘unit cost table’ attached

* Amount calculated as follows:

$$\frac{\text{average annual total access cost to the installation (over past two years}^3\text{)}}{\text{average annual total quantity of access to the installation (over past two years}^4\text{)}}$$

Estimated number of units: see (for each access provider and installation) the ‘unit cost table’ attached

Unit cost table (access to research infrastructure unit cost)⁵

Short name access provider	Short name infrastru cture	Installation		Unit of access	Amount per unit	Estimated No of units	Total unit cost (cost per unit x estimated no of units)
		No	Short name				

Clinical studies unit cost

4. Costs for clinical studies

Units: patients/subjects that participate in the clinical study

Amount per unit^{*}: see (for each sequence (if any), clinical study and beneficiary/linked third party) the ‘unit cost table’ attached

* Amount calculated, for the cost components of each task, as follows:

For **personnel costs**:

For personnel costs of doctors: ‘average hourly cost for doctors’, i.e.:

{certified or auditable total personnel costs for doctors for year N-1

{ 1720 * number of full-time-equivalent for doctors for year N-1 }

multiplied by

estimated number of hours to be worked by doctors for the task (per participant)}

For personnel costs of other medical personnel: ‘average hourly cost for other medical personnel’, i.e.:

{certified or auditable total personnel costs for other medical personnel for year N-1

{ 1720 * number of full-time-equivalent for other medical personnel for year N-1 }

² Unit of access (e.g. beam hours, weeks of access, sample analysis) fixed by the access provider in proposal.

³ In exceptional and duly justified cases, the Commission/Agency may agree to a different reference period.

⁴ In exceptional and duly justified cases, the Commission/Agency may agree to a different reference period.

⁵ Data from the ‘table on estimated costs/quantity of access to be provided’ that is part of the proposal and Annex 1.

H2020 Templates: Annex 2a (Additional information on the estimated budget)

multiplied by
estimated number of hours to be worked by other medical personnel for the task (per participant))

For personnel costs of technical personnel: 'average hourly cost for technical personnel', i.e.:

$$\frac{\{\text{certified or auditable total personnel costs for technical personnel for year N-1}\}}{\{1720 * \text{number of full-time-equivalent for technical personnel for year N-1}\}}$$

multiplied by
estimated number of hours to be worked by technical personnel for the task (per participant))

'total personnel costs' means actual salaries + actual social security contributions + actual taxes and other costs included in the remuneration, provided they arise from national law or the employment contract/equivalent appointing act

For **consumables**:

For each cost item: 'average price of the consumable', i.e.:

$$\frac{\{\{\text{certified or auditable total costs of purchase of the consumable in year N-1}\}}{\text{total number of items purchased in year N-1}\}}$$

multiplied by
estimated number of items to be used for the task (per participant))

'total costs of purchase of the consumable' means total value of the supply contracts (including related duties, taxes and charges such as non-deductible VAT) concluded by the beneficiary for the consumable delivered in year N-1, provided the contracts were awarded according to the principle of best value- for-money and without any conflict of interests

For **medical equipment**:

For each cost item: 'average cost of depreciation and directly related services per unit of use', i.e.:

$$\frac{\{\{\text{certified or auditable total depreciation costs in year N-1} + \text{certified or auditable total costs of purchase of services in year N-1 for the category of equipment concerned}\}}{\text{total capacity in year N-1}}$$

multiplied by
estimated number of units of use of the equipment for the task (per participant))

'total depreciation costs' means total depreciation allowances as recorded in the beneficiary's accounts of year N-1 for the category of equipment concerned, provided the equipment was purchased according to the principle of best value for money and without any conflict of interests + total costs of renting or leasing contracts (including related duties, taxes and charges such as non-deductible VAT) in year N-1 for the category of equipment concerned, provided they do not exceed the depreciation costs of similar equipment and do not include finance fees

For **services**:

For each cost item: 'average cost of the service per study participant', i.e.:

$$\frac{\{\text{certified or auditable total costs of purchase of the service in year N-1}\}}{\text{total number of patients or subjects included in the clinical studies for which the service was delivered in year N-1}\}}$$

'total costs of purchase of the service' means total value of the contracts concluded by the beneficiary (including related duties, taxes and charges such as non-deductible VAT) for the specific service delivered in year N-1 for the conduct of clinical studies, provided the contracts were awarded according to the principle of best value for money and without any conflict of interests

For **indirect costs**:

$$\{\{\{\text{cost component 'personnel costs'} + \text{cost component 'consumables'} + \text{cost component 'medical equipment'}\}\}$$

minus

$$\{\text{costs of in-kind contributions provided by third parties which are not used on the beneficiary's premises} + \text{costs of providing financial support to third parties (if any)}\}$$

multiplied by

$$25\% \}$$

H2020 Templates: Annex 2a (Additional information on the estimated budget)

The estimation of the resources to be used must be done on the basis of the study protocol and must be the same for all beneficiaries/linked third parties/third parties involved.

The year N-1 to be used is the last closed financial year at the time of submission of the grant application.

Estimated number of units: see (for each clinical study and beneficiary/linked third party) the 'unit cost table' attached

Unit cost table: clinical studies unit cost⁶

Task, Direct cost categories	Resource per patient	Costs year N-1 Beneficiary 1 [short name]	Costs year N-1 Linked third party 1a [short name]	Costs year N-1 Beneficiary 2 [short name]	Costs year N-1 Linked third party 2a [short name]	Costs year N-1 Third party giving in-kind contributions 1 [short name]
Sequence No. 1						
Task No. 1 Blood sample						
(a) Personnel costs:						
- Doctors	n/a					
- Other Medical Personnel	Phlebotomy (nurse), 10 minutes	8,33 EUR	11,59 EUR	10,30 EUR	11,00 EUR	9,49 EUR
- Technical Personnel	Sample Processing (lab technician), 15 minutes	9,51 EUR	15,68 EUR	14,60 EUR	15,23 EUR	10,78 EUR
(b) Costs of consumables:	Syringe	XX EUR	XX EUR	XX EUR	XX EUR	XX EUR
	Cannula	XX EUR	XX EUR	XX EUR	XX EUR	XX EUR
	Blood container	XX EUR	XX EUR	XX EUR	XX EUR	XX EUR
(c) Costs of medical equipment:	Use of -80° deep freezer, 60 days	XX EUR	XX EUR	XX EUR	XX EUR	XX EUR
	Use of centrifuge, 15 minutes	XX EUR	XX EUR	XX EUR	XX EUR	XX EUR
(d) Costs of services	Cleaning of XXX	XX EUR	XX EUR	XX EUR	XX EUR	XX EUR
(e) Indirect costs (25% flat-rate)		XX EUR	XX EUR	XX EUR	XX EUR	XX EUR
Task No. 2						
...						
Amount per unit (unit cost sequence 1):		XX EUR	XX EUR	XX EUR	XX EUR	XX EUR
Sequence No. 2						
Task No. 1						

⁶ Same table as in proposal and Annex 1.

H2020 Templates: Annex 2a (Additional information on the estimated budget)

XXX						
(a) Personnel costs:						
- Doctors	XXX	XX EUR	XX EUR	XX EUR	XX EUR	XX EUR
- Other Medical Personnel	XXX	XX EUR	XX EUR	XX EUR	XX EUR	XX EUR
- Technical Personnel	XXX	XX EUR	XX EUR	XX EUR	XX EUR	XX EUR
(b) Costs of consumables:	XXX	XX EUR	XX EUR	XX EUR	XX EUR	XX EUR
	XXX	XX EUR	XX EUR	XX EUR	XX EUR	XX EUR
	XXX	XX EUR	XX EUR	XX EUR	XX EUR	XX EUR
(c) Costs of medical equipment:	XXX	XX EUR	XX EUR	XX EUR	XX EUR	XX EUR
	XXX	XX EUR	XX EUR	XX EUR	XX EUR	XX EUR
(d) Costs of services	XXX	XX EUR	XX EUR	XX EUR	XX EUR	XX EUR
(e) Indirect costs (25% flat-rate)		XX EUR	XX EUR	XX EUR	XX EUR	XX EUR
Task No. 2						
...						
Amount per unit (unit cost sequence 2):		XX EUR	XX EUR	XX EUR	XX EUR	XX EUR
...						
Amount per unit (unit cost entire study):		XX EUR	XX EUR	XX EUR	XX EUR	XX EUR

ANNEX 3

ACCESSION FORM FOR BENEFICIARIES

AIRBUS (AIRBUS), established in 2 ROND POINT EMILE DEWOITINE, BLAGNAC 31700, 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 101017626 ('the Agreement')

between DIRECTION DES SERVICES DE LA NAVIGATION AERIENNE **and** the Single European Sky ATM Research Joint Undertaking ('the JU'),

for the action entitled 'ADS-C ENables and Supports Improved ATM Operations (PJ38-W3-ADSCENSIO)'.

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), 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 ('3')

in Grant Agreement No 101017626 ('the Agreement')

between DIRECTION DES SERVICES DE LA NAVIGATION AERIENNE **and** the Single European Sky ATM Research Joint Undertaking ('the JU'),

for the action entitled 'ADS-C ENables and Supports Improved ATM Operations (PJ38-W3-ADSCENSIO)'.

and mandates

the coordinator to submit and sign in its name and on its behalf any **amendments** to the Agreement, in accordance with Article 55.

By signing this Accession Form, the beneficiary accepts the grant and agrees to implement it in accordance with the Agreement, with all the obligations and conditions it sets out.

SIGNATURE

For the beneficiary

ANNEX 3

ACCESSION FORM FOR BENEFICIARIES

DFS DEUTSCHE FLUGSICHERUNG GMBH (DFS), established in AM DFS CAMPUS 10, LANGEN 63225, Germany, VAT number: DE114110232, ('the beneficiary'), represented for the purpose of signing this Accession Form by the undersigned,

hereby agrees

to become beneficiary No ('4')

in Grant Agreement No 101017626 ('the Agreement')

between DIRECTION DES SERVICES DE LA NAVIGATION AERIENNE **and** the Single European Sky ATM Research Joint Undertaking ('the JU'),

for the action entitled 'ADS-C ENables and Supports Improved ATM Operations (PJ38-W3-ADSCENSIO)'.

and mandates

the coordinator to submit and sign in its name and on its behalf any **amendments** to the Agreement, in accordance with Article 55.

By signing this Accession Form, the beneficiary accepts the grant and agrees to implement it in accordance with the Agreement, with all the obligations and conditions it sets out.

SIGNATURE

For the beneficiary

ANNEX 3

ACCESSION FORM FOR BENEFICIARIES

ENAIRE (ENAIRE), established in AVENIDA DE ARAGON S/N BLOQUE 330, PORTAL 2 PARQUE EMPRESARIAL LAS MERCEDES, MADRID 28022, Spain, VAT number: ESQ2822001J, ('the beneficiary'), represented for the purpose of signing this Accession Form by the undersigned,

hereby agrees

to become beneficiary No ('5')

in Grant Agreement No 101017626 ('the Agreement')

between DIRECTION DES SERVICES DE LA NAVIGATION AERIENNE **and** the Single European Sky ATM Research Joint Undertaking ('the JU'),

for the action entitled 'ADS-C ENables and Supports Improved ATM Operations (PJ38-W3-ADSCENSIO)'.

and mandates

the coordinator to submit and sign in its name and on its behalf any **amendments** to the Agreement, in accordance with Article 55.

By signing this Accession Form, the beneficiary accepts the grant and agrees to implement it in accordance with the Agreement, with all the obligations and conditions it sets out.

SIGNATURE

For the beneficiary

ANNEX 3

ACCESSION FORM FOR BENEFICIARIES

ENAV SPA (ENAV), established in VIA SALARIA 716, ROMA 00138, Italy, VAT number: IT02152021008, ('the beneficiary'), represented for the purpose of signing this Accession Form by the undersigned,

hereby agrees

to become beneficiary No ('6')

in Grant Agreement No 101017626 ('the Agreement')

between DIRECTION DES SERVICES DE LA NAVIGATION AERIENNE **and** the Single European Sky ATM Research Joint Undertaking ('the JU'),

for the action entitled 'ADS-C ENables and Supports Improved ATM Operations (PJ38-W3-ADSCENSIO)'.

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), 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 ('7')

in Grant Agreement No 101017626 ('the Agreement')

between DIRECTION DES SERVICES DE LA NAVIGATION AERIENNE **and** the Single European Sky ATM Research Joint Undertaking ('the JU'),

for the action entitled 'ADS-C ENables and Supports Improved ATM Operations (PJ38-W3-ADSCENSIO)'.

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), 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 ('8')

in Grant Agreement No 101017626 ('the Agreement')

between DIRECTION DES SERVICES DE LA NAVIGATION AERIENNE **and** the Single European Sky ATM Research Joint Undertaking ('the JU'),

for the action entitled 'ADS-C ENables and Supports Improved ATM Operations (PJ38-W3-ADSCENSIO)'.

and mandates

the coordinator to submit and sign in its name and on its behalf any **amendments** to the Agreement, in accordance with Article 55.

By signing this Accession Form, the beneficiary accepts the grant and agrees to implement it in accordance with the Agreement, with all the obligations and conditions it sets out.

SIGNATURE

For the beneficiary

ANNEX 3

ACCESSION FORM FOR BENEFICIARIES

HUNGAROCONTROL MAGYAR LEGIFORGALMISZOLGALAT ZARTKORUEN MUKODO RESZVENYTARSASAG (HC (FSP)), established in IGLO UTCA 33 35, BUDAPEST 1185, Hungary, VAT number: HU13851325, ('the beneficiary'), represented for the purpose of signing this Accession Form by the undersigned,

hereby agrees

to become beneficiary No ('9')

in Grant Agreement No 101017626 ('the Agreement')

between DIRECTION DES SERVICES DE LA NAVIGATION AERIENNE **and** the Single European Sky ATM Research Joint Undertaking ('the JU'),

for the action entitled 'ADS-C ENables and Supports Improved ATM Operations (PJ38-W3-ADSCENSIO)'.

and mandates

the coordinator to submit and sign in its name and on its behalf any **amendments** to the Agreement, in accordance with Article 55.

By signing this Accession Form, the beneficiary accepts the grant and agrees to implement it in accordance with the Agreement, with all the obligations and conditions it sets out.

SIGNATURE

For the beneficiary

ANNEX 3

ACCESSION FORM FOR BENEFICIARIES

INDRA SISTEMAS SA (INDRA), established in AVENIDA DE BRUSELAS 35, ALCOBENDAS MADRID 28108, Spain, VAT number: ESA28599033, ('the beneficiary'), represented for the purpose of signing this Accession Form by the undersigned,

hereby agrees

to become beneficiary No ('10')

in Grant Agreement No 101017626 ('the Agreement')

between DIRECTION DES SERVICES DE LA NAVIGATION AERIENNE **and** the Single European Sky ATM Research Joint Undertaking ('the JU'),

for the action entitled 'ADS-C ENables and Supports Improved ATM Operations (PJ38-W3-ADSCENSIO)'.

and mandates

the coordinator to submit and sign in its name and on its behalf any **amendments** to the Agreement, in accordance with Article 55.

By signing this Accession Form, the beneficiary accepts the grant and agrees to implement it in accordance with the Agreement, with all the obligations and conditions it sets out.

SIGNATURE

For the beneficiary

ANNEX 3

ACCESSION FORM FOR BENEFICIARIES

LEONARDO - SOCIETA PER AZIONI (LEONARDO), 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 ('11')

in Grant Agreement No 101017626 ('the Agreement')

between DIRECTION DES SERVICES DE LA NAVIGATION AERIENNE **and** the Single European Sky ATM Research Joint Undertaking ('the JU'),

for the action entitled 'ADS-C ENables and Supports Improved ATM Operations (PJ38-W3-ADSCENSIO)'.

and mandates

the coordinator to submit and sign in its name and on its behalf any **amendments** to the Agreement, in accordance with Article 55.

By signing this Accession Form, the beneficiary accepts the grant and agrees to implement it in accordance with the Agreement, with all the obligations and conditions it sets out.

SIGNATURE

For the beneficiary

ANNEX 3

ACCESSION FORM FOR BENEFICIARIES

NATS (EN ROUTE) PUBLIC LIMITED COMPANY (NATS), established in 4000 PARKWAY WHITELEY, FAREHAM PO15 7FL, United Kingdom, VAT number: GB440379456, ('the beneficiary'), represented for the purpose of signing this Accession Form by the undersigned,

hereby agrees

to become beneficiary No ('12')

in Grant Agreement No 101017626 ('the Agreement')

between DIRECTION DES SERVICES DE LA NAVIGATION AERIENNE **and** the Single European Sky ATM Research Joint Undertaking ('the JU'),

for the action entitled 'ADS-C ENables and Supports Improved ATM Operations (PJ38-W3-ADSCENSIO)'.

and mandates

the coordinator to submit and sign in its name and on its behalf any **amendments** to the Agreement, in accordance with Article 55.

By signing this Accession Form, the beneficiary accepts the grant and agrees to implement it in accordance with the Agreement, with all the obligations and conditions it sets out.

SIGNATURE

For the beneficiary

ANNEX 3

ACCESSION FORM FOR BENEFICIARIES

POLSKA AGENCJA ZEGLUGI POWIETRZNEJ (PANSA (B4)), established in UL. WIEZOWA 8, WARSZAWA 02 147, Poland, VAT number: PL5222838321, ('the beneficiary'), represented for the purpose of signing this Accession Form by the undersigned,

hereby agrees

to become beneficiary No ('13')

in Grant Agreement No 101017626 ('the Agreement')

between DIRECTION DES SERVICES DE LA NAVIGATION AERIENNE **and** the Single European Sky ATM Research Joint Undertaking ('the JU'),

for the action entitled 'ADS-C ENables and Supports Improved ATM Operations (PJ38-W3-ADSCENSIO)'.

and mandates

the coordinator to submit and sign in its name and on its behalf any **amendments** to the Agreement, in accordance with Article 55.

By signing this Accession Form, the beneficiary accepts the grant and agrees to implement it in accordance with the Agreement, with all the obligations and conditions it sets out.

SIGNATURE

For the beneficiary

ANNEX 3

ACCESSION FORM FOR BENEFICIARIES

SKYGUIDE, SA SUISSE POUR LES SERVICES DE LA NAVIGATION AERIENNE CIVILS ET MILITAIRES (SKYGUIDE), established in ROUTE DE PRE BOIS 15-17, GENEVA 1215, Switzerland, VAT number: CH514204, ('the beneficiary'), represented for the purpose of signing this Accession Form by the undersigned,

hereby agrees

to become beneficiary No ('14')

in Grant Agreement No 101017626 ('the Agreement')

between DIRECTION DES SERVICES DE LA NAVIGATION AERIENNE **and** the Single European Sky ATM Research Joint Undertaking ('the JU'),

for the action entitled 'ADS-C ENables and Supports Improved ATM Operations (PJ38-W3-ADSCENSIO)'.

and mandates

the coordinator to submit and sign in its name and on its behalf any **amendments** to the Agreement, in accordance with Article 55.

By signing this Accession Form, the beneficiary accepts the grant and agrees to implement it in accordance with the Agreement, with all the obligations and conditions it sets out.

SIGNATURE

For the beneficiary

ANNEX 3

ACCESSION FORM FOR BENEFICIARIES

RIZENI LETOVEHO PROVOZU CESKE REPUBLIKY STATNI PODNIK (ANS CR (B4)), established in JENEC NAVIGACNI 787, JENEC 252 61, Czech Republic, VAT number: CZ699004742, ('the beneficiary'), represented for the purpose of signing this Accession Form by the undersigned,

hereby agrees

to become beneficiary No ('15')

in Grant Agreement No 101017626 ('the Agreement')

between DIRECTION DES SERVICES DE LA NAVIGATION AERIENNE **and** the Single European Sky ATM Research Joint Undertaking ('the JU'),

for the action entitled 'ADS-C ENables and Supports Improved ATM Operations (PJ38-W3-ADSCENSIO)'.

and mandates

the coordinator to submit and sign in its name and on its behalf any **amendments** to the Agreement, in accordance with Article 55.

By signing this Accession Form, the beneficiary accepts the grant and agrees to implement it in accordance with the Agreement, with all the obligations and conditions it sets out.

SIGNATURE

For the beneficiary

ANNEX 3

ACCESSION FORM FOR BENEFICIARIES

LETOVE PREVADZKOVE SLUZBY SLOVENSKEJ REPUBLIKY, STATNY PODNIK (LPS SR (B4)), established in IVANSKA CESTA 93, BRATISLAVA 823 07, Slovakia, VAT number: SK2020244699, ('the beneficiary'), represented for the purpose of signing this Accession Form by the undersigned,

hereby agrees

to become beneficiary No ('16')

in Grant Agreement No 101017626 ('the Agreement')

between DIRECTION DES SERVICES DE LA NAVIGATION AERIENNE **and** the Single European Sky ATM Research Joint Undertaking ('the JU'),

for the action entitled 'ADS-C ENables and Supports Improved ATM Operations (PJ38-W3-ADSCENSIO)'.

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)), established in BALIO KARVELIO G. 25, VILNIUS LT-02184, Lithuania, VAT number: LT100604610, ('the beneficiary'), represented for the purpose of signing this Accession Form by the undersigned,

hereby agrees

to become beneficiary No ('17')

in Grant Agreement No 101017626 ('the Agreement')

between DIRECTION DES SERVICES DE LA NAVIGATION AERIENNE **and** the Single European Sky ATM Research Joint Undertaking ('the JU'),

for the action entitled 'ADS-C ENables and Supports Improved ATM Operations (PJ38-W3-ADSCENSIO)'.

and mandates

the coordinator to submit and sign in its name and on its behalf any **amendments** to the Agreement, in accordance with Article 55.

By signing this Accession Form, the beneficiary accepts the grant and agrees to implement it in accordance with the Agreement, with all the obligations and conditions it sets out.

SIGNATURE

For the beneficiary

ANNEX 3

ACCESSION FORM FOR BENEFICIARIES

ATOS BELGIUM (ATOS (FSP)), established in DA VINCILAAN 5, ZAVENTEM 1930, Belgium, VAT number: BE0401848135, ('the beneficiary'), represented for the purpose of signing this Accession Form by the undersigned,

hereby agrees

to become beneficiary No ('18')

in Grant Agreement No 101017626 ('the Agreement')

between DIRECTION DES SERVICES DE LA NAVIGATION AERIENNE **and** the Single European Sky ATM Research Joint Undertaking ('the JU'),

for the action entitled 'ADS-C ENables and Supports Improved ATM Operations (PJ38-W3-ADSCENSIO)'.

and mandates

the coordinator to submit and sign in its name and on its behalf any **amendments** to the Agreement, in accordance with Article 55.

By signing this Accession Form, the beneficiary accepts the grant and agrees to implement it in accordance with the Agreement, with all the obligations and conditions it sets out.

SIGNATURE

For the beneficiary

ANNEX 3

ACCESSION FORM FOR BENEFICIARIES

FREQUENTIS AG (FRQ (FSP)), established in Innovationsstrasse 1, WIEN 1100, Austria, VAT number: ATU14715600, ('the beneficiary'), represented for the purpose of signing this Accession Form by the undersigned,

hereby agrees

to become beneficiary No ('19')

in Grant Agreement No 101017626 ('the Agreement')

between DIRECTION DES SERVICES DE LA NAVIGATION AERIENNE **and** the Single European Sky ATM Research Joint Undertaking ('the JU'),

for the action entitled 'ADS-C ENables and Supports Improved ATM Operations (PJ38-W3-ADSCENSIO)'.

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), established in .., LINKOPING 581 88, Sweden, VAT number: SE556036079301, ('the beneficiary'), represented for the purpose of signing this Accession Form by the undersigned,

hereby agrees

to become beneficiary No ('20')

in Grant Agreement No 101017626 ('the Agreement')

between DIRECTION DES SERVICES DE LA NAVIGATION AERIENNE **and** the Single European Sky ATM Research Joint Undertaking ('the JU'),

for the action entitled 'ADS-C ENables and Supports Improved ATM Operations (PJ38-W3-ADSCENSIO)'.

and mandates

the coordinator to submit and sign in its name and on its behalf any **amendments** to the Agreement, in accordance with Article 55.

By signing this Accession Form, the beneficiary accepts the grant and agrees to implement it in accordance with the Agreement, with all the obligations and conditions it sets out.

SIGNATURE

For the beneficiary

ANNEX 3

ACCESSION FORM FOR BENEFICIARIES

SINTEF AS (SINTEF), established in STRINDVEGEN 4, TRONDHEIM 7034, Norway, VAT number: NO919303808MVA, ('the beneficiary'), represented for the purpose of signing this Accession Form by the undersigned,

hereby agrees

to become beneficiary No ('21')

in Grant Agreement No 101017626 ('the Agreement')

between DIRECTION DES SERVICES DE LA NAVIGATION AERIENNE **and** the Single European Sky ATM Research Joint Undertaking ('the JU'),

for the action entitled 'ADS-C ENables and Supports Improved ATM Operations (PJ38-W3-ADSCENSIO)'.

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**

AIRBUS OPERATIONS SAS (AI OPS), 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 (AIRBUS)**, established in 2 ROND POINT EMILE DEWOITINE, BLAGNAC 31700, France, VAT number: FR89383474814, ('the beneficiary'),

hereby accepts joint and several liability with the beneficiary

for any amount owed to the JU by the beneficiary under Grant Agreement No 101017626 (PJ38-W3-ADSCENSIO), up to the maximum JU contribution indicated, for the linked third party, in the estimated budget (see Annex 2).

The linked third party irrevocably and unconditionally agrees to pay amounts requested under this Declaration to the JU, immediately and at first demand.

For the linked third party
[forename/surname/function]

Done in English at [place], on [date]

FINANCIAL STATEMENT FOR *[BENEFICIARY [name]/ LINKED THIRD PARTY [name]]* FOR REPORTING PERIOD *[reporting period]*

	Eligible ¹ costs (per budget category)													Receipts	EU contribution			Additional information	
	A. Direct personnel costs			B. Direct costs of subcontracting	[C. Direct costs of fin. support]	D. Other direct costs			E. Indirect costs ²	[F. Costs of ...]		Total costs	Receipts	Reimburse ment rate %	Maximum EU contribution ³	Requested EU contribution	Information for indirect costs :		
	A.1 Employees (or equivalent)	A.4 SME owners without salary		[C.1 Financial support]	D.1 Travel	[D.4 Costs of large research infrastructure]	D.5 Costs of internally invoiced goods and services		[F.1 Costs of ...]	[F.2 Costs of ...]		Receipts of the action, to be reported in the last reporting period, according to Article 5.3.3					Costs of in-kind contributions not used on premises		
	A.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	Unit	Flat-rate ⁵		Unit	[Unit][Lump sum]						
										25%									
	a	Total b	No hours	Total c	d	[e]	f	[g]	Total h	i=0,25 x (a+b+c+f+[g]+h+[j1] ⁶ + [j2] ⁶ -p)	No units	Total [j1]	Total [j2]	k = a+b+c+d+[e]+f+[g]+h+i+[j1]+[j2]	l	m	n	o	p
[short name beneficiary/linked third party]																			

The beneficiary/linked third party hereby confirms that:
The information provided is complete, reliable and true.
The costs declared are eligible (see Article 6).
The costs can be substantiated by adequate records and supporting documentation that will be produced upon request or in the context of checks, reviews, audits and investigations (see Articles 17, 18 and 22).
For the last reporting period: that all the receipts have been declared (see Article 5.3.3).

📌 Please declare all eligible costs, even if they exceed the amounts indicated in the estimated budget (see Annex 2). Only amounts that were declared in your individual financial statements can be taken into account lateron, in order to replace other costs that are found to be ineligible.

¹ See Article 6 for the eligibility conditions

² The indirect costs claimed must be free of any amounts covered by an operating grant (received under any EU or Euratom funding programme; see Article 6.2.E). If you have received an operating grant during this reporting period, you cannot claim indirect costs unless you can demonstrate that the operating grant does not cover any costs of the action.

³ This is the *theoretical* amount of EU contribution that the system calculates automatically (by multiplying the reimbursement rate by the total costs declared). The amount you request (in the column 'requested EU contribution') may be less,

⁴ See Article 5 for the forms of costs

⁵ Flat rate : 25% of eligible direct costs, from which are excluded: direct costs of subcontracting, costs of in-kind contributions not used on premises, direct costs of financial support, and unit costs declared under budget category F if they include indirect costs (see Article 6.2.E)

⁶ Only specific unit costs that do not include indirect costs

ANNEX 5

MODEL FOR THE CERTIFICATE ON THE FINANCIAL STATEMENTS

- For options [*in italics in square brackets*]: choose the applicable option. Options not chosen should be deleted.
- For fields in [grey in square brackets]: enter the appropriate data

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TERMS OF REFERENCE FOR AN INDEPENDENT REPORT OF FACTUAL FINDINGS ON COSTS DECLARED UNDER A GRANT AGREEMENT FINANCED UNDER THE HORIZON 2020 RESEARCH FRAMEWORK PROGRAMME

INDEPENDENT REPORT OF FACTUAL FINDINGS ON COSTS DECLARED UNDER A GRANT AGREEMENT FINANCED UNDER THE HORIZON 2020 RESEARCH FRAMEWORK PROGRAMME

Terms of Reference for an Independent Report of Factual Findings on costs declared under a Grant Agreement financed by [Clean Sky 2] [Bio Based Industries][ECSEL][Fuel Cells and Hydrogen 2][Innovative Medicines Initiative 2][Single European Sky Air Traffic Management Research (SESAR)][Shift2Rail] JU under the Horizon 2020 Research and Innovation Framework Programme

This document sets out the ‘**Terms of Reference (ToR)**’ under which

[OPTION 1: *[insert name of the beneficiary]* (*‘the Beneficiary’*)] [OPTION 2: *[insert name of the linked third party]* (*‘the Linked Third Party’*), third party linked to the Beneficiary *[insert name of the beneficiary]* (*‘the Beneficiary’*)]

agrees to engage

[insert legal name of the auditor] (*‘the Auditor’*)

to produce an independent report of factual findings (*‘the Report’*) concerning the Financial Statement(s)¹ drawn up by the *[Beneficiary]* *[Linked Third Party]* for the Horizon 2020 grant agreement *[insert number of the grant agreement, title of the action, acronym and duration from/to]* (*‘the Agreement’*), and

to issue a Certificate on the Financial Statements’ (*‘CFS’*) referred to in Article 20.4 of the Agreement based on the compulsory reporting template stipulated by the European Commission (*‘the Commission’*).

The Agreement has been concluded under the Horizon 2020 Research and Innovation Framework Programme (H2020) between the Beneficiary and the *[Clean Sky 2][Bio Based Industries][ECSEL][Fuel Cells and Hydrogen 2][Innovative Medicines Initiative 2][Single European Sky Air Traffic Management Research (SESAR)][Shift2Rail]* Joint Undertaking (*“the JU”*).

The JU is mentioned as a signatory of the Agreement with the Beneficiary only. The JU is not a party to this engagement.

1.1 Subject of the engagement

The coordinator must submit to the JU the final report within 60 days following the end of the last reporting period which should include, amongst other documents, a CFS for each beneficiary and for each linked third party that requests a total contribution of EUR 325 000 or more, as reimbursement of actual costs and unit costs calculated on the basis of its usual cost accounting practices (see Article 20.4 of the Agreement). The CFS must cover all reporting periods of the beneficiary or linked third party indicated above.

The Beneficiary must submit to the coordinator the CFS for itself and for its linked third party(ies), if the CFS must be included in the final report according to Article 20.4 of the Agreement.

The CFS is composed of two separate documents:

- The Terms of Reference (*‘the ToR’*) to be signed by the *[Beneficiary]* *[Linked Third Party]* and the Auditor;

¹ By which costs under the Agreement are declared (see template ‘Model Financial Statements’ in Annex 4 to the Grant Agreement).



- The Auditor's Independent Report of Factual Findings ('the Report') to be issued on the Auditor's letterhead, dated, stamped and signed by the Auditor (or the competent public officer) which includes the agreed-upon procedures ('the Procedures') to be performed by the Auditor, and the standard factual findings ('the Findings') to be confirmed by the Auditor.

If the CFS must be included in the final report according to Article 20.4 of the Agreement, the request for payment of the balance relating to the Agreement cannot be made without the CFS. However, the payment for reimbursement of costs covered by the CFS does not preclude the JU, the Commission, the European Anti-Fraud Office and the European Court of Auditors from carrying out checks, reviews, audits and investigations in accordance with Article 22 of the Agreement.

1.2 Responsibilities

The *[Beneficiary]* *[Linked Third Party]*:

- must draw up the Financial Statement(s) for the action financed by the Agreement in compliance with the obligations under the Agreement. The Financial Statement(s) must be drawn up according to the *[Beneficiary's]* *[Linked Third Party's]* accounting and book-keeping system and the underlying accounts and records;
- must send the Financial Statement(s) to the Auditor;
- is responsible and liable for the accuracy of the Financial Statement(s);
- is responsible for the completeness and accuracy of the information provided to enable the Auditor to carry out the Procedures. It must provide the Auditor with a written representation letter supporting these statements. The written representation letter must state the period covered by the statements and must be dated;
- accepts that the Auditor cannot carry out the Procedures unless it is given full access to the *[Beneficiary's]* *[Linked Third Party's]* staff and accounting as well as any other relevant records and documentation.

The Auditor:

- *[Option 1 by default: is qualified to carry out statutory audits of accounting documents in accordance with Directive 2006/43/EC of the European Parliament and of the Council of 17 May 2006 on statutory audits of annual accounts and consolidated accounts, amending Council Directives 78/660/EEC and 83/349/EEC and repealing Council Directive 84/253/EEC or similar national regulations].*
- *[Option 2 if the Beneficiary or Linked Third Party has an independent Public Officer: is a competent and independent Public Officer for which the relevant national authorities have established the legal capacity to audit the Beneficiary].*
- *[Option 3 if the Beneficiary or Linked Third Party is an international organisation: is an [internal] [external] auditor in accordance with the internal financial regulations and procedures of the international organisation].*

The Auditor:

- must be independent from the Beneficiary *[and the Linked Third Party]*, in particular, it must not have been involved in preparing the *[Beneficiary's]* *[Linked Third Party's]* Financial Statement(s);
- must plan work so that the Procedures may be carried out and the Findings may be assessed;
- must adhere to the Procedures laid down and the compulsory report format;
- must carry out the engagement in accordance with this ToR;
- must document matters which are important to support the Report;
- must base its Report on the evidence gathered;
- must submit the Report to the *[Beneficiary]* *[Linked Third Party]*.

The Commission sets out the Procedures to be carried out by the Auditor. The Auditor is not responsible for their suitability or pertinence. As this engagement is not an assurance engagement, the Auditor does not provide an audit opinion or a statement of assurance.

1.3 Applicable Standards

The Auditor must comply with these Terms of Reference and with²:

- the International Standard on Related Services ('ISRS') 4400 *Engagements to perform Agreed-upon Procedures regarding Financial Information* as issued by the International Auditing and Assurance Standards Board (IAASB);
- the *Code of Ethics for Professional Accountants* issued by the International Ethics Standards Board for Accountants (IESBA). Although ISRS 4400 states that independence is not a requirement for engagements to carry out agreed-upon procedures, the JU requires that the Auditor also complies with the Code's independence requirements.

The Auditor's Report must state that there is no conflict of interests in establishing this Report between the Auditor and the Beneficiary *[and the Linked Third Party]*, and must specify - if the service is invoiced - the total fee paid to the Auditor for providing the Report.

1.4 Reporting

The Report must be written in the language of the Agreement (see Article 20.7).

Under Article 22 of the Agreement, the JU, the Commission, the European Anti-Fraud Office and the Court of Auditors have the right to audit any work that is carried out under the action and for which costs are declared from the European Union budget. This includes work related to this engagement. The Auditor must provide access to all working papers (e.g. recalculation of hourly rates, verification of the time declared for the action) related to this assignment if the JU, the Commission, the European Anti-Fraud Office or the European Court of Auditors requests them.

1.5 Timing

The Report must be provided by [dd Month yyyy].

1.6 Other terms

[The [Beneficiary] [Linked Third Party] and the Auditor can use this section to agree other specific terms, such as the Auditor's fees, liability, applicable law, etc. Those specific terms must not contradict the terms specified above.]

[legal name of the Auditor]	[legal name of the [Beneficiary][Linked Third Party]]
[name & function of authorised representative]	[name & function of authorised representative]
[dd Month yyyy]	[dd Month yyyy]
Signature of the Auditor	Signature of the [Beneficiary][Linked Third Party]

² Supreme Audit Institutions applying INTOSAI-standards may carry out the Procedures according to the corresponding International Standards of Supreme Audit Institutions and code of ethics issued by INTOSAI instead of the International Standard on Related Services ('ISRS') 4400 and the Code of Ethics for Professional Accountants issued by the IAASB and the IESBA.

**Independent Report of Factual Findings on costs declared
under a grant agreement financed by the [Clean Sky 2] [Bio Based Industries][ECSEL][Fuel
Cells and Hydrogen 2][Innovative Medicines Initiative 2][Single European Sky Air Traffic
Management Research (SESAR)][Shift2Rail] JU under the Horizon 2020 Research and
Innovation Framework Programme**

(To be printed on the Auditor's letterhead)

To
[name of contact person(s)], [Position]
[[Beneficiary's] [Linked Third Party's] name]
[Address]
[dd Month yyyy]

Dear [Name of contact person(s)],

As agreed under the terms of reference dated [dd Month yyyy]

with [OPTION 1: [insert name of the beneficiary] ('the Beneficiary')] [OPTION 2: [insert name of
the linked third party] ('the Linked Third Party'), third party linked to the Beneficiary [insert name of
the beneficiary] ('the Beneficiary')],

we

[name of the auditor] ('the Auditor'),
established at
[full address/city/state/province/country],
represented by
[name and function of an authorised representative],

have carried out the procedures agreed with you regarding the costs declared in the Financial
Statement(s)³ of the [Beneficiary] [Linked Third Party] concerning the grant agreement
[insert grant agreement reference: number, title of the action and acronym] ('the Agreement'),

with a total cost declared of
[total amount] EUR,

and a total of actual costs and unit costs calculated in accordance with the [Beneficiary's] [Linked
Third Party's] usual cost accounting practices' declared of

[sum of total actual costs and total direct personnel costs declared as unit costs calculated in
accordance with the [Beneficiary's] [Linked Third Party's] usual cost accounting practices] EUR

and **hereby provide our Independent Report of Factual Findings ('the Report')** using the
compulsory report format agreed with you.

The Report

³ By which the Beneficiary declares costs under the Agreement (see template 'Model Financial Statement' in
Annex 4 to the Agreement).



Our engagement was carried out in accordance with the terms of reference ('the ToR') appended to this Report. The Report includes the agreed-upon procedures ('the Procedures') carried out and the standard factual findings ('the Findings') examined.

The Procedures were carried out solely to assist the JU in evaluating whether the [Beneficiary's] [Linked Third Party's] costs in the accompanying Financial Statement(s) were declared in accordance with the Agreement. The JU draws its own conclusions from the Report and any additional information it may require.

The scope of the Procedures was defined by the European Commission ('the Commission'). Therefore, the Auditor is not responsible for their suitability or pertinence. Since the Procedures carried out constitute neither an audit nor a review made in accordance with International Standards on Auditing or International Standards on Review Engagements, the Auditor does not give a statement of assurance on the Financial Statements.

Had the Auditor carried out additional procedures or an audit of the [Beneficiary's] [Linked Third Party's] Financial Statements in accordance with International Standards on Auditing or International Standards on Review Engagements, other matters might have come to its attention and would have been included in the Report.

Not applicable Findings

We examined the Financial Statement(s) stated above and considered the following Findings not applicable:

Explanation (to be removed from the Report):

If a Finding was not applicable, it must be marked as 'N.A.' ('Not applicable') in the corresponding row on the right-hand column of the table and means that the Finding did not have to be corroborated by the Auditor and the related Procedure(s) did not have to be carried out.

The reasons of the non-application of a certain Finding must be obvious i.e.

- i) if no cost was declared under a certain category then the related Finding(s) and Procedure(s) are not applicable;*
- ii) if the condition set to apply certain Procedure(s) are not met the related Finding(s) and those Procedure(s) are not applicable. For instance, for 'beneficiaries with accounts established in a currency other than euro' the Procedure and Finding related to 'beneficiaries with accounts established in euro' are not applicable. Similarly, if no additional remuneration is paid, the related Finding(s) and Procedure(s) for additional remuneration are not applicable.*

List here all Findings considered not applicable for the present engagement and explain the reasons of the non-applicability.

....

Exceptions

Apart from the exceptions listed below, the [Beneficiary] [Linked Third Party] provided the Auditor all the documentation and accounting information needed by the Auditor to carry out the requested Procedures and evaluate the Findings.

Explanation (to be removed from the Report):

- If the Auditor was not able to successfully complete a procedure requested, it must be marked as 'E' ('Exception') in the corresponding row on the right-hand column of the table. The reason such as the inability to reconcile key information or the unavailability of data that prevents the Auditor from carrying out the Procedure must be indicated below.*
- If the Auditor cannot corroborate a standard finding after having carried out the corresponding procedure, it must also be marked as 'E' ('Exception') and, where possible, the reasons why the Finding was not fulfilled and its possible impact must be explained here below.*



List here any exceptions and add any information on the cause and possible consequences of each exception, if known. If the exception is quantifiable, include the corresponding amount.

....

Example (to be removed from the Report):

1. *The Beneficiary was unable to substantiate the Finding number 1 on ... because*
2. *Finding number 30 was not fulfilled because the methodology used by the Beneficiary to calculate unit costs was different from the one approved by the Commission. The differences were as follows: ...*
3. *After carrying out the agreed procedures to confirm the Finding number 31, the Auditor found a difference of _____ EUR. The difference can be explained by ...*

Further Remarks

In addition to reporting on the results of the specific procedures carried out, the Auditor would like to make the following general remarks:

Example (to be removed from the Report):

1. *Regarding Finding number 8 the conditions for additional remuneration were considered as fulfilled because ...*
2. *In order to be able to confirm the Finding number 15 we carried out the following additional procedures:*

Use of this Report

This Report may be used only for the purpose described in the above objective. It was prepared solely for the confidential use of the [Beneficiary] [Linked Third Party], the JU and the Commission, and only to be submitted to the JU in connection with the requirements set out in Article 20.4 of the Agreement. The Report may not be used by the [Beneficiary] [Linked Third Party], by the JU or the Commission for any other purpose, nor may it be distributed to any other parties. The JU or the Commission may only disclose the Report to authorised parties, in particular to the European Anti-Fraud Office (OLAF) and the European Court of Auditors.

This Report relates only to the Financial Statement(s) submitted to the JU by the [Beneficiary] [Linked Third Party] for the Agreement. Therefore, it does not extend to any other of the [Beneficiary's] [Linked Third Party's] Financial Statement(s).

There was no conflict of interest⁴ between the Auditor and the Beneficiary [and Linked Third Party] in establishing this Report. The total fee paid to the Auditor for providing the Report was EUR [] (including EUR [] of deductible VAT).

We look forward to discussing our Report with you and would be pleased to provide any further information or assistance.

[legal name of the Auditor]

⁴ A conflict of interest arises when the Auditor's objectivity to establish the certificate is compromised in fact or in appearance when the Auditor for instance:

- was involved in the preparation of the Financial Statements;
- stands to benefit directly should the certificate be accepted;
- has a close relationship with any person representing the beneficiary;
- is a director, trustee or partner of the beneficiary; or
- is in any other situation that compromises his or her independence or ability to establish the certificate impartially.

Grant Agreement number: [insert number] [insert acronym] [insert call identifier]  Associated with document Ref. Ares(2020)7661305 - 16/12/2020

[name and function of an authorised representative]

[dd Month yyyy]

Signature of the Auditor

Agreed-upon procedures to be performed and standard factual findings to be confirmed by the Auditor

The European Commission ('the Commission') reserves the right to i) provide the auditor with additional guidance regarding the procedures to be followed or the facts to be ascertained and the way in which to present them (this may include sample coverage and findings) or to ii) change the procedures, by notifying the Beneficiary in writing. The procedures carried out by the auditor to confirm the standard factual finding are listed in the table below.

If this certificate relates to a Linked Third Party, any reference here below to 'the Beneficiary' is to be considered as a reference to 'the Linked Third Party'.

The 'result' column has three different options: 'C', 'E' and 'N.A.':

- 'C' stands for 'confirmed' and means that the auditor can confirm the 'standard factual finding' and, therefore, there is no exception to be reported.
- 'E' stands for 'exception' and means that the Auditor carried out the procedures but cannot confirm the 'standard factual finding', or that the Auditor was not able to carry out a specific procedure (e.g. because it was impossible to reconcile key information or data were unavailable),
- 'N.A.' stands for 'not applicable' and means that the Finding did not have to be examined by the Auditor and the related Procedure(s) did not have to be carried out. The reasons of the non-application of a certain Finding must be obvious i.e. i) if no cost was declared under a certain category then the related Finding(s) and Procedure(s) are not applicable; ii) if the condition set to apply certain Procedure(s) are not met then the related Finding(s) and Procedure(s) are not applicable. For instance, for 'beneficiaries with accounts established in a currency other than the euro' the Procedure related to 'beneficiaries with accounts established in euro' is not applicable. Similarly, if no additional remuneration is paid, the related Finding(s) and Procedure(s) for additional remuneration are not applicable.

Ref	Procedures	Standard factual finding	Result (C / E / N.A.)
A	ACTUAL PERSONNEL COSTS AND UNIT COSTS CALCULATED BY THE BENEFICIARY IN ACCORDANCE WITH ITS USUAL COST ACCOUNTING PRACTICE		
	<p>The Auditor draws a sample of persons whose costs were declared in the Financial Statement(s) to carry out the procedures indicated in the consecutive points of this section A.</p> <p><i>(The sample should be selected randomly so that it is representative. Full coverage is required if there are fewer than 10 people (including employees, natural persons working under a direct contract and personnel seconded by a third party), otherwise the sample should have a minimum of 10 people, or 10% of the total, whichever number is the highest)</i></p> <p>The Auditor sampled [] people out of the total of [] people.</p>		

Ref	Procedures	Standard factual finding	Result (C / E / N.A.)
A.1	<p>PERSONNEL COSTS</p> <p><u>For the persons included in the sample and working under an employment contract or equivalent act (general procedures for individual actual personnel costs and personnel costs declared as unit costs)</u></p> <p>To confirm standard factual findings 1-5 listed in the next column, the Auditor reviewed following information/documents provided by the Beneficiary:</p> <ul style="list-style-type: none"> ○ a list of the persons included in the sample indicating the period(s) during which they worked for the action, their position (classification or category) and type of contract; ○ the payslips of the employees included in the sample; ○ reconciliation of the personnel costs declared in the Financial Statement(s) with the accounting system (project accounting and general ledger) and payroll system; ○ information concerning the employment status and employment conditions of personnel included in the sample, in particular their employment contracts or equivalent; ○ the Beneficiary's usual policy regarding payroll matters (e.g. salary policy, overtime policy, variable pay); ○ applicable national law on taxes, labour and social security and ○ any other document that supports the personnel costs declared. <p>The Auditor also verified the eligibility of all components of the retribution (see Article 6 GA) and recalculated the personnel costs for employees included in the sample.</p>	1) The employees were i) directly hired by the Beneficiary in accordance with its national legislation, ii) under the Beneficiary's sole technical supervision and responsibility and iii) remunerated in accordance with the Beneficiary's usual practices.	
		2) Personnel costs were recorded in the Beneficiary's accounts/payroll system.	
		3) Costs were adequately supported and reconciled with the accounts and payroll records.	
		4) Personnel costs did not contain any ineligible elements.	
		5) There were no discrepancies between the personnel costs charged to the action and the costs recalculated by the Auditor.	
	<p><i>Further procedures if 'additional remuneration' is paid</i></p> <p>To confirm standard factual findings 6-9 listed in the next column, the Auditor:</p> <ul style="list-style-type: none"> ○ reviewed relevant documents provided by the Beneficiary (legal form, legal/statutory 	6) The Beneficiary paying "additional remuneration" was a non-profit legal entity.	

Ref	Procedures	Standard factual finding	Result (C / E / N.A.)
	<p>obligations, the Beneficiary's usual policy on additional remuneration, criteria used for its calculation, the Beneficiary's usual remuneration practice for projects funded under national funding schemes ...);</p> <ul style="list-style-type: none"> recalculated the amount of additional remuneration eligible for the action based on the supporting documents received (full-time or part-time work, exclusive or non-exclusive dedication to the action, usual remuneration paid for projects funded by national schemes) to arrive at the applicable FTE/year and pro-rata rate (see data collected in the course of carrying out the procedures under A.2 'Productive hours' and A.4 'Time recording system'). <p><i>'ADDITIONAL REMUNERATION' MEANS ANY PART OF THE REMUNERATION WHICH EXCEEDS WHAT THE PERSON WOULD BE PAID FOR TIME WORKED IN PROJECTS FUNDED BY NATIONAL SCHEMES.</i></p> <p><i>IF ANY PART OF THE REMUNERATION PAID TO THE EMPLOYEE IS QUALIFIED AS "ADDITIONAL REMUNERATION" AND IS ELIGIBLE UNDER THE PROVISIONS OF ARTICLE 6.2.A.1, THIS CAN BE CHARGED AS ELIGIBLE COST TO THE ACTION UP TO THE FOLLOWING AMOUNT:</i></p> <p>(A) <i>IF THE PERSON WORKS FULL TIME AND EXCLUSIVELY ON THE ACTION DURING THE FULL YEAR: UP TO EUR 8 000/YEAR;</i></p> <p>(B) <i>IF THE PERSON WORKS EXCLUSIVELY ON THE ACTION BUT NOT FULL-TIME OR NOT FOR THE FULL YEAR: UP TO THE CORRESPONDING PRO-RATA AMOUNT OF EUR 8 000, OR</i></p> <p>(C) <i>IF THE PERSON DOES NOT WORK EXCLUSIVELY ON THE ACTION: UP TO A PRO-RATA AMOUNT CALCULATED IN ACCORDANCE TO ARTICLE 6.2.A.1.</i></p>	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.	
		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.)
	<p>factual findings 10-13 listed in the next column:</p> <ul style="list-style-type: none"> obtained a description of the Beneficiary's usual cost accounting practice to calculate unit costs; reviewed whether the Beneficiary's usual cost accounting practice was applied for the Financial Statements subject of the present CFS; verified the employees included in the sample were charged under the correct category (in accordance with the criteria used by the Beneficiary to establish personnel categories) by reviewing the contract/HR-record or analytical accounting records; verified that there is no difference between the total amount of personnel costs used in calculating the cost per unit and the total amount of personnel costs recorded in the statutory accounts; verified whether actual personnel costs were adjusted on the basis of budgeted or estimated elements and, if so, verified whether those elements used are actually relevant for the calculation, objective and supported by documents. 	used in all H2020 actions.	
		11) The employees were charged under the correct category.	
		12) Total personnel costs used in calculating the unit costs were consistent with the expenses recorded in the statutory accounts.	
		13) Any estimated or budgeted element used by the Beneficiary in its unit-cost calculation were relevant for calculating personnel costs and corresponded to objective and verifiable information.	
	<p><u>For natural persons included in the sample and working with the Beneficiary under a direct contract other than an employment contract, such as consultants (no subcontractors).</u></p> <p>To confirm standard factual findings 14-17 listed in the next column the Auditor reviewed following information/documents provided by the Beneficiary:</p> <ul style="list-style-type: none"> the contracts, especially the cost, contract duration, work description, place of work, ownership of the results and reporting obligations to the Beneficiary; the employment conditions of staff in the same category to compare costs and; any other document that supports the costs declared and its registration (e.g. invoices, accounting records, etc.). 	14) The natural persons worked under conditions similar to those of an employee, in particular regarding the way the work is organised, the tasks that are performed and the premises where they are performed.	
		15) The results of work carried out belong to the Beneficiary, or, if not, the Beneficiary has obtained all necessary rights to fulfil its obligations as if those	

Ref	Procedures	Standard factual finding	Result (C / E / N.A.)
		results were generated by itself.	
		16) Their costs were not significantly different from those for staff who performed similar tasks under an employment contract with the Beneficiary.	
		17) The costs were supported by audit evidence and registered in the accounts.	
	<u>For personnel seconded by a third party and included in the sample (not subcontractors)</u> To confirm standard factual findings 18-21 listed in the next column, the Auditor reviewed following information/documents provided by the Beneficiary: <ul style="list-style-type: none"> ○ their secondment contract(s) notably regarding costs, duration, work description, place of work and ownership of the results; ○ if there is reimbursement by the Beneficiary to the third party for the resource made available (in-kind contribution against payment): any documentation that supports the costs declared (e.g. contract, invoice, bank payment, and proof of registration in its accounting/payroll, etc.) and reconciliation of the Financial Statement(s) with the accounting system (project accounting and general ledger) as well as any proof that the amount invoiced by the third party did not include any profit; ○ if there is no reimbursement by the Beneficiary to the third party for the resource made available (in-kind contribution free of charge): a proof of the actual cost borne by the Third Party for the resource made available free of charge to the Beneficiary such as a statement of costs incurred by the Third Party and proof of the registration in the Third Party's accounting/payroll; 	18) Seconded personnel reported to the Beneficiary and worked on the Beneficiary's premises (unless otherwise agreed with the Beneficiary).	
		19) The results of work carried out belong to the Beneficiary, or, if not, the Beneficiary has obtained all necessary rights to fulfil its obligations as if those results were generated by itself.	
		<i>If personnel is seconded against payment:</i>	
		20) The costs declared were supported with documentation and recorded in the Beneficiary's accounts. The	

Ref	Procedures	Standard factual finding	Result (C / E / N.A.)
	<ul style="list-style-type: none"> any other document that supports the costs declared (e.g. invoices, etc.). 	third party did not include any profit.	
		<i>If personnel is seconded free of charge:</i> 21) The costs declared did not exceed the third party's cost as recorded in the accounts of the third party and were supported with documentation.	
A.2	PRODUCTIVE HOURS To confirm standard factual findings 22-27 listed in the next column, the Auditor reviewed relevant documents, especially national legislation, labour agreements and contracts and time records of the persons included in the sample, to verify that: <ul style="list-style-type: none"> the annual productive hours applied were calculated in accordance with one of the methods described below, the full-time equivalent (FTEs) ratios for employees not working full-time were correctly calculated. If the Beneficiary applied method B, the auditor verified that the correctness in which the total number of hours worked was calculated and that the contracts specified the annual workable hours. If the Beneficiary applied method C, the auditor verified that the 'annual productive hours' applied when calculating the hourly rate were equivalent to at least 90 % of the 'standard annual workable hours'. The Auditor can only do this if the calculation of the standard annual workable	22) The Beneficiary applied method [<i>choose one option and delete the others</i>] [A: 1720 hours] [B: the 'total number of hours worked'] [C: 'standard annual productive hours' used correspond to usual accounting practices]	
		23) Productive hours were calculated annually.	
		24) For employees not working full-time the full-time equivalent (FTE) ratio was correctly applied.	

Ref	Procedures	Standard factual finding	Result (C / E / N.A.)
	<p>hours can be supported by records, such as national legislation, labour agreements, and contracts.</p> <p><i>BENEFICIARY'S PRODUCTIVE HOURS' FOR PERSONS WORKING FULL TIME SHALL BE ONE OF THE FOLLOWING METHODS:</i></p> <p><i>A. 1720 ANNUAL PRODUCTIVE HOURS (PRO-RATA FOR PERSONS NOT WORKING FULL-TIME)</i></p> <p><i>B. THE TOTAL NUMBER OF HOURS WORKED BY THE PERSON FOR THE BENEFICIARY IN THE YEAR (THIS METHOD IS ALSO REFERRED TO AS 'TOTAL NUMBER OF HOURS WORKED' IN THE NEXT COLUMN). THE CALCULATION OF THE TOTAL NUMBER OF HOURS WORKED WAS DONE AS FOLLOWS: ANNUAL WORKABLE HOURS OF THE PERSON ACCORDING TO THE EMPLOYMENT CONTRACT, APPLICABLE LABOUR AGREEMENT OR NATIONAL LAW PLUS OVERTIME WORKED MINUS ABSENCES (SUCH AS SICK LEAVE OR SPECIAL LEAVE).</i></p> <p><i>C. THE STANDARD NUMBER OF ANNUAL HOURS GENERALLY APPLIED BY THE BENEFICIARY FOR ITS PERSONNEL IN ACCORDANCE WITH ITS USUAL COST ACCOUNTING PRACTICES (THIS METHOD IS ALSO REFERRED TO AS 'STANDARD ANNUAL PRODUCTIVE HOURS' IN THE NEXT COLUMN). THIS NUMBER MUST BE AT LEAST 90% OF THE STANDARD ANNUAL WORKABLE HOURS.</i></p> <p><i>'ANNUAL WORKABLE HOURS' MEANS THE PERIOD DURING WHICH THE PERSONNEL MUST BE WORKING, AT THE EMPLOYER'S DISPOSAL AND CARRYING OUT HIS/HER ACTIVITY OR DUTIES UNDER THE EMPLOYMENT CONTRACT, APPLICABLE COLLECTIVE LABOUR AGREEMENT OR NATIONAL WORKING TIME LEGISLATION.</i></p>	<p><i>If the Beneficiary applied method B.</i></p> <p>25) The calculation of the number of 'annual workable hours', overtime and absences was verifiable based on the documents provided by the Beneficiary.</p> <p>25.1) The Beneficiary calculates the hourly rates per full financial year following procedure A.3 (method B is not allowed for beneficiaries calculating hourly rates per month).</p> <p><i>If the Beneficiary applied method C.</i></p> <p>26) The calculation of the number of 'standard annual workable hours' was verifiable based on the documents provided by the Beneficiary.</p>	

Ref	Procedures	Standard factual finding	Result (C / E / N.A.)
		27) The 'annual productive hours' used for calculating the hourly rate were consistent with the usual cost accounting practices of the Beneficiary and were equivalent to at least 90 % of the 'annual workable hours'.	
A.3	<p>HOURLY PERSONNEL RATES</p> <p><u>I) For unit costs calculated in accordance to the Beneficiary's usual cost accounting practice (unit costs):</u></p> <p>If the Beneficiary has a "Certificate on Methodology to calculate unit costs " (CoMUC) approved by the Commission, the Beneficiary provides the Auditor with a description of the approved methodology and the Commission's letter of acceptance. The Auditor verified that the Beneficiary has indeed used the methodology approved. If so, no further verification is necessary.</p> <p>If the Beneficiary does not have a "Certificate on Methodology" (CoMUC) approved by the Commission, or if the methodology approved was not applied, then the Auditor:</p> <ul style="list-style-type: none"> ○ reviewed the documentation provided by the Beneficiary, including manuals and internal guidelines that explain how to calculate hourly rates; ○ recalculated the unit costs (hourly rates) of staff included in the sample following the results of the procedures carried out in A.1 and A.2. <p><u>II) For individual hourly rates:</u></p> <p>The Auditor:</p> <ul style="list-style-type: none"> ○ reviewed the documentation provided by the Beneficiary, including manuals and internal guidelines that explain how to calculate hourly rates; ○ recalculated the hourly rates of staff included in the sample (recalculation of all hourly 	<p>28) The Beneficiary applied [<i>choose one option and delete the other</i>]:</p> <p>[Option I: "Unit costs (hourly rates) were calculated in accordance with the Beneficiary's usual cost accounting practices"]</p> <p>[Option II: Individual hourly rates were applied]</p> <p><i>For option I concerning unit costs and if the Beneficiary applies the methodology approved by the Commission (CoMUC):</i></p> <p>29) The Beneficiary used the Commission-approved methodology to calculate hourly rates. It corresponded to the organisation's usual cost accounting practices and was applied consistently for all</p>	

Ref	Procedures	Standard factual finding	Result (C / E / N.A.)
	<p>rates if the Beneficiary uses annual rates, recalculation of three months selected randomly for every year and person if the Beneficiary uses monthly rates) following the results of the procedures carried out in A.1 and A.2;</p> <ul style="list-style-type: none"> ○ (only in case of monthly rates) confirmed that the time spent on parental leave is not deducted, and that, if parts of the basic remuneration are generated over a period longer than a month, the Beneficiary has included only the share which is generated in the month. <p><u>“UNIT COSTS CALCULATED BY THE BENEFICIARY IN ACCORDANCE WITH ITS USUAL COST ACCOUNTING PRACTICES”:</u> <i>IT IS CALCULATED BY DIVIDING THE TOTAL AMOUNT OF PERSONNEL COSTS OF THE CATEGORY TO WHICH THE EMPLOYEE BELONGS VERIFIED IN LINE WITH PROCEDURE A.1 BY THE NUMBER OF FTE AND THE ANNUAL TOTAL PRODUCTIVE HOURS OF THE SAME CATEGORY CALCULATED BY THE BENEFICIARY IN ACCORDANCE WITH PROCEDURE A.2.</i> <u>HOURLY RATE FOR INDIVIDUAL ACTUAL PERSONAL COSTS:</u> <i>IT IS CALCULATED FOLLOWING ONE OF THE TWO OPTIONS BELOW:</i></p> <p><i>A) [OPTION BY DEFAULT] BY DIVIDING THE ACTUAL ANNUAL AMOUNT OF PERSONNEL COSTS OF AN EMPLOYEE VERIFIED IN LINE WITH PROCEDURE A.1 BY THE NUMBER OF ANNUAL PRODUCTIVE HOURS VERIFIED IN LINE WITH PROCEDURE A.2 (FULL FINANCIAL YEAR HOURLY RATE);</i></p> <p><i>B) BY DIVIDING THE ACTUAL MONTHLY AMOUNT OF PERSONNEL COSTS OF AN EMPLOYEE VERIFIED IN LINE WITH PROCEDURE A.1 BY 1/12 OF THE NUMBER OF ANNUAL PRODUCTIVE HOURS VERIFIED IN LINE WITH PROCEDURE A.2.(MONTHLY HOURLY RATE).</i></p>	<p>activities irrespective of the source of funding.</p> <p><i>For option I concerning unit costs and if the Beneficiary applies a methodology not approved by the Commission:</i></p> <p>30) The unit costs re-calculated by the Auditor were the same as the rates applied by the Beneficiary.</p> <p><i>For option II concerning individual hourly rates:</i></p> <p>31) The individual rates re-calculated by the Auditor were the same as the rates applied by the Beneficiary.</p> <p>31.1) The Beneficiary used only one option (per full financial year or per month) throughout each financial year examined.</p> <p>31.2) The hourly rates do not include additional remuneration.</p>	

Ref	Procedures	Standard factual finding	Result (C / E / N.A.)
A.4	TIME RECORDING SYSTEM To verify that the time recording system ensures the fulfilment of all minimum requirements and that the hours declared for the action were correct, accurate and properly authorised and supported by documentation, the Auditor made the following checks for the persons included in the sample that declare time as worked for the action on the basis of time records: <ul style="list-style-type: none"> ○ description of the time recording system provided by the Beneficiary (registration, authorisation, processing in the HR-system); ○ its actual implementation; ○ time records were signed at least monthly by the employees (on paper or electronically) and authorised by the project manager or another manager; ○ the hours declared were worked within the project period; ○ there were no hours declared as worked for the action if HR-records showed absence due to holidays or sickness (further cross-checks with travels are carried out in B.1 below) ; ○ the hours charged to the action matched those in the time recording system. 	32) All persons recorded their time dedicated to the action on a daily/ weekly/ monthly basis using a paper/computer-based system. <i>(delete the answers that are not applicable)</i>	
		33) Their time-records were authorised at least monthly by the project manager or other superior.	
		34) Hours declared were worked within the project period and were consistent with the presences/absences recorded in HR-records.	
		35) There were no discrepancies between the number of hours charged to the action and the number of hours recorded.	
	<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>	36) The exclusive dedication is supported by a declaration signed by the Beneficiary and by any other evidence gathered.	

Ref	Procedures	Standard factual finding	Result (C / E / N.A.)
B	COSTS OF SUBCONTRACTING		
B.1	<p>The Auditor obtained the detail/breakdown of subcontracting costs and sampled cost items selected randomly <i>(full coverage is required if there are fewer than 10 items, otherwise the sample should have a minimum of 10 item, or 10% of the total, whichever number is highest).</i></p> <p>To confirm standard factual findings 37-41 listed in the next column, the Auditor reviewed the following for the items included in the sample:</p> <ul style="list-style-type: none"> ○ the use of subcontractors was foreseen in Annex 1; ○ subcontracting costs were declared in the subcontracting category of the Financial Statement; ○ supporting documents on the selection and award procedure were followed; ○ the Beneficiary ensured best value for money (key elements to appreciate the respect of this principle are the award of the subcontract to the bid offering best price-quality ratio, under conditions of transparency and equal treatment. In case an existing framework contract was used the Beneficiary ensured it was established on the basis of the principle of best value for money under conditions of transparency and equal treatment). <p>In particular,</p> <ol style="list-style-type: none"> i. if the Beneficiary acted as a contracting authority within the meaning of Directive 2004/18/EC (or 2014/24/EU) or of Directive 2004/17/EC (or 2014/25/EU), the Auditor verified that the applicable national law on public procurement was followed and that the subcontracting complied with the Terms and Conditions of the Agreement. ii. if the Beneficiary did not fall under the above-mentioned category the Auditor verified that the Beneficiary followed their usual procurement rules and respected the Terms and Conditions of the Agreement.. 	<p>37) The use of claimed subcontracting costs was foreseen in Annex 1 and costs were declared in the Financial Statements under the subcontracting category.</p> <p>38) There were documents of requests to different providers, different offers and assessment of the offers before selection of the provider in line with internal procedures and procurement rules. Subcontracts were awarded in accordance with the principle of best value for money.</p> <p><i>(When different offers were not collected the Auditor explains the reasons provided by the Beneficiary under the caption “Exceptions” of the Report. The JU will analyse this information to evaluate whether these costs might be accepted as eligible)</i></p> <p>39) The subcontracts were not awarded to other Beneficiaries</p>	

Ref	Procedures	Standard factual finding	Result (C / E / N.A.)
	For the items included in the sample the Auditor also verified that: <ul style="list-style-type: none"> ○ the subcontracts were not awarded to other Beneficiaries in the consortium; ○ there were signed agreements between the Beneficiary and the subcontractor; ○ there was evidence that the services were provided by subcontractor; 	of the consortium.	
		40) All subcontracts were supported by signed agreements between the Beneficiary and the subcontractor.	
		41) There was evidence that the services were provided by the subcontractors.	
C	COSTS OF PROVIDING FINANCIAL SUPPORT TO THIRD PARTIES		
C.1	<p>The Auditor obtained the detail/breakdown of the costs of providing financial support to third parties and sampled [] cost items selected randomly <i>(full coverage is required if there are fewer than 10 items, otherwise the sample should have a minimum of 10 item, or 10% of the total, whichever number is highest).</i></p> <p>The Auditor verified that the following minimum conditions were met:</p> <ul style="list-style-type: none"> a) the maximum amount of financial support for each third party did not exceed EUR 60 000, unless explicitly mentioned in Annex 1; b) the financial support to third parties was agreed in Annex 1 of the Agreement and the other provisions on financial support to third parties included in Annex 1 were respected. 	42) All minimum conditions were met	

D	OTHER ACTUAL DIRECT COSTS		
D.1	COSTS OF TRAVEL AND RELATED SUBSISTENCE ALLOWANCES The Auditor sampled [] cost items selected randomly <i>(full coverage is required if there are fewer than 10 items, otherwise the sample should have a minimum of 10 item, or 10% of the total, whichever number is the highest).</i> The Auditor inspected the sample and verified that: <ul style="list-style-type: none"> ○ travel and subsistence costs were consistent with the Beneficiary's usual policy for travel. In this context, the Beneficiary provided evidence of its normal policy for travel costs (e.g. use of first class tickets, reimbursement by the Beneficiary on the basis of actual costs, a lump sum or per diem) to enable the Auditor to compare the travel costs charged with this policy; ○ travel costs are correctly identified and allocated to the action (e.g. trips are directly linked to the action) by reviewing relevant supporting documents such as minutes of meetings, workshops or conferences, their registration in the correct project account, their consistency with time records or with the dates/duration of the workshop/conference; ○ no ineligible costs or excessive or reckless expenditure was declared (see Article 6.5 MGA). 	43) Costs were incurred, approved and reimbursed in line with the Beneficiary's usual policy for travels.	
		44) There was a link between the trip and the action.	
		45) The supporting documents were consistent with each other regarding subject of the trip, dates, duration and reconciled with time records and accounting.	
		46) No ineligible costs or excessive or reckless expenditure was declared.	
D.2	DEPRECIATION COSTS FOR EQUIPMENT, INFRASTRUCTURE OR OTHER ASSETS The Auditor sampled [] cost items selected randomly <i>(full coverage is required if there are fewer than 10 items, otherwise the sample should have a minimum of 10 item, or 10% of the total, whichever number is the highest).</i> For “equipment, infrastructure or other assets” [from now on called “asset(s)”] selected in the sample the Auditor verified that: <ul style="list-style-type: none"> ○ the assets were acquired in conformity with the Beneficiary's internal guidelines and procedures; ○ they were correctly allocated to the action (with supporting documents such as delivery 	47) Procurement rules, principles and guides were followed.	
		48) There was a link between the grant agreement and the asset charged to the action.	
		49) The asset charged to the action was traceable to the accounting records and the underlying documents.	

	<p>note invoice or any other proof demonstrating the link to the action)</p> <ul style="list-style-type: none"> ○ they were entered in the accounting system; ○ the extent to which the assets were used for the action (as a percentage) was supported by reliable documentation (e.g. usage overview table); <p>The Auditor recalculated the depreciation costs and verified that they were in line with the applicable rules in the Beneficiary's country and with the Beneficiary's usual accounting policy (e.g. depreciation calculated on the acquisition value).</p> <p>The Auditor verified that no ineligible costs such as deductible VAT, exchange rate losses, excessive or reckless expenditure were declared (see Article 6.5 GA).</p>	<p>50) The depreciation method used to charge the asset to the action was in line with the applicable rules of the Beneficiary's country and the Beneficiary's usual accounting policy.</p>	
		<p>51) The amount charged corresponded to the actual usage for the action.</p>	
		<p>52) No ineligible costs or excessive or reckless expenditure were declared.</p>	
D.3	<p>COSTS OF OTHER GOODS AND SERVICES</p> <p>The Auditor sampled [] cost items selected randomly (<i>full coverage is required if there are fewer than 10 items, otherwise the sample should have a minimum of 10 item, or 10% of the total, whichever number is highest</i>).</p> <p>For the purchase of goods, works or services included in the sample the Auditor verified that:</p> <ul style="list-style-type: none"> ○ the contracts did not cover tasks described in Annex 1; ○ they were correctly identified, allocated to the proper action, entered in the accounting system (traceable to underlying documents such as purchase orders, invoices and accounting); ○ the goods were not placed in the inventory of durable equipment; ○ the costs charged to the action were accounted in line with the Beneficiary's usual accounting practices; ○ no ineligible costs or excessive or reckless expenditure were declared (see Article 6 GA). <p>In addition, the Auditor verified that these goods and services were acquired in conformity with the Beneficiary's internal guidelines and procedures, in particular:</p> <ul style="list-style-type: none"> ○ if Beneficiary acted as a contracting authority within the meaning of Directive 	<p>53) Contracts for works or services did not cover tasks described in Annex 1.</p>	
		<p>54) Costs were allocated to the correct action and the goods were not placed in the inventory of durable equipment.</p>	
		<p>55) The costs were charged in line with the Beneficiary's accounting policy and were adequately supported.</p>	
		<p>56) No ineligible costs or excessive or reckless expenditure were declared. For internal invoices/charges only the cost element was charged, without any mark-ups.</p>	

	<p>2004/18/EC (or 2014/24/EU) or of Directive 2004/17/EC (or 2014/25/EU), the Auditor verified that the applicable national law on public procurement was followed and that the procurement contract complied with the Terms and Conditions of the Agreement.</p> <ul style="list-style-type: none"> ○ if the Beneficiary did not fall into the category above, the Auditor verified that the Beneficiary followed their usual procurement rules and respected the Terms and Conditions of the Agreement. <p>For the items included in the sample the Auditor also verified that:</p> <ul style="list-style-type: none"> ○ the Beneficiary ensured best value for money (key elements to appreciate the respect of this principle are the award of the contract to the bid offering best price-quality ratio, under conditions of transparency and equal treatment. In case an existing framework contract was used the Auditor also verified that the Beneficiary ensured it was established on the basis of the principle of best value for money under conditions of transparency and equal treatment); <p><i>SUCH GOODS AND SERVICES INCLUDE, FOR INSTANCE, CONSUMABLES AND SUPPLIES, DISSEMINATION (INCLUDING OPEN ACCESS), PROTECTION OF RESULTS, SPECIFIC EVALUATION OF THE ACTION IF IT IS REQUIRED BY THE AGREEMENT, CERTIFICATES ON THE FINANCIAL STATEMENTS IF THEY ARE REQUIRED BY THE AGREEMENT AND CERTIFICATES ON THE METHODOLOGY, TRANSLATIONS, REPRODUCTION.</i></p>	<p>57) Procurement rules, principles and guides were followed. There were documents of requests to different providers, different offers and assessment of the offers before selection of the provider in line with internal procedures and procurement rules. The purchases were made in accordance with the principle of best value for money.</p> <p><i>(When different offers were not collected the Auditor explains the reasons provided by the Beneficiary under the caption "Exceptions" of the Report. The JU will analyse this information to evaluate whether these costs might be accepted as eligible)</i></p>	
D.4	<p>AGGREGATED CAPITALISED AND OPERATING COSTS OF RESEARCH INFRASTRUCTURE</p> <p>The Auditor ensured the existence of a positive ex-ante assessment (issued by the EC Services) of the cost accounting methodology of the Beneficiary allowing it to apply the guidelines on direct costing for large research infrastructures in Horizon 2020.</p> <p><i>In the cases that a positive ex-ante assessment has been issued (see the standard factual findings 58-59 on the next column),</i></p>	<p>58) The costs declared as direct costs for Large Research Infrastructures (in the appropriate line of the Financial Statement) comply with the methodology described in the positive ex-ante assessment report.</p>	

	<p>The Auditor ensured that the beneficiary has applied consistently the methodology that is explained and approved in the positive ex ante assessment;</p> <p><i>In the cases that a positive ex-ante assessment has NOT been issued (see the standard factual findings 60 on the next column),</i></p> <p>The Auditor verified that no costs of Large Research Infrastructure have been charged as direct costs in any costs category;</p> <p><i>In the cases that a draft ex-ante assessment report has been issued with recommendation for further changes (see the standard factual findings 60 on the next column),</i></p> <ul style="list-style-type: none"> • The Auditor followed the same procedure as above (when a positive ex-ante assessment has NOT yet been issued) and paid particular attention (testing reinforced) to the cost items for which the draft ex-ante assessment either rejected the inclusion as direct costs for Large Research Infrastructures or issued recommendations. 	59) Any difference between the methodology applied and the one positively assessed was extensively described and adjusted accordingly.	
		60) The direct costs declared were free from any indirect costs items related to the Large Research Infrastructure.	
D.5	<p>Costs of internally invoiced goods and services</p> <p>The Auditor sampled cost items selected randomly (<i>full coverage is required if there are fewer than 10 items, otherwise the sample should have a minimum of 10 item, or 10% of the total, whichever number is highest</i>).</p> <p>To confirm standard factual findings 61-65 listed in the next column, the Auditor:</p> <ul style="list-style-type: none"> ○ obtained a description of the Beneficiary's usual cost accounting practice to calculate costs of internally invoiced goods and services (unit costs); ○ reviewed whether the Beneficiary's usual cost accounting practice was applied for the Financial Statements subject of the present CFS; ○ ensured that the methodology to calculate unit costs is being used in a consistent manner, based on objective criteria, regardless of the source of funding; ○ verified that any ineligible items or any costs claimed under other budget categories, in particular indirect costs, have not been taken into account when calculating the costs of internally invoiced goods and services (see Article 6 GA); ○ verified whether actual costs of internally invoiced goods and services were adjusted on 	<p>61) The costs of internally invoiced goods and services included in the Financial Statement were calculated in accordance with the Beneficiary's usual cost accounting practice.</p> <p>62) The cost accounting practices used to calculate the costs of internally invoiced goods and services were applied by the Beneficiary in a consistent manner based on objective criteria regardless of the source of funding.</p> <p>63) The unit cost is calculated using the actual costs for the good or service recorded in the Beneficiary's accounts, excluding any ineligible cost or</p>	

	<p>the basis of budgeted or estimated elements and, if so, verified whether those elements used are actually relevant for the calculation, and correspond to objective and verifiable information.</p> <ul style="list-style-type: none"> o verified that any costs of items which are not directly linked to the production of the invoiced goods or service (e.g. supporting services like cleaning, general accountancy, administrative support, etc. not directly used for production of the good or service) have not been taken into account when calculating the costs of internally invoiced goods and services. o verified that any costs of items used for calculating the costs internally invoiced goods and services are supported by audit evidence and registered in the accounts. o 	<p>costs included in other budget categories.</p> <p>64) The unit cost excludes any costs of items which are not directly linked to the production of the invoiced goods or service.</p> <p>65) The costs items used for calculating the actual costs of internally invoiced goods and services were relevant, reasonable and correspond to objective and verifiable information.</p>	
E	USE OF EXCHANGE RATES		
E.1	<p>a) For Beneficiaries with accounts established in a currency other than euros</p> <p>The Auditor sampled [] cost items selected randomly and verified that the exchange rates used for converting other currencies into euros were in accordance with the following rules established in the Agreement (<i>full coverage is required if there are fewer than 10 items, otherwise the sample should have a minimum of 10 item, or 10% of the total, whichever number is highest</i>):</p> <p><i>COSTS RECORDED IN THE ACCOUNTS IN A CURRENCY OTHER THAN EURO SHALL BE CONVERTED INTO EURO AT THE AVERAGE OF THE DAILY EXCHANGE RATES PUBLISHED IN THE C SERIES OF OFFICIAL JOURNAL OF THE EUROPEAN UNION (https://www.ecb.int/stats/exchange/eurofxref/html/index.en.html), DETERMINED OVER THE CORRESPONDING REPORTING PERIOD.</i></p> <p><i>IF NO DAILY EURO EXCHANGE RATE IS PUBLISHED IN THE OFFICIAL JOURNAL OF THE EUROPEAN UNION FOR THE CURRENCY IN QUESTION, CONVERSION SHALL BE MADE AT THE AVERAGE OF THE MONTHLY ACCOUNTING RATES ESTABLISHED BY THE COMMISSION AND PUBLISHED ON ITS WEBSITE (http://ec.europa.eu/budget/contracts_grants/info_contracts/inforeuro/inforeuro_en.cfm),</i></p>	<p>66) The exchange rates used to convert other currencies into Euros were in accordance with the rules established of the Grant Agreement and there was no difference in the final figures.</p>	

	<i>DETERMINED OVER THE CORRESPONDING REPORTING PERIOD.</i>		
	<p>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>	67) The Beneficiary applied its usual accounting practices.	

[legal name of the audit firm]

[name and function of an authorised representative]

[dd Month yyyy]

<Signature of the Auditor>

ANNEX 6

MODEL FOR THE CERTIFICATE ON THE METHODOLOGY

- For options [*in italics in square brackets*]: choose the applicable option. Options not chosen should be deleted.
- For fields in [grey in square brackets]: enter the appropriate data.

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TERMS OF REFERENCE FOR AN AUDIT ENGAGEMENT FOR A METHODOLOGY CERTIFICATE IN CONNECTION WITH ONE OR MORE GRANT AGREEMENTS FINANCED UNDER THE HORIZON 2020 RESEARCH AND INNOVATION FRAMEWORK PROGRAMME

INDEPENDENT REPORT OF FACTUAL FINDINGS ON THE METHODOLOGY CONCERNING GRANT AGREEMENTS FINANCED UNDER THE HORIZON 2020 RESEARCH AND INNOVATION FRAMEWORK PROGRAMME

**Terms of reference for an audit engagement for a methodology certificate
in connection with one or more grant agreements financed
by [Clean Sky 2] [Bio Based Industries][ECSEL][Fuel Cells and Hydrogen 2][Innovative
Medicines Initiative 2][Single European Sky Air Traffic Management Research
(SESAR)][Shift2Rail] JU under the Horizon 2020 Research and Innovation Framework
Programme**

This document sets out the ‘**Terms of Reference (ToR)**’ under which

[OPTION 1: *[insert name of the beneficiary]* (*‘the Beneficiary’*)] [OPTION 2: *[insert name of the linked third party]* (*‘the Linked Third Party’*), third party linked to the Beneficiary *[insert name of the beneficiary]* (*‘the Beneficiary’*)]

agrees to engage

[insert legal name of the auditor] (*‘the Auditor’*)

to produce an independent report of factual findings (*‘the Report’*) concerning the *[Beneficiary’s]* *[Linked Third Party’s]* usual accounting practices for calculating and claiming direct personnel costs declared as unit costs (*‘the Methodology’*) in connection with grant agreements financed under the Horizon 2020 Research and Innovation Framework Programme.

The procedures to be carried out for the assessment of the methodology will be based on the grant agreement(s) detailed below:

[title and number of the grant agreement(s)] (*‘the Agreement(s)’*)

The Agreement(s) has(have) been concluded between the Beneficiary and the *[Clean Sky 2][Bio Based Industries][ECSEL][Fuel Cells and Hydrogen 2][Innovative Medicines Initiative 2][Single European Sky Air Traffic Management Research (SESAR)][Shift2Rail]* Joint Undertaking (*‘the JU’*).

The JU is mentioned as a signatory of the Agreement with the Beneficiary only. The JU is not a party to this engagement.

1.1 Subject of the engagement

According to Article 18.1.2 of the Agreement, beneficiaries *[and linked third parties]* that declare direct personnel costs as unit costs calculated in accordance with their usual cost accounting practices may submit to the JU, for approval by the European Commission (*‘the Commission’*), a certificate on the methodology (*‘CoMUC’*) stating that there are adequate records and documentation to prove that their cost accounting practices used comply with the conditions set out in Point A of Article 6.2.

The subject of this engagement is the CoMUC which is composed of two separate documents:

- the Terms of Reference (*‘the ToR’*) to be signed by the *[Beneficiary]* *[Linked Third Party]* and the Auditor;
- the Auditor’s Independent Report of Factual Findings (*‘the Report’*) issued on the Auditor’s letterhead, dated, stamped and signed by the Auditor which includes; the standard statements (*‘the Statements’*) evaluated and signed by the *[Beneficiary]* *[Linked Third Party]*, the agreed-upon procedures (*‘the Procedures’*) performed by the Auditor and the standard factual findings (*‘the Findings’*) assessed by the Auditor. The Statements, Procedures and Findings are summarised in the table that forms part of the Report.

The information provided through the Statements, the Procedures and the Findings will enable the Commission to draw conclusions regarding the existence of the *[Beneficiary's] [Linked Third Party's]* usual cost accounting practice and its suitability to ensure that direct personnel costs claimed on that basis comply with the provisions of the Agreement. The Commission draws its own conclusions from the Report and any additional information it may require.

1.2 Responsibilities

The parties to this agreement are the *[Beneficiary] [Linked Third Party]* and the Auditor.

The *[Beneficiary] [Linked Third Party]*:

- is responsible for preparing financial statements for the Agreement(s) ('the Financial Statements') in compliance with those Agreements;
- is responsible for providing the Financial Statement(s) to the Auditor and enabling the Auditor to reconcile them with the *[Beneficiary's] [Linked Third Party's]* accounting and bookkeeping system and the underlying accounts and records. The Financial Statement(s) will be used as a basis for the procedures which the Auditor will carry out under this ToR;
- is responsible for its Methodology and liable for the accuracy of the Financial Statement(s);
- is responsible for endorsing or refuting the Statements indicated under the heading 'Statements to be made by the Beneficiary/ Linked Third Party' in the first column of the table that forms part of the Report;
- must provide the Auditor with a signed and dated representation letter;
- accepts that the ability of the Auditor to carry out the Procedures effectively depends upon the *[Beneficiary] [Linked Third Party]* providing full and free access to the *[Beneficiary's] [Linked Third Party's]* staff and to its accounting and other relevant records.

The Auditor:

- *[Option 1 by default: is qualified to carry out statutory audits of accounting documents in accordance with Directive 2006/43/EC of the European Parliament and of the Council of 17 May 2006 on statutory audits of annual accounts and consolidated accounts, amending Council Directives 78/660/EEC and 83/349/EEC and repealing Council Directive 84/253/EEC or similar national regulations].*
- *[Option 2 if the Beneficiary or Linked Third Party has an independent Public Officer: is a competent and independent Public Officer for which the relevant national authorities have established the legal capacity to audit the Beneficiary].*
- *[Option 3 if the Beneficiary or Linked Third Party is an international organisation: is an [internal] [external] auditor in accordance with the internal financial regulations and procedures of the international organisation].*

The Auditor:

- must be independent from the Beneficiary *[and the Linked Third Party]*, in particular, it must not have been involved in preparing the Beneficiary's *[and Linked Third Party's]* Financial Statement(s);
- must plan work so that the Procedures may be carried out and the Findings may be assessed;
- must adhere to the Procedures laid down and the compulsory report format;
- must carry out the engagement in accordance with these ToR;
- must document matters which are important to support the Report;
- must base its Report on the evidence gathered;
- must submit the Report to the *[Beneficiary] [Linked Third Party]*.

The Commission sets out the Procedures to be carried out and the Findings to be endorsed by the Auditor. The Auditor is not responsible for their suitability or pertinence. As this engagement is not an assurance engagement the Auditor does not provide an audit opinion or a statement of assurance.

1.3 Applicable Standards

The Auditor must comply with these Terms of Reference and with¹:

- the International Standard on Related Services ('ISRS') 4400 *Engagements to perform Agreed-upon Procedures regarding Financial Information* as issued by the International Auditing and Assurance Standards Board (IAASB);
- the *Code of Ethics for Professional Accountants* issued by the International Ethics Standards Board for Accountants (IESBA). Although ISRS 4400 states that independence is not a requirement for engagements to carry out agreed-upon procedures, the Commission requires that the Auditor also complies with the Code's independence requirements.

The Auditor's Report must state that there was no conflict of interests in establishing this Report between the Auditor and the Beneficiary *[and the Linked Third Party]* that could have a bearing on the Report, and must specify – if the service is invoiced - the total fee paid to the Auditor for providing the Report.

1.4 Reporting

The Report must be written in the language of the Agreement (see Article 20.7 of the Agreement).

Under Article 22 of the Agreement, the JU, the Commission, the European Anti-Fraud Office and the Court of Auditors have the right to audit any work that is carried out under the action and for which costs are declared from the European Union budget. This includes work related to this engagement. The Auditor must provide access to all working papers related to this assignment if the JU, the Commission, the European Anti-Fraud Office or the European Court of Auditors requests them.

1.5 Timing

The Report must be provided by [dd Month yyyy].

1.6 Other Terms

[The [Beneficiary] [Linked Third Party] and the Auditor can use this section to agree other specific terms, such as the Auditor's fees, liability, applicable law, etc. Those specific terms must not contradict the terms specified above.]

[legal name of the Auditor]
[name & title of authorised representative]
[dd Month yyyy]
Signature of the Auditor

[legal name of the [Beneficiary] [Linked Third Party]]
[name & title of authorised representative]
[dd Month yyyy]
Signature of the [Beneficiary] [Linked Third Party]

¹ Supreme Audit Institutions applying INTOSAI-standards may carry out the Procedures according to the corresponding International Standards of Supreme Audit Institutions and code of ethics issued by INTOSAI instead of the International Standard on Related Services ('ISRS') 4400 and the Code of Ethics for Professional Accountants issued by the IAASB and the IESBA.

**Independent report of factual findings on the methodology concerning grant agreements
financed by *[Clean Sky 2] [Bio Based Industries][ECSEL][Fuel Cells and Hydrogen
2][Innovative Medicines Initiative 2][Single European Sky Air Traffic Management Research
(SESAR)][Shift2Rail]* JU
under the Horizon 2020 Research and Innovation Framework Programme**

(To be printed on letterhead paper of the auditor)

To
[name of contact person(s)], [Position]
[[Beneficiary's] [Linked Third Party's] name]
[Address]
[dd Month yyyy]

Dear [Name of contact person(s)],

As agreed under the terms of reference dated [dd Month yyyy]

with [OPTION 1: *[insert name of the beneficiary]* ('the Beneficiary')] [OPTION 2: *[insert name of the linked third party]* ('the Linked Third Party'), third party linked to the Beneficiary *[insert name of the beneficiary]* ('the Beneficiary')],

we

[name of the auditor] ('the Auditor'),
established at
[full address/city/state/province/country],
represented by
[name and function of an authorised representative],

have carried out the agreed-upon procedures ('the Procedures') and provide hereby our Independent Report of Factual Findings ('the Report'), concerning the *[Beneficiary's] [Linked Third Party's]* usual accounting practices for calculating and declaring direct personnel costs declared as unit costs ('the Methodology').

You requested certain procedures to be carried out in connection with the grant(s)

[title and number of the grant agreement(s)] ('the Agreement(s)').

The Report

Our engagement was carried out in accordance with the terms of reference ('the ToR') appended to this Report. The Report includes: the standard statements ('the Statements') made by the *[Beneficiary] [Linked Third Party]*, the agreed-upon procedures ('the Procedures') carried out and the standard factual findings ('the Findings') confirmed by us.

The engagement involved carrying out the Procedures and assessing the Findings and the documentation requested appended to this Report, the results of which the European Commission ('the Commission') uses to draw conclusions regarding the acceptability of the Methodology applied by the *[Beneficiary] [Linked Third Party]*.

The Report covers the methodology used from [dd Month yyyy]. In the event that the [Beneficiary] [Linked Third Party] changes this methodology, the Report will not be applicable to any Financial Statement¹ submitted thereafter.

The scope of the Procedures and the definition of the standard statements and findings were determined solely by the Commission. Therefore, the Auditor is not responsible for their suitability or pertinence.

Since the Procedures carried out constitute neither an audit nor a review made in accordance with International Standards on Auditing or International Standards on Review Engagements, we do not give a statement of assurance on the costs declared on the basis of the [Beneficiary's] [Linked Third Party's] Methodology. Had we carried out additional procedures or had we performed an audit or review in accordance with these standards, other matters might have come to its attention and would have been included in the Report.

Exceptions

Apart from the exceptions listed below, the [Beneficiary] [Linked Third Party] agreed with the standard Statements and provided the Auditor all the documentation and accounting information needed by the Auditor to carry out the requested Procedures and corroborate the standard Findings.

List here any exception and add any information on the cause and possible consequences of each exception, if known. If the exception is quantifiable, also indicate the corresponding amount.

.....

Explanation of possible exceptions in the form of examples (to be removed from the Report):

- i. the [Beneficiary] [Linked Third Party] did not agree with the standard Statement number ... because...;
- ii. the Auditor could not carry out the procedure ... established because (e.g. due to the inability to reconcile key information or the unavailability or inconsistency of data);
- iii. the Auditor could not confirm or corroborate the standard Finding number ... because

Remarks

We would like to add the following remarks relevant for the proper understanding of the Methodology applied by the [Beneficiary] [Linked Third Party] or the results reported:

Example (to be removed from the Report):

Regarding the methodology applied to calculate hourly rates ...

Regarding standard Finding 15 it has to be noted that ...

The [Beneficiary] [Linked Third Party] explained the deviation from the benchmark statement XXIV concerning time recording for personnel with no exclusive dedication to the action in the following manner:

...

Annexes

Please provide the following documents to the auditor and annex them to the report when submitting this CoMUC to the JU:

¹ Financial Statement in this context refers solely to Annex 4 of the Agreement by which the Beneficiary declares costs under the Agreement.

1. Brief description of the methodology for calculating personnel costs, productive hours and hourly rates;
2. Brief description of the time recording system in place;
3. An example of the time records used by the [Beneficiary] [Linked Third Party];
4. Description of any budgeted or estimated elements applied, together with an explanation as to why they are relevant for calculating the personnel costs and how they are based on objective and verifiable information;
5. A summary sheet with the hourly rate for direct personnel declared by the [Beneficiary] [Linked Third Party] and recalculated by the Auditor for each staff member included in the sample (the names do not need to be reported);
6. A comparative table summarising for each person selected in the sample a) the time claimed by the [Beneficiary] [Linked Third Party] in the Financial Statement(s) and b) the time according to the time record verified by the Auditor;
7. A copy of the letter of representation provided to the Auditor.

Use of this Report

This Report has been drawn up solely for the purpose given under Point 1.1 Reasons for the engagement.

The Report:

- is confidential and is intended to be submitted to the JU by the [Beneficiary] [Linked Third Party] in connection with Article 18.1.2 of the Agreement;
- may not be used by the [Beneficiary] [Linked Third Party], by the JU or by the Commission for any other purpose, nor distributed to any other parties;
- may be disclosed by the JU or by the Commission only to authorised parties, in particular the European Anti-Fraud Office (OLAF) and the European Court of Auditors.
- relates only to the usual cost accounting practices specified above and does not constitute a report on the Financial Statements of the [Beneficiary] [Linked Third Party].

No conflict of interest² exists between the Auditor and the Beneficiary [and the Linked Third Party] that could have a bearing on the Report. The total fee paid to the Auditor for producing the Report was EUR [] (including EUR [] of deductible VAT).

We look forward to discussing our Report with you and would be pleased to provide any further information or assistance which may be required.

Yours sincerely

[legal name of the Auditor]

[name and title of the authorised representative]

[dd Month yyyy]

Signature of the Auditor

² A conflict of interest arises when the Auditor's objectivity to establish the certificate is compromised in fact or in appearance when the Auditor for instance:

- was involved in the preparation of the Financial Statements;
- stands to benefit directly should the certificate be accepted;
- has a close relationship with any person representing the beneficiary;
- is a director, trustee or partner of the beneficiary; or
- is in any other situation that compromises his or her independence or ability to establish the certificate impartially.

Statements to be made by the Beneficiary/Linked Third Party ('the Statements') and Procedures to be carried out by the Auditor ('the Procedures') and standard factual findings ('the Findings') to be confirmed by the Auditor

The European Commission ('the Commission') reserves the right to provide the auditor with guidance regarding the Statements to be made, the Procedures to be carried out or the Findings to be ascertained and the way in which to present them. The Commission reserves the right to vary the Statements, Procedures or Findings by written notification to the Beneficiary/Linked Third Party to adapt the procedures to changes in the grant agreement(s) or to any other circumstances.

If this methodology certificate relates to the Linked Third Party's usual accounting practices for calculating and claiming direct personnel costs declared as unit costs any reference here below to 'the Beneficiary' is to be considered as a reference to 'the Linked Third Party'.

<i>Please explain any discrepancies in the body of the Report.</i>	
Statements to be made by Beneficiary	Procedures to be carried out and Findings to be confirmed by the Auditor
A. Use of the Methodology I. The cost accounting practice described below has been in use since [dd Month yyyy]. II. The next planned alteration to the methodology used by the Beneficiary will be from [dd Month yyyy].	Procedure: ✓ The Auditor checked these dates against the documentation the Beneficiary has provided. Factual finding: 1. The dates provided by the Beneficiary were consistent with the documentation.
B. Description of the Methodology III. The methodology to calculate unit costs is being used in a consistent manner and is reflected in the relevant procedures. <i>[Please describe the methodology your entity uses to calculate <u>personnel</u> costs, productive hours and hourly rates, present your description to the Auditor and annex it to this certificate]</i> <i>[If the statement of section "B. Description of the methodology" cannot be endorsed by the Beneficiary or there is no written methodology to calculate unit costs it should be listed here below and reported as exception by the Auditor in the main Report of Factual Findings: - ...]</i>	Procedure: ✓ The Auditor reviewed the description, the relevant manuals and/or internal guidance documents describing the methodology. Factual finding: 2. The brief description was consistent with the relevant manuals, internal guidance and/or other documentary evidence the Auditor has reviewed. 3. The methodology was generally applied by the Beneficiary as part of its usual costs accounting practices.
C. Personnel costs	Procedure:

<i>Please explain any discrepancies in the body of the Report.</i>	
Statements to be made by Beneficiary	Procedures to be carried out and Findings to be confirmed by the Auditor
<u>General</u>	
IV. The unit costs (hourly rates) are limited to salaries including during parental leave, social security contributions, taxes and other costs included in the remuneration required under national law and the employment contract or equivalent appointing act;	<p><i>The Auditor draws a sample of employees to carry out the procedures indicated in this section C and the following sections D to F.</i> <i>[The Auditor has drawn a random sample of 10 employees assigned to Horizon 2020 action(s). If fewer than 10 employees are assigned to the Horizon 2020 action(s), the Auditor has selected all employees assigned to the Horizon 2020 action(s), complemented by other employees irrespective of their assignments until he has reached 10 employees.].</i> For this sample:</p> <ul style="list-style-type: none"> ✓ the Auditor reviewed all documents relating to personnel costs such as employment contracts, payslips, payroll policy (e.g. salary policy, overtime policy, variable pay policy), accounting and payroll records, applicable national tax, labour and social security law and any other documents corroborating the personnel costs claimed; ✓ in particular, the Auditor reviewed the employment contracts of the employees in the sample to verify that: <ul style="list-style-type: none"> i. they were employed directly by the Beneficiary in accordance with applicable national legislation; ii. they were working under the sole technical supervision and responsibility of the latter; iii. they were remunerated in accordance with the Beneficiary's usual practices; iv. they were allocated to the correct group/category/cost centre for the purposes of calculating the unit cost in line with the Beneficiary's usual cost accounting practices; ✓ the Auditor verified that any ineligible items or any costs claimed under other costs categories or costs covered by other types of grant or by other grants financed from the European Union budget have not been taken into account when calculating the personnel costs; ✓ the Auditor numerically reconciled the total amount of personnel costs used to calculate the unit cost with the total amount of personnel costs recorded in the statutory accounts and the payroll system. ✓ to the extent that actual personnel costs were adjusted on the basis of budgeted or estimated elements, the Auditor carefully examined those elements and checked the information source to confirm that they correspond to objective and verifiable information;
V. Employees are hired directly by the Beneficiary in accordance with national law, and work under its sole supervision and responsibility;	
VI. The Beneficiary remunerates its employees in accordance with its usual practices. This means that personnel costs are charged in line with the Beneficiary's usual payroll policy (e.g. salary policy, overtime policy, variable pay) and no special conditions exist for employees assigned to tasks relating to the European Union or Euratom, unless explicitly provided for in the grant agreement(s);	
VII. The Beneficiary allocates its employees to the relevant group/category/cost centre for the purpose of the unit cost calculation in line with the usual cost accounting practice;	
VIII. Personnel costs are based on the payroll system and accounting system.	
IX. Any exceptional adjustments of actual personnel costs resulted from relevant budgeted or estimated elements and were based on objective and verifiable information. <i>[Please describe the 'budgeted or estimated elements' and their relevance to personnel costs, and explain how they were reasonable and based on objective and verifiable information, present your explanation to the Auditor and annex it to this certificate].</i>	
X. Personnel costs claimed do not contain any of the following ineligible costs: costs related to return on capital; debt and debt service charges; provisions for future losses or debts; interest owed; doubtful debts; currency exchange losses; bank costs charged by the Beneficiary's bank for transfers from the JU; excessive or reckless expenditure; deductible VAT or costs incurred during suspension of the implementation of the action.	
XI. Personnel costs were not declared under another EU or Euratom grant (including grants awarded by a Member State and financed by the EU budget and grants awarded by bodies other than the JU for the purpose of implementing the EU or Euratom budget in the same period, unless the Beneficiary can demonstrate that the operating grant does not cover any costs of the action).	

<i>Please explain any discrepancies in the body of the Report.</i>	
Statements to be made by Beneficiary	Procedures to be carried out and Findings to be confirmed by the Auditor
<p><u>If additional remuneration as referred to in the grant agreement(s) is paid</u></p> <p>XII. The Beneficiary is a non-profit legal entity;</p> <p>XIII. The additional remuneration is part of the beneficiary's usual remuneration practices and paid consistently whenever the relevant work or expertise is required;</p> <p>XIV. The criteria used to calculate the additional remuneration are objective and generally applied regardless of the source of funding;</p> <p>XV. The additional remuneration included in the personnel costs used to calculate the hourly rates for the grant agreement(s) is capped at EUR 8 000 per full-time equivalent (reduced proportionately if the employee is not assigned exclusively to the action).</p> <p><i>[If certain statement(s) of section "C. Personnel costs" cannot be endorsed by the Beneficiary they should be listed here below and reported as exception by the Auditor in the main Report of Factual Findings:</i> - ...]</p>	<p>✓ if additional remuneration has been claimed, the Auditor verified that the Beneficiary was a non-profit legal entity, that the amount was capped at EUR 8 000 per full-time equivalent and that it was reduced proportionately for employees not assigned exclusively to the action(s).</p> <p>✓ the Auditor recalculated the personnel costs for the employees in the sample.</p> <p>Factual finding:</p> <ol style="list-style-type: none"> All the components of the remuneration that have been claimed as personnel costs are supported by underlying documentation. The employees in the sample were employed directly by the Beneficiary in accordance with applicable national law and were working under its sole supervision and responsibility. Their employment contracts were in line with the Beneficiary's usual policy; Personnel costs were duly documented and consisted solely of salaries, social security contributions (pension contributions, health insurance, unemployment fund contributions, etc.), taxes and other statutory costs included in the remuneration (holiday pay, thirteenth month's pay, etc.); The totals used to calculate the personnel unit costs are consistent with those registered in the payroll and accounting records; To the extent that actual personnel costs were adjusted on the basis of budgeted or estimated elements, those elements were relevant for calculating the personnel costs and correspond to objective and verifiable information. The budgeted or estimated elements used are: — (indicate the elements and their values). Personnel costs contained no ineligible elements; Specific conditions for eligibility were fulfilled when additional remuneration was paid: a) the Beneficiary is registered in the grant agreements as a non-profit legal entity; b) it was paid according to objective criteria generally applied regardless of the source of funding used and c) remuneration was capped at EUR 8 000 per full-time equivalent (or up to up to the equivalent pro-rata amount if the person did not work on the action full-time during the year or did not work

<i>Please explain any discrepancies in the body of the Report.</i>	
Statements to be made by Beneficiary	Procedures to be carried out and Findings to be confirmed by the Auditor
	exclusively on the action).
<p>D. Productive hours</p> <p>XVI. The number of productive hours per full-time employee applied is <i>[delete as appropriate]</i>:</p> <p>A. 1720 productive hours per year for a person working full-time (corresponding pro-rata for persons not working full time).</p> <p>B. the total number of hours worked in the year by a person for the Beneficiary</p> <p>C. the standard number of annual hours generally applied by the beneficiary for its personnel in accordance with its usual cost accounting practices. This number must be at least 90% of the standard annual workable hours.</p> <p><u>If method B is applied</u></p> <p>XVII. The calculation of the total number of hours worked was done as follows: annual workable hours of the person according to the employment contract, applicable labour agreement or national law plus overtime worked minus absences (such as sick leave and special leave).</p> <p>XVIII. ‘Annual workable hours’ are hours during which the personnel must be working, at the employer’s disposal and carrying out his/her activity or duties under the employment contract, applicable collective labour agreement or national working time legislation.</p> <p>XIX. The contract (applicable collective labour agreement or national working time legislation) do specify the working time enabling to calculate the annual workable hours.</p> <p><u>If method C is applied</u></p> <p>XX. The standard number of productive hours per year is that of a full-time equivalent.</p> <p>XXI. The number of productive hours per year on which the hourly rate is based i) corresponds to the Beneficiary’s usual accounting practices; ii) is at least 90% of the standard number of workable (working) hours per year.</p>	<p>Procedure (same sample basis as for Section C: Personnel costs):</p> <ul style="list-style-type: none"> ✓ The Auditor verified that the number of productive hours applied is in accordance with method A, B or C. ✓ The Auditor checked that the number of productive hours per full-time employee is correct. ✓ If method B is applied the Auditor verified i) the manner in which the total number of hours worked was done and ii) that the contract specified the annual workable hours by inspecting all the relevant documents, national legislation, labour agreements and contracts. ✓ If method C is applied the Auditor reviewed the manner in which the standard number of working hours per year has been calculated by inspecting all the relevant documents, national legislation, labour agreements and contracts and verified that the number of productive hours per year used for these calculations was at least 90% of the standard number of working hours per year. <p>Factual finding:</p> <p><u>General</u></p> <p>12. The Beneficiary applied a number of productive hours consistent with method A, B or C detailed in the left-hand column.</p> <p>13. The number of productive hours per year per full-time employee was accurate.</p> <p><u>If method B is applied</u></p> <p>14. The number of ‘annual workable hours’, overtime and absences was verifiable based on the documents provided by the Beneficiary and the calculation of the total number of hours worked was accurate.</p> <p>15. The contract specified the working time enabling to calculate the annual workable hours.</p> <p><u>If method C is applied</u></p> <p>16. The calculation of the number of productive hours per year corresponded</p>

<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>to the usual costs accounting practice of the Beneficiary.</p> <p>17. The calculation of the standard number of workable (working) hours per year was corroborated by the documents presented by the Beneficiary.</p> <p>18. The number of productive hours per year used for the calculation of the hourly rate was at least 90 % of the number of workable (working) hours per year.</p>
<p>E. Hourly rates</p> <p>The hourly rates are correct because:</p> <p>XXIII. Hourly rates are correctly calculated since they result from dividing annual personnel costs by the productive hours of a given year and group (e.g. staff category or department or cost centre depending on the methodology applied) and they are in line with the statements made in section C. and D. above.</p> <p><i>[If the statement of section 'E. Hourly rates' cannot be endorsed by the Beneficiary they should be listed here below and reported as exception by the Auditor: - ...]</i></p>	<p>Procedure</p> <ul style="list-style-type: none"> ✓ The Auditor has obtained a list of all personnel rates calculated by the Beneficiary in accordance with the methodology used. ✓ The Auditor has obtained a list of all the relevant employees, based on which the personnel rate(s) are calculated. <p>For 10 employees selected at random (same sample basis as Section C: Personnel costs):</p> <ul style="list-style-type: none"> ✓ The Auditor recalculated the hourly rates. ✓ The Auditor verified that the methodology applied corresponds to the usual accounting practices of the organisation and is applied consistently for all activities of the organisation on the basis of objective criteria irrespective of the source of funding. <p>Factual finding:</p> <p>19. No differences arose from the recalculation of the hourly rate for the employees included in the sample.</p>
<p>F. Time recording</p> <p>XXIV. Time recording is in place for all persons with no exclusive dedication to one Horizon 2020 action. At least all hours worked in connection with the grant agreement(s) are registered on a daily/weekly/monthly basis <i>[delete as appropriate]</i> using a paper/computer-based system <i>[delete as appropriate]</i>;</p> <p>XXV. For persons exclusively assigned to one Horizon 2020 activity the Beneficiary has either signed a declaration to that effect or has put</p>	<p>Procedure</p> <ul style="list-style-type: none"> ✓ The Auditor reviewed the brief description, all relevant manuals and/or internal guidance describing the methodology used to record time. <p>The Auditor reviewed the time records of the random sample of 10 employees referred to under Section C: Personnel costs, and verified in particular:</p>

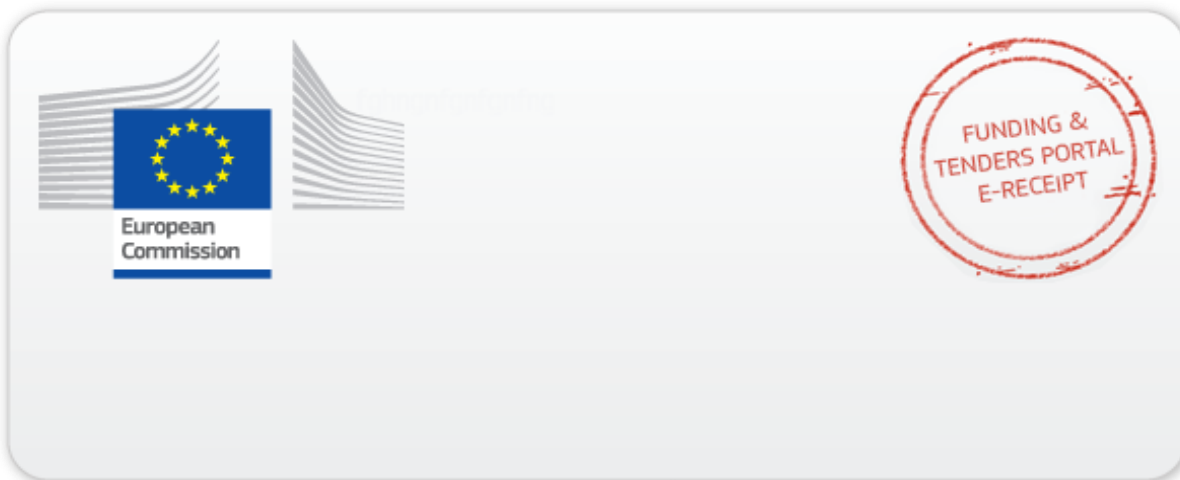
<i>Please explain any discrepancies in the body of the Report.</i>	
Statements to be made by Beneficiary	Procedures to be carried out and Findings to be confirmed by the Auditor
<p>arrangements in place to record their working time;</p> <p>XXVI. Records of time worked have been signed by the person concerned (on paper or electronically) and approved by the action manager or line manager at least monthly;</p> <p>XXVII. Measures are in place to prevent staff from:</p> <ul style="list-style-type: none"> i. recording the same hours twice, ii. recording working hours during absence periods (e.g. holidays, sick leave), iii. recording more than the number of productive hours per year used to calculate the hourly rates, and iv. recording hours worked outside the action period. <p>XXVIII. No working time was recorded outside the action period;</p> <p>XXIX. No more hours were claimed than the productive hours used to calculate the hourly personnel rates.</p> <p><i>[Please provide a brief description of the <u>time recording system</u> in place together with the measures applied to ensure its reliability to the Auditor and annex it to the present certificate¹].</i></p> <p><i>[If certain statement(s) of section “F. Time recording” cannot be endorsed by the Beneficiary they should be listed here below and reported as exception by the Auditor: - ...]</i></p>	<ul style="list-style-type: none"> ✓ that time records were available for all persons with not exclusive assignment to the action; ✓ that time records were available for persons working exclusively for a Horizon 2020 action, or, alternatively, that a declaration signed by the Beneficiary was available for them certifying that they were working exclusively for a Horizon 2020 action; ✓ that time records were signed and approved in due time and that all minimum requirements were fulfilled; ✓ that the persons worked for the action in the periods claimed; ✓ that no more hours were claimed than the productive hours used to calculate the hourly personnel rates; ✓ that internal controls were in place to prevent that time is recorded twice, during absences for holidays or sick leave; that more hours are claimed per person per year for Horizon 2020 actions than the number of productive hours per year used to calculate the hourly rates; that working time is recorded outside the action period; ✓ the Auditor cross-checked the information with human-resources records to verify consistency and to ensure that the internal controls have been effective. In addition, the Auditor has verified that no more hours were charged to Horizon 2020 actions per person per year than the number of productive hours per year used to calculate the hourly rates, and verified that no time worked outside the action period was charged to the action. <p>Factual finding:</p> <p>20. The brief description, manuals and/or internal guidance on time recording provided by the Beneficiary were consistent with management</p>

¹ The description of the time recording system must state among others information on the content of the time records, its coverage (full or action time-recording, for all personnel or only for personnel involved in H2020 actions), its degree of detail (whether there is a reference to the particular tasks accomplished), its form, periodicity of the time registration and authorisation (paper or a computer-based system; on a daily, weekly or monthly basis; signed and countersigned by whom), controls applied to prevent double-charging of time or ensure consistency with HR-records such as absences and travels as well as its information flow up to its use for the preparation of the Financial Statements.

<i>Please explain any discrepancies in the body of the Report.</i>	
Statements to be made by Beneficiary	Procedures to be carried out and Findings to be confirmed by the Auditor
	<p>reports/records and other documents reviewed and were generally applied by the Beneficiary to produce the financial statements.</p> <p>21. For the random sample time was recorded or, in the case of employees working exclusively for the action, either a signed declaration or time records were available;</p> <p>22. For the random sample the time records were signed by the employee and the action manager/line manager, at least monthly.</p> <p>23. Working time claimed for the action occurred in the periods claimed;</p> <p>24. No more hours were claimed than the number productive hours used to calculate the hourly personnel rates;</p> <p>25. There is proof that the Beneficiary has checked that working time has not been claimed twice, that it is consistent with absence records and the number of productive hours per year, and that no working time has been claimed outside the action period.</p> <p>26. Working time claimed is consistent with that on record at the human-resources department.</p>

[official name of the [Beneficiary] [Linked Third Party]]
[name and title of authorised representative]
[dd Month yyyy]
<Signature of the [Beneficiary] [Linked Third Party]>

[official name of the Auditor]
[name and title of authorised representative]
[dd Month yyyy]
<Signature of the Auditor>



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