



## **GRANT AGREEMENT**

### **Project 101287174 — PARADISE**

#### **PREAMBLE**

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

**on the one part,**

**SESAR3 Joint Undertaking** ('granting authority'), under the powers delegated by the European Commission ('European Commission'),

**and**

**on the other part,**

1. 'the coordinator':

**SINTEF AS (SINTEF)**, PIC 910945140, established in STRINDVEGEN 4, TRONDHEIM 7034, Norway,

and the following other beneficiaries, if they sign their 'accession form' (see Annex 3 and Article 40):

2. **ADB SAFEGATE Austria GmbH (ADBSG)**, PIC 884180221, established in Dietrich-Keller-Strabe 24/2, Raaba-Grambach 8074, Austria,

3. **FRAPORT AG FRANKFURT AIRPORT SERVICES WORLDWIDE (FRA)**, PIC 983036413, established in FLUGHAFEN GEB 178, FRANKFURT AM MAIN 60547, Germany,

4. **AVINOR AS (AVINOR)**, PIC 938275375, established in DRONNING EUFEMIAS GATE 6, OSLO 0191, Norway,

5. **DEUTSCHES ZENTRUM FÜR LUFT - UND RAUMFAHRT EV (DLR)**, PIC 999981731, established in LINDER HOHE, KOLN 51147, Germany,

6. **EML SPEECH TECHNOLOGY GMBH (EML)**, PIC 999756788, established in Kriegsstrasse 100, Karlsruhe 76133, Germany,

7. **ENAV SPA (ENAV)**, PIC 998197513, established in VIA SALARIA 716, ROMA 00138, Italy,

8. **EUROCONTROL - EUROPEAN ORGANISATION FOR THE SAFETY OF AIR NAVIGATION (ECTN)**, PIC 999483733, established in Rue de la Fusée 96, BRUXELLES 1130, Belgium,

9. **SWEDAVIA AB (SWED)**, PIC 984282281, established in SWEDAVIA, STOCKHOLM ARLANDA 190 45, Sweden,
10. **AIRBUS (AIRBUS)**, PIC 999963010, established in 2 ROND POINT EMILE DEWOITINE, BLAGNAC 31700, France,
11. **AIRBUS OPERATIONS SAS (AIROPS)**, PIC 991247948, established in ROUTE DE BAYONNE 316, TOULOUSE 31060, France,
12. **LUFTHARTSVERKET (LFV)**, PIC 942346077, established in HOSPITALSGATAN 30, NORRKOPING 602 27, Sweden,
13. **Saab Air Traffic Management AB (SAAB)**, PIC 868099076, established in c/o Saab AB, LINKOPING 581 88, Sweden,
14. **ENAIRE (ENAIRE)**, PIC 997701843, established in AVENIDA DE ARAGON S/N BLOQUE 330, PORTAL 2 PARQUE EMPRESARIAL LAS MERCEDES, MADRID 28022, Spain,
15. **LETISTE PRAHA AS (PRG)**, PIC 891456967, established in K LETISTI 6/1019, PRAHA 160 08, Czechia,
16. **SOCIETA' PER AZIONI ESERCIZI AEROPORTUALI SEA (SEA)**, PIC 986590687, established in PRESSO AEROPORTO LINATE, SEGRATE MI 20054, Italy,
17. **AEROPORTI DI ROMA SPA (ADR)**, PIC 970508475, established in VIA PIER PAOLO RACCHETTI 1, FIUMICINO RM 00054, Italy,
18. **ROSENBAUER INTERNATIONAL AG (ROS)**, PIC 972434992, established in PASCHINGER STR 90, LEONDING 4060, Austria,
19. **PILDO CONSULTING SL (PILDO)**, PIC 998162690, established in c/ Bac de Roda 120 (Local 2), BARCELONA 08019, Spain,
20. **AIRSIDE INNOVATION AS (AIRSIDE)**, PIC 877514769, established in BODO LUFTHAVN OLAV V GATE 60, BODO 8004, Norway,
21. **FREQUENTIS AG (FRQ)**, PIC 998307317, established in INNOVATIONSSTRASSE 1, WIEN 1100, Austria,
22. **HUNGAROCONTROL MAGYAR LEGIFORGALMISZOLGALAT ZARTKORUEN MUKODO RESZVENYTARSASAG (HUN)**, PIC 941767472, established in IGLO UTCA 33 35, BUDAPEST 1185, Hungary,
23. **DEUTSCHE LUFTHANSA AKTIENGESELLSCHAFT (LH)**, PIC 999965532, established in VENLOER STRASSE 151-153, KOLN 50672, Germany,
24. **LUFTHANSA SYSTEMS GMBH & CO KG (LHS)**, PIC 927065376, established in AM MESSEPLATZ 1, RAUNHEIM 65479, Germany,
25. **AENA S.M.E. SA (AENA)**, PIC 957048464, established in CALLE PEONIAS 12, MADRID 28042, Spain,

26. **ALMA MATER STUDIORUM - UNIVERSITA DI BOLOGNA (UNIBO)**, PIC 999993953, established in VIA ZAMBONI 33, BOLOGNA 40126, Italy,

27. **DEEP BLUE SRL (DBL)**, PIC 998325941, established in VIA DANIELE MANIN 53, ROMA 00185, Italy,

28. **FLUGHAFEN MUNCHEN GMBH (MUC)**, PIC 944977784, established in NORDALLEE 25, MUNCHEN 85356, Germany,

29. **CENTRO INTERNAZIONALE IN MONITORAGGIO AMBIENTALE - FONDAZIONE CIMA (CIMA)**, PIC 997710476, established in VIA ARMANDO MAGLIOTTO 2 CAMPUS UNIVERSITARIO, SAVONA 17100, Italy,

30. **TERN SYSTEMS EHF (TERN)**, PIC 887286355, established in HLIOASMARA 15, KOPAVOGUR 201, Iceland,

31. **RIZENI LETOVEHO PROVOZU CESKE REPUBLIKY STATNI PODNIK (ANS CR)**, PIC 954552363, established in JENEC NAVIGACNI 787, JENEC 252 61, Czechia,

Unless otherwise specified, references to ‘beneficiary’ or ‘beneficiaries’ include the coordinator and affiliated entities (if any).

If only one beneficiary signs the grant agreement (‘mono-beneficiary grant’), all provisions referring to the ‘coordinator’ or the ‘beneficiaries’ will be considered — mutatis mutandis — as referring to the beneficiary.

The parties referred to above have agreed to enter into the Agreement.

By signing the Agreement and the accession forms, the beneficiaries accept the grant and agree to implement the action under their own responsibility and in accordance with the Agreement, with all the obligations and terms and conditions it sets out.

The Agreement is composed of:

Preamble

Terms and Conditions (including Data Sheet)

Annex 1 Description of the action<sup>1</sup>

Annex 2 Estimated budget for the action

Annex 3 Accession forms (if applicable)<sup>2</sup>

Annex 3a Declaration on joint and several liability of affiliated entities (if applicable)<sup>3</sup>

Annex 4 Model for the financial statements

Annex 5 Specific rules (if applicable)

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<sup>1</sup> Template published on [Portal Reference Documents](#).

<sup>2</sup> Template published on [Portal Reference Documents](#).

<sup>3</sup> Template published on [Portal Reference Documents](#).

## **TERMS AND CONDITIONS**

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## **DATA SHEET**

### **1. General data**

Project summary:

| Project summary                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |
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| <p>The PARADISE project (Precise and Automated Runway and Airport Decision-making for Intelligent and Safe Execution) aims to develop a next-generation ATS platform that supports safe, efficient, and scalable airport operations. It introduces four integrated solutions, each addressing a critical aspect of airport performance, supported by two transversal threads for cybersecurity and architectural harmonisation. 1. Dynamic Calibration of Airport Capacity: This solution applies AI-driven analytics to dynamically calibrate airport capacity based on real-time and historical data. It enhances strategic, tactical, and post-operational planning, enabling more accurate demand forecasting, improved resource allocation, and reduced delays, while maintaining safety and resilience. 2. Optimisation of Runway Throughput: Combining machine learning and aircraft-derived data, this solution improves arrival and departure spacing and sequencing. It integrates enhanced tools to increase runway capacity, reduce fuel burn and emissions, and improve punctuality without requiring additional infrastructure. 3. Intelligent Surface Management: This solution leverages automation, digital ATCO assistants, and enhanced connectivity to optimise surface operations. It supports SESAR Automation Level 4, enabling safer taxiing, reduced controller workload, and improved situational awareness through integrated surveillance and communication systems. 4. Prediction and Optimisation in Adverse Weather: This solution uses sensor fusion, AI, and improved data exchange to optimise planning and operations during severe weather. It enhances turnaround monitoring, de-icing coordination, and dynamic routing, reducing delays and fuel consumption. The transversal threads, Secure Exchange of Data and a New Service Delivery Model, ensure cyber-resilience and interoperability across all solutions. The PARADISE platform contributes to nine SESAR capabilities and advances automation towards Level 4.</p> |

Keywords:

- Dynamic Calibration of Airport Capacity, Optimisation of runway throughput, Intelligent Surface Management, Airport operations in adverse weather, Secure exchange of data, New service delivery model

Project number: 101287174

Project name: PARADISE – the Airport Platform of the Future

Project acronym: PARADISE

Call: HORIZON-SESAR-2025-DES-IR-02

Topic: HORIZON-SESAR-2025-DES-IR-02-WA4-1

Type of action: HORIZON JU Research and Innovation Actions

Granting authority: SESAR3 Joint Undertaking

Grant managed through EU Funding & Tenders Portal: Yes (eGrants)

Project starting date: fixed date: 1 September 2026

Project end date: 31 August 2029

Project duration: 36 months

Consortium agreement: Yes

### **2. Participants**

List of participants:

| N° | Role | Short name | Legal name                                      | Ctry | PIC       | Max grant amount |
|----|------|------------|-------------------------------------------------|------|-----------|------------------|
| 1  | COO  | SINTEF     | SINTEF AS                                       | NO   | 910945140 | 1 672 442.75     |
| 2  | BEN  | ADBSG      | ADB SAFEGATE Austria GmbH                       | AT   | 884180221 | 828 858.64       |
| 3  | BEN  | FRA        | FRAPORT AG FRANKFURT AIRPORT SERVICES WORLDWIDE | DE   | 983036413 | 237 893.27       |
| 4  | BEN  | AVINOR     | AVINOR AS                                       | NO   | 938275375 | 382 856.60       |

| N°           | Role     | Short name | Legal name                                                                    | Ctry | PIC       | Max grant amount     |
|--------------|----------|------------|-------------------------------------------------------------------------------|------|-----------|----------------------|
| 5            | BEN      | DLR        | DEUTSCHES ZENTRUM FUR LUFT - UND RAUMFAHRT EV                                 | DE   | 999981731 | 527 502.80           |
| 6            | BEN      | EML        | EML SPEECH TECHNOLOGY GMBH                                                    | DE   | 999756788 | 212 392.69           |
| 7            | BEN      | ENAV       | ENAV SPA                                                                      | IT   | 998197513 | 295 389.04           |
| 8            | BEN (IO) | ECTL       | EUROCONTROL - EUROPEAN ORGANISATION FOR THE SAFETY OF AIR NAVIGATION          | BE   | 999483733 | 0.00                 |
| 9            | BEN      | SWED       | SWEDAVIA AB                                                                   | SE   | 984282281 | 114 831.50           |
| 10           | BEN      | AIRBUS     | AIRBUS                                                                        | FR   | 999963010 | 223 324.49           |
| 11           | BEN      | AIROPS     | AIRBUS OPERATIONS SAS                                                         | FR   | 991247948 | 330 322.14           |
| 12           | BEN      | LFV        | LUFTFARTSVERKET                                                               | SE   | 942346077 | 508 233.63           |
| 13           | BEN      | SAAB       | Saab Air Traffic Management AB                                                | SE   | 868099076 | 85 906.28            |
| 13.1         | AE       | SAABNL     | Saab Air Traffic Management Nederland B.V.                                    | NL   | 868098009 | 343 625.09           |
| 14           | BEN      | ENAIRE     | ENAIRE                                                                        | ES   | 997701843 | 60 375.00            |
| 14.1         | AE       | CRIDA      | CENTRO DE REFERENCIA INVESTIGACION DESARROLLO E INNOVACION ATM, A.I.E.        | ES   | 997605619 | 386 968.75           |
| 15           | BEN      | PRG        | LETISTE PRAHA AS                                                              | CZ   | 891456967 | 106 487.51           |
| 16           | BEN      | SEA        | SOCIETA' PER AZIONI ESERCIZI AEROPORTUALI SEA                                 | IT   | 986590687 | 236 217.74           |
| 17           | BEN      | ADR        | AEROPORTI DI ROMA SPA                                                         | IT   | 970508475 | 239 461.25           |
| 18           | BEN      | ROS        | ROSENBAUER INTERNATIONAL AG                                                   | AT   | 972434992 | 162 931.61           |
| 19           | BEN      | PILDO      | PILDO CONSULTING SL                                                           | ES   | 998162690 | 560 612.50           |
| 20           | BEN      | AIRSIDE    | AIRSIDE INNOVATION AS                                                         | NO   | 877514769 | 130 112.50           |
| 21           | BEN      | FRQ        | FREQUENTIS AG                                                                 | AT   | 998307317 | 1 090 096.35         |
| 21.1         | AE       | FOR        | FREQUENTIS ORTHOGON GMBH                                                      | DE   | 957912443 | 410 000.00           |
| 21.2         | AE       | FRO        | FREQUENTIS ROMANIA SRL                                                        | RO   | 923657475 | 295 000.00           |
| 21.3         | AE       | ATR        | ATRICS Advanced Traffic Solutions GmbH                                        | DE   | 885348392 | 215 000.00           |
| 22           | BEN      | HUN        | HUNGAROCNTRAL MAGYAR LEGIFORGALMISZOLGALAT ZARTKORUEN MUKODO RESZVENYTARSASAG | HU   | 941767472 | 56 235.38            |
| 23           | BEN      | LH         | DEUTSCHE LUFTHANSA AKTIENGESELLSCHAFT                                         | DE   | 999965532 | 102 036.20           |
| 24           | BEN      | LHS        | LUFTHANSA SYSTEMS GMBH & CO KG                                                | DE   | 927065376 | 431 016.79           |
| 25           | BEN      | AENA       | AENA S.M.E. SA                                                                | ES   | 957048464 | 151 040.32           |
| 26           | BEN      | UNIBO      | ALMA MATER STUDIORUM - UNIVERSITA DI BOLOGNA                                  | IT   | 999993953 | 188 820.62           |
| 27           | BEN      | DBL        | DEEP BLUE SRL                                                                 | IT   | 998325941 | 307 387.50           |
| 28           | BEN      | MUC        | FLUGHAFEN MUNCHEN GMBH                                                        | DE   | 944977784 | 247 607.50           |
| 29           | BEN      | CIMA       | CENTRO INTERNAZIONALE IN MONITORAGGIO AMBIENTALE - FONDAZIONE CIMA            | IT   | 997710476 | 137 385.50           |
| 30           | BEN      | TERN       | TERN SYSTEMS EHF                                                              | IS   | 887286355 | 433 735.76           |
| 30.1         | AE       | TERN-H     | Tern Systems kft                                                              | HU   | 870091747 | 235 305.00           |
| 31           | BEN      | ANS CR     | RIZENI LETOVEHO PROVOZU CESKE REPUBLIKY STATNI PODNIK                         | CZ   | 954552363 | 52 500.00            |
| <b>Total</b> |          |            |                                                                               |      |           | <b>11 999 912.70</b> |

**Coordinator:**

— SINTEF AS (SINTEF)

**3. Grant****Maximum grant amount, total estimated eligible costs and contributions and funding rate:**

| Maximum grant amount<br>(Annex 2) | Maximum grant amount<br>(award decision) |
|-----------------------------------|------------------------------------------|
| 11 999 912.70                     | 11 999 912.70                            |

**Grant form:** Lump Sum

**Grant mode:** Action grant

**Budget categories/activity types:** Lump sum contributions

**Cost eligibility options:** n/a

**Budget flexibility:** No

#### **4. Reporting, payments and recoveries**

##### **4.1 Continuous reporting** (art 21)

**Deliverables:** see Funding & Tenders Portal Continuous Reporting tool

##### **4.2 Periodic reporting and payments**

**Reporting and payment schedule** (art 21, 22):

| Reporting         |            |          |                 |                                       | Payments             |                                                                                      |
|-------------------|------------|----------|-----------------|---------------------------------------|----------------------|--------------------------------------------------------------------------------------|
| Reporting periods |            |          | Type            | Deadline                              | Type                 | Deadline<br>(time to pay)                                                            |
| RP No             | Month from | Month to |                 |                                       |                      |                                                                                      |
|                   |            |          |                 |                                       | Initial prefinancing | 30 days from entry into force/10 days before starting date – whichever is the latest |
|                   |            |          |                 |                                       | Interim payment      | 90 days from receiving periodic report                                               |
| 1                 | 1          | 18       | Periodic report | 60 days after end of reporting period | Final payment        | 90 days from receiving periodic report                                               |
| 2                 | 19         | 36       | Periodic report | 60 days after end of reporting period |                      |                                                                                      |

**Prefinancing payments and guarantees:**

| Prefinancing payment     |              |
|--------------------------|--------------|
| Type                     | Amount       |
| Prefinancing 1 (initial) | 7 199 947.62 |

**Reporting and payment modalities** (art 21, 22):

Mutual Insurance Mechanism (MIM): Yes

MIM contribution: 5% of the maximum grant amount (599 995.64), retained from the initial prefinancing

Restrictions on distribution of initial prefinancing: The prefinancing may be distributed only if the minimum number of beneficiaries set out in the call conditions (if any) have acceded to the Agreement and only to beneficiaries that have acceded.

Interim payment ceiling (if any): 90% of the maximum grant amount

No-profit rule: n/a

Late payment interest: ECB + 3.5%

Bank account for payments:

NO2442010943854 SPTRNO22XXX

Conversion into euros: n/a

Reporting language: Language of the Agreement

**4.3 Certificates** (art 24): n/a

**4.4 Recoveries** (art 22)

**First-line liability for recoveries:**

Beneficiary termination: Beneficiary concerned

Final payment: Each beneficiary for their own debt

After final payment: Beneficiary concerned

**Joint and several liability for enforced recoveries (in case of non-payment):**

Individual financial responsibility: Each beneficiary is liable only for its own debts (and those of its affiliated entities, if any)

Joint and several liability of affiliated entities — n/a

## **5. Consequences of non-compliance, applicable law & dispute settlement forum**

**Suspension and termination:**

Additional suspension grounds (art 31)

Additional termination grounds (art 32)

**Applicable law** (art 43):

Standard applicable law regime: EU law + law of Belgium

Special applicable law regime:

- EUROCONTROL - EUROPEAN ORGANISATION FOR THE SAFETY OF AIR NAVIGATION (ECTL): general principles governing the law of international organisations and the general rules of international law

**Dispute settlement forum** (art 43):

Standard dispute settlement forum:

EU beneficiaries: EU General Court + EU Court of Justice (on appeal)

Non-EU beneficiaries: Courts of Brussels, Belgium (unless an international agreement provides for the enforceability of EU court judgements)

Special dispute settlement forum:

- EUROCONTROL - EUROPEAN ORGANISATION FOR THE SAFETY OF AIR NAVIGATION (ECTL): Arbitration

## **6. Other**

**Specific rules (Annex 5):** Yes

**Standard time-limits after project end:**

Confidentiality (for X years after final payment): 5

Record-keeping (for X years after final payment): 5 (or 3 for grants of not more than EUR 60 000)

Reviews (up to X years after final payment): 2

Audits (up to X years after final payment): 2

Extension of findings from other grants to this grant (no later than X years after final payment): 2

Impact evaluation (up to X years after final payment): 5 (or 3 for grants of not more than EUR 60 000)

## **CHAPTER 1 GENERAL**

### **ARTICLE 1 — SUBJECT OF THE AGREEMENT**

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

### **ARTICLE 2 — DEFINITIONS**

For the purpose of this Agreement, the following definitions apply:

Actions — The project which is being funded in the context of this Agreement.

Grant — The grant awarded in the context of this Agreement.

EU grants — Grants awarded by EU institutions, bodies, offices or agencies (including EU executive agencies, EU regulatory agencies, EDA, joint undertakings, etc.).

Participants — Entities participating in the action as beneficiaries, affiliated entities, associated partners, third parties giving in-kind contributions, subcontractors or recipients of financial support to third parties.

Beneficiaries (BEN) — The signatories of this Agreement (either directly or through an accession form).

Affiliated entities (AE) — Entities affiliated to a beneficiary within the meaning of Article 190 of EU Financial Regulation 2024/2509<sup>4</sup> which participate in the action with similar rights and obligations as the beneficiaries (obligation to implement action tasks and right to charge costs and claim contributions).

Associated partners (AP) — Entities which participate in the action, but without the right to charge costs or claim contributions.

Purchases — Contracts for goods, works or services needed to carry out the action (e.g. equipment, consumables and supplies) but which are not part of the action tasks (see Annex 1).

Subcontracting — Contracts for goods, works or services that are part of the action tasks (see Annex 1).

In-kind contributions — In-kind contributions within the meaning of Article 2(38) of EU Financial Regulation 2024/2509, i.e. non-financial resources made available free of charge by third parties.

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<sup>4</sup> For the definition, see Article 190 Regulation (EU, Euratom) 2024/2509 of the European Parliament and of the Council of 23 September 2024 on the financial rules applicable to the general budget of the Union (recast) ('EU Financial Regulation') (OJ L, 2024/2509, 26.9.2024): "**affiliated entities** [are]:

- (a) entities that form a sole beneficiary [(i.e. where an entity is formed of several entities that satisfy the criteria for being awarded a grant, including where the entity is specifically established for the purpose of implementing an action to be financed by a grant)];
- (b) entities that satisfy the eligibility criteria and that do not fall within one of the situations referred to in Article 138(1) and 143(1) and that have a link with the beneficiary, in particular a legal or capital link, which is neither limited to the action nor established for the sole purpose of its implementation".

**Fraud** — Fraud within the meaning of Article 3 of EU Directive 2017/1371<sup>5</sup> and Article 1 of the Convention on the protection of the European Communities' financial interests, drawn up by the Council Act of 26 July 1995<sup>6</sup>, as well as any other wrongful or criminal deception intended to result in financial or personal gain.

**Irregularities** — Any type of breach (regulatory or contractual) which could impact the EU financial interests, including irregularities within the meaning of Article 1(2) of EU Regulation 2988/95<sup>7</sup>.

**Grave professional misconduct** — Any type of unacceptable or improper behaviour in exercising one's profession, especially by employees, including grave professional misconduct within the meaning of Article 138(1)(c) of EU Financial Regulation 2024/2509<sup>8</sup>.

**Applicable EU, international and national law** — Any legal acts or other (binding or non-binding) rules and guidance in the area concerned.

**Portal** — EU Funding & Tenders Portal; electronic portal and exchange system managed by the European Commission and used by itself and other EU institutions, bodies, offices or agencies for the management of their funding programmes (grants, procurements, prizes, etc.).

## **CHAPTER 2 ACTION**

### **ARTICLE 3 — ACTION**

The grant is awarded for the action **101287174 — PARADISE** ('action'), as described in Annex 1.

### **ARTICLE 4 — DURATION AND STARTING DATE**

The duration and the starting date of the action are set out in the Data Sheet (see Point 1).

## **CHAPTER 3 GRANT**

### **ARTICLE 5 — GRANT**

#### **5.1 Form of grant**

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<sup>5</sup> Directive (EU) 2017/1371 of the European Parliament and of the Council of 5 July 2017 on the fight against fraud to the Union's financial interests by means of criminal law (OJ L 198, 28.7.2017, p. 29).

<sup>6</sup> OJ C 316, 27.11.1995, p. 48.

<sup>7</sup> Council Regulation (EC, Euratom) No 2988/95 of 18 December 1995 on the protection of the European Communities financial interests (OJ L 312, 23.12.1995, p. 1).

<sup>8</sup> 'Professional misconduct' includes, in particular, the following: violation of ethical standards of the profession; wrongful conduct with impact on professional credibility; breach of generally accepted professional ethical standards; false declarations/misrepresentation of information; participation in a cartel or other agreement distorting competition; violation of IPR; attempting to influence decision-making processes by taking advantage, through misrepresentation, of a conflict of interests, or to obtain confidential information from public authorities to gain an advantage; incitement to discrimination, hatred or violence or similar activities contrary to the EU values where negatively affecting or risking to affect the performance of a legal commitment.

The grant is an action grant<sup>9</sup> which takes the form of a lump sum grant for the completion of work packages.

## 5.2 Maximum grant amount

The maximum grant amount is set out in the Data Sheet (see Point 3) and in the estimated budget (Annex 2).

## 5.3 Funding rate

Not applicable

## 5.4 Estimated budget, budget categories and forms of funding

The estimated budget for the action (lump sum breakdown) is set out in Annex 2.

It contains the estimated eligible contributions for the action (lump sum contributions), broken down by participant and work package.

Annex 2 also shows the types of contributions (forms of funding)<sup>10</sup> to be used for each work package.

## 5.5 Budget flexibility

Budget flexibility does not apply; changes to the estimated budget (lump sum breakdown) always require an amendment (see Article 39).

Amendments for transfers between *work packages* are moreover possible only if:

- the work packages concerned are not already completed (and declared in a financial statement) and
- the transfers are justified by the technical implementation of the action.

# ARTICLE 6 — ELIGIBLE AND INELIGIBLE CONTRIBUTIONS

## 6.1 and 6.2 General and specific eligibility conditions

Lump sum contributions are eligible ('eligible contributions'), if:

- (a) they are set out in Annex 2 and
- (b) the work packages are completed and the work is properly implemented by the beneficiaries and/or the results are achieved, in accordance with Annex 1 and during in the period set out in Article 4 (with the exception of work/results relating to the submission of the final periodic report, which may be achieved afterwards; see Article 21)

They will be calculated on the basis of the amounts set out in Annex 2.

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<sup>9</sup> For the definition, see Article 183(2)(a) EU Financial Regulation 2024/2509: '**action grant**' means an EU grant to finance "an action intended to help achieve a Union policy objective".

<sup>10</sup> See Article 125 EU Financial Regulation 2024/2509.



### 6.3 Ineligible contributions

‘Ineligible contributions’ are:

- (a) lump sum contributions that do not comply with the conditions set out above (see Article 6.1 and 6.2)
- (b) lump sum contributions for activities already funded under other EU grants (or grants awarded by an EU Member State, non-EU country or other body implementing the EU budget), except for the following case:
  - (i) Synergy actions: not applicable
- (c) other:
  - (i) country restrictions for eligible costs: not applicable.

### 6.4 Consequences of non-compliance

If a beneficiary declares lump sum contributions that are ineligible, they will be rejected (see Article 27).

This may also lead to other measures described in Chapter 5.

## **CHAPTER 4 GRANT IMPLEMENTATION**

### **SECTION 1 CONSORTIUM: BENEFICIARIES, AFFILIATED ENTITIES AND OTHER PARTICIPANTS**

#### **ARTICLE 7 — BENEFICIARIES**

The beneficiaries, as signatories of the Agreement, are fully responsible towards the granting authority for implementing it and for complying with all its obligations.

They must implement the Agreement to their best abilities, in good faith and in accordance with all the obligations and terms and conditions it sets out.

They must have the appropriate resources to implement the action and implement the action under their own responsibility and in accordance with Article 11. If they rely on affiliated entities or other participants (see Articles 8 and 9), they retain sole responsibility towards the granting authority and the other beneficiaries.

They are jointly responsible for the *technical* implementation of the action. If one of the beneficiaries fails to implement their part of the action, the other beneficiaries must ensure that this part is implemented by someone else (without being entitled to an increase of the maximum grant amount and subject to an amendment; see Article 39). The *financial* responsibility of each beneficiary in case of recoveries is governed by Article 22.

The beneficiaries (and their action) must remain eligible under the EU programme funding the grant

for the entire duration of the action. Lump sum contributions will be eligible only as long as the beneficiary and the action are eligible.

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

(a) Each beneficiary must:

- (i) keep information stored in the Portal Participant Register up to date (see Article 19)
- (ii) inform the granting authority (and the other beneficiaries) immediately of any events or circumstances likely to affect significantly or delay the implementation of the action (see Article 19)
- (iii) submit to the coordinator in good time:
  - the prefinancing guarantees (if required; see Article 23)
  - the financial statements and certificates on the financial statements (CFS): not applicable
  - the contribution to the deliverables and technical reports (see Article 21)
  - any other documents or information required by the granting authority under the Agreement
- (iv) submit via the Portal data and information related to the participation of their affiliated entities.

(b) The coordinator must:

- (i) monitor that the action is implemented properly (see Article 11)
- (ii) act as the intermediary for all communications between the consortium and the granting authority, unless the Agreement or granting authority specifies otherwise, and in particular:
  - submit the prefinancing guarantees to the granting authority (if any)
  - request and review any documents or information required and verify their quality and completeness before passing them on to the granting authority
  - submit the deliverables and reports to the granting authority
  - inform the granting authority about the payments made to the other beneficiaries (report on the distribution of payments; if required, see Articles 22 and 32)
- (iii) distribute the payments received from the granting authority to the other beneficiaries without unjustified delay (see Article 22).

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

However, coordinators which are public bodies may delegate the tasks set out in Point (b)(ii) last

indent and (iii) above to entities with ‘authorisation to administer’ which they have created or which are controlled by or affiliated to them. In this case, the coordinator retains sole responsibility for the payments and for compliance with the obligations under the Agreement.

Moreover, coordinators which are ‘sole beneficiaries’<sup>11</sup> (or similar, such as European research infrastructure consortia (ERICs)) may delegate the tasks set out in Point (b)(i) to (iii) above to one of their members. The coordinator retains sole responsibility for compliance with the obligations under the Agreement.

The beneficiaries must have **internal arrangements** regarding their operation and co-ordination, to ensure that the action is implemented properly.

If required by the granting authority (see Data Sheet, Point 1), these arrangements must be set out in a written **consortium agreement** between the beneficiaries, covering for instance:

- the internal organisation of the consortium
- the management of access to the Portal
- different distribution keys for the payments and financial responsibilities in case of recoveries (if any)
- additional rules on rights and obligations related to background and results (see Article 16)
- settlement of internal disputes
- liability, indemnification and confidentiality arrangements between the beneficiaries.

The internal arrangements must not contain any provision contrary to this Agreement.

## ARTICLE 8 — AFFILIATED ENTITIES

The following entities which are linked to a beneficiary will participate in the action as ‘affiliated entities’:

- **Saab Air Traffic Management Nederland B.V. (SAABNL)**, PIC 868098009, linked to Saab Air Traffic Management AB (SAAB)
- **CENTRO DE REFERENCIA INVESTIGACION DESARROLLO E INNOVACION ATM, A.I.E. (CRIDA)**, PIC 997605619, linked to ENAIRE (ENAIRE)
- **FREQUENTIS ORTHOGON GMBH (FOR)**, PIC 957912443, linked to FREQUENTIS AG (FRQ)
- **FREQUENTIS ROMANIA SRL (FRO)**, PIC 923657475, linked to FREQUENTIS AG (FRQ)
- **ATRICS Advanced Traffic Solutions GmbH (ATR)**, PIC 885348392, linked to FREQUENTIS AG (FRQ)

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<sup>11</sup> For the definition, see Article 190(2) EU Financial Regulation 2024/2509: “Where several entities satisfy the criteria for being awarded a grant and together form one entity, that entity may be treated as the **sole beneficiary**, including where it is specifically established for the purpose of implementing the action financed by the grant.”

- **Tern Systems kft (TERN-H)**, PIC 870091747, linked to TERN SYSTEMS EHF (TERN)

Affiliated entities can charge lump sum contributions to the action under the same conditions as the beneficiaries and must implement the action tasks attributed to them in Annex 1 in accordance with Article 11.

Their contributions will be included in Annex 2 and will be taken into account for the calculation of the grant.

The beneficiaries must ensure that all their obligations under this Agreement also apply to their affiliated entities.

The beneficiaries must ensure that the bodies mentioned in Article 25 (e.g. granting authority, OLAF, Court of Auditors (ECA), etc.) can exercise their rights also towards the affiliated entities.

Breaches by affiliated entities will be handled in the same manner as breaches by beneficiaries. Recovery of undue amounts will be handled through the beneficiaries.

If the granting authority requires joint and several liability of affiliated entities (see Data Sheet, Point 4.4), they must sign the declaration set out in Annex 3a and may be held liable in case of enforced recoveries against their beneficiaries (see Article 22.2 and 22.4).

## **ARTICLE 9 — OTHER PARTICIPANTS INVOLVED IN THE ACTION**

### **9.1 Associated partners**

Not applicable

### **9.2 Third parties giving in-kind contributions to the action**

Other third parties may give in-kind contributions to the action (i.e. personnel, equipment, other goods, works and services, etc. which are free-of-charge) if necessary for the implementation.

Third parties giving in-kind contributions do not implement any action tasks. They may not charge contributions to the action (no lump sum contributions) and their costs are considered entirely covered by the lump sum contributions paid to the beneficiaries.

The third parties and their in-kind contributions should be set out in Annex 1.

### **9.3 Subcontractors**

Subcontractors may participate in the action, if necessary for the implementation.

Subcontractors must implement their action tasks in accordance with Article 11. The beneficiaries' costs for subcontracting are considered entirely covered by the lump sum contributions for implementing the work packages (irrespective of the actual subcontracting costs incurred, if any).

The beneficiaries must ensure that their contractual obligations under Articles 11 (proper implementation), 12 (conflict of interest), 13 (confidentiality and security), 14 (ethics), 17.2 (visibility), 18 (specific rules for carrying out action), 19 (information) and 20 (record-keeping) also apply to the subcontractors.

The beneficiaries must ensure that the bodies mentioned in Article 25 (e.g. granting authority, OLAF, Court of Auditors (ECA), etc.) can exercise their rights also towards the subcontractors.

#### **9.4 Recipients of financial support to third parties**

If the action includes providing financial support to third parties (e.g. grants, prizes or similar forms of support), the beneficiaries must ensure that their contractual obligations under Articles 12 (conflict of interest), 13 (confidentiality and security), 14 (ethics), 17.2 (visibility), 18 (specific rules for carrying out action), 19 (information) and 20 (record-keeping) also apply to the third parties receiving the support (recipients).

The beneficiaries must also ensure that the bodies mentioned in Article 25 (e.g. granting authority, OLAF, Court of Auditors (ECA), etc.) can exercise their rights also towards the recipients.

### **ARTICLE 10 — PARTICIPANTS WITH SPECIAL STATUS**

#### **10.1 Non-EU participants**

Participants which are established in a non-EU country (if any) undertake to comply with their obligations under the Agreement and:

- to respect general principles (including fundamental rights, values and ethical principles, environmental and labour standards, rules on classified information, intellectual property rights, visibility of funding and protection of personal data)
- for the submission of certificates under Article 24: use qualified external auditors which are independent and comply with comparable standards as those set out in EU Directive 2006/43/EC<sup>12</sup>
- for the controls under Article 25: allow for checks, reviews, audits and investigations (including on-the-spot checks, visits and inspections) by the bodies mentioned in that Article (e.g. granting authority, OLAF, Court of Auditors (ECA), etc.).

Special rules on dispute settlement apply (see Data Sheet, Point 5).

#### **10.2 Participants which are international organisations**

Participants which are international organisations (IOs; if any) undertake to comply with their obligations under the Agreement and:

- to respect general principles (including fundamental rights, values and ethical principles, environmental and labour standards, rules on classified information, intellectual property rights, visibility of funding and protection of personal data)
- for the submission of certificates under Article 24: to use either independent public officers or

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<sup>12</sup> 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 (OJ L 157, 9.6.2006, p. 87).

external auditors which comply with comparable standards as those set out in EU Directive 2006/43/EC<sup>13</sup>

- for the controls under Article 25: to allow for the checks, reviews, audits and investigations by the bodies mentioned in that Article, taking into account the specific agreements concluded by them and the EU (if any).

For such participants, nothing in the Agreement will be interpreted as a waiver of their privileges or immunities, as accorded by their constituent documents or international law.

Special rules on applicable law and dispute settlement apply (see Article 43 and Data Sheet, Point 5).

### 10.3 Pillar-assessed participants

Pillar-assessed participants (if any) may rely on their own systems, rules and procedures, in so far as they have been positively assessed and do not call into question the decision awarding the grant or breach the principle of equal treatment of applicants or beneficiaries.

‘Pillar-assessment’ means a review by the European Commission on the systems, rules and procedures which participants use for managing EU grants (in particular internal control system, accounting system, external audits, financing of third parties, rules on recovery and exclusion, information on recipients and protection of personal data; see Article 157 EU Financial Regulation 2024/2509).

Participants with a positive pillar assessment may rely on their own systems, rules and procedures, in particular for:

- record-keeping (Article 20): may be done in accordance with internal standards, rules and procedures
- currency conversion for financial statements (Article 21): may be done in accordance with usual accounting practices
- guarantees (Article 23): for public law bodies, prefinancing guarantees are not needed
- certificates (Article 24):
  - certificates on the financial statements (CFS): may be provided by their regular internal or external auditors and in accordance with their internal financial regulations and procedures
  - certificates on usual accounting practices (CoMUC): are not needed if those practices are covered by an ex-ante assessment

and use the following specific rules, for:

- recoveries (Article 22): in case of financial support to third parties, there will be no recovery if the participant has done everything possible to retrieve the undue amounts from the third party receiving the support (including legal proceedings) and non-recovery is not due to an error or negligence on its part

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<sup>13</sup> 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 (OJ L 157, 9.6.2006, p. 87).

- checks, reviews, audits and investigations by the EU (Article 25): will be conducted taking into account the rules and procedures specifically agreed between them and the framework agreement (if any)
- impact evaluation (Article 26): will be conducted in accordance with the participant's internal rules and procedures and the framework agreement (if any)
- grant agreement termination (Article 32): the final grant amount and final payment will be calculated taking into account also costs relating to contracts due for execution only after termination takes effect, if the contract was entered into before the pre-information letter was received and could not reasonably be terminated on legal grounds
- liability for damages (Article 33.2): the granting authority must be compensated for 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 only if the damage is due to an infringement of the participant's internal rules and procedures or due to a violation of third parties' rights by the participant or one of its employees or individual for whom the employees are responsible.

Participants whose pillar assessment covers procurement and granting procedures may also do purchases, subcontracting and financial support to third parties (Article 6.2) in accordance with their internal rules and procedures for purchases, subcontracting and financial support.

Participants whose pillar assessment covers data protection rules may rely on their internal standards, rules and procedures for data protection (Article 15).

The participants may however not rely on provisions which would breach the principle of equal treatment of applicants or beneficiaries or call into question the decision awarding the grant, such as in particular:

- eligibility (Article 6)
- consortium roles and set-up (Articles 7-9)
- security and ethics (Articles 13, 14)
- IPR (including background and results, access rights and rights of use), communication, dissemination and visibility (Articles 16 and 17)
- information obligation (Article 19)
- payment, reporting and amendments (Articles 21, 22 and 39)
- rejections, reductions, suspensions and terminations (Articles 27, 28, 29-32)

If the pillar assessment was subject to remedial measures, reliance on the internal systems, rules and procedures is subject to compliance with those remedial measures.

Participants must inform the coordinator without delay of any changes to the systems, rules and procedures that were part of the pillar assessment. The coordinator must immediately inform the granting authority.

Pillar-assessed participants that have also concluded a framework agreement with the EU, may



moreover — under the same conditions as those above (i.e. not call into question the decision awarding the grant or breach the principle of equal treatment of applicants or beneficiaries) — rely on provisions set out in that framework agreement.

## **SECTION 2 RULES FOR CARRYING OUT THE ACTION**

### **ARTICLE 11 — PROPER IMPLEMENTATION OF THE ACTION**

#### **11.1 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, the call conditions and all legal obligations under applicable EU, international and national law.

#### **11.2 Consequences of non-compliance**

If a beneficiary breaches any of its obligations under this Article, the grant may be reduced (see Article 28).

Such breaches may also lead to other measures described in Chapter 5.

### **ARTICLE 12 — CONFLICT OF INTERESTS**

#### **12.1 Conflict of interests**

The beneficiaries must take all measures to prevent any situation where the impartial and objective implementation of the Agreement could be compromised for reasons involving family, emotional life, political or national affinity, economic interest or any other direct or indirect interest ('conflict of interests').

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

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

#### **12.2 Consequences of non-compliance**

If a beneficiary breaches any of its obligations under this Article, the grant may be reduced (see Article 28) and the grant or the beneficiary may be terminated (see Article 32).

Such breaches may also lead to other measures described in Chapter 5.

### **ARTICLE 13 — CONFIDENTIALITY AND SECURITY**

#### **13.1 Sensitive information**

The parties must keep confidential any data, documents or other material (in any form) that is identified as sensitive in writing ('sensitive information') — during the implementation of the action and for at least until the time-limit set out in the Data Sheet (see Point 6).



If a beneficiary requests, the granting authority may agree to keep such information confidential for a longer period.

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

The beneficiaries may disclose sensitive information to their personnel or other participants involved in the action only if they:

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

The granting authority may disclose sensitive information to its staff and to other EU institutions and bodies.

It may moreover disclose sensitive information to third parties, if:

- (a) this is necessary to implement the Agreement or safeguard the EU 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 becomes publicly available, without breaching any confidentiality obligation
- (c) the disclosure of the sensitive information is required by EU, international or national law.

Specific confidentiality rules (if any) are set out in Annex 5.

### **13.2 Classified information**

The parties must handle classified information in accordance with the applicable EU, international or national law on classified information (in particular, Decision 2015/444<sup>14</sup> and its implementing rules).

Deliverables which contain classified information must be submitted according to special procedures agreed with the granting authority.

Action tasks involving classified information may be subcontracted only after explicit approval (in writing) from the granting authority.

Classified information may not be disclosed to any third party (including participants involved in the action implementation) without prior explicit written approval from the granting authority.

Specific security rules (if any) are set out in Annex 5.

### **13.3 Consequences of non-compliance**

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<sup>14</sup> Commission Decision 2015/444/EC, Euratom of 13 March 2015 on the security rules for protecting EU classified information (OJ L 72, 17.3.2015, p. 53).

If a beneficiary breaches any of its obligations under this Article, the grant may be reduced (see Article 28).

Such breaches may also lead to other measures described in Chapter 5.

## **ARTICLE 14 — ETHICS AND VALUES**

### **14.1 Ethics**

The action must be carried out in line with the highest ethical standards and the applicable EU, international and national law on ethical principles.

Specific ethics rules (if any) are set out in Annex 5.

### **14.2 Values**

The beneficiaries must commit to and ensure the respect of basic EU values (such as respect for human dignity, freedom, democracy, equality, the rule of law and human rights, including the rights of minorities).

Specific rules on values (if any) are set out in Annex 5.

### **14.3 Consequences of non-compliance**

If a beneficiary breaches any of its obligations under this Article, the grant may be reduced (see Article 28).

Such breaches may also lead to other measures described in Chapter 5.

## **ARTICLE 15 — DATA PROTECTION**

### **15.1 Data processing by the granting authority**

Any personal data under the Agreement will be processed under the responsibility of the data controller of the granting authority in accordance with and for the purposes set out in the Portal Privacy Statement.

For grants where the granting authority is the European Commission, an EU regulatory or executive agency, joint undertaking or other EU body, the processing will be subject to Regulation 2018/1725<sup>15</sup>.

### **15.2 Data processing by the beneficiaries**

The beneficiaries must process personal data under the Agreement in compliance with the applicable EU, international and national law on data protection (in particular, Regulation 2016/679<sup>16</sup>).

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<sup>15</sup> Regulation (EU) 2018/1725 of the European Parliament and of the Council of 23 October 2018 on the protection of natural persons with regard to the processing of personal data by the Union institutions, bodies, offices and agencies and on the free movement of such data, and repealing Regulation (EC) No 45/2001 and Decision No 1247/2002/EC (OJ L 295, 21.11.2018, p. 39).

<sup>16</sup> Regulation (EU) 2016/679 of the European Parliament and of the Council of 27 April 2016 on the protection of natural persons with regard to the processing of personal data and on the free movement of such data, and repealing Directive 95/46/EC ('GDPR') (OJ L 119, 4.5.2016, p. 1).

They must ensure that personal data is:

- processed lawfully, fairly and in a transparent manner in relation to the data subjects
- collected for specified, explicit and legitimate purposes and not further processed in a manner that is incompatible with those purposes
- adequate, relevant and limited to what is necessary in relation to the purposes for which they are processed
- accurate and, where necessary, kept up to date
- kept in a form which permits identification of data subjects for no longer than is necessary for the purposes for which the data is processed and
- processed in a manner that ensures appropriate security of the data.

The beneficiaries may grant their personnel access to personal data only if it is strictly necessary for implementing, managing and monitoring the Agreement. The beneficiaries must ensure that the personnel is under a confidentiality obligation.

The beneficiaries must inform the persons whose data are transferred to the granting authority and provide them with the Portal Privacy Statement.

### **15.3 Consequences of non-compliance**

If a beneficiary breaches any of its obligations under this Article, the grant may be reduced (see Article 28).

Such breaches may also lead to other measures described in Chapter 5.

## **ARTICLE 16 — INTELLECTUAL PROPERTY RIGHTS (IPR) — BACKGROUND AND RESULTS — ACCESS RIGHTS AND RIGHTS OF USE**

### **16.1 Background and access rights to background**

The beneficiaries must give each other and the other participants access to the background identified as needed for implementing the action, subject to any specific rules in Annex 5.

‘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 is:

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

If background is subject to rights of a third party, the beneficiary concerned must ensure that it is able to comply with its obligations under the Agreement.

### **16.2 Ownership of results**

The granting authority does not obtain ownership of the results produced under the action.

‘Results’ means any tangible or intangible effect of the action, such as data, know-how or information, whatever its form or nature, whether or not it can be protected, as well as any rights attached to it, including intellectual property rights.

### **16.3 Rights of use of the granting authority on materials, documents and information received for policy, information, communication, dissemination and publicity purposes**

The granting authority has the right to use non-sensitive information relating to the action and materials and documents received from the beneficiaries (notably summaries for publication, deliverables, as well as any other material, such as pictures or audio-visual material, in paper or electronic form) for policy information, communication, dissemination and publicity purposes — during the action or afterwards.

The right to use the beneficiaries’ materials, documents and information is granted in the form of a royalty-free, non-exclusive and irrevocable licence, which includes the following rights:

- (a) **use for its own purposes** (in particular, making them available to persons working for the granting authority or any other EU service (including institutions, bodies, offices, agencies, etc.) or EU Member State institution or body; copying or reproducing them in whole or in part, in unlimited numbers; and communication through press information services)
- (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** (including shortening, summarising, inserting other elements (e.g. 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) **storage** in paper, electronic or other form
- (f) **archiving**, in line with applicable document-management rules
- (g) the right to authorise **third parties** to act on its behalf or sub-license to third parties the modes of use set out in Points (b), (c), (d) and (f), if needed for the information, communication and publicity activity of the granting authority and
- (h) **processing**, analysing, aggregating the materials, documents and information received and **producing derivative works**.

The rights of use are granted for the whole duration of the industrial or intellectual property rights concerned.

If materials or documents are subject to moral rights or third party rights (including intellectual property rights or rights of natural persons on their image and voice), the beneficiaries must ensure that they comply with their obligations under this Agreement (in particular, by obtaining the necessary licences and authorisations from the rights holders concerned).

Where applicable, the granting authority will insert the following information:

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

#### **16.4 Specific rules on IPR, results and background**

Specific rules regarding intellectual property rights, results and background (if any) are set out in Annex 5.

#### **16.5 Consequences of non-compliance**

If a beneficiary breaches any of its obligations under this Article, the grant may be reduced (see Article 28).

Such a breach may also lead to other measures described in Chapter 5.

### **ARTICLE 17 — COMMUNICATION, DISSEMINATION AND VISIBILITY**

#### **17.1 Communication — Dissemination — Promoting the action**

Unless otherwise agreed with the granting authority, the beneficiaries must promote the action and its results by providing targeted information to multiple audiences (including the media and the public), in accordance with Annex 1 and in a strategic, coherent and effective manner.

Before engaging in a communication or dissemination activity expected to have a major media impact, the beneficiaries must inform the granting authority.

#### **17.2 Visibility — European flag and funding statement**

Unless otherwise agreed with the granting authority, communication activities of the beneficiaries related to the action (including media relations, conferences, seminars, information material, such as brochures, leaflets, posters, presentations, etc., in electronic form, via traditional or social media, etc.), dissemination activities and any infrastructure, equipment, vehicles, supplies or major result funded by the grant must acknowledge the EU support and display the European flag (emblem) and funding statement (translated into local languages, where appropriate):



Funded by the  
European Union



Co-funded by the  
European Union



Funded by the  
European Union



Co-funded by the  
European Union

The emblem must remain distinct and separate and cannot be modified by adding other visual marks, brands or text.

Apart from the emblem, no other visual identity or logo may be used to highlight the EU support.

When displayed in association with other logos (e.g. of beneficiaries or sponsors), the emblem must be displayed at least as prominently and visibly as the other logos.

For the purposes of their obligations under this Article, the beneficiaries may use the emblem without first obtaining approval from the granting authority. This does not, however, give them the right to exclusive use. Moreover, they may not appropriate the emblem or any similar trademark or logo, either by registration or by any other means.

### **17.3 Quality of information — Disclaimer**

Any communication or dissemination activity related to the action must use factually accurate information.

Moreover, it must indicate the following disclaimer (translated into local languages where appropriate):

“Funded by the European Union. Views and opinions expressed are however those of the author(s) only and do not necessarily reflect those of the European Union or [name of the granting authority]. Neither the European Union nor the granting authority can be held responsible for them.”

### **17.4 Specific communication, dissemination and visibility rules**

Specific communication, dissemination and visibility rules (if any) are set out in Annex 5.

### **17.5 Consequences of non-compliance**

If a beneficiary breaches any of its obligations under this Article, the grant may be reduced (see Article 28).

Such breaches may also lead to other measures described in Chapter 5.

## **ARTICLE 18 — SPECIFIC RULES FOR CARRYING OUT THE ACTION**

### **18.1 Specific rules for carrying out the action**

Specific rules for implementing the action (if any) are set out in Annex 5.

### **18.2 Consequences of non-compliance**

If a beneficiary breaches any of its obligations under this Article, the grant may be reduced (see Article 28).

Such a breach may also lead to other measures described in Chapter 5.

## **SECTION 3 GRANT ADMINISTRATION**

### **ARTICLE 19 — GENERAL INFORMATION OBLIGATIONS**

#### **19.1 Information requests**

The beneficiaries must provide — during the action or afterwards and in accordance with Article 7 — any information requested in order to verify eligibility of the lump sum contributions declared, proper implementation of the action and compliance with the other obligations under the Agreement.

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

#### **19.2 Participant Register data updates**

The beneficiaries must keep — at all times, during the action or afterwards — their information stored in the Portal Participant Register up to date, in particular, their name, address, legal representatives, legal form and organisation type.

#### **19.3 Information about events and circumstances which impact the action**

The beneficiaries must immediately inform the granting authority (and the other beneficiaries) of any of the following:

- (a) **events** which are likely to affect or delay the implementation of the action or affect the EU's financial interests, in particular:
  - (i) changes in their legal, financial, technical, organisational or ownership situation (including changes linked to one of the exclusion grounds listed in the declaration of honour signed before grant signature)
  - (ii) linked action information: not applicable
- (b) **circumstances** affecting:
  - (i) the decision to award the grant or
  - (ii) compliance with requirements under the Agreement.

#### **19.4 Consequences of non-compliance**

If a beneficiary breaches any of its obligations under this Article, the grant may be reduced (see Article 28).

Such breaches may also lead to other measures described in Chapter 5.

## ARTICLE 20 — RECORD-KEEPING

### 20.1 Keeping records and supporting documents

The beneficiaries must — at least until the time-limit set out in the Data Sheet (see Point 6) — keep records and other supporting documents to prove the proper implementation of the action (proper implementation of the work and/or achievement of the results as described in Annex 1) in line with the accepted standards in the respective field (if any); beneficiaries do not need to keep specific records on the actual costs incurred.

The records and supporting documents must be made available upon request (see Article 19) or in the context of checks, reviews, audits or investigations (see Article 25).

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 25), the beneficiaries must keep these 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 granting authority may accept non-original documents if they offer a comparable level of assurance.

### 20.2 Consequences of non-compliance

If a beneficiary breaches any of its obligations under this Article, lump sum contributions insufficiently substantiated will be ineligible (see Article 6) and will be rejected (see Article 27), and the grant may be reduced (see Article 28).

Such breaches may also lead to other measures described in Chapter 5.

## ARTICLE 21 — REPORTING

### 21.1 Continuous reporting

The beneficiaries must report on the progress of the action (e.g. **deliverables, milestones, outputs/outcomes, critical risks, indicators**, etc; if any), in the Portal Continuous Reporting tool and in accordance with the timing and conditions it sets out (as agreed with the granting authority).

Standardised deliverables (e.g. progress reports not linked to payments, reports on cumulative expenditure, special reports, etc; if any) must be submitted using the templates published on the Portal.

### 21.2 Periodic reporting: Technical reports and financial statements

In addition, the beneficiaries must provide reports to request payments, in accordance with the schedule and modalities set out in the Data Sheet (see Point 4.2):

- for additional prefinancings (if any): **an additional prefinancing report**
- for interim payments (if any) and the final payment: a **periodic report**

The prefinancing and periodic reports include a technical and financial part.



The technical part includes an overview of the action implementation. It must be prepared using the template available in the Portal Periodic Reporting tool.

The financial part of the additional prefinancing report includes a statement on the use of the previous prefinancing payment.

The financial part of the periodic report includes:

- the financial statement (consolidated statement for the consortium)
- the explanation on the use of resources (or detailed cost reporting table): not applicable
- the certificates on the financial statements (CFS): not applicable.

The **financial statement** must contain the lump sum contributions indicated in Annex 2, for the work packages that were completed during the reporting period.

For the last reporting period, the beneficiaries may exceptionally also declare partial lump sum contributions for work packages that were not completed (e.g. due to force majeure or technical impossibility).

Lump sum contributions which are not declared in a financial statement will not be taken into account by the granting authority.

By signing the financial statement (directly in the Portal Periodic Reporting tool), the coordinator confirms (on behalf of the consortium) that:

- the information provided is complete, reliable and true
- the lump sum contributions declared are eligible (in particular, the work packages have been completed, that the work has been properly implemented and/or the results were achieved in accordance with Annex 1; see Article 6)
- the proper implementation and/or achievement can be substantiated by adequate records and supporting documents (see Article 20) that will be produced upon request (see Article 19) or in the context of checks, reviews, audits and investigations (see Article 25).

In case of recoveries (see Article 22), beneficiaries will be held responsible also for the lump sum contributions declared for their affiliated entities (if any).

### **21.3 Currency for financial statements and conversion into euros**

The financial statements must be drafted in euro.

### **21.4 Reporting language**

The reporting must be in the language of the Agreement, unless otherwise agreed with the granting authority (see Data Sheet, Point 4.2).

### **21.5 Consequences of non-compliance**

If a report submitted does not comply with this Article, the granting authority may suspend the payment deadline (see Article 29) and apply other measures described in Chapter 5.

If the coordinator breaches its reporting obligations, the granting authority may terminate the grant or the coordinator's participation (see Article 32) or apply other measures described in Chapter 5.

## **ARTICLE 22 — PAYMENTS AND RECOVERIES — CALCULATION OF AMOUNTS DUE**

### **22.1 Payments and payment arrangements**

Payments will be made in accordance with the schedule and modalities set out in the Data Sheet (see Point 4.2).

They will be made in euro to the bank account indicated by the coordinator (see Data Sheet, Point 4.2) and must be distributed without unjustified delay (restrictions may apply to distribution of the initial prefinancing payment; see Data Sheet, Point 4.2).

Payments to this bank account will discharge the granting authority from its payment obligation.

The cost of payment transfers will be borne as follows:

- the granting authority 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.

Payments by the granting authority will be considered to have been carried out on the date when they are debited to its account.

### **22.2 Recoveries**

Recoveries will be made, if — at beneficiary termination, final payment or afterwards — it turns out that the granting authority has paid too much and needs to recover the amounts undue.

Each beneficiary's financial responsibility in case of recovery is in principle limited to their own debt and undue amounts of their affiliated entities.

In case of enforced recoveries (see Article 22.4), affiliated entities will be held liable for repaying debts of their beneficiaries, if required by the granting authority (see Data Sheet, Point 4.4).

### **22.3 Amounts due**

#### **22.3.1 Prefinancing payments**

The aim of the prefinancing is to provide the beneficiaries with a float.

It remains the property of the EU until the final payment.

For **initial prefinancings** (if any), the amount due, schedule and modalities are set out in the Data Sheet (see Point 4.2).

For **additional prefinancings** (if any), the amount due, schedule and modalities are also set out in the Data Sheet (see Point 4.2). However, if the statement on the use of the previous prefinancing

payment shows that less than 70% was used, the amount set out in the Data Sheet will be reduced by the difference between the 70% threshold and the amount used.

The contribution to the Mutual Insurance Mechanism will be retained from the prefinancing payments (at the rate and in accordance with the modalities set out in the Data Sheet, see Point 4.2) and transferred to the Mechanism.

Prefinancing payments (or parts of them) may be offset (without the beneficiaries' consent) against amounts owed by a beneficiary to the granting authority — up to the amount due to that beneficiary.

For grants where the granting authority is the European Commission or an EU executive agency, offsetting may also be done against amounts owed to other Commission services or executive agencies.

Payments will not be made if the payment deadline or payments are suspended (see Articles 29 and 30).

### 22.3.2 Amount due at beneficiary termination — Recovery

In case of beneficiary termination, the granting authority will determine the provisional amount due for the beneficiary concerned.

This will be done on the basis of work packages already completed in previous interim payments. Payments for ongoing/not yet completed work packages which the beneficiary was working on before termination (if any) will therefore be made only later on, with the next interim or final payments when those work packages have been completed.

The **amount due** will be calculated in the following step:

Step 1 — Calculation of the total accepted EU contribution

#### Step 1 — Calculation of the total accepted EU contribution

The granting authority will first calculate the 'accepted EU contribution' for the beneficiary, on the basis of the beneficiary's lump sum contributions for the work packages which were approved in previous interim payments.

After that, the granting authority will take into account grant reductions (if any). The resulting amount is the 'total accepted EU contribution' for the beneficiary.

The **balance** is then calculated by deducting the payments received (if any; see report on the distribution of payments in Article 32), from the total accepted EU contribution:

$$\left\{ \begin{array}{l} \text{total accepted EU contribution for the beneficiary} \\ \text{minus} \\ \text{prefinancing and interim payments received (if any)} \end{array} \right\}.$$

If the balance is **negative**, it will be **recovered** in accordance with the following procedure:

The granting authority will send a **pre-information letter** to the beneficiary concerned:

- formally notifying the intention to recover, the amount due, the amount to be recovered and the reasons why and
- requesting observations within 30 days of receiving notification.

If no observations are submitted (or the granting authority decides to pursue recovery despite the observations it has received), it will confirm the amount to be recovered and ask this amount to be paid to the coordinator (**confirmation letter**).

If payment is not made to the coordinator by the date specified in the confirmation letter, the granting authority may call on the Mutual Insurance Mechanism to intervene, if continuation of the action is guaranteed and the conditions set out in the rules governing the Mechanism are met.

In this case, it will send a **beneficiary recovery letter**, together with a **debit note** with the terms and date for payment.

The debit note for the beneficiary will include the amount calculated for the affiliated entities which also had to end their participation (if any).

If payment is not made by the date specified in the debit note, the granting authority will **enforce recovery** in accordance with Article 22.4.

### 22.3.3 Interim payments

Interim payments reimburse the eligible lump sum contributions claimed for work packages implemented during the reporting periods (if any).

Interim payments (if any) will be made in accordance with the schedule and modalities set out the Data Sheet (see Point 4.2).

Payment is subject to the approval of the periodic report and the work packages declared. Their approval does not imply recognition of compliance, authenticity, completeness or correctness of their content.

Incomplete work packages and work packages that have not been delivered or cannot be approved will be rejected (see Article 27).

The **interim payment** will be calculated by the granting authority in the following steps:

Step 1 — Calculation of the total accepted EU contribution

Step 2 — Limit to the interim payment ceiling

#### Step 1 — Calculation of the total accepted EU contribution

The granting authority will first calculate the ‘accepted EU contribution’ for the action for the reporting period, by calculating the lump sum contributions for the approved work packages.

After that, the granting authority will take into account grant reductions from beneficiary termination (if any). The resulting amount is the ‘total accepted EU contribution’.

#### Step 2 — Limit to the interim payment ceiling

The resulting amount is then capped to ensure that the total amount of prefinancing and interim payments (if any) does not exceed the interim payment ceiling set out in the Data Sheet (see Point 4.2).

Interim payments (or parts of them) may be offset (without the beneficiaries' consent) against amounts owed by a beneficiary to the granting authority — up to the amount due to that beneficiary.

For grants where the granting authority is the European Commission or an EU executive agency, offsetting may also be done against amounts owed to other Commission services or executive agencies.

Payments will not be made if the payment deadline or payments are suspended (see Articles 29 and 30).

#### **22.3.4 Final payment — Final grant amount — Revenues and Profit — Recovery**

The final payment (payment of the balance) reimburses the remaining eligible lump sum contributions claimed for the implemented work packages (if any).

The final payment will be made in accordance with the schedule and modalities set out in the Data Sheet (see Point 4.2).

Payment is subject to the approval of the final periodic report and the work packages declared. Their approval does not imply recognition of compliance, authenticity, completeness or correctness of their content.

Work packages (or parts of them) that have not been delivered or cannot be approved will be rejected (see Article 27).

The **final grant amount for the action** will be calculated in the following steps:

Step 1 — Calculation of the total accepted EU contribution

Step 2 — Limit to the maximum grant amount

Step 3 — Reduction due to the no-profit rule

##### Step 1 — Calculation of the total accepted EU contribution

The granting authority will first calculate the 'accepted EU contribution' for the action for all reporting periods, by calculating the lump sum contributions for the approved work packages.

After that, the granting authority will take into account grant reductions (if any). The resulting amount is the 'total accepted EU contribution'.

##### Step 2 — Limit to the maximum grant amount

Not applicable

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

Not applicable

The **balance** (final payment) is then calculated by deducting the total amount of prefinancing and interim payments already made (if any), from the final grant amount:

$$\begin{aligned} & \{\text{final grant amount} \\ & \text{minus} \\ & \{\text{prefinancing and interim payments made (if any)}\} \}. \end{aligned}$$

If the balance is **positive**, it will be **paid** to the coordinator.

The amount retained for the Mutual Insurance Mechanism (see above) will be released and **paid** to the coordinator (in accordance with the rules governing the Mechanism).

The final payment (or part of it) may be offset (without the beneficiaries' consent) against amounts owed by a beneficiary to the granting authority — up to the amount due to that beneficiary.

For grants where the granting authority is the European Commission or an EU executive agency, offsetting may also be done against amounts owed to other Commission services or executive agencies.

Payments will not be made if the payment deadline or payments are suspended (see Articles 29 and 30).

If — despite the release of the Mutual Insurance Mechanism contribution — the balance is **negative**, it will be **recovered** in accordance with the following procedure:

The granting authority will send a **pre-information letter** to the coordinator:

- formally notifying the intention to recover, the final grant amount, the amount to be recovered and the reasons why
- requesting a report on the distribution of payments to the beneficiaries within 30 days of receiving notification and
- requesting observations within 30 days of receiving notification.

If no observations are submitted (or the granting authority decides to pursue recovery despite the observations it has received) and the coordinator has submitted the report on the distribution of payments, it will calculate the **share of the debt per beneficiary**, by:

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

$$\begin{aligned} & \{ \{ \text{total accepted EU contribution for the beneficiary} \\ & \text{divided by} \\ & \text{total accepted EU contribution for the action} \} \\ & \text{multiplied by} \\ & \text{final grant amount for the action} \}, \\ & \text{minus} \\ & \{ \text{prefinancing and interim payments received by the beneficiary (if any)} \} \} \end{aligned}$$

and

(b) dividing the debt:

$$\left\{ \begin{array}{l} \text{\{amount calculated according to point (a) for the beneficiary concerned} \\ \text{divided by} \\ \text{the sum of the amounts calculated according to point (a) for all the beneficiaries identified according to} \\ \text{point (a)\}} \\ \text{multiplied by} \\ \text{the amount to be recovered} \end{array} \right\}.$$

and confirm the amount to be recovered from each beneficiary concerned (**confirmation letter**), together with **debit notes** with the terms and date for payment.

The debit notes for beneficiaries will include the amounts calculated for their affiliated entities (if any).

If the coordinator has not submitted the report on the distribution of payments, the granting authority will **recover** the full amount from the coordinator (**confirmation letter** and **debit note** with the terms and date for payment).

If payment is not made by the date specified in the debit note, the granting authority will **enforce recovery** in accordance with Article 22.4.

### 22.3.5 Audit implementation after final payment — Revised final grant amount — Recovery

If — after the final payment (in particular, after checks, reviews, audits or investigations; see Article 25) — the granting authority rejects lump sum contributions (see Article 27) or reduces the grant (see Article 28), it will calculate the **revised final grant amount** for the beneficiary concerned.

The **beneficiary revised final grant amount** will be calculated in the following step:

Step 1 — Calculation of the revised total accepted EU contribution

#### Step 1 — Calculation of the revised total accepted EU contribution

The granting authority will first calculate the ‘revised accepted EU contribution’ for the beneficiary, by calculating the ‘revised accepted contributions’.

After that, it will take into account grant reductions (if any). The resulting ‘revised total accepted EU contribution’ is the beneficiary revised final grant amount.

If the revised final grant amount is lower than the beneficiary’s final grant amount (i.e. its share in the final grant amount for the action), it will be **recovered** in accordance with the following procedure:

The **beneficiary final grant amount** (i.e. share in the final grant amount for the action) is calculated as follows:

$$\left\{ \begin{array}{l} \text{\{total accepted EU contribution for the beneficiary} \\ \text{divided by} \\ \text{total accepted EU contribution for the action\}} \end{array} \right\}$$

multiplied by  
final grant amount for the action}.

The granting authority will send a **pre-information letter** to the beneficiary concerned:

- formally notifying the intention to recover, the amount to be recovered and the reasons why and
- requesting observations within 30 days of receiving notification.

If no observations are submitted (or the granting authority decides to pursue recovery despite the observations it has received), it will confirm the amount to be recovered (**confirmation letter**), together with a **debit note** with the terms and the date for payment.

Recoveries against affiliated entities (if any) will be handled through their beneficiaries.

If payment is not made by the date specified in the debit note, the granting authority will **enforce recovery** in accordance with Article 22.4.

## 22.4 Enforced recovery

If payment is not made by the date specified in the debit note, the amount due will be recovered:

- (a) by offsetting the amount — without the coordinator or beneficiary's consent — against any amounts owed to the coordinator or beneficiary by the granting authority.

In exceptional circumstances, to safeguard the EU financial interests, the amount may be offset before the payment date specified in the debit note.

For grants where the granting authority is the European Commission or an EU executive agency, debts may also be offset against amounts owed by other Commission services or executive agencies.

- (b) financial guarantee(s): not applicable

- (c) joint and several liability of beneficiaries: not applicable

- (d) by holding affiliated entities jointly and severally liable (if any, see Data Sheet, Point 4.4)

- (e) by taking legal action (see Article 43) or, provided that the granting authority is the European Commission or an EU executive agency, by adopting an enforceable decision under Article 299 of the Treaty on the Functioning of the EU (TFEU) and Article 100(2) of EU Financial Regulation 2024/2509.

If the Mutual Insurance Mechanism was called on by the granting authority to intervene, recovery will be continued in the name of the Mutual Insurance Mechanism. If two debit notes were sent, the second one (in the name of the Mutual Insurance Mechanism) will be considered to replace the first one (in the name of the granting authority). Where the MIM intervened, offsetting, enforceable decisions or any other of the above-mentioned forms of enforced recovery may be used mutatis mutandis.

The amount to be recovered will be increased by **late-payment interest** at the rate set out in Article 23.5, from the day following the payment date in the debit note, up to and including the date the full payment is received.



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 2015/2366<sup>17</sup> applies.

For grants where the granting authority is an EU executive agency, enforced recovery by offsetting or enforceable decision will be done by the services of the European Commission (see also Article 43).

## 22.5 Consequences of non-compliance

**22.5.1** If the granting authority does not pay within the payment deadlines (see above), the beneficiaries are entitled to **late-payment interest** at the reference rate applied by the European Central Bank (ECB) for its main refinancing operations in euros, plus the percentage specified in the Data Sheet (Point 4.2). The ECB reference rate to be used 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 on 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).

If payments or the payment deadline are suspended (see Articles 29 and 30), payment will not be considered as late.

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.

**22.5.2** If the coordinator breaches any of its obligations under this Article, the grant may be reduced (see Article 28) and the grant or the coordinator may be terminated (see Article 32).

Such breaches may also lead to other measures described in Chapter 5.

## ARTICLE 23 — GUARANTEES

Not applicable

## ARTICLE 24 — CERTIFICATES

Not applicable

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<sup>17</sup> Directive (EU) 2015/2366 of the European Parliament and of the Council of 25 November 2015 on payment services in the internal market, amending Directives 2002/65/EC, 2009/110/EC and 2013/36/EU and Regulation (EU) No 1093/2010, and repealing Directive 2007/64/EC (OJ L 337, 23.12.2015, p. 35).

## ARTICLE 25 — CHECKS, REVIEWS, AUDITS AND INVESTIGATIONS — EXTENSION OF FINDINGS

### 25.1 Granting authority checks, reviews and audits

#### 25.1.1 Internal checks

The granting authority may — during the action or afterwards — check the proper implementation of the action and compliance with the obligations under the Agreement, including assessing lump sum contributions, deliverables and reports.

#### 25.1.2 Project reviews

The granting authority may carry out reviews on the proper implementation of the action and compliance with the obligations under the Agreement (general project reviews or specific issues reviews).

Such project reviews may be started during the implementation of the action and until the time-limit set out in the Data Sheet (see Point 6). They will be formally notified to the coordinator or beneficiary concerned and will be considered to start on the date of the notification.

If needed, the granting authority may be assisted by independent, outside experts. If it uses outside experts, the coordinator or beneficiary concerned will be informed and have the right to object on grounds of commercial confidentiality or conflict of interest.

The coordinator or beneficiary concerned must cooperate diligently and provide — within the deadline requested — any information and data in addition to deliverables and reports already submitted. The granting authority may request beneficiaries to provide such information to it directly. Sensitive information and documents will be treated in accordance with Article 13.

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

For **on-the-spot visits**, the beneficiary concerned must allow access to sites and premises (including to the outside experts) 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 **project review report** will be drawn up.

The granting authority will formally notify the project review report to the coordinator or beneficiary concerned, which has 30 days from receiving notification to make observations.

Project reviews (including project review reports) will be in the language of the Agreement, unless otherwise agreed with the granting authority (see Data Sheet, Point 4.2).

#### 25.1.3 Audits

The granting authority may carry out audits on the proper implementation of the action and compliance with the obligations under the Agreement.

Such audits may be started during the implementation of the action and until the time-limit set out in

the Data Sheet (see Point 6). They will be formally notified to the beneficiary concerned and will be considered to start on the date of the notification.

The granting authority may use its own audit service, delegate audits to a centralised service or use external audit firms. If it uses an external firm, the beneficiary concerned will be informed and have the right to object on grounds of commercial confidentiality or conflict of interest.

The beneficiary concerned must cooperate diligently and provide — within the deadline requested — any information (including complete accounts, individual salary statements or other personal data) to verify compliance with the Agreement. Sensitive information and documents will be treated in accordance with Article 13.

For **on-the-spot** visits, the beneficiary concerned must allow access to sites and premises (including for the external audit firm) 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 auditors will formally notify the draft audit report to the beneficiary concerned, which has 30 days from receiving notification to make observations (contradictory audit procedure).

The **final audit report** will take into account observations by the beneficiary concerned and will be formally notified to them.

Audits (including audit reports) will be in the language of the Agreement, unless otherwise agreed with the granting authority (see Data Sheet, Point 4.2).

## **25.2 European Commission checks, reviews and audits in grants of other granting authorities**

Where the granting authority is not the European Commission, the latter has the same rights of checks, reviews and audits as the granting authority.

## **25.3 Access to records for assessing simplified forms of funding**

The beneficiaries must give the European Commission access to their statutory records for the periodic assessment of simplified forms of funding which are used in EU programmes.

## **25.4 OLAF, EPPO and ECA audits and investigations**

The following bodies may also carry out checks, reviews, audits and investigations — during the action or afterwards:

- the European Anti-Fraud Office (OLAF) under Regulations No 883/2013<sup>18</sup> and No 2185/96<sup>19</sup>

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<sup>18</sup> 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).

<sup>19</sup> Council Regulation (Euratom, EC) No 2185/96 of 11 November 1996 concerning on-the-spot checks and inspections

- the European Public Prosecutor's Office (EPPO) under Regulation 2017/1939
- the European Court of Auditors (ECA) under Article 287 of the Treaty on the Functioning of the EU (TFEU) and Article 263 of EU Financial Regulation 2024/2509.

If requested by these bodies, the beneficiary concerned must provide full, accurate and complete information in the format requested (including complete accounts, individual salary statements or other personal data, including in electronic format) and allow access to sites and premises for on-the-spot visits or inspections — as provided for under these Regulations.

To this end, the beneficiary concerned must keep all relevant information relating to the action, at least until the time-limit set out in the Data Sheet (Point 6) and, in any case, until any ongoing checks, reviews, audits, investigations, litigation or other pursuits of claims have been concluded.

## **25.5 Consequences of checks, reviews, audits and investigations — Extension of findings**

### **25.5.1 Consequences of checks, reviews, audits and investigations in this grant**

Findings in checks, reviews, audits or investigations carried out in the context of this grant may lead to rejections (see Article 27), grant reduction (see Article 28) or other measures described in Chapter 5.

Rejections or grant reductions after the final payment will lead to a revised final grant amount (see Article 22).

Findings in checks, reviews, audits or investigations during the action implementation may lead to a request for amendment (see Article 39), to change the description of the action set out in Annex 1.

Checks, reviews, audits or investigations that find systemic or recurrent errors, irregularities, fraud or breach of obligations in any EU grant may also lead to consequences in other EU grants awarded under similar conditions ('extension to other grants').

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

### **25.5.2 Extension from other grants**

Findings of checks, reviews, audits or investigations in other grants may be extended to this grant, if:

- (a) the beneficiary concerned is found, in other EU 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 — within the time-limit for audits set out in the Data Sheet (see Point 6).

The granting authority will formally notify the beneficiary concerned of the intention to extend the findings and the list of grants affected.

If the extension concerns **rejections of lump sum contributions**: the notification will include:

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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).

- (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 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.

If the extension concerns **grant reductions**: the notification will include:

- (a) an invitation to submit observations on the list of grants affected by the findings and
- (b) the **correction rate for extrapolation**, established on the basis of the systemic or recurrent errors and the principle of proportionality.

The beneficiary concerned has **60 days** from receiving notification to submit observations, revised financial statements or to propose a duly substantiated **alternative correction method/rate**.

On the basis of this, the granting authority will analyse the impact and decide on the implementation (i.e. start rejection or grant reduction procedures, either on the basis of the revised financial statements or the announced/alternative method/rate or a mix of those; see Articles 27 and 28).

## 25.6 Consequences of non-compliance

If a beneficiary breaches any of its obligations under this Article, lump sum contributions insufficiently substantiated will be ineligible (see Article 6) and will be rejected (see Article 27), and the grant may be reduced (see Article 28).

Such breaches may also lead to other measures described in Chapter 5.

## ARTICLE 26 — IMPACT EVALUATIONS

### 26.1 Impact evaluation

The granting authority may carry out impact evaluations of the action, measured against the objectives and indicators of the EU programme funding the grant.

Such evaluations may be started during implementation of the action and until the time-limit set out in the Data Sheet (see Point 6). They will be formally notified to the coordinator or beneficiaries and will be considered to start on the date of the notification.

If needed, the granting authority may be assisted by independent outside experts.

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

### 26.2 Consequences of non-compliance

If a beneficiary breaches any of its obligations under this Article, the granting authority may apply the measures described in Chapter 5.

## **CHAPTER 5 CONSEQUENCES OF NON-COMPLIANCE**

### **SECTION 1 REJECTIONS AND GRANT REDUCTION**

#### **ARTICLE 27 — REJECTION OF CONTRIBUTIONS**

##### **27.1 Conditions**

The granting authority will — at interim payment, final payment or afterwards — reject any lump sum contributions which are ineligible (see Article 6), in particular following checks, reviews, audits or investigations (see Article 25).

The rejection may also be based on the extension of findings from other grants to this grant (see Article 25).

Ineligible lump sum contributions will be rejected.

##### **27.2 Procedure**

If the rejection does not lead to a recovery, the granting authority will formally notify the coordinator or beneficiary concerned of the rejection, the amounts and the reasons why. The coordinator or beneficiary concerned may — within 30 days of receiving notification — submit observations if it disagrees with the rejection (payment review procedure).

If the rejection leads to a recovery, the granting authority will follow the contradictory procedure with pre-information letter set out in Article 22.

##### **27.3 Effects**

If the granting authority rejects lump sum contributions, it will deduct them from the lump sum contributions declared and then calculate the amount due (and, if needed, make a recovery; see Article 22).

#### **ARTICLE 28 — GRANT REDUCTION**

##### **28.1 Conditions**

The granting authority may — at beneficiary termination, final payment or afterwards — reduce the grant for a beneficiary, if:

- (a) the beneficiary (or a person having powers of representation, decision-making or control, or person essential for the award/implementation of the grant) has committed:
  - (i) substantial errors, irregularities or fraud or
  - (ii) serious breach of obligations under this Agreement or during its award (including

improper implementation of the action, non-compliance with the call conditions, submission of false information, failure to provide required information, breach of ethics or security rules (if applicable), failure to cooperate with checks, reviews, audits and investigations, etc.), or

- (b) the beneficiary (or a person having powers of representation, decision-making or control, or person essential for the award/implementation of the grant) has committed — in other EU 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; see Article 25.5).

The amount of the reduction will be calculated for each beneficiary concerned and proportionate to the seriousness and the duration of the errors, irregularities or fraud or breach of obligations, by applying an individual reduction rate to their accepted EU contribution.

## **28.2 Procedure**

If the grant reduction does not lead to a recovery, the granting authority will formally notify the coordinator or beneficiary concerned of the reduction, the amount to be reduced and the reasons why. The coordinator or beneficiary concerned may — within 30 days of receiving notification — submit observations if it disagrees with the reduction (payment review procedure).

If the grant reduction leads to a recovery, the granting authority will follow the contradictory procedure with pre-information letter set out in Article 22.

## **28.3 Effects**

If the granting authority reduces the grant, it will deduct the reduction and then calculate the amount due (and, if needed, make a recovery; see Article 22).

# **SECTION 2 SUSPENSION AND TERMINATION**

## **ARTICLE 29 — PAYMENT DEADLINE SUSPENSION**

### **29.1 Conditions**

The granting authority may — at any moment — suspend the payment deadline if a payment cannot be processed because:

- (a) the required report (see Article 21) has not been submitted or is not complete or additional information is needed
- (b) there are doubts about the amount to be paid (e.g. ongoing extension procedure, queries about eligibility, need for a grant reduction, etc.) and additional checks, reviews, audits or investigations are necessary, or
- (c) there are other issues affecting the EU financial interests.

### **29.2 Procedure**

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



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

If the conditions for suspending the payment deadline are no longer met, the suspension will be **lifted** — and the remaining time to pay (see Data Sheet, Point 4.2) will resume.

If the suspension exceeds two months, the coordinator may request the granting authority to confirm if the suspension will continue.

If the payment deadline has been suspended due to the non-compliance of the report and the revised report is not submitted (or was submitted but is also rejected), the granting authority may also terminate the grant or the participation of the coordinator (see Article 32).

## ARTICLE 30 — PAYMENT SUSPENSION

### 30.1 Conditions

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

- (a) a beneficiary (or a person having powers of representation, decision-making or control, or person essential for the award/implementation of the grant) has committed or is suspected of having committed:
  - (i) substantial errors, irregularities or fraud or
  - (ii) serious breach of obligations under this Agreement or during its award (including improper implementation of the action, non-compliance with the call conditions, submission of false information, failure to provide required information, breach of ethics or security rules (if applicable), failure to cooperate with checks, reviews, audits and investigations, etc.), or
- (b) a beneficiary (or a person having powers of representation, decision-making or control, or person essential for the award/implementation of the grant) has committed — in other EU 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; see Article 25.5).

If payments are suspended for one or more beneficiaries, the granting authority will make partial payment(s) for the part(s) not suspended. If suspension concerns the final payment, the payment (or recovery) of the remaining amount after suspension is lifted will be considered to be the payment that closes the action.

### 30.2 Procedure

Before suspending payments, the granting authority will send a **pre-information letter** to the beneficiary concerned:

- formally notifying the intention to suspend payments and the reasons why and
- requesting observations within 30 days of receiving notification.

If the granting authority does not receive observations or decides to pursue the procedure despite the



observations it has received, it will confirm the suspension (**confirmation letter**). Otherwise, it will formally notify that the procedure is discontinued.

At the end of the suspension procedure, the granting authority will also inform the coordinator.

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

If the conditions for resuming payments are met, the suspension will be **lifted**. The granting authority will formally notify the beneficiary concerned (and the coordinator) and set the suspension end date.

During the suspension, no prefinancing will be paid to the beneficiaries concerned. For interim payments, the periodic reports for all reporting periods except the last one (see Article 21) must not contain any financial statements from the beneficiary concerned (or its affiliated entities). 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.

## ARTICLE 31 — GRANT AGREEMENT SUSPENSION

### 31.1 Consortium-requested GA suspension

#### 31.1.1 Conditions and procedure

The beneficiaries may request the suspension of the grant or any part of it, if exceptional circumstances — in particular *force majeure* (see Article 35) — make implementation impossible or excessively difficult.

The coordinator must submit a request for **amendment** (see Article 39), with:

- the reasons why
- the date the suspension takes effect; this date may be before the date of the submission of the amendment request and
- the expected date of resumption.

The suspension will **take effect** on the day specified in the amendment.

Once circumstances allow for implementation to resume, the coordinator must immediately request another **amendment** of the Agreement to set the suspension end date, the resumption date (one day after suspension end date), extend the duration and make other changes necessary to adapt the action to the new situation (see Article 39) — unless the grant has been terminated (see Article 32). The suspension will be **lifted** with effect from the suspension end date set out in the amendment. This date may be before the date of the submission of the amendment request.

During the suspension, no prefinancing will be paid. Moreover, no work may be done. Ongoing work packages must be interrupted and no new work packages may be started.

### 31.2 EU-initiated GA suspension

#### 31.2.1 Conditions

The granting authority may suspend the grant or any part of it, if:

- (a) a beneficiary (or a person having powers of representation, decision-making or control, or person essential for the award/implementation of the grant) has committed or is suspected of having committed:
  - (i) substantial errors, irregularities or fraud or
  - (ii) serious breach of obligations under this Agreement or during its award (including improper implementation of the action, non-compliance with the call conditions, submission of false information, failure to provide required information, breach of ethics or security rules (if applicable), failure to cooperate with checks, reviews, audits and investigations, etc.), or
- (b) a beneficiary (or a person having powers of representation, decision-making or control, or person essential for the award/implementation of the grant) has committed — in other EU 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; see Article 25.5)
- (c) other:
  - (i) linked action issues: not applicable
  - (ii) the action has lost its scientific or technological relevance, for EIC Accelerator actions: the action has lost its economic relevance, for challenge-based EIC Pathfinder actions and Horizon Europe Missions: the action has lost its relevance as part of the Portfolio for which it has been initially selected

### 31.2.2 Procedure

Before suspending the grant, the granting authority will send a **pre-information letter** to the coordinator:

- formally notifying the intention to suspend the grant and the reasons why and
- requesting observations within 30 days of receiving notification.

If the granting authority does not receive observations or decides to pursue the procedure despite the observations it has received, it will confirm the suspension (**confirmation letter**). Otherwise, it will formally notify that the procedure is discontinued.

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

Once the conditions for resuming implementation of the action are met, the granting authority will formally notify the coordinator a **lifting of suspension letter**, in which it will set the suspension end date and invite the coordinator to request an amendment of the Agreement to set the resumption date (one day after suspension end date), extend the duration and make other changes necessary to adapt the action to the new situation (see Article 39) — unless the grant has been terminated (see Article 32). The suspension will be **lifted** with effect from the suspension end date set out in the lifting of suspension letter. This date may be before the date on which the letter is sent.

During the suspension, no prefinancing will be paid. Moreover, no work may be done. Ongoing work packages must be interrupted and no new work packages may be started.

The beneficiaries may not claim damages due to suspension by the granting authority (see Article 33).

Grant suspension does not affect the granting authority's right to terminate the grant or a beneficiary (see Article 32) or reduce the grant (see Article 28).

## ARTICLE 32 — GRANT AGREEMENT OR BENEFICIARY TERMINATION

### 32.1 Consortium-requested GA termination

#### 32.1.1 Conditions and procedure

The beneficiaries may request the termination of the grant.

The coordinator must submit a request for **amendment** (see Article 39), with:

- the reasons why
- the date the consortium ends work on the action ('end of work date') and
- the date the termination takes effect ('termination date'); this date must be after the date of the submission of the amendment request.

The termination will **take effect** on the termination date specified in the amendment.

If no reasons are given or if the granting authority considers the reasons do not justify termination, it may consider the grant terminated improperly.

#### 32.1.2 Effects

The coordinator must — within 60 days from when termination takes effect — submit a **periodic report** (for the open reporting period until termination).

The granting authority will calculate the final grant amount and final payment on the basis of the report submitted and taking into account the lump sum contributions for activities implemented before the end of work date (see Article 22). Partial lump sum contributions for work packages that were not completed (e.g. due to technical reasons) may exceptionally be taken into account.

If the granting authority does not receive the report within the deadline, only lump sum contributions which are included in an approved periodic report will be taken into account (no contributions if no periodic report was ever approved).

Improper termination may lead to a grant reduction (see Article 28).

After termination, the beneficiaries' obligations (in particular Articles 13 (confidentiality and security), 16 (IPR), 17 (communication, dissemination and visibility), 21 (reporting), 25 (checks, reviews, audits and investigations), 26 (impact evaluation), 27 (rejections), 28 (grant reduction) and 42 (assignment of claims)) continue to apply.

### 32.2 Consortium-requested beneficiary termination

### 32.2.1 Conditions and procedure

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

The coordinator must submit a request for **amendment** (see Article 39), with:

- the reasons why
- the opinion of the beneficiary concerned (or proof that this opinion has been requested in writing)
- the date the beneficiary ends work on the action ('end of work date')
- the date the termination takes effect ('termination date'); this date must be after the date of the submission of the amendment request.

If the termination concerns the coordinator and is done without its agreement, the amendment request must be submitted by another beneficiary (acting on behalf of the consortium).

The termination will **take effect** on the termination date specified in the amendment.

If no information is given or if the granting authority considers that the reasons do not justify termination, it may consider the beneficiary to have been terminated improperly.

### 32.2.2 Effects

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 **termination report** from the beneficiary concerned, for the open reporting period until termination, containing an overview of the progress of the work
- (iii) a second **request for amendment** (see Article 39) with other amendments needed (e.g. reallocation of the tasks and the estimated budget of the terminated beneficiary; addition of a new beneficiary to replace the terminated beneficiary; change of coordinator, etc.).

The granting authority will calculate the amount due to the beneficiary on the basis of the reports submitted in previous interim payments (i.e. beneficiary's lump sum contributions for completed and approved work packages).

Lump sum contributions for ongoing/not yet completed work packages will have to be included in the periodic report for the next reporting periods when those work packages have been completed.

If the granting authority does not receive the report on the distribution of payments within the deadline, 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.

If the second request for amendment is accepted by the granting authority, the Agreement is **amended** to introduce the necessary changes (see Article 39).

If the second request for amendment is rejected by the granting authority (because it calls into question the decision awarding the grant or breaches the principle of equal treatment of applicants), the grant may be terminated (see Article 32).

Improper termination may lead to a reduction of the grant (see Article 31) or grant termination (see Article 32).

After termination, the concerned beneficiary's obligations (in particular Articles 13 (confidentiality and security), 16 (IPR), 17 (communication, dissemination and visibility), 21 (reporting), 25 (checks, reviews, audits and investigations), 26 (impact evaluation), 27 (rejections), 28 (grant reduction) and 42 (assignment of claims)) continue to apply.

### **32.3 EU-initiated GA or beneficiary termination**

#### **32.3.1 Conditions**

The granting authority may terminate the grant or the participation of one or more beneficiaries, if:

- (a) one or more beneficiaries do not accede to the Agreement (see Article 40)
- (b) a change to the action or the legal, financial, technical, organisational or ownership situation of a beneficiary is likely to substantially affect the implementation of the action or calls into question the decision to award the grant (including changes linked to one of the exclusion grounds listed in the declaration of honour)
- (c) following termination of one or more beneficiaries, the necessary changes to the Agreement (and their impact on the action) would call into question the decision awarding the grant or breach the principle of equal treatment of applicants
- (d) implementation of the action has become impossible or the changes necessary for its continuation would call into question the decision awarding the grant or breach the principle of equal treatment of applicants
- (e) a beneficiary (or person with unlimited liability for its debts) is subject to bankruptcy proceedings or similar (including insolvency, winding-up, administration by a liquidator or court, arrangement with creditors, suspension of business activities, etc.)
- (f) a beneficiary (or person with unlimited liability for its debts) is in breach of social security or tax obligations
- (g) a beneficiary (or person having powers of representation, decision-making or control, or person essential for the award/implementation of the grant) has been found guilty of grave professional misconduct
- (h) a beneficiary (or person having powers of representation, decision-making or control, or person essential for the award/implementation of the grant) has committed fraud, corruption, or is involved in a criminal organisation, money laundering, terrorism-related crimes (including terrorism financing), child labour or human trafficking

- (i) a beneficiary (or person having powers of representation, decision-making or control, or person essential for the award/implementation of the grant) was created under a different jurisdiction with the intent to circumvent fiscal, social or other legal obligations in the country of origin (or created another entity with this purpose)
- (j) a beneficiary (or person having powers of representation, decision-making or control, or person essential for the award/implementation of the grant) has committed:
  - (i) substantial errors, irregularities or fraud or
  - (ii) serious breach of obligations under this Agreement or during its award (including improper implementation of the action, non-compliance with the call conditions, submission of false information, failure to provide required information, breach of ethics or security rules (if applicable), failure to cooperate with checks, reviews, audits and investigations, etc.)
- (k) a beneficiary (or person having powers of representation, decision-making or control, or person essential for the award/implementation of the grant) has committed — in other EU 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; see Article 25.5)
- (l) despite a specific request by the granting authority, a beneficiary does not request — through the coordinator — an amendment to the Agreement to end the participation of one of its affiliated entities or associated partners that is in one of the situations under points (d), (f), (e), (g), (h), (i) or (j) and to reallocate its tasks, or
- (m) other:
  - (i) linked action issues: not applicable
  - (ii) the action has lost its scientific or technological relevance, for EIC Accelerator actions: the action has lost its economic relevance, for challenge-based EIC Pathfinder actions and Horizon Europe Missions: the action has lost its relevance as part of the Portfolio for which it has been initially selected

### 32.3.2 Procedure

Before terminating the grant or participation of one or more beneficiaries, the granting authority will send a **pre-information letter** to the coordinator or beneficiary concerned:

- formally notifying the intention to terminate and the reasons why and
- requesting observations within 30 days of receiving notification.

If the granting authority does not receive observations or decides to pursue the procedure despite the observations it has received, it will confirm the termination and the date it will take effect (**confirmation letter**). Otherwise, it will formally notify that the procedure is discontinued.

For beneficiary terminations, the granting authority will — at the end of the procedure — also inform the coordinator.

The termination will **take effect** the day after the confirmation notification is sent (or on a later date specified in the notification; ‘termination date’).

### 32.3.3 Effects

#### (a) for **GA termination**:

The coordinator must — within 60 days from when termination takes effect — submit a **periodic report** (for the last open reporting period until termination).

The granting authority will calculate the final grant amount and final payment on the basis of the report submitted and taking into account the lump sum contributions for activities implemented before termination takes effect (see Article 22). Partial lump sum contributions for work packages that were not completed (e.g. due to technical reasons) may exceptionally be taken into account.

If the grant is terminated for breach of the obligation to submit reports, the coordinator may not submit any report after termination.

If the granting authority does not receive the report within the deadline, only lump sum contributions which are included in an approved periodic report will be taken into account (no contributions if no periodic report was ever approved).

Termination does not affect the granting authority’s right to reduce the grant (see Article 28) or to impose administrative sanctions (see Article 34).

The beneficiaries may not claim damages due to termination by the granting authority (see Article 33).

After termination, the beneficiaries’ obligations (in particular Articles 13 (confidentiality and security), 16 (IPR), 17 (communication, dissemination and visibility), 21 (reporting), 25 (checks, reviews, audits and investigations), 26 (impact evaluation), 27 (rejections), 28 (grant reduction) and 42 (assignment of claims)) continue to apply.

#### (b) for **beneficiary termination**:

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 **termination report** from the beneficiary concerned, for the open reporting period until termination, containing an overview of the progress of the work
- (iii) a **request for amendment** (see Article 39) with any amendments needed (e.g. reallocation of the tasks and the estimated budget of the terminated beneficiary; addition of a new beneficiary to replace the terminated beneficiary; change of coordinator, etc.).

The granting authority will calculate the amount due to the beneficiary on the basis of the reports submitted in previous interim payments (i.e. beneficiary’s lump sum contributions for completed and approved work packages).

Lump sum contributions for ongoing/not yet completed work packages will have to be included



in the periodic report for the next reporting periods when those work packages have been completed.

If the granting authority does not receive the report on the distribution of payments within the deadline, 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.

If the request for amendment is accepted by the granting authority, the Agreement is **amended** to introduce the necessary changes (see Article 39).

If the request for amendment is rejected by the granting authority (because it calls into question the decision awarding the grant or breaches the principle of equal treatment of applicants), the grant may be terminated (see Article 32).

After termination, the concerned beneficiary's obligations (in particular Articles 13 (confidentiality and security), 16 (IPR), 17 (communication, dissemination and visibility), 21 (reporting), 25 (checks, reviews, audits and investigations), 26 (impact evaluation), 27 (rejections), 28 (grant reduction) and 42 (assignment of claims)) continue to apply.

## **SECTION 3 OTHER CONSEQUENCES: DAMAGES AND ADMINISTRATIVE SANCTIONS**

### **ARTICLE 33 — DAMAGES**

#### **33.1 Liability of the granting authority**

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

The granting authority cannot be held liable for any damage caused by any of the beneficiaries or other participants involved in the action, as a consequence of the implementation of the Agreement.

#### **33.2 Liability of the beneficiaries**

The beneficiaries must compensate the granting authority 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, provided that it was caused by gross negligence or wilful act.

The liability does not extend to indirect or consequential losses or similar damage (such as loss of profit, loss of revenue or loss of contracts), provided such damage was not caused by wilful act or by a breach of confidentiality.

### **ARTICLE 34 — ADMINISTRATIVE SANCTIONS AND OTHER MEASURES**

Nothing in this Agreement may be construed as preventing the adoption of administrative sanctions (i.e. exclusion from EU award procedures and/or financial penalties) or other public law measures, in addition or as an alternative to the contractual measures provided under this Agreement (see,



for instance, Articles 137 to 148 EU Financial Regulation 2024/2509 and Articles 4 and 7 of Regulation 2988/95<sup>20</sup>).

## **SECTION 4 FORCE MAJEURE**

### **ARTICLE 35 — FORCE MAJEURE**

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

‘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 other participants involved in the action) and
- proves to be inevitable in spite of exercising all due diligence.

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.

## **CHAPTER 6 FINAL PROVISIONS**

### **ARTICLE 36 — COMMUNICATION BETWEEN THE PARTIES**

#### **36.1 Forms and means of communication — Electronic management**

EU grants are managed fully electronically through the EU Funding & Tenders Portal (‘Portal’).

All communications must be made electronically through the Portal in accordance with the Portal Terms and Conditions and using the forms and templates provided there (except if explicitly instructed otherwise by the granting authority).

Communications must be made in writing and clearly identify the grant agreement (project number and acronym).

Communications must be made by persons authorised according to the Portal Terms and 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 their appointment letter (see Portal Terms and Conditions).

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<sup>20</sup> Council Regulation (EC, Euratom) No 2988/95 of 18 December 1995 on the protection of the European Communities financial interests (OJ L 312, 23.12.1995, p. 1).

If the electronic exchange system is temporarily unavailable, instructions will be given on the Portal.

### **36.2 Date of communication**

The sending date for communications made through the Portal will be the date and time of sending, as indicated by the time logs.

The receiving date for communications made through the Portal will be the date and time the communication is accessed, as indicated by the time logs. Formal notifications that have not been accessed within 10 days after sending, will be considered to have been accessed (see Portal Terms and Conditions).

If a communication is exceptionally made on paper (by e-mail or postal service), general principles apply (i.e. date of sending/receipt). Formal notifications by registered post with proof of delivery will be considered to have been received either on 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.

### **36.3 Addresses for communication**

The Portal can be accessed via the Europa website.

The address for paper communications to the granting authority (if exceptionally allowed) is the official mailing address indicated on its website.

For beneficiaries, it is the legal address specified in the Portal Participant Register.

## **ARTICLE 37 — INTERPRETATION OF THE AGREEMENT**

The provisions in the Data Sheet take precedence over the rest of the Terms and Conditions of the Agreement.

Annex 5 takes precedence over the Terms and Conditions.

The Terms and Conditions take precedence over the Annexes other than Annex 5.

Annex 2 takes precedence over Annex 1.

## **ARTICLE 38 — CALCULATION OF PERIODS AND DEADLINES**

In accordance with Regulation No 1182/71<sup>21</sup>, 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.

‘Days’ means calendar days, not working days.

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<sup>21</sup> 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).

## ARTICLE 39 — AMENDMENTS

### 39.1 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.

### 39.2 Procedure

The party requesting an amendment must submit a request for amendment signed directly in the Portal Amendment tool.

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 granting authority may request additional information.

If the party receiving the request agrees, it must sign the amendment in the tool within 45 days of receiving notification (or any additional information the granting authority has requested). If it does not agree, it must formally notify its disagreement within the same deadline. The deadline may be extended, if necessary for the assessment of the request. If no notification is received within the deadline, the request is considered to have been rejected.

An amendment **enters into force** on the day of the signature of the receiving party.

An amendment **takes effect** on the date of entry into force or other date specified in the amendment.

## ARTICLE 40 — ACCESSION AND ADDITION OF NEW BENEFICIARIES

### 40.1 Accession of the beneficiaries mentioned in the Preamble

The beneficiaries which are not coordinator must accede to the grant by signing the accession form (see Annex 3) directly in the Portal Grant Preparation tool, within 30 days after the entry into force of the Agreement (see Article 44).

They will assume the rights and obligations under the Agreement with effect from the date of its entry into force (see Article 44).

If a beneficiary does not accede to the grant within the above deadline, the coordinator must — within

30 days — request an amendment (see Article 39) to terminate the beneficiary and make any changes necessary to ensure proper implementation of the action. This does not affect the granting authority's right to terminate the grant (see Article 32).

## **40.2 Addition of new beneficiaries**

In justified cases, the beneficiaries may request the addition of a new beneficiary.

For this purpose, the coordinator must submit a request for amendment in accordance with Article 39. It must include an accession form (see Annex 3) signed by the new beneficiary directly in the Portal Amendment tool.

New beneficiaries will assume the rights and obligations under the Agreement with effect from the date of their accession specified in the accession form (see Annex 3).

Additions are also possible in mono-beneficiary grants.

## **ARTICLE 41 — TRANSFER OF THE AGREEMENT**

In justified cases, the beneficiary of a mono-beneficiary grant may request the transfer of the grant to a new beneficiary, provided that this would not call into question the decision awarding the grant or breach the principle of equal treatment of applicants.

The beneficiary must submit a request for **amendment** (see Article 39), with

- the reasons why
- the accession form (see Annex 3) signed by the new beneficiary directly in the Portal Amendment tool and
- additional supporting documents (if required by the granting authority).

The new beneficiary will assume the rights and obligations under the Agreement with effect from the date of accession specified in the accession form (see Annex 3).

## **ARTICLE 42 — ASSIGNMENTS OF CLAIMS FOR PAYMENT AGAINST THE GRANTING AUTHORITY**

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

If the granting authority has not accepted the assignment or if 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 granting authority.

## **ARTICLE 43 — APPLICABLE LAW AND SETTLEMENT OF DISPUTES**

### **43.1 Applicable law**

The Agreement is governed by the applicable EU law, supplemented if necessary by the law of Belgium.

Special rules may apply for beneficiaries which are international organisations (if any; see Data Sheet, Point 5).

### **43.2 Dispute settlement**

If a dispute concerns the interpretation, application or validity of the Agreement, the parties must bring action before the EU General Court — or, on appeal, the EU Court of Justice — under Article 272 of the Treaty on the Functioning of the EU (TFEU).

For non-EU beneficiaries (if any), such disputes must be brought before the courts of Brussels, Belgium — unless an international agreement provides for the enforceability of EU court judgements.

For beneficiaries with arbitration as special dispute settlement forum (if any; see Data Sheet, Point 5), the dispute will — in the absence of an amicable settlement — be settled in accordance with the Rules for Arbitration published on the Portal.

If a dispute concerns administrative sanctions, offsetting or an enforceable decision under Article 299 TFEU (see Articles 22 and 34), the beneficiaries must bring action before the General Court — or, on appeal, the Court of Justice — under Article 263 TFEU.

For grants where the granting authority is an EU executive agency (see Preamble), actions against offsetting and enforceable decisions must be brought against the European Commission (not against the granting authority; see also Article 22).

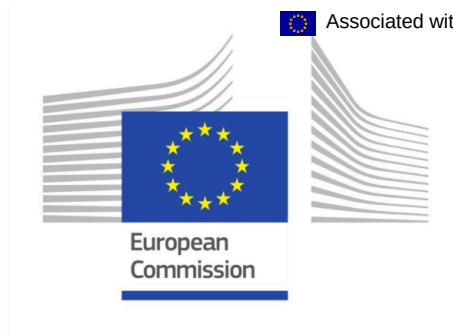
## **ARTICLE 44 — ENTRY INTO FORCE**

The Agreement will enter into force on the day of signature by the granting authority or the coordinator, depending on which is later.

### **SIGNATURES**

For the coordinator

For the granting authority



## **ANNEX 1**



# **Horizon Europe (HORIZON)**

## **Description of the action (DoA)**

**Part A**

**Part B**

DESCRIPTION OF THE ACTION (PART A)

COVER PAGE

Part A of the Description of the Action (DoA) must be completed directly on the Portal Grant Preparation screens.

| PROJECT                                                          |                                               |
|------------------------------------------------------------------|-----------------------------------------------|
| Grant Preparation (General Information screen) — Enter the info. |                                               |
| Project number:                                                  | 101287174                                     |
| Project name:                                                    | PARADISE – the Airport Platform of the Future |
| Project acronym:                                                 | PARADISE                                      |
| Call:                                                            | HORIZON-SESAR-2025-DES-IR-02                  |
| Topic:                                                           | HORIZON-SESAR-2025-DES-IR-02-WA4-1            |
| Type of action:                                                  | HORIZON-JU-RIA                                |
| Service:                                                         | SESAR                                         |
| Project starting date:                                           | fixed date: 1 September 2026                  |
| Project duration:                                                | 36 months                                     |

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Staff effort ..... 27

List of deliverables .....31

List of milestones (outputs/outcomes) ..... 60

List of critical risks ..... 62

Project reviews ..... 65

JU contributions .....65

## PROJECT SUMMARY

**Project summary**

*Grant Preparation (General Information screen) — Provide an overall description of your project (including context and overall objectives, planned activities and main achievements, and expected results and impacts (on target groups, change procedures, capacities, innovation etc)). This summary should give readers a clear idea of what your project is about.*

*Use the project summary from your proposal.*

The PARADISE project (Precise and Automated Runway and Airport Decision-making for Intelligent and Safe Execution) aims to develop a next-generation ATS platform that supports safe, efficient, and scalable airport operations. It introduces four integrated solutions, each addressing a critical aspect of airport performance, supported by two transversal threads for cybersecurity and architectural harmonisation.

- 1. Dynamic Calibration of Airport Capacity:** This solution applies AI-driven analytics to dynamically calibrate airport capacity based on real-time and historical data. It enhances strategic, tactical, and post-operational planning, enabling more accurate demand forecasting, improved resource allocation, and reduced delays, while maintaining safety and resilience.
- 2. Optimisation of Runway Throughput:** Combining machine learning and aircraft-derived data, this solution improves arrival and departure spacing and sequencing. It integrates enhanced tools to increase runway capacity, reduce fuel burn and emissions, and improve punctuality without requiring additional infrastructure.
- 3. Intelligent Surface Management:** This solution leverages automation, digital ATCO assistants, and enhanced connectivity to optimise surface operations. It supports SESAR Automation Level 4, enabling safer taxiing, reduced controller workload, and improved situational awareness through integrated surveillance and communication systems.
- 4. Prediction and Optimisation in Adverse Weather:** This solution uses sensor fusion, AI, and improved data exchange to optimise planning and operations during severe weather. It enhances turnaround monitoring, de-icing coordination, and dynamic routing, reducing delays and fuel consumption.

The transversal threads, Secure Exchange of Data and a New Service Delivery Model, ensure cyber-resilience and interoperability across all solutions. The PARADISE platform contributes to nine SESAR capabilities and advances automation towards Level 4.

## LIST OF PARTICIPANTS

**PARTICIPANTS**

*Grant Preparation (Beneficiaries screen) — Enter the info.*

| Number | Role | Short name | Legal name                                      | Country | PIC       |
|--------|------|------------|-------------------------------------------------|---------|-----------|
| 1      | COO  | SINTEF     | SINTEF AS                                       | NO      | 910945140 |
| 2      | BEN  | ADBSG      | ADB SAFEGATE Austria GmbH                       | AT      | 884180221 |
| 3      | BEN  | FRA        | FRAPORT AG FRANKFURT AIRPORT SERVICES WORLDWIDE | DE      | 983036413 |
| 4      | BEN  | AVINOR     | AVINOR AS                                       | NO      | 938275375 |
| 5      | BEN  | DLR        | DEUTSCHES ZENTRUM FUR LUFT - UND RAUMFAHRT EV   | DE      | 999981731 |
| 6      | BEN  | EML        | EML SPEECH TECHNOLOGY GMBH                      | DE      | 999756788 |
| 7      | BEN  | ENAV       | ENAV SPA                                        | IT      | 998197513 |



| <b>PARTICIPANTS</b>                                               |             |                   |                                                                                |                |            |
|-------------------------------------------------------------------|-------------|-------------------|--------------------------------------------------------------------------------|----------------|------------|
| <i>Grant Preparation (Beneficiaries screen) — Enter the info.</i> |             |                   |                                                                                |                |            |
| <b>Number</b>                                                     | <b>Role</b> | <b>Short name</b> | <b>Legal name</b>                                                              | <b>Country</b> | <b>PIC</b> |
| 8                                                                 | BEN         | ECTL              | EUROCONTROL - EUROPEAN ORGANISATION FOR THE SAFETY OF AIR NAVIGATION           | BE             | 999483733  |
| 9                                                                 | BEN         | SWED              | SWEDAVIA AB                                                                    | SE             | 984282281  |
| 10                                                                | BEN         | AIRBUS            | AIRBUS                                                                         | FR             | 999963010  |
| 11                                                                | BEN         | AIOPS             | AIRBUS OPERATIONS SAS                                                          | FR             | 991247948  |
| 12                                                                | BEN         | LFV               | LUFTFARTSVERKET                                                                | SE             | 942346077  |
| 13                                                                | BEN         | SAAB              | Saab Air Traffic Management AB                                                 | SE             | 868099076  |
| 13.1                                                              | AE          | SAABNL            | Saab Air Traffic Management Nederland B.V.                                     | NL             | 868098009  |
| 14                                                                | BEN         | ENAIRES           | ENAIRES                                                                        | ES             | 997701843  |
| 14.1                                                              | AE          | CRIDA             | CENTRO DE REFERENCIA INVESTIGACION DESARROLLO E INNOVACION ATM, A.I.E.         | ES             | 997605619  |
| 15                                                                | BEN         | PRG               | LETISTE PRAHA AS                                                               | CZ             | 891456967  |
| 16                                                                | BEN         | SEA               | SOCIETA' PER AZIONI ESERCIZI AEROPORTUALI SEA                                  | IT             | 986590687  |
| 17                                                                | BEN         | ADR               | AEROPORTI DI ROMA SPA                                                          | IT             | 970508475  |
| 18                                                                | BEN         | ROS               | ROSENBAUER INTERNATIONAL AG                                                    | AT             | 972434992  |
| 19                                                                | BEN         | PILDO             | PILDO CONSULTING SL                                                            | ES             | 998162690  |
| 20                                                                | BEN         | AIRSIDE           | AIRSIDE INNOVATION AS                                                          | NO             | 877514769  |
| 21                                                                | BEN         | FRQ               | FREQUENTIS AG                                                                  | AT             | 998307317  |
| 21.1                                                              | AE          | FOR               | FREQUENTIS ORTHOGON GMBH                                                       | DE             | 957912443  |
| 21.2                                                              | AE          | FRO               | FREQUENTIS ROMANIA SRL                                                         | RO             | 923657475  |
| 21.3                                                              | AE          | ATR               | ATRICs Advanced Traffic Solutions GmbH                                         | DE             | 885348392  |
| 22                                                                | BEN         | HUN               | HUNGAROCONTROL MAGYAR LEGIFORGALMISZOLGALAT ZARTKORUEN MUKODO RESZVENYTARSASAG | HU             | 941767472  |
| 23                                                                | BEN         | LH                | DEUTSCHE LUFTHANSA AKTIENGESELLSCHAFT                                          | DE             | 999965532  |
| 24                                                                | BEN         | LHS               | LUFTHANSA SYSTEMS GMBH & CO KG                                                 | DE             | 927065376  |
| 25                                                                | BEN         | AENA              | AENA S.M.E. SA                                                                 | ES             | 957048464  |
| 26                                                                | BEN         | UNIBO             | ALMA MATER STUDIORUM - UNIVERSITA DI BOLOGNA                                   | IT             | 999993953  |
| 27                                                                | BEN         | DBL               | DEEP BLUE SRL                                                                  | IT             | 998325941  |
| 28                                                                | BEN         | MUC               | FLUGHAFEN MUNCHEN GMBH                                                         | DE             | 944977784  |
| 29                                                                | BEN         | CIMA              | CENTRO INTERNAZIONALE IN MONITORAGGIO AMBIENTALE - FONDAZIONE CIMA             | IT             | 997710476  |
| 30                                                                | BEN         | TERN              | TERN SYSTEMS EHF                                                               | IS             | 887286355  |
| 30.1                                                              | AE          | TERN-H            | Tern Systems kft                                                               | HU             | 870091747  |

| PARTICIPANTS                                               |      |            |                                                       |         |           |
|------------------------------------------------------------|------|------------|-------------------------------------------------------|---------|-----------|
| Grant Preparation (Beneficiaries screen) — Enter the info. |      |            |                                                       |         |           |
| Number                                                     | Role | Short name | Legal name                                            | Country | PIC       |
| 31                                                         | BEN  | ANS CR     | RIZENI LETOVEHO PROVOZU CESKE REPUBLIKY STATNI PODNIK | CZ      | 954552363 |

## LIST OF WORK PACKAGES

| <b>Work packages</b><br><i>Grant Preparation (Work Packages screen) — Enter the info.</i> |                                                          |                  |                        |             |           |                                                                                                                                                                                             |
|-------------------------------------------------------------------------------------------|----------------------------------------------------------|------------------|------------------------|-------------|-----------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Work Package No                                                                           | Work Package name                                        | Lead Beneficiary | Effort (Person-Months) | Start Month | End Month | Deliverables                                                                                                                                                                                |
| WP1                                                                                       | Project coordination, part 1                             | 1 - SINTEF       | 18.50                  | 1           | 18        | D1.1 – PMP v1<br>D1.2 – DMP v1                                                                                                                                                              |
| WP2                                                                                       | Project coordination, part 2                             | 1 - SINTEF       | 18.50                  | 19          | 36        | D2.1 – DMP v2                                                                                                                                                                               |
| WP3                                                                                       | Secure exchange of data for PARADISE platform, part 1    | 1 - SINTEF       | 15.00                  | 1           | 18        | D3.1 – SED v1                                                                                                                                                                               |
| WP4                                                                                       | Secure exchange of data for PARADISE platform, part 2    | 1 - SINTEF       | 10.50                  | 19          | 36        | D4.1 – SED v2                                                                                                                                                                               |
| WP5                                                                                       | New service delivery model for PARADISE platform, part 1 | 21 - FRQ         | 20.00                  | 1           | 18        | D5.1 – nSDM v1                                                                                                                                                                              |
| WP6                                                                                       | New service delivery model for PARADISE platform, part 2 | 21 - FRQ         | 17.44                  | 19          | 36        | D6.1 – nSDM v2                                                                                                                                                                              |
| WP7                                                                                       | Exploitation, dissemination, and outreach, part 1        | 26 - UNIBO       | 35.30                  | 1           | 18        | D7.1 – CDEP v1<br>D7.2 – CDEP v2                                                                                                                                                            |
| WP8                                                                                       | Exploitation, dissemination, and outreach, part 2        | 26 - UNIBO       | 36.40                  | 19          | 36        | D8.1 – CDEP v3<br>D8.2 – CDEP v4                                                                                                                                                            |
| WP9                                                                                       | Solution 1, part 1                                       | 14 - ENAIRE      | 205.40                 | 1           | 18        | D9.1 – REG S1 v1<br>D9.2 – STAND S1 v1<br>D9.3 – OSED S1 v1<br>D9.4 – TS/IRS S1 v1<br>D9.5 – VALP S1 v1<br>D9.6 – STAND S1 v2<br>D9.7 – REG S1 v2<br>D9.8 – VALP S1 v2<br>D9.9 – OSED S1 v2 |

| Work packages                                              |                    |                  |                        |             |           |                                                                                                                                                                                                                                                  |
|------------------------------------------------------------|--------------------|------------------|------------------------|-------------|-----------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Grant Preparation (Work Packages screen) — Enter the info. |                    |                  |                        |             |           |                                                                                                                                                                                                                                                  |
| Work Package No                                            | Work Package name  | Lead Beneficiary | Effort (Person-Months) | Start Month | End Month | Deliverables                                                                                                                                                                                                                                     |
|                                                            |                    |                  |                        |             |           | D9.10 – TS/IRS S1 v2                                                                                                                                                                                                                             |
| WP10                                                       | Solution 1, part 2 | 14 - ENAIRE      | 150.40                 | 19          | 36        | D10.1 – REG S1 v3<br>D10.2 – CBA S1 v1<br>D10.3 – STAND S1 v3<br>D10.4 – VALR S1 v1<br>D10.5 – OSED S1 v3<br>D10.6 – TS/IRS S1 v3<br>D10.7 – CBA S1 v2<br>D10.8 – STAND S1 v4<br>D10.9 – REG S1 v4<br>D10.10 – CN S1                             |
| WP11                                                       | Solution 2, part 1 | 12 - LFV         | 171.76                 | 1           | 18        | D11.1 – STAND S2 v1<br>D11.2 – REG S2 v1<br>D11.3 – OSED S2 v1<br>D11.4 – STAND S2 v2<br>D11.5 – REG S2 v2<br>D11.6 – TS/IRS S2 v1<br>D11.7 – VALP S2 v1                                                                                         |
| WP12                                                       | Solution 2, part 2 | 12 - LFV         | 181.05                 | 19          | 36        | D12.1 – VALP S2 v2<br>D12.2 – REG S2 v3<br>D12.3 – TS/IRS S2 v2<br>D12.4 – CBA S2 v1<br>D12.5 – STAND S2 v3<br>D12.6 – OSED S2 v2<br>D12.7 – OSED S2 v3<br>D12.8 – TS/IRS S2 v3<br>D12.9 – VALR S2<br>D12.10 – CBA S2 v2<br>D12.11 – STAND S2 v4 |

| <b>Work packages</b><br><i>Grant Preparation (Work Packages screen) — Enter the info.</i> |                    |                  |                        |             |           |                                                                                                                                                                                                                                                                                          |
|-------------------------------------------------------------------------------------------|--------------------|------------------|------------------------|-------------|-----------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Work Package No                                                                           | Work Package name  | Lead Beneficiary | Effort (Person-Months) | Start Month | End Month | Deliverables                                                                                                                                                                                                                                                                             |
|                                                                                           |                    |                  |                        |             |           | D12.12 – REG S2 v4<br>D12.13 – CN S2                                                                                                                                                                                                                                                     |
| WP13                                                                                      | Solution 3, part 1 | 2 - ADBSG        | 182.90                 | 1           | 18        | D13.1 – STAND S3 v1<br>D13.2 – REG S3 v1<br>D13.3 – OSED S3 v1<br>D13.4 – TS/IRS S3 v1<br>D13.5 – VALP S3 v1<br>D13.6 – STAND S3 v2<br>D13.7 – REG S3 v2                                                                                                                                 |
| WP14                                                                                      | Solution 3, part 2 | 2 - ADBSG        | 184.90                 | 19          | 36        | D14.1 – OSED S3 v2<br>D14.2 – TS/IRS S3 v2<br>D14.3 – CBA S3 v1<br>D14.4 – STAND S3 v3<br>D14.5 – REG S3 v3<br>D14.6 – OSED S3 v3<br>D14.7 – TS/IRS S3 v3<br>D14.8 – VALP S3 v2<br>D14.9 – VALR S3<br>D14.10 – CBA S3 v2<br>D14.11 – STAND S3 v4<br>D14.12 – REG S3 v4<br>D14.13 – CN S3 |
| WP15                                                                                      | Solution 4, part 1 | 21 - FRQ         | 167.85                 | 1           | 18        | D15.1 – REG S4 v1<br>D15.2 – STAND S4 v1<br>D15.3 – OSED S4 v1<br>D15.4 – TS/IRS S4 v1<br>D15.5 – VALP S4 v1<br>D15.6 – STAND S4 v2<br>D15.7 – REG S4 v2                                                                                                                                 |

| <b>Work packages</b><br><i>Grant Preparation (Work Packages screen) — Enter the info.</i> |                    |                  |                        |             |           |                                                                                                                                                                                                                                                                                          |
|-------------------------------------------------------------------------------------------|--------------------|------------------|------------------------|-------------|-----------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Work Package No                                                                           | Work Package name  | Lead Beneficiary | Effort (Person-Months) | Start Month | End Month | Deliverables                                                                                                                                                                                                                                                                             |
| WP16                                                                                      | Solution 4, part 2 | 21 - FRQ         | 153.83                 | 19          | 36        | D16.1 – REG S4 v3<br>D16.2 – OSED S4 v2<br>D16.3 – TS/IRS S4 v2<br>D16.4 – CBA S4 v1<br>D16.5 – STAND S4 v3<br>D16.6 – OSED S4 v3<br>D16.7 – TS/IRS S4 v3<br>D16.8 – VALP S4 v2<br>D16.9 – VALR S4<br>D16.10 – CBA S4 v2<br>D16.11 – STAND S4 v4<br>D16.12 – REG S4 v4<br>D16.13 – CN S4 |

**Work package WP1 – Project coordination, part 1**

|                            |                              |                         |            |
|----------------------------|------------------------------|-------------------------|------------|
| <b>Work Package Number</b> | WP1                          | <b>Lead Beneficiary</b> | 1 - SINTEF |
| <b>Work Package Name</b>   | Project coordination, part 1 |                         |            |
| <b>Start Month</b>         | 1                            | <b>End Month</b>        | 18         |

|                                                                                            |
|--------------------------------------------------------------------------------------------|
| <b>Objectives</b>                                                                          |
| Project management, administration, coordination, and communication for reporting period 1 |

|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |
|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Description</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |
| <p><b>T01 Project Management and Coordination:</b><br/>Day-to-day monitoring, control, and reporting of project progress with respect to project objectives, timetable, acceptance of deliverables, all in accordance with the SESAR 3 JU Project Handbook (Edition 02.00), and hence to comply with needs defined by the SESAR 3 JU. The effort of work package leaders is allocated to each work package.</p> <p><b>T02 Project Quality Management:</b><br/>Ensure the quality management of the project in conjunction with solution leaders and all project participants.</p> <p><b>T03 Reporting and Communication with the SJU:</b><br/>In cooperation with solution leaders and all involved project participants, the coordinator will provide the required periodic and final reports to the SJU/EC.</p> <p><b>T04 Administration:</b><br/>Ensure that the EU Grant Agreement administration processes are deployed throughout the project and acted upon by partners as required.</p> <p><b>T05 Manage third-party involvement:</b><br/>Involvement of EASA in the project to provide technical contribution for all solutions in the area of certification and other areas described in Article 156 of the Single Basic Act, and to ensure acceptable means of compliance with the SES basic regulation and its implementing rules.</p> |

**Work package WP2 – Project coordination, part 2**

|                            |                              |                         |            |
|----------------------------|------------------------------|-------------------------|------------|
| <b>Work Package Number</b> | WP2                          | <b>Lead Beneficiary</b> | 1 - SINTEF |
| <b>Work Package Name</b>   | Project coordination, part 2 |                         |            |
| <b>Start Month</b>         | 19                           | <b>End Month</b>        | 36         |

|                                                                                            |
|--------------------------------------------------------------------------------------------|
| <b>Objectives</b>                                                                          |
| Project management, administration, coordination, and communication for reporting period 2 |

|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |
|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Description</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |
| <p><b>T01 Project Management and Coordination:</b><br/>Day-to-day monitoring, control, and reporting of project progress with respect to project objectives, timetable, acceptance of deliverables, all in accordance with the SESAR 3 JU Project Handbook (Edition 02.00), and hence to comply with needs defined by the SESAR 3 JU. The effort of work package leaders is allocated to each work package.</p> <p><b>T02 Project Quality Management:</b><br/>Ensure the quality management of the project in conjunction with solution leaders and all project participants.</p> <p><b>T03 Reporting and Communication with the SJU:</b><br/>In cooperation with solution leaders and all involved project participants, the coordinator will provide the required periodic and final reports to the SJU/EC.</p> |

**T04 Administration:**

Ensure that the EU Grant Agreement administration processes are deployed throughout the project and acted upon by partners as required.

**T05 Manage third-party involvement:**

Involvement of EASA in the project to provide technical contribution for all solutions in the area of certification and other areas described in Article 156 of the Single Basic Act, and to ensure acceptable means of compliance with the SES basic regulation and its implementing rules.

## Work package WP3 – Secure exchange of data for PARADISE platform, part 1

|                            |                                                       |                         |            |
|----------------------------|-------------------------------------------------------|-------------------------|------------|
| <b>Work Package Number</b> | WP3                                                   | <b>Lead Beneficiary</b> | 1 - SINTEF |
| <b>Work Package Name</b>   | Secure exchange of data for PARADISE platform, part 1 |                         |            |
| <b>Start Month</b>         | 1                                                     | <b>End Month</b>        | 18         |

### Objectives

Creation of draft documentation of an architecture for secure exchange of data for reporting period 1

### Description

The WP03 description

This transversal WP will deliver a cyber security framework and architecture for secure exchange of data and information exchange in the next generation of ATS platforms. The framework will be aligned with the new service delivery model developed in WP05 and WP06. Further, the work will result in a set of security requirements for secure data exchange, which will be directly applicable on the four solutions developed in WP 09-16.

The work will take a holistic and system-wide approach, which will address the needs for security (covering identification, authentication, integrity and confidentiality) from the different stakeholders involved in the ATS ecosystem. Specific focus will be on the need to leverage existing the initiatives and technologies by the different actors involved, to avoid the need to rebuild existing systems and services, and on ensuring interoperability amongst all actors and their technologies, including both new entrants and legacy users. Existing relevant standards and best practices related to cyber security of ATS platforms will be considered. The work will be organised in three tasks: T01 for work package management, T02 for the conceptual modelling on cyber security framework and architecture and T03 for the elicitation of security requirements and a gap analysis.

The work in all three tasks of WP03 will be led by SINTEF, supported by CRIDA and ENAV (representing Solution 1), AIRBUS, SAAB and TERN (Solution 2), ADBSG, DLR and LH (Solution 3) and FRQ (Solution 4), which will participate as stakeholders in interviews and/or workshops and review the produced results. Note that security risk assessments of the individual solutions is not within the scope of this transversal WP but should be performed as a part of the development of the solutions.

T01: Coordination and alignment of partners on work package level/ Participation on project coordination/ Reporting of work package evolution/ Organisation of coordination meetings/ Communication of changes throughout the project evolution to PARADISE project management (impact related to the ATM master plan to trigger Grant Agreement changes)/ Responsibility for document submission and delivery of work-package documents/ Identification of risks: assessment and mitigation on operational, technical and project level. Lead: SINTEF

T02: Literature study and conceptual modelling of the envisioned framework and architecture. The initial definition will consist of the core elements and relationships needed for trusted service delivery, secure communication and monitoring. Core security concepts will be visualised through diagrams and high-level abstract representations of security functions. The main input to the initial cyber security framework and architecture will be the Initial Aviation Trust Framework (IATF), the post quantum cryptography (PQC) algorithms released by NIST and existing state-of-the-art



recommendations and specifications on cyber security of ATS platforms. LEAD: SINTEF Contributing beneficiaries: CRIDA, LFV, ADBSG, FRQ, ENAV, AIRBUS, TERN, DLR, LH

T03: The initial set of security requirements for secure data exchange and a gap analysis. The work will consist of stakeholder requirements elicitation activities (interviews and/or workshops) related to the initial architecture definition delivered by T02. The scope will be limited to the technologies/services used in the four solutions. The work will also include a gap analysis of the solutions with respect to their existing cyber security requirements and capabilities. This analysis will identify missing or insufficient security mechanisms, assess their alignment with the proposed framework, and provide recommendations for enhancements. The gap analysis will serve as a foundation for tailoring the security architecture to the specific needs and constraints of the SESAR ecosystem, ensuring that the framework is both forward-looking and practically applicable. CRIDA, LFV, ADBSG, FRQ, ENAV, AIRBUS, TERN, DLR, LH

## Work package WP4 – Secure exchange of data for PARADISE platform, part 2

|                            |                                                       |                         |            |
|----------------------------|-------------------------------------------------------|-------------------------|------------|
| <b>Work Package Number</b> | WP4                                                   | <b>Lead Beneficiary</b> | 1 - SINTEF |
| <b>Work Package Name</b>   | Secure exchange of data for PARADISE platform, part 2 |                         |            |
| <b>Start Month</b>         | 19                                                    | <b>End Month</b>        | 36         |

### Objectives

Creation of final documentation of an architecture for secure exchange of data for reporting period 2

### Description

The WP04 description

This transversal WP builds on the work performed in WP03 to deliver a cyber security framework and architecture for secure exchange of data and information exchange in the next generation of ATS platforms. The work in all three tasks of WP04 will be led by SINTEF, supported by CRIDA and ENAV (representing Solution 1), AIRBUS, SAAB and TERN (Solution 2), ADBSG, DLR and LH (Solution 3) and FRQ (Solution 4), which will participate as stakeholders in interviews and/or workshops and review the produced results.

T01: Coordination and alignment of partners on work package level/ Participation on project coordination/ Reporting of work package evolution/ Organisation of coordination meetings/ Communication of changes throughout the project evolution to PARADISE project management (impact related to the ATM master plan to trigger Grant Agreement changes)/ Responsibility for document submission and delivery of work-package documents/ Identification of risks: assessment and mitigation on operational, technical and project level. Lead : SINTEF

T02: The final cyber security framework and architecture for secure exchange of data and information in next generation ATS platforms. A gap analysis will map existing security mechanisms against the initial cyber security framework and definition (T3.1), and work on refinement and further detailing of these results, as well as providing recommendations for enhancements to align the solutions with the proposed framework and with IATF principles. Lead : SINTEF Contributing beneficiaries: LFV, ADBSG, FRQ, AIRBUS, TERN, DLR, LH

T03: The final set of security requirements for secure data exchange. The work will be a refinement and further detailing of the results from T03 in WP03. Lead : SINTEF Contributing beneficiaries: LFV, ADBSG, FRQ, AIRBUS, TERN, DLR, LH

T02-T03:

The work will be led by SINTEF, supported by CRIDA and ENAV (representing Solution 1), AIRBUS, SAAB and TERN (Solution 2), ADBSG, DLR and LH (Solution 3) and FRQ (Solution 4), which will participate as stakeholders in interviews and/or workshops and review the produced results Lead : SINTEF Contributing beneficiaries: LFV, ADBSG, FRQ, AIRBUS, TERN, DLR, LH

**Work package WP5 – New service delivery model for PARADISE platform, part 1**

|                            |                                                          |                         |          |
|----------------------------|----------------------------------------------------------|-------------------------|----------|
| <b>Work Package Number</b> | WP5                                                      | <b>Lead Beneficiary</b> | 21 - FRQ |
| <b>Work Package Name</b>   | New service delivery model for PARADISE platform, part 1 |                         |          |
| <b>Start Month</b>         | 1                                                        | <b>End Month</b>        | 18       |

|                                                                                        |
|----------------------------------------------------------------------------------------|
| <b>Objectives</b>                                                                      |
| Creation of draft documentation of a new service delivery model for reporting period 1 |

|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |
|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Description</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |
| <p>T01 Work package management<br/>Coordination and alignment of partners on work package level/ Participation on project coordination/ Reporting of work package evolution/ Organisation of coordination meetings/ Communication of changes throughout the project evolution to PARADISE project management (impact related to the ATM master plan to trigger Grant Agreement changes)/ Responsibility for document submission and delivery of work-package documents/ Identification of risks: assessment and mitigation on operational, technical and project level.<br/>Lead: FRQ. Contributing BE: ADBSG, CRIDA, LFV, FRA</p> <p>T02 Technical Preparation nSDM:<br/>Technical Preparation: FRQ to lead the nSDM and structure the input to be gathered by the leads of the 4 building blocks (ADBSG, CRIDA/ENAI, FRQ, LFV, FRA = ALL nSDM)Lead: FRQ. Contributing BE: ADBSG, CRIDA, LFV, FRA</p> <p>T03 Kick Off Workshop and Initiation:<br/>nSDM Kick-Off (WS1) and Initiation: during Kick-Off Workshop ALL nSDM to agree on scope, limitations, final input structure and what input needs to be gathered on their building block. Input will cover interfaces, tools, established standards and proposed elements for standardization. Lead: FRQ. Contributing BE: ADBSG, CRIDA, LFV, FRA</p> <p>T04 Input Gathering/Workshop 2:<br/>ALL nSDM will gather the information according to the agreed structure, present their building blocks, discuss results and help to define a first draft for a taxonomy map and interfaces including a list of proposed standards and tools. ALL nSDM will agree on the details that are to be gathered and planned for refinement during a 3rd workshop Lead: FRQ. Contributing BE: ADBSG, CRIDA, LFV, FRA</p> |

**Work package WP6 – New service delivery model for PARADISE platform, part 2**

|                            |                                                          |                         |          |
|----------------------------|----------------------------------------------------------|-------------------------|----------|
| <b>Work Package Number</b> | WP6                                                      | <b>Lead Beneficiary</b> | 21 - FRQ |
| <b>Work Package Name</b>   | New service delivery model for PARADISE platform, part 2 |                         |          |
| <b>Start Month</b>         | 19                                                       | <b>End Month</b>        | 36       |

|                                                                                        |
|----------------------------------------------------------------------------------------|
| <b>Objectives</b>                                                                      |
| Creation of final documentation of a new service delivery model for reporting period 2 |

|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |
|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Description</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |
| <p>T01 Work package management:<br/>Coordination and alignment of partners on work package level/ Participation on project coordination/ Reporting of work package evolution/ Organisation of coordination meetings/ Communication of changes throughout the project evolution to PARADISE project management (impact related to the ATM master plan to trigger Grant Agreement changes)/ Responsibility for document submission and delivery of work-package documents/ Identification of risks: assessment and mitigation on operational, technical and project level. Lead: FRQ. Contributing BE: ADBSG, CRIDA, LFV, FRA</p> <p>T02 Refinement:<br/>Information gathering to be used during refinement, preparation of proposal for standardization topics and collection of</p> |

commonalities, alignment with the transversal WP Secure Exchange of Data (FRQ), and presentation of a detailed view on how the service delivery model has been applied to each individual work package of this call (WP Building Blocks 1-4) (ALL nSDM). Lead: FRQ. Contributing BE: ADBSG, CRIDA, LFV, FRA

#### T03 Standardization/Tooling/ Workshop 3:

Discussions on findings, agreement on standardization topics and common service delivery architecture aspects including commonalities and interchangeable formats e.g. on used engineering tooling; topics to be considered during workshops (ALL nSDM): Use of Open Standards, Definition of service contracts (Input/Output, Error Handling, non-Functional Requirements, Security and Performance Requirements), Use of governance and configuration Frameworks (Lifecycle, Versioning, Compliance with domain specific Standards, Change Management), Adoption of common information model, Readiness for federated service registry (dynamic service discovery and runtime binding), Loose Coupling and Location Transparency, Use of Middleware and Integration Platforms. Lead: FRQ. Contributing BE: ADBSG, CRIDA, LFV, FRA

#### T04 nSDM Report:

Consolidation of review comments (FRQ), finalize documentation for nSDM report (ALL nSDM). Lead: FRQ. Contributing BE: ADBSG, CRIDA, LFV, FRA

## Work package WP7 – Exploitation, dissemination, and outreach, part 1

|                            |                                                   |                         |            |
|----------------------------|---------------------------------------------------|-------------------------|------------|
| <b>Work Package Number</b> | WP7                                               | <b>Lead Beneficiary</b> | 26 - UNIBO |
| <b>Work Package Name</b>   | Exploitation, dissemination, and outreach, part 1 |                         |            |
| <b>Start Month</b>         | 1                                                 | <b>End Month</b>        | 18         |

### Objectives

Dissemination, communication, and exploitation of project outcomes to the broader European and international community.

### Description

#### T01 Work package management:

Coordination and alignment of partners on work package level/ Participation on project coordination/ Reporting of work package evolution/ Organisation of coordination meetings/ Communication of changes throughout the project evolution to PARADISE project management (impact related to the ATM master plan to trigger Grant Agreement changes)/ Responsibility for document submission and delivery of work-package documents/ Identification of risks: assessment and mitigation on operational, technical and project level.

Lead: UNIBO. Contributing BE: SINTEF, ADBSG, FRA, AVINOR, DLR, ENAV, ECTL, SWED, LFV, CRIDA, PILDO, FRQ, CIMA, TERN, TERN-H

#### T02 Dissemination, Communication, and Outreach:

UNIBO will develop and implement a comprehensive Dissemination and Communication Strategy to effectively promote the project's objectives, activities, and results to relevant target groups. All contributing participants will perform targeted dissemination (see Table 6).

Lead: UNIBO. Contributing BE: SINTEF, ADBSG, FRA, AVINOR, DLR, ENAV, ECTL, SWED, LFV, CRIDA, PILDO, FRQ, CIMA, TERN, TERN-H

#### T03 Exploitation, Replicability, and Sustainability:

Maximising the long-term impact of the project by developing a structured strategy for exploitation, replicability, and sustainability.

Lead: UNIBO. Contributing BE: SINTEF, ADBSG, FRA, AVINOR, DLR, ENAV, ECTL, SWED, LFV, CRIDA, PILDO, FRQ, CIMA, TERN, TERN-H

## Work package WP8 – Exploitation, dissemination, and outreach, part 2

|                            |                                                   |                         |            |
|----------------------------|---------------------------------------------------|-------------------------|------------|
| <b>Work Package Number</b> | WP8                                               | <b>Lead Beneficiary</b> | 26 - UNIBO |
| <b>Work Package Name</b>   | Exploitation, dissemination, and outreach, part 2 |                         |            |
| <b>Start Month</b>         | 19                                                | <b>End Month</b>        | 36         |

| Objectives                                                                                                              |
|-------------------------------------------------------------------------------------------------------------------------|
| Dissemination, communication, and exploitation of project outcomes to the broader European and international community. |

| Description                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |
|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <p>T01: Work package management<br/>Coordination and alignment of partners on work package level/ Participation on project coordination/ Reporting of work package evolution/ Organisation of coordination meetings/ Communication of changes throughout the project evolution to PARADISE project management (impact related to the ATM master plan to trigger Grant Agreement changes)/ Responsibility for document submission and delivery of work-package documents/ Identification of risks: assessment and mitigation on operational, technical and project level.<br/>Lead: UNIBO. Contributing BE: SINTEF, ADBSG, FRA, AVINOR, DLR, ENAV, ECTL, SWED, LFV, CRIDA, PILDO, FRQ, CIMA, TERN, TERN-H</p> <p>T02 Dissemination, Communication, and Outreach:<br/>UNIBO will continue to implement the D&amp;C strategy and iteration after the mid-term review, updating the Key Performance Indicators (KPIs). All contributing participants will perform targeted dissemination<br/>Lead: UNIBO. Contributing BE: SINTEF, ADBSG, FRA, AVINOR, DLR, ENAV, ECTL, SWED, LFV, CRIDA, PILDO, FRQ, CIMA, TERN, TERN-H</p> <p>T03 Exploitation, Replicability, and Sustainability:<br/>Final refinement of the exploitation strategy based on the identified project outcomes, also through the organisation of a dedicated Exploitation Workshop.<br/>Lead: UNIBO. Contributing BE: SINTEF, ADBSG, FRA, AVINOR, DLR, ENAV, ECTL, SWED, LFV, CRIDA, PILDO, FRQ, CIMA, TERN, TERN-H</p> |

## Work package WP9 – Solution 1, part 1

|                            |                    |                         |             |
|----------------------------|--------------------|-------------------------|-------------|
| <b>Work Package Number</b> | WP9                | <b>Lead Beneficiary</b> | 14 - ENAIRE |
| <b>Work Package Name</b>   | Solution 1, part 1 |                         |             |
| <b>Start Month</b>         | 1                  | <b>End Month</b>        | 18          |

| Objectives                                                                                                                                                                                                            |
|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| This work packages will develop the concepts and systems covering the scope and objectives of PARADISE Solution 1 and produce the associated deliverables and prototypes in preparation for the validation exercises. |

| Description                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |
|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <p>T01: Solution Management<br/>Coordination and alignment of partners on work package level/ Participation on project coordination/ Reporting of work package evolution/ Organisation of coordination meetings/ Communication of changes throughout the project evolution to PARADISE project management (impact related to the ATM master plan to trigger Grant Agreement changes)/ Responsibility for document submission and delivery of work-package documents/ Identification of risks: assessment and mitigation on operational, technical and project level.<br/>In addition to Work package management: Monitoring and control of solution development, reporting of solution evolution and securing Exit Maturity Gate.</p> |

Lead: CIMA. Contributing BE: All solution contributors

**T02: SPR-INTEROP/OSD**

Preparation and delivery of a comprehensive description to define the operational context, the use cases, the requirements and the safety, environmental, human performance, and performance assessments under consideration of validation results. It includes Part I to Part V Annexes.

Lead: ENAV. Contributing BE: All solution contributors

**T03: TS/IRS**

Preparation and delivery of the Technical Specifications/Interface Requirements Specifications document providing functional, non-functional and interface requirements related to the solution.

Lead: PILDO. Contributing BE: ENAV, ECTL, PRG, SEA, ADR, AENA, CIMA

**T04: VALP**

Preparation and delivery of the Validation Plan describing how the solution is intended to be validated. It includes Part I to Part IV Annexes.

Lead: CRIDA. Contributing BE: All solution contributors

T05: This task includes the first four phases mentioned in section 1.2.1 Methodology, Solution 1. It is aimed at Collecting and providing the data (ADR, SEA, ENAV, AENA, CRIDA) Preparing the data (PILDO, ECTL, CIMA (meteorology)), developing and training the models (PILDO) for the four integrated modules and developing their user interfaces (DBL, PILDO) for use during the validation exercises.: This task includes the first 4 phases mentioned in section 1.2.1 Methodology, Solution 1. It is aimed at preparing the data, developing and training the models for the four integrated modules and developing their user interfaces for use during the validation exercises.

Lead: PILDO: Contributing BE:: CRIDA, ENAV, SEA, ADR, PRG, AENA, DBL, CIMA

**T06: REG**

Lead: ECTL Contributing BE:: ENAV, ECTL, CRIDA, PRG, PILDO

**T07: STAND**

Lead: ECTL Contributing BE:: ENAV, ECTL, CRIDA, PRG, PILDO

## Work package WP10 – Solution 1, part 2

| Work Package Number | WP10               | Lead Beneficiary | 14 - ENAIRE |
|---------------------|--------------------|------------------|-------------|
| Work Package Name   | Solution 1, part 2 |                  |             |
| Start Month         | 19                 | End Month        | 36          |

### Objectives

This work packages will validate and report on the services covering the scope and objectives of PARADISE Solution 1 and produce the associated deliverables

### Description

**T01: Solution Management**

Coordination and alignment of partners on work package level/ Participation on project coordination/ Reporting of work package evolution/ Organisation of coordination meetings/ Communication of changes throughout the project evolution to PARADISE project management (impact related to the ATM master plan to trigger Grant Agreement changes)/ Responsibility for document submission and delivery of work-package documents/ Identification of risks: assessment and mitigation on operational, technical and project level.

In addition to Work package management: Monitoring and control of solution development, reporting of solution evolution and securing Exit Maturity Gate.

Lead: CRIDA. Contributing BEs: All solution contributors

**T02: SPR-INTEROP/OSD**

Preparation and delivery of a comprehensive description to define the operational context, the use cases, the requirements

and the safety, environmental, human performance, and performance assessments under consideration of validation results. It includes Part I to Part V Annexes.

Lead: ENAV. Contributing BEs: All solution contributors

#### T03: TS/IRS

Preparation and delivery of the Technical Specifications/Interface Requirements Specifications document providing functional, non-functional and interface requirements related to the solution.

Lead: PILDO. Contributing BEs: All solution contributors

#### T04: VALR

Preparation and delivery of the Validation Report describing the results of validation exercises defined in VALP, how they have been conducted, and relevant conclusions and recommendations.

Lead: CRIDA. Contributing BEs: All solution contributors

#### T05: CBA

Preparation and delivery of the Cost Benefit Analysis report describing the benefits and costs related to deployment of the solution.

Lead: CRIDA. Contributing BEs: ECTL, ENAV, SEA, ADR, CIMA

#### T06: REG

Preparation and delivery of input to regulatory activities

Lead: ECTL. Contributing BEs: CRIDA, ECTL, ENAV

#### T07: STAND

Preparation and delivery of input to standardisation activities

Lead: ECTL. Contributing BEs: CRIDA, ECTL, ENAV, PILDO, AENA

#### T08: Contextual Note

Preparation and delivery of the Contextual Note document introducing the solution in terms of scope, main operational and performance benefits, relevant system impacts.

Lead: CRIDA. Contributing BEs: ECTL, ENAV, SEA, ADR,

#### T09/T10 EXE 1.1 and EXE 1.2:

Real-time simulations/Prototyping session (recorded data) preparation and execution. ENAV: Coordination of validation activities, data provision, operational expertise, validation activities preparation, execution and reporting, validation of KPI selection and analysis; Operational Performance assessment. ADR/SEA: Data provision and support to validation activities preparation, execution and reporting, validation of KPI selection and analysis. ECTL Data Provision, technical expertise and validation activities preparation CIMA: MET Data provision and technical expertise, validation activities preparation, execution and reporting, validation of MET KPI selection and analysis. PILDO Labs prototyping. DBL: HMI requirements and user needs collection; HP and SAF Assessment. This task includes Phase 5 mentioned in section 1.2.1 Methodology.

Lead: ENAV. Contributing BEs: ADR, ECTL, CIMA, PILDO, DBL

#### T11 EXE 1.3:

Real-time simulations/Prototyping session (recorded data) preparation and execution. CRIDA, ENAIRE, AENA: Coordination of validation activities, data provision, operational expertise, validation activities preparation, execution and reporting, validation of KPI selection and analysis; Operational Performance assessment. CRIDA prototyping. CRIDA: HMI requirements and user needs collection; HP and SAF Assessment. This task includes Phase 5 mentioned in section 1.2.1 Methodology.

Lead: ENAIRE. Contributing BEs: AENA, CRIDA

#### T12 Prototype refinement:

This task is dedicated to completing the work in WP09 Task T05 and refining the prototypes, customising to local requirements and data availability for the needs of the individual validations.

Lead: PILDO. Contributing BEs: CRIDA, ENAV, SEA, ADR, PRG, AENA, DBL, CIMA

## Work package WP11 – Solution 2, part 1

|                            |      |                         |          |
|----------------------------|------|-------------------------|----------|
| <b>Work Package Number</b> | WP11 | <b>Lead Beneficiary</b> | 12 - LFV |
|----------------------------|------|-------------------------|----------|



|                          |                    |                  |    |
|--------------------------|--------------------|------------------|----|
| <b>Work Package Name</b> | Solution 2, part 1 |                  |    |
| <b>Start Month</b>       | 1                  | <b>End Month</b> | 18 |

### Objectives

This work packages realize the first part of Solution 2 with a focus on the optimisation of runway throughput

### Description

#### T01: Solution Management

Coordination and alignment of partners on work package level/ Participation on project coordination/ Reporting of work package evolution/ Organisation of coordination meetings/ Communication of changes throughout the project evolution to PARADISE project management (impact related to the ATM master plan to trigger Grant Agreement changes)/ Responsibility for document submission and delivery of work-package documents/ Identification of risks: assessment and mitigation on operational, technical and project level.

In addition to Work package management: Monitoring and control of solution development, reporting of solution evolution and securing Exit Maturity Gate. Lead: LFV. Contributing beneficiaries: All solution contributors

#### T02 SPR-INTEROP/OSED

Preparation and delivery of a comprehensive description to define the operational context, the use cases, the requirements and the safety, environmental, human performance, and performance assessments under consideration of validation results. It includes Part I to Part V Annexes. Lead: SWED. Contributing beneficiaries: All solution contributors

#### T03 TS/IRS

Preparation and delivery of the Technical Specifications/Interface Requirements Specifications document providing functional, non-functional and interface requirements related to the solution. Lead: TERN. Contributing beneficiaries: AIROPS, ECTL, LFV, SAAB, SAABNL, SINTEF, SWED

T04 Development thread 2.1: TERN will develop the ORD prototype and integrate the ML algorithms developed by ECTL for eORD. The ORD/eORD will be integrated into the TERN Polaris ATM simulation platform (in LHBP APP configuration) in preparation for the technical assessment/prototyping sessions and validation exercise. LEAD: TERN. Contributing beneficiaries: AIRBUS, AIROPS, ECTL

T05 Development thread 2.2: SINTEF will implement the optimisation of SID among alternative performance-based SIDs into eIRSM and SAAB and SAABNL will integrate eORD, eOSD and eIRSM into eIRD supported by SINTEF and ECTL. LEAD: SINTEF. Contributing beneficiaries: ECTL, LFV, SAAB, SAABNL

#### T06 VALP

Preparation and delivery of the Validation Plan describing how the solution is intended to be validated. It includes Part I to Part IV Annexes. Lead: LFV. Contributing beneficiaries: AIRBUS, AIROPS, ECTL, HUN, LFV, SAAB, SAABNL, SINTEF, SWED, TERN

T07 Prototyping eORD with ML: In RP1 TERN, HUN and ECTL will conduct a prototyping session of the eORD with ML industrial prototype in preparation for the EXE2.1 RTS. This prototyping session will be conducted on the TERN premises in Iceland with ATCOs from HUN. Lead: HUN. Contributing beneficiaries: ECTL, TERN

T08: AIRBUS will prepare for the eORD with ADS-C simulation session later conducted as part of WP12. Lead: AIRBUS. Contributing beneficiaries: AIRBUS, AIROPS

T09: HUN will prepare for EXE 2.1 later conducted as part of WP12. Lead: HUN. Contributing beneficiaries: ECTL, TERN

T10: LFV will prepare for the eIRD technical assessment / prototyping session later conducted as part of WP12. Lead: LFV. Contributing beneficiaries: ECTL, SAAB, SAABNL, SINTEF, SWED

T11: LFV will prepare EXE 2.2 later conducted as part of WP12. Lead: LFV. Contributing beneficiaries: ECTL, SINTEF

T12: LFV will prepare EXE 2.3 later conducted as part of WP12. Lead: LFV. Contributing beneficiaries: ECTL, SAAB, SAABNL, SINTEF, SWED

#### T13 Technical assessment

AIRBUS, ECTL, ENAV and HUN will perform a technical assessment after prototyping session T07 in preparation of EXE 2.1 Lead: AIRBUS. Contributing beneficiaries: ECTL, ENAV, HUN

#### T14 CBA

Preparation and delivery of the Cost Benefit Analysis report describing the benefits and costs related to deployment of the solution. Lead: AIRBUS. Contributing beneficiaries: SINTEF

#### T15 STAND

Preparation and delivery of input to standardisation activities. Lead: ECTL. Contributing beneficiaries: AIRBUS, AIROPS, SWED

#### T16 REG

Preparation and delivery of input to regulatory activities. Lead: ECTL.

## Work package WP12 – Solution 2, part 2

| Work Package Number | WP12               | Lead Beneficiary | 12 - LFV |
|---------------------|--------------------|------------------|----------|
| Work Package Name   | Solution 2, part 2 |                  |          |
| Start Month         | 19                 | End Month        | 36       |

### Objectives

This work packages realize the second part of Solution 2 with a focus on validation of solutions for the optimisation of runway throughput.

### Description

#### T01 Solution Management

Coordination and alignment of partners on work package level/ Participation on project coordination/ Reporting of work package evolution/ Organisation of coordination meetings/ Communication of changes throughout the project evolution to PARADISE project management (impact related to the ATM master plan to trigger Grant Agreement changes)/ Responsibility for document submission and delivery of work-package documents/ Identification of risks: assessment and mitigation on operational, technical and project level.

In addition to Work package management: Monitoring and control of solution development, reporting of solution evolution and securing Exit Maturity Gate. Lead: LFV. Contributing beneficiaries: All solution contributors

#### T02 SPR-INTEROP/OSED

Preparation and delivery of a comprehensive description to define the operational context, the use cases, the requirements and the safety, environmental, human performance, and performance assessments under consideration of validation results. It includes Part I to Part V Annexes. Lead: SWED. Contributing beneficiaries: ECTL, ENAV, HUN, LFV, SAAB, SAABNL, SINTEF, TERN

#### T03 TS/IRS

Preparation and delivery of the Technical Specifications/Interface Requirements Specifications document providing functional, non-functional and interface requirements related to the solution. Lead: TERN. Contributing beneficiaries: ECTL, LFV, SAAB, SAABNL, SINTEF, SWED

#### T04 Development thread 2.1

TERN with support from ECTL will continue to develop the eORD prototype and integrate the updated ML algorithms with ADS-C models developed by Airbus. The updated eORD will be integrated into the TERN Polaris APP simulation platform for LHBP in preparation for the EXE2.1 validation exercise. Lead: TERN. Contributing beneficiaries: ECTL

#### T05 Development thread 2.2

SINTEF will test the optimisation of SID among alternative performance-based SIDs in preparation of EXE 2.2 and EXE 2.3. SAAB and SAABNL will integrate eORD, eOSD and eIRSM into eIRD supported by SINTEF and ECTL. Lead: SINTEF. Contributing beneficiaries: ECTL, LFV, SAAB, SAABNL

#### T06 VALP



Preparation and delivery of the Validation Plan describing how the solution is intended to be validated. It includes Part I to Part IV Annexes. Lead: LFV. Contributing beneficiaries: TERN, ECTL

T07

T08 Prototyping session for eORD with ADS-C

AIRBUS will conduct a technical assessment / simulation to calibrate the eORD models for eORD with the downlink of flight specific information via ADS-C prior to the EXE2.1. The calibration will be based on various environments including several European airports and will be conducted by Airbus, in Toulouse. Lead: AIRBUS. Contributing beneficiaries: AIROPS

T09 EXE 2.1

HUN, with support from ECTL and TERN will conduct EXE 2.1 as a TRL6 Real Time Simulation validating eORD (with ML and ADS-C) compared to ORD based on LHBP environment. The RTS will be conducted by HUN in Budapest with eORD (comprising of ML and ADS-C models) using the TERN Polaris ATM simulation platform with the in LHBP APP configuration. Lead: HUN. Contributing beneficiaries: ECTL, TERN

T10 Prototyping session eIRD

LFV will conduct a technical assessment / prototyping session for eIRD with iRSM supported by eORD and eOSD based on the ESSA APP and TWR environment with LFV ATCOs in preparation for the TRL6 RTS. validating eIRD with eIRSM supported by eORD and eOSD compared to iRSM based on ESSA environment. Lead: LFV. Contributing beneficiaries: ECTL, SAAB, SAABNL

T11 EXE 2.2

LFV will conduct EXE 2.2 as a Real Time Simulation supporting TRL6 validating eIRD to assess performance benefits of using eIRD developed by SAAB and SAABNL consisting of iRSM with eOSD and eORD based on ESSA environment. Lead: LFV. Contributing beneficiaries: ECTL, SAAB, SAABNL, SINTEF, SWED

T12 EXE 2.3

LFV will conduct EXE 2.3 a RTS integrating the complete Solution 2, with eIRSM including the performance based SIDs developed by SINTEF). This TRL6 Real Time Simulation will be based on ESSA environment. Contributing beneficiaries: Lead: LFV. Contributing beneficiaries: ECTL, SAAB, SAABNL, SINTEF, SWED

T13 VALR

Preparation and delivery of the Validation Report describing the results of validation exercises defined in VALP, how they have been conducted, and relevant conclusions and recommendations. Lead: AIRBUS. Contributing beneficiaries: All solution contributors

T14 CBA

Preparation and delivery of the Cost Benefit Analysis report describing the benefits and costs related to deployment of the solution. Lead: AIRBUS. Contributing beneficiaries: AIROPS, ECTL, LFV, SAAB, SAABNL, SINTEF

T15 STAND

Preparation and delivery of input to standardisation activities. Lead: ECTL. Contributing beneficiaries: AIRBUS, AIROPS, SAAB, SAABNL, SINTEF, SWED

T16 REG

Preparation and delivery of input to regulatory activities. Lead: ECTL. Contributing beneficiaries: AIRBUS, AIROPS, ECTL, SINTEF

## Work package WP13 – Solution 3, part 1

|                            |                    |                         |           |
|----------------------------|--------------------|-------------------------|-----------|
| <b>Work Package Number</b> | WP13               | <b>Lead Beneficiary</b> | 2 - ADBSG |
| <b>Work Package Name</b>   | Solution 3, part 1 |                         |           |
| <b>Start Month</b>         | 1                  | <b>End Month</b>        | 18        |

### Objectives

This work package realizes the first part of Solution 3 with a focus on intelligent surface management

| Description                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |
|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <p><b>T01 Solution Management</b><br/> Coordination and alignment of partners on work package level/ Participation on project coordination/ Reporting of work package evolution/ Organisation of coordination meetings/ Communication of changes throughout the project evolution to PARADISE project management (impact related to the ATM master plan to trigger Grant Agreement changes)/ Responsibility for document submission and delivery of work-package documents/ Identification of risks: assessment and mitigation on operational, technical and project level.<br/> In addition to Work package management: Monitoring and control of solution development, reporting of solution evolution and securing Exit Maturity Gate.<br/> Lead: ADBSG. Contributing BEs: All solution contributors</p> |
| <p><b>T02 SPR-INTEROP/OSED</b><br/> Preparation and delivery of a comprehensive description to define the operational context, the use cases, the requirements and the safety, environmental, human performance, and performance assessments under consideration of validation results. It includes Part I to Part V Annexes.<br/> Lead: DLR. Contributing BEs: ADBSG, FRA, MUC, ECTL, AIROPS</p>                                                                                                                                                                                                                                                                                                                                                                                                           |
| <p><b>T03 TS-IRS</b><br/> Preparation and delivery of the Technical Specifications/Interface Requirements Specifications document providing functional, non-functional and interface requirements related to the solution.<br/> Lead: ADBSG, Contributing BEs: EML, FRA, ROS, ECTL, LHS</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |
| <p><b>T04 VALP</b><br/> Preparation and delivery of the Validation Plan describing how the solution is intended to be validated. It includes Part I to Part IV Annexes.<br/> Lead: DLR. Contributing BEs: ADBSG, EML, FRA, MUC, ROS, ECTL, LHS, SINTEF</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |
| <p><b>T05 Development thread 3.0</b><br/> EML and DLR will develop ASRU for ground operations (clearances, taxi routes); ADBSG will integrate ASRU in ICWP, MUC, FRA and DLR will train the ASRU service<br/> Lead: ADBSG. Contributing BEs: DLR, EML, FRA, MUC</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |
| <p><b>T06 Development thread 3.1</b><br/> ADBSG will integrate camera stream in ICWP to be automatically displayed based on callsign detection from EML/ DLR ASRU (pilot and controller voice)<br/> Lead: ADBSG. Contributing BEs: DLR, MUC</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |
| <p><b>T07 Development thread 3.2</b><br/> DLR develops Digital ATCO Service which operates (clearances, handovers) one part of airport. Digital ATCO commands are integrated in ADBSG ICWP. For instructions from Digital ATCO the corresponding synthetic voice commands are generated by DLR.<br/> Lead: DLR. Contributing BEs: ADBSG</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |
| <p><b>T08 Development thread 3.3, Moving Map</b><br/> Verbal controller clearance/taxi instructions are converted into digital commands via ASRU from EML and DLR and further integrated in ADBSG ICWP. ADBSG ICWP transmits digital messages to Airport Moving Map (AMM) from LHS and ROS. Technical and operational support provided by Airbus and LH.<br/> Lead: ADBSG. Contributing BEs: FRA, ROS, LH, LHS</p>                                                                                                                                                                                                                                                                                                                                                                                          |
| <p><b>T09 Development thread 3.3, Voice Generation Service</b><br/> Building on T08, digital messages are transmitted from ADBSG ICWP to mobile device in cockpit, and voice commands are generated by DLR.<br/> Lead: DLR. Contributing BEs: ADBSG</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |
| <p><b>T10 STAND</b><br/> Preparation and delivery of input to standardisation activities<br/> Lead: FRA Contributing BEs: MUC, ADBSG, DLH, EML, LHS</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |
| <p><b>T11 REG</b><br/> Preparation and delivery of input to regulatory activities<br/> Lead: ADBSG. Contributing BEs: EML, FRA, MUC, ECTL, DLH, LHS</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |

**Work package WP14 – Solution 3, part 2**

|                            |                    |                         |           |
|----------------------------|--------------------|-------------------------|-----------|
| <b>Work Package Number</b> | WP14               | <b>Lead Beneficiary</b> | 2 - ADBSG |
| <b>Work Package Name</b>   | Solution 3, part 2 |                         |           |
| <b>Start Month</b>         | 19                 | <b>End Month</b>        | 36        |

|                                                                                                      |
|------------------------------------------------------------------------------------------------------|
| <b>Objectives</b>                                                                                    |
| This work package realizes the 2nd part of Solution 3 with a focus on intelligent surface management |

|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |
|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Description</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |
| <p><b>T01 Solution Management</b><br/> Coordination and alignment of partners on work package level/ Participation on project coordination/ Reporting of work package evolution/ Organisation of coordination meetings/ Communication of changes throughout the project evolution to PARADISE project management (impact related to the ATM master plan to trigger Grant Agreement changes)/ Responsibility for document submission and delivery of work-package documents/ Identification of risks: assessment and mitigation on operational, technical and project level.<br/> In addition to Work package management: Monitoring and control of solution development, reporting of solution evolution and securing Exit Maturity Gate.<br/> Lead: ADBSG. Contributing BEs: All solution contributors</p> <p><b>T02 SPR-INTEROP/OSED</b><br/> Preparation and delivery of a comprehensive description to define the operational context, the use cases, the requirements and the safety, environmental, human performance, and performance assessments under consideration of validation results. It includes Part I to Part V Annexes.<br/> Lead: DLR. Contributing BEs: ADBSG, FRA, MUC, ECTL, AIROPS</p> <p><b>T03 TS-IRS</b><br/> Preparation and delivery of the Technical Specifications/Interface Requirements Specifications document providing functional, non-functional and interface requirements related to the solution.<br/> Lead: ADBSG. Contributing BEs: EML, FRA, MUC, ROS, LH, LHS, AIROPS, SINTEF</p> <p><b>T04 VALP</b><br/> Preparation and delivery of the Validation Plan describing how the solution is intended to be validated. It includes Part I to Part IV Annexes.<br/> Lead: DLR. Contributing BEs: ADBSG, EML, FRA, MUC, ROS, ECTL, LHS, SINTEF</p> <p><b>T05 Development thread 3.0</b><br/> Lead: ADBSG. Contributing BEs: DLR, EML, FRA, MUC</p> <p><b>T06 Development thread 3.1</b><br/> Lead: ADBSG. Contributing BEs: DLR, MUC</p> <p><b>T07 Development thread 3.2</b><br/> Lead: DLR. Contributing BEs: ADBSG</p> <p><b>T08 Development thread 3.3, Moving Map</b><br/> Lead: ADBSG. Contributing BEs: FRA, ROS, LH, LHS</p> <p><b>T09 Development thread 3.3: Voice Generation Service</b><br/> Lead: DLR. Contributing BEs: ADBSG</p> <p><b>T10 Simulator Installation</b><br/> Lead: DLR. Contributing BEs: ADBSG, EML, LHS</p> <p><b>T11 Validation thread 3.1</b><br/> Lead: DLR. Contributing BEs: MUC</p> <p><b>T12 Validation thread 3.2</b><br/> Lead: DLR. Contributing BEs: FRA, MUC, ECTL</p> |

|                                                                                                                                                                                                                                                                                   |
|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| T13 Validation thread 3.3, Moving Map<br>Lead: DLR. Controbuting BEs: FRA, MUC, LH, AIROPS                                                                                                                                                                                        |
| T14 Validation thread 3.3, Voice Generation<br>Lead: DLR. Controbuting BEs: FRA, MUC, ECTL                                                                                                                                                                                        |
| T15 Installation Field Test FRA<br>Lead: FRA. Controbuting BEs: ADBSG, DLR, EML, LHS                                                                                                                                                                                              |
| T16 Validation thread 3.3, Moving Map<br>Lead: FRA. Controbuting BEs: MUC, LH, ROS, ECTL                                                                                                                                                                                          |
| T17 Installation Field Test MUC<br>Lead: MUC. Controbuting BEs: ADBSG, EML                                                                                                                                                                                                        |
| T18 Validation thread 3.1<br>Lead: ADBSG. Controbuting BEs: DLR, MUC, ECTL                                                                                                                                                                                                        |
| T19 VALR<br>Preparation and delivery of the Validation Report describing the results of validation exercises defined in VALP, how they have been conducted, and relevant conclusions and recommendations.<br>Lead: DLR. Controbuting BEs: ADBSG, EML, FRA, ROS, ECTL, LHS, AIRPOS |
| T20 CBA<br>Preparation and delivery of the Cost Benefit Analysis report describing the benefits and costs related to deployment of the solution.<br>Lead: FRA. Controbuting BEs: ADBSG, EML, LHS                                                                                  |
| T21 STAND<br>Preparation and delivery of input to standardisation activities<br>Lead: FRA. Controbuting BEs: ADBSG, EML, ROS, ECTL, LHS                                                                                                                                           |
| T22 REG<br>Preparation and delivery of input to regulatory activities<br>Lead: ADBSG. Controbuting BEs: EML, FRA, ECTL, LHS                                                                                                                                                       |

## Work package WP15 – Solution 4, part 1

|                            |                    |                         |          |
|----------------------------|--------------------|-------------------------|----------|
| <b>Work Package Number</b> | WP15               | <b>Lead Beneficiary</b> | 21 - FRQ |
| <b>Work Package Name</b>   | Solution 4, part 1 |                         |          |
| <b>Start Month</b>         | 1                  | <b>End Month</b>        | 18       |

|                                                                                                                                                                                               |
|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Objectives</b>                                                                                                                                                                             |
| The first phase of Solution 4 with a focus on prediction and optimization in adverse weather, specifically at large airports affected by severe weather conditions impacting their operation. |

|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |
|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Description</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |
| <p>T01 Solution Management</p> <p>Coordination and alignment of partners on work package level/ Participation on project coordination/ Reporting of work package evolution/ Organisation of coordination meetings/ Communication of changes throughout the project evolution to PARADISE project management (impact related to the ATM master plan to trigger Grant Agreement changes)/ Responsibility for document submission and delivery of work-package documents/ Identification of risks: assessment and mitigation on operational, technical and project level.</p> <p>In addition to Work package management: Monitoring and control of solution development, reporting of solution evolution and securing Exit Maturity Gate.</p> <p>Lead: FRQ . Controbuting BEs: SINTEF, AVINOR, AIRSIDE, FOR, FRO, ATR</p> |

**T02 Technical Preparation, Implementation Support**

Based on T10 FRQ prepares and develops a validation system considering software and hardware components, configures the system according to requirements and integrates developed functionality and required interfaces. SINTEF will extend their existing video-based gate monitoring system with a new LIDAR based sensor and will integrate, test and ensure interworking of sensors and train new AI models.

Lead: FRQ . Contributing BEs: SINTEF, FOR, FRO, ATR

**T03 Platform Set-up (HW/SW Installation)**

AIRSIDE, AVINOR, FRQ, SINTEF (= ALL S4) will install the validation platform on site at Oslo Airport, integrate the different sub-systems, and interconnect it to the airport infrastructure, airport systems, and simulators, if necessary, in compliance with data protection and cyber security regulations. Integration testing will be performed by FRQ and SINTEF to ensure components to be interworking.

Lead: FRQ . Contributing BEs: SINTEF, AVINOR, AIRSIDE, FOR, FRO, ATR

**T04 Operational Support**

Air Traffic Controller involvement from the beginning of the project to align the technical solution with operational needs/ ATCO's provision of information to ensure a user-friendly front-end design for advanced human machine teaming in iterative steps through multiple workshops for operational validation readiness/ Validation participation of operational experts to provide feedback on usability and HMI design during passive shadow mode operation/ Support during report period from the operational point of view. (AVINOR)

Lead: AVINOR.

**T05 Functional performance and interoperability testing**

Functional performance and interoperability testing with all related systems (FRQ, AIRSIDE, SINTEF) in solution platform/Lab tests with prerecorded sim. data (AIRSIDE, SINTEF) and passive shadow mode tests (FRQ).

Lead: FRQ. Contributing BEs: SINTEF, AIRSIDE, FOR, FRO, ATR

**T06 Validation Preparation**

Validation Preparation gathering data (AIRSIDE, SINTEF) and pre-testing of validation scenarios in preparation for Validation (AIRSIDE, FRQ, SINTEF).

Lead: AVINOR. Contributing BEs: SINTEF, AVINOR, AIRSIDE, FRQ, FOR, FRO, ATR

**T07 Contextual Note Preparation**

Preparation of the Contextual Note document to be completed in T6 of WP16.

Lead: FRQ. Contributing BEs: FOR, FRO, ATR

**T08 INTEROP/OSD**

Preparation and delivery of a comprehensive description to define the operational context, the use cases, the requirements and the safety, environmental, human performance, and performance assessments under consideration of validation results. It includes Part I to Part V Annexes.

Lead: AVINOR. Contributing BEs: SINTEF, FRQ, FOR, FRO, ATR

**T09 TS/IRS**

Preparation and delivery of the Technical Specifications/Interface Requirements Specifications document providing functional, non-functional and interface requirements related to the solution.

Lead: FRQ. Contributing BEs: SINTEF, FOR, FRO, ATR

**T10 VALP**

Preparation and delivery of the Validation Plan describing how the solution is intended to be validated. It includes Part I to Part IV Annexes.

Lead: SINTEF. Contributing BEs: AVINOR, AIRSIDE, FRQ, FOR, FRO, ATR

**T11 STAND**

Preparation and delivery of input to standardisation activities

Lead: FRQ. Contributing BEs: SINTEF, AIRSIDE, FOR, FRO, ATR

**T12 REG**

Preparation and delivery of input to regulatory activities

Lead: AVINOR.

**Work package WP16 – Solution 4, part 2**

|                            |                    |                         |          |
|----------------------------|--------------------|-------------------------|----------|
| <b>Work Package Number</b> | WP16               | <b>Lead Beneficiary</b> | 21 - FRQ |
| <b>Work Package Name</b>   | Solution 4, part 2 |                         |          |
| <b>Start Month</b>         | 19                 | <b>End Month</b>        | 36       |

**Objectives**

The second phase of Solution 4 with a focus on prediction and optimization in adverse weather, specifically at large airports affected by severe weather conditions impacting their operation.

**Description****T01 Solution Management**

Coordination and alignment of partners on work package level/ Participation on project coordination/ Reporting of work package evolution/ Organisation of coordination meetings/ Communication of changes throughout the project evolution to PARADISE project management (impact related to the ATM master plan to trigger Grant Agreement changes)/ Responsibility for document submission and delivery of work-package documents/ Identification of risks: assessment and mitigation on operational, technical and project level.

In addition to Work package management: Monitoring and control of solution development, reporting of solution evolution and securing Exit Maturity Gate.

Lead: FRQ. Contributing BEs: SINTEF, AVINOR, AIRSIDE, FOR, FRO, ATR

**T02 Technical Consolidation of Results, Validation Report Support**

Based on the development and preliminary validation results, software adjustment (FRQ, SINTEF) and modifications for the refinement (FRQ) and support (SINTEF) for creating the data pack (FRQ). FRQ to refine software configuration based on validation feedback, ensuring alignment with operational requirements as defined in the key project deliverables. SINTEF to contribute through targeted support activities. FRQ will collect input from the project for standardization and certification and coordinate the inputs with EASA for the certification program.

Lead: FRQ. Contributing BEs: SINTEF, FRQ, FOR, FRO, ATR

**T03 Operational Support, Validation Report Support**

Continued Air Traffic Controller involvement (AVINOR) to align the technical solution with operational needs/ATCO's information provision to ensure a user friendly front end design (AVINOR) for advanced human machine teaming in iterative steps through multiple workshops (FRQ, AVINOR) for operational validation readiness/ Validation Preparation and Validation participation of operational experts to provide usability and HMI design feedback during passive shadow mode operation (AVINOR)/ Complementary engineering support and issue processing (AIRSIDE, FRQ, SINTEF) Support during report period from the operational point of view (AVINOR).

Lead: AVINOR. Contributing BEs: SINTEF, AIRSIDE, FRQ, FOR, FRO, ATR

**T04 Functional performance and interoperability re-testing**

Functional performance and interoperability re-testing with all related systems (AIRSIDE, AVINOR, FRQ, SINTEF = ALL S4) as part of the solution platform/ Passive shadow mode re-tests, where applicable (ALL S4).

Lead: FRQ. Contributing BEs: SINTEF, AVINOR, AIRSIDE, FOR, FRO, ATR

**T05 Validation**

Validation, EXE 4.1 with focus on LIDAR based prediction and AI-enabled (AIRSIDE, SINTEF) departure sequencing for more accurate TSAT predictions (FRQ) on an intuitive HMI (FRQ), EXE 4.2 with focus on improved air-ground information exchange through datalink (FRQ) and AIXM-based D-NOTAMs to provide rapid updates for taxi routing clearances in passive shadow mode incorporating adaptive supervisory feedback for control output (ALL S4)/ Focus on human factors, impact on human performance considering operator workload (AVINOR, FRQ)/ Assessment of operational readiness up to TRL6 and user experience with the additional tools provided (AVINOR/FRQ)/Evaluation of software to lower the operational effort and environmental impact (FRQ), while increasing efficiency, safety and resilience (AIRSIDE, FRQ, SINTEF).

Lead: AVINOR. Contributing BEs: SINTEF, AIRSIDE, FRQ, FOR, FRO, ATR

**T06 Contextual Note**

Preparation and delivery of the Contextual Note document introducing the solution in terms of scope, main operational and performance benefits, relevant system impacts.

Lead: FRQ.

#### T07 INTEROP/OSD

Preparation and delivery of a comprehensive description to define the operational context, the use cases, the requirements and the safety, environmental, human performance, and performance assessments under consideration of validation results. It includes Part I to Part V Annexes.

Lead: AVINOR. Contributing BEs: SINTEF, FRQ, FOR, FRO, ATR

#### T08 TS/IRS

Preparation and delivery of the Technical Specifications/Interface Requirements Specifications document providing functional, non-functional and interface requirements related to the solution.

Lead: FRQ. Contributing BEs: SINTEF, FOR, FRO, ATR

#### T09 VALP

Preparation and delivery of the Validation Plan describing how the solution is intended to be validated. It includes Part I to Part IV Annexes.

Lead: SINTEF Contributing BEs: AVINOR, FRQ, FOR, FRO, ATR

#### T10 VALR

Preparation and delivery of the Validation Report describing the results of validation exercises defined in VALP, how they have been conducted, and relevant conclusions and recommendations.

Lead: AIRSIDE. Contributing BEs: SINTEF, AVINOR, FRQ, FOR, FRO, ATR

#### T11 CBA

Preparation and delivery of the Cost Benefit Analysis report describing the benefits and costs related to deployment of the solution.

Lead: AVINOR. Contributing BEs: FRQ, FOR, FRO, ATR

#### T12 STAND

Preparation and delivery of input to standardisation activities

Lead: FRQ. Contributing BEs: SINTEF, AIRSIDE, FOR, FRO, ATR

#### T13 REG

Preparation and delivery of input to regulatory activities

Lead: AVINOR.



## STAFF EFFORT

| Staff effort per participant                                        |       |       |      |      |      |      |      |      |       |       |                     |
|---------------------------------------------------------------------|-------|-------|------|------|------|------|------|------|-------|-------|---------------------|
| Grant Preparation (Work packages - Effort screen) — Enter the info. |       |       |      |      |      |      |      |      |       |       |                     |
| Participant                                                         | WP1   | WP2   | WP3  | WP4  | WP5  | WP6  | WP7  | WP8  | WP9   | WP10  | Total Person-Months |
| 1 - SINTEF                                                          | 18.50 | 18.50 | 7.00 | 5.00 | 1.00 | 1.00 | 3.00 | 4.00 | 2.00  | 1.00  | 151.75              |
| 2 - ADBSG                                                           |       |       | 1.00 | 1.00 | 0.75 | 0.75 | 2.00 | 2.00 |       |       | 134.40              |
| 3 - FRA                                                             |       |       |      |      | 0.75 | 0.75 | 0.50 | 0.50 |       |       | 28.70               |
| 4 - AVINOR                                                          |       |       |      |      |      |      | 0.50 | 0.50 |       |       | 29.40               |
| 5 - DLR                                                             |       |       | 0.50 | 0.50 |      |      | 2.00 |      |       |       | 56.70               |
| 6 - EML                                                             |       |       |      |      |      |      |      |      |       |       | 36.00               |
| 7 - ENAV                                                            |       |       | 0.50 |      |      |      | 1.00 | 1.00 | 17.00 | 21.50 | 45.00               |
| 8 - ECTL                                                            |       |       |      |      |      |      | 0.50 | 3.50 | 12.50 | 14.50 | 89.00               |
| 9 - SWED                                                            |       |       |      |      |      |      | 0.10 | 0.20 |       |       | 13.36               |
| 10 - AIRBUS                                                         |       |       | 0.50 | 0.50 |      |      |      |      |       |       | 20.00               |
| 11 - AIROPS                                                         |       |       |      |      |      |      |      |      |       |       | 37.00               |
| 12 - LFV                                                            |       |       | 0.50 | 0.50 | 1.50 | 1.50 | 1.00 | 1.00 |       |       | 50.00               |
| 13 - SAAB                                                           |       |       |      |      |      |      |      |      |       |       | 8.60                |
| 13.1 - SAABNL                                                       |       |       |      |      |      |      |      |      |       |       | 34.40               |
| 14 - ENAIRE                                                         |       |       |      |      |      |      |      |      | 2.00  | 2.50  | 4.50                |
| 14.1 - CRIDA                                                        |       |       | 2.00 |      | 0.50 | 0.50 | 1.00 | 1.00 | 31.00 | 17.50 | 53.50               |
| 15 - PRG                                                            |       |       |      |      |      |      |      |      | 13.50 | 8.50  | 22.00               |
| 16 - SEA                                                            |       |       |      |      |      |      |      |      | 11.50 | 8.50  | 20.00               |
| 17 - ADR                                                            |       |       |      |      |      |      |      |      | 10.50 | 8.50  | 19.00               |



| <b>Staff effort per participant</b><br><i>Grant Preparation (Work packages - Effort screen) — Enter the info.</i> |       |       |       |       |       |       |       |       |        |        |                     |
|-------------------------------------------------------------------------------------------------------------------|-------|-------|-------|-------|-------|-------|-------|-------|--------|--------|---------------------|
| Participant                                                                                                       | WP1   | WP2   | WP3   | WP4   | WP5   | WP6   | WP7   | WP8   | WP9    | WP10   | Total Person-Months |
| 18 - ROS                                                                                                          |       |       |       |       |       |       |       |       |        |        | 23.50               |
| 19 - PILDO                                                                                                        |       |       |       |       |       |       | 1.00  | 1.00  | 60.00  | 30.00  | 92.00               |
| 20 - AIRSIDE                                                                                                      |       |       |       |       |       |       |       |       |        |        | 12.00               |
| 21 - FRQ                                                                                                          |       |       | 2.00  | 2.00  | 15.50 | 12.94 | 2.50  | 1.50  |        |        | 129.24              |
| 21.1 - FOR                                                                                                        |       |       |       |       |       |       |       |       |        |        | 47.38               |
| 21.2 - FRO                                                                                                        |       |       |       |       |       |       |       |       |        |        | 69.66               |
| 21.3 - ATR                                                                                                        |       |       |       |       |       |       |       |       |        |        | 26.44               |
| 22 - HUN                                                                                                          |       |       |       |       |       |       |       |       |        |        | 4.00                |
| 23 - LH                                                                                                           |       |       |       |       |       |       |       |       |        |        | 8.40                |
| 24 - LHS                                                                                                          |       |       | 0.50  | 0.50  |       |       |       |       |        |        | 35.10               |
| 25 - AENA                                                                                                         |       |       |       |       |       |       |       |       | 10.00  | 4.50   | 14.50               |
| 26 - UNIBO                                                                                                        |       |       |       |       |       |       | 17.50 | 17.50 |        |        | 35.00               |
| 27 - DBL                                                                                                          |       |       |       |       |       |       |       |       | 18.50  | 16.50  | 54.50               |
| 28 - MUC                                                                                                          |       |       |       |       |       |       |       |       |        |        | 27.00               |
| 29 - CIMA                                                                                                         |       |       |       |       |       |       | 1.20  | 1.20  | 12.60  | 12.60  | 27.60               |
| 30 - TERN                                                                                                         |       |       | 0.50  | 0.50  |       |       | 1.00  | 1.00  |        |        | 42.50               |
| 30.1 - TERN-H                                                                                                     |       |       |       |       |       |       | 0.50  | 0.50  |        |        | 59.00               |
| 31 - ANS CR                                                                                                       |       |       |       |       |       |       |       |       | 4.30   | 4.30   | 8.60                |
| <b>Total Person-Months</b>                                                                                        | 18.50 | 18.50 | 15.00 | 10.50 | 20.00 | 17.44 | 35.30 | 36.40 | 205.40 | 150.40 | 1569.73             |

| Staff effort per participant                                        |       |       |       |       |       |       |                     |
|---------------------------------------------------------------------|-------|-------|-------|-------|-------|-------|---------------------|
| Grant Preparation (Work packages - Effort screen) — Enter the info. |       |       |       |       |       |       |                     |
| Participant                                                         | WP11  | WP12  | WP13  | WP14  | WP15  | WP16  | Total Person-Months |
| 1 - SINTEF                                                          | 22.25 | 20.50 | 2.00  | 1.00  | 25.00 | 20.00 | 151.75              |
| 2 - ADBSG                                                           |       |       | 70.70 | 56.20 |       |       | 134.40              |
| 3 - FRA                                                             |       |       | 14.70 | 11.50 |       |       | 28.70               |
| 4 - AVINOR                                                          |       |       |       |       | 14.60 | 13.80 | 29.40               |
| 5 - DLR                                                             |       |       | 21.10 | 32.60 |       |       | 56.70               |
| 6 - EML                                                             |       |       | 22.50 | 13.50 |       |       | 36.00               |
| 7 - ENAV                                                            | 1.50  | 2.50  |       |       |       |       | 45.00               |
| 8 - ECTL                                                            | 15.00 | 18.00 | 11.00 | 14.00 |       |       | 89.00               |
| 9 - SWED                                                            | 6.01  | 7.05  |       |       |       |       | 13.36               |
| 10 - AIRBUS                                                         | 10.25 | 8.75  |       |       |       |       | 20.00               |
| 11 - AROPS                                                          | 20.00 | 13.00 | 3.00  | 1.00  |       |       | 37.00               |
| 12 - LFV                                                            | 18.50 | 25.50 |       |       |       |       | 50.00               |
| 13 - SAAB                                                           | 4.10  | 4.50  |       |       |       |       | 8.60                |
| 13.1 - SAABNL                                                       | 16.40 | 18.00 |       |       |       |       | 34.40               |
| 14 - ENAIRE                                                         |       |       |       |       |       |       | 4.50                |
| 14.1 - CRIDA                                                        |       |       |       |       |       |       | 53.50               |
| 15 - PRG                                                            |       |       |       |       |       |       | 22.00               |
| 16 - SEA                                                            |       |       |       |       |       |       | 20.00               |
| 17 - ADR                                                            |       |       |       |       |       |       | 19.00               |
| 18 - ROS                                                            |       |       | 9.50  | 14.00 |       |       | 23.50               |
| 19 - PILDO                                                          |       |       |       |       |       |       | 92.00               |

| <b>Staff effort per participant</b><br><i>Grant Preparation (Work packages - Effort screen) — Enter the info.</i> |        |        |        |        |        |        |                     |
|-------------------------------------------------------------------------------------------------------------------|--------|--------|--------|--------|--------|--------|---------------------|
| Participant                                                                                                       | WP11   | WP12   | WP13   | WP14   | WP15   | WP16   | Total Person-Months |
| 20 - AIRSIDE                                                                                                      |        |        |        |        | 5.50   | 6.50   | 12.00               |
| 21 - FRQ                                                                                                          |        |        |        |        | 48.75  | 44.05  | 129.24              |
| 21.1 - FOR                                                                                                        |        |        |        |        | 24.50  | 22.88  | 47.38               |
| 21.2 - FRO                                                                                                        |        |        |        |        | 37.50  | 32.16  | 69.66               |
| 21.3 - ATR                                                                                                        |        |        |        |        | 12.00  | 14.44  | 26.44               |
| 22 - HUN                                                                                                          | 2.00   | 2.00   |        |        |        |        | 4.00                |
| 23 - LH                                                                                                           |        |        | 4.20   | 4.20   |        |        | 8.40                |
| 24 - LHS                                                                                                          |        |        | 16.70  | 17.40  |        |        | 35.10               |
| 25 - AENA                                                                                                         |        |        |        |        |        |        | 14.50               |
| 26 - UNIBO                                                                                                        |        |        |        |        |        |        | 35.00               |
| 27 - DBL                                                                                                          | 6.00   | 13.50  |        |        |        |        | 54.50               |
| 28 - MUC                                                                                                          |        |        | 7.50   | 19.50  |        |        | 27.00               |
| 29 - CIMA                                                                                                         |        |        |        |        |        |        | 27.60               |
| 30 - TERN                                                                                                         | 20.75  | 18.75  |        |        |        |        | 42.50               |
| 30.1 - TERN-H                                                                                                     | 29.00  | 29.00  |        |        |        |        | 59.00               |
| 31 - ANS CR                                                                                                       |        |        |        |        |        |        | 8.60                |
| <b>Total Person-Months</b>                                                                                        | 171.76 | 181.05 | 182.90 | 184.90 | 167.85 | 153.83 | 1569.73             |

## LIST OF DELIVERABLES

| <b>Deliverables</b><br><i>Grant Preparation (Deliverables screen) — Enter the info.</i><br><i>The labels used mean:</i><br><i>Public — fully open ( automatically posted online)</i><br><i>Sensitive — limited under the conditions of the Grant Agreement</i><br><i>EU classified —RESTREINT-UE/EU-RESTRICTED, CONFIDENTIEL-UE/EU-CONFIDENTIAL, SECRET-UE/EU-SECRET under Decision <a href="#">2015/444</a></i> |                  |                 |                  |                            |                     |                  |
|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------|-----------------|------------------|----------------------------|---------------------|------------------|
| Deliverable No                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    | Deliverable Name | Work Package No | Lead Beneficiary | Type                       | Dissemination Level | Due Date (month) |
| D1.1                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              | PMP v1           | WP1             | 1 - SINTEF       | R — Document, report       | SEN - Sensitive     | 3                |
| D1.2                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              | DMP v1           | WP1             | 1 - SINTEF       | DMP — Data Management Plan | PU - Public         | 6                |
| D2.1                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              | DMP v2           | WP2             | 1 - SINTEF       | DMP — Data Management Plan | PU - Public         | 34               |
| D3.1                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              | SED v1           | WP3             | 1 - SINTEF       | R — Document, report       | SEN - Sensitive     | 16               |
| D4.1                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              | SED v2           | WP4             | 1 - SINTEF       | R — Document, report       | PU - Public         | 32               |
| D5.1                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              | nSDM v1          | WP5             | 21 - FRQ         | R — Document, report       | SEN - Sensitive     | 16               |
| D6.1                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              | nSDM v2          | WP6             | 21 - FRQ         | R — Document, report       | PU - Public         | 32               |
| D7.1                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              | CDEP v1          | WP7             | 26 - UNIBO       | R — Document, report       | PU - Public         | 3                |
| D7.2                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              | CDEP v2          | WP7             | 26 - UNIBO       | R — Document, report       | PU - Public         | 8                |
| D8.1                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              | CDEP v3          | WP8             | 26 - UNIBO       | R — Document, report       | PU - Public         | 20               |
| D8.2                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              | CDEP v4          | WP8             | 26 - UNIBO       | R — Document, report       | PU - Public         | 34               |
| D9.1                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              | REG S1 v1        | WP9             | 8 - ECTL         | R — Document, report       | SEN - Sensitive     | 3                |
| D9.2                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              | STAND S1 v1      | WP9             | 8 - ECTL         | R — Document, report       | SEN - Sensitive     | 3                |

**Deliverables**

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| Deliverable No | Deliverable Name | Work Package No | Lead Beneficiary | Type                 | Dissemination Level | Due Date (month) |
|----------------|------------------|-----------------|------------------|----------------------|---------------------|------------------|
| D9.3           | OSD S1 v1        | WP9             | 7 - ENAV         | R — Document, report | SEN - Sensitive     | 8                |
| D9.4           | TS/IRS S1 v1     | WP9             | 19 - PILDO       | R — Document, report | SEN - Sensitive     | 8                |
| D9.5           | VALP S1 v1       | WP9             | 14.1 - CRIDA     | R — Document, report | SEN - Sensitive     | 8                |
| D9.6           | STAND S1 v2      | WP9             | 8 - ECTL         | R — Document, report | SEN - Sensitive     | 8                |
| D9.7           | REG S1 v2        | WP9             | 8 - ECTL         | R — Document, report | SEN - Sensitive     | 8                |
| D9.8           | VALP S1 v2       | WP9             | 14.1 - CRIDA     | R — Document, report | SEN - Sensitive     | 18               |
| D9.9           | OSD S1 v2        | WP9             | 7 - ENAV         | R — Document, report | SEN - Sensitive     | 18               |
| D9.10          | TS/IRS S1 v2     | WP9             | 19 - PILDO       | R — Document, report | SEN - Sensitive     | 18               |
| D10.1          | REG S1 v3        | WP10            | 8 - ECTL         | R — Document, report | SEN - Sensitive     | 20               |
| D10.2          | CBA S1 v1        | WP10            | 14.1 - CRIDA     | R — Document, report | SEN - Sensitive     | 20               |
| D10.3          | STAND S1 v3      | WP10            | 8 - ECTL         | R — Document, report | SEN - Sensitive     | 20               |
| D10.4          | VALR S1 v1       | WP10            | 14.1 - CRIDA     | R — Document, report | PU - Public         | 31               |
| D10.5          | OSD S1 v3        | WP10            | 7 - ENAV         | R — Document, report | PU - Public         | 32               |
| D10.6          | TS/IRS S1 v3     | WP10            | 19 - PILDO       | R — Document, report | PU - Public         | 32               |
| D10.7          | CBA S1 v2        | WP10            | 14.1 - CRIDA     | R — Document, report | PU - Public         | 32               |
| D10.8          | STAND S1 v4      | WP10            | 8 - ECTL         | R — Document, report | PU - Public         | 32               |
| D10.9          | REG S1 v4        | WP10            | 8 - ECTL         | R — Document, report | PU - Public         | 32               |

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| Deliverable No | Deliverable Name | Work Package No | Lead Beneficiary | Type                 | Dissemination Level | Due Date (month) |
|----------------|------------------|-----------------|------------------|----------------------|---------------------|------------------|
| D10.10         | CN S1            | WP10            | 14.1 - CRIDA     | R — Document, report | PU - Public         | 32               |
| D11.1          | STAND S2 v1      | WP11            | 8 - ECTL         | R — Document, report | SEN - Sensitive     | 3                |
| D11.2          | REG S2 v1        | WP11            | 8 - ECTL         | R — Document, report | SEN - Sensitive     | 3                |
| D11.3          | OSSED S2 v1      | WP11            | 9 - SWED         | R — Document, report | SEN - Sensitive     | 8                |
| D11.4          | STAND S2 v2      | WP11            | 8 - ECTL         | R — Document, report | SEN - Sensitive     | 8                |
| D11.5          | REG S2 v2        | WP11            | 8 - ECTL         | R — Document, report | SEN - Sensitive     | 8                |
| D11.6          | TS/IRS S2 v1     | WP11            | 30 - TERN        | R — Document, report | SEN - Sensitive     | 8                |
| D11.7          | VALP S2 v1       | WP11            | 12 - LFV         | R — Document, report | SEN - Sensitive     | 8                |
| D12.1          | VALP S2 v2       | WP12            | 12 - LFV         | R — Document, report | SEN - Sensitive     | 20               |
| D12.2          | REG S2 v3        | WP12            | 8 - ECTL         | R — Document, report | SEN - Sensitive     | 20               |
| D12.3          | TS/IRS S2 v2     | WP12            | 30 - TERN        | R — Document, report | SEN - Sensitive     | 20               |
| D12.4          | CBA S2 v1        | WP12            | 10 - AIRBUS      | R — Document, report | SEN - Sensitive     | 20               |
| D12.5          | STAND S2 v3      | WP12            | 8 - ECTL         | R — Document, report | PU - Public         | 20               |
| D12.6          | OSSED S2 v2      | WP12            | 9 - SWED         | R — Document, report | SEN - Sensitive     | 20               |
| D12.7          | OSSED S2 v3      | WP12            | 9 - SWED         | R — Document, report | PU - Public         | 32               |
| D12.8          | TS/IRS S2 v3     | WP12            | 30 - TERN        | R — Document, report | PU - Public         | 32               |
| D12.9          | VALR S2          | WP12            | 10 - AIRBUS      | R — Document, report | PU - Public         | 32               |

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| Deliverable No | Deliverable Name | Work Package No | Lead Beneficiary | Type                 | Dissemination Level | Due Date (month) |
|----------------|------------------|-----------------|------------------|----------------------|---------------------|------------------|
| D12.10         | CBA S2 v2        | WP12            | 10 - AIRBUS      | R — Document, report | PU - Public         | 32               |
| D12.11         | STAND S2 v4      | WP12            | 8 - ECTL         | R — Document, report | PU - Public         | 32               |
| D12.12         | REG S2 v4        | WP12            | 8 - ECTL         | R — Document, report | PU - Public         | 32               |
| D12.13         | CN S2            | WP12            | 12 - LFV         | R — Document, report | PU - Public         | 32               |
| D13.1          | STAND S3 v1      | WP13            | 3 - FRA          | R — Document, report | SEN - Sensitive     | 3                |
| D13.2          | REG S3 v1        | WP13            | 3 - FRA          | R — Document, report | SEN - Sensitive     | 3                |
| D13.3          | OSD S3 v1        | WP13            | 5 - DLR          | R — Document, report | SEN - Sensitive     | 8                |
| D13.4          | TS/IRS S3 v1     | WP13            | 2 - ADBSG        | R — Document, report | SEN - Sensitive     | 8                |
| D13.5          | VALP S3 v1       | WP13            | 5 - DLR          | R — Document, report | SEN - Sensitive     | 8                |
| D13.6          | STAND S3 v2      | WP13            | 3 - FRA          | R — Document, report | SEN - Sensitive     | 8                |
| D13.7          | REG S3 v2        | WP13            | 3 - FRA          | R — Document, report | SEN - Sensitive     | 8                |
| D14.1          | OSD S3 v2        | WP14            | 5 - DLR          | R — Document, report | SEN - Sensitive     | 20               |
| D14.2          | TS/IRS S3 v2     | WP14            | 2 - ADBSG        | R — Document, report | SEN - Sensitive     | 20               |
| D14.3          | CBA S3 v1        | WP14            | 3 - FRA          | R — Document, report | SEN - Sensitive     | 20               |
| D14.4          | STAND S3 v3      | WP14            | 3 - FRA          | R — Document, report | SEN - Sensitive     | 20               |
| D14.5          | REG S3 v3        | WP14            | 3 - FRA          | R — Document, report | SEN - Sensitive     | 20               |
| D14.6          | OSD S3 v3        | WP14            | 5 - DLR          | R — Document, report | PU - Public         | 32               |

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| Deliverable No | Deliverable Name | Work Package No | Lead Beneficiary | Type                 | Dissemination Level | Due Date (month) |
|----------------|------------------|-----------------|------------------|----------------------|---------------------|------------------|
| D14.7          | TS/IRS S3 v3     | WP14            | 2 - ADBSG        | R — Document, report | PU - Public         | 32               |
| D14.8          | VALP S3 v2       | WP14            | 5 - DLR          | R — Document, report | SEN - Sensitive     | 32               |
| D14.9          | VALR S3          | WP14            | 5 - DLR          | R — Document, report | PU - Public         | 32               |
| D14.10         | CBA S3 v2        | WP14            | 3 - FRA          | R — Document, report | PU - Public         | 32               |
| D14.11         | STAND S3 v4      | WP14            | 3 - FRA          | R — Document, report | PU - Public         | 32               |
| D14.12         | REG S3 v4        | WP14            | 2 - ADBSG        | R — Document, report | PU - Public         | 32               |
| D14.13         | CN S3            | WP14            | 2 - ADBSG        | R — Document, report | PU - Public         | 32               |
| D15.1          | REG S4 v1        | WP15            | 4 - AVINOR       | R — Document, report | SEN - Sensitive     | 3                |
| D15.2          | STAND S4 v1      | WP15            | 21 - FRQ         | R — Document, report | SEN - Sensitive     | 3                |
| D15.3          | OSD S4 v1        | WP15            | 4 - AVINOR       | R — Document, report | SEN - Sensitive     | 8                |
| D15.4          | TS/IRS S4 v1     | WP15            | 21 - FRQ         | R — Document, report | SEN - Sensitive     | 8                |
| D15.5          | VALP S4 v1       | WP15            | 1 - SINTEF       | R — Document, report | SEN - Sensitive     | 8                |
| D15.6          | STAND S4 v2      | WP15            | 21 - FRQ         | R — Document, report | SEN - Sensitive     | 8                |
| D15.7          | REG S4 v2        | WP15            | 4 - AVINOR       | R — Document, report | SEN - Sensitive     | 8                |
| D16.1          | REG S4 v3        | WP16            | 4 - AVINOR       | R — Document, report | SEN - Sensitive     | 20               |
| D16.2          | OSD S4 v2        | WP16            | 4 - AVINOR       | R — Document, report | SEN - Sensitive     | 20               |
| D16.3          | TS/IRS S4 v2     | WP16            | 21 - FRQ         | R — Document, report | SEN - Sensitive     | 20               |



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| Deliverable No | Deliverable Name | Work Package No | Lead Beneficiary | Type                 | Dissemination Level | Due Date (month) |
|----------------|------------------|-----------------|------------------|----------------------|---------------------|------------------|
| D16.4          | CBA S4 v1        | WP16            | 4 - AVINOR       | R — Document, report | SEN - Sensitive     | 20               |
| D16.5          | STAND S4 v3      | WP16            | 21 - FRQ         | R — Document, report | SEN - Sensitive     | 20               |
| D16.6          | OSD S4 v3        | WP16            | 4 - AVINOR       | R — Document, report | PU - Public         | 32               |
| D16.7          | TS/IRS S4 v3     | WP16            | 21 - FRQ         | R — Document, report | PU - Public         | 32               |
| D16.8          | VALP S4 v2       | WP16            | 1 - SINTEF       | R — Document, report | SEN - Sensitive     | 32               |
| D16.9          | VALR S4          | WP16            | 20 - AIRSIDE     | R — Document, report | PU - Public         | 32               |
| D16.10         | CBA S4 v2        | WP16            | 4 - AVINOR       | R — Document, report | PU - Public         | 32               |
| D16.11         | STAND S4 v4      | WP16            | 21 - FRQ         | R — Document, report | PU - Public         | 32               |
| D16.12         | REG S4 v4        | WP16            | 4 - AVINOR       | R — Document, report | PU - Public         | 32               |
| D16.13         | CN S4            | WP16            | 21 - FRQ         | R — Document, report | PU - Public         | 32               |

**Deliverable D1.1 – PMP v1**

|                           |                      |                            |                 |
|---------------------------|----------------------|----------------------------|-----------------|
| <b>Deliverable Number</b> | D1.1                 | <b>Lead Beneficiary</b>    | 1 - SINTEF      |
| <b>Deliverable Name</b>   | PMP v1               |                            |                 |
| <b>Type</b>               | R — Document, report | <b>Dissemination Level</b> | SEN - Sensitive |
| <b>Due Date (month)</b>   | 3                    | <b>Work Package No</b>     | WP1             |

| Description             |
|-------------------------|
| Project Management plan |

**Deliverable D1.2 – DMP v1**

|                           |                            |                            |             |
|---------------------------|----------------------------|----------------------------|-------------|
| <b>Deliverable Number</b> | D1.2                       | <b>Lead Beneficiary</b>    | 1 - SINTEF  |
| <b>Deliverable Name</b>   | DMP v1                     |                            |             |
| <b>Type</b>               | DMP — Data Management Plan | <b>Dissemination Level</b> | PU - Public |
| <b>Due Date (month)</b>   | 6                          | <b>Work Package No</b>     | WP1         |

| Description          |
|----------------------|
| Data management plan |

**Deliverable D2.1 – DMP v2**

|                           |                            |                            |             |
|---------------------------|----------------------------|----------------------------|-------------|
| <b>Deliverable Number</b> | D2.1                       | <b>Lead Beneficiary</b>    | 1 - SINTEF  |
| <b>Deliverable Name</b>   | DMP v2                     |                            |             |
| <b>Type</b>               | DMP — Data Management Plan | <b>Dissemination Level</b> | PU - Public |
| <b>Due Date (month)</b>   | 34                         | <b>Work Package No</b>     | WP2         |

| Description                  |
|------------------------------|
| Final service delivery model |

**Deliverable D3.1 – SED v1**

|                           |                      |                            |                 |
|---------------------------|----------------------|----------------------------|-----------------|
| <b>Deliverable Number</b> | D3.1                 | <b>Lead Beneficiary</b>    | 1 - SINTEF      |
| <b>Deliverable Name</b>   | SED v1               |                            |                 |
| <b>Type</b>               | R — Document, report | <b>Dissemination Level</b> | SEN - Sensitive |
| <b>Due Date (month)</b>   | 16                   | <b>Work Package No</b>     | WP3             |

| Description                     |
|---------------------------------|
| Interim secure exchange of data |

**Deliverable D4.1 – SED v2**

|                           |                      |                            |             |
|---------------------------|----------------------|----------------------------|-------------|
| <b>Deliverable Number</b> | D4.1                 | <b>Lead Beneficiary</b>    | 1 - SINTEF  |
| <b>Deliverable Name</b>   | SED v2               |                            |             |
| <b>Type</b>               | R — Document, report | <b>Dissemination Level</b> | PU - Public |
| <b>Due Date (month)</b>   | 32                   | <b>Work Package No</b>     | WP4         |

| Description             |
|-------------------------|
| Secure exchange of data |

**Deliverable D5.1 – nSDM v1**

|                           |                      |                            |                 |
|---------------------------|----------------------|----------------------------|-----------------|
| <b>Deliverable Number</b> | D5.1                 | <b>Lead Beneficiary</b>    | 21 - FRQ        |
| <b>Deliverable Name</b>   | nSDM v1              |                            |                 |
| <b>Type</b>               | R — Document, report | <b>Dissemination Level</b> | SEN - Sensitive |
| <b>Due Date (month)</b>   | 16                   | <b>Work Package No</b>     | WP5             |

| Description                    |
|--------------------------------|
| Interim service delivery model |

**Deliverable D6.1 – nSDM v2**

|                           |                      |                            |             |
|---------------------------|----------------------|----------------------------|-------------|
| <b>Deliverable Number</b> | D6.1                 | <b>Lead Beneficiary</b>    | 21 - FRQ    |
| <b>Deliverable Name</b>   | nSDM v2              |                            |             |
| <b>Type</b>               | R — Document, report | <b>Dissemination Level</b> | PU - Public |
| <b>Due Date (month)</b>   | 32                   | <b>Work Package No</b>     | WP6         |

| Description            |
|------------------------|
| Service delivery model |

**Deliverable D7.1 – CDEP v1**

|                           |                      |                            |             |
|---------------------------|----------------------|----------------------------|-------------|
| <b>Deliverable Number</b> | D7.1                 | <b>Lead Beneficiary</b>    | 26 - UNIBO  |
| <b>Deliverable Name</b>   | CDEP v1              |                            |             |
| <b>Type</b>               | R — Document, report | <b>Dissemination Level</b> | PU - Public |
| <b>Due Date (month)</b>   | 3                    | <b>Work Package No</b>     | WP7         |

| Description      |
|------------------|
| CDE plan initial |

**Deliverable D7.2 – CDEP v2**

|                           |                      |                            |             |
|---------------------------|----------------------|----------------------------|-------------|
| <b>Deliverable Number</b> | D7.2                 | <b>Lead Beneficiary</b>    | 26 - UNIBO  |
| <b>Deliverable Name</b>   | CDEP v2              |                            |             |
| <b>Type</b>               | R — Document, report | <b>Dissemination Level</b> | PU - Public |
| <b>Due Date (month)</b>   | 8                    | <b>Work Package No</b>     | WP7         |

| Description      |
|------------------|
| CDE plan interim |

**Deliverable D8.1 – CDEP v3**

|                           |                      |                            |             |
|---------------------------|----------------------|----------------------------|-------------|
| <b>Deliverable Number</b> | D8.1                 | <b>Lead Beneficiary</b>    | 26 - UNIBO  |
| <b>Deliverable Name</b>   | CDEP v3              |                            |             |
| <b>Type</b>               | R — Document, report | <b>Dissemination Level</b> | PU - Public |
| <b>Due Date (month)</b>   | 20                   | <b>Work Package No</b>     | WP8         |

| Description    |
|----------------|
| CDE plan final |

**Deliverable D8.2 – CDEP v4**

|                           |                      |                            |             |
|---------------------------|----------------------|----------------------------|-------------|
| <b>Deliverable Number</b> | D8.2                 | <b>Lead Beneficiary</b>    | 26 - UNIBO  |
| <b>Deliverable Name</b>   | CDEP v4              |                            |             |
| <b>Type</b>               | R — Document, report | <b>Dissemination Level</b> | PU - Public |
| <b>Due Date (month)</b>   | 34                   | <b>Work Package No</b>     | WP8         |

| Description |
|-------------|
| CDE report  |

**Deliverable D9.1 – REG S1 v1**

|                           |                      |                            |                 |
|---------------------------|----------------------|----------------------------|-----------------|
| <b>Deliverable Number</b> | D9.1                 | <b>Lead Beneficiary</b>    | 8 - ECTL        |
| <b>Deliverable Name</b>   | REG S1 v1            |                            |                 |
| <b>Type</b>               | R — Document, report | <b>Dissemination Level</b> | SEN - Sensitive |
| <b>Due Date (month)</b>   | 3                    | <b>Work Package No</b>     | WP9             |

| Description            |
|------------------------|
| Regulatory deliverable |

**Deliverable D9.2 – STAND S1 v1**

|                           |                      |                            |                 |
|---------------------------|----------------------|----------------------------|-----------------|
| <b>Deliverable Number</b> | D9.2                 | <b>Lead Beneficiary</b>    | 8 - ECTL        |
| <b>Deliverable Name</b>   | STAND S1 v1          |                            |                 |
| <b>Type</b>               | R — Document, report | <b>Dissemination Level</b> | SEN - Sensitive |
| <b>Due Date (month)</b>   | 3                    | <b>Work Package No</b>     | WP9             |

| Description                 |
|-----------------------------|
| Standardisation deliverable |

**Deliverable D9.3 – OSED S1 v1**

|                           |                      |                            |                 |
|---------------------------|----------------------|----------------------------|-----------------|
| <b>Deliverable Number</b> | D9.3                 | <b>Lead Beneficiary</b>    | 7 - ENAV        |
| <b>Deliverable Name</b>   | OSED S1 v1           |                            |                 |
| <b>Type</b>               | R — Document, report | <b>Dissemination Level</b> | SEN - Sensitive |
| <b>Due Date (month)</b>   | 8                    | <b>Work Package No</b>     | WP9             |

| Description            |
|------------------------|
| Draft SPR-INTEROP/OSED |

**Deliverable D9.4 – TS/IRS S1 v1**

|                           |                      |                            |                 |
|---------------------------|----------------------|----------------------------|-----------------|
| <b>Deliverable Number</b> | D9.4                 | <b>Lead Beneficiary</b>    | 19 - PILDO      |
| <b>Deliverable Name</b>   | TS/IRS S1 v1         |                            |                 |
| <b>Type</b>               | R — Document, report | <b>Dissemination Level</b> | SEN - Sensitive |
| <b>Due Date (month)</b>   | 8                    | <b>Work Package No</b>     | WP9             |

| Description                      |
|----------------------------------|
| Draft Tech./Interface req. spec. |

**Deliverable D9.5 – VALP S1 v1**

|                           |                      |                            |                 |
|---------------------------|----------------------|----------------------------|-----------------|
| <b>Deliverable Number</b> | D9.5                 | <b>Lead Beneficiary</b>    | 14.1 - CRIDA    |
| <b>Deliverable Name</b>   | VALP S1 v1           |                            |                 |
| <b>Type</b>               | R — Document, report | <b>Dissemination Level</b> | SEN - Sensitive |
| <b>Due Date (month)</b>   | 8                    | <b>Work Package No</b>     | WP9             |

| Description     |
|-----------------|
| Validation plan |

**Deliverable D9.6 – STAND S1 v2**

|                           |                      |                            |                 |
|---------------------------|----------------------|----------------------------|-----------------|
| <b>Deliverable Number</b> | D9.6                 | <b>Lead Beneficiary</b>    | 8 - ECTL        |
| <b>Deliverable Name</b>   | STAND S1 v2          |                            |                 |
| <b>Type</b>               | R — Document, report | <b>Dissemination Level</b> | SEN - Sensitive |
| <b>Due Date (month)</b>   | 8                    | <b>Work Package No</b>     | WP9             |

| Description                 |
|-----------------------------|
| Standardisation deliverable |

**Deliverable D9.7 – REG S1 v2**

|                           |                      |                            |                 |
|---------------------------|----------------------|----------------------------|-----------------|
| <b>Deliverable Number</b> | D9.7                 | <b>Lead Beneficiary</b>    | 8 - ECTL        |
| <b>Deliverable Name</b>   | REG S1 v2            |                            |                 |
| <b>Type</b>               | R — Document, report | <b>Dissemination Level</b> | SEN - Sensitive |
| <b>Due Date (month)</b>   | 8                    | <b>Work Package No</b>     | WP9             |

| Description            |
|------------------------|
| Regulatory deliverable |

**Deliverable D9.8 – VALP S1 v2**

|                           |                      |                            |                 |
|---------------------------|----------------------|----------------------------|-----------------|
| <b>Deliverable Number</b> | D9.8                 | <b>Lead Beneficiary</b>    | 14.1 - CRIDA    |
| <b>Deliverable Name</b>   | VALP S1 v2           |                            |                 |
| <b>Type</b>               | R — Document, report | <b>Dissemination Level</b> | SEN - Sensitive |
| <b>Due Date (month)</b>   | 18                   | <b>Work Package No</b>     | WP9             |

| Description     |
|-----------------|
| Validation plan |

**Deliverable D9.9 – OSED S1 v2**

|                           |                      |                            |                 |
|---------------------------|----------------------|----------------------------|-----------------|
| <b>Deliverable Number</b> | D9.9                 | <b>Lead Beneficiary</b>    | 7 - ENAV        |
| <b>Deliverable Name</b>   | OSED S1 v2           |                            |                 |
| <b>Type</b>               | R — Document, report | <b>Dissemination Level</b> | SEN - Sensitive |
| <b>Due Date (month)</b>   | 18                   | <b>Work Package No</b>     | WP9             |

| Description               |
|---------------------------|
| SPR-INTEROP/OSED Part I-V |

**Deliverable D9.10 – TS/IRS S1 v2**

|                           |                      |                            |                 |
|---------------------------|----------------------|----------------------------|-----------------|
| <b>Deliverable Number</b> | D9.10                | <b>Lead Beneficiary</b>    | 19 - PILDO      |
| <b>Deliverable Name</b>   | TS/IRS S1 v2         |                            |                 |
| <b>Type</b>               | R — Document, report | <b>Dissemination Level</b> | SEN - Sensitive |
| <b>Due Date (month)</b>   | 18                   | <b>Work Package No</b>     | WP9             |

| Description                |
|----------------------------|
| Tech./Interface req. spec. |

**Deliverable D10.1 – REG S1 v3**

|                           |                      |                            |                 |
|---------------------------|----------------------|----------------------------|-----------------|
| <b>Deliverable Number</b> | D10.1                | <b>Lead Beneficiary</b>    | 8 - ECTL        |
| <b>Deliverable Name</b>   | REG S1 v3            |                            |                 |
| <b>Type</b>               | R — Document, report | <b>Dissemination Level</b> | SEN - Sensitive |
| <b>Due Date (month)</b>   | 20                   | <b>Work Package No</b>     | WP10            |

| Description            |
|------------------------|
| Regulatory deliverable |

**Deliverable D10.2 – CBA S1 v1**

|                           |                      |                            |                 |
|---------------------------|----------------------|----------------------------|-----------------|
| <b>Deliverable Number</b> | D10.2                | <b>Lead Beneficiary</b>    | 14.1 - CRIDA    |
| <b>Deliverable Name</b>   | CBA S1 v1            |                            |                 |
| <b>Type</b>               | R — Document, report | <b>Dissemination Level</b> | SEN - Sensitive |
| <b>Due Date (month)</b>   | 20                   | <b>Work Package No</b>     | WP10            |

| Description           |
|-----------------------|
| Cost benefit analysis |

**Deliverable D10.3 – STAND S1 v3**

|                           |                      |                            |                 |
|---------------------------|----------------------|----------------------------|-----------------|
| <b>Deliverable Number</b> | D10.3                | <b>Lead Beneficiary</b>    | 8 - ECTL        |
| <b>Deliverable Name</b>   | STAND S1 v3          |                            |                 |
| <b>Type</b>               | R — Document, report | <b>Dissemination Level</b> | SEN - Sensitive |
| <b>Due Date (month)</b>   | 20                   | <b>Work Package No</b>     | WP10            |

| Description                 |
|-----------------------------|
| Standardisation deliverable |

**Deliverable D10.4 – VALR S1 v1**

|                           |                      |                            |              |
|---------------------------|----------------------|----------------------------|--------------|
| <b>Deliverable Number</b> | D10.4                | <b>Lead Beneficiary</b>    | 14.1 - CRIDA |
| <b>Deliverable Name</b>   | VALR S1 v1           |                            |              |
| <b>Type</b>               | R — Document, report | <b>Dissemination Level</b> | PU - Public  |
| <b>Due Date (month)</b>   | 31                   | <b>Work Package No</b>     | WP10         |

| Description       |
|-------------------|
| Validation report |

**Deliverable D10.5 – OSED S1 v3**

|                           |                      |                            |             |
|---------------------------|----------------------|----------------------------|-------------|
| <b>Deliverable Number</b> | D10.5                | <b>Lead Beneficiary</b>    | 7 - ENAV    |
| <b>Deliverable Name</b>   | OSED S1 v3           |                            |             |
| <b>Type</b>               | R — Document, report | <b>Dissemination Level</b> | PU - Public |
| <b>Due Date (month)</b>   | 32                   | <b>Work Package No</b>     | WP10        |

| Description                            |
|----------------------------------------|
| SPR-INTEROP/OSED Part I-V Final report |

**Deliverable D10.6 – TS/IRS S1 v3**

|                           |                      |                            |             |
|---------------------------|----------------------|----------------------------|-------------|
| <b>Deliverable Number</b> | D10.6                | <b>Lead Beneficiary</b>    | 19 - PILDO  |
| <b>Deliverable Name</b>   | TS/IRS S1 v3         |                            |             |
| <b>Type</b>               | R — Document, report | <b>Dissemination Level</b> | PU - Public |
| <b>Due Date (month)</b>   | 32                   | <b>Work Package No</b>     | WP10        |

| Description                             |
|-----------------------------------------|
| Tech./Interface req. spec. Final report |

**Deliverable D10.7 – CBA S1 v2**

|                           |                      |                            |              |
|---------------------------|----------------------|----------------------------|--------------|
| <b>Deliverable Number</b> | D10.7                | <b>Lead Beneficiary</b>    | 14.1 - CRIDA |
| <b>Deliverable Name</b>   | CBA S1 v2            |                            |              |
| <b>Type</b>               | R — Document, report | <b>Dissemination Level</b> | PU - Public  |
| <b>Due Date (month)</b>   | 32                   | <b>Work Package No</b>     | WP10         |

| Description                         |
|-------------------------------------|
| Cost benefit analysis. Final report |



**Deliverable D10.8 – STAND S1 v4**

|                           |                      |                            |             |
|---------------------------|----------------------|----------------------------|-------------|
| <b>Deliverable Number</b> | D10.8                | <b>Lead Beneficiary</b>    | 8 - ECTL    |
| <b>Deliverable Name</b>   | STAND S1 v4          |                            |             |
| <b>Type</b>               | R — Document, report | <b>Dissemination Level</b> | PU - Public |
| <b>Due Date (month)</b>   | 32                   | <b>Work Package No</b>     | WP10        |

| Description                               |
|-------------------------------------------|
| Standardisation deliverable. Final report |

**Deliverable D10.9 – REG S1 v4**

|                           |                      |                            |             |
|---------------------------|----------------------|----------------------------|-------------|
| <b>Deliverable Number</b> | D10.9                | <b>Lead Beneficiary</b>    | 8 - ECTL    |
| <b>Deliverable Name</b>   | REG S1 v4            |                            |             |
| <b>Type</b>               | R — Document, report | <b>Dissemination Level</b> | PU - Public |
| <b>Due Date (month)</b>   | 32                   | <b>Work Package No</b>     | WP10        |

| Description                          |
|--------------------------------------|
| Regulatory deliverable. Final report |

**Deliverable D10.10 – CN S1**

|                           |                      |                            |              |
|---------------------------|----------------------|----------------------------|--------------|
| <b>Deliverable Number</b> | D10.10               | <b>Lead Beneficiary</b>    | 14.1 - CRIDA |
| <b>Deliverable Name</b>   | CN S1                |                            |              |
| <b>Type</b>               | R — Document, report | <b>Dissemination Level</b> | PU - Public  |
| <b>Due Date (month)</b>   | 32                   | <b>Work Package No</b>     | WP10         |

| Description              |
|--------------------------|
| Solution contextual Note |

**Deliverable D11.1 – STAND S2 v1**

|                           |                      |                            |                 |
|---------------------------|----------------------|----------------------------|-----------------|
| <b>Deliverable Number</b> | D11.1                | <b>Lead Beneficiary</b>    | 8 - ECTL        |
| <b>Deliverable Name</b>   | STAND S2 v1          |                            |                 |
| <b>Type</b>               | R — Document, report | <b>Dissemination Level</b> | SEN - Sensitive |
| <b>Due Date (month)</b>   | 3                    | <b>Work Package No</b>     | WP11            |

| Description                 |
|-----------------------------|
| Standardisation deliverable |

**Deliverable D11.2 – REG S2 v1**

|                           |                      |                            |                 |
|---------------------------|----------------------|----------------------------|-----------------|
| <b>Deliverable Number</b> | D11.2                | <b>Lead Beneficiary</b>    | 8 - ECTL        |
| <b>Deliverable Name</b>   | REG S2 v1            |                            |                 |
| <b>Type</b>               | R — Document, report | <b>Dissemination Level</b> | SEN - Sensitive |
| <b>Due Date (month)</b>   | 3                    | <b>Work Package No</b>     | WP11            |

| Description            |
|------------------------|
| Regulatory deliverable |

**Deliverable D11.3 – OSED S2 v1**

|                           |                      |                            |                 |
|---------------------------|----------------------|----------------------------|-----------------|
| <b>Deliverable Number</b> | D11.3                | <b>Lead Beneficiary</b>    | 9 - SWED        |
| <b>Deliverable Name</b>   | OSED S2 v1           |                            |                 |
| <b>Type</b>               | R — Document, report | <b>Dissemination Level</b> | SEN - Sensitive |
| <b>Due Date (month)</b>   | 8                    | <b>Work Package No</b>     | WP11            |

| Description            |
|------------------------|
| Draft SPR-INTEROP/OSED |

**Deliverable D11.4 – STAND S2 v2**

|                           |                      |                            |                 |
|---------------------------|----------------------|----------------------------|-----------------|
| <b>Deliverable Number</b> | D11.4                | <b>Lead Beneficiary</b>    | 8 - ECTL        |
| <b>Deliverable Name</b>   | STAND S2 v2          |                            |                 |
| <b>Type</b>               | R — Document, report | <b>Dissemination Level</b> | SEN - Sensitive |
| <b>Due Date (month)</b>   | 8                    | <b>Work Package No</b>     | WP11            |

| Description                 |
|-----------------------------|
| Standardisation deliverable |

**Deliverable D11.5 – REG S2 v2**

|                           |                      |                            |                 |
|---------------------------|----------------------|----------------------------|-----------------|
| <b>Deliverable Number</b> | D11.5                | <b>Lead Beneficiary</b>    | 8 - ECTL        |
| <b>Deliverable Name</b>   | REG S2 v2            |                            |                 |
| <b>Type</b>               | R — Document, report | <b>Dissemination Level</b> | SEN - Sensitive |
| <b>Due Date (month)</b>   | 8                    | <b>Work Package No</b>     | WP11            |

| Description            |
|------------------------|
| Regulatory deliverable |

**Deliverable D11.6 – TS/IRS S2 v1**

|                           |                      |                            |                 |
|---------------------------|----------------------|----------------------------|-----------------|
| <b>Deliverable Number</b> | D11.6                | <b>Lead Beneficiary</b>    | 30 - TERN       |
| <b>Deliverable Name</b>   | TS/IRS S2 v1         |                            |                 |
| <b>Type</b>               | R — Document, report | <b>Dissemination Level</b> | SEN - Sensitive |
| <b>Due Date (month)</b>   | 8                    | <b>Work Package No</b>     | WP11            |

| Description                      |
|----------------------------------|
| Draft Tech./Interface req. spec. |

**Deliverable D11.7 – VALP S2 v1**

|                           |                      |                            |                 |
|---------------------------|----------------------|----------------------------|-----------------|
| <b>Deliverable Number</b> | D11.7                | <b>Lead Beneficiary</b>    | 12 - LFV        |
| <b>Deliverable Name</b>   | VALP S2 v1           |                            |                 |
| <b>Type</b>               | R — Document, report | <b>Dissemination Level</b> | SEN - Sensitive |
| <b>Due Date (month)</b>   | 8                    | <b>Work Package No</b>     | WP11            |

| Description          |
|----------------------|
| Validation plan TRL4 |

**Deliverable D12.1 – VALP S2 v2**

|                           |                      |                            |                 |
|---------------------------|----------------------|----------------------------|-----------------|
| <b>Deliverable Number</b> | D12.1                | <b>Lead Beneficiary</b>    | 12 - LFV        |
| <b>Deliverable Name</b>   | VALP S2 v2           |                            |                 |
| <b>Type</b>               | R — Document, report | <b>Dissemination Level</b> | SEN - Sensitive |
| <b>Due Date (month)</b>   | 20                   | <b>Work Package No</b>     | WP12            |

| Description                       |
|-----------------------------------|
| Validation plan TRL6 Final report |

**Deliverable D12.2 – REG S2 v3**

|                           |                      |                            |                 |
|---------------------------|----------------------|----------------------------|-----------------|
| <b>Deliverable Number</b> | D12.2                | <b>Lead Beneficiary</b>    | 8 - ECTL        |
| <b>Deliverable Name</b>   | REG S2 v3            |                            |                 |
| <b>Type</b>               | R — Document, report | <b>Dissemination Level</b> | SEN - Sensitive |
| <b>Due Date (month)</b>   | 20                   | <b>Work Package No</b>     | WP12            |

| Description            |
|------------------------|
| Regulatory deliverable |

**Deliverable D12.3 – TS/IRS S2 v2**

|                           |                      |                            |                 |
|---------------------------|----------------------|----------------------------|-----------------|
| <b>Deliverable Number</b> | D12.3                | <b>Lead Beneficiary</b>    | 30 - TERN       |
| <b>Deliverable Name</b>   | TS/IRS S2 v2         |                            |                 |
| <b>Type</b>               | R — Document, report | <b>Dissemination Level</b> | SEN - Sensitive |
| <b>Due Date (month)</b>   | 20                   | <b>Work Package No</b>     | WP12            |

| Description                      |
|----------------------------------|
| Draft Tech./Interface req. spec. |

**Deliverable D12.4 – CBA S2 v1**

|                           |                      |                            |                 |
|---------------------------|----------------------|----------------------------|-----------------|
| <b>Deliverable Number</b> | D12.4                | <b>Lead Beneficiary</b>    | 10 - AIRBUS     |
| <b>Deliverable Name</b>   | CBA S2 v1            |                            |                 |
| <b>Type</b>               | R — Document, report | <b>Dissemination Level</b> | SEN - Sensitive |
| <b>Due Date (month)</b>   | 20                   | <b>Work Package No</b>     | WP12            |

| Description           |
|-----------------------|
| Draft SPR-INTEROP/OSD |

**Deliverable D12.5 – STAND S2 v3**

|                           |                      |                            |             |
|---------------------------|----------------------|----------------------------|-------------|
| <b>Deliverable Number</b> | D12.5                | <b>Lead Beneficiary</b>    | 8 - ECTL    |
| <b>Deliverable Name</b>   | STAND S2 v3          |                            |             |
| <b>Type</b>               | R — Document, report | <b>Dissemination Level</b> | PU - Public |
| <b>Due Date (month)</b>   | 20                   | <b>Work Package No</b>     | WP12        |

| Description                 |
|-----------------------------|
| Standardisation deliverable |

**Deliverable D12.6 – OSD S2 v2**

|                           |                      |                            |                 |
|---------------------------|----------------------|----------------------------|-----------------|
| <b>Deliverable Number</b> | D12.6                | <b>Lead Beneficiary</b>    | 9 - SWED        |
| <b>Deliverable Name</b>   | OSD S2 v2            |                            |                 |
| <b>Type</b>               | R — Document, report | <b>Dissemination Level</b> | SEN - Sensitive |
| <b>Due Date (month)</b>   | 20                   | <b>Work Package No</b>     | WP12            |

| Description           |
|-----------------------|
| Draft SPR-INTEROP/OSD |

**Deliverable D12.7 – OSED S2 v3**

|                           |                      |                            |             |
|---------------------------|----------------------|----------------------------|-------------|
| <b>Deliverable Number</b> | D12.7                | <b>Lead Beneficiary</b>    | 9 - SWED    |
| <b>Deliverable Name</b>   | OSED S2 v3           |                            |             |
| <b>Type</b>               | R — Document, report | <b>Dissemination Level</b> | PU - Public |
| <b>Due Date (month)</b>   | 32                   | <b>Work Package No</b>     | WP12        |

| Description                             |
|-----------------------------------------|
| SPR-INTEROP/OSED Part I-V. Final report |

**Deliverable D12.8 – TS/IRS S2 v3**

|                           |                      |                            |             |
|---------------------------|----------------------|----------------------------|-------------|
| <b>Deliverable Number</b> | D12.8                | <b>Lead Beneficiary</b>    | 30 - TERN   |
| <b>Deliverable Name</b>   | TS/IRS S2 v3         |                            |             |
| <b>Type</b>               | R — Document, report | <b>Dissemination Level</b> | PU - Public |
| <b>Due Date (month)</b>   | 32                   | <b>Work Package No</b>     | WP12        |

| Description                             |
|-----------------------------------------|
| Tech./Interface req. spec. Final report |

**Deliverable D12.9 – VALR S2**

|                           |                      |                            |             |
|---------------------------|----------------------|----------------------------|-------------|
| <b>Deliverable Number</b> | D12.9                | <b>Lead Beneficiary</b>    | 10 - AIRBUS |
| <b>Deliverable Name</b>   | VALR S2              |                            |             |
| <b>Type</b>               | R — Document, report | <b>Dissemination Level</b> | PU - Public |
| <b>Due Date (month)</b>   | 32                   | <b>Work Package No</b>     | WP12        |

| Description       |
|-------------------|
| Validation report |

**Deliverable D12.10 – CBA S2 v2**

|                           |                      |                            |             |
|---------------------------|----------------------|----------------------------|-------------|
| <b>Deliverable Number</b> | D12.10               | <b>Lead Beneficiary</b>    | 10 - AIRBUS |
| <b>Deliverable Name</b>   | CBA S2 v2            |                            |             |
| <b>Type</b>               | R — Document, report | <b>Dissemination Level</b> | PU - Public |
| <b>Due Date (month)</b>   | 32                   | <b>Work Package No</b>     | WP12        |

| Description                         |
|-------------------------------------|
| Cost benefit analysis. Final report |

**Deliverable D12.11 – STAND S2 v4**

|                           |                      |                            |             |
|---------------------------|----------------------|----------------------------|-------------|
| <b>Deliverable Number</b> | D12.11               | <b>Lead Beneficiary</b>    | 8 - ECTL    |
| <b>Deliverable Name</b>   | STAND S2 v4          |                            |             |
| <b>Type</b>               | R — Document, report | <b>Dissemination Level</b> | PU - Public |
| <b>Due Date (month)</b>   | 32                   | <b>Work Package No</b>     | WP12        |

| Description                               |
|-------------------------------------------|
| Standardisation deliverable. Final report |

**Deliverable D12.12 – REG S2 v4**

|                           |                      |                            |             |
|---------------------------|----------------------|----------------------------|-------------|
| <b>Deliverable Number</b> | D12.12               | <b>Lead Beneficiary</b>    | 8 - ECTL    |
| <b>Deliverable Name</b>   | REG S2 v4            |                            |             |
| <b>Type</b>               | R — Document, report | <b>Dissemination Level</b> | PU - Public |
| <b>Due Date (month)</b>   | 32                   | <b>Work Package No</b>     | WP12        |

| Description                          |
|--------------------------------------|
| Regulatory deliverable. Final report |

**Deliverable D12.13 – CN S2**

|                           |                      |                            |             |
|---------------------------|----------------------|----------------------------|-------------|
| <b>Deliverable Number</b> | D12.13               | <b>Lead Beneficiary</b>    | 12 - LFV    |
| <b>Deliverable Name</b>   | CN S2                |                            |             |
| <b>Type</b>               | R — Document, report | <b>Dissemination Level</b> | PU - Public |
| <b>Due Date (month)</b>   | 32                   | <b>Work Package No</b>     | WP12        |

| Description                            |
|----------------------------------------|
| Solution contextual Note. Final report |

**Deliverable D13.1 – STAND S3 v1**

|                           |                      |                            |                 |
|---------------------------|----------------------|----------------------------|-----------------|
| <b>Deliverable Number</b> | D13.1                | <b>Lead Beneficiary</b>    | 3 - FRA         |
| <b>Deliverable Name</b>   | STAND S3 v1          |                            |                 |
| <b>Type</b>               | R — Document, report | <b>Dissemination Level</b> | SEN - Sensitive |
| <b>Due Date (month)</b>   | 3                    | <b>Work Package No</b>     | WP13            |

| Description                         |
|-------------------------------------|
| Standardisation deliverable - draft |

**Deliverable D13.2 – REG S3 v1**

|                           |                      |                            |                 |
|---------------------------|----------------------|----------------------------|-----------------|
| <b>Deliverable Number</b> | D13.2                | <b>Lead Beneficiary</b>    | 3 - FRA         |
| <b>Deliverable Name</b>   | REG S3 v1            |                            |                 |
| <b>Type</b>               | R — Document, report | <b>Dissemination Level</b> | SEN - Sensitive |
| <b>Due Date (month)</b>   | 3                    | <b>Work Package No</b>     | WP13            |

| Description                   |
|-------------------------------|
| Regulatory deliverable -Draft |

**Deliverable D13.3 – OSED S3 v1**

|                           |                      |                            |                 |
|---------------------------|----------------------|----------------------------|-----------------|
| <b>Deliverable Number</b> | D13.3                | <b>Lead Beneficiary</b>    | 5 - DLR         |
| <b>Deliverable Name</b>   | OSED S3 v1           |                            |                 |
| <b>Type</b>               | R — Document, report | <b>Dissemination Level</b> | SEN - Sensitive |
| <b>Due Date (month)</b>   | 8                    | <b>Work Package No</b>     | WP13            |

| Description            |
|------------------------|
| Draft SPR-INTEROP/OSED |

**Deliverable D13.4 – TS/IRS S3 v1**

|                           |                      |                            |                 |
|---------------------------|----------------------|----------------------------|-----------------|
| <b>Deliverable Number</b> | D13.4                | <b>Lead Beneficiary</b>    | 2 - ADBSG       |
| <b>Deliverable Name</b>   | TS/IRS S3 v1         |                            |                 |
| <b>Type</b>               | R — Document, report | <b>Dissemination Level</b> | SEN - Sensitive |
| <b>Due Date (month)</b>   | 8                    | <b>Work Package No</b>     | WP13            |

| Description                      |
|----------------------------------|
| Draft Tech./Interface req. spec. |

**Deliverable D13.5 – VALP S3 v1**

|                           |                      |                            |                 |
|---------------------------|----------------------|----------------------------|-----------------|
| <b>Deliverable Number</b> | D13.5                | <b>Lead Beneficiary</b>    | 5 - DLR         |
| <b>Deliverable Name</b>   | VALP S3 v1           |                            |                 |
| <b>Type</b>               | R — Document, report | <b>Dissemination Level</b> | SEN - Sensitive |
| <b>Due Date (month)</b>   | 8                    | <b>Work Package No</b>     | WP13            |

| Description           |
|-----------------------|
| Draft Validation plan |

**Deliverable D13.6 – STAND S3 v2**

|                           |                      |                            |                 |
|---------------------------|----------------------|----------------------------|-----------------|
| <b>Deliverable Number</b> | D13.6                | <b>Lead Beneficiary</b>    | 3 - FRA         |
| <b>Deliverable Name</b>   | STAND S3 v2          |                            |                 |
| <b>Type</b>               | R — Document, report | <b>Dissemination Level</b> | SEN - Sensitive |
| <b>Due Date (month)</b>   | 8                    | <b>Work Package No</b>     | WP13            |

| Description                         |
|-------------------------------------|
| Standardisation deliverable - Draft |

**Deliverable D13.7 – REG S3 v2**

|                           |                      |                            |                 |
|---------------------------|----------------------|----------------------------|-----------------|
| <b>Deliverable Number</b> | D13.7                | <b>Lead Beneficiary</b>    | 3 - FRA         |
| <b>Deliverable Name</b>   | REG S3 v2            |                            |                 |
| <b>Type</b>               | R — Document, report | <b>Dissemination Level</b> | SEN - Sensitive |
| <b>Due Date (month)</b>   | 8                    | <b>Work Package No</b>     | WP13            |

| Description                   |
|-------------------------------|
| Regulatory deliverable -Draft |

**Deliverable D14.1 – OSED S3 v2**

|                           |                      |                            |                 |
|---------------------------|----------------------|----------------------------|-----------------|
| <b>Deliverable Number</b> | D14.1                | <b>Lead Beneficiary</b>    | 5 - DLR         |
| <b>Deliverable Name</b>   | OSED S3 v2           |                            |                 |
| <b>Type</b>               | R — Document, report | <b>Dissemination Level</b> | SEN - Sensitive |
| <b>Due Date (month)</b>   | 20                   | <b>Work Package No</b>     | WP14            |

| Description                      |
|----------------------------------|
| SPR-INTEROP/OSED Part I-V. Draft |

**Deliverable D14.2 – TS/IRS S3 v2**

|                           |                      |                            |                 |
|---------------------------|----------------------|----------------------------|-----------------|
| <b>Deliverable Number</b> | D14.2                | <b>Lead Beneficiary</b>    | 2 - ADBSG       |
| <b>Deliverable Name</b>   | TS/IRS S3 v2         |                            |                 |
| <b>Type</b>               | R — Document, report | <b>Dissemination Level</b> | SEN - Sensitive |
| <b>Due Date (month)</b>   | 20                   | <b>Work Package No</b>     | WP14            |

| Description                       |
|-----------------------------------|
| Tech./Interface req. spec. -Draft |



**Deliverable D14.3 – CBA S3 v1**

|                           |                      |                            |                 |
|---------------------------|----------------------|----------------------------|-----------------|
| <b>Deliverable Number</b> | D14.3                | <b>Lead Beneficiary</b>    | 3 - FRA         |
| <b>Deliverable Name</b>   | CBA S3 v1            |                            |                 |
| <b>Type</b>               | R — Document, report | <b>Dissemination Level</b> | SEN - Sensitive |
| <b>Due Date (month)</b>   | 20                   | <b>Work Package No</b>     | WP14            |

| Description                  |
|------------------------------|
| Cost benefit analysis -Draft |

**Deliverable D14.4 – STAND S3 v3**

|                           |                      |                            |                 |
|---------------------------|----------------------|----------------------------|-----------------|
| <b>Deliverable Number</b> | D14.4                | <b>Lead Beneficiary</b>    | 3 - FRA         |
| <b>Deliverable Name</b>   | STAND S3 v3          |                            |                 |
| <b>Type</b>               | R — Document, report | <b>Dissemination Level</b> | SEN - Sensitive |
| <b>Due Date (month)</b>   | 20                   | <b>Work Package No</b>     | WP14            |

| Description                        |
|------------------------------------|
| Standardisation deliverable -Draft |

**Deliverable D14.5 – REG S3 v3**

|                           |                      |                            |                 |
|---------------------------|----------------------|----------------------------|-----------------|
| <b>Deliverable Number</b> | D14.5                | <b>Lead Beneficiary</b>    | 3 - FRA         |
| <b>Deliverable Name</b>   | REG S3 v3            |                            |                 |
| <b>Type</b>               | R — Document, report | <b>Dissemination Level</b> | SEN - Sensitive |
| <b>Due Date (month)</b>   | 20                   | <b>Work Package No</b>     | WP14            |

| Description            |
|------------------------|
| Regulatory deliverable |

**Deliverable D14.6 – OSED S3 v3**

|                           |                      |                            |             |
|---------------------------|----------------------|----------------------------|-------------|
| <b>Deliverable Number</b> | D14.6                | <b>Lead Beneficiary</b>    | 5 - DLR     |
| <b>Deliverable Name</b>   | OSED S3 v3           |                            |             |
| <b>Type</b>               | R — Document, report | <b>Dissemination Level</b> | PU - Public |
| <b>Due Date (month)</b>   | 32                   | <b>Work Package No</b>     | WP14        |

| Description                             |
|-----------------------------------------|
| SPR-INTEROP/OSED Part I-V. Final report |

**Deliverable D14.7 – TS/IRS S3 v3**

|                           |                      |                            |             |
|---------------------------|----------------------|----------------------------|-------------|
| <b>Deliverable Number</b> | D14.7                | <b>Lead Beneficiary</b>    | 2 - ADBSG   |
| <b>Deliverable Name</b>   | TS/IRS S3 v3         |                            |             |
| <b>Type</b>               | R — Document, report | <b>Dissemination Level</b> | PU - Public |
| <b>Due Date (month)</b>   | 32                   | <b>Work Package No</b>     | WP14        |

| Description                             |
|-----------------------------------------|
| Tech./Interface req. spec. Final report |

**Deliverable D14.8 – VALP S3 v2**

|                           |                      |                            |                 |
|---------------------------|----------------------|----------------------------|-----------------|
| <b>Deliverable Number</b> | D14.8                | <b>Lead Beneficiary</b>    | 5 - DLR         |
| <b>Deliverable Name</b>   | VALP S3 v2           |                            |                 |
| <b>Type</b>               | R — Document, report | <b>Dissemination Level</b> | SEN - Sensitive |
| <b>Due Date (month)</b>   | 32                   | <b>Work Package No</b>     | WP14            |

| Description     |
|-----------------|
| Validation plan |

**Deliverable D14.9 – VALR S3**

|                           |                      |                            |             |
|---------------------------|----------------------|----------------------------|-------------|
| <b>Deliverable Number</b> | D14.9                | <b>Lead Beneficiary</b>    | 5 - DLR     |
| <b>Deliverable Name</b>   | VALR S3              |                            |             |
| <b>Type</b>               | R — Document, report | <b>Dissemination Level</b> | PU - Public |
| <b>Due Date (month)</b>   | 32                   | <b>Work Package No</b>     | WP14        |

| Description       |
|-------------------|
| Validation report |

**Deliverable D14.10 – CBA S3 v2**

|                           |                      |                            |             |
|---------------------------|----------------------|----------------------------|-------------|
| <b>Deliverable Number</b> | D14.10               | <b>Lead Beneficiary</b>    | 3 - FRA     |
| <b>Deliverable Name</b>   | CBA S3 v2            |                            |             |
| <b>Type</b>               | R — Document, report | <b>Dissemination Level</b> | PU - Public |
| <b>Due Date (month)</b>   | 32                   | <b>Work Package No</b>     | WP14        |

| Description           |
|-----------------------|
| Cost benefit analysis |

**Deliverable D14.11 – STAND S3 v4**

|                           |                      |                            |             |
|---------------------------|----------------------|----------------------------|-------------|
| <b>Deliverable Number</b> | D14.11               | <b>Lead Beneficiary</b>    | 3 - FRA     |
| <b>Deliverable Name</b>   | STAND S3 v4          |                            |             |
| <b>Type</b>               | R — Document, report | <b>Dissemination Level</b> | PU - Public |
| <b>Due Date (month)</b>   | 32                   | <b>Work Package No</b>     | WP14        |

| Description                 |
|-----------------------------|
| Standardisation deliverable |

**Deliverable D14.12 – REG S3 v4**

|                           |                      |                            |             |
|---------------------------|----------------------|----------------------------|-------------|
| <b>Deliverable Number</b> | D14.12               | <b>Lead Beneficiary</b>    | 2 - ADBSG   |
| <b>Deliverable Name</b>   | REG S3 v4            |                            |             |
| <b>Type</b>               | R — Document, report | <b>Dissemination Level</b> | PU - Public |
| <b>Due Date (month)</b>   | 32                   | <b>Work Package No</b>     | WP14        |

| Description            |
|------------------------|
| Regulatory deliverable |

**Deliverable D14.13 – CN S3**

|                           |                      |                            |             |
|---------------------------|----------------------|----------------------------|-------------|
| <b>Deliverable Number</b> | D14.13               | <b>Lead Beneficiary</b>    | 2 - ADBSG   |
| <b>Deliverable Name</b>   | CN S3                |                            |             |
| <b>Type</b>               | R — Document, report | <b>Dissemination Level</b> | PU - Public |
| <b>Due Date (month)</b>   | 32                   | <b>Work Package No</b>     | WP14        |

| Description              |
|--------------------------|
| Solution contextual Note |

**Deliverable D15.1 – REG S4 v1**

|                           |                      |                            |                 |
|---------------------------|----------------------|----------------------------|-----------------|
| <b>Deliverable Number</b> | D15.1                | <b>Lead Beneficiary</b>    | 4 - AVINOR      |
| <b>Deliverable Name</b>   | REG S4 v1            |                            |                 |
| <b>Type</b>               | R — Document, report | <b>Dissemination Level</b> | SEN - Sensitive |
| <b>Due Date (month)</b>   | 3                    | <b>Work Package No</b>     | WP15            |

| Description                   |
|-------------------------------|
| Regulatory deliverable -Draft |

**Deliverable D15.2 – STAND S4 v1**

|                           |                      |                            |                 |
|---------------------------|----------------------|----------------------------|-----------------|
| <b>Deliverable Number</b> | D15.2                | <b>Lead Beneficiary</b>    | 21 - FRQ        |
| <b>Deliverable Name</b>   | STAND S4 v1          |                            |                 |
| <b>Type</b>               | R — Document, report | <b>Dissemination Level</b> | SEN - Sensitive |
| <b>Due Date (month)</b>   | 3                    | <b>Work Package No</b>     | WP15            |

| Description                        |
|------------------------------------|
| Standardisation deliverable -Draft |

**Deliverable D15.3 – OSED S4 v1**

|                           |                      |                            |                 |
|---------------------------|----------------------|----------------------------|-----------------|
| <b>Deliverable Number</b> | D15.3                | <b>Lead Beneficiary</b>    | 4 - AVINOR      |
| <b>Deliverable Name</b>   | OSED S4 v1           |                            |                 |
| <b>Type</b>               | R — Document, report | <b>Dissemination Level</b> | SEN - Sensitive |
| <b>Due Date (month)</b>   | 8                    | <b>Work Package No</b>     | WP15            |

| Description            |
|------------------------|
| Draft SPR-INTEROP/OSED |

**Deliverable D15.4 – TS/IRS S4 v1**

|                           |                      |                            |                 |
|---------------------------|----------------------|----------------------------|-----------------|
| <b>Deliverable Number</b> | D15.4                | <b>Lead Beneficiary</b>    | 21 - FRQ        |
| <b>Deliverable Name</b>   | TS/IRS S4 v1         |                            |                 |
| <b>Type</b>               | R — Document, report | <b>Dissemination Level</b> | SEN - Sensitive |
| <b>Due Date (month)</b>   | 8                    | <b>Work Package No</b>     | WP15            |

| Description                      |
|----------------------------------|
| Draft Tech./Interface req. spec. |

**Deliverable D15.5 – VALP S4 v1**

|                           |                      |                            |                 |
|---------------------------|----------------------|----------------------------|-----------------|
| <b>Deliverable Number</b> | D15.5                | <b>Lead Beneficiary</b>    | 1 - SINTEF      |
| <b>Deliverable Name</b>   | VALP S4 v1           |                            |                 |
| <b>Type</b>               | R — Document, report | <b>Dissemination Level</b> | SEN - Sensitive |
| <b>Due Date (month)</b>   | 8                    | <b>Work Package No</b>     | WP15            |

| Description           |
|-----------------------|
| Draft Validation plan |

**Deliverable D15.6 – STAND S4 v2**

|                           |                      |                            |                 |
|---------------------------|----------------------|----------------------------|-----------------|
| <b>Deliverable Number</b> | D15.6                | <b>Lead Beneficiary</b>    | 21 - FRQ        |
| <b>Deliverable Name</b>   | STAND S4 v2          |                            |                 |
| <b>Type</b>               | R — Document, report | <b>Dissemination Level</b> | SEN - Sensitive |
| <b>Due Date (month)</b>   | 8                    | <b>Work Package No</b>     | WP15            |

|                                    |
|------------------------------------|
| <b>Description</b>                 |
| Standardisation deliverable -Draft |

**Deliverable D15.7 – REG S4 v2**

|                           |                      |                            |                 |
|---------------------------|----------------------|----------------------------|-----------------|
| <b>Deliverable Number</b> | D15.7                | <b>Lead Beneficiary</b>    | 4 - AVINOR      |
| <b>Deliverable Name</b>   | REG S4 v2            |                            |                 |
| <b>Type</b>               | R — Document, report | <b>Dissemination Level</b> | SEN - Sensitive |
| <b>Due Date (month)</b>   | 8                    | <b>Work Package No</b>     | WP15            |

|                               |
|-------------------------------|
| <b>Description</b>            |
| Regulatory deliverable -Draft |

**Deliverable D16.1 – REG S4 v3**

|                           |                      |                            |                 |
|---------------------------|----------------------|----------------------------|-----------------|
| <b>Deliverable Number</b> | D16.1                | <b>Lead Beneficiary</b>    | 4 - AVINOR      |
| <b>Deliverable Name</b>   | REG S4 v3            |                            |                 |
| <b>Type</b>               | R — Document, report | <b>Dissemination Level</b> | SEN - Sensitive |
| <b>Due Date (month)</b>   | 20                   | <b>Work Package No</b>     | WP16            |

|                        |
|------------------------|
| <b>Description</b>     |
| Regulatory deliverable |

**Deliverable D16.2 – OSED S4 v2**

|                           |                      |                            |                 |
|---------------------------|----------------------|----------------------------|-----------------|
| <b>Deliverable Number</b> | D16.2                | <b>Lead Beneficiary</b>    | 4 - AVINOR      |
| <b>Deliverable Name</b>   | OSED S4 v2           |                            |                 |
| <b>Type</b>               | R — Document, report | <b>Dissemination Level</b> | SEN - Sensitive |
| <b>Due Date (month)</b>   | 20                   | <b>Work Package No</b>     | WP16            |

|                           |
|---------------------------|
| <b>Description</b>        |
| SPR-INTEROP/OSED Part I-V |

**Deliverable D16.3 – TS/IRS S4 v2**

|                           |                      |                            |                 |
|---------------------------|----------------------|----------------------------|-----------------|
| <b>Deliverable Number</b> | D16.3                | <b>Lead Beneficiary</b>    | 21 - FRQ        |
| <b>Deliverable Name</b>   | TS/IRS S4 v2         |                            |                 |
| <b>Type</b>               | R — Document, report | <b>Dissemination Level</b> | SEN - Sensitive |
| <b>Due Date (month)</b>   | 20                   | <b>Work Package No</b>     | WP16            |

| Description                |
|----------------------------|
| Tech./Interface req. spec. |

**Deliverable D16.4 – CBA S4 v1**

|                           |                      |                            |                 |
|---------------------------|----------------------|----------------------------|-----------------|
| <b>Deliverable Number</b> | D16.4                | <b>Lead Beneficiary</b>    | 4 - AVINOR      |
| <b>Deliverable Name</b>   | CBA S4 v1            |                            |                 |
| <b>Type</b>               | R — Document, report | <b>Dissemination Level</b> | SEN - Sensitive |
| <b>Due Date (month)</b>   | 20                   | <b>Work Package No</b>     | WP16            |

| Description           |
|-----------------------|
| Cost benefit analysis |

**Deliverable D16.5 – STAND S4 v3**

|                           |                      |                            |                 |
|---------------------------|----------------------|----------------------------|-----------------|
| <b>Deliverable Number</b> | D16.5                | <b>Lead Beneficiary</b>    | 21 - FRQ        |
| <b>Deliverable Name</b>   | STAND S4 v3          |                            |                 |
| <b>Type</b>               | R — Document, report | <b>Dissemination Level</b> | SEN - Sensitive |
| <b>Due Date (month)</b>   | 20                   | <b>Work Package No</b>     | WP16            |

| Description                 |
|-----------------------------|
| Standardisation deliverable |

**Deliverable D16.6 – OSED S4 v3**

|                           |                      |                            |             |
|---------------------------|----------------------|----------------------------|-------------|
| <b>Deliverable Number</b> | D16.6                | <b>Lead Beneficiary</b>    | 4 - AVINOR  |
| <b>Deliverable Name</b>   | OSED S4 v3           |                            |             |
| <b>Type</b>               | R — Document, report | <b>Dissemination Level</b> | PU - Public |
| <b>Due Date (month)</b>   | 32                   | <b>Work Package No</b>     | WP16        |

| Description                            |
|----------------------------------------|
| SPR-INTEROP/OSED Part I-V final report |

**Deliverable D16.7 – TS/IRS S4 v3**

|                           |                      |                            |             |
|---------------------------|----------------------|----------------------------|-------------|
| <b>Deliverable Number</b> | D16.7                | <b>Lead Beneficiary</b>    | 21 - FRQ    |
| <b>Deliverable Name</b>   | TS/IRS S4 v3         |                            |             |
| <b>Type</b>               | R — Document, report | <b>Dissemination Level</b> | PU - Public |
| <b>Due Date (month)</b>   | 32                   | <b>Work Package No</b>     | WP16        |

| Description                             |
|-----------------------------------------|
| Tech./Interface req. spec. Final report |

**Deliverable D16.8 – VALP S4 v2**

|                           |                      |                            |                 |
|---------------------------|----------------------|----------------------------|-----------------|
| <b>Deliverable Number</b> | D16.8                | <b>Lead Beneficiary</b>    | 1 - SINTEF      |
| <b>Deliverable Name</b>   | VALP S4 v2           |                            |                 |
| <b>Type</b>               | R — Document, report | <b>Dissemination Level</b> | SEN - Sensitive |
| <b>Due Date (month)</b>   | 32                   | <b>Work Package No</b>     | WP16            |

| Description                   |
|-------------------------------|
| Validation plan. Final report |

**Deliverable D16.9 – VALR S4**

|                           |                      |                            |              |
|---------------------------|----------------------|----------------------------|--------------|
| <b>Deliverable Number</b> | D16.9                | <b>Lead Beneficiary</b>    | 20 - AIRSIDE |
| <b>Deliverable Name</b>   | VALR S4              |                            |              |
| <b>Type</b>               | R — Document, report | <b>Dissemination Level</b> | PU - Public  |
| <b>Due Date (month)</b>   | 32                   | <b>Work Package No</b>     | WP16         |

| Description       |
|-------------------|
| Validation report |

**Deliverable D16.10 – CBA S4 v2**

|                           |                      |                            |             |
|---------------------------|----------------------|----------------------------|-------------|
| <b>Deliverable Number</b> | D16.10               | <b>Lead Beneficiary</b>    | 4 - AVINOR  |
| <b>Deliverable Name</b>   | CBA S4 v2            |                            |             |
| <b>Type</b>               | R — Document, report | <b>Dissemination Level</b> | PU - Public |
| <b>Due Date (month)</b>   | 32                   | <b>Work Package No</b>     | WP16        |

| Description                         |
|-------------------------------------|
| Cost benefit analysis. Final report |

**Deliverable D16.11 – STAND S4 v4**

|                           |                      |                            |             |
|---------------------------|----------------------|----------------------------|-------------|
| <b>Deliverable Number</b> | D16.11               | <b>Lead Beneficiary</b>    | 21 - FRQ    |
| <b>Deliverable Name</b>   | STAND S4 v4          |                            |             |
| <b>Type</b>               | R — Document, report | <b>Dissemination Level</b> | PU - Public |
| <b>Due Date (month)</b>   | 32                   | <b>Work Package No</b>     | WP16        |

| Description                               |
|-------------------------------------------|
| Standardisation deliverable. Final report |

**Deliverable D16.12 – REG S4 v4**

|                           |                      |                            |             |
|---------------------------|----------------------|----------------------------|-------------|
| <b>Deliverable Number</b> | D16.12               | <b>Lead Beneficiary</b>    | 4 - AVINOR  |
| <b>Deliverable Name</b>   | REG S4 v4            |                            |             |
| <b>Type</b>               | R — Document, report | <b>Dissemination Level</b> | PU - Public |
| <b>Due Date (month)</b>   | 32                   | <b>Work Package No</b>     | WP16        |

| Description                          |
|--------------------------------------|
| Regulatory deliverable. Final report |

**Deliverable D16.13 – CN S4**

|                           |                      |                            |             |
|---------------------------|----------------------|----------------------------|-------------|
| <b>Deliverable Number</b> | D16.13               | <b>Lead Beneficiary</b>    | 21 - FRQ    |
| <b>Deliverable Name</b>   | CN S4                |                            |             |
| <b>Type</b>               | R — Document, report | <b>Dissemination Level</b> | PU - Public |
| <b>Due Date (month)</b>   | 32                   | <b>Work Package No</b>     | WP16        |

| Description              |
|--------------------------|
| Solution contextual Note |



## LIST OF MILESTONES

| Milestones                                              |                                                                                       |                                            |                  |                                                                |                  |
|---------------------------------------------------------|---------------------------------------------------------------------------------------|--------------------------------------------|------------------|----------------------------------------------------------------|------------------|
| Grant Preparation (Milestones screen) — Enter the info. |                                                                                       |                                            |                  |                                                                |                  |
| Milestone No                                            | Milestone Name                                                                        | Work Package No                            | Lead Beneficiary | Means of Verification                                          | Due Date (month) |
| 1                                                       | Project kick-off meeting (KOM)                                                        | WP1                                        | 1 - SINTEF       | Meeting convened                                               | 1                |
| 2                                                       | PR#1 is prepared, including CDEP and STAND, REG, OSED, TS/IRS, VALP for all solutions | WP1, WP15, WP5, WP11, WP9, WP7, WP13, WP3  | 1 - SINTEF       | Draft CDE, STDs, REGs, VALP uploaded on STELLAR                | 8                |
| 3                                                       | S1: Solutions enablers described                                                      | WP9                                        | 14 - ENAIRE      | All enablers on STELLAR                                        | 12               |
| 4                                                       | S1: Initial prototype available for testing                                           | WP9                                        | 14 - ENAIRE      | Meeting report of initial test with end users                  | 17               |
| 5                                                       | All nSDM RP1 workshops conducted                                                      | WP5                                        | 21 - FRQ         | Minutes of meeting                                             | 18               |
| 6                                                       | PR#2 is prepared                                                                      | WP8, WP14, WP10, WP6, WP2, WP12, WP16, WP4 | 1 - SINTEF       | Reviewed Maturity assessment CDE, STDs, REGs, VALPs on STELLAR | 19               |
| 7                                                       | S2: Thread 2.1, prototype integrated                                                  | WP12                                       | 12 - LFV         | Prototype integrated                                           | 22               |
| 8                                                       | All WP6 workshops completed                                                           | WP6                                        | 1 - SINTEF       | Minutes of workshops                                           | 28               |
| 9                                                       | S1: All validation exercises completed                                                | WP10                                       | 2 - ADBSG        | Minutes of workshops & exercise executions                     | 28               |
| 10                                                      | S1: Exit maturity gate                                                                | WP10                                       | 14 - ENAIRE      | Maturity gate report                                           | 34               |
| 11                                                      | S1: OSED and TS/IRS stable as input for completing VALP                               | WP9                                        | 14 - ENAIRE      | Deliverables available and uploaded                            | 16               |
| 12                                                      | S2: OSED and TS/IRS stable as input for completing VALP                               | WP11                                       | 12 - LFV         | Deliverables available and uploaded                            | 12               |
| 13                                                      | S3: OSED and TS/IRS stable as input for completing VALP                               | WP13                                       | 2 - ADBSG        | Deliverables available and uploaded                            | 16               |

| Milestones                                              |                                                                                        |                 |                  |                                                                                |                  |
|---------------------------------------------------------|----------------------------------------------------------------------------------------|-----------------|------------------|--------------------------------------------------------------------------------|------------------|
| Grant Preparation (Milestones screen) — Enter the info. |                                                                                        |                 |                  |                                                                                |                  |
| Milestone No                                            | Milestone Name                                                                         | Work Package No | Lead Beneficiary | Means of Verification                                                          | Due Date (month) |
| 14                                                      | S4: OSED and TS/IRS stable as input for completing VALP                                | WP15            | 21 - FRQ         | Deliverables available and uploaded                                            | 18               |
| 15                                                      | S1: Approval of VALP and confirmed availability of resources for validation exercises  | WP10            | 14 - ENAIRE      | Written approval and confirmation received by project coordinator and uploaded | 19               |
| 16                                                      | S2: Approval of VALP and confirmed availability of resources for technical assessments | WP11            | 12 - LFV         | Written approval and confirmation received by project coordinator and uploaded | 18               |
| 17                                                      | S2: Approval of VALP and confirmed availability of resources for validation exercises  | WP12            | 12 - LFV         | Written approval and confirmation received by project coordinator and uploaded | 19               |
| 18                                                      | S3: Approval of VALP and confirmed availability of resources for validation exercises  | WP13            | 2 - ADBSG        | Written approval and confirmation received by project coordinator and uploaded | 19               |
| 19                                                      | S4: Approval of VALP and confirmed availability of resources for validation exercises  | WP15            | 21 - FRQ         | Written approval and confirmation received by project coordinator and uploaded | 19               |
| 20                                                      | S2: Exit maturity gate                                                                 | WP12            | 12 - LFV         | Maturity gate report                                                           | 34               |
| 21                                                      | S3: Exit maturity gate                                                                 | WP14            | 2 - ADBSG        | Maturity gate report                                                           | 34               |
| 22                                                      | S4: Exit maturity gate                                                                 | WP16            | 21 - FRQ         | Maturity gate report                                                           | 34               |
| 23                                                      | S2: All validation exercises completed                                                 | WP12            | 12 - LFV         | Minutes of workshops & exercise executions                                     | 28               |
| 24                                                      | S3: All validation exercises completed                                                 | WP14            | 2 - ADBSG        | Minutes of workshops & exercise executions                                     | 30               |
| 25                                                      | S4: All validation exercises completed                                                 | WP16            | 21 - FRQ         | Minutes of workshops & exercise executions                                     | 28               |
| 26                                                      | S2: Solutions enablers described                                                       | WP11            | 12 - LFV         | All enablers on STELLAR                                                        | 12               |

| Milestones                                              |                                           |                 |                  |                                              |                  |
|---------------------------------------------------------|-------------------------------------------|-----------------|------------------|----------------------------------------------|------------------|
| Grant Preparation (Milestones screen) — Enter the info. |                                           |                 |                  |                                              |                  |
| Milestone No                                            | Milestone Name                            | Work Package No | Lead Beneficiary | Means of Verification                        | Due Date (month) |
| 27                                                      | S3: Solutions enablers described          | WP13            | 2 - ADBSG        | All enablers on STELLAR                      | 12               |
| 28                                                      | S4: Solutions enablers described          | WP15            | 21 - FRQ         | All enablers on STELLAR                      | 12               |
| 29                                                      | S1: Initial BIM ready                     | WP9             | 7 - ENAV         | Draft annex to the SPR-INTEROP/OSD available | 3                |
| 30                                                      | S2: Initial BIM ready                     | WP11            | 9 - SWED         | Draft annex to the SPR-INTEROP/OSD available | 3                |
| 31                                                      | S3: Initial BIM ready                     | WP13            | 5 - DLR          | Draft annex to the SPR-INTEROP/OSD available | 3                |
| 32                                                      | S4: Initial BIM ready                     | WP15            | 4 - AVINOR       | Draft annex to the SPR-INTEROP/OSD available | 3                |
| 33                                                      | S2: VALP is ready for EXE 2.2 and EXE 2.3 | WP11            | 12 - LFV         | Status confirmed with SJU                    | 18               |
| 34                                                      | S3: VALP is ready for EXE 3.1 and EXE 3.2 | WP13            | 5 - DLR          | Status confirmed with SJU                    | 18               |
| 35                                                      | S4: VALP is ready for EXE 4.1 and EXE 4.2 | WP15            | 1 - SINTEF       | Status confirmed with SJU                    | 16               |

## LIST OF CRITICAL RISKS

| Critical risks & risk management strategy                   |                                                 |                        |                                                                                                                                                                                          |
|-------------------------------------------------------------|-------------------------------------------------|------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Grant Preparation (Critical Risks screen) — Enter the info. |                                                 |                        |                                                                                                                                                                                          |
| Risk number                                                 | Description                                     | Work Package No(s)     | Proposed Mitigation Measures                                                                                                                                                             |
| 1                                                           | Solution failed exit maturity gate: Low, Medium | WP14, WP10, WP12, WP16 | Regular project team review of solution progresses during project lifecycle and draft versions of solutions' data pack sent to SJU during reporting period 2 to derisk final data-packs. |

| <b>Critical risks &amp; risk management strategy</b><br><i>Grant Preparation (Critical Risks screen) — Enter the info.</i> |                                                                                                                              |                                                                                       |                                                                                                                                                                                                                                   |
|----------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Risk number</b>                                                                                                         | <b>Description</b>                                                                                                           | <b>Work Package No(s)</b>                                                             | <b>Proposed Mitigation Measures</b>                                                                                                                                                                                               |
|                                                                                                                            |                                                                                                                              |                                                                                       | Re-assessment of project scope in case of issues observed during the monitoring of the progresses.                                                                                                                                |
| 2                                                                                                                          | Technology may not reach desired level of maturity and feasibility within project timeline: Low, High                        | WP14, WP10, WP15, WP11, WP9, WP12, WP16, WP13                                         | Regular alignment within the project team and prioritize incremental development with regular testing to address technical challenges.                                                                                            |
| 3                                                                                                                          | Systems may fail to integrate with existing legacy systems or other components: Medium, Medium                               | WP14, WP10, WP15, WP11, WP9, WP12, WP16, WP13                                         | Build upon existing infrastructure to reduce integration efforts with third parties; use industry standards for system design and conduct rigorous integration tests to ensure compatibility across platforms.                    |
| 4                                                                                                                          | Unavailability of operational environment or technologies for validations due to unforeseen circumstances: Medium, High      | WP14, WP10, WP15, WP11, WP9, WP12, WP16, WP13                                         | Thorough planning and communication of validation plan, ensuring that a) technology is ready, integrated and tested, and b) airport environments are prepared and briefed and c) backup solutions are planned for key components. |
| 5                                                                                                                          | Budget Overrun: Budget is exceeded due to unforeseen technical challenges, regulatory delays, or scope creep: Medium, Medium | WP8, WP10, WP1, WP15, WP5, WP6, WP11, WP2, WP9, WP12, WP16, WP13, WP14, WP7, WP3, WP4 | Establish a detailed budget and regularly review financial progress to identify and address cost overruns early.                                                                                                                  |
| 6                                                                                                                          | Project delays: Failure to meet key milestones could delay the overall project timeline: Medium, Medium                      | WP8, WP10, WP1, WP15, WP5, WP6, WP11, WP2, WP9, WP12, WP16, WP13, WP14, WP7, WP3, WP4 | Use agile project management techniques to ensure progress is monitored and roadblocks are addressed promptly                                                                                                                     |
| 7                                                                                                                          | Data required for ML algorithms is not available in time or insufficient: Medium, High                                       | WP10, WP15, WP11, WP9, WP12, WP16                                                     | Inform partners prior to start of project about required data to ensure collecting starts in time and necessary NDAs are established in place.                                                                                    |
| 8                                                                                                                          | Scarcity of operational resources for ATCO and                                                                               | WP11, WP12                                                                            | To continue developing an operational resource pool with retired or partially retired ATCOs.                                                                                                                                      |

| <b>Critical risks &amp; risk management strategy</b><br><i>Grant Preparation (Critical Risks screen) — Enter the info.</i> |                                                                                                                                                         |                                             |                                                                                                                                                                                                                                        |
|----------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Risk number</b>                                                                                                         | <b>Description</b>                                                                                                                                      | <b>Work Package No(s)</b>                   | <b>Proposed Mitigation Measures</b>                                                                                                                                                                                                    |
|                                                                                                                            | pseudo-pilots available for RTS exercises: Medium, High                                                                                                 |                                             |                                                                                                                                                                                                                                        |
| 9                                                                                                                          | Airline cannot be subcontracted for contributions in OSED and solution validation: Medium, Low                                                          | WP15, WP16                                  | AVINOR employs several former pilots from airlines and will cover OSED contributions and solution validation with internal resources. Cockpit interactions can be simulated in a lab environment with the technical enablers in place. |
| 10                                                                                                                         | Changes in the EUROCONTROL team and the unavailability of proposal-phase experts may impact continuity and the timely execution of PARADISE activities. | WP8, WP14, WP10, WP11, WP12, WP9, WP7, WP13 | Mitigation measures include early onboarding of alternative expertise, structured knowledge transfer, and close coordination with the project coordinator.                                                                             |

## PROJECT REVIEWS

| Project Reviews                                      |                |          |          |
|------------------------------------------------------|----------------|----------|----------|
| Grant Preparation (Reviews screen) — Enter the info. |                |          |          |
| Review No                                            | Timing (month) | Location | Comments |
| RV1                                                  | 21             | Brussels |          |

## JU CONTRIBUTIONS

| PIC       | Legal Name                                 | Membership                      | IKOP         | Financial Contribution | IKAA   |
|-----------|--------------------------------------------|---------------------------------|--------------|------------------------|--------|
| 868098009 | Saab Air Traffic Management Nederland B.V. | No                              | € 0.00       | € 0.00                 | € 0.00 |
| 868099076 | Saab Air Traffic Management AB             | No                              | € 0.00       | € 0.00                 | € 0.00 |
| 870091747 | Tern Systems kft                           | No                              | € 0.00       | € 0.00                 | € 0.00 |
| 877514769 | AIRSIDE INNOVATION AS                      | No                              | € 0.00       | € 0.00                 | € 0.00 |
| 884180221 | ADB SAFEGATE Austria GmbH                  | No                              | € 0.00       | € 0.00                 | € 0.00 |
| 885348392 | ATRICs Advanced Traffic Solutions GmbH     | No                              | € 0.00       | € 0.00                 | € 0.00 |
| 887286355 | TERN SYSTEMS EHF                           | No                              | € 0.00       | € 0.00                 | € 0.00 |
| 891456967 | LETISTE PRAHA AS                           | Yes (Founding Member)           | € 45 637.50  | € 0.00                 | € 0.00 |
| 910945140 | SINTEF AS                                  | Yes (Founding Member)           | € 716 761.22 | € 0.00                 | € 0.00 |
| 923657475 | FREQUENTIS ROMANIA SRL                     | Yes (Founding Member Affiliate) | € 126 428.57 | € 0.00                 | € 0.00 |
| 927065376 | LUFTHANSA SYSTEMS GMBH & CO KG             | No                              | € 0.00       | € 0.00                 | € 0.00 |
| 938275375 | AVINOR AS                                  | No                              | € 0.00       | € 0.00                 | € 0.00 |
| 941767472 | HUNGAROCONTROL MAGYAR                      | Yes (Founding Member)           | € 24 100.88  | € 0.00                 | € 0.00 |

| PIC       | Legal Name                                                             | Membership                      | IKOP         | Financial Contribution | IKAA   |
|-----------|------------------------------------------------------------------------|---------------------------------|--------------|------------------------|--------|
|           | LEGIFORGALMISZOLGALAT ZARTKORUEN MUKODO RESZVENYTARSASAG               |                                 |              |                        |        |
| 942346077 | LUFTFARTSVERKET                                                        | Yes (Founding Member)           | € 217 814.40 | € 0.00                 | € 0.00 |
| 944977784 | FLUGHAFEN MUNCHEN GMBH                                                 | Yes (Founding Member)           | € 106 117.50 | € 0.00                 | € 0.00 |
| 954552363 | RIZENI LETOVEHO PROVOZU CESKE REPUBLIKY STATNI PODNIK                  | Yes (Founding Member)           | € 22 500.00  | € 0.00                 | € 0.00 |
| 957048464 | AENA S.M.E. SA                                                         | Yes (Founding Member)           | € 64 731.56  | € 0.00                 | € 0.00 |
| 957912443 | FREQUENTIS ORTHOGON GMBH                                               | Yes (Founding Member Affiliate) | € 175 714.29 | € 0.00                 | € 0.00 |
| 970508475 | AEROPORTI DI ROMA SPA                                                  | Yes (Founding Member)           | € 102 626.25 | € 0.00                 | € 0.00 |
| 972434992 | ROSENBAUER INTERNATIONAL AG                                            | No                              | € 0.00       | € 0.00                 | € 0.00 |
| 983036413 | FRAPORT AG FRANKFURT AIRPORT SERVICES WORLDWIDE                        | No                              | € 0.00       | € 0.00                 | € 0.00 |
| 984282281 | SWEDAVIA AB                                                            | Yes (Founding Member)           | € 49 213.50  | € 0.00                 | € 0.00 |
| 986590687 | SOCIETA' PER AZIONI ESERCIZI AEROPORTUALI SEA                          | Yes (Founding Member)           | € 101 236.17 | € 0.00                 | € 0.00 |
| 991247948 | AIRBUS OPERATIONS SAS                                                  | Yes (Founding Member Affiliate) | € 141 566.63 | € 0.00                 | € 0.00 |
| 997605619 | CENTRO DE REFERENCIA INVESTIGACION DESARROLLO E INNOVACION ATM, A.I.E. | Yes (Founding Member Affiliate) | € 165 843.75 | € 0.00                 | € 0.00 |
| 997701843 | ENAIRE                                                                 | Yes (Founding Member)           | € 25 875.00  | € 0.00                 | € 0.00 |
| 997710476 | CENTRO INTERNAZIONALE IN MONITORAGGIO AMBIENTALE - FONDAZIONE CIMA     | No                              | € 0.00       | € 0.00                 | € 0.00 |
| 998162690 | PILDO CONSULTING SL                                                    | No                              | € 0.00       | € 0.00                 | € 0.00 |
| 998197513 | ENAV SPA                                                               | Yes (Founding Member)           | € 126 595.30 | € 0.00                 | € 0.00 |
| 998307317 | FREQUENTIS AG                                                          | Yes (Founding Member)           | € 467 184.15 | € 0.00                 | € 0.00 |
| 998325941 | DEEP BLUE SRL                                                          | No                              | € 0.00       | € 0.00                 | € 0.00 |

| PIC       | Legal Name                                                           | Membership            | IKOP           | Financial Contribution | IKAA   |
|-----------|----------------------------------------------------------------------|-----------------------|----------------|------------------------|--------|
| 999483733 | EUROCONTROL - EUROPEAN ORGANISATION FOR THE SAFETY OF AIR NAVIGATION | Yes (Founding Member) | € 1 939 172.00 | € 0.00                 | € 0.00 |
| 999756788 | EML SPEECH TECHNOLOGY GMBH                                           | No                    | € 0.00         | € 0.00                 | € 0.00 |
| 999959615 | SAAB AKTIEBOLAG                                                      | Yes (Founding Member) | € 184 084.88   | € 0.00                 | € 0.00 |
| 999963010 | AIRBUS                                                               | Yes (Founding Member) | € 95 710.50    | € 0.00                 | € 0.00 |
| 999965532 | DEUTSCHE LUFTHANSA AKTIENGESELLSCHAFT                                | Yes (Founding Member) | € 43 729.80    | € 0.00                 | € 0.00 |
| 999981731 | DEUTSCHES ZENTRUM FUR LUFT - UND RAUMFAHRT EV                        | Yes (Founding Member) | € 226 072.62   | € 0.00                 | € 0.00 |
| 999993953 | ALMA MATER STUDIORUM - UNIVERSITA DI BOLOGNA                         | No                    | € 0.00         | € 0.00                 | € 0.00 |



| TABLE OF HISTORY OF CHANGES |                         |                                                                                                                                                     |
|-----------------------------|-------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------|
| PHASE                       | PART A                  |                                                                                                                                                     |
| GAP                         | Section                 | Description of change                                                                                                                               |
|                             | Budget changes          | BE1 WP7-8: Moved €4000 from B. Sub.cont. Costs to C.3 Publication fees. Adjusted sum for Indirect costs/VAT                                         |
|                             |                         | B1 WP15: Moved cost in budget from B. to D.2                                                                                                        |
|                             |                         | BE5 WP14: Moved cost in budget from B. to C.3 Other. Adjusted sum for Indirect costs/VAT                                                            |
|                             |                         | BE14 WP11: Corrected discrepancy in A.1                                                                                                             |
|                             | Researchers             | The list of researchers is now corresponding to the list in the EU portal                                                                           |
|                             | Work Packages           | Updated work package descriptions for WP03 and WP04 to better explain actions and tasks regarding cyber-security                                    |
|                             | Deliverables            | The list is updated to comply with the guidance document                                                                                            |
|                             | Milestones              | The list is updated to comply with the guidance document                                                                                            |
|                             | Critical risks          | The list is updated to comply with the guidance document. Added Critical risk 10 in portal.                                                         |
|                             |                         |                                                                                                                                                     |
| PHASE                       | PART B                  |                                                                                                                                                     |
| GAP                         | Section                 | Description of change                                                                                                                               |
|                             | Part B                  | Removed the list of participants, Section 3.3 Tables for Section 3.1, and document processing tags. Moved Table 3.1g and Table 3.1j to Section 3.1. |
|                             | Part B                  | Changed footer to include proposal number and proposal acronym.                                                                                     |
|                             | Part B                  | Added table of history of changes and table of contents.                                                                                            |
|                             | Section 1               | Text is added to address shortcomings identified in the ESR. No text has been removed in this process.                                              |
|                             | Section 4               | Added section 4 Ethics and self-assessment.                                                                                                         |
|                             | Section 2.3.4           | TRL at Project End in Table 7 updated for KER5, KER6 and KER9 to align with the Target Maturity Levels of each solution.                            |
|                             | Table 3.1g              | Table 3.1g is updated to match the budget                                                                                                           |
|                             | Table 1                 | Added ENAV as contributor to Solution 1.                                                                                                            |
|                             | Section 1.2.5 and 1.3.5 | Added references to the European Aviation Common Public Key Infrastructure (EACP)                                                                   |
|                             | Section 3.2             | Added ECTL's contribution per WP, as requested by ECTL                                                                                              |

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## 1. Excellence

### 1.1 Objectives and ambition

PARADISE answers the topic “HORIZON-SESAR-2025-DES-IR-02-WA4-1, Next generation ATS platform for airport operations”. The overall goal of the project is to conduct research and innovation to prepare the next generation airport platform to provide an ideal environment for the execution of airport operations while being a scalable and secure platform. We name this future platform “PARADISE” (Precise and Automated Runway and Airport Decision-making for Intelligent and Safe Execution) as it will provide a perfect environment for harmonized operations for all stakeholders at the airport.

To fulfil the goal, the project proposes 4 innovative solutions, each focusing on primary key elements of the PARADISE platform. They are listed in Table 1 and will be developed, validated and documented separately.

| No. | Solution title                                 | Lead participant | Contributors                                                                       |
|-----|------------------------------------------------|------------------|------------------------------------------------------------------------------------|
| 1   | Dynamic Calibration of Airport Capacity        | ENAIRE           | CRIDA, ECTL, ENAIRE, ENAV, SEA, ADR, PRG, ANS CR, PILDO, AENA, DBL, CIMA, SINTEF   |
| 2   | Optimisation of Runway Throughput              | LFV              | AIRBUS, AIOPS, DBL, ECTL, ENAV, HUN, LFV, SAAB, SAABNL, SINTEF, SWED, TERN, TERN-H |
| 3   | Intelligent Surface Management                 | ADBSG            | ADBSG, AIRBUS, DLR, ECTL, EML, FRA, LH, LHS, MUC, ROS, SINTEF                      |
| 4   | Prediction and Optimisation in Adverse Weather | FRQ              | AIRSIDE, ATR, AVINOR, FOR, FRO, FRQ, SINTEF                                        |

Table 1 The four solutions developed in PARADISE with their participants.

Solutions are split into different threads, each thread with a specific focus within the solution. In addition, the project includes two threads that are transversal to all 4 solutions. The new Service Delivery Model (nSDM) transversal thread aims to support the harmonisation of the software architecture to transition from monolithic architectures to a service-based, cyber-secure ecosystem. The secure exchange of data transversal thread, in turn, aims to achieve secure data exchange in the development of the four solutions. Together, those two transversal threads will enable and facilitate the future integration of the four building blocks (solutions) such that they comprise a common PARADISE platform. A close coordination with WA7 transversal projects will be performed to ensure consistency with the Digital European Sky (DES) performance assessment and solution architecture.

PARADISE will enable a seamless and safe environment through a common infrastructure and services supporting a common concept of trajectory-based operations in a highly automated airport environment where the human role focuses on strategic decision-making while supervising automation. The four solutions are complementary and form the building blocks for a future PARADISE platform, such that each solution can either be implemented independently or integrated to fully maximise the potential performance benefits as they focus on different layers of decision-making or different stages of the airport-centred trajectories, see Figure 1. Solution 1 addresses the strategic, tactical, and post-operation layers to precisely calibrate the capacity of key resources at the airport. Solutions 2 and 3 both address the operational layer for safe and effective throughput, but for different stages of the flight and aircraft turnaround processes. Solution 4 also addresses the operational layer, but with a specific focus on safe, effective, and resilient operations in adverse weather.

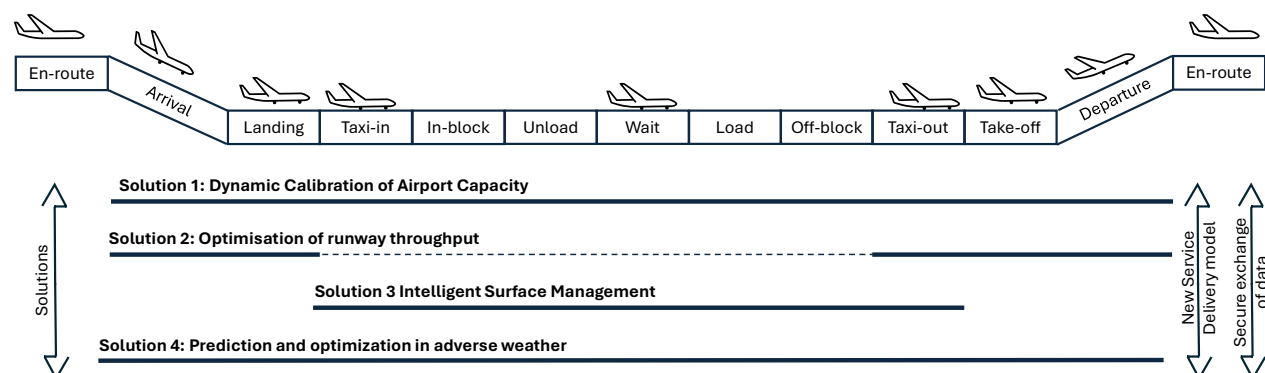


Figure 1: How the four solutions of PARADISE are mapped to stages of flights and linked through transversal threads.

The service improvement derived from this research will empower controllers and airport operators to make informed choices, providing context and recommendations through integrated interfaces for rapid, data-driven responses to changing conditions.

### 1.1.1 Solution 1: Dynamic Calibration of Airport Capacity

Solution 1 addresses inefficiencies and misalignment in predicted demand and capacity by proposing a **Dynamic Calibration of Airport Capacity Service**. It integrates live and historical data to model the impact of variable factors like **weather, staffing, runway configuration, infrastructure, and traffic complexity** to dynamically calibrate airport capacity and optimise resource allocation, aiming to minimise arrival delays, reduce regulations, optimise runway throughput, and enhance environmental performance. The proposed **data-driven AI model** operates at strategic, tactical, and post-operation layers to accurately predict hourly traffic demand, dynamically calibrate declared airport capacity, optimise ATC staffing, minimise Arrival Sequencing and Metering Area (ASMA) delays, and reduce regulations.

Solution 1 is made up of one thread with four interconnected modules:

1. **Capacity Calibration Assistant:** Establishes baseline performance, analyses root causes post-operation, and determines buffers using historical and static data.
2. **Demand Prediction Assistant:** Forecasts short-term demand based on schedules (Target Off-Block Time, Target Landing Time) to determine runway, surface, and passenger traffic.
3. **Capacity Prediction Assistant:** Predicts live capacity with attribution and alerting, refining actual buffers.
4. **ATC Capacity Delivery Assistant:** Supports tactical configuration, sequencing, and regulation advice, leveraging available buffers and providing "what-if" functionalities.

The modules then apply AI-driven predictive analytics to this data, generating accurate, dynamic 4D trajectory predictions for every flight. This crucial information is then shared with all stakeholders for safer, more efficient decisions across three phases:

- **Pre-Operations (Strategic & Pre-Tactical Planning):** Using Machine Learning (ML), the solution analyses historical performance to generate hourly capacity envelopes for nominal and degraded operations. These forecasts are distributed to APOCs, ANSPs, and the Network Manager to align ATFM measures and slot allocation.
- **Tactical Operations (Day-of-Ops):** Acting as a real-time forecasting engine, it continuously ingests live data from sources like AODB, A-SMGCS, RMS, MET, and ECTL B2B interfaces. By correlating past performance with current conditions, it recalibrates throughput forecasts in response to disruptions. These dynamic recalibrations are immediately published, enabling Tower and TMA ATC, APOC, and NMOC to respond rapidly with informed decisions on slot management and demand/capacity balancing.
- **Post-Operations (Performance Monitoring & Learning):** This phase uses the solution as a performance analysis tool, comparing declared capacity with observed throughput and attributing deviations to quantifiable drivers. These insights, shared via Solution 1's data fabric, refine ML models, tune procedures, and align local Airport Operations Plans with the broader Network Operations Plan.

Solution 1 aims to improve airport capacity declaration and utilisation processes across strategic, pre-tactical, and tactical windows. In a previously validated application of the CCPM methodology, TIRANA, a medium-sized airport (LATI) was able to raise its total runway capacity from 13 to 20 movements per hour (+54%), under a theoretical 50/50 arrival-departure split—demonstrating the potential of data-driven calibration to unlock latent capacity without compromising safety. Building on this foundation, the proposed work targets measurable improvements in throughput, punctuality, and system resilience, particularly at medium and large airports with untapped capacity.

Depending on the airport's traffic complexity, infrastructure constraints, weather variability, and operational maturity, a sizeable revision of declared capacity can lead to performance gains which are mapped to three key operational objectives and roughly estimated by expert judgement under a series of success metrics (SM) listed below.

- **[OBJ.101] For Airport Operations and Air Navigation Service Providers (ANSPs):** To dynamically calibrate and optimise airport capacity, thereby reducing ASMA delay, increasing arrival punctuality.
  - SM.101: 10-30% relative reduction of ASMA delay in minutes/aircraft
  - SM.102: 10-30% relative increase of arrival and departure punctuality in minutes/aircraft
  - SM.103: 5-15% relative reduction of departure delay in minutes/aircraft

- SM.104: Safety levels maintained despite the reduction of capacity buffers (risk of runway collision accidents and arrival/departure under separation not increased).
- SM.105: 5-15% relative increase of airport capacity in movements/hour
- SM.106: 5-20% relative reduction in capacity buffers in movements/hour
- SM.107: 5-20% relative decrease in the airport time to recover from disruptions in minutes.
- **[OBJ.102]** For Airport Operators and Tower Controllers: To establish a single, coherent operational picture, eliminating information fragmentation and providing each of these crucial actors with a real-time, unified, and accurate view of the air traffic situation for seamless coordination, increasing situational awareness, and resilience to disruptions like weather and technical issues.
  - SM.107: 10-25% relative reduction of average fuel burn in kg of fuel/aircraft
  - SM.108: 5-15% relative reduction of Average of Difference in actual & Flight Plan or RBT durations in minutes/flight
  - SM.109: Relative increase of Airport Operators and Tower Controllers situational awareness
  - SM.110: Relative reduction of Airport Operators and Tower Controllers Coordination Workload
  - SM.111: 10-20% relative reduction of loss of airport capacity in movements/hour
- **[OBJ. 103]** For Airspace Users and Tower Controllers: To increase accuracy in flight plan (FPL) information and ensure high connectivity between ground-based systems, increasing flight efficiency and decreasing fuel burn.
  - SM.112: 5-15% relative reduction in flown vs planned trajectory difference in minutes (PRD1)
  - SM.113: 10-20% relative increase in slot compliance (# of aircraft).
  - SM.114: 10-30% relative reduction in use of arrival regulations in # of regulations.

The objectives are considered realistic and measurable as they are supported by structured validation exercises and clearly defined success criteria associated with specific indicators and metrics that allow for quantifiable evidence tracking. In addition, different airport test environments have been planned to be used to allow for variation in validation conditions, which increase reliability and confidence in the results: Rome Fiumicino (LIRF), Milan Malpensa (LIMC), and Palma de Mallorca (LEPA) Airports.

Solution 1 will be building on top of research already completed in SESAR 1 and SESAR 2020, but since there is no current or ongoing research in the area of an ATC capacity delivery assistant at a readiness level higher than Technology Readiness Level 2 (TRL2), Solution 1 will target Technology Readiness Level 4 (TRL4) for all the above objectives. The initial TRL is discussed more in the State-of-the-Art subsection. Solution 1 will also provide a mature evolution of the aforementioned concepts that can be integrated as far as possible in the new airport architecture, in particular for OBJ.102, and OBJ.103.

### 1.1.2 Solution 2: Optimisation of Runway Throughput

Airports will have to improve the efficiency of runway operations in order to improve the runway capacity and reduce the environmental impact. This challenge is the primary focus of Solution 2, with the goal to further develop operational procedures and tools for the optimisation of runway throughput, in line with development actions IR-4-06. The work of solution 2 will be organised in two threads:

**Thread 2.1. Enhanced Optimized Runway Delivery for arrivals (eORD):** Automated provision of accurate information regarding the minimum spacing between consecutive arrivals to optimize the runway utilization and increase the safety level. Enhanced Optimized Runway Delivery (eORD) uses ML together with the downlink of flight-specific information via ADS-C to better predict the final approach speed (Vapp) and arrival runway occupancy time (AROT). Hence, a better prediction of the deceleration profile of arriving aircraft and the associated compression effect, as well as the runway occupancy time per aircraft, will be used to better determine the minimum, safe spacing required between consecutive arrivals during the final approach. Thread 2.1 combines and builds on the work already conducted in PJ.02-W2-14.6a and 14.6b, as well as PJ.02-W2-4.11. Therefore, eORD builds on ORD from PJ.02-01-01 to further increase runway throughput in those capacity-constrained airports, using state-of-the-art ML techniques combined with the downlink of information from the aircraft.

Previous work conducted on eORD in SESAR Wave 2 (PJ.02-14.6) showed that a reduction of 25% or more of the current buffer applied today by the PJ.02-01-01 TBS-ORD tool is achievable with eORD using advanced ML techniques, resulting in an increase of runway throughput of up to 8% depending on the wind and traffic mix. As a result of the capacity benefits, there were subsequent benefits in terms of flight and fuel efficiency due to reduced holding times and/or shorter trajectories on the downwind leg. Furthermore, as the spacings on the final approach were better tailored per aircraft pair, safety was maintained and even improved. Thus, the aim in thread 2.1 is to expand and further the work on eORD by combining with ML techniques and information downlinked from aircraft via ADS-C (Vapp and AROT), to achieve further runway throughput gains and complete TRL6.



**Thread 2.2. Optimization of runway throughput with eIRD:** In this thread, three SESAR solutions will be integrated to develop a new tool, enhanced Integrated Runway Delivery (eIRD). eIRD will optimise the sequence and landing and take-off times which satisfy the minimum time-based separations between any pair of flights at runways operating in segregated or mixed mode. The solutions that will be combined to develop eIRD, include:

1. eORD (enhanced Optimised Runway Delivery for arrivals (as described in thread 2.1)).
2. eOSD (enhanced Optimised Spacing Delivery for departures) is an automated countdown timer that uses ML to more accurately predict the individual performance characteristics of each departing aircraft to optimise the spacing minima between consecutive departures on the initial departure path. eOSD continues the work conducted in PJ.02-W2-14.8, using ML to improve OSD developed in PJ.02-01-02.
3. eIRSM (enhanced Integrated Runway Sequence Manager) will be an enhanced version of the iRSM solution developed in PJ.02 Wave 1 and VLD3-W2. eIRSM will also optimize the Standard Instrument Departure (SID) route of each departure flight among multiple alternative performance-based SIDs (e.g., including advanced curved departure procedures). The selection of SID will affect the punctuality, the emission, and the minimum separation (calculated by eORD and eOSD). The SID assigned to each departure flight by eIRSM will therefore be selected considering the trade-off between maximizing punctuality and runway throughput whilst minimizing the emissions from the aircraft. eIRSM will further be integrated to receive predictions of the earliest possible take-off time while departing aircraft are taxiing out. These dynamic predictions will be based on the optimal taxi route, real-time estimation and remaining taxi time.

The combined solution from both threads aims to increase runway throughput by optimising the sequence of aircraft and increasing the accuracy of spacing delivery on the approach and for departures without the need for additional infrastructure, as defined in the ATM Master Plan Phase D ambition. Hence, the solution brings KPA benefits in terms of capacity, resilience, and environmental benefits, without incurring major disruption or cost to stakeholders, whilst maintaining and even improving safety. We expect eIRD to further improve the runway capacity, to further reduce CO<sub>2</sub> emissions, to increase both the safety and the automation (level towards level 4) through a reduction in the need for manual sequence interventions and automated SID conformance monitoring in the background. The performance benefits will be measured via the following objectives, each specified with corresponding success metrics according to KPIs of the performance framework:

- **[OBJ.201]** CAP3 & CAP3.2: peak runway throughput increased by 5-10% with eIRD compared to the reference scenario, depending on traffic mix and weather, due to more exact spacing and optimised runway sequence in segregated and mixed mode runway operations
- **[OBJ.202]** ENV1, FEFF1: average CO<sub>2</sub> emissions per flight are reduced, as average fuel burn per flight is reduced by up to 5% due to the fact that the approach and departure routes are optimised and holding time for both departures and arrivals is reduced with eIRD compared to the reference scenario.
- **[OBJ.203]** SAF1, SAF6.x, SAF6.10: Safety is increased as the eIRD will enable the spacing minima to be more accurately and consistently delivered by the ATCO, so reducing the number of cases where the minimum spacing between aircraft is violated by up to 10% compared to the reference scenario, i.e. reducing the risk for wake-induced accidents. This will be calculated using the Accident Incident Model (AIM) and the number of under-separations measured in the Real-Time Simulation (RTS).
- **[OBJ.204]** PUN1: Punctuality, i.e. the average departure delay per flight, is improved by up to 8% with eIRD compared to the reference scenario, due to the optimisation of both the runway sequence and the approach and departure routes.
- **[OBJ.205]** TEFF1, TEFF4, TEFF5: Flight efficiency in terms of flight time is improved with eIRD by up to 5% per aircraft on average, compared to the reference scenario, as increased runway throughput in peak traffic periods reduces the length of downwind leg and/or holding times for both arrivals and departures.
- **[OBJ.206]** HP1, HP2: Human performance will be improved as the eIRD will determine the sequence and spacing minima to optimise runway throughput, so reducing ATCO workload whilst improving aircraft sequencing and spacing delivery so enabling the ATCO to manage more a/c per hour (approx., 3 more a/c per hour in peak periods depending on traffic mix and weather) compared to the reference scenario.

### 1.1.3 Solution 3: Intelligent Surface Management

Solution 3 is aimed at improving airport surface operations to enhance safety, efficiency and situational awareness through AI, automation, and digital communications. The scope of the solution includes three threads which are all relevant for the two validation airports of the solution, i.e., Frankfurt and Munich. By combining them into one single solution, one Human-in-The-Loop (HiTL) exercise in DLR's tower simulator in Braunschweig is possible.

**Thread 3.1 Enhanced Surveillance** offers automated support for ATCO by showing camera contents on Integrated Controller Working Position (ICWP) of parking positions, where calling aircraft are located. The relevant camera for a calling aircraft is automatically selected based on callsign detection extracted from voice communication via Automatic Speech Recognition and Understanding (ASRU), surveillance information of the current aircraft and camera positions. This enables, for example, more precise ATCO pushback and taxi clearances, including conditional clearances for intersections. Also, verification/falsification of A-SMGCS identified obstacles or ghost targets, and looking into hidden areas is possible. The thread enables a safer and more efficient surface management, because situation awareness of the ATCO increases by better surveillances information, and decisions can be taken faster and more adequately.

**Thread 3.2 Digital ATCO / Automated Surface Management Assistant:** An automated surface management assistant tool can take full control over specific aircraft (e.g. based on call sign, aircraft type, or tow operations) or aircraft in specific areas of the airport (e.g. a predefined area of responsibility), enabling SESAR Automation Level 4. Taxi trajectories are calculated and optimized using various algorithms based on different metrics. Commands for the aircraft are automatically generated based on these trajectories and additional factors and sent to the aircraft via digital messages or voice generation as described by the following thread. The human ATCO supervises the system and interacts with the automation when control is assumed from or delegated to the automation. In this thread the human factors during the switch from one automation level to another will also be investigated.

**Thread 3.3 Enhanced Connectivity:** The apron controller can enter clearances via voice, via mouse/keyboard/pen, or just by accepting the planning of an assistant system. The exchange of this information between the apron controller, pilots and other ground vehicles can be done by radio communication **or** by digital messages, and thanks to ASRU and Speech Generation (SG) in most cases voice and digital messages are used in parallel, resulting in a significant safety increase. The thread includes updates of standards for digital messages via data and radio communication in close cooperation with EUROCAE. Clearances received on board in the Airport Moving Map (AMM) application via digital messages can be transformed into voice clearances by speech generation, so that the visual and audio channel of the pilot is used, avoiding information overload of one channel.

The field test validations are performed at Frankfurt airport involving Lufthansa and the fire truck manufacturer Rosenbauer. To guarantee that the results are relevant for other airports, airlines and local airport carriers, Munich airport and Airbus are participating in the thread.

The objectives and success metrics are:

- **[OBJ.311]** SAF4.x: ATC safety is increased by reducing the number of hidden areas and increasing situation awareness.
  - SM.311: Error rate for selecting wrong camera (baseline is 100%) < 5%
  - SM.312: Reaction time until correct camera selected < 2s
  - SM.313: Head-down times of apron controllers are reduced by 10%
- **[OBJ.321]** HP1.x/2.x/3.x/4.x, TEFF1/2/3: A digital ATCO and introducing Speech Recognition and Understanding increases the efficiency of the human ATCO and reduces the workload.
  - SM.321: Number of clearances given by the Digital ATCO (baseline is 0%) > 50%
  - SM.322: Number of given clearances, which a human ATCO does not support < 5%
- **[OBJ.331]** HP1.x/2.x/3.x/4.x: Air-ground voice communication is no longer the primary way of communicating.
  - SM.331: Commands only sent via voice (baseline in FRA is > 95%) < 30%
  - SM.332: Frequency usage by ATCO in high traffic (baseline for EDDM airport > 90%) < 50%
  - SM.333: More than 10% of full taxi clearances are communicated via digital means (technical feasibility)

#### 1.1.4 Solution 4: Prediction and Optimisation in Adverse Weather

This solution focuses on large airports which are affected by severe weather conditions impacting their operation. Severe/adverse weather conditions may lead to a significant reduction in the airport's capacity, causing longer delays of aircraft on the ground, longer waiting times for the de-icing station, and queueing for the runway. Different measures are taken to improve capacity under such conditions and improve predictability and optimise operations. A validation will be performed at Oslo Airport. The solution is split into the following threads, which are achieved via a set of capabilities and solution objectives, as specified in later sections.

The services planned in solution #4 cover the following automation levels:

- Automation-enhanced operational awareness – Level 2 Resolution Support, EASA Level 2A (AI based gate turnaround monitoring in adverse weather)
- Improved information exchange – Level 2 Resolution Support, EASA Level 2A (D-NOTAM, De-Icing message exchange are automatically processed where safe)

- Optimized departure prediction and sequencing – Level 1 Decision Support, EASA Level 1B (AI supported optimization of departure sequence)
- Dynamic surface management – Level 2 Resolution Support, EASA Level 2A (alternative optimized routes are proposed to ATCO reflecting the dynamic ground situation)

SOL 4 uses datalink capabilities to exchange D-TAXI and De-Icing messages directly between ATCO and pilot. Early information on exact de-icing needs allows planning of de-icing pad operations and helps to improve predictability to optimize departure sequence. The use of datalink streamlines the communication between ATCO and pilots and triggers automatic background processing. Technically the interface is based on industry standard protocol (Matip, Batap messages over FMTP). Relevant message types are exchanged using a gateway service process to connect to and convert messages for AFTN network. The gateway ensures that both networks - SITA and ARINC - can be supported making the implementation of universal use. The focus with this datalink capability lies on the evaluation of the overall performance gain especially human interaction aspects and advantage through automatic trigger of background optimization processes (planning of de-icing pad operations and departure sequence with smaller runway holding queue) are subject to validation. It is mainly the functional integration and security point aspects of that interface which are subject to analysis rather than the purely the interface technical aspects.

**Thread 4.1 Automation enhanced operational awareness via an improved prediction model:** Adverse weather can significantly disrupt turnaround processes at the gate. To mitigate this, multi-modal sensor-based gate surveillance—including Light Detection and Ranging (LIDAR) and cameras—is used to monitor the progress of turnaround processes such as boarding and fuelling. These sensors feed real-time data into AI-driven components that analyse progress and infrastructure status, enabling accurate Target Off-Block Time (TOBT) predictions. This enhanced awareness ensures that controllers and planning systems have a reliable operational picture, forming the basis for timely decision-making.

**Thread 4.2 Improved information exchange:** Building on the gate-level awareness, the solution supports improved air-ground information exchange through CPDLC, including cyber security considerations. This enables the delivery of explicit de-icing requests and fluid needs directly to the integrated arrival/departure manager. The information exchange is enriched by Aeronautical Information Exchange Model (AIXM)-based D-NOTAMs to provide rapid updates on static and dynamic airport data, such as runway and taxiway closures, e.g. due to scheduled snow cleaning or heavy rain.

**Thread 4.3 Optimized departure prediction and sequencing:** With synchronized data and communication in place, the solution utilizes AI-enabled departure sequencing, where de-icing requests and weather-related constraints are incorporated early in the planning process, allowing for more accurate Target Start-Up Approval Time (TSAT) predictions and providing this information to the user (ATCO) via an intuitive HMI.

**Thread 4.4 Dynamic surface management:** Based on the data of radar surveillance, departure manager (DMAN) and AOP/NOTAMs, the solution calculates alternative taxi routes tailored to current weather and operational conditions which are then proposed to the ATCO for confirmation to be sent to the aircraft via CPDLC/D-TAXI. Thereby, the calculated taxi routes ensure the effective utilization of remote de-icing hold and balancing of holding points to enhance adherence to planned Target Take-Off Times (TTOTs).

The objectives set for this solution correspond to the solution team's capabilities and solution threads.

**OBJ.401:** Increase of predictability and improvement of planning in adverse weather. Expected benefits include:

1. Optimized throughput (incl. shorter taxi time via having a good estimate of taxi times).
2. Reduced delays during winter and adverse weather operations, through optimized routing and sequencing.
3. Reduced number of unplanned de-icings caused by long lineup queues and missed take-off slots or de-icing holdover times, leading to improved predictability, reduced delays, and a de-icing fluid saving.
4. Reduction in average taxi-out time.
5. Reduced engine-on time, reduced fuel consumption during taxiing, leading to fuel savings for the aircraft.

The achievement of OBJ.401 is to be navigated via a set of success metrics:

- SM.401: Reduce the deviation between estimated taxi out time (EXOT) and actual taxi out time (AXOT) (Root Mean Squared Error -25% comparing new method to baseline method).
- SM.402: Improve robustness of turn around milestone monitoring under adverse weather conditions (rain, fog, snow, low visibility) using combined camera and LIDAR). (Increase the number of flights with measured turn around milestones in more adverse weather with 25%).



- SM.403: Improvement of the prediction model of TOBT, TSAT, and TTOT to achieve reduced difference of departure prediction and actual departure times (AOBT, ATOT), including the de-icing process (Root Mean Squared Error between TOBT vs. AOBT -20%, and TTOT vs. ATOT -10%).

**OBJ.402:** Human-machine teaming-up. The machine reduces the excess ATCO workload, which is especially large during adverse weather. Expected benefits of striving toward OBJ.402 include:

1. Increased ATCO capacity and efficiency under adverse weather conditions
2. Better usage and plannability of resources
3. Scaling-up of the work efficiency

To track achievement of OBJ.402, we will base the judgement on two success metrics:

- SM.404: 5-15% relative reduction of voice transmissions and read back monitoring
- SM.405: 5-15% relative reduction of all false data input, which requires subsequent correction by the user

**OBJ.421:** Complete Gap Analysis for Cybersecurity standards (NIS2 and/or ISO/IEC 27001 and IEC 62443) with focus on air-ground communication (datalink interface) and D-NOTAM (AIM interface). The objective can be considered achieved once the gap analysis is complete, and clear targets have been set.

**OBJ.404:** To bring the Human Factors (HF) perspective into focus and achieve an improvement in user experience. The expected benefits of this key objective include:

1. Increased effectiveness of an ATCO via the new HMI concept (enhanced workflow model)
2. Improved situational awareness of an ATCO (the platform provides an increased level of automation, but ATCO remains aware of the detailed traffic situation)
3. Eased workload for the ATCO as compared to status quo
4. Reduction in communication errors

We will track the achievement of OBJ.404 via three success metrics:

- SM.406: 10-30% relative increase of ATCO decision-making speed: final decision information processing
- SM.407: 5-15% relative increase of tools and components integration into collaborative decision-making environments
- SM.408: 10-30% relative increase of data sharing between stakeholders.

### 1.1.5 Transversal threads

In addition to the four solutions, the project includes the following two activities to enable a common, seamless and safe PARADISE platform:

**Secure exchange of data for PARADISE platform** will deliver a cyber security framework and architecture for secure exchange of data and information in next generation ATS platforms. The work will result in a set of security requirements for secure data exchange, which will be directly applicable on the four solutions. This activity will hence ensure that the four solutions are designed and developed with the capability “*Endpoints, data connection and ecosystem are cybersecure*” and contribute to advance development action IR-4-03.

The work will take a holistic and system-wide approach, which will address the needs for security (identification, authentication, integrity, confidentiality) from the stakeholders involved in the ATS ecosystem. Specific focus will be on leveraging existing initiatives and technologies by the involved actors, to avoid the need to rebuild existing systems and services, and to ensure interoperability amongst all users, including both new entrants and legacy users. To ensure future resilience, the framework will include security mechanisms using both classical and post-quantum cryptography (PQC). The security considerations will extend to microservice-based architectures, which are increasingly prevalent in ATS platforms. The work will also incorporate supply chain security as a critical component of the overall cyber resilience strategy. The framework and architecture will be aligned with the new service delivery model for PARADISE platform.

**New service delivery model for PARADISE platform** will deliver a list of services for future tower applications (service taxonomy map) and corresponding technical interfaces. It will provide high-level information on the status quo of solutions 1-4 and information, benefits, and prioritization on standardization topics. It will further give guidance on methods and tooling for the harmonization of architecture documentation. In addition, the outcome of this transversal thread will be shared with WA7-2 (architecture, performance framework, regulatory) and will contribute to advance development action IR-4-01. The new service delivery model is essential to integrate all 4 solutions (building blocks) of PARADISE in a common airport platform.

### 1.1.6 Relevance to the call

To provide a seamless and safe environment, the PARADISE platform enables all the nine capabilities asked for in the call. The four solutions and the two transversal threads together ensure that the PARADISE platform covers all capabilities as a primary scope.

| No.   | Required capability, abbreviated     | Solution 1 | Solution 2 | Solution 3 | Solution 4 | Transversal threads |
|-------|--------------------------------------|------------|------------|------------|------------|---------------------|
| CAP.1 | Reduce climate impact                | S          | P          |            | S          |                     |
| CAP.2 | Optimised flight trajectory          | S          | P          |            |            |                     |
| CAP.3 | Surface management/runway throughput | P          | P          | S          | S          |                     |
| CAP.4 | Scale capacity with demand           | P          |            |            | P          |                     |
| CAP.5 | Cybersecure                          | S          |            | S          | S          | P                   |
| CAP.6 | Connectivity/continuous optimisation |            | P          | S          | P          | P                   |
| CAP.7 | Automation                           | S          | S          | P          | S          |                     |
| CAP.8 | Machine-to-machine                   | S          |            | P          | S          |                     |
| CAP.9 | Trajectory Based Operation phase 3   | P          | S          | P          | S          |                     |

Table 2 Coverage of capabilities as Primary (P) or Secondary (S) in the scope of solutions and transversal threads

The primary coverage is due to the following:

- **CAP.1:** As eORD and eIRD (Solution 2) will lead to optimised spacing delivery, runway sequence and SID routes, there will be shorter down leg trajectories or less holding for arrivals and departures, which will lead to increased flight efficiency, OBJ.205. Hence, there will be less CO<sub>2</sub> emissions per flight, measured in OBJ.202.
- **CAP.2:** As ML and the downlink information via ADS-C will provide more accurate predictions of the aircraft performance, the minima spacing required between arrivals will be better tailored per aircraft pair, and in most cases reduced. In addition, eIRD will optimize the SID route while considering the effect on runway throughput. As a result, with Solution 2 of PARADISE, flight trajectories will systematically be optimised OBJ.205, and throughput will be improved in high-demand scenarios, measured in OBJ.201.
- **CAP.3:** In solution 1, scaling capacity up or down collaboratively has a direct beneficial effect on runway throughput, measured in OBJ.101. In Solution 2, sequencing and spacing on the final approach and initial departure path are optimised, increasing runway throughput in peak traffic periods, measured in OBJ.201.
- **CAP.4:** Solution 1's real-time sharing of adaptive capacity calculations empowers service providers to dynamically scale capacity up or down collaboratively, ensuring optimal civil and military resource use based on actual demand and conditions. This has a direct beneficial effect on runway throughput, measured in OBJ.101, OBJ.102. Optimized surface management in adverse weather is one of the core elements of Solution 4 and will be improved by better time prediction via camera and LIDAR based analytics, improved AI algorithms, more efficient communication via data link between ATC and pilots and an improved ATCO integrated working position, measured in OBJ.401 and OBJ.404.
- **CAP.5:** With the transversal threads, the project will deliver a cyber security framework aligned with the new service delivery model to ensure that PARADISE is developed with the capability that “Endpoints, data connection and ecosystem are cybersecure” and will also contribute to advance IR-4-03.
- **CAP.6:** Sequencing and spacing on the final approach and initial departure path are optimised by using real-time information updates combined with ML plus Vapp & AROT downlinked from aircraft to the eIRD tool, increasing runway throughput in peak traffic periods, measured in OBJ.201. Connectivity is addressed by exploring new ways of datalink-based communication between ATC and pilots to optimize the efficiency of communication, measured in OBJ.402. Also, both transversal threads contribute to enabling high connectivity.
- **CAP.7:** In Solution 3, to ensure that the human controller is still able to fulfil all required tasks, an intelligent surface management will plan all taxi operations, a digital assistant will execute standard tasks, while the human controller can concentrate on complex situations and safety-critical operations. Together with digital messages, the human operator can concentrate on the most relevant tasks. Communication with pilots and other operators can be delegated to the automation. This is measured in OBJ.321 and OBJ.331.
- **CAP.8:** Solution 1 strengthens machine-to-machine automation by enabling seamless data exchange between airport, ANSP, and network systems through a common data fabric. By integrating capacity models, live surveillance, and real-time infrastructure status, the system supports automated decision-making across planning and operational layers, reducing reliance on manual coordination. Digital messages are now the primary way of communication, independent of the source of the communicated data. Solution 3 enables longer and more

detailed clearances, which include continuous optimisation of every flight/mission, without losing the benefits of voice communication, because all clearances can be transmitted by digital messages.

- **CAP.9:** Solution 1 fully addresses the TBO phase 3 enabler of Advanced Calibration of Airport Capacity. As part of Solution 3, a full-scale time-based route planning will be adapted to multiple sustainable taxi techniques. Depending on the selected technique the required information is transferred automatically to all operational partners via digital messages and voice. This allows for mixed usage of all sustainable taxi techniques depending on the available airport resources and requirements from the air traffic network.

In addition, the project contributes to development actions IR-4-01, IR-4-02, IR-4-03, IR-4-04, IR-4-05, IR-1-01, and IR-4-06, and the target architecture will be aligned with the service delivery model outlined in the Master Plan.

PARADISE contributes to achieving level 4 of automation by addressing an increase in the automation level. Solution 1 foresees a level 2/3 automation. However, the solution will be working toward a long-term goal of an automation level 4 with many of the data exchange and analysis tasks being managed by the system itself. Solution 2 automates the calculation of the optimal sequence, timing and minimum spacing between consecutive arriving and departing aircraft (a prerequisite for automation of decision and action selection). Solution 3 will introduce a confined automation (level 3 to 4) specifically for apron and ground controllers. The digital controller will provide clearances to the aircraft and vehicles, but when operational limits are exceeded, it will downgrade itself to a supporting role and handover to the human controller. Solution 4 targets level 3 with the processing of de-icing requests using datalink and AIXM based NOTAM updates to trigger system-initiated re-routing.

To sum up, all these references to the call are traced in Figure 2, where the bold lines and large arrows signifying a primary contribution and faint lines and smaller arrows, a secondary contribution.

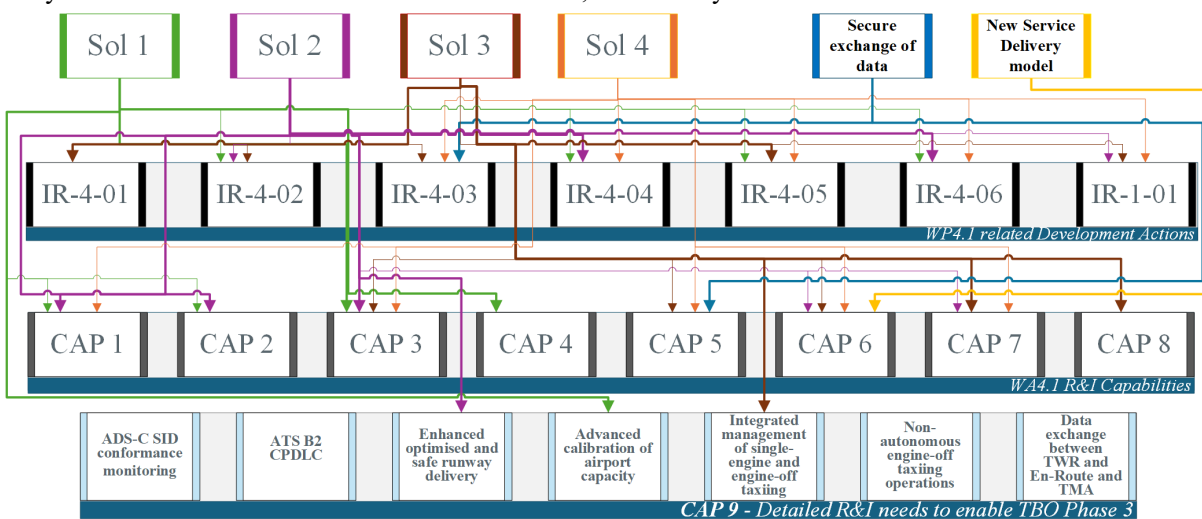


Figure 2 Mapping solutions to development actions, capabilities, and R&I needs for CAP.9, TBO phase 3.

## 1.2 Methodology

The specific methodology required to develop each individual solution and relevant technology is described in the following sections.

### 1.2.1 Methodology, Solution 1

Solution 1 research focuses on developing a core intelligence component for dynamic airport capacity declarations and usage. The service uses **Artificial Intelligence**, specifically **Machine Learning (ML)**, to offer several features. These include:

- Neural net prediction models trained on historical and real-time data.
- Automated calibration of declared capacity buffers based on predicted demand and uncertainty.
- Dynamic throughput monitoring supported by interconnected systems.
- Human-machine teaming for decision support to prevent overload and aid in rostering.

To address challenges with neural networks like data needs, computational costs, and bias, Solution 1 will evaluate various techniques. These include data augmentation, transfer learning, and Explainable AI (XAI) to improve transparency and trust.

A key aspect of Solution 1 is evolving ECTL's **Continuous Capacity Performance Monitoring (CCPM)** by integrating it with local and network information (e.g., airline status and ADS-B, NM data). This will create a trusted performance baseline, enabling the service to provide probabilistic hourly capacity profiles with confidence intervals that reflect real-time operational margins.

The goal is to create a predictive, data-driven approach to significantly reduce operational uncertainty. To accomplish this, the solution development will occur over four phases, with a fifth phase for validation. The service developed during the first four phases will use, as a reference, the work performed in SESAR Solution PJ.04-W2-29.2a for the MET related tools, Solution PJ.01-W2-01 for the arrival sequencing information, and Solution PJ.02-08 for traffic optimization tools and models.

**Phase 1: Baseline Modelling from Historical Data** - To start, factors and indicators that influence airport capacity will be selected. A historical meteorological dataset will be created using WRF, ensuring spatial and temporal resolution are consistent with other datasets. Next, historical data for relevant factors and indicators will be aggregated, including throughput, MET, and staffing. An analytical engine will then be built to quantify the contributions of each factor to throughput variance. Workshops and focus group sessions will be performed, including end users (ATCOs and Airport Operators) and technical experts to refine user needs and select the relevant indicators to be used. The team will also define the "effective throughput envelope" compared to the declared capacity and buffers. The final output will be a validated model of historical airport behaviour under varying ops conditions.

**Phase 2: ML-Driven Predictive Engine** - AI/ML models will be trained on cleaned and engineered baseline data. These models will forecast probabilistic throughput envelopes (including range and confidence levels) for pre-tactical and day-of-ops use, including scenario simulations as a "what-if" tool and provide an estimate of ATCO workload.

**Phase 3: Integration and Streaming Architecture** - A meteorological nowcasting system will be developed for the specific airport. The system will include a real-time data streaming layer for various information, such as MET, ADS-B, AODB, ATCO info, and NOTAMs. This live data will then be fed into the prediction engine, allowing for dynamic updates and recalibration. The outputs will be provided to downstream systems.

**Phase 4: Delivery assistance and User Interface** - The final part delivers a Common Operational Picture (COP) user interface. HMI prototyping sessions will be performed including end users (ATCOs and Airport Operators) and technical experts to identify HMI user needs and requirements. This includes alerts, buffer allocating decision support, as well as "what-if" scenarios. The system will also incorporate feedback loops to improve AI transparency and trust.

**Phase 5: Feedback Learning Trials and Validation Activities** - Validation of the Dynamic Calibration of Airport Capacity Service will focus on systematically identifying and quantifying the impact of dynamic, non-deterministic factors on actual airport throughput. CCPM evolution will be a central data and monitoring layer, enabling consistent input and benchmarking across the validation lifecycle. The validation approach foresees the following cycle of validations in Large (LIMC) and Very Large (LIRF) airport environments. Three validation exercises will be conducted.

**EXE 1.1:** Real-time simulation/Prototyping sessions (recorded data) conducted within the operational environments of LIRF to perform a TRL4 assessment of the technical and operational feasibility, as well as the acceptability, of the new PILDO platform comprising its four integrated modules: Capacity Calibration Assistant; Demand Prediction Assistant; Capacity Prediction Assistant; ATC Capacity Delivery Assistant. Benefits measured will include human performance, safety, capacity, environment, and resilience.

**EXE 1.2:** Real-time simulation/Prototyping sessions (recorded data) conducted within the operational environments of LIMC to perform a TRL4 assessment of the technical and operational feasibility, as well as the acceptability, of the new PILDO platform comprising its four integrated modules: Capacity Calibration Assistant; Demand Prediction Assistant; Capacity Prediction Assistant; ATC Capacity Delivery Assistant. Benefits measured will include human performance, safety, capacity, environment, and resilience.

**EXE 1.3:** Real-time simulation/Prototyping session (recorded data) conducted within the operational environment of a Spanish airport to perform a preliminary TRL4 assessment of the technical and operational feasibility, as well as the acceptability, of the new CRIDA platform comprising its four integrated modules: Capacity Calibration Assistant; Demand Prediction Assistant; Capacity Prediction Assistant; ATC Capacity Delivery Assistant. Benefits measured will include reduction of capacity buffers, environmental impact, and resilience. The participants will contribute to the validation activities in EXE 1.3:

- CRIDA: Coordination of validation activities, Prototyping, Data Provision, Operational expertise, validation activities preparation, execution and reporting, validation of KPIs, HP, and SAF Assessment.

- AENA/ENAI: Data provision and support to validation activities preparation, execution and reporting, validation of KPIs.

For EXE1.1 and EXE1.2, the reference scenario corresponds to the current operational situation at LIRF and LIMC, against which the performance of the proposed Dynamic Calibration of Airport Capacity Service will be assessed. Specifically, it represents how airport capacity, demand forecasting, real time capacity monitoring, and ATC tactical decision making are currently managed without the support of the new data driven AI platform. In the reference scenario:

- declared airport capacity is defined using static methods, fixed buffers and operational experience, with limited integration of real time data and no dynamic calibration.
- traffic demand forecasting relies primarily on scheduled data and historical trends, without advanced predictive analytics or machine learning based modelling.
- live capacity assessment is performed through manual monitoring, existing ATM tools, and separate sources of information on weather, runway configuration, staffing availability and traffic complexity.
- ATC staffing, sequencing and regulation decisions are taken manually, with reactive management of congestion, ASMA delays and perturbations, and without systematic “what if” or decision support capabilities.

This reference scenario includes the current tools, procedures, performance levels and decision-making processes used today at LIRF and LIMC. It establishes the comparison point for evaluating the benefits of the four integrated modules (Capacity Calibration Assistant, Demand Prediction Assistant, Capacity Prediction Assistant, ATC Capacity Delivery Assistant).

For EXE 1.1 and EXE 1.2, the TRL4 the reference scenario will be emulated based on current operating methods, and the prototyping sessions will compare the new AI based solution against this existing reference scenario to quantify improvements in capacity, safety, human performance, environmental impact and resilience.

For EXE 1.3, the reference scenario corresponds to the current operational situation at a Spanish Airport, against which the performance of the proposed Dynamic Calibration of Airport Capacity Service will be assessed. In the reference scenario:

- Declared airport capacity is defined using static methods, fixed buffers and operational experience, with limited integration of real time data and no dynamic calibration.
- Traffic demand forecasting relies primarily on scheduled data and historical trends, without advanced predictive analytics, machine learning based modelling
- Live capacity assessment is performed through manual monitoring, existing ATM tools, and separate sources of information on weather, runway configuration, staffing availability and traffic complexity.
- ATC staffing, sequencing and regulation decisions are taken manually, with reactive management of congestion, ASMA delays and perturbations, and without systematic “what if” or decision support capabilities, or automated data sharing between the APOC and tower.

Training needs will be addressed as set out in the SESAR HP methodology, while the actual training will be addressed in TRL7/8. HMIs will be designed for, and with the input from, trained operators.

As Solution 1 is targeting TRL 4, testing activities will be conducted across different environments and representative edge cases to progressively assess system behaviour. These activities will be complemented by the definition of robustness criteria and structured validation approaches, ensuring that testing is not only extensive but also targeted and measurable. Further testing and validation shall be expanded in the future in subsequent TRL phases, incorporating more complex scenarios and operational conditions to fully address robustness.

## 1.2.2 Methodology, Solution 2

Solution 2 is built on the work conducted in previous SESAR solutions to optimise runway throughput at capacity constrained airports, without the need for additional infrastructure. The methodology for the solution is defined according to the maturity and objectives as defined in section 1.1.2.

**Thread 2.1. Enhanced Optimized Runway Delivery for arrivals (eORD):** eORD continues the work started in SESAR 2020 Wave 2 WP 4 by building on the ORD tool developed in SESAR 2020 Wave 1 PJ.02-01-01 to develop a more efficient spacing delivery tool (eORD) for arrivals using ML and the downlink of flight specific information



via ADS-C. eORD combines 3 solutions from SESAR 2020 Wave 2 WP4: 1) eORD with ML (PJ.02-W2-14.6a), 2) eORD with ADS-C (PJ.02-W2-14.6b), and 3) Dynamic Pairwise Runway Occupancy Time Separation (PJ.02-W2-14.11). Prior to the TRL6 HITL Real-Time Simulation (RTS) validation exercises, the following preparatory activities will be conducted:

- The eORD ML models developed in PJ.02-W2-14.6a will be updated by ECTL for the airport environments targeted in PARADISE. This would require a minimum of 1 year of data, including meteorological and flight data/information from each target airport environment. The new airport-specific ML models will then be trained and calibrated with the data from each of the target airport environments and subsequently integrated into industrial-based platforms or prototypes. eORD (with ML) will be calibrated for Budapest Ferenc Liszt International Airport approach environment (LHBP), where it can support distinct types of approach modes (ILS, RNP), as well as Stockholm Arlanda Airport (ESSA).
- A technical assessment /prototyping session with controllers from HUN will be conducted with the eORD prototype integrated into the Polaris ATM simulator in the LHBP approach configuration.
- The downlink of flight-specific information from aircraft, namely Vapp and AROT via ADS-C is also targeted to be used as a parameter in eORD to support the ML-based prediction of spacing between arrivals. This work builds on PJ.02-W2-14.6b and PJ.02-W2-14.11. The objective is to explore the benefit of using the downlink of flight specific information in the eORD ML model, and to ensure a provision for future next generation aircraft capabilities in eORD through the development of an airborne function enabling both the AROT prediction and the full automation of the deceleration on the runway (enhanced Brake-to-Vacate function). Therefore, AIRBUS will conduct back-to-back simulations of “airborne-predicted vs simulated” AROT and “downlinked vs actual” Vapp simulations, based on in-service data (fast time simulation), to assess 1) the performance benefits of Runway Occupancy Time (ROT) prediction onboard the aircraft and downlink using ADS-C; and 2) the accuracy of the downlinked Vapp. The calibration will be based on various environments, including several European airports and will be conducted by Airbus. If performance benefits of the downlink of flight-specific information are observed, simplified models for real-time simulations representing flight-specific information (predicted and actual deceleration) will be represented in the eORD ML models. These updates will be done by ECTL.

**Thread 2.2. Optimization of runway throughput with eIRD:** eIRSM solution developed in PJ.02 Wave 1 and VLD3-W2, will be connected to the eORD & eOSD enriched by multiple performance-based SIDs to form eIRD.

The methodology to develop the eIRD solution will be:

- eIRD includes eORD, which will primarily be developed in thread 2.1. When integrated into eIRD, eORD must be able to quickly provide minimum pairwise arrival-arrival separation as eIRSM will need this information to compare a large number of alternative sequences.
- In the same way, eOSD must be able to quickly provide minimum pairwise departure-departure separations. eOSD will therefore be integrated into eIRD and tested for this performance requirement.
- The development required to create eIRSM will start from iRSM, which is already validated at TRL7. The extension required to optimize the SID routes starts from the work done in SESAR PJ.02-W2-04.2 to provide more flexible SID route designs, already validated at TRL4. Hence, the added optimisation of SID routes with respect to runway throughput and the integration of these two solutions only needs to be validated to TRL6.
- The integrated eIRD solution will be developed in line with the new service delivery model of the PARADISE platform and will therefore provide valuable input to the transversal thread.
- Prior to the TRL6 HITL RTS, a technical assessment/prototyping session including dry runs will be conducted with eIRD based on ESSA. This preparatory exercise is required to ensure thread 2.2 is ready for the TRL6 validation exercises.

Following the preparatory activities the following validation exercises will be conducted to complete TRL6:

- **EXE 2.1:** In thread 2.1, a HITL RTS will be conducted in the second reporting period using the eORD prototype developed by TERN, ECTL and Airbus with ML and simplified models of ADS-C based aircraft information. The aim is to validate the performance benefits of eORD as well as safety and HP aspects compared to ORD. The RTS will be based on the LHBP environment, operating mixed straight-in ILS and RNP curved segment approaches and conducted in Budapest on their Polaris simulation platform. The relevant data from the ANSP will include surveillance data, surface wind for each runway, vertical profile of wind, temperature and pressure on final. The reference scenario will be ATCOs working with the TBS-ORD tool. Minimal training would be needed in reference to the baseline scenario as the tool would essentially have the same interface, only the tools output is being changed.

- **EXE 2.2:** In thread 2.2, a HITL RTS with eIRD will be conducted with LFV controllers to assess the performance benefits of integrating eOSD and eORD into eIRD on the ESSA environment without performance-based SIDS. The functionalities will be integrated into an industrial-based prototype and platform.
- **EXE 2.3:** This final RTS integrates the development in both threads and will hence validate the full solution in a TRL6 exercise, including the assessment of the ability of eIRD to optimize multiple performance-based SIDS on the ESSA environment.

The findings of these three validation exercises will be used to develop the Performance Assessment and Cost Benefits Assessments, as well as the Safety, Human Performance, and the environment assessments. The safety and human performance assessments will be used to support the development of regulation as well as local safety cases to facilitate deployment.

AI robustness in Solution 2 is strengthened through the use of SESAR proven validation approaches that go beyond extensive testing alone. These include scenario-based validation, human in the loop real time simulations, and incremental integration of the AI components into operationally realistic environments at airports.

### 1.2.3 Methodology, Solution 3

All three threads benefit from ASRU systems of EML. They will be fine-tuned for Frankfurt (EDDF) and Munich (EDDM) Airports and for simulations at DLR by recording training data which include surveillance data and voice recording from operational environment. Interfaces between ASRU and ATC systems are based on EUROCAE standards currently under development in WG 41 and WG 126. The solution will actively participate in extensions of these standards.

**Thread 3.1 Enhanced Surveillance** harvests low-hanging fruits of benefitting from ASRU usage in the operational environment by extracting callsigns from pilot's radio communications with ATCOs and mapping the callsign to the aircraft position from ICWP to camera streams.

- **EXE 3.1:** Exercises in the simulator are needed to iteratively improve the OSER (OBJ.311, metric SM.312, SM.313). Field test validations in Munich are used to fine tune, having low false camera selection and a high rate of automatic camera selection (metric SM.311). Voice recordings from > 25 apron controllers from Munich ops room and from the simulation environment of Munich will be evaluated with respect to OBJ.311 to prepare TRL6 validations in shadow mode. HiTL simulations within DLR's facilities will iteratively improve OSER and TS/IS by concentrating on the metrics of OBJ.311. The baseline will be the current situation in Munich. Cameras are available, but no support of selecting the right camera is available. The current head-down times of ATCO due to observing the hidden area at Munich Airport are not known. Therefore, only a relative improvement is suggested. The target values of SM311 of SM312 are calculated from recognition performance of current ASRU system, which have been validated for TRL 6. A callsign recognition error rate of <5% is realistic.
- **EXE 3.2:** The main TRL6 validation is performed in shadow mode in the operational environment of Munich apron. Cameras are automatically selected based on the call-ins of pilots.

**Thread 3.2 Digital ATCO / Automated Surface Management Assistant:** A genetic algorithm is used to plan and optimize trajectories under the control of the digital ATCO. Clearances are generated based on these trajectories and sent to the aircraft via data link or speech generation. In the DLR internal project THOR, a fully autonomous version of this system (i.e. all aircraft under control of digital ATCO) was validated in HITL simulations for Hamburg (EDDH) Airport. The system is adapted for Frankfurt airport (EDDF) and enhanced to enable human-automation-teaming (i.e. digital ATCO controls flight in one area, human ATCO controls flight in other area and supervises automation). The controller working position is adapted to allow the human ATCO to supervise the automation by providing information and notifying the user when control needs to be delegated. Findings from the SESAR project ASTAIR and the DLR project LOKI will be used to improve the human-automation-teaming. The enhancements will be developed with an iterative development cycle, including ATCOs in early checkpoints and a final HITL simulation in the DLR tower simulator.

- **EXE 3.3:** Iterative HiTL simulations in the tower simulator of DLR in Braunschweig (OBJ. 321). The validation airport is Frankfurt airport. Apron controllers from different organisations will be invited, with a focus on Munich and Frankfurt airport controllers. The digital ATCO will control the apron area west or east. The other parts of the airport are still managed by a human apron controller, who needs to interact with the digital ATCO. Success Measures are SM.321 and SM.322. Currently no digital ATCO is used at the airport. Therefore, the baseline of SM.321 is 0 % and for SM.322 the baseline is undefined. We have selected SM.321 with 50%, because this would dramatically reduce ATCO workload. This is just a first guess, which seems to be realistic considering first results of DLR projects LOKI and DIAL.

**Thread 3.3 Enhanced Connectivity:** enables to transmit all clearances via voice or by digital means. Clearances given via voice are transformed into digital form via ASRU. An ASRU engine of EML is fine-tuned, considering also German voice communication between ATCO and ground vehicles. Speech generation of DLR is fine-tuned for Frankfurt apron and used to transform digital clearances into voice clearances. HITL trials at DLR with a cockpit and a tower simulator will be used to iteratively improve the OSED for air-ground communication via digital messages and voice communication supported by speech generation. Subject matter experts of Airbus and Lufthansa will provide on-board expertise. The technical feasibility will be demonstrated in field tests with Lufthansa, Lufthansa Systems and Rosenbauer at Frankfurt airport (SM.333).

- **EXE 3.4:** Iterative HiTL simulations in the tower simulator of DLR in Braunschweig (OBJ. 321). The validation airport is Frankfurt airport. Apron controllers from different organization will be invited, with a focus on Munich and Frankfurt airport controllers. Focus is on dual communication via voice and digital messages using the DLR cockpit simulator.
- **EXE 3.5:** Field test at Frankfurt airport with digital messages exchange with an aircraft and ground vehicles (OBJ.331)

Currently voice communication the primary way of communication at airports at least when considering PARADISE partner airports. Only less than 5% of commands are currently sent at Frankfurt airport via digital means. SM.331. with < 30% is a compromise between the primary way (<50%) and what makes sense and what is reasonable.

At Munich airport the frequency usage by ATCO plus pilots could raise to greater than 90%. If more than 50% of clearances are given in digital form, we could reduce the value down to 50% considering that readback is then also in digital form. SM.333 aims to demonstrate technical feasibility. Therefore, a threshold of 10% is chosen.

Additionally digital message exchange between ICWP and AMM will be reflected in ECTL A-SMGCS specification and EUROCAE standards on A-SMGCS and VCS - ATC Systems Integration for ATM Information Exchange.

Wherever possible, speech generation should take place in addition to transmission via the digital channel. Taxi routes are checked for their effect using what-if probing. The interpretation of the speech recognizer's outputs is carried out, at the very least, additionally in the traditional manner using the rule-based approach published by the DLR. The semantic outputs of speech understanding are not directly converted into actions anyway but serve as input for the operator or other traditional systems.

Regulatory safety expectations defined by authorities such as EASA will be addressed by:

- The identification of solution-specific regulatory requirements such as reliability, accuracy, and fail-safe mechanisms
- Rigorous validation and testing, including simulation and real-world testing
- Engagement with authorities, e.g. by seeking feedback and early alignment with evolving standards
- Detailed documentation and reporting

Robustness will be addressed by several approaches that go beyond extensive testing. Among them are:

- Robustness by design, e.g. by using techniques such as data augmentation and adversarial training
- Comprehensive testing, including unit tests, integration tests, system-level tests
- Real world simulations and testing under realistic conditions,
- The development of adaptive algorithms that guarantee high performance and reliability by allowing customization (e.g. to specific airports, or scenarios)
- Documentation of all key decisions, datasets used, and random seeds during AI training.

#### 1.2.4 Methodology, Solution 4

The solution utilizes methodologies from holistic concepts such as Total Airport Management to integrate TOBT/TSAT calculation and prediction, taxi out, de-icing process, arrival and departure management to a fully interconnected process chain encompassing the different subprocesses. Optimizing local processes does not guarantee a good overall optimum: an optimized process from gate to runway also needs to be integrated with the European air traffic network, which is achieved through a calculated take-off time (CTOT). Pre-departure sequencing, that is, setting start-up approval times correctly, will also integrate the upstream processes (from gate to the runway) seamlessly. This is accomplished via the usage of dynamic monitoring to improve prediction models and automated updates of milestones to ensure seamless integration.

In the centre of this will be the research question of how to connect the technical enablers into surface operations to achieve the objectives of the solution. The automated turnaround milestone solution will build on the ongoing project with AIRSIDE, AVINOR and SINTEF on developing a camera-based gate surveillance system, including measuring the turnaround milestones (VARDR product). It will also build on the broad experience SINTEF has in developing



industrial solutions using AI-based 3D analysis (e.g. autonomous drone-based infrastructure inspection with Stellaire) and will be integrated with the tower platform from Frequentis.

- Use-case definition for specific weather scenarios, iterative workshops with air traffic controllers, airport stakeholders (e.g. ground handlers), and airline operators (pilots, flight crew members) will be involved
- Based on detailed Use-Cases description specification of OSED and VALP
- Technical verification of sensor-based gate monitoring by recording different weather scenarios, pre-recorded data used to verify the capability and accuracy of LIDAR in combination with video cameras.
- Live passive shadow validation: via a live validation, the overall concept and human performance aspects of the solution and the HMI will be evaluated. For the validation AVINOR has also received a letter of intent from Norwegian, who will participate in validation activities from the airline's perspective.

To validate the solution, it is planned to prepare an integrated controller working position HMI and 3 core components: Electronic Flight Strips, Integrated Arrival and Departure Manager and Ground Surveillance Manager. A set of sensors (camera-based and LIDAR-based) is used to monitor the ground process on the gate and provide inputs to a prediction model, which provides estimates to the other components. Figure 3 depicts the main building blocks used in the solution environment to validate the objectives close to an operational environment at Oslo airport. The whole software stack will be installed on an independent validation system hardware and run in parallel to the operational system in passive shadow mode. The orange-marked modules highlight the components that need to be enhanced or created as part of this project. These are designed to fit a service-based architecture and are installed on top of an existing solution.

Validation is planned in two parts (validation preparation and validation execution), covering multiple stages to determine individual success metrics and measure the improvement gains by each step. The integration of the system is then validated after completion of all steps (1-6) in a last step (marked yellow in Figure 3). For the IAD main component, a shadow operational mode is supported, which assures that a qualitative assessment, including human factor analysis, can be made.

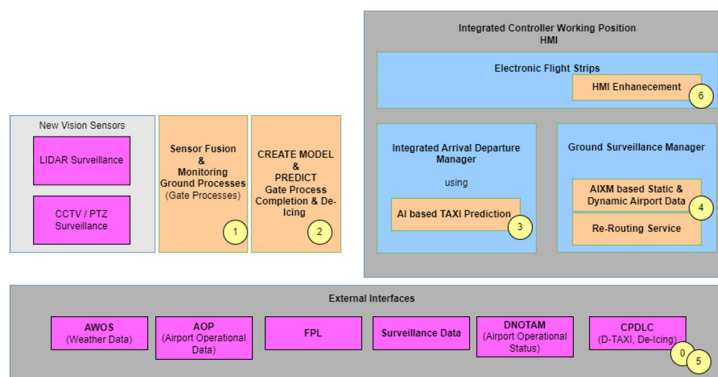


Figure 3 The main building blocks used in the Solution 4 environment. The numbers 0-6 indicate different implementation steps

The steps are explained below in detail based on chronological order of the steps of the implementation procedure and matched to the corresponding threads.

**Step #1** (related to Thread 4.1): The existing camera surveillance solution will be improved for enhanced robustness to challenging weather conditions by an optimised camera HW and an AI model. To further increase the robustness, a combined camera, LIDAR sensor fusion model will be developed, enhanced by training on data augmentation with weather-specific noise, and real adverse weather data will be captured, especially winter conditions like fog and snow. It is expected to improve monitoring of turnaround progress and completion, especially during conditions where visual camera-based monitoring fails or cannot be relied upon. A comparison between combined camera and LIDAR sensor results and those from state-of-the-art visual cameras is made. The improved data is used to train a high-precision ground process prediction model which can be verified in step #2.

**Step #2** (related to Thread 4.1): Based on meteorological, flight data and the measured turnaround milestones, a model for TOBT will be developed. This will need sensor recording and collecting data from the targeted airport and will require several months of data collection. The turnaround milestone model and the TOBT model will be trained with this data and integrated into industrial-based platforms. The new AI models will be evaluated in shadow mode at Oslo airport by comparing the existing camera solution with the new solution. The key to this implementation step is an improvement of target times whereby TTOT can be improved based on TSAT, EOBT and TOBT and a reliable prediction of de-icing durations.

**Step #3** (related to Thread 4.3): The new AI-based TAXI prediction model within the Integrated Arrival and Departure Manager (IAD) is trained using the historical data gained from ground radar, LIDAR and vision-based sensors for ground processes. Along with historical data on TAXI route movements, flight plan and weather data, the new prediction model can better calculate the TAXIING out duration from pushback to runway holding point and provide a better and more reliable prediction for TTOT and TSAT. This allows IAD to optimize the sequencing of

all departing aircraft. IAD and the new AI-based algorithm will help to shorten runway queuing and lead to an optimized runway use (e.g. longer periods with no departure/arrival, allowing for snow cleaning and similar). During this implementation step #3 it is checked if TAXIING on chosen TAXI routes takes a shorter time and if the actual time taken matches the prediction. The controller may also view a proposed departure sequence on a timeline view to compare and assess the generated sequence to the real-world sequence. CPDLC information from an aircraft providing upfront the required de-icing mode is used to optimize and sequence the requested de-icing procedure.

**Steps #4 and #5** (related to Thread 4.4): integrate dynamic surveillance data and static taxi route use, as well as keep track of gate process completion, using an up-to-date AIXM-based model representing a comprehensive ground situation of an aerodrome. This model allows to identify all possible taxi routes. Once a controller confirms a departure sequence proposed by IAD, the ground surveillance component will automatically populate the respective D-TAXI route and create corresponding CPDLC information, which can be shown in the electronic flight strips. The controller shall confirm this route prior to sending it to the aircraft for the pilot to execute. The pilot may confirm or reject an alternative route. Upon confirmation, the route gets reserved for the relevant timeslot, and it can then be executed by the pilot.

**Step #6** (related to Thread 4.2): Focus on the integration of the 5 steps. Implementation step #6 shall focus on the improved HMI which will be used to visualize and monitor the situation and guide the ATC to confirm an optimal departure sequence.

After the 6 implementation steps are completed, an on-site shadow mode validation at Oslo Airport with ATCOs is conducted (with de-risking measures to be taken, if on-site not possible). Expert opinion and perception will be obtained from relevant stakeholders estimating the delta workload if the solution is compared to the lower-level automation. Detailed exercises which constitute validation of the Solution 4 are described below.

- **EXE 4.1:** Focuses on validating the optimization of the prediction times, referring to the Threads 4.1 and 4.3. This exercise is to address the SM.401, SM.402, and SM.403.
- **EXE 4.2:** Focuses on validating the operations utilizing the new technical enablers and the interaction between stakeholders and include the perspective of HMI. The exercise refers to the threads 4.2. and 4.4. This exercise is to address SM.404, SM.405, SM.406, SM.407, SM.408.

The graphical user interface is discussed in ATCO workshops related to each use case, which will be covered during the validation. The design will be smoothly incorporated to fit into existing workflows and will be harmonized to fit the operators' needs. An iterative process ensures acceptability for each improvement. HMI layouts and designs will be thoroughly examined during the workshops and will be documented and used as baseline for the training programs.

With the development end phase, a summary of all functions and instructions will be available in a "quick manual". This manual is provided to the ATCOs for the training prior to validation. A system introduction and a training phase is scheduled before validation start. Validations typically follow a specific pattern covering each use-case and are accompanied with observations and feedback based on e.g. SUS and UEQ.

During validation, the estimations of SM.401, SM402, SM403 derived by the new AI based models (turnaround prediction, taxiing prediction, sequence planning) and will be compared against true values measured in the field. (EXOT vs AXOT; TOBT vs AOBT, TTOT vs ATOT). AI based turnaround process monitoring improvement during adverse weather compares 2D vision-based sensor model versus 3D Lidar and vision fusion model. SM.404 baseline for the validation is the number of needed voice transmissions and readback/repeats for taxiing which will be compared to D-TAXI and DE-ICING messaging resulting in a reduction of voice communication.

### 1.2.5 Methodology, Transversal threads

The transversal threads are not solutions per se, but rather technical work packages specifically designed to aid the four PARADISE solutions to enable the capabilities required for the future airport platforms, as expressed by the call. These activities are therefore planned to be executed in parallel with the solutions, but in close cooperation with the solution leaders. More specifically, the framework and architecture for cybersecurity and the new service delivery model will both be developed by a collection of input from the solution leaders, from workshops between solution leaders, selected solution contributors and the transversal thread leaders, and from conceptual modelling supported by relevant stakeholders. Relevant standards and framework will also be reviewed and analysed, including but not limited to, The International Aviation Trust Framework (IATF), the European Aviation Common Public Key Infrastructure (EACP), the NIST PQC algorithms (FIPS 203, 204, 205) and existing state-of-the-art recommendations and specifications on cybersecurity of ATS platforms. The output from both the transversal threads will be directly applicable and useful for both the solutions in the PARADISE projects, as well as for other actors developing similar airport platforms.

### **1.2.6 Inter-disciplinary approach**

PARADISE is adopting a truly interdisciplinary approach, integrating multiple stakeholders critical to enabling ATM-related solutions. In line with the objectives of the call, the consortium defined clear goals and KPIs: increased automation in operations, human factors and operator interaction, and the regulatory and standardization frameworks required for implementation. The composition of the consortium reflects this multidisciplinary strategy: ANSPs, airports, research organizations, and public authorities are all collaborating to design, develop, and validate the airport services. Stakeholders and end-users will be actively involved from the outset, supported by targeted communication and dissemination activities and participation in advisory committees. This integrated approach will support the delivery of impactful, replicable, and increasingly automated airport operations.

### **1.2.7 Social sciences and humanities aspects in the project**

The PARADISE project does not have a direct impact on social sciences or humanities aspects. Indeed, even if human performance is a key topic for assessment of workload reduction for operators, this is not considered an advancement for human sciences, but rather an implementation for assessment.

### **1.2.8 Sex and/or gender dimension in the project**

The scope and content of the planned R&I activities do not address a specific gender dimension, and project members do not foresee a gender-related impact for the features researched. The S3JU Bi-Annual Work Programme for years 2024-2025 establishes that “the integration of a gender dimension (sex and gender analysis) into R&I content is not a mandatory requirement” for the HORIZON-SESAR-2022-DES-IR-02 call for proposals.

### **1.2.9 Open science practices in the project**

PARADISE anticipates that adopting Open Science principles will deliver substantial impact. Firstly, publishing the PARADISE results in open-access journals or platforms is expected to increase citation rates and improve dissemination efficiency. Additionally, making research papers freely accessible to the public will broaden their communication reach. Open-access publications are also more likely to receive media attention and be shared via social and mainstream media channels, enhancing science communication, sparking industry interest, and encouraging citizen engagement. PARADISE is committed to maximising open access to ensure that research outcomes remain available without paywalls.

The project will primarily follow the Green Open Access model and, where feasible, use platforms aligned with international interoperability standards. These platforms are indexed by Google and other widely used search engines, further increasing visibility. Particular care will be taken to comply with journal copyright conditions, ensuring that articles are published under CC-BY or similar licences, enabling commercial use of the outputs.

### **1.2.10 Data management and management of other research outputs**

PARADISE will ensure that data management is properly handled in the different WPs during the project. In line with Horizon Europe guidelines on data management, the project will produce a Data Management Plan (DMP). The plan will include information on how the project data will be collected, processed, shared, and made accessible by the project partners. The DMP will evolve during the project, and its initial release will be followed by two updates.

## **1.3 State of the art**

The current state of the art in airport air traffic management is undergoing a profound and integrated evolution towards an automated, data-driven, and collaborative environment. A key aspect is the strategic focus on supervised automation, such as the EASA 2B level automation, particularly the human-AI teaming initiatives. Central to this modernization is the transition to service-oriented, cloud-based platforms. These are not merely hosting solutions but serve as the foundational infrastructure for deploying advanced AI applications and ensuring robust cyber-resilience. Such platforms facilitate unified interfaces and seamless data exchange, crucial for realizing the Digital Sky vision, which demands a comprehensive re-evaluation of data governance and interoperability among all aviation stakeholders.

Dynamic capacity adjustment has evolved from reactive measures to proactive optimization, driven by the integration of real-time and historical data with sophisticated mathematical models and artificial intelligence. AI's predictive capabilities are transforming airport operations by anticipating challenges and optimizing resource allocation across the entire airport ecosystem. Concurrently, environmental sustainability has emerged as a primary, explicit driver for ATM modernization, with initiatives pursuing net-zero emissions, reduced fuel consumption, and noise mitigation, influencing both technological development and operational procedures. This is complemented by a holistic approach to safety, achieved through integrated data systems that provide improved situational awareness and enable proactive risk mitigation.

Crucially, cyber-resilience is recognized as an integral and foundational requirement for this digital transformation, rather than an optional add-on. The increasingly interconnected nature of IT, Operational Technology (OT), and Internet of Things (IoT) systems within airports necessitates a continuous, adaptive, and highly collaborative approach to security, involving all aviation stakeholders.

The following sections describe in more detail the relevant aspects of state of the art for each solution and thread.

### 1.3.1 State of the art, Solution 1

As a baseline, Solution 1 will be referring to the developments of the following SESAR solutions: Solution PJ.04-W2-29.2a, Solution PJ.01-W2-01, and Solution PJ.02-08. The current state-of-the-art in Airport Demand and Capacity Balancing has highly sophisticated individual systems for various ATM functions, such as radar surveillance, flight plan processing, and initial trajectory prediction. Tools like AMAN and DMAN are widely implemented, and often coupled, to optimize runway sequencing and integrate arrival and departure flows in the immediate terminal area. Furthermore, Airport Collaborative Decision Making (A-CDM) principles as developed in SESAR 2020 PJ.04 foster better information exchange among airport partners. Existing platforms such as ECTL's CCPM supports performance assessment based on historical data. To support a capacity increase while maintaining safety, CCPM already includes tagging separation infringements in post ops and this helps feed the AI to maintain safety levels.

However, the current landscape remains reactive, relying on manual or semi-automated coordination between airport capacity declarations and tower operations. While 4D trajectory management is progressing (e.g., i4D), the optimization remains largely conceptual. Capacity declarations are often static and buffered, failing to dynamically reflect real-time influences like precise weather conditions, fluctuating staffing, or transient infrastructure availability, leading to sub-optimal throughput and unnecessary holding. Decision-making on tactical airport capacity is conducted by the on-duty operator and is based on a judgment influenced by operator's mental picture, which results from the mental analysis and integration of data from multiple sources. Solution 1 is proposing to integrate and analyse through AI different data sets and indicators in one single service composed of the 4 modules to support all actors (ATCOs and Airport Operators) to dynamically calibrate the available airport capacity in response to a more accurate traffic demand.

### 1.3.2 State of the art, Solution 2

Solution 2 builds on the following solutions:

- **ORD:** eORD builds on ORD from PJ.02-01-01 replacing analytical techniques to calculate spacing minima between consecutive arrivals on the final approach with ML as well as flight specific information downlinked from aircraft via ADS-C (see below for more details on eORD).
- **eORD:** eORD continues and builds on the work conducted in SESAR 2020 Wave 2 on the solutions eORD with ML (PJ.02-W2-14.6a), eORD with ABS-C (PJ.02-W2-14.6b), and the downlink of AROT information from aircraft via ADS-C (PJ.02-W2-14.11). The eORD ML algorithm (PJ.02-W2-14.6a) will be updated and tailored for the LHBP and ESSA approach and airport environment and combined with the downlink of Vapp (PJ.02-W2-14.6b) and ROT (PJ.02-W2-14.11) information via ADS-C to form a more efficient eORD. The eORD, together with eOSD, will then be integrated with iRSM to develop the new solution 2 tool, enhanced Integrated Runway Delivery (eIRD).
- **iRSM:** eIRD builds on work on iRSM conducted in PJ.02 EARTH and VLD03 W2 SORT. In SORT, iRSM was demonstrated to have reached TRL7.
- **Advanced Curved Departure Operation in the TMA (PJ.02-W2-04.2)** eIRD builds on the development of this solution at TRL4 to support optimizing the SID routes among multiple alternative performance-based SIDs to provide more dynamic departure routes compared with today's operation. The solution was brought up to an equivalent level of TRL6 maturity level within the project CURDEP run by EATIN (ECTL Air Transport Innovation Network) in 2025. By fully using curved departures as preferred procedures in the Sequencing algorithm of the eIRSM (eIRD) combined with straight departure SID's increased runway capacity at the same time as both less environmental footprint and costs for the AU would be achieved.
- **Advanced Curved Approach Operation in the TMA with the use of Barometric altitude (PJ.02-W2-04.1),** validated to a TRL4 level with the SESAR2020 W2 project PJ.02 W2 Airport Airside and Runway throughput.
- **eOSD (PJ.02-W2-14.8).** eOSD continues the work conducted in SESAR 2020 Wave 2 on the solution, (PJ.02-W2-14.8), tailoring the ML algorithms for the ESSA environment. The eOSD, together with the eORD, will then be integrated into iRSM to develop the new tool, enhanced Integrated Runway Delivery (eIRD).

**Thread 2.1. Enhanced Optimized Runway Delivery for arrivals (eORD):** eORD will continue the work done in SESAR 2020 Wave 2 PJ.02 WP4 using state-of-the-art big data/ML techniques together with the downlink of flight specific information (Vapp and ROT) to further improve the accuracy of spacing delivery for arrivals, in order to gain greater runway throughput performance benefits. This includes better definition of safety buffers for coping with aircraft behaviour and wind evolution uncertainty. This solution, will facilitate and ensure the modernization of ATC systems, including an increased connectivity between ATC systems and the aircraft. The development of



aircraft systems to predict the ROT will further develop on the BTV (Brake to Vacate) function, currently available on A350 and A380 only and requiring several enhancements and validations of the ROT prediction, to confirm the ROT accuracy and allow such integration with ATC systems. The eORD controller support tool validated in PARADISE solution 2 is an enabler that will facilitate and accelerate the introduction of more complex but efficient dynamic and pairwise separation schemes, which cannot be applied without tool support, in order to further enhance the efficiency of approach and airport operations. The move towards a more integrated and efficient runway management initiated with TBS will be continued opening new market opportunities for industry towards modernisation of runway management tool and processes.

**Thread 2.2. Optimization of runway throughput with eIRD:** eIRD will extend iRSM with functionality to support optimisation of each SID route. State of the art regarding the development of eORD is described under thread 2.1. iRSM is designed to work in real-time environments where it is essential that it quickly responds to substantial amounts of new and updated information regarding the status of flights and airport resources. Classical optimization techniques have often been found to respond too slowly in such environments. In the development of eIRD we will therefore use an alternative approach based on the following design: At any given point of time there will exist a model representing the most updated information received so far, as well as the solution from the previous optimization. The solution contains the sequence of flights for each runway orientation in use in each runway configuration period. For each flight, the optimal TLDT or TSAT and TTOT are calculated. This incremental approach to optimization takes inspiration from approaches studied in the fields of *prescriptive analytics* with adaptation mechanisms in dynamic environments, *multi-agent systems* with the emphasis on distributed cooperation and coordination, *incremental computation* with the representation and propagation of changed data, *online optimization* with the representation of incomplete knowledge of the future and *streaming data processing* with the handling of big data with separate storage and processing layers.

Solution 2 will not introduce untested or isolated AI concepts but builds upon methods and operational improvements previously validated in SESAR runway throughput projects, including ML based arrival spacing, departure spacing, and runway occupancy time prediction. These earlier SESAR solutions followed established SESAR safety assessment processes and incorporated regulatory considerations aligned with EASA and EUROCAE frameworks

### 1.3.3 State of the art, Solution 3

Solution 3 builds on the following solutions:

**Thread 3.1 Enhanced surveillance:** Today ASRU is used in different Industries, but the use in ATM is limited. Previous projects like **HAAWAII** showed that ASRU can support controllers in reducing the workload and head-down time, thus increasing situational awareness. PARADISE builds on this and further improves situational awareness by using ASRU to automatically display camera streams on the controller display for enhanced surveillance so that controllers do not need to select the right camera picture, which is time consuming and reduces the time the controller is looking out of the window.

**Thread 3.2 Intelligent surface management including human-automation-teaming:** The **ASTAIR** project aims to design a human-machine interface that uses algorithms to autonomously manage vehicle movements on the airport surface. PARADISE further enhances this concept by applying it to the field (TRL6) and raising it to a higher automation level. Rather than providing the information via a human machine interface, machine-to-machine interfaces are used to directly transfer the information (e.g. via digital messages or voice generation) to the concerned aircraft and vehicles. Traditional A-SMGCS assumes that a human controller is required to coordinate the routing with the aircrafts and vehicles. In PARADISE, the digital controller will provide clearances to the aircraft and vehicles. If the clearance exceeds predefined operational limits, the digital controller will downgrade itself to a supporting role and handover to the human controller.

**Thread 3.3 Enhanced digital communication usage enabled by ASRU:** The **MIAR** project defined a solution for LDACS navigation. PARADISE takes this work into account within the multilink capability. The link to the project is established by involving the project lead of MIAR (DLR). Moving maps are a common technology in cockpits already, however the integration with airport systems like A-SMGCS is limited. Today pilots have the possibility to enter routes manually in their onboard moving maps, and static information like closures of taxiways or runways and simple information like position of aircraft is shared, however, more advanced information like clearances, taxi routes or safety net alerts are not exchanged. Additionally, in previous research projects (like EMMA) the assumption was that all aircraft are equipped with moving maps; however, the reality is that a mixed mode is more likely to become standard and needs to be supported.

Congestion of the voice frequency is one of the issues that may lead to critical situations at busy airports. Decreasing voice frequency usage and the probability of misunderstandings between pilots and ATCOs is needed. Digital

messages were introduced in En route area for this purpose. Here, 70% and more clearance are already given via digital message exchange. Although 60% of ground startup clearance are already given via digital messages, it means that digital messages are not used on ground because taxi clearances need a big part of the frequency bandwidth. SESAR1 project investigated D-TAXI in 6.7.3 project but the maturity of the concept was blocked due to the workload and head down issue in the cockpit that may be induced by the implementation of digital messages. Introducing ASRU can solve this issue and bring digital messages to a maturity that allow its implementation. Voice and digital communication should be seen as complementing technologies. The clearance can result from a planning system, which is then transformed via speech generation to the pilot. Workload of the apron controller is reduced. Voice generation or digital messages can therefore dramatically reduce controllers' speaker time below e.g. 20% in high traffic scenarios. To reduce misunderstandings and better understanding for the pilot the information given via voice should be also send digitally. Taxi clearances could be displayed on an Airport Moving Map (AMM) application on the EFB to relief the pilot from taking notes for the readback. Currently only the application of radar label maintenance supported via Speech Understanding is validated for TRL6 in the SESAR context (Solution 96). Other applications achieved TRL4 or below.

#### 1.3.4 State of the art, Solution 4

PARADISE solution 4 addresses the call's capability of Intelligent surface management while runway throughput is improved in high demand scenarios. The research in Solution 4 (on weather enhanced multi modal sensor-based gate surveillance) will consider the work conducted in SESAR solution #23, #54, and the ongoing projects PEACOCK and ASTONISH in SESAR DES.

- **PEACOCK:** The project implements a dashboard to analyse and quantify the environmental impact of landing, taxiing and take-off operations at airports by implementing a quasi-automatic turn-around milestones surveillance process, to increase the predictability of flight departure estimates.
- **ASTONISH:** The project improves aircraft safety during ground operation by investigating new sensing systems such as LIDARs, radars, and vision-based sensor at aircraft and airport level, improving ground operation safety and airport resilience by increasing the situational awareness of the pilots and air traffic controllers under all-weather conditions.
- **SESAR Solution #23:** investigated the utility and usability of D-TAXI as an additional communication means during surface operations at V2 maturity level.
- **SESAR Solution #54:** AMAN/DMAN integration validated in trials with NATS and London Gatwick Airport (SESAR1 PJ.6.8.4). At London Gatwick arrivals and departures are jointly displayed in a tower human-machine interface (HMI) for improved controller situational awareness – an approach, using a ready-to-go Frequentis Orthogon HMI solution, which could apply to other towers as well.

Solution 4 will build on the surveillance sensors or sensor fusion architecture in the ASTONISH project and enhance the existing camera-based turn around milestone system (VARDR) by including LIDAR. The solution will further enhance the PJ.02-W2-28.1 solution and the PEACOCK work by improving robustness in the turn around milestone monitoring under adverse weather using deep learning multimodal models, focusing on winter conditions like fog and snow and developing a more precise estimate of TOBT using historical weather and flight data with real turn around milestone time measures.

The solution brings further SESAR Solution #23, moving this to V3/TRL6. Beyond that, our solution focuses on adverse weather conditions, particularly winter operations and de-icing. Furthermore, the solution aims to align surface operations into the AMAN/DMAN integration through better prediction and management of turn-around, taxi and de-icing operations.

Developing a reliable perception and sensing system is a continually evolving research domain, particularly concerning adverse weather conditions. Significant advancements have been achieved under favourable weather circumstances. However, conditions such as rain, fog, and snow remain problematic<sup>1</sup>.

The primary strategies to address issues related to adverse weather involve advanced sensor fusion and ML techniques. Active LiDAR sensor has been used to generate a precise 3D depiction of a scene, making it an essential component for environmental perception, serving as a complement to camera information<sup>2</sup>. Initial research on sensor

<sup>1</sup> Yuxiao Zhang et al. "Perception and sensing for autonomous vehicles under adverse weather conditions: A survey". ISPRS Journal of Photogrammetry and Remote Sensing, Volume 196,2023

<sup>2</sup> M. Dreissig et al. "Survey on LiDAR Perception in Adverse Weather Conditions," 2023 IEEE Intelligent Vehicles Symposium (IV)

fusion for handling the adverse effect of weather on sensor perception concentrated on the development of robust data association frameworks. More recent research efforts have adopted deep learning-based methods for resilient multi-modal perception. Our aim is to increase the state of the art in perception robustness by optimizing multimodal models for adverse weather conditions.



### 1.3.5 State of the art, Transversal threads

**Secure exchange of data for PARADISE platform:** the work performed by the International Aviation Trust Framework (IATF) is a key initiative by the International Civil Aviation Organization (ICAO) that aims at enabling secure, resilient, and interoperable digital information exchange across the global aviation ecosystem. The IATF is designed to support the digital transformation of aviation by ensuring that all digital communications—whether it is ground-ground, air-ground, or air-air—are trustworthy, secure, and harmonized. This is achieved through a combination of 1) policies and governance structures for digital trust, 2) technical requirements for secure data exchange, 3) best practices for implementation across stakeholders (states, ANSPs, airlines, OEMs, etc.), and 4) cyber-resilience measures to protect against threats and ensure continuity. The IATF is currently under development. A foundational component of the IATF is SWIM, which enables standardized data exchange models, interoperability across systems and stakeholders, and real-time access to aeronautical, meteorological, and flight data.

The European Aviation Common Public Key Infrastructure (EACAP) is tailored to address the European aviation stakeholder needs of cybersecurity and help them comply with the Commission Implementing Regulation (EU) 2021/116- Common Project 1 (CP1). EACAP provides a common PKI for all European aviation stakeholders. The future airport platforms will rely on this PKI as their trusted cybersecurity backbone. In PARADISE, the four solutions will use it to secure, for example, their SWIM services and operational data exchange.

Due to the long lifecycle of systems used in the aviation sector and the increasing threat posed by quantum computing, the next generation airport platforms need to be prepared for the transition to quantum-safe cryptography. To mitigate the risk of future quantum attacks, which may break existing cryptographic protocols and standards, the sector must begin assessing its cryptographic dependencies, updating standards, and implementing post-quantum cryptographic algorithms. This proactive approach will be essential to safeguard sensitive data in the airport platforms, maintain operational safety, and ensure regulatory compliance in a post-quantum world. The National Institute of Standards and Technology (NIST) has officially released three finalized standards for post-quantum cryptographic algorithms (FIPS 203, 204, 205), and a fourth (FIPS 206) is underway. These, and other related standards, will be reviewed and considered for the development of the architecture and framework for secure exchange of data.

Given the complexity and interdependence of the ATM ecosystem—which includes infrastructure providers, software vendors, hardware manufacturers, integrators, and regulatory bodies—cyber security work must also address risks across the full lifecycle of systems and services<sup>3,4</sup>. This includes assessing the provenance and integrity of third-party components, enforcing secure development and integration practices, monitoring for vulnerabilities introduced through dependencies<sup>5</sup>, and establishing mechanisms for monitoring, threat detection and response across the supply chain.

**New Service Delivery Model for PARADISE platform:** For Enroute a service level taxonomy structure exists published in document "Accelerating the implementation of a New Service Delivery Model for ATM in Europe". This document superficially covers tower application landscape and corresponding standardization topics.

## 2. Impact

PARADISE's overall impact, from creation to how it is maximized, can be traced from its objectives and ambition to the communication and dissemination channels and the exploitation strategy.

### 2.1 Project's pathways towards impact

The pathway to impact shows how the ambitions of the project objectives relate to the expected outcomes. These impacts can be organized along technical, economic, and societal lines. From a technical point of view, **Solution 1** creates impact by reducing the uncertainty of capacity buffers leveraging the reduced uncertainty of the traffic brought by SESAR developments. This will in turn reduce ASMA and departure delay, increase the arrival and departure punctuality, and reduce fuel burn. **Solution 2** will also contribute an impact to overall airport capacity by optimizing runway throughput during peak traffic periods, thereby optimizing flight trajectories, reducing holdings/fuel burn. **Solution 3** will contribute to safety, cost-efficiency, and situational awareness on the airport surface. **Solution 4** will reduce the impact of weather events on airport operations.

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<sup>3</sup> Tim, H. Stelkens-Kobsch, et al. "Towards cybersecurity risk assessment for future ATM—first steps." 2024 AIAA DATC/IEEE 43rd Digital Avionics Systems Conference (DASC). IEEE, 2024.

<sup>4</sup> European ATM Master Plan 2025, A.6. Cybersecurity capabilities roadmap. <https://www.sesarju.eu/node/4823>

<sup>5</sup> Dambra, Carlo, et al. "Modelling and Analysing Cascading Effects of Cyberattacks to ATM Systems." 2025 Integrated Communications, Navigation and Surveillance Conference (ICNS). IEEE, 2025.

The following table shows a more detailed breakdown of how the PARADISE objectives and ambition create technical impact and how those impacts address the expected outcomes of the call. CBAs and Performance Reports from previous projects described in section 1.3 were used as references to extrapolate the benefit targets. The provided conservative outcomes overview (where possible to be quantified) is expected to provide improvements against a current “do nothing” situation.

| Target Groups                        | Outcome | Impact against ATM Masterplan Deployment Phases                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |
|--------------------------------------|---------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| TG3<br>ANSPs<br>and<br>Airports      | IR-4-01 | Further evolution of SDO 2.2 for 30 larger airports in Europe able to calibrate the airport capacity in relation to the actual operating conditions supported by data sharing for common operational picture allowing for ~10% of usage of capacity buffers in phase D and ~10 % reduction of recovery time from disruptions (such as adverse weather or technical failures) in phase D.<br>Implementing Level 4 automation for routine tasks at 30 larger European airports reducing ANSP costs of 20% through digital ATCO deployment in phase D.<br>Improved predictability in adverse weather conditions with 10-25%, contributing to reducing the effects of adverse weather triggered bottlenecks locally, through advanced surface management in phase D.<br>Further evolution of SDO 2.6 for 30 larger airports in Europe accommodating more traffic without adding more infrastructure through reduced capacity buffers and increased runway throughput. (~150M€ saved in Phase C and ~155M€ in Phase D). Achieve harmonised capacity calibration among medium, large, and very large European Airports in Phase C (2040) and promote adaptive AI support to capacity management in phase D (2045) |
|                                      | IR-4-06 |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |
|                                      | IR4-02  |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |
|                                      | IR4-05  |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |
|                                      | IR1-01  |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |
| TG2<br>R&I<br>communities            | IR-4-02 | Significantly advancing the use and knowledge of AI and post-quantum cryptography (PQC) algorithms in safety critical environments through the application of ML for the analysis and prediction of capacity buffers in phase D and advancing the use and knowledge of digital messages and prediction of turn-around times in adverse weather in phase C.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |
| TG3<br>Airlines                      | IR-4-01 | Increased slot compliance and reduced trajectory deviations by 10% in phase C and 20% in phase D through an efficient use of existing infrastructure (reduced capacity buffers and improved runway throughput)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |
|                                      | IR-4-06 |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |
| TG4<br>Society                       | IR-4-01 | Providing validated data and methodologies for airport capacity, which can be used by researchers and policymakers to inform future developments in air traffic management and airport planning in phase C. Improving the efficiency of public infrastructures through the efficient use of existing airport facilities (runway sequence management and capacity calibration) while maintaining safety and improving ANSPs cost efficiency.<br>Reducing environmental impact of fuel burnt for flights for 30 European larger airports by 5% in Phase C and 15% in Phase D by reducing arrival and departure delays.<br>Improved passenger experience for ~1,300B passengers through reduced delay at 30 larger airports starting from phase C towards phase D.                                                                                                                                                                                                                                                                                                                                                                                                                                             |
|                                      | IR-4-06 |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |
|                                      | IR-4-04 |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |
| TG5<br>Standard<br>ization<br>bodies | IR-4-01 | Support regulatory needs for automation level 4 in safety critical environment by assessing the regulatory framework and standard requirements in relation to digital ATCO in Phase C (2030). Outcome of the nSDM thread will contribute to standardization organizations of relevance.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |
|                                      | IR-4-03 |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |
|                                      | IR-4-02 |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |
|                                      | IR-4-05 |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |

Table 3 How the project will provide benefit against ATM Masterplan Deployment Phases.

### 2.1.1 Societal and Economic Impacts

An important benefit of the PARADISE project will be improving the resilience of airport operations through shorter and more effective recovery to ‘normal’ operations after disruption, mitigating the impact of adverse events, and to resume ‘normal’ operations faster. This would subsequently limit the negative economic impact of such events. PARADISE will extend its benefits to smaller airports (which usually serve smaller communities), improving the efficiency of air transport for those communities. PARADISE will also focus on environmental sustainability and ensuring that environmental mitigation measures and impact are included in the airport optimization trade-offs. Moreover, PARADISE will increase efficiency and predictability of daily operations which in turn increase passenger satisfaction and contribute to a seamless travel experience.

### 2.1.2 Potential Barriers and Mitigating Measures

However, there are several potential barriers that can be mitigated, including but not limited to:

**Barrier 1 – Proven Technology and Cost of Implementation:** Many airports and ATC systems still rely on legacy hardware and software, making integration of new, digital systems complex and costly. Before investments are done, innovative technologies need to be proven to be operationally viable, otherwise the financial and operational burden of upgrading infrastructure limits scalability and industrialization. **Mitigation strategies** within this project focus on how the individual technologies meet the concept of the new service delivery model for the PARADISE platforms. The solutions consider modular and iterative development to allow integration with existing systems while minimizing disruption and changes to existing infrastructure.

**Barrier 2 – Regulatory and Standardization Challenges:** The aviation industry is highly regulated, with strict requirements for safety, interoperability, and compliance. Developing and approving innovative technologies require extensive coordination with regulatory bodies such as ECTL, ICAO, and EUROCAE. Current standards may not yet support the seamless integration of these technologies, and regulatory delays slow down the adoption of innovative systems, leaving airports reliant on legacy systems. The main **mitigation strategy** is proactive engagement with regulators already during the project (e.g., ECTL as project partner, EASA, EUROCAE) to define and update standards that accommodate these advanced technologies and make sure early involvement ensures that regulatory frameworks evolve in tandem with technological development. Within the project the safety and effectiveness of these technologies is demonstrated at selected airports or in a simulator in a controlled, real-world environment.

**Barrier 3 – Data Interoperability and Integration:** The technologies necessary for PARADISE to create impact heavily rely on the integration of multiple data sources. Ensuring seamless data exchange and interoperability between systems from different manufacturers and operators is a significant challenge, and lack of data integration can create inconsistencies, delays, and a lack of trust in automated systems, reducing their effectiveness. Therefore, the solutions **mitigation** is to develop and enforce usage of standardized data exchange protocols to ensure seamless communication between systems from different vendors, something that is considered within this project as part of the new service delivery model for PARADISE platform as well as participation in standardisation organisations (ECTL, EUROCAE).

**Barrier 4 – Cybersecurity Concerns:** Enhanced connectivity and digital communication systems increase the risk of cyberattacks. For example, vulnerabilities in data links, automated messaging systems, or AI algorithms could be exploited, potentially compromising safety. Cybersecurity risks may lead to hesitancy in adopting digital communications and AI-based automation. **To mitigate** this risk, the security activities in this solution, and especially the transversal solution, consider and develop concepts regarding implementation of end-to-end encryption for digital messages to protect data integrity and the dissemination and sharing of threat intelligence and best practices.

**Barrier 5 – Human Factors and Training:** Introducing automation and AI tools changes the role of air traffic controllers since standard repetitive tasks should be reduced, putting their focus on tasks that cannot be automated. This change requires new training programs and a shift in mindset. Controllers may resist adopting tools that they perceive as reducing their control or job security. Without proper training and trust in the systems, human operators may underutilize, misuse or object to these technologies, reducing their potential benefits. Important **mitigation strategies**, but outside the scope of PARADISE include comprehensive training programs to support air traffic controllers (ATCOs) to help them adapt to their evolving roles. Focus should be on building trust in the new systems, ensuring they can effectively supervise automated tools, and that new tools are designed with intuitive user interfaces (Human-Centred Design) and workflows that complement the ATCO's tasks, rather than complicating them. To reduce the anxiety of automation and AI tools, the decision-making processes of AI/automation systems must be made transparent to ATCOs, so they understand how recommendations or actions are generated in order to support them.

**Barrier 6 – System Reliability and Validation:** Automated systems must demonstrate high reliability and safety before they can be widely adopted. AI algorithms, speech generation, and automated decision-making systems must be rigorously tested to ensure they perform accurately under all scenarios, including edge cases. Slow validation processes and the conservative nature of the ATM industry limit the pace of industrialization. **Mitigation strategies** to improve the level of reliability and safety (especially in the context of reaching higher TRL) begin with an extensive testing of tools in both simulated and real-world environments to ensure reliability. Furthermore, in the industrialization phase a fail-safe mechanism must be introduced, which allows that a human controller seamlessly takes over in case of system failure.

## 2.2 Project's content towards impact

The services developed in PARADISE can consistently be integrated in a future industrial platform by means of common standards and regulatory activities. The strategy of the project is to include two focused transversal threads with respect to harmonising the service delivery and providing security in the data exchange. These activities will provide guidance on the prioritized standardization topics and perform gap analysis for each solution with respect to the alignment of each solution with respect to a transversal service delivery model and security standards.

- Websites will be created/updated for providing all validation results for supporting both industrialisation and specification of ANSP needs.
- All results produced by the project will be direct inputs for regulatory processes and ANSPs having to decide what and how to deploy the solution threads.
- Safety analyses and performance analyses will all be developed for being easily reproduced for specific airport environment in support to deployment decisions.
- Safety assessments will be prepared to be direct inputs to regulatory processes
- Specification and guidance documentation will be direct input for ANSP and ATC system providers willing to industrialise and deploy products developed.
- Requirements and specifications will be turned into regulatory material for either supporting ICAO, European or national authorities.
- Requirements and specifications will be used for the development of standardisation and guidance materials.

The project includes the development and use of AI. EUROCAE working groups (WG 114 / G34) are in the process of developing a standard for the Development and Certification/Approval of Aeronautical Safety-Related Products Implementing AI. At the end of 2021, EASA also published the “EASA Concept Paper: First usable guidance for Level 1 machine learning applications”. ECTL participates in both of these initiatives, and the outputs of the eORD solution in SESAR 2020 PJ.02-W2-14.6a have already been used as recommendations for these regulatory/standardisation initiatives.

Solution 3 includes speech recognition and understanding: This will be aligned with EUROCAE Working Groups 41 (A-SMGCS) and 126 (VCS - ATC Systems Integration for ATM Information Exchange) on the standardisation and message exchange of speech commands. Participation in the ECTL task force which focus on speech recognition requirements to be added into the specification of A-SMGCS. Digital communication systems will be aligned with EUROCAE Working Groups 41 (A-SMGCS) on the standardisation of route exchange.

The work proposed in PARADISE is aligned with the framework defined by the European Union Aviation Safety Agency, taking the Artificial Intelligence Roadmap 2.0 as the main strategic reference for the safe and trustworthy integration of AI in aviation. Additional guidance, including the Concept Paper on Artificial Intelligence (AI) and Machine Learning (ML), and outcomes from the EASA AI Days, will also be considered. All AI tasks in the project will map the proposed AI solutions against these principles, identifying gaps and translating them into concrete technical requirements. Considering the early TRL4 stage, these activities will be applied with an appropriate level of flexibility, focusing on alignment with key principles rather than full compliance, while progressively integrating best practices for trustworthy AI into the development process.

Solutions 1 and 2 use AI (machine learning models) mainly for planning and prediction of runway and resource utilization. In addition to the turnaround monitoring Solution 4 covers a service that optimizes a departure sequence using an AI based model which incorporates weather and dynamic ground situation for de-icing pad planning and departure sequence. These aspects are considered from a safety point perspective of lesser criticality due to the resulting predictions being used by Level 0 (Low Automation) and Level 1 (Decision Support) processing (EASA AI Levels 1A, 1B respectively).

Whether resulting inferencing data from the AI model can be relied upon, depends on the model types that are used. According to the different scope in the 4 distinct solutions which cover vision-based processing and recognition in Solution 4, voice recognition in Solution 3 and numerical models used for optimizations in Solutions 1, 2 and 4, different state of the art approaches will be applied. These will include careful model input feature selection, comprehensive data outlier removal, overfitting/underfitting model performance checks and online monitoring of a confidence value along for inferencing data. At runtime model drift may also be monitored and data identified as being drifting may be used in an iteration step for further model retraining.

PARADISE will involve EASA in the project to align our strategy with standardisation and regulatory needs. EASA will contribute in the form of action tasks, expertise and advisory services in the area of certification and other areas described in Article 156 of the SBA, and to ensure acceptable means of compliance with the SES basic regulation and its implementing rules.

## 2.3 Measures to maximise impact - Dissemination, exploitation and communication

The PARADISE consortium will promote the project, its activities, and results to maximise the impacts. The project will develop and implement an integrated communication, dissemination and exploitation plan involving all partners from the initial stages of the project. The objective of PARADISE **Communication Plan** is to inform others about the project, to promote the achievements to potential interested parties, to raise awareness about the project goals, and promote them to stakeholders and the interested public, using all the appropriate communication channels and means. PARADISE **Dissemination Plan** objective is to publicly disclose the project results by all the appropriate means, such as scientific papers, policy papers, and technical reports. As more information becomes available during the project, targeted communication and dissemination activities will engage with relevant external stakeholders. PARADISE **Exploitation Plan**'s objective is the long-term sustainability and implementation of the solutions developed within the project. These different measures will aim to support the following goals:

- **Goal 1:** Visibility to the project, enhance partners' visibility and gain support from relevant stakeholders.
- **Goal 2:** Attract potential end-users of the results, including ANSPs, and professional organizations.
- **Goal 3:** Ensure sharing of the results and feedback from relevant operational stakeholders involved, including industries and standardization bodies.
- **Goal 4:** Ensure adoption of research outputs, solutions and recommendations and uptake of the results by the community of researchers, the end users' community, industry, and standardization bodies.
- **Goal 5:** Spread knowledge and raise awareness by making the project results openly available and searchable.

The Communication, Dissemination and Exploitation Plan will assist partners in conducting the right types of communication, dissemination, and exploitation activities, at the right time and towards the right target groups.

Overall, all partners will be engaged in the communication and dissemination and, where possible, communication will be delivered electronically for a more sustainable approach. A first target group segmentation model (Table 4), along with a series of communication channels (Table 5) and dissemination activities (Table 6), has been identified. The exploitation strategy is described separately in section 2.3.4.

The Consortium acknowledges the additional dissemination and exploitation obligations as set out under the call.



### 2.3.1 Target Groups (TG)

PARADISE will target a variety of stakeholders potentially interested in the project activities and outputs. The identified target groups will be engaged in specific dissemination, communication, and exploitation activities.

| Target Group                                                                                                                                  | Key Message                                                                                                                                                                                                                                                                 | Objectives and expected feedback                                                                                                                                                                                                                                                                                          |
|-----------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>TG1: Institutions, Decision Makers, and Policy Makers: European and National levels</b>                                                    | Increase European competitiveness in the aviation sector. Develop solutions to make the air transport system more sustainable and resilient.                                                                                                                                | Highlight the main benefits associated with a large-scale deployment of the proposed solutions. Get feedback about the alignment of the expected benefits with the EU and national strategies. <b>Imp.1</b>                                                                                                               |
| <b>TG2: Research and Innovation communities: Universities, Research organisations, educational institutions, in the air transport sector.</b> | Availability of open-access publications. Share of knowledge about technical solutions for perception, analysis and decision making by e.g., using ML and optimization. Availability of validation data to build new research projects that exploit the knowledge acquired. | Strengthen the scientific community of ATM research. Provide awareness of the proposed technical solutions and the associated research questions. Get feedback from the scientific community about research streams associated with the solutions, and their impact on educational programmes. <b>Imp.1, Imp.4, Imp.5</b> |
| <b>TG3: Airports, ANSPs, airlines and end user communities as implementors and appliers of the solutions.</b>                                 | ANSP, airlines and airports will benefit from the availability of new technical solutions to improve efficiency, resilience, and cost efficiency. ATCOs will benefit from highly automated solutions and human-machine teaming to balance workload.                         | Highlight the specific benefits associated with the deployment of the proposed solutions in the different operating environments. Increase acceptance of the technology for ATCOs and pilots. Get feedback from operational experts. <b>Imp.1, Imp.2, Imp.4</b>                                                           |
| <b>TG4: Industries providing enabling technologies for PARADISE solutions, which would expand their market segment.</b>                       | The proposed solution may lead to the deployment of new technical solutions at a European scale with the consequent business for the industries that will produce and supply the deployable solutions.                                                                      | Highlight the potential business associated to a large-scale deployment of the proposed solutions. Get feedback about risks, and related mitigation actions, for the industrialization of the products associated to the proposed solutions. <b>Imp.1, Imp.3, Imp.4</b>                                                   |
| <b>TG5: Standardization bodies</b>                                                                                                            | Definition of new standards for the proposed technical solutions.                                                                                                                                                                                                           | Provide input for new standards needed to deploy the proposed solutions. Get feedback about existing standards that may apply to the proposed solutions elements. <b>Imp.1, Imp.3, Imp.4</b>                                                                                                                              |
| <b>TG6: General public</b>                                                                                                                    | More efficient air transport system. Return on public investment in R&D.                                                                                                                                                                                                    | Create awareness of the benefits introduced by the proposed solutions. Create awareness of the positive social impact derived from research and development investments. <b>Imp.1</b>                                                                                                                                     |

Table 4 Target groups

### 2.3.2 Communication channels

Based on the segmentation of the target groups, different communication strategies, channels, and tools will apply.

| Channel                                   | Information to be shared                                         | TG                      | Indicators and Targets                           |
|-------------------------------------------|------------------------------------------------------------------|-------------------------|--------------------------------------------------|
| Public website for the project            | General information, key messages                                | TG1, TG2, TG3, TG4, TG5 | # of visitors: 5 000 within the project duration |
| News, blogposts on website & social media | Solution progress update, key messages, milestones, achievements | All                     | # of news and blogposts: 45                      |
| General press/magazine articles published | Solution progress update, key messages, milestones, achievements | All                     | # of articles: 10                                |
| Project videos                            | Key messages @project level and @solution level                  | All                     | # of project videos: 4 (1 per solution)          |

Table 5 Communication channels

### 2.3.3 Dissemination Activities

Dissemination activities will include scientific publications, participation in the most relevant congresses and exhibitions for the ATM sector, thematic workshops to engage stakeholders, and demonstration events to show the validation platforms developed and the results achieved within the project. Whenever possible, and in alignment with open research publication practices, the research data and results managed or generated by the project will be made publicly available, provided this complies with GDPR and intellectual property rights (IPR) regulations. Confidential information and industrial trade secrets will be fully respected and protected.

| Channel                                    | Information to be shared                                                     | TG                      | Indicators and Targets                                                      |
|--------------------------------------------|------------------------------------------------------------------------------|-------------------------|-----------------------------------------------------------------------------|
| Scientific Peer-Reviewed Journals          | Technical solutions, progress beyond state of the art, methodology, results. | TG1, TG2                | # of papers published open access: 8 (2 per solution)                       |
| Scientific Conferences                     | Technical solutions, progress beyond state of the art, methodology, results. | TG1, TG2, TG3           | # of publications in scientific conferences: 8 (2 per solution)             |
| Congresses and Fairs (e.g. Airspace World) | Technical solutions, progress beyond the state of the art, results.          | TG1, TG2, TG3, TG4, TG5 | # of talks, exhibition, demonstrations: 8 (across project and per solution) |
| Thematic workshops                         | Project Results.                                                             | TG1, TG3, TG4, TG5      | # of workshop organized or attended: 6 (1 per solution/thread)              |
| Open Days/Exercise Demonstration           | Technical solutions, progress beyond the state of the art, results           | TG1, TG3, TG4, TG5      | # of open days: 4 (1 per solution)                                          |

Table 6 Dissemination activities

A preliminary list of peer-reviewed journals, along with their open access policy, congresses and conferences, is:

- **Peer-reviewed journals:** Journal of Air Transport Management, Elsevier, supports open access; Journal of Aerospace, MDPI, open access; Transport Research Part C, Elsevier, supports open access; AIAA Journal of Air Transportation, green open access; CEAS Aeronautical Journal, Springer, supports open access; Remote Sensing, MDPI, open access; Journal of Hydrometeorology, AMS, supports open access; Journal of Photogrammetry and Remote Sensing, ISPRS, supports open access; Transactions on Aerospace and Electronic, IEEE, supports open access.
- **Congresses and Conferences:** SESAR Innovation Days 2027,2028, open access, indexed on Scopus; ICAS congress 2028, open access, indexed on Scopus; AIAA Aviation Forum 2027,2028,2029, green open access; CEAS conferences, indexed on Scopus; Airspace World technical forum; US-Europe Air Transportation Research & Development Symposium 2027, 2028, 2029; I-CNS 2027, 2028, 2029; FAA/ ECTL Seminar 2027; IEEE/AIAA Digital Avionics System Conference 2027, 2028.

### 2.3.4 Exploitation Strategy

A successful take-up and replicability strategy will create more acceptance among stakeholders and contribute to the further growth towards the project objectives. During the project, a set of specific actions will be undertaken to ensure a comprehensive and effective exploitation of project results and outcomes, in particular:

1. An **Exploitation Plan**, to be considered as a clear guideline for take-up and replicability of the results, will be delivered, indicating the full exploitation strategy and main actions to be conducted by partners well after the project to guarantee exploitation of the project results. Consequently, **specific plans** for the relevant exploitation assets will be developed to ensure the sustainability of PARADISE solutions according to the SESAR Innovation Pipeline.
2. A detailed **Exploitation Agreement** (that will integrate the Consortium Agreement) will be defined among partners to establish clear commercial routes with which project results and know-how will be exploited in the defined market, providing commercial opportunities for all involved parties.
3. An **Exploitation Workshop** is to be held in the advanced phase of the project. This will enable all partners to share the exploitation strategy and vision, as well as discuss and agree on it.
4. Involvement of relevant **external stakeholders** in the exploitation planning through tailored activities such as expert interviews, focus groups, and workshops will be ensured.

The consortium will pursue the following exploitation pathways:

- **Industrial Uptake:** Several partners (e.g. ANSPs, ATM Industry) intend to bring results into operational contexts or product portfolios post-project.
- **Further R&I:** Raising the maturity of results in follow-up SESAR projects or Digital Sky Demonstrators.

- Policy and Regulation: Outputs will be shared with EASA, ECTL NM, and EC bodies.
- Standardisation and Interoperability: Engagement with standardisation bodies (e.g. EUROCAE, ICAO Panels) to contribute to future standards, attacking barrier 3-2.

At this stage, we have gathered a preliminary list of Key Exploitable Results in Table 7.

| KER ID | Title                                                                              | Type                 | Soluti<br>on(s)  | TRL at<br>Project<br>End | Gap Addressed                                                                  | Intended<br>Exploitation                                                              |
|--------|------------------------------------------------------------------------------------|----------------------|------------------|--------------------------|--------------------------------------------------------------------------------|---------------------------------------------------------------------------------------|
| KER1   | Dynamic Calibration of Airport Capacity assistant                                  | Software             | 1                | TRL4                     | Overestimation of airport capacity buffers – capacity scaling                  | Early prototype for TRL6 validation and exploitation to ECAC airports                 |
| KER2   | Methodology for Airport Capacity Calibration                                       | Methodolo<br>gy      | 1                | TRL4                     | Overestimation of airport capacity buffers – capacity scaling                  | Methodology for TRL6 validation and future airport applications                       |
| KER3   | eORD ATCO tool for aircraft spacing                                                | Software             | 2                | TRL6                     | Runway throughput                                                              | Prototype for exploitation                                                            |
| KER4   | Integrated Runway Sequencer                                                        | Software             | 2                | TRL6                     | Runway throughput                                                              | Prototype for exploitation                                                            |
| KER5   | Calculation logics for enhanced Brake-to-Vacate                                    | Algorithm            | 2                | TRL6                     | Runway throughput - ROT                                                        | Basis for future developments                                                         |
| KER6   | Digital Controller for autonomous ground and apron traffic management              | Software             | 3                | TRL6                     | Level 4 Automation                                                             | Prototype for HITL validation at the DLR tower simulator in Braunschweig              |
| KER7   | Speech Recognition for ground operations in Integrated Controller Working Position | Software             | 3                | TRL6                     | Machine to Machine                                                             | Prototype for TRL6 validation at Fraport Airport                                      |
| KER8   | Dual Communication – Digital Messaging (ICWP and AMM)                              | Software             | 3                | TRL6                     | Machine to Machine                                                             | Prototype for TRL6 validation at Fraport Airport                                      |
| KER9   | Dual Communication – Voice Generation                                              | Software             | 3                | TRL6                     | Machine to Machine                                                             | Prototype for validation in DLR cockpit simulator                                     |
| KER10  | Enhanced surveillance via camera streams and speech recognition                    | Software             | 3                | TRL6                     | Enhanced Surveillance                                                          | Prototype for TRL6 validation at Munich Airport                                       |
| KER11  | Prediction and optimization in adverse weather                                     | Software             | 4                | TRL6                     | Improved spacing in harsh and icy weather conditions                           | Prototype for surface management                                                      |
| KER12  | Architecture for secure exchange of data                                           | Policy/fram<br>ework | Trans-<br>versal | N/A                      | Securing interoperability                                                      | Design basis for future airport platforms                                             |
| KER13  | Service delivery model                                                             | Policy/fram<br>ework | Trans-<br>versal | N/A                      | Lack of service orientated architecture, gaps in standardization of interfaces | List of services for future tower applications: taxonomy map and technical interfaces |

Table 7 Preliminary list of Key Exploitable Results



At this stage, the PARADISE partners have identified preliminary exploitation plans, which will warrant the impact:

| PARTNER       | EXPLOITATION PLAN                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |
|---------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| ADBSG         | <p><b>Result:</b> Successful validation of dual communication via voice and digital messages</p> <p><b>Plan:</b> Introduce the learnings and outcomes of the project in the Tower ATM platform and include speech recognition and digital communication with cockpit crew and vehicle drivers in ATM portfolio</p> <p><b>When:</b> Potential partners approached during project or after successful project completion (2028).</p>                                                                                                                                                                |
| ADR           | <p><b>Result:</b> New KPIs to measure the performance of the airport achieving the demand by an optimizes use of the capacity. The KPIs will use data provided by MLAT and e-AOP that allow the daily analysis of the root causes in case of performance degradation or over-performance to define best practises. <b>Plan:</b> Sharing data from various airport systems with ENAV and ECTL to define unique KPIs to measure airport performance.</p> <p><b>When:</b> After the completion of the validation of the project foreseen within 2029.</p>                                            |
| AENA          | <p><b>Result:</b> Enhancement of dynamic airport capacity calculations in multiple airports through the use of the new KPIs and functionalities developed for the prototype and validated in the exercise, considering all analysed and validated criteria affecting resource allocation.</p> <p><b>Plan:</b> Applying criteria from various airport configurations to ensure broad applicability across the Aena network.</p> <p><b>When:</b> After validation completion.</p>                                                                                                                   |
| AVINOR        | <p><b>Result:</b> Implemented concept of optimizing handling of traffic in adverse weather and integrate into future TWR product. Connecting separate airside processes into one process, incl. de-icing.</p> <p><b>Plan:</b> Establish an implementation project based on the results of PARADISE</p> <p><b>When:</b> 2029 onwards</p>                                                                                                                                                                                                                                                           |
| ENAV / ENAIRE | <p><b>Result:</b> TRL4 Dynamic Calibration of Airport Capacity Assistant, including key influencing factors of airport capacity and user interface.</p> <p><b>Plan:</b> Support development of advanced user interfaces through operational experts' feedback; Validate Solution 1 and identifies target airports for early testing and adoptions for next steps</p> <p><b>When:</b> After successful validation</p>                                                                                                                                                                              |
| EML           | <p><b>Result:</b> Successful validation of speech recognition for ground operations.</p> <p><b>Plan:</b> Further enhance ATM/airport sector speech technology portfolios with Speech Recognition</p> <p><b>When:</b> Industrial partners/potential customers will be approached during project timeline.</p>                                                                                                                                                                                                                                                                                      |
| FRQ           | <p><b>Result:</b> Successful validation of integrated sensor, prediction, and automation for tower solutions</p> <p><b>Plan:</b> Incorporate findings and results in tower product suite; consider developed features and functions in their product roadmap; further industrialization will be driven by close collaboration with selected ANSPs; by a close collaboration with research partners (e.g. SINTEF) maturity of new technologies (e.g. LIDAR) can be evaluated for operational use in implementation projects</p> <p><b>When:</b> Following the successful validation in 2028/29</p> |
| LH/LHS/ ROS   | <p><b>Result:</b> Successful validation of digital message exchange between ATM solution and Airport Moving Map.</p> <p><b>Plan:</b> Including the digital messaging system in their Airport Moving Map solutions to connect to ground controller working position.</p> <p><b>When:</b> Following the successful validation in 2028/29.</p>                                                                                                                                                                                                                                                       |
| MUC/FRA       | <p><b>Result:</b> Successful validation of dual communication via voice and digital messages; successful validation of enhanced surveillance</p> <p><b>Plan:</b> Serve as testbeds for enhancing TRL after the project and further industrialization activities</p> <p><b>When:</b> Following the successful validation in 2028/29.</p>                                                                                                                                                                                                                                                           |
| SINTEF        | <p><b>Result:</b> Integrated Runway Sequencer [KER4]</p> <p><b>Plan:</b> To further develop eIRSM and eIRD towards operational use. The tool will help airports to comply with EU Regulation 2021/116 (CP1). SINTEF has already received funding to build the business case and explore potential paths for bringing the product into real-world use. The extensions developed in PARADISE will be essential for the product.</p> <p><b>When:</b> SINTEF will approach industrial partners already during the project.</p>                                                                        |
| SAAB/ SAABNL  | <p><b>Result:</b> Integrated Runway Sequencer in a A-SMGCS system</p> <p><b>Plan:</b> Integrate eIRSM and eIRD data in A-SMGCS system.</p> <p><b>When:</b> After successful validation and when potential users have shown interest in these features.</p>                                                                                                                                                                                                                                                                                                                                        |
| LFV/SWED      | <p><b>Result:</b> Integrated Runway Sequencer</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |

| PARTNER           | EXPLOITATION PLAN                                                                                                                                                                                                                                                                                                                                                                             |
|-------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|                   | <p><b>Plan:</b> To organise and conduct successful validations of eIRD which will show clear operational and capacity benefits for involved stakeholders, and which would allow for a rapid implementation in ESSA and other Swedish airports.</p> <p><b>When:</b> Following the successful validations, managerial decisions and procurement process will be prepared to implement eIRD.</p> |
| AIRBUS/<br>AIROPS | <p><b>Result:</b> Implement outcomes in Brake-to-Vacate function for existing and next generation aircraft</p> <p><b>Plan:</b> agree and establish specification for Brake-to-Vacate function improvements</p> <p><b>When:</b> After successful validation and management decisions</p>                                                                                                       |
| TERN              | <p><b>Result:</b> Successful validations of eORD over ORD benefits and UX aspects</p> <p><b>Plan:</b> Incorporate the eORD and other validated benefits in the production ready, operational portfolio</p> <p><b>When:</b> After successful validation</p>                                                                                                                                    |

Table 8 Preliminary exploitation plan

The consortium has also identified the following preliminary list of post-project actions:

- Prepare Deployment Viewpoints for SESAR Deployment Manager
- Submit matured results to SESAR Innovation Pipeline (Deployment Level)
- Seek additional funding to support pre-operational rollout

### 2.3.5 Strategy for the Management of Intellectual Property

The consortium is fully committed to the protection, management, sharing, and exploitation of the intellectual property (IP) generated throughout the PARADISE project. This strategy aims to ensure the widest possible outreach, stakeholder engagement, scientific and societal impact, and long-term benefit. The intellectual property management framework will be outlined in the Consortium Agreement (CA), to be signed by all partners prior to the execution of the Grant Agreement. The CA will be based on the widely used and well-established DESCAs template, with the necessary project-specific adjustments to support the above-described IP strategy. The CA will provide clear provisions for IP-related issues, ensuring they are addressed in line with fundamental ethical principles and standards recognized at the European level.

## 2.4 Summary

### KEY ELEMENT OF THE IMPACT SECTION

| SPECIFIC NEEDS                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          | EXPECTED RESULTS                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    | D & E & C MEASURES                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |
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| <p><b>Increase of capacity:</b> European airspace is experiencing increasing levels of congestion due to an increase in traffic levels. The ATM system has been struggling to keep up with the rising demand and is therefore at a crossroads. According to the European ATM Master plan, by 2045, all flights should therefore be optimised from gate to gate through ensuring continuous connectivity between air-ground and ground-ground operations.</p> <p><b>Mitigation of climate change:</b> ATM is impacted by and has an impact on climate change. There is therefore an urgent need to improve the environmental sustainability of aviation. All flights should therefore operate in a way that maximises, to the fullest extent, aircraft capabilities to reduce the overall climate impact of aviation and support operations in adverse weather</p> <p><b>Cost efficiency:</b> There is a need for airport platforms to become service-oriented by means of a service delivery model in which service providers can dynamically, efficiently and collaboratively scale airport capacity up or down in line with demand from airspace users.</p> <p><b>Security:</b> Geopolitical crises, security threats and natural events are all contributing to significant stress on aviation, and air traffic management is an essential safety- and security-critical infrastructure for Europe. The airport platform of the future should be ensuring all types of aircraft to fly as safely and as efficiently as possible.</p> | <p>The PARADISE project includes 4 innovative solutions that will be verified through 13 validation exercises to finalize the solutions within the overall SESAR architecture with complete assessment and final quantitative results. Together the solutions will address the specified need, by supporting all required capabilities of a future airport platform.</p> <p>The resulting PARADISE platform will contribute to achieve optimised trajectories from gate to gate by optimizing trajectories within the airport's TMA. It also increases the connectivity both between air-ground and between ground-ground operations.</p> <p>It will contribute to the environmental sustainability of aviation by supporting the usage of single-engine, engine-off, non-autonomously and autonomous towed taxiing. It will also reduce emissions from fossil fuel by optimizing the approach and departure routes and the holding time for both departures and arrivals.</p> <p>It will deliver a new service delivery model for the PARADISE platform, i.e., a list of services for future tower applications (service taxonomy map), corresponding technical interfaces and provide high level information on the status of the solutions with a prioritization on standardization topics.</p> <p>Finally, it will enable a secure exchange of data within the platform by means of a cyber security framework and architecture, i.e., to ensure that the four solutions are developed with the capability that "Endpoints, data connection and ecosystem are cybersecure".</p> | <p>The PARADISE project adopts an integrated Communication, Dissemination, and Exploitation (CDE) plan. <b>Communication</b> aims to raise awareness, inform stakeholders, and promote achievements via diverse channels. <b>Dissemination</b> focuses on making project results publicly available through scientific papers, reports, policy briefs, and workshops. <b>Exploitation</b> ensures long-term sustainability and uptake of solutions by industry, regulators, and end-users.</p> <p>CDE's five main <b>goals</b>: visibility, attracting end-users, sharing results, adoption of outputs, and raising awareness. Most partners contribute to CDE, prioritising <b>digital communication for sustainability</b>.</p> <p><b>Communication</b> channels include the SESAR 3 JU website, a project website, social media, blogs, press articles, and project videos. Quantitative targets are set, including 5,000 website visitors, 45 news items, 10 press articles, and 4 videos within the project duration.</p> <p><b>Dissemination</b> activities include peer-reviewed journals, conferences, congresses, workshops, and open days. At least 8 journal papers and 8 conference publications (open access) are planned. Demonstrations will showcase technical solutions and results to stakeholders.</p> <p><b>Exploitation</b> actions include a comprehensive plan, an exploitation agreement, and an exploitation workshop. External stakeholders will be engaged through interviews, focus groups, and workshops. Exploitation pathways target industrial uptake, further R&amp;I projects, policy/regulation input, and standardisation.</p> <p>Overall, CDE ensures knowledge transfer, stakeholder engagement, and sustainability of PARADISE outcomes.</p> |

| TARGET GROUPS                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               | OUTCOMES                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          | IMPACTS                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |
|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <p>Airports and ANSPs are the implementors and appliers of the solutions and will directly benefit from the availability of new technical solutions to improve airport operations.</p> <p>Airspace users will benefit from the more effective airport operations to lower the operational costs, the possibility to increase their income due to higher airport capacity and higher punctuality of flights.</p> <p>Institutions, decision makers and policymakers at European and National levels will adopt the results with the regulations and certifications required to implement solutions to improve the air transport system.</p> <p>Communities within research, education and innovation will help share the knowledge about the technical solutions by dissemination of publications through open-access channels.</p> <p>Standardization bodies will use the results to define new standards for future airport systems.</p> <p>Passengers will benefit from increased availability of a safer, more cost-effective and punctual air transport.</p> <p>Citizens and the general public will benefit from a more environmentally friendly and sustainable aviation industry.</p> | <p>We expect to see all the key exploitable results from the project to be implemented into industrial products and to be implemented at a minimum of 20 European airports 5 years after project completion.</p> <p>Industry and research communities will continue to evolve the solutions, e.g., until they provide full automation.</p> <p>To transition to confined automation of airport processes will require standards and regulations to be ready before deployment of the PARADISE solutions. Standardization bodies will therefore establish, or continue to evolve, the relevant standards needed to realize the services and interfaces of the new service deliver model.</p> <p>Hence, the competition within the aviation systems industry will increase as airports can procure their digital solutions from a mix of system providers. Airports can in this way more easily both tailor and optimize the output of their strategic outcomes.</p> | <p>We expect to demonstrate that the positive benefits from the PARADISE platform for airspace user and airports will greatly exceed the overall implementation costs. The deployment will therefore accelerate already during ATM Masterplan Deployment Phase C as the first airports put the platform into use, and further into Deployment Phase D as airports fully implement scalable systems and automation level 4.</p> <p>Passengers will, in the longer term (during Phase D), increase their trust in the aviation system with respect to safety and punctuality and enjoy more affordable ticket prices. Even with an increase in traffic, the high effectiveness and precision of airport operations provided by the PARADISE platform will both allow for more efficient flight routes as well as enabling novel, zero-emission and/or uncrewed aircraft technology to be deployed. The share of global pollution due to air transport will hence be reduced.</p> <p>In the end we expect the scientific, economic and societal effects of the project to greatly contribute to position European aviation industry as the most technologically advanced in the world and to make Europe the most efficient and environmentally friendly sky to fly in the world.</p> |

### 3. Quality and efficiency of the implementation

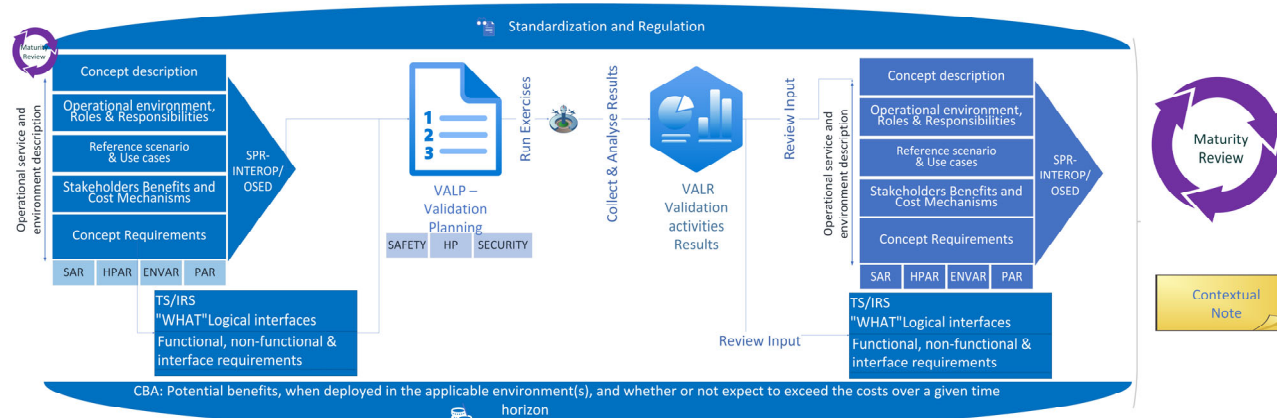


Figure 4 The PARADISE project methodology and standard dependencies within solutions.

The project management will ensure a consistent approach among the work packages and solutions and full compliance to DES SESAR 3 Joint Undertaking Project Handbook in the solution lifecycle and validation towards the achievement of the target levels of maturity and the relevant performance assessments. The process is described in Figure 4. The solutions will confirm their level of maturity considering DES maturity criteria at the beginning of the project. All the solutions will then focus on their operational and technical characteristics and will collect them in a SPR-INTEROP/OSED, (including an initial version of Safety, Human Performance, Environment and Performance reports for solution starting at TRL4 level of maturity) and TS/IRS, respectively. These will serve as input to the validation planning, to describe how and where the solutions will be validated and which objectives, success criteria and indicators will be used to prove the expected benefits. Validation exercises will then be run including enablers and requirements identified in the SPR-INTEROP/OSED and TS-IRS. Validation results will be collected in the validation report to feed a refinement of the operational and technical characteristics of the concepts respectively documented in the SPR-INTEROP/OSED (including Safety, Human Performance, Environment and Performance reports), and TS/IRS. The solutions will also document the cost benefit analysis and the standard and regulatory framework reports that are transversal activities that will be progressively matured based on the results gained in the solutions' lifecycle. The solutions' maturity will finally be reviewed according to the DES criteria considering all the conducted activities and gained results and main achievements will be documented in the contextual note for each solution.

#### 3.1 Work plan and resources

The work within the project is divided into work packages as major sub-division of the total work, with minimal interdependencies and to facilitate the lump-sum approach of the project handbook. However, a number of milestones are included to facilitate coordination and monitoring the progress of the overall project during the project's execution. Figure 5 shows a high-level work breakdown structure. In the vertical direction the project of divided into transversal threads and solutions, and solutions are again divided into solution threads. The horizontal direction indicates the timeline covering the two reporting periods. Hence, the work within each solution thread spans the duration of the project. The detailed planning of the project is shown as Gantt charts in Figure 6 to Figure 14.

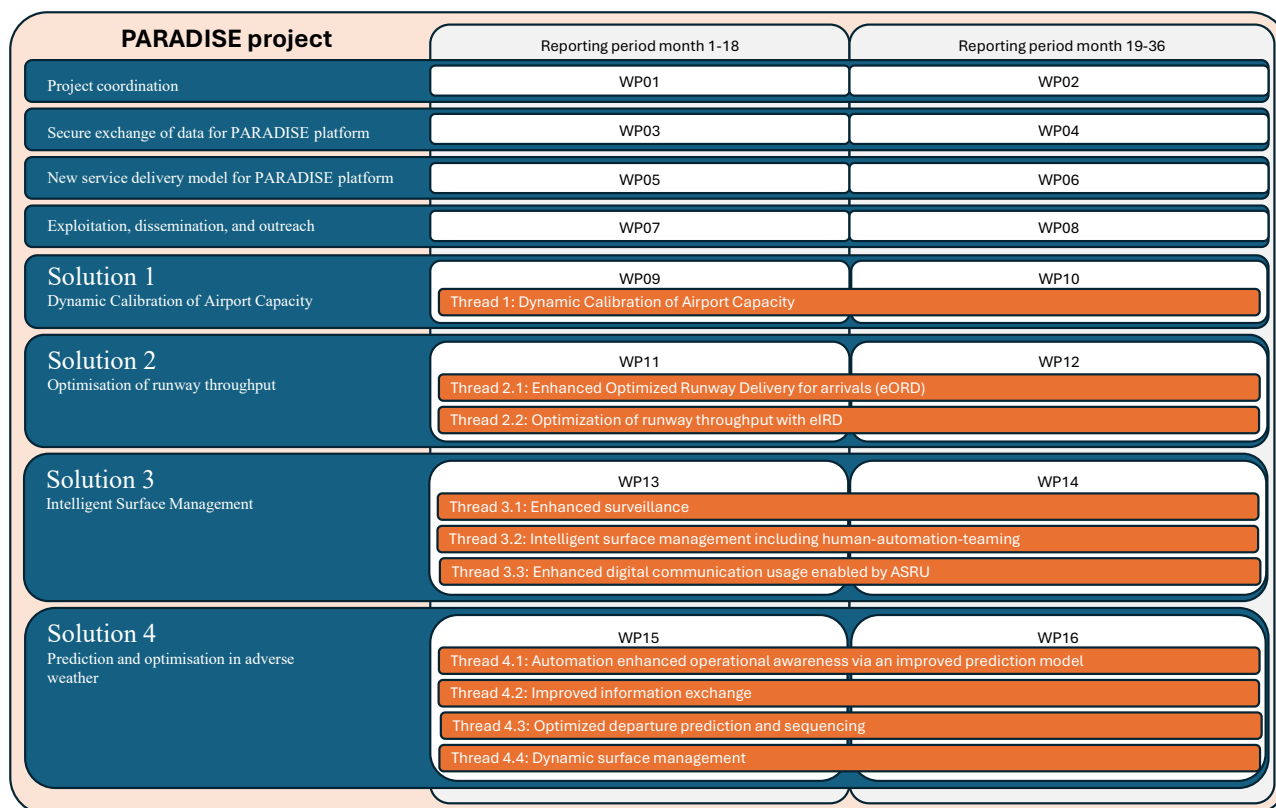


Figure 5 High-level project structure.



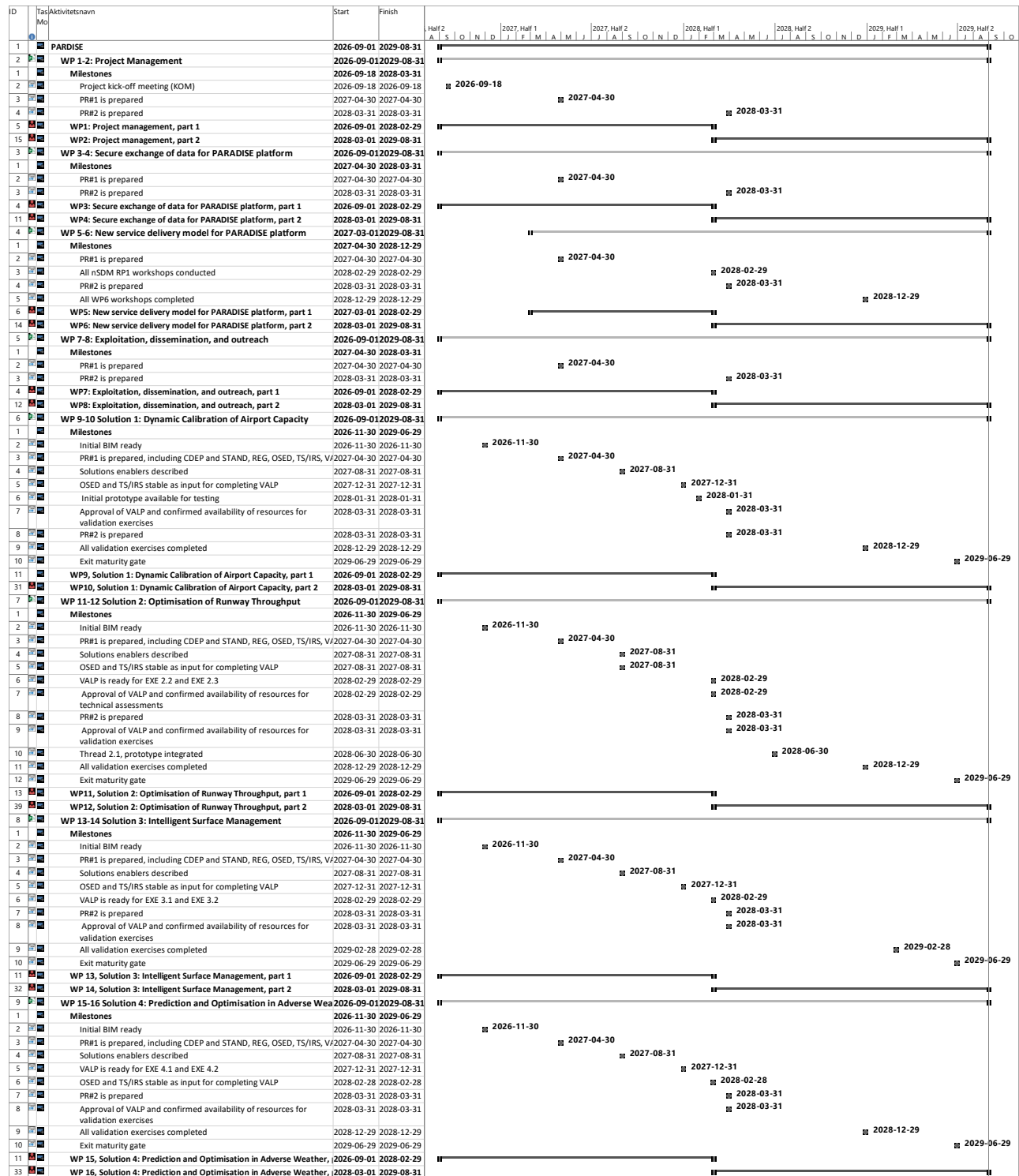


Figure 6 Gantt diagram: All work packages of the project with milestones

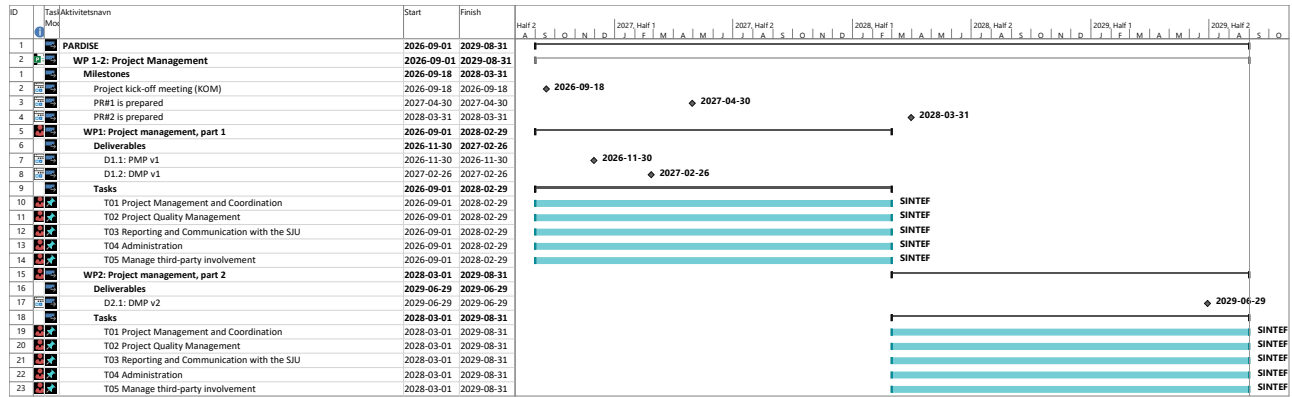


Figure 7 Gantt diagram: WP 1-2: Project coordination

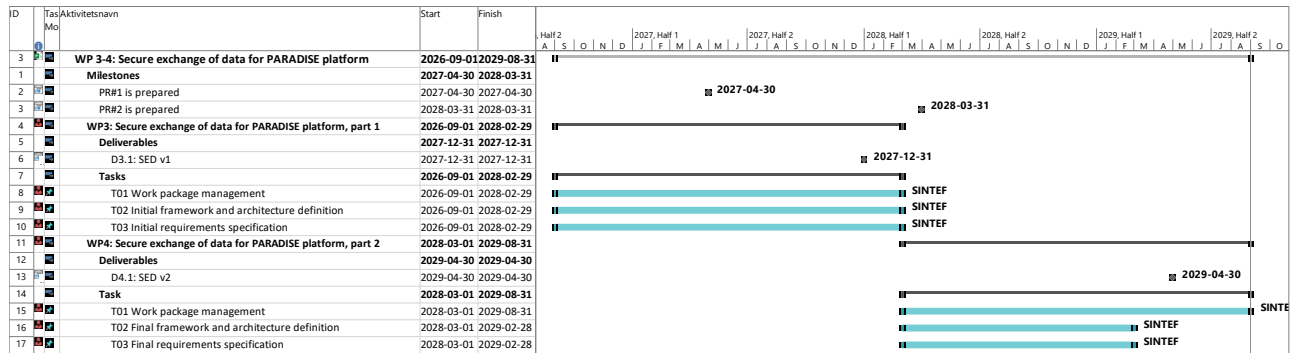


Figure 8 Gantt diagram: WP 3-4: Secure exchange of data for PARADISE platform

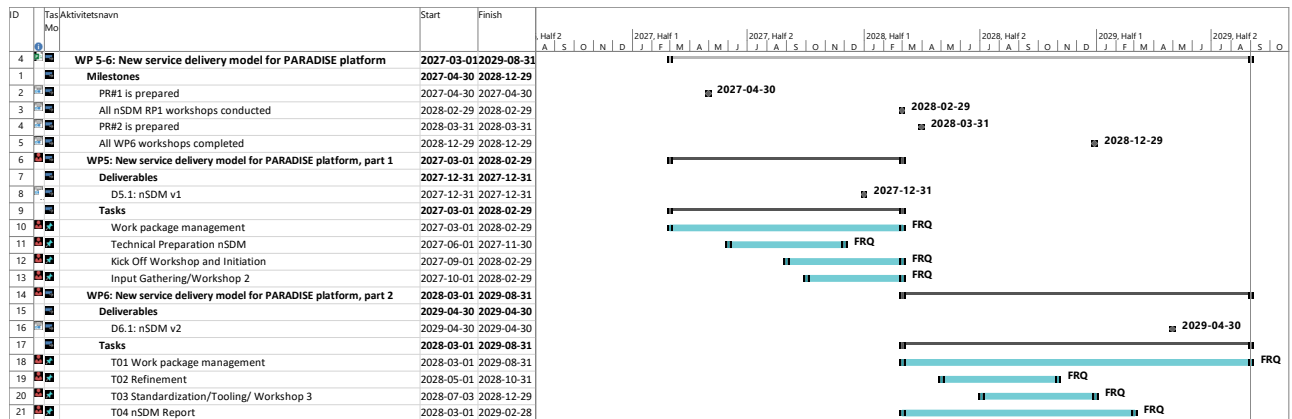


Figure 9 Gantt diagram: WP 5-6: New service delivery model for PARADISE platform



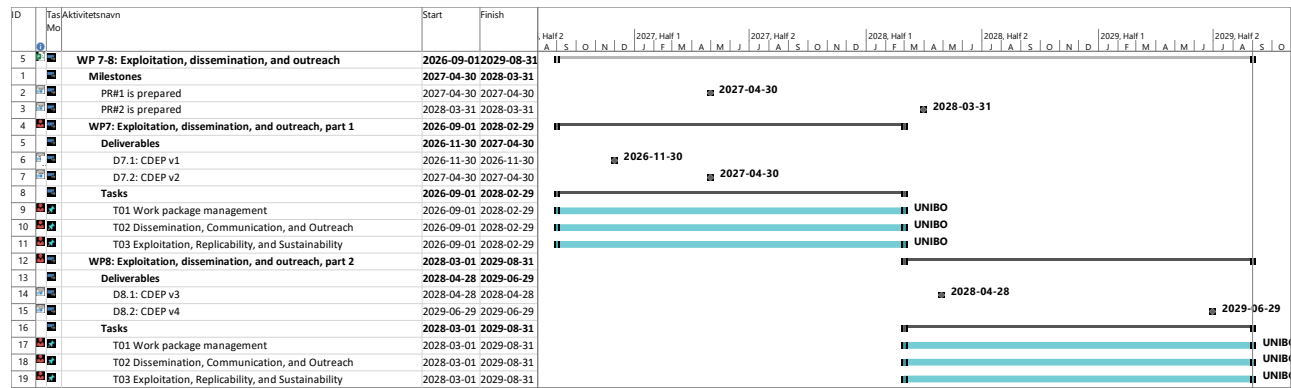


Figure 10 Gantt diagram: WP 7-8: Exploitation, dissemination, and outreach

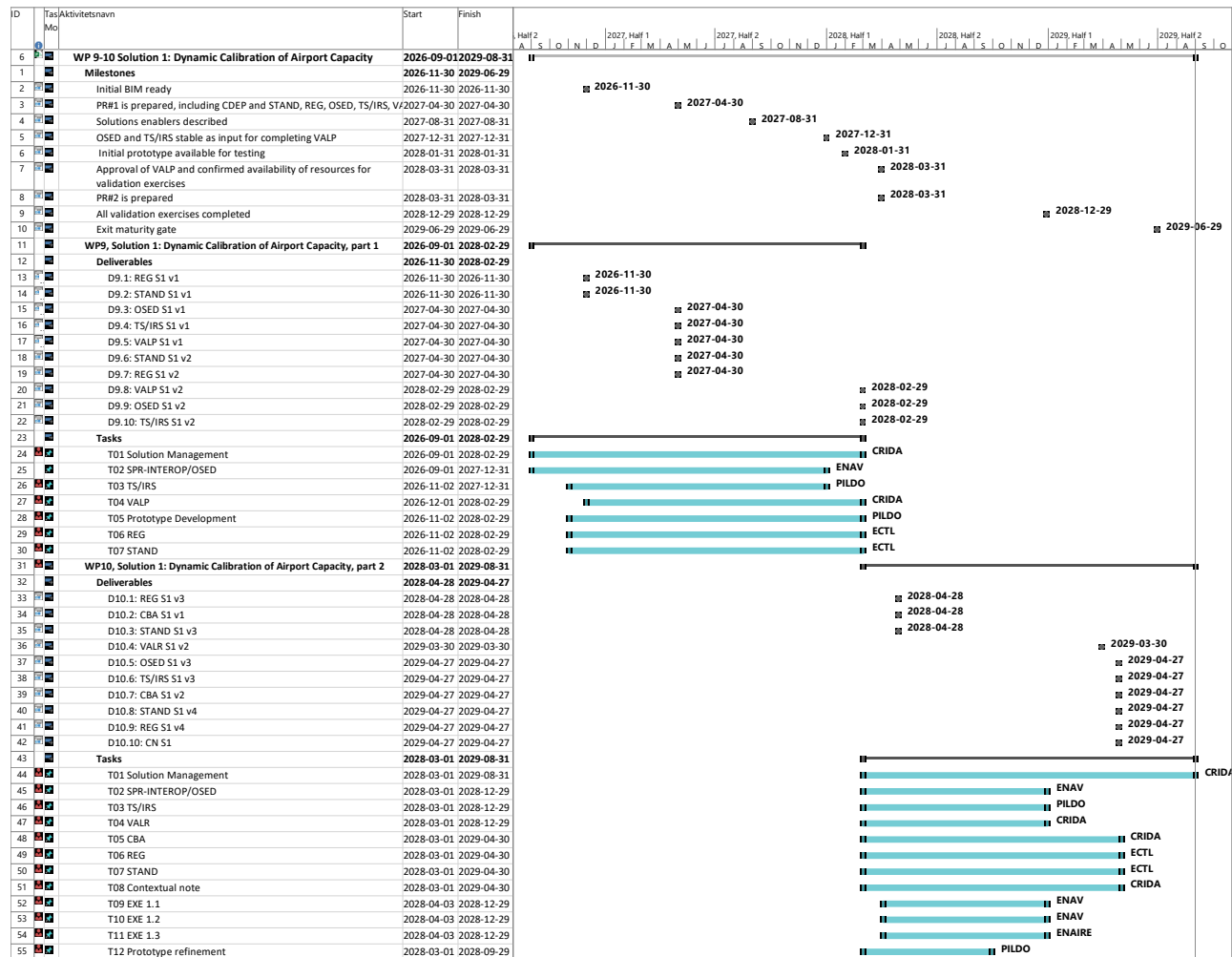


Figure 11 Gantt diagram: WP 9-10 Solution 1: Dynamic Calibration of Airport Capacity

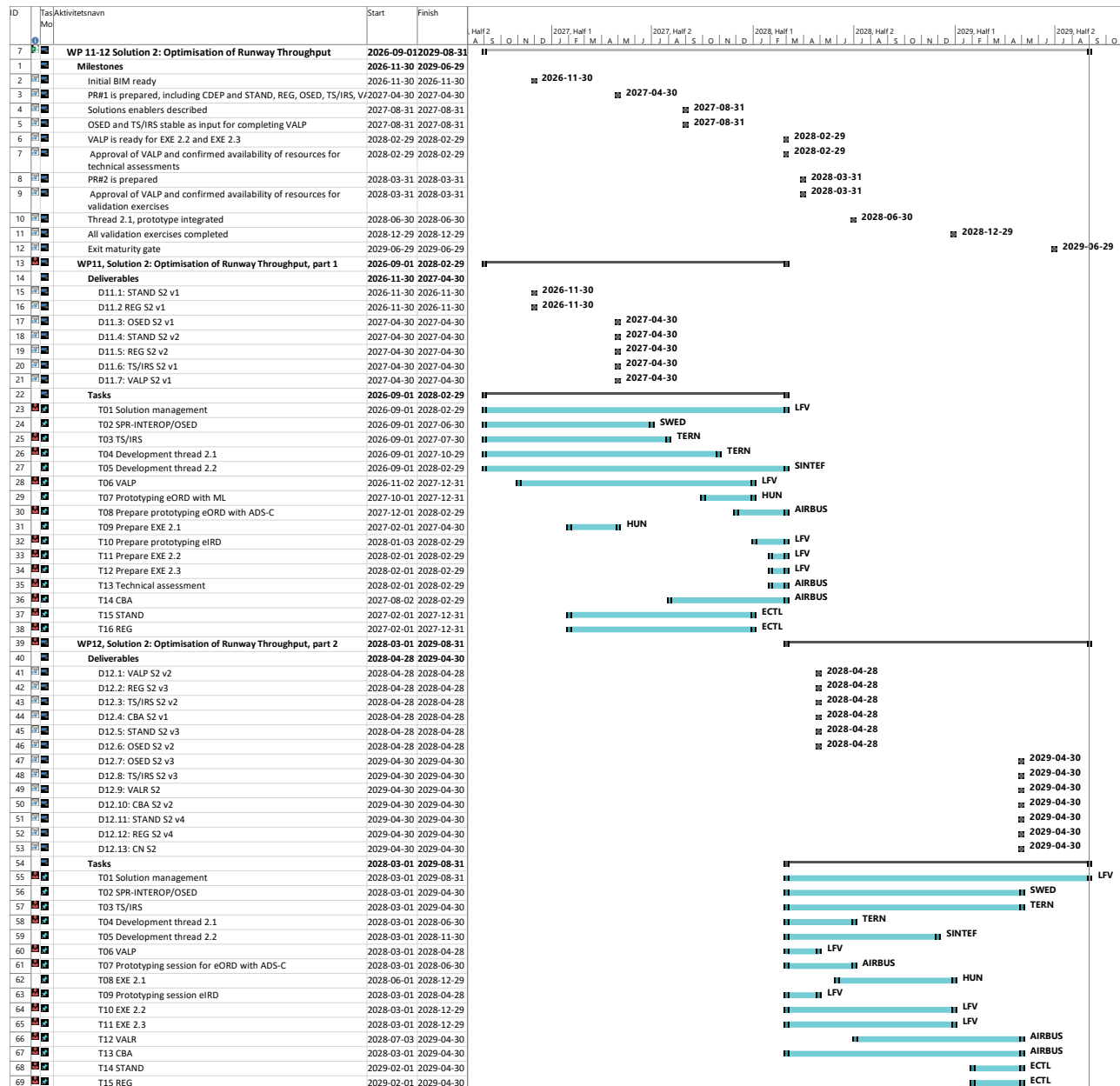


Figure 12 Gantt diagram: WP 11-12 Solution 2: Optimisation of Runway Throughput

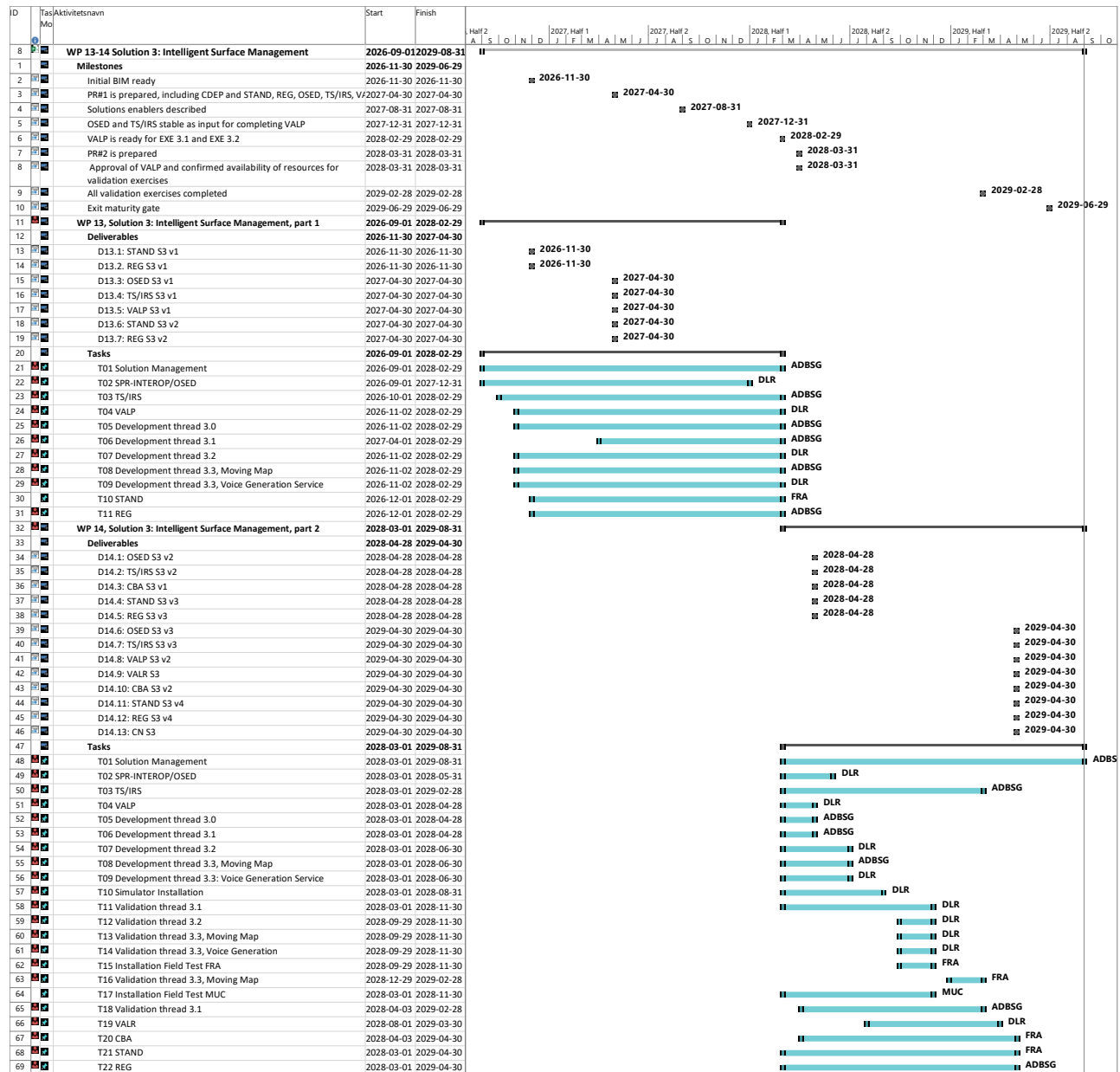


Figure 13 Gantt diagram: WP 13-14 Solution 3: Intelligent Surface Management

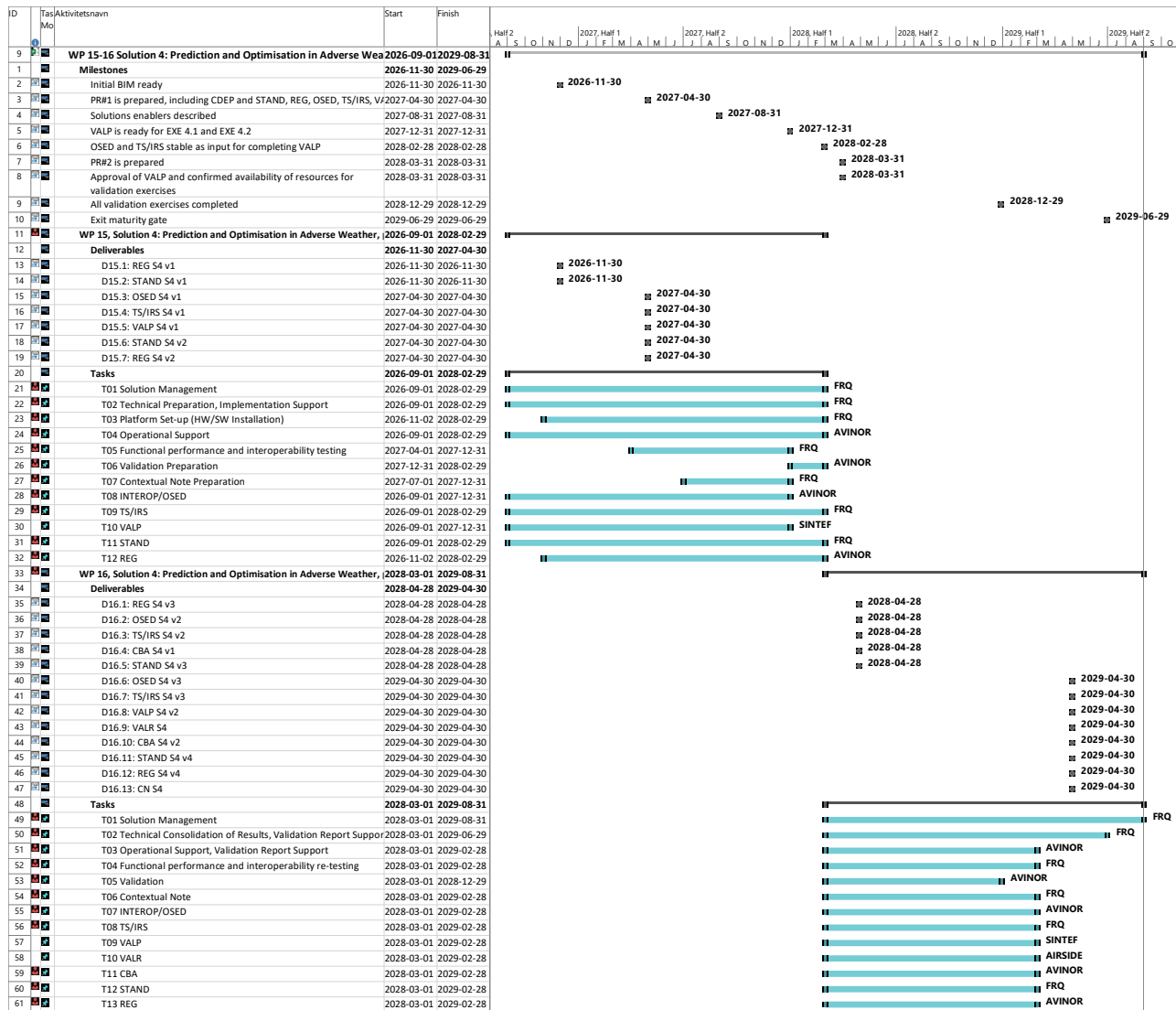


Figure 14 Gantt diagram: WP 15-16 Solution 4: Prediction and Optimisation in Adverse Weather

Table 3.1g: ‘Subcontracting costs’ items

| 3/FRA                 | Cost (€) | Description of tasks and justification                                                                                                                                                                                                                                                                                        |
|-----------------------|----------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Subcontracting</b> | 42 000   | Subcontracting for Apron Controllers in Frankfurt to support project validations.                                                                                                                                                                                                                                             |
| 4/AVINOR              | Cost (€) | Description of tasks and justification                                                                                                                                                                                                                                                                                        |
| <b>Subcontracting</b> | 25 000   | Airline contributing in WP15 OSD development and WP16 validation                                                                                                                                                                                                                                                              |
| 12/LFV                | Cost (€) | Description of tasks and justification                                                                                                                                                                                                                                                                                        |
| <b>Subcontracting</b> | 31 028   | Key Operational Expert with knowledge in ATM system design, knowledge in ATM rules & regulations, operational experience, and experience from previous similar SESAR projects. The subcontractor will contribute to WP11 and WP12 and will play a central role in the development phase and validation phase of the project   |
| 16/SEA                | Cost (€) | Description of tasks and justification                                                                                                                                                                                                                                                                                        |
| <b>Subcontracting</b> | 130 000  | Subcontracting will primarily focus on the development of a dedicated B2B channel for data provision, along with support for validation activities including preparation, execution, reporting, and KPI selection validation. The objective is to ensure that the prototype meets both functional and technical requirements. |

|                       |                 |                                                                                                                                                                                                                  |
|-----------------------|-----------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>17/ADR</b>         | <b>Cost (€)</b> | <b>Description of tasks and justification</b>                                                                                                                                                                    |
| <b>Subcontracting</b> | 150 000         | Subcontracting costs will be used during the execution phase for the development and implementation of data transmission platform, KPI analysis and validation.                                                  |
| <b>21/FRQ</b>         | <b>Cost (€)</b> | <b>Description of tasks and justification</b>                                                                                                                                                                    |
| <b>Subcontracting</b> | 25 000          | Subcontracting for a CPDLC simulator and gateway provider contributing to integration of CPDLC communication for WP15 and WP16.                                                                                  |
| <b>25/AENA</b>        | <b>Cost (€)</b> | <b>Description of tasks and justification</b>                                                                                                                                                                    |
| <b>Subcontracting</b> | 100 000         | Mainly prototype development but also supporting validation preparation, execution and reporting, validation of KPI selection and analysis, to ensure the prototype meets functional and technical requirements. |
| <b>28/MUC</b>         | <b>Cost (€)</b> | <b>Description of tasks and justification</b>                                                                                                                                                                    |
| <b>Subcontracting</b> | 15 000          | Integration Testing in the Apron Simulator and field tests of components                                                                                                                                         |

### 3.2 Capacity of participants and consortium as a whole

The Consortium involves key European stakeholders providing a wide range of expertise covering the whole value chain of EUROPEAN ATM. To ensure exploitation of the results, all solutions involve both industrial and end users. Most of the partners have contributed to SESAR since the early phases of the programme and are familiar with the solution lifecycle and programme framework. The participants were carefully selected according to the skills and experiences required to complement each other and accomplish the proposed work. The operational expertise, which is crucial for the conceptualisation and implementation phase of PARADISE, is found in the strong representation of end-user organisations in the consortium. The work is structured to ensure the transfer of knowledge and expertise between all participants. The partners will be provided access to the critical infrastructure needed to conduct the validation activities.

ECTL's contribution per Work Package in the project is as follows:

| WP7       | WP8       | WP9        | WP10       | WP11       | WP12       | WP13       | WP14       | Total        |
|-----------|-----------|------------|------------|------------|------------|------------|------------|--------------|
| 13.148,44 | 79.539,06 | 271.210,94 | 315.054,69 | 325.703,13 | 389.593,75 | 240.515,63 | 304.406,25 | 1.939.171,88 |

## 4. Ethics and self-assessment

### 4.1 Ethical dimension of the objectives, methodology and likely impact

The project has the objectives to maintain High Ethical Standards in compliance with EU and Member States regulation.

A preliminary evaluation of the ethics issues emerging from the proposal has been performed considering the scope of the project and the activities envisaged in the work program. The initial conclusion is that ethics issues could potentially arise related to human participants, personal data, non-EU countries, and development and integration of AI technologies. The analysis performed excluded that the proposal presents any serious or complex ethics issue for the reasons briefly detailed below.

No ethical issues have been identified for PARADISE project objectives, methodologies and impact. Main Ethics PARADISE relevance is the involvement of Humans in validation activities and development of tools including Artificial Intelligence, but the specificity of their application in PARADISE context does not constitute an ethic issue according to the conducted self-assessment. Human Validation activities including human in the loop (Air Traffic Controller Operators and Pilots) using Real Time Simulation, Live Trials and shadow mode technique to assess operational feasibility of the proposed solution will be carried out (WP03 to WP16) to achieve the proposed technology readiness level. Operational people involved are staff of the project participants and will be volunteer and informed about the objectives of the assessments. There is no anticipated ethics issue nor concern neither discriminatory practices or treatment for the involvement of the operational people from the different project participants. Personal data might be collected for the organization of those activities and for the collection of results that will be anonymously analysed and reported. The project will ensure to minimise as much as possible the

collection of the personal data and their management will follow the applicable regulation and will ensure due consideration in order to not generate ethically unwanted personal or social effects. The necessary ethics approvals and free and fully informed consent of the participants will be collected before the execution of each activity. Furthermore, the collected results will be anonymously assessed and reported. Under no circumstances these personal data will refer to racial or ethnic origin, political opinions, economic situation, religious or philosophical beliefs, trade-union membership, physical and mental health, sex life, or any other sensitive data.

Artificial Intelligence in PARADISE context will be applied to develop decision support tools (WP09 to WP16) to support Air Traffic Control Operators in the decision making process and in the interaction process but in no way there will be replacement of freedom of choice for Humans, thus it's not anticipated any ethical issues linked to the application of AI in the context of the PARADISE project. Operational people involved in the human-in-the-loop activities will be fully briefed about the capabilities of the systems using Artificial Intelligence functionalities, limitations and risks prior to the execution of the testing. All video data used in the project will be anonymized at source through automated face detection and blurring of personally identifiable information, processed with privacy-preserving techniques, and handled in strict compliance with GDPR and EU AI Act requirements for data protection.

## **4.2 Compliance with ethical principles and relevant legislations**

No ethical Issues have been identified. Signed consent forms will be collected before the involvement of Humans (staff of the project participants) in any testing activities informing about the objectives of the assessments and any safety relevant aspect, including consent for being filmed. The signed consent forms will be used in compliance with General Data Protection Regulation (GDPR). The participants will be fully briefed before the execution of any activities. The involved non-EU countries companies SINTEF AS, AVINOR AS, TERN SYSTEMS EHF, and AIRSIDE INNOVATION AS confirm that the activities that they will perform are conformant to what allowed in Member States. The personal data and the security protected data will under no circumstances be disclosed and will be used only for the purposes of the specific project organization, execution and assessment.

ANNEX 2

ESTIMATED BUDGET (LUMP SUM BREAKDOWN) FOR THE ACTION

|                  | Estimated EU contribution                                    |                                  |                                                           |                                                           |                                                              |                                                              |                                                       |                                                       |                        |                         |                                                                   |
|------------------|--------------------------------------------------------------|----------------------------------|-----------------------------------------------------------|-----------------------------------------------------------|--------------------------------------------------------------|--------------------------------------------------------------|-------------------------------------------------------|-------------------------------------------------------|------------------------|-------------------------|-------------------------------------------------------------------|
|                  | Estimated eligible lump sum contributions (per work package) |                                  |                                                           |                                                           |                                                              |                                                              |                                                       |                                                       |                        |                         | Maximum grant amount <sup>1</sup>                                 |
|                  | WP1 Project coordination, part 1                             | WP2 Project coordination, part 2 | WP3 Secure exchange of data for PARADISE platform, part 1 | WP4 Secure exchange of data for PARADISE platform, part 2 | WP5 New service delivery model for PARADISE platform, part 1 | WP6 New service delivery model for PARADISE platform, part 2 | WP7 Exploitation, dissemination, and outreach, part 1 | WP8 Exploitation, dissemination, and outreach, part 2 | WP9 Solution 1, part 1 | WP10 Solution 1, part 2 |                                                                   |
| Forms of funding | Lump sum contribution                                        | Lump sum contribution            | Lump sum contribution                                     | Lump sum contribution                                     | Lump sum contribution                                        | Lump sum contribution                                        | Lump sum contribution                                 | Lump sum contribution                                 | Lump sum contribution  | Lump sum contribution   |                                                                   |
|                  | a                                                            | b                                | c                                                         | d                                                         | e                                                            | f                                                            | g                                                     | h                                                     | i                      | j                       | q = a + b + c + d + e + f + g + h + i + j + k + l + m + n + o + p |
| 1 - SINTEF       | 215 128.32                                                   | 215 040.91                       | 72 556.20                                                 | 52 219.61                                                 | 10 168.30                                                    | 11 546.42                                                    | 36 039.26                                             | 47 585.69                                             | 20 336.59              | 11 546.42               | 1 672 442.75                                                      |
| 2 - ADBSG        | 0.00                                                         | 0.00                             | 6 081.25                                                  | 6 081.25                                                  | 8 498.44                                                     | 8 498.44                                                     | 14 402.50                                             | 17 027.50                                             | 0.00                   | 0.00                    | 828 858.64                                                        |
| 3 - FRA          | 0.00                                                         | 0.00                             | 0.00                                                      | 0.00                                                      | 9 312.19                                                     | 9 312.19                                                     | 3 583.13                                              | 3 583.13                                              | 0.00                   | 0.00                    | 237 893.27                                                        |
| 4 - AVINOR       | 0.00                                                         | 0.00                             | 0.00                                                      | 0.00                                                      | 0.00                                                         | 0.00                                                         | 4 502.31                                              | 4 502.31                                              | 0.00                   | 0.00                    | 382 856.60                                                        |
| 5 - DLR          | 0.00                                                         | 0.00                             | 4 006.73                                                  | 4 378.42                                                  | 0.00                                                         | 0.00                                                         | 25 212.01                                             | 0.00                                                  | 0.00                   | 0.00                    | 527 502.80                                                        |
| 6 - EML          | 0.00                                                         | 0.00                             | 0.00                                                      | 0.00                                                      | 0.00                                                         | 0.00                                                         | 0.00                                                  | 0.00                                                  | 0.00                   | 0.00                    | 212 392.69                                                        |
| 7 - ENAV         | 0.00                                                         | 0.00                             | 3 411.45                                                  | 0.00                                                      | 0.00                                                         | 0.00                                                         | 7 075.21                                              | 7 075.21                                              | 109 626.61             | 137 939.34              | 295 389.04                                                        |
| 8 - ECTL         | 0.00                                                         | 0.00                             | 0.00                                                      | 0.00                                                      | 0.00                                                         | 0.00                                                         | 0.00                                                  | 0.00                                                  | 0.00                   | 0.00                    | 0.00                                                              |
| 9 - SWED         | 0.00                                                         | 0.00                             | 0.00                                                      | 0.00                                                      | 0.00                                                         | 0.00                                                         | 691.25                                                | 1 382.50                                              | 0.00                   | 0.00                    | 114 831.50                                                        |
| 10 - AIRBUS      | 0.00                                                         | 0.00                             | 5 364.36                                                  | 5 364.36                                                  | 0.00                                                         | 0.00                                                         | 0.00                                                  | 0.00                                                  | 0.00                   | 0.00                    | 223 324.49                                                        |
| 11 - AIROPS      | 0.00                                                         | 0.00                             | 0.00                                                      | 0.00                                                      | 0.00                                                         | 0.00                                                         | 0.00                                                  | 0.00                                                  | 0.00                   | 0.00                    | 330 322.14                                                        |
| 12 - LFV         | 0.00                                                         | 0.00                             | 3 738.88                                                  | 3 738.88                                                  | 11 216.63                                                    | 19 091.63                                                    | 7 477.75                                              | 15 225.88                                             | 0.00                   | 0.00                    | 508 233.63                                                        |
| 13 - SAAB        | 0.00                                                         | 0.00                             | 0.00                                                      | 0.00                                                      | 0.00                                                         | 0.00                                                         | 0.00                                                  | 0.00                                                  | 0.00                   | 0.00                    | 85 906.28                                                         |
| 13.1 - SAABNL    | 0.00                                                         | 0.00                             | 0.00                                                      | 0.00                                                      | 0.00                                                         | 0.00                                                         | 0.00                                                  | 0.00                                                  | 0.00                   | 0.00                    | 343 625.09                                                        |
| 14 - ENAIRE      | 0.00                                                         | 0.00                             | 0.00                                                      | 0.00                                                      | 0.00                                                         | 0.00                                                         | 0.00                                                  | 0.00                                                  | 25 287.50              | 35 087.50               | 60 375.00                                                         |
| 14.1 - CRIDA     | 0.00                                                         | 0.00                             | 16 625.00                                                 | 0.00                                                      | 5 031.25                                                     | 5 031.25                                                     | 8 312.50                                              | 8 312.50                                              | 220 062.50             | 123 593.75              | 386 968.75                                                        |
| 15 - PRG         | 0.00                                                         | 0.00                             | 0.00                                                      | 0.00                                                      | 0.00                                                         | 0.00                                                         | 0.00                                                  | 0.00                                                  | 64 946.88              | 41 540.63               | 106 487.51                                                        |
| 16 - SEA         | 0.00                                                         | 0.00                             | 0.00                                                      | 0.00                                                      | 0.00                                                         | 0.00                                                         | 0.00                                                  | 0.00                                                  | 127 677.27             | 108 540.47              | 236 217.74                                                        |
| 17 - ADR         | 0.00                                                         | 0.00                             | 0.00                                                      | 0.00                                                      | 0.00                                                         | 0.00                                                         | 0.00                                                  | 0.00                                                  | 181 387.50             | 58 073.75               | 239 461.25                                                        |
| 18 - ROS         | 0.00                                                         | 0.00                             | 0.00                                                      | 0.00                                                      | 0.00                                                         | 0.00                                                         | 0.00                                                  | 0.00                                                  | 0.00                   | 0.00                    | 162 931.61                                                        |
| 19 - PILDO       | 0.00                                                         | 0.00                             | 0.00                                                      | 0.00                                                      | 0.00                                                         | 0.00                                                         | 8 356.25                                              | 8 356.25                                              | 366 756.25             | 177 143.75              | 560 612.50                                                        |
| 20 - AIRSIDE     | 0.00                                                         | 0.00                             | 0.00                                                      | 0.00                                                      | 0.00                                                         | 0.00                                                         | 0.00                                                  | 0.00                                                  | 0.00                   | 0.00                    | 130 112.50                                                        |
| 21 - FRQ         | 0.00                                                         | 0.00                             | 18 677.48                                                 | 18 677.48                                                 | 130 853.51                                                   | 115 460.93                                                   | 16 158.31                                             | 10 140.96                                             | 0.00                   | 0.00                    | 1 090 096.35                                                      |
| 21.1 - FOR       | 0.00                                                         | 0.00                             | 0.00                                                      | 0.00                                                      | 0.00                                                         | 0.00                                                         | 0.00                                                  | 0.00                                                  | 0.00                   | 0.00                    | 410 000.00                                                        |
| 21.2 - FRO       | 0.00                                                         | 0.00                             | 0.00                                                      | 0.00                                                      | 0.00                                                         | 0.00                                                         | 0.00                                                  | 0.00                                                  | 0.00                   | 0.00                    | 295 000.00                                                        |
| 21.3 - ATR       | 0.00                                                         | 0.00                             | 0.00                                                      | 0.00                                                      | 0.00                                                         | 0.00                                                         | 0.00                                                  | 0.00                                                  | 0.00                   | 0.00                    | 215 000.00                                                        |
| 22 - HUN         | 0.00                                                         | 0.00                             | 0.00                                                      | 0.00                                                      | 0.00                                                         | 0.00                                                         | 0.00                                                  | 0.00                                                  | 0.00                   | 0.00                    | 56 235.38                                                         |
| 23 - LH          | 0.00                                                         | 0.00                             | 0.00                                                      | 0.00                                                      | 0.00                                                         | 0.00                                                         | 0.00                                                  | 0.00                                                  | 0.00                   | 0.00                    | 102 036.20                                                        |
| 24 - LHS         | 0.00                                                         | 0.00                             | 6 040.13                                                  | 6 040.13                                                  | 0.00                                                         | 0.00                                                         | 0.00                                                  | 0.00                                                  | 0.00                   | 0.00                    | 431 016.79                                                        |
| 25 - AENA        | 0.00                                                         | 0.00                             | 0.00                                                      | 0.00                                                      | 0.00                                                         | 0.00                                                         | 0.00                                                  | 0.00                                                  | 110 268.38             | 40 771.94               | 151 040.32                                                        |
| 26 - UNIBO       | 0.00                                                         | 0.00                             | 0.00                                                      | 0.00                                                      | 0.00                                                         | 0.00                                                         | 92 222.81                                             | 96 597.81                                             | 0.00                   | 0.00                    | 188 820.62                                                        |
| 27 - DBL         | 0.00                                                         | 0.00                             | 0.00                                                      | 0.00                                                      | 0.00                                                         | 0.00                                                         | 0.00                                                  | 0.00                                                  | 105 262.50             | 94 937.50               | 307 387.50                                                        |
| 28 - MUC         | 0.00                                                         | 0.00                             | 0.00                                                      | 0.00                                                      | 0.00                                                         | 0.00                                                         | 0.00                                                  | 0.00                                                  | 0.00                   | 0.00                    | 247 607.50                                                        |
| 29 - CIMA        | 0.00                                                         | 0.00                             | 0.00                                                      | 0.00                                                      | 0.00                                                         | 0.00                                                         | 4 410.00                                              | 4 410.00                                              | 62 751.50              | 65 814.00               | 137 385.50                                                        |
| 30 - TERN        | 0.00                                                         | 0.00                             | 4 475.19                                                  | 4 475.19                                                  | 0.00                                                         | 0.00                                                         | 11 123.00                                             | 11 123.00                                             | 0.00                   | 0.00                    | 433 735.76                                                        |

|                  | Estimated EU contribution                                    |                                  |                                                           |                                                           |                                                              |                                                              |                                                       |                                                       |                        |                         |                                                                   |
|------------------|--------------------------------------------------------------|----------------------------------|-----------------------------------------------------------|-----------------------------------------------------------|--------------------------------------------------------------|--------------------------------------------------------------|-------------------------------------------------------|-------------------------------------------------------|------------------------|-------------------------|-------------------------------------------------------------------|
|                  | Estimated eligible lump sum contributions (per work package) |                                  |                                                           |                                                           |                                                              |                                                              |                                                       |                                                       |                        |                         | Maximum grant amount <sup>1</sup>                                 |
|                  | WP1 Project coordination, part 1                             | WP2 Project coordination, part 2 | WP3 Secure exchange of data for PARADISE platform, part 1 | WP4 Secure exchange of data for PARADISE platform, part 2 | WP5 New service delivery model for PARADISE platform, part 1 | WP6 New service delivery model for PARADISE platform, part 2 | WP7 Exploitation, dissemination, and outreach, part 1 | WP8 Exploitation, dissemination, and outreach, part 2 | WP9 Solution 1, part 1 | WP10 Solution 1, part 2 |                                                                   |
|                  | Lump sum contribution                                        | Lump sum contribution            | Lump sum contribution                                     | Lump sum contribution                                     | Lump sum contribution                                        | Lump sum contribution                                        | Lump sum contribution                                 | Lump sum contribution                                 | Lump sum contribution  | Lump sum contribution   |                                                                   |
| Forms of funding | a                                                            | b                                | c                                                         | d                                                         | e                                                            | f                                                            | g                                                     | h                                                     | i                      | j                       | q = a + b + c + d + e + f + g + h + i + j + k + l + m + n + o + p |
| 30.1 - TERN-H    | 0.00                                                         | 0.00                             | 0.00                                                      | 0.00                                                      | 0.00                                                         | 0.00                                                         | 2 100.00                                              | 3 517.50                                              | 0.00                   | 0.00                    | 235 305.00                                                        |
| 31 - ANS CR      | 0.00                                                         | 0.00                             | 0.00                                                      | 0.00                                                      | 0.00                                                         | 0.00                                                         | 0.00                                                  | 0.00                                                  | 26 250.00              | 26 250.00               | 52 500.00                                                         |
| Σ consortium     | 215 128.32                                                   | 215 040.91                       | 140 976.67                                                | 100 975.32                                                | 175 080.32                                                   | 168 940.86                                                   | 241 666.29                                            | 238 840.24                                            | 1 420 613.48           | 921 239.05              | 11 999 912.70                                                     |



| Forms of funding | Estimated EU contribution                                    |                         |                         |                         |                         |                         |                                                                      |
|------------------|--------------------------------------------------------------|-------------------------|-------------------------|-------------------------|-------------------------|-------------------------|----------------------------------------------------------------------|
|                  | Estimated eligible lump sum contributions (per work package) |                         |                         |                         |                         |                         | Maximum grant amount <sup>1</sup>                                    |
|                  | WP11 Solution 2, part 1                                      | WP12 Solution 2, part 2 | WP13 Solution 3, part 1 | WP14 Solution 3, part 2 | WP15 Solution 4, part 1 | WP16 Solution 4, part 2 |                                                                      |
|                  | Lump sum contribution                                        | Lump sum contribution   | Lump sum contribution   | Lump sum contribution   | Lump sum contribution   | Lump sum contribution   |                                                                      |
|                  | k                                                            | l                       | m                       | n                       | o                       | p                       | q = a + b + c + d + e + f + g +<br>h + i + j + k + l + m + n + o + p |
| 1 - SINTEF       | 224 988.70                                                   | 208 801.86              | 20 336.59               | 11 546.42               | 292 598.03              | 222 003.43              | 1 672 442.75                                                         |
| 2 - ADBSG        | 0.00                                                         | 0.00                    | 424 213.13              | 344 056.13              | 0.00                    | 0.00                    | 828 858.64                                                           |
| 3 - FRA          | 0.00                                                         | 0.00                    | 108 787.00              | 103 315.63              | 0.00                    | 0.00                    | 237 893.27                                                           |
| 4 - AVINOR       | 0.00                                                         | 0.00                    | 0.00                    | 0.00                    | 203 602.35              | 170 249.63              | 382 856.60                                                           |
| 5 - DLR          | 0.00                                                         | 0.00                    | 186 047.51              | 307 858.13              | 0.00                    | 0.00                    | 527 502.80                                                           |
| 6 - EML          | 0.00                                                         | 0.00                    | 139 124.56              | 73 268.13               | 0.00                    | 0.00                    | 212 392.69                                                           |
| 7 - ENAV         | 10 054.42                                                    | 20 206.80               | 0.00                    | 0.00                    | 0.00                    | 0.00                    | 295 389.04                                                           |
| 8 - ECTL         | 0.00                                                         | 0.00                    | 0.00                    | 0.00                    | 0.00                    | 0.00                    | 0.00                                                                 |
| 9 - SWED         | 52 120.25                                                    | 60 637.50               | 0.00                    | 0.00                    | 0.00                    | 0.00                    | 114 831.50                                                           |
| 10 - AIRBUS      | 114 344.43                                                   | 98 251.34               | 0.00                    | 0.00                    | 0.00                    | 0.00                    | 223 324.49                                                           |
| 11 - AIROPS      | 178 552.50                                                   | 116 059.13              | 26 782.88               | 8 927.63                | 0.00                    | 0.00                    | 330 322.14                                                           |
| 12 - LFV         | 180 698.18                                                   | 267 045.80              | 0.00                    | 0.00                    | 0.00                    | 0.00                    | 508 233.63                                                           |
| 13 - SAAB        | 42 412.56                                                    | 43 493.72               | 0.00                    | 0.00                    | 0.00                    | 0.00                    | 85 906.28                                                            |
| 13.1 - SAABNL    | 169 650.25                                                   | 173 974.84              | 0.00                    | 0.00                    | 0.00                    | 0.00                    | 343 625.09                                                           |
| 14 - ENAIRE      | 0.00                                                         | 0.00                    | 0.00                    | 0.00                    | 0.00                    | 0.00                    | 60 375.00                                                            |
| 14.1 - CRIDA     | 0.00                                                         | 0.00                    | 0.00                    | 0.00                    | 0.00                    | 0.00                    | 386 968.75                                                           |
| 15 - PRG         | 0.00                                                         | 0.00                    | 0.00                    | 0.00                    | 0.00                    | 0.00                    | 106 487.51                                                           |
| 16 - SEA         | 0.00                                                         | 0.00                    | 0.00                    | 0.00                    | 0.00                    | 0.00                    | 236 217.74                                                           |
| 17 - ADR         | 0.00                                                         | 0.00                    | 0.00                    | 0.00                    | 0.00                    | 0.00                    | 239 461.25                                                           |
| 18 - ROS         | 0.00                                                         | 0.00                    | 66 536.18               | 96 395.43               | 0.00                    | 0.00                    | 162 931.61                                                           |
| 19 - PILDO       | 0.00                                                         | 0.00                    | 0.00                    | 0.00                    | 0.00                    | 0.00                    | 560 612.50                                                           |
| 20 - AIRSIDE     | 0.00                                                         | 0.00                    | 0.00                    | 0.00                    | 70 787.50               | 59 325.00               | 130 112.50                                                           |
| 21 - FRQ         | 0.00                                                         | 0.00                    | 0.00                    | 0.00                    | 399 806.51              | 380 321.17              | 1 090 096.35                                                         |
| 21.1 - FOR       | 0.00                                                         | 0.00                    | 0.00                    | 0.00                    | 211 277.52              | 198 722.48              | 410 000.00                                                           |
| 21.2 - FRO       | 0.00                                                         | 0.00                    | 0.00                    | 0.00                    | 158 513.59              | 136 486.41              | 295 000.00                                                           |
| 21.3 - ATR       | 0.00                                                         | 0.00                    | 0.00                    | 0.00                    | 96 559.49               | 118 440.51              | 215 000.00                                                           |
| 22 - HUN         | 28 117.69                                                    | 28 117.69               | 0.00                    | 0.00                    | 0.00                    | 0.00                    | 56 235.38                                                            |
| 23 - LH          | 0.00                                                         | 0.00                    | 49 268.10               | 52 768.10               | 0.00                    | 0.00                    | 102 036.20                                                           |
| 24 - LHS         | 0.00                                                         | 0.00                    | 205 240.18              | 213 696.35              | 0.00                    | 0.00                    | 431 016.79                                                           |
| 25 - AENA        | 0.00                                                         | 0.00                    | 0.00                    | 0.00                    | 0.00                    | 0.00                    | 151 040.32                                                           |
| 26 - UNIBO       | 0.00                                                         | 0.00                    | 0.00                    | 0.00                    | 0.00                    | 0.00                    | 188 820.62                                                           |
| 27 - DBL         | 34 300.00                                                    | 72 887.50               | 0.00                    | 0.00                    | 0.00                    | 0.00                    | 307 387.50                                                           |
| 28 - MUC         | 0.00                                                         | 0.00                    | 54 871.25               | 192 736.25              | 0.00                    | 0.00                    | 247 607.50                                                           |
| 29 - CIMA        | 0.00                                                         | 0.00                    | 0.00                    | 0.00                    | 0.00                    | 0.00                    | 137 385.50                                                           |
| 30 - TERN        | 219 229.94                                                   | 183 309.44              | 0.00                    | 0.00                    | 0.00                    | 0.00                    | 433 735.76                                                           |
| 30.1 - TERN-H    | 115 552.50                                                   | 114 135.00              | 0.00                    | 0.00                    | 0.00                    | 0.00                    | 235 305.00                                                           |
| 31 - ANS CR      | 0.00                                                         | 0.00                    | 0.00                    | 0.00                    | 0.00                    | 0.00                    | 52 500.00                                                            |
| Σ consortium     | 1 370 021.42                                                 | 1 386 920.62            | 1 281 207.38            | 1 404 568.20            | 1 433 144.99            | 1 285 548.63            | 11 999 912.70                                                        |

<sup>1</sup> The 'maximum grant amount' is the maximum grant amount fixed in the grant agreement (on the basis of the sum of the beneficiaries' lump sum shares for the work packages).

**ANNEX 3**

**ACCESSION FORM FOR BENEFICIARIES**

**ADB SAFEGATE Austria GmbH (ADBSG)**, PIC 884180221, established in Dietrich-Keller-Strabe 24/2, Raaba-Grambach 8074, Austria,

**hereby agrees**

**to become beneficiary**

**in Agreement No 101287174 — PARADISE** ('the Agreement')

**between SINTEF AS (SINTEF) and SESAR3 Joint Undertaking** ('granting authority'), under the powers delegated by the European Commission ('European Commission'),

**and mandates**

**the coordinator** to submit and sign in its name and on its behalf any **amendments** to the Agreement, in accordance with Article 39.

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 terms and conditions it sets out.

SIGNATURE

For the beneficiary

**ANNEX 3**

**ACCESSION FORM FOR BENEFICIARIES**

**FRAPORT AG FRANKFURT AIRPORT SERVICES WORLDWIDE (FRA)**, PIC 983036413,  
established in FLUGHAFEN GEB 178, FRANKFURT AM MAIN 60547, Germany,

**hereby agrees**

**to become beneficiary**

**in Agreement No 101287174 — PARADISE** ('the Agreement')

**between SINTEF AS (SINTEF) and SESAR3 Joint Undertaking** ('granting authority'), under the  
powers delegated by the European Commission ('European Commission'),

**and mandates**

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accordance with the Agreement, with all the obligations and terms and conditions it sets out.

SIGNATURE

For the beneficiary

**ANNEX 3**

**ACCESSION FORM FOR BENEFICIARIES**

**AVINOR AS (AVINOR)**, PIC 938275375, established in DRONNING EUFEMIAS GATE 6, OSLO 0191, Norway,

**hereby agrees**

**to become beneficiary**

**in Agreement No 101287174 — PARADISE** ('the Agreement')

**between SINTEF AS (SINTEF) and SESAR3 Joint Undertaking** ('granting authority'), under the powers delegated by the European Commission ('European Commission'),

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SIGNATURE

For the beneficiary

**ANNEX 3**

**ACCESSION FORM FOR BENEFICIARIES**

**DEUTSCHES ZENTRUM FÜR LUFT - UND RAUMFAHRT EV (DLR)**, PIC 999981731,  
established in LINDER HOHE, KOLN 51147, Germany,

**hereby agrees**

**to become beneficiary**

**in Agreement No 101287174 — PARADISE** ('the Agreement')

**between SINTEF AS (SINTEF) and SESAR3 Joint Undertaking** ('granting authority'), under the  
powers delegated by the European Commission ('European Commission'),

**and mandates**

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in accordance with Article 39.

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accordance with the Agreement, with all the obligations and terms and conditions it sets out.

SIGNATURE

For the beneficiary

**ANNEX 3**

**ACCESSION FORM FOR BENEFICIARIES**

**EML SPEECH TECHNOLOGY GMBH (EML)**, PIC 999756788, established in Kriegsstrasse 100, Karlsruhe 76133, Germany,

**hereby agrees**

**to become beneficiary**

**in Agreement No 101287174 — PARADISE** ('the Agreement')

**between SINTEF AS (SINTEF) and SESAR3 Joint Undertaking** ('granting authority'), under the powers delegated by the European Commission ('European Commission'),

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SIGNATURE

For the beneficiary

**ANNEX 3**

**ACCESSION FORM FOR BENEFICIARIES**

**ENAV SPA (ENAV)**, PIC 998197513, established in VIA SALARIA 716, ROMA 00138, Italy,

**hereby agrees**

**to become beneficiary**

**in Agreement No 101287174 — PARADISE** ('the Agreement')

**between SINTEF AS (SINTEF) and SESAR3 Joint Undertaking** ('granting authority'), under the powers delegated by the European Commission ('European Commission'),

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SIGNATURE

For the beneficiary



**ANNEX 3**

**ACCESSION FORM FOR BENEFICIARIES**

**EUROCONTROL - EUROPEAN ORGANISATION FOR THE SAFETY OF AIR NAVIGATION (ECTL)**, PIC 999483733, established in Rue de la Fusée 96, BRUXELLES 1130, Belgium,

**hereby agrees**

**to become beneficiary**

**in Agreement No 101287174 — PARADISE** ('the Agreement')

**between SINTEF AS (SINTEF) and SESAR3 Joint Undertaking** ('granting authority'), under the powers delegated by the European Commission ('European Commission'),

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SIGNATURE

For the beneficiary

**ANNEX 3**

**ACCESSION FORM FOR BENEFICIARIES**

**SWEDAVIA AB (SWED)**, PIC 984282281, established in SWEDAVIA, STOCKHOLM ARLANDA 190 45, Sweden,

**hereby agrees**

**to become beneficiary**

**in Agreement No 101287174 — PARADISE** ('the Agreement')

**between SINTEF AS (SINTEF) and SESAR3 Joint Undertaking** ('granting authority'), under the powers delegated by the European Commission ('European Commission'),

**and mandates**

**the coordinator** to submit and sign in its name and on its behalf any **amendments** to the Agreement, in accordance with Article 39.

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SIGNATURE

For the beneficiary

**ANNEX 3**

**ACCESSION FORM FOR BENEFICIARIES**

**AIRBUS (AIRBUS)**, PIC 999963010, established in 2 ROND POINT EMILE DEWOITINE,  
BLAGNAC 31700, France,

**hereby agrees**

**to become beneficiary**

**in Agreement No 101287174 — PARADISE** ('the Agreement')

**between SINTEF AS (SINTEF) and SESAR3 Joint Undertaking** ('granting authority'), under the  
powers delegated by the European Commission ('European Commission'),

**and mandates**

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accordance with the Agreement, with all the obligations and terms and conditions it sets out.

SIGNATURE

For the beneficiary

**ANNEX 3**

**ACCESSION FORM FOR BENEFICIARIES**

**AIRBUS OPERATIONS SAS (AIROPS)**, PIC 991247948, established in ROUTE DE BAYONNE 316, TOULOUSE 31060, France,

**hereby agrees**

**to become beneficiary**

**in Agreement No 101287174 — PARADISE** ('the Agreement')

**between SINTEF AS (SINTEF) and SESAR3 Joint Undertaking** ('granting authority'), under the powers delegated by the European Commission ('European Commission'),

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SIGNATURE

For the beneficiary

**ANNEX 3**

**ACCESSION FORM FOR BENEFICIARIES**

**LUFTFARTSVERKET (LFV)**, PIC 942346077, established in HOSPITALSGATAN 30, NORRKOPING 602 27, Sweden,

**hereby agrees**

**to become beneficiary**

**in Agreement No 101287174 — PARADISE** ('the Agreement')

**between SINTEF AS (SINTEF) and SESAR3 Joint Undertaking** ('granting authority'), under the powers delegated by the European Commission ('European Commission'),

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SIGNATURE

For the beneficiary

**ANNEX 3**

**ACCESSION FORM FOR BENEFICIARIES**

**Saab Air Traffic Management AB (SAAB)**, PIC 868099076, established in c/o Saab AB, LINKOPING 581 88, Sweden,

**hereby agrees**

**to become beneficiary**

**in Agreement No 101287174 — PARADISE** ('the Agreement')

**between SINTEF AS (SINTEF) and SESAR3 Joint Undertaking** ('granting authority'), under the powers delegated by the European Commission ('European Commission'),

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SIGNATURE

For the beneficiary

**ANNEX 3**

**ACCESSION FORM FOR BENEFICIARIES**

**ENAIRE (ENAIRE)**, PIC 997701843, established in AVENIDA DE ARAGON S/N BLOQUE 330, PORTAL 2 PARQUE EMPRESARIAL LAS MERCEDES, MADRID 28022, Spain,

**hereby agrees**

**to become beneficiary**

**in Agreement No 101287174 — PARADISE** ('the Agreement')

**between SINTEF AS (SINTEF) and SESAR3 Joint Undertaking** ('granting authority'), under the powers delegated by the European Commission ('European Commission'),

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SIGNATURE

For the beneficiary

**ANNEX 3**

**ACCESSION FORM FOR BENEFICIARIES**

**LETISTE PRAHA AS (PRG)**, PIC 891456967, established in K LETISTI 6/1019, PRAHA 160 08, Czechia,

**hereby agrees**

**to become beneficiary**

**in Agreement No 101287174 — PARADISE** ('the Agreement')

**between SINTEF AS (SINTEF) and SESAR3 Joint Undertaking** ('granting authority'), under the powers delegated by the European Commission ('European Commission'),

**and mandates**

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SIGNATURE

For the beneficiary



**ANNEX 3**

**ACCESSION FORM FOR BENEFICIARIES**

**SOCIETA' PER AZIONI ESERCIZI AEROPORTUALI SEA (SEA)**, PIC 986590687,  
established in PRESSO AEROPORTO LINATE, SEGRATE MI 20054, Italy,

**hereby agrees**

**to become beneficiary**

**in Agreement No 101287174 — PARADISE** ('the Agreement')

**between SINTEF AS (SINTEF) and SESAR3 Joint Undertaking** ('granting authority'), under the  
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SIGNATURE

For the beneficiary

**ANNEX 3**

**ACCESSION FORM FOR BENEFICIARIES**

**AEROPORTI DI ROMA SPA (ADR)**, PIC 970508475, established in VIA PIER PAOLO RACCHETTI 1, FIUMICINO RM 00054, Italy,

**hereby agrees**

**to become beneficiary**

**in Agreement No 101287174 — PARADISE** ('the Agreement')

**between SINTEF AS (SINTEF) and SESAR3 Joint Undertaking** ('granting authority'), under the powers delegated by the European Commission ('European Commission'),

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SIGNATURE

For the beneficiary

**ANNEX 3**

**ACCESSION FORM FOR BENEFICIARIES**

**ROSENBAUER INTERNATIONAL AG (ROS)**, PIC 972434992, established in PASCHINGER STR 90, LEONDING 4060, Austria,

**hereby agrees**

**to become beneficiary**

**in Agreement No 101287174 — PARADISE** ('the Agreement')

**between SINTEF AS (SINTEF) and SESAR3 Joint Undertaking** ('granting authority'), under the powers delegated by the European Commission ('European Commission'),

**and mandates**

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SIGNATURE

For the beneficiary

**ANNEX 3**

**ACCESSION FORM FOR BENEFICIARIES**

**PILDO CONSULTING SL (PILDO)**, PIC 998162690, established in c/ Bac de Roda 120 (Local 2), BARCELONA 08019, Spain,

**hereby agrees**

**to become beneficiary**

**in Agreement No 101287174 — PARADISE** ('the Agreement')

**between SINTEF AS (SINTEF) and SESAR3 Joint Undertaking** ('granting authority'), under the powers delegated by the European Commission ('European Commission'),

**and mandates**

**the coordinator** to submit and sign in its name and on its behalf any **amendments** to the Agreement, in accordance with Article 39.

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 terms and conditions it sets out.

SIGNATURE

For the beneficiary

**ANNEX 3**

**ACCESSION FORM FOR BENEFICIARIES**

**AIRSIDE INNOVATION AS (AIRSIDE)**, PIC 877514769, established in BODO LUFTHAVN  
OLAV V GATE 60, BODO 8004, Norway,

**hereby agrees**

**to become beneficiary**

**in Agreement No 101287174 — PARADISE** ('the Agreement')

**between SINTEF AS (SINTEF) and SESAR3 Joint Undertaking** ('granting authority'), under the  
powers delegated by the European Commission ('European Commission'),

**and mandates**

**the coordinator** to submit and sign in its name and on its behalf any **amendments** to the Agreement,  
in accordance with Article 39.

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 terms and conditions it sets out.

SIGNATURE

For the beneficiary

**ANNEX 3**

**ACCESSION FORM FOR BENEFICIARIES**

**FREQUENTIS AG (FRQ)**, PIC 998307317, established in INNOVATIONSSTRASSE 1, WIEN 1100, Austria,

**hereby agrees**

**to become beneficiary**

**in Agreement No 101287174 — PARADISE** ('the Agreement')

**between SINTEF AS (SINTEF) and SESAR3 Joint Undertaking** ('granting authority'), under the powers delegated by the European Commission ('European Commission'),

**and mandates**

**the coordinator** to submit and sign in its name and on its behalf any **amendments** to the Agreement, in accordance with Article 39.

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 terms and conditions it sets out.

SIGNATURE

For the beneficiary

**ANNEX 3**

**ACCESSION FORM FOR BENEFICIARIES**

**HUNGAROCONTROL MAGYAR LEGIFORGALMISZOLGALAT ZARTKORUEN MUKODO RESZVENYTARSASAG (HUN)**, PIC 941767472, established in IGLO UTCA 33 35, BUDAPEST 1185, Hungary,

**hereby agrees**

**to become beneficiary**

**in Agreement No 101287174 — PARADISE** ('the Agreement')

**between SINTEF AS (SINTEF) and SESAR3 Joint Undertaking** ('granting authority'), under the powers delegated by the European Commission ('European Commission'),

**and mandates**

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SIGNATURE

For the beneficiary

**ANNEX 3**

**ACCESSION FORM FOR BENEFICIARIES**

**DEUTSCHE LUFTHANSA AKTIENGESELLSCHAFT (LH)**, PIC 999965532, established in  
VENLOER STRASSE 151-153, KOLN 50672, Germany,

**hereby agrees**

**to become beneficiary**

**in Agreement No 101287174 — PARADISE** ('the Agreement')

**between SINTEF AS (SINTEF) and SESAR3 Joint Undertaking** ('granting authority'), under the  
powers delegated by the European Commission ('European Commission'),

**and mandates**

**the coordinator** to submit and sign in its name and on its behalf any **amendments** to the Agreement,  
in accordance with Article 39.

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 terms and conditions it sets out.

SIGNATURE

For the beneficiary



**ANNEX 3**

**ACCESSION FORM FOR BENEFICIARIES**

**LUFTHANSA SYSTEMS GMBH & CO KG (LHS)**, PIC 927065376, established in AM MESSEPLATZ 1, RAUNHEIM 65479, Germany,

**hereby agrees**

**to become beneficiary**

**in Agreement No 101287174 — PARADISE** ('the Agreement')

**between SINTEF AS (SINTEF) and SESAR3 Joint Undertaking** ('granting authority'), under the powers delegated by the European Commission ('European Commission'),

**and mandates**

**the coordinator** to submit and sign in its name and on its behalf any **amendments** to the Agreement, in accordance with Article 39.

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SIGNATURE

For the beneficiary

**ANNEX 3**

**ACCESSION FORM FOR BENEFICIARIES**

**AENA S.M.E. SA (AENA)**, PIC 957048464, established in CALLE PEONIAS 12, MADRID 28042, Spain,

**hereby agrees**

**to become beneficiary**

**in Agreement No 101287174 — PARADISE** ('the Agreement')

**between SINTEF AS (SINTEF) and SESAR3 Joint Undertaking** ('granting authority'), under the powers delegated by the European Commission ('European Commission'),

**and mandates**

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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 terms and conditions it sets out.

SIGNATURE

For the beneficiary

**ANNEX 3**

**ACCESSION FORM FOR BENEFICIARIES**

**ALMA MATER STUDIORUM - UNIVERSITA DI BOLOGNA (UNIBO)**, PIC 999993953,  
established in VIA ZAMBONI 33, BOLOGNA 40126, Italy,

**hereby agrees**

**to become beneficiary**

**in Agreement No 101287174 — PARADISE** ('the Agreement')

**between SINTEF AS (SINTEF) and SESAR3 Joint Undertaking** ('granting authority'), under the  
powers delegated by the European Commission ('European Commission'),

**and mandates**

**the coordinator** to submit and sign in its name and on its behalf any **amendments** to the Agreement,  
in accordance with Article 39.

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 terms and conditions it sets out.

SIGNATURE

For the beneficiary

**ANNEX 3**

**ACCESSION FORM FOR BENEFICIARIES**

**DEEP BLUE SRL (DBL)**, PIC 998325941, established in VIA DANIELE MANIN 53, ROMA 00185, Italy,

**hereby agrees**

**to become beneficiary**

**in Agreement No 101287174 — PARADISE** ('the Agreement')

**between SINTEF AS (SINTEF) and SESAR3 Joint Undertaking** ('granting authority'), under the powers delegated by the European Commission ('European Commission'),

**and mandates**

**the coordinator** to submit and sign in its name and on its behalf any **amendments** to the Agreement, in accordance with Article 39.

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 terms and conditions it sets out.

SIGNATURE

For the beneficiary

**ANNEX 3**

**ACCESSION FORM FOR BENEFICIARIES**

**FLUGHAFEN MUNCHEN GMBH (MUC)**, PIC 944977784, established in NORDALLEE 25, MUNCHEN 85356, Germany,

**hereby agrees**

**to become beneficiary**

**in Agreement No 101287174 — PARADISE** ('the Agreement')

**between SINTEF AS (SINTEF) and SESAR3 Joint Undertaking** ('granting authority'), under the powers delegated by the European Commission ('European Commission'),

**and mandates**

**the coordinator** to submit and sign in its name and on its behalf any **amendments** to the Agreement, in accordance with Article 39.

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 terms and conditions it sets out.

SIGNATURE

For the beneficiary

**ANNEX 3**

**ACCESSION FORM FOR BENEFICIARIES**

**CENTRO INTERNAZIONALE IN MONITORAGGIO AMBIENTALE - FONDAZIONE CIMA (CIMA)**, PIC 997710476, established in VIA ARMANDO MAGLIOTTO 2 CAMPUS UNIVERSITARIO, SAVONA 17100, Italy,

**hereby agrees**

**to become beneficiary**

**in Agreement No 101287174 — PARADISE** ('the Agreement')

**between SINTEF AS (SINTEF) and SESAR3 Joint Undertaking** ('granting authority'), under the powers delegated by the European Commission ('European Commission'),

**and mandates**

**the coordinator** to submit and sign in its name and on its behalf any **amendments** to the Agreement, in accordance with Article 39.

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 terms and conditions it sets out.

SIGNATURE

For the beneficiary

### **ANNEX 3**

#### **ACCESSION FORM FOR BENEFICIARIES**

**TERN SYSTEMS EHF (TERN)**, PIC 887286355, established in HLIOASMARA 15, KOPAVOGUR 201, Iceland,

**hereby agrees**

**to become beneficiary**

**in Agreement No 101287174 — PARADISE** ('the Agreement')

**between SINTEF AS (SINTEF) and SESAR3 Joint Undertaking** ('granting authority'), under the powers delegated by the European Commission ('European Commission'),

**and mandates**

**the coordinator** to submit and sign in its name and on its behalf any **amendments** to the Agreement, in accordance with Article 39.

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 terms and conditions it sets out.

SIGNATURE

For the beneficiary

**ANNEX 3**

**ACCESSION FORM FOR BENEFICIARIES**

**RIZENI LETOVEHO PROVOZU CESKE REPUBLIKY STATNI PODNIK (ANS CR), PIC**  
954552363, established in JENEC NAVIGACNI 787, JENEC 252 61, Czechia,

**hereby agrees**

**to become beneficiary**

**in Agreement No 101287174 — PARADISE** ('the Agreement')

**between SINTEF AS (SINTEF) and SESAR3 Joint Undertaking** ('granting authority'), under the powers delegated by the European Commission ('European Commission'),

**and mandates**

**the coordinator** to submit and sign in its name and on its behalf any **amendments** to the Agreement, in accordance with Article 39.

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 terms and conditions it sets out.

SIGNATURE

For the beneficiary



ANNEX 4 XXX LUMP SUM MGA — MULTI & MONO

FINANCIAL STATEMENT FOR THE ACTION FOR REPORTING PERIOD [NUMBER]

|                                      | EU contribution                                    |                                                          |                                                          |                                                          |                                                          |                                                          |                                                          |                                                          |                                                          |                                                          |                                                          |                                       |
|--------------------------------------|----------------------------------------------------|----------------------------------------------------------|----------------------------------------------------------|----------------------------------------------------------|----------------------------------------------------------|----------------------------------------------------------|----------------------------------------------------------|----------------------------------------------------------|----------------------------------------------------------|----------------------------------------------------------|----------------------------------------------------------|---------------------------------------|
|                                      | Eligible lump sum contributions (per work package) |                                                          |                                                          |                                                          |                                                          |                                                          |                                                          |                                                          |                                                          |                                                          |                                                          | Requested EU contribution             |
|                                      | WP1 [name]                                         | WP2 [name]                                               | WP3 [name]                                               | WP4 [name]                                               | WP5 [name]                                               | WP6 [name]                                               | WP7 [name]                                               | WP8 [name]                                               | WP9 [name]                                               | WP10 [name]                                              | WP [XX]                                                  |                                       |
|                                      | Forms of funding                                   | [ Lump sum contribution// Financing not linked to costs] | [ Lump sum contribution// Financing not linked to costs] | [ Lump sum contribution// Financing not linked to costs] | [ Lump sum contribution// Financing not linked to costs] | [ Lump sum contribution// Financing not linked to costs] | [ Lump sum contribution// Financing not linked to costs] | [ Lump sum contribution// Financing not linked to costs] | [ Lump sum contribution// Financing not linked to costs] | [ Lump sum contribution// Financing not linked to costs] | [ Lump sum contribution// Financing not linked to costs] |                                       |
| Status of completion                 | COMPLETED                                          | COMPLETED                                                | COMPLETED                                                | COMPLETED                                                | COMPLETED                                                | COMPLETED                                                | COMPLETED                                                | PARTIALLY COMPLETED                                      | PARTIALLY COMPLETED                                      | COMPLETED                                                | NOT COMPLETED                                            |                                       |
|                                      | a                                                  | b                                                        | c                                                        | d                                                        | e                                                        | f                                                        | g                                                        | h                                                        | i                                                        | j                                                        | k                                                        | l = a + b+ c + d+ e+ f+ g+ h+ i+ j+ k |
| 1 – [short name beneficiary]         |                                                    |                                                          |                                                          |                                                          |                                                          |                                                          |                                                          |                                                          |                                                          |                                                          |                                                          |                                       |
| 1.1 – [short name affiliated entity] |                                                    |                                                          |                                                          |                                                          |                                                          |                                                          |                                                          |                                                          |                                                          |                                                          |                                                          |                                       |
| 2 – [short name beneficiary]         |                                                    |                                                          |                                                          |                                                          |                                                          |                                                          |                                                          |                                                          |                                                          |                                                          |                                                          |                                       |
| 2.1 – [short name affiliated entity] |                                                    |                                                          |                                                          |                                                          |                                                          |                                                          |                                                          |                                                          |                                                          |                                                          |                                                          |                                       |
|                                      |                                                    |                                                          |                                                          |                                                          |                                                          |                                                          |                                                          |                                                          |                                                          |                                                          |                                                          |                                       |
| X – [short name associated partner]  |                                                    |                                                          |                                                          |                                                          |                                                          |                                                          |                                                          |                                                          |                                                          |                                                          |                                                          |                                       |
| Total consortium                     |                                                    |                                                          |                                                          |                                                          |                                                          |                                                          |                                                          |                                                          |                                                          |                                                          |                                                          |                                       |

The consortium hereby confirms that:

The information provided is complete, reliable and true.

The lump sum contributions declared are eligible (in particular, the work packages have been completed and the work has been properly implemented and/or the results were achieved; see Article 6).

The proper implementation of the action/achievement of the results 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 19, 21 and 25).

## **ANNEX 5**

### **SPECIFIC RULES**

#### **CONFIDENTIALITY AND SECURITY (— ARTICLE 13)**

##### **Sensitive information with security recommendation**

Sensitive information with a security recommendation must comply with the additional requirements imposed by the granting authority.

Before starting the action tasks concerned, the beneficiaries must have obtained all approvals or other mandatory documents needed for implementing the task. The documents must be kept on file and be submitted upon request by the coordinator to the granting authority. If they are not in English, they must be submitted together with an English summary.

For requirements restricting disclosure or dissemination, the information must be handled in accordance with the recommendation and may be disclosed or disseminated only after written approval from the granting authority.

##### **EU classified information**

If EU classified information is used or generated by the action, it must be treated in accordance with the security classification guide (SCG) and security aspect letter (SAL) set out in Annex 1 and Decision 2015/444<sup>1</sup> and its implementing rules — until it is declassified.

Deliverables which contain EU classified information must be submitted according to special procedures agreed with the granting authority.

Action tasks involving EU classified information may be subcontracted only with prior explicit written approval from the granting authority and only to entities established in an EU Member State or in a non-EU country with a security of information agreement with the EU (or an administrative arrangement with the Commission).

EU classified information may not be disclosed to any third party (including participants involved in the action implementation) without prior explicit written approval from the granting authority.

#### **ETHICS (— ARTICLE 14)**

##### **Ethics and research integrity**

The beneficiaries must carry out the action in compliance with:

- ethical principles (including the highest standards of research integrity)

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<sup>1</sup> Commission Decision 2015/444/EC, Euratom of 13 March 2015 on the security rules for protecting EU classified information (OJ L 72, 17.3.2015, p. 53).

and

- applicable EU, international and national law, including the EU Charter of Fundamental Rights and the European Convention for the Protection of Human Rights and Fundamental Freedoms and its Supplementary Protocols.

No funding can be granted, within or outside the EU, for activities that are prohibited in all Member States. No funding can be granted in a Member State for an activity which is forbidden in that Member State.

The beneficiaries must pay particular attention to the principle of proportionality, the right to privacy, the right to the protection of personal data, the right to the physical and mental integrity of persons, the right to non-discrimination, the need to ensure protection of the environment and high levels of human health protection.

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:

- aim at human cloning for reproductive purposes
- intend to modify the genetic heritage of human beings which could make such modifications heritable (with the exception of research relating to cancer treatment of the gonads, which may be financed)
- 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, or
- lead to the destruction of human embryos (for example, for obtaining stem cells).

Activities involving research on human embryos or human embryonic stem cells may be carried out only if:

- they are set out in Annex 1 or
- the coordinator has obtained explicit approval (in writing) from the granting authority.

In addition, the beneficiaries must respect the fundamental principle of research integrity — as set out in the European Code of Conduct for Research Integrity<sup>2</sup>.

This implies compliance with the following principles:

- 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

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<sup>2</sup> European Code of Conduct for Research Integrity of ALLEA (All European Academies).

- 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 including ensuring, where possible, openness, reproducibility and traceability and refrain from the research integrity violations described in the Code.

Activities raising ethical issues must comply with the additional requirements formulated by the ethics panels (including after checks, reviews or audits; see Article 25).

Before starting an action task raising ethical issues, the beneficiaries must have obtained all approvals or other mandatory documents needed for implementing the task, notably from any (national or local) ethics committee or other bodies such as data protection authorities.

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

## **VALUES (— ARTICLE 14)**

### **Gender mainstreaming**

The beneficiaries must take all measures to promote equal opportunities between men and women in the implementation of the action and, where applicable, in line with the gender equality plan. 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.

## **INTELLECTUAL PROPERTY RIGHTS (IPR) — BACKGROUND AND RESULTS — ACCESS RIGHTS AND RIGHTS OF USE (— ARTICLE 16)**

### **Definitions**

Access rights — Rights to use results or background.

Dissemination — The public disclosure of the results by appropriate means, other than resulting from protecting or exploiting the results, including by scientific publications in any medium.

Exploit(ation) — The use of results in further research and innovation activities other than those covered by the action concerned, including among other things, commercial exploitation such as developing, creating, manufacturing and marketing a product or process, creating and providing a service, or in standardisation activities.

Fair and reasonable conditions — 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.

FAIR principles — ‘findability’, ‘accessibility’, ‘interoperability’ and ‘reusability’.

Open access — Online access to research outputs provided free of charge to the end-user.

Open science — An approach to the scientific process based on open cooperative work, tools and diffusing knowledge.

Research data management — The process within the research lifecycle that includes the organisation, storage, preservation, security, quality assurance, allocation of persistent identifiers (PIDs) and rules and procedures for sharing of data including licensing.

Research outputs — Results to which access can be given in the form of scientific publications, data or other engineered results and processes such as software, algorithms, protocols, models, workflows and electronic notebooks.

### **Scope of the obligations**

For this section, references to ‘beneficiary’ or ‘beneficiaries’ do not include affiliated entities (if any).

### **Agreement on background — Background free from restrictions**

The beneficiaries must identify in a written agreement the background as needed for implementing the action or for exploiting its results.

Where the call conditions restrict control due to strategic interests reasons, background that is subject to control or other restrictions by a country (or entity from a country) which is not one of the eligible countries or target countries set out in the call conditions and that impact the exploitation of the results (i.e. would make the exploitation of the results subject to control or restrictions) must not be used and must be explicitly excluded in the agreement on background — unless otherwise agreed with the granting authority.

### **Results free from restrictions**

Where the call conditions restrict control due to strategic interests reasons, the beneficiaries must ensure that the results of the action are not subject to control or other restrictions by a country (or entity from a country) which is not one of the eligible countries or target countries set out in the call conditions — unless otherwise agreed with the granting authority.

### **Ownership of results**

Results are owned by the beneficiaries that generate them.

However, two or more beneficiaries own results jointly if:

- they have jointly generated them and
- it is not possible to:
  - establish the respective contribution of each beneficiary, or
  - separate them for the purpose of applying for, obtaining or maintaining their protection.

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

- at least 45 days advance notice and
- fair and reasonable compensation.

The joint owners may agree — in writing — to apply another regime than joint ownership.

If third parties (including employees and other personnel) may claim rights to the results, the beneficiary concerned must ensure that those rights can be exercised in a manner compatible with its obligations under the Agreement.

The beneficiaries must indicate the owner(s) of the results (results ownership list) in the final periodic report.

### **Protection of results**

Beneficiaries which have received funding under the grant must adequately protect their results — for an appropriate period and with appropriate territorial coverage — if protection is possible and justified, taking into account all relevant considerations, including the prospects for commercial exploitation, the legitimate interests of the other beneficiaries and any other legitimate interests.

### **Exploitation of results**

Beneficiaries which have received funding under the grant must — up to four years after the end of the action (see Data Sheet, Point 1) — use their best efforts to exploit their results directly or to have them exploited indirectly by another entity, in particular through transfer or licensing.

If, despite a beneficiary's best efforts, the results are not exploited within one year after the end of the action, the beneficiaries must (unless otherwise agreed in writing with the granting authority) use the Horizon Results Platform to find interested parties to exploit the results.

If results are incorporated in a standard, the beneficiaries must (unless otherwise agreed with the granting authority or unless it is impossible) ask the standardisation body to include the funding statement (see Article 17) in (information related to) the standard.

### **Additional exploitation obligations**

Where the call conditions impose additional exploitation obligations (including obligations linked to the restriction of participation or control due to strategic assets, interests, autonomy or security reasons), the beneficiaries must comply with them — up to four years after the end of the action (see Data Sheet, Point 1).

Where the call conditions impose additional exploitation obligations in case of a public emergency, the beneficiaries must (if requested by the granting authority) grant for a limited period of time specified in the request, non-exclusive licences — under fair and reasonable conditions — to their results to legal entities that need the results to address the public emergency and commit to rapidly and broadly exploit the resulting products and services at fair and reasonable conditions. This provision applies up to four years after the end of the action (see Data Sheet, Point 1).

### Additional information obligation relating to standards

Where the call conditions impose additional information obligations relating to possible standardisation, the beneficiaries must — up to four years after the end of the action (see Data Sheet, Point 1) — inform the granting authority, if the results could reasonably be expected to contribute to European or international standards.

## **Transfer and licensing of results**

### Transfer of ownership

The beneficiaries may transfer ownership of their results, provided this does not affect compliance with their obligations under the Agreement.

The beneficiaries must ensure that their obligations under the Agreement regarding their results are passed on to the new owner and that this new owner has the obligation to pass them on in any subsequent transfer.

Moreover, they must inform the other beneficiaries with access rights of the transfer at least 45 days in advance (or less if agreed in writing), unless agreed otherwise in writing for specifically identified third parties including affiliated entities or unless impossible under the applicable law. This notification must include sufficient information on the new owner to enable the beneficiaries concerned to assess the effects on their access rights. The beneficiaries may object within 30 days of receiving notification (or less if agreed in writing), if they can show that the transfer would adversely affect their access rights. In this case, the transfer may not take place until agreement has been reached between the beneficiaries concerned.

### Granting licences

The beneficiaries may grant licences to their results (or otherwise give the right to exploit them), including on an exclusive basis, provided this does not affect compliance with their obligations.

Exclusive licences for results may be granted only if all the other beneficiaries concerned have waived their access rights.

### Granting authority right to object to transfers or licensing — Horizon Europe actions

Where the call conditions in Horizon Europe actions provide for the right to object to transfers or licensing, the granting authority may — up to four years after the end of the action (see Data Sheet, Point 1) — object to a transfer of ownership or the exclusive licensing of results, if:

- the beneficiaries which generated the results have received funding under the grant
- it is to a legal entity established in a non-EU country not associated with Horizon Europe, and
- the granting authority considers that the transfer or licence is not in line with EU interests.

Beneficiaries that intend to transfer ownership or grant an exclusive licence must formally notify the granting authority 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 interests, in particular regarding competitiveness as well as consistency with ethical principles and security considerations.

The granting authority may request additional information.

If the granting authority 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 granting authority decision, within the period set out above
- if the granting authority objects
- until the conditions are complied with, if the granting authority objection comes with conditions.

A beneficiary may formally notify a request to waive the right to object regarding intended transfers or grants to a specifically identified third party, if measures safeguarding EU interests are in place. If the granting authority agrees, it will formally notify the beneficiary concerned within 60 days of receiving notification (or any additional information requested).

*Limitations to transfers and licensing due to strategic assets, interests, autonomy or security reasons of the EU and its Member States*

Where the call conditions restrict participation or control due to strategic assets, interests, autonomy or security reasons, the beneficiaries may not transfer ownership of their results or grant licences to third parties which are established in countries which are not eligible countries or target countries set out in the call conditions (or, if applicable, are controlled by such countries or entities from such countries) — unless they have requested and received prior approval by the granting authority.

The request must:

- 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 license on the strategic assets, interests, autonomy or security of the EU and its Member States.

The granting authority may request additional information.

**Access rights to results and background**

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

Requests to exercise access rights and the waiver of access rights must be in writing.



Unless agreed otherwise in writing with the beneficiary granting access, access rights do not include the right to sub-license.

If a beneficiary is no longer involved in the action, this does not affect its obligations to grant access.

If a beneficiary defaults on its obligations, the beneficiaries may agree that that beneficiary no longer has access rights.

#### Access rights for implementing the action

The beneficiaries must grant 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 —:

- informed the other beneficiaries that access to its background is subject to restrictions, or
- agreed with the other beneficiaries that access would not be on a royalty-free basis.

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

#### Access rights for exploiting the results

The beneficiaries must grant each other access — under fair and reasonable conditions — to results needed for exploiting their results.

The beneficiaries must grant each other access — under fair and reasonable conditions — to background needed for exploiting their 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 restrictions.

Requests for access must be made — unless agreed otherwise in writing — up to one year after the end of the action (see Data Sheet, Point 1).

#### Access rights for entities under the same control

Unless agreed otherwise in writing by the beneficiaries, access to results and, subject to the restrictions referred to above (if any), background must also be granted — under fair and reasonable conditions — to entities that:

- are established in an EU Member State or Horizon Europe associated country
- are under the direct or indirect control of another beneficiary, or under the same direct or indirect control as that beneficiary, or directly or indirectly controlling that beneficiary and
- need the access to exploit the results of that beneficiary.

Unless agreed otherwise in writing, such requests for access must be made by the entity directly to the beneficiary concerned.

Requests for access must be made — unless agreed otherwise in writing — up to one year after the end of the action (see Data Sheet, Point 1).

### Access rights for the granting authority, EU institutions, bodies, offices or agencies and national authorities to results for policy purposes — Horizon Europe actions

In Horizon Europe actions, the beneficiaries which have received funding under the grant must grant access to their results — on a royalty-free basis — to the granting authority, EU institutions, bodies, offices or agencies for developing, implementing and monitoring EU policies or programmes. Such access rights do not extend to beneficiaries' background.

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

For actions under the cluster 'Civil Security for Society', such access rights also extend to national authorities of EU Member States for developing, implementing and monitoring their policies or programmes in this area. In this case, access is subject to a bilateral agreement to define specific conditions ensuring that:

- the access rights will be used only for the intended purpose and
- appropriate confidentiality obligations are in place.

Moreover, the requesting national authority or EU institution, body, office or agency (including the granting authority) must inform all other national authorities of such a request.

### Additional access rights

Where the call conditions impose additional access rights, the beneficiaries must comply with them.

## **COMMUNICATION, DISSEMINATION, OPEN SCIENCE AND VISIBILITY (— ARTICLE 17)**

### **Dissemination**

#### Dissemination of results

The beneficiaries must disseminate their results as soon as feasible, in a publicly available format, subject to any restrictions due to the protection of intellectual property, security rules or legitimate interests.

A beneficiary that intends to disseminate its results must give at least 15 days advance notice to the other beneficiaries (unless agreed otherwise), together with sufficient information on the results it will disseminate.

Any other beneficiary may object within (unless agreed otherwise) 15 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 results may not be disseminated unless appropriate steps are taken to safeguard those interests.

#### Additional dissemination obligations

Where the call conditions impose additional dissemination obligations, the beneficiaries must also comply with those.

### **Open Science**

#### Open science: open access to scientific publications

The beneficiaries must ensure open access to peer-reviewed scientific publications relating to their results. In particular, they must ensure that:

- at the latest at the time of publication, a machine-readable electronic copy of the published version or the final peer-reviewed manuscript accepted for publication, is deposited in a trusted repository for scientific publications
- immediate open access is provided to the deposited publication via the repository, under the latest available version of the Creative Commons Attribution International Public Licence (CC BY) or a licence with equivalent rights; for monographs and other long-text formats, the licence may exclude commercial uses and derivative works (e.g. CC BY-NC, CC BY-ND) and
- information is given via the repository about any research output or any other tools and instruments needed to validate the conclusions of the scientific publication.

Beneficiaries (or authors) must retain sufficient intellectual property rights to comply with the open access requirements.

Metadata of deposited publications must be open under a Creative Commons Public Domain Dedication (CC 0) or equivalent, in line with the FAIR principles (in particular machine-actionable) and provide information at least about the following: publication (author(s), title, date of publication, publication venue); Horizon Europe or Euratom funding; grant project name, acronym and number; licensing terms; persistent identifiers for the publication, the authors involved in the action and, if possible, for their organisations and the grant. Where applicable, the metadata must include persistent identifiers for any research output or any other tools and instruments needed to validate the conclusions of the publication.

Only publication fees in full open access venues for scientific publications are eligible for reimbursement.

#### Open science: research data management

The beneficiaries must manage the digital research data generated in the action ('data') responsibly, in line with the FAIR principles and by taking all of the following actions:

- establish a data management plan ('DMP') (and regularly update it)
- as soon as possible and within the deadlines set out in the DMP, deposit the data in a trusted repository; if required in the call conditions, this repository must be federated in the EOSC in compliance with EOSC requirements
- as soon as possible and within the deadlines set out in the DMP, ensure open access — via the repository — to the deposited data, under the latest available version of the Creative Commons Attribution International Public License (CC BY) or Creative Commons Public Domain Dedication (CC 0) or a licence/dedication with equivalent rights, following the principle 'as open as possible as closed as necessary', unless providing open access would in particular:
  - be against the beneficiary's legitimate interests, including regarding commercial exploitation, or

- be contrary to any other constraints, in particular the EU competitive interests or the beneficiary's obligations under this Agreement; if open access is not provided (to some or all data), this must be justified in the DMP
- provide information via the repository about any research output or any other tools and instruments needed to re-use or validate the data.

Metadata of deposited data must be open under a Creative Common Public Domain Dedication (CC 0) or equivalent (to the extent legitimate interests or constraints are safeguarded), in line with the FAIR principles (in particular machine-actionable) and provide information at least about the following: datasets (description, date of deposit, author(s) and embargo); Horizon Europe or Euratom funding; grant project name, acronym and number; licensing terms; persistent identifiers for the dataset, the authors involved in the action, and, if possible, for their organisations and the grant. Where applicable, the metadata must include persistent identifiers for related publications and other research outputs.

#### Open science: additional practices

Where the call conditions impose additional obligations regarding open science practices, the beneficiaries must also comply with those.

Where the call conditions impose additional obligations regarding the validation of scientific publications, the beneficiaries must provide (digital or physical) access to data or other results needed for validation of the conclusions of scientific publications, to the extent that their legitimate interests or constraints are safeguarded (and unless they already provided (open) access at publication).

Where the call conditions impose additional open science obligations in case of a public emergency, the beneficiaries must (if requested by the granting authority) immediately deposit any research output in a trusted repository and provide open access to it under a CC BY licence, a Public Domain Dedication (CC 0) or equivalent. As an exception, if the access would be against the beneficiaries' legitimate interests, the beneficiaries must grant non-exclusive licenses — under fair and reasonable conditions — to legal entities that need the research output to address the public emergency and commit to rapidly and broadly exploit the resulting products and services at fair and reasonable conditions. This provision applies up to four years after the end of the action (see Data Sheet, Point 1).

#### **Plan for the exploitation and dissemination of results including communication activities**

Unless excluded by the call conditions, the beneficiaries must provide and regularly update a plan for the exploitation and dissemination of results including communication activities.

#### **SPECIFIC RULES FOR CARRYING OUT THE ACTION (— ARTICLE 18)**

##### **Implementation in case of restrictions due to strategic assets, interests, autonomy or security of the EU and its Member States**

Where the call conditions restrict participation or control due to strategic assets, interests, autonomy or security, the beneficiaries must ensure that none of the entities that participate as affiliated entities, associated partners, third parties giving in-kind contributions, subcontractors or recipients of financial support to third parties are established in countries which are not eligible countries or target countries set out in the call conditions (or, if applicable, are controlled by such countries or entities from such countries) — unless otherwise agreed with the granting authority.

The beneficiaries must moreover ensure that any cooperation with entities established in countries which are not eligible countries or target countries set out in the call conditions (or, if applicable, are controlled by such countries or entities from such countries) does not affect the strategic assets, interests, autonomy or security of the EU and its Member States.

### **Recruitment and working conditions for researchers**

The beneficiaries must take all measures to implement the principles set out in Annex II to the Council Recommendation on a European framework to attract and retain research, innovation and entrepreneurial talents in Europe<sup>3</sup> ('the European Charter for Researchers'), in particular regarding:

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

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

### **Specific rules for access to research infrastructure activities**

#### Definitions

Research Infrastructures — Facilities that provide resources and services for the research communities to conduct research and foster innovation in their fields. This definition includes the associated human resources, and it covers major equipment or sets of instruments; knowledge-related facilities such as collections, archives or scientific data infrastructures; computing systems, communication networks, and any other infrastructure, of a unique nature and open to external users, essential to achieve excellence in research and innovation. Where relevant, they may be used beyond research, for example for education or public services, and they may be 'single-sited', 'virtual' or 'distributed'<sup>4</sup>:

When implementing access to research infrastructure activities, the beneficiaries must respect the following conditions:

- for transnational access:
  - access which must be provided:

The access must be free of charge, transnational access to research infrastructure or installations for selected user-groups.

The access must include the logistical, technological and scientific support and the specific training that is usually provided to external researchers using the

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<sup>3</sup> Council Recommendation C/2023/1640 of 18 December 2023 on a European framework to attract and retain research, innovation and entrepreneurial talents in Europe, Annex II (OJ C, C/2023/1640, 29.12.2023).

<sup>4</sup> See Article 2(1) of the Horizon Europe Framework Programme Regulation 2021/695.

infrastructure. Transnational access can be either in person (hands-on), provided to selected users that visit the installation to make use of it, or remote, through the provision to selected user-groups of remote scientific services (e.g. provision of reference materials or samples, remote access to a high-performance computing facility).

- categories of users that may have access:

Transnational access must be provided to selected user-groups, i.e. teams of one or more researchers (users).

The majority of the users must work in a country other than the country(ies) where the installation is located (unless access is provided by an international organisation, the Joint Research Centre (JRC), an ERIC or similar legal entity).

Only user groups that are allowed to disseminate the results they have generated under the action may benefit from the access (unless the users are working for SMEs).

Access for user groups with a majority of users not working in a EU Member State or Horizon Europe associated country is limited to 20% of the total amount of units of access provided under the grant (unless a higher percentage is foreseen in Annex 1).

- procedure and criteria for selecting user groups:

The user groups must request access by submitting (in writing) a description of the work that they wish to carry out and the names, nationalities and home institutions of the users.

The user groups must be selected by (one or more) selection panels set up by the consortium.

The selection panels must be composed of international experts in the field, at least half of them independent from the consortium (unless otherwise specified in Annex 1).

The selection panels must assess all proposals received and recommend a short-list of the user groups that should benefit from access.

The selection panels must base their selection on scientific merit, taking into account that priority should be given to user groups composed of users who:

- have not previously used the installation and
- are working in countries where no equivalent research infrastructure exist.

It will apply the principles of transparency, fairness and impartiality.

Where the call conditions impose additional rules for the selection of user groups, the beneficiaries must also comply with those.

- other conditions:

The beneficiaries must request written approval from the granting authority for the selection of user groups requiring visits to the installations exceeding 3 months (unless such visits are foreseen in Annex 1).

In addition, the beneficiaries must:

- advertise widely, including on a their websites, the access offered under the Agreement
  - promote equal opportunities in advertising the access and take into account the gender dimension when defining the support provided to users
  - ensure that users comply with the terms and conditions of the Agreement
  - ensure that its obligations under Articles 12, 13, 17 and 33 also apply to the users
  - keep records of the names, nationalities, and home institutions of users, as well as the nature and quantity of access provided to them
- for virtual access:
- access which must be provided:

The access must be free of charge, virtual access to research infrastructure or installations.

‘Virtual access’ means open and free access through communication networks to digital resources and services needed for research, without selecting the users to whom access is provided.

The access must include the support that is usually provided to external users.

Where allowed by the call conditions, beneficiaries may in justified cases define objective eligibility criteria (e.g. affiliation to a research or academic institution) for specific users.

- other conditions:

The beneficiaries must have the virtual access services assessed periodically by a board composed of international experts in the field, at least half of whom must be independent from the consortium (unless otherwise specified in Annex 1). For this purpose, information and statistics on the users and the nature and quantity of the access provided, must be made available to the board.

The beneficiaries must advertise widely, including on a dedicated website, the access offered under the grant and the eligibility criteria, if any.

Where the call conditions impose additional traceability<sup>5</sup> obligations, information on the traceability of the users and the nature and quantity of access must be provided by the beneficiaries.

These obligations apply regardless of the form of funding or budget categories used to declare the costs (unit costs or actual costs or a combination of the two).

### **Specific rules for JU actions**

JU actions must contribute to the long-term implementation of the JU partnership, including the JU Strategic Research and Innovation Agenda, the JU objectives and the exploitation of research and innovation results.

Moreover, when implementing JU actions, the members and contributing partners of the Joint Undertaking must fulfil their obligations regarding contributions to the Joint Undertaking:

- the description of the action in Annex 1 must include, for beneficiaries, affiliated entities, associated partners or other participants or third parties which are members or contributing partners, the estimated contributions to the action, i.e.:
  - in-kind contributions to operational activities ('IKOP'; if applicable)
  - in-kind contributions to additional activities linked to the action ('IKAA'; if applicable)
  - financial contributions ('FC'; if applicable)
- the in-kind contributions to operational activities and financial contributions must be reported during the implementation of the action in the Portal Continuous Reporting tool
- at the end of the action, the members and contributing partners that have not received funding under the grant must ensure that financial and in-kind contributions to operational activities of EUR 430 000 or more (see Article 21) are supported by statements of contributions (CS) and certificates on the statements of contributions (CCS) which fulfil the following conditions:
  - be provided by a qualified approved external auditor which is independent and complies with Directive 2006/43/EC (or for public bodies: by a competent independent public officer)
  - the verification must be carried out according to the highest professional standards to ensure that the statements of contributions comply with the provisions under the Agreement and the applicable JU Regulation, that the contributions cover activities that are part of the action and that they have not been reimbursed by the grant
- contributions must comply with the following conditions:

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<sup>5</sup> According to the definition given in ISO 9000, i.e.: "Traceability is the ability to trace the history, application, use and location of an item or its characteristics through recorded identification data." The users can be traced, for example, by authentication and/or by authorization or by other means that allows for analysis of the type of users and the nature and quantity of access provided.



- costs covered by financial contributions cannot be claimed for reimbursement under the JU grant
- for Clean Aviation JU, SNS JU, Europe's Rail JU, CBE JU grants: if provided in the call conditions, a certain percentage of the total costs of the action must be covered by contributions (IKOP, IKAA or FC)
- for IHI JU grants: at least 45% (or another amount set out in the call conditions) of the total costs of the action and of the related IKAA must be covered by contributions (IKOP, IKAA or FC).

The beneficiaries must comply with the additional IPR, dissemination and exploitation obligations set out in the call conditions (Article 16 and Annex 5), in particular:

- for all JU grants: the granting authority right to object to transfers or licensing also applies to results generated by beneficiaries not having received funding under the grant
- for SESAR 3 JU and Clean Aviation JU grants: in view of the long innovation cycles:
  - the granting authority right to object to transfers or licensing (if any) can be exercised for up to 10 years after the end of the action (see Data Sheet, Point 1)
  - the beneficiaries must comply with their best effort obligation to exploit the results and any additional exploitation obligations imposed by the call conditions for up to 10 years after the end of the action (see Data Sheet, Point 1)
- for IHI JU and Global Health EDCTP3 JU grants (if applicable): the beneficiaries must ensure that the products and services that they develop based or partially based on the results of clinical studies undertaken as part of the grant are affordable, available and accessible to the public at fair and reasonable conditions.

In addition to the obligations set out in Article 17, communication and dissemination activities as well as infrastructure, equipment or major results funded under JU actions must moreover display the Joint Undertaking's special logo:





and the following text:

“The project is supported by the [insert JU name] and its members *[OPTION for actions with national contribution top-ups: (including top-up funding by [name of the national funding authority])]*.”

For Clean Aviation and SNS JU grants, where imposed by the call conditions, the beneficiaries must — before grant signature (or another date specified in the call conditions or agreed with the granting authority) — adhere to a written agreement based on the model set up by the Joint Undertaking, in order to ensure best possible coordination and a programmatic approach amongst all the JU funded actions to achieve the Programme’s objectives.

The agreement will set a framework and cover areas where close cooperation and coordination is needed (e.g. sharing of information, management of outputs, common approaches towards standardisation, common communication and dissemination activities, links with regulatory and policy activities, contribution to the impact monitoring, access to results and background, etc.) and define the rules for this cooperation (e.g. dispute settlement mechanisms, confidentiality arrangements, indemnification, etc).

The agreement should be signed by the coordinators in the name of their consortia (or by all the beneficiaries where imposed by the call conditions) of all JU funded actions and in line with the accession modalities set out in the agreement, and thus create a partnership between all participants of closed and ongoing JU funded actions, including actions funded under the same or different calls.

For EuroHPC and Chips JU grants, the beneficiaries must respect the following conditions when implementing actions with national contribution top-ups from Participating States:

- the beneficiaries must ensure visibility of the national contributions (see below)
- the payment deadlines for prefinancing, interim or final payments are automatically suspended if a national funding authority is late with its payments to the Joint Undertaking for the national contribution top-up
- the European Anti-Fraud Office (OLAF), European Public Prosecutor's Office (EPPO), European Court of Auditors (ECA), the National Court of Auditors and other national authorities can exercise their control rights on the project implementation and costs declared, including for the national contribution top-up.

For SNS JU grants, where imposed by the call conditions for digital infrastructure projects, the beneficiaries must ensure that the network technologies and equipment (including software and services) funded by the action comply with the security requirements and assessments as reflected in the applicable EU, international and national law on cybersecurity and on data protection.

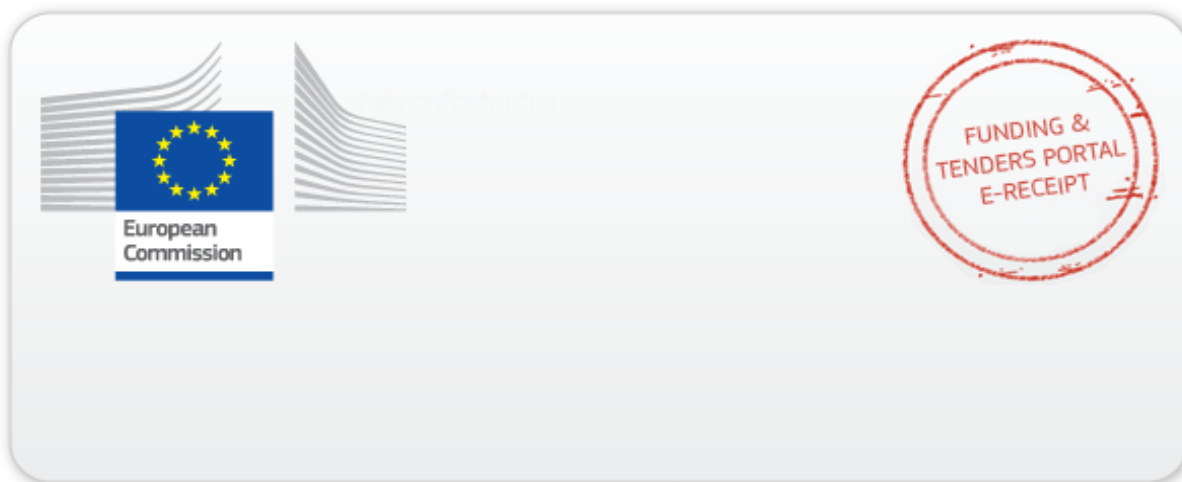
Moreover, where the call conditions impose wholesale access obligations, the beneficiaries must provide wholesale access to the digital infrastructure funded by the action, under fair and reasonable conditions, in a non-discriminatory manner and in accordance with the call conditions.

For Global Health EDCTP3 JU fellowship grants, the beneficiaries must respect the following conditions when implementing them through financial support to third parties:

- avoid any conflict of interest and comply with the principles of transparency, non-discrimination and sound financial management
- take all measures to implement the principles set out in the European Charter for Researchers and ensure that the researchers and all participants involved in the action are aware of them
- ensure that the researchers enjoy at the place of the implementation at least the same standards and working conditions as those applicable to local researchers holding a similar position
- ensure that the other direct contract or fixed-amount-fellowship agreement specifies:
  - the name of the supervisor(s) and/or mentor(s) for the research and training activities
  - the starting date and duration of the research and training activities
  - the monthly support for the researcher under this Agreement (in euro and, if relevant, in the currency in which the remuneration is paid)
  - the obligation of the researcher to work exclusively for the action, unless part-time has been approved and not to receive, for activities carried out in the frame of the action, other incomes than those received from the beneficiary or other entities mentioned in Annex 1)
  - the working pattern of the researcher

- the arrangements related to the intellectual property rights (during implementation of the action and afterwards), in particular full access — on a royalty-free basis — for the researcher to background and results needed for their activities under the action
- the obligation of the researcher to inform as soon as possible about events or circumstances likely to affect the implementation of the action or the compliance with requirements under the Agreement (see Article 19)
- the obligation of the researcher to maintain confidentiality (see Article 13)
- the obligation of the researcher to ensure the visibility of the EDCTP Association and EU funding in communications or publications and in applications for the protection of results (see Articles 17)
- where set out in the call conditions, the obligation of the researcher to carry out a mandatory return period of 12 months
- assist the researchers in the administrative procedures related to the recruitment
- inform the researchers about:
  - the description, conditions, location and timetable for the implementation of the research and training activities
  - the rights and obligations toward the researchers under this Agreement
  - the obligation of the researchers to complete and submit — at the end of the research training activities — the evaluation questionnaire and — two years later — follow-up questionnaire provided by the granting authority
- ensure full access — on a royalty-free basis — for the researchers to background and results needed for their activities under the action
- ensure that the researchers do not have to bear any costs for the implementation of the action as described in Annex 1
- provide training, infrastructure and the necessary means for implementing the action (or ensure that such training and means are provided by other participants in the action)
- ensure that the researchers are adequately supervised and receive appropriate career guidance
- ensure that personalised career development plans are established, support their implementation and update in view of the needs of the researchers
- ensure an appropriate exposure to the non-academic sector (if applicable)
- respect the maximum limit for secondments set out in the call conditions (if applicable)
- respect the conditions for the outgoing and return phases set out in the call conditions (if any)

- ensure that the researchers are informed that they are ‘Global Health EDCTP3 JU fellows’
- ensure that the researchers do not receive, for activities carried out in the frame of the action, other incomes than those received from the beneficiaries (or other entities mentioned in Annex 1)
- host the researchers at their premises (or at the premises of other participants in the action).



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