



## EUROPEAN RESEARCH EXECUTIVE AGENCY (REA)

REA.A — Marie Skłodowska-Curie Actions & Support to Experts  
**A.2 — MSCA European Postdoctoral Fellowships**

### GRANT AGREEMENT

**Project 101064805 — LEMMA**

#### PREAMBLE

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

**on the one part,**

the **European Research Executive Agency (REA)** ('EU executive agency' or 'granting authority'),  
under the powers delegated by the European Commission ('European Commission'),

**and**

**on the other part,**

1. 'the coordinator':

**INSTITUT NATIONAL DE RECHERCHE EN INFORMATIQUE ET AUTOMATIQUE (INRIA)**, PIC 999547074, established in DOMAINE DE VOLUCEAU ROCQUENCOURT, LE CHESNAY CEDEX 78153, France,

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 2a Additional information on unit costs and contributions (if applicable)
- 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
<p>Landslides and avalanches jointly cause approximately 150 deaths and €4.9 billion economic losses each year, with the impacts predicted to become more severe due to climate change. Mitigation and prevention of disasters requires accurate predictions of these phenomena, which due to their scale is only achievable via modelling and simulation. Accurate models of landslides in permafrost or avalanches must account for micro-scale (&lt;1mm) processes such as cracks and shear bands that also involve thermal and hydrological effects that will be exacerbated by climate change. Such models do not currently exist. Further, this level of refinement is not computationally viable when modelling an entire mountainside, and so a new approach must be adopted. This project will: 1) Develop new models for permafrost and snow subject to climate-change-induced loadings; 2) Use the new data-driven mechanics framework to transfer information from these models to the scale of the mountainside; and 3) Simulate the effects of climate change on the Mont-Blanc massif at Chamonix. This will combine the researcher's experience with shear band models with the supervisor's expertise in crack models and optimisation techniques. A secondment at a group specialising in simulating landslides and avalanches will provide the expertise to implement the simulation on a real mountainside. This interdisciplinary project will ideally set the researcher for a career in academia in Europe, while benefiting the community at Chamonix, in particular the guide's association, as they will be able to plan adaptations and mitigations for the effects of climate change, ensuring their tourism industry remains viable. Specialised multiphysical models that are adapted to permafrost and snow will advance the state-of-the-art significantly, and the implementation of optimisation techniques in data-driven mechanics has wide applicability throughout civil and mechanical engineering, geology and environmental science.</p>

Keywords:

- Civil engineering
- Cryosphere, dynamics of snow and ice cover, sea ice, permafrost and ice sheets
- ENV Environmental Hazard Analysis
- Environmental engineering and geotechnics
- Geology, tectonics, volcanology

Project number: 101064805

Project name: Landslide and avalanche Mechanics with Multiphysical data

Project acronym: LEMMA

Call: HORIZON-MSCA-2021-PF-01

Topic: HORIZON-MSCA-2021-PF-01-01

Type of action: HORIZON TMA MSCA Postdoctoral Fellowships - European Fellowships

Granting authority: European Research Executive Agency

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

Project starting date: fixed date: 1 September 2022

Project end date: 31 August 2024

Project duration: 24 months

Consortium agreement: No

### 2. Participants

List of participants:

N°	Role	Short name	Legal name	Ctry	PIC	Total eligible contrib.	Max grant amount
1	COO	INRIA	INSTITUT NATIONAL DE RECHERCHE EN INFORMATIQUE ET AUTOMATIQUE	FR	999547074	195 914.88	195 914.88



N°	Role	Short name	Legal name	Ctry	PIC	Total eligible contrib.	Max grant amount
2	AP	UGA	UNIVERSITE GRENOBLE ALPES	FR	897379108	0.00	0.00
3	AP	EPFL	ECOLE POLYTECHNIQUE FEDERALE DE LAUSANNE	CH	999973971	0.00	0.00
<b>Total</b>						195 914.88	195 914.88

**Coordinator:**

- INSTITUT NATIONAL DE RECHERCHE EN INFORMATIQUE ET AUTOMATIQUE (INRIA)

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

Total eligible contributions (unit, flat-rate and lump sum contributions and financing not linked to costs)	Maximum grant amount (Annex 2)	Maximum grant amount (award decision)
195 914.88	195 914.88	195 914.88

**Grant form:** Unit**Grant mode:** Action grant**Budget categories/activity types:**

- A. Contributions for recruited researchers
  - A.1 Living allowance
  - A.2 Mobility allowance
  - A.3 Family allowance
  - A.4 Long-term leave allowance
  - A.5 Special needs allowance
- B. Institutional contributions
  - B.1 Research, training and networking contribution
  - B.2 Management and indirect contribution

**Cost eligibility options:**

- In-kind contributions eligible costs

**Budget flexibility:** Yes (flexibility with conditions)**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 (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
					Final payment	90 days from receiving periodic report
1	1	24	Periodic report	60 days after end of reporting period		

**Prefinancing payments and guarantees:**

Prefinancing payment	
Type	Amount
Prefinancing 1 (initial)	137 140.42

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

Mutual Insurance Mechanism (MIM): Yes

MIM contribution: 5% of the maximum grant amount (9 795.74), 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:

FR7610071780000000100634856

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)

## **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

### **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)

## **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 187 of EU Financial Regulation 2018/1046<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(36) of EU Financial

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<sup>4</sup> For the definition, see Article 187 Regulation (EU, Euratom) 2018/1046 of the European Parliament and of the Council of 18 July 2018 on the financial rules applicable to the general budget of the Union, amending Regulations (EU) No 1296/2013, (EU) No 1301/2013, (EU) No 1303/2013, (EU) No 1304/2013, (EU) No 1309/2013, (EU) No 1316/2013, (EU) No 223/2014, (EU) No 283/2014, and Decision No 541/2014/EU and repealing Regulation (EU, Euratom) No 966/2012 ('EU Financial Regulation') (OJ L 193, 30.7.2018, p. 1): "**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 136(1) and 141(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".

Regulation 2018/1046, i.e. non-financial resources made available free of charge by third parties to a beneficiary.

**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 136(1)(c) of EU Financial Regulation 2018/1046.

**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 **101064805 — LEMMA** ('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**

The grant is an action grant<sup>8</sup> which takes the form of a unit grant.

<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> For the definition, see Article 180(2)(a) EU Financial Regulation 2018/1046: '**action grant**' means an EU grant to finance "an action intended to help achieve a Union policy objective".

## 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 is set out in Annex 2.

It contains the estimated eligible contributions for the action (unit contributions), broken down by participant and budget category.

Annex 2 also shows the types of contributions (forms of funding)<sup>9</sup> to be used for each budget category.

The details on the calculation of the unit contributions will be explained in Annex 2a.

## 5.5 Budget flexibility

The budget breakdown may be adjusted — without an amendment (see Article 39) — by transfers of units between participants, as long as this does not imply any substantive or important change to the description of the action in Annex 1. Transfers between budget categories are not allowed.

# ARTICLE 6 — ELIGIBLE AND INELIGIBLE CONTRIBUTIONS

## 6.1 General eligibility conditions

The **general eligibility conditions** for the unit contributions are the following:

(a) the units must:

- be actually used or produced by the beneficiary in the period set out in Article 4 (with the exception of units relating to the submission of the final periodic report, which may be used or produced afterwards; see Article 21)
- be necessary for the implementation of the action and

(b) the number of units must be identifiable and verifiable, in particular supported by records and documentation (see Article 20).

## 6.2 Specific eligibility conditions for each budget category

For each budget category, the **specific eligibility conditions** are as follows:

### A. Contributions for recruited researchers

Contributions for recruited researchers (A.1 Living allowance, A.2 Mobility allowance, A.3 Family

<sup>9</sup> See Article 125 EU Financial Regulation 2018/1046.

allowance, A.4 Long-term leave allowance and A.5 Special needs allowance) are eligible, if they fulfil the general eligibility conditions and are calculated as unit contributions in accordance with the method set out in Annex 2a, and if:

**for A.1 Living allowance and A.2 Mobility allowance:**

- (a) the number of units declared:
  - (i) corresponds to the number of months spent by the recruited researchers on the research training activities and
  - (ii) does not exceed the maximum number of months (per researcher) set out in the call conditions
- (b) the recruited researchers comply with the following conditions:
  - (i) be — at the date of the call deadline — a post-doctoral researcher (i.e. in possession of a doctoral degree<sup>10</sup>)
  - (ii) be recruited by the beneficiaries under an employment contract (or other direct contract with equivalent benefits, including social security coverage) or — if not otherwise possible under national law — under a fixed amount fellowship agreement with minimum social security coverage, including during periods of secondment
  - (iii) be employed full-time, unless the granting authority has approved a part-time employment for professional, personal or family reasons, and
  - (iv) be working exclusively for the action, unless part-time for professional reasons has been approved
- (c) the contributions have been fully incurred for the benefit of the recruited researchers

This condition is met if:

{ **total remuneration costs** (salaries, social security contributions, taxes and other costs included in the remuneration under the employment contract or other direct contract) or **total fixed-amount fellowship costs** for the researcher during the action

plus

**total mobility costs** (household, relocation and travel expenses and, if they must be paid under national law, taxes, duties and social security contributions) for the researcher during the action}

divided by

the number of actual units}.

is equal to or higher than the following amount:

{amount per unit contribution set out in Annex 2 as living allowance

plus

amount per unit contribution set out in Annex 2 as mobility allowance}.

<sup>10</sup> As defined in the call conditions.

**for A.3 Family allowance:**

- (a) the recruited researchers have a family.

‘Family’ means persons linked to the researcher by marriage (or a relationship with equivalent status to a marriage recognised by the legislation of the country where this relationship was formalised) or dependent children who are actually being maintained by the researcher.

- (b) the number of units declared:

- (i) corresponds to the number of months spent by the recruited researchers with a family on the research training activities and
- (ii) does not exceed the maximum number of months (per researcher) set out in the call conditions.

- (c) the contributions have been fully incurred for the benefit of the recruited researchers

This condition is met if they have been fully used for the recruited researchers for whom they are claimed.

**for A.4 Long-term leave<sup>11</sup> allowance:**

- (a) the general and specific eligibility conditions for the living and mobility allowances were fulfilled before the long-term leave and
- (b) the number of units declared corresponds to the number of months paid by the beneficiary.

**for A.5 Special needs allowance:**

- (a) they are used for recruited researchers with disabilities whose long-term physical, mental, intellectual or sensory impairments are certified by a competent national authority and of such nature that their participation in the action would not be possible without the special needs items or services
- (b) the special needs items or services are not already covered from another source (such as social security or health insurance)
- (c) the number of units declared corresponds to the number of special needs units that were needed for implementing the action.

**B. Institutional contributions**

Institutional contributions (B.1 Research, training and networking contribution and B.2 Management and indirect contribution) are eligible, if they are calculated as unit contributions in accordance with the method set out in Annex 2a, and if the living and mobility allowances are eligible.

**6.3 Ineligible contributions**

‘Ineligible contributions’ are:

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<sup>11</sup> Long-term leave includes maternity, paternity, parental, sick or special leave of more than 30 days.



- (a) units that do not comply with the conditions set out above (see Article 6.1 and 6.2)
- (b) units implemented during grant agreement suspension (see Article 31) and
- (c) units 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
- (d) other:
  - (i) country restrictions for eligible costs: not applicable.

## 6.4 Consequences of non-compliance

If a beneficiary declares unit 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. Unit 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) (if required; see Articles 21 and 24.2 and Data Sheet, Point 4.3)
  - 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>12</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

Not applicable

## ARTICLE 9 — OTHER PARTICIPANTS INVOLVED IN THE ACTION

### 9.1 Associated partners

The following entities which cooperate with a beneficiary will participate in the action as ‘associated partners’:

- **UNIVERSITE GRENOBLE ALPES (UGA)**, PIC 897379108, associated partner of INSTITUT NATIONAL DE RECHERCHE EN INFORMATIQUE ET AUTOMATIQUE (INRIA)
- **ECOLE POLYTECHNIQUE FEDERALE DE LAUSANNE (EPFL)**, PIC 999973971

Associated partners must implement the action tasks attributed to them in Annex 1 in accordance with Article 11. They may not charge contributions to the action (no unit contributions) and the costs for their tasks are not eligible.

The tasks must be set out in Annex 1.

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<sup>12</sup> For the definition, see Article 187(2) EU Financial Regulation 2018/1046: “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.”

The beneficiaries must ensure that their contractual obligations under Articles 11 (proper implementation), 12 (conflict of interests), 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 associated partners.

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 associated partners.

## **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 unit contributions) and their costs are considered entirely covered by the unit 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 unit contributions (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: to use qualified external auditors which are independent and 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 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 external auditors which comply with comparable standards as those set out in EU Directive 2006/43/EC
- 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 154 EU Financial Regulation 2018/1046).

<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 or similar national regulations (OJ L 157, 9.6.2006, p. 87).

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
- 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 suspension (Article 31): certain costs incurred during grant suspension are eligible (notably, minimum costs necessary for a possible resumption of the action and costs relating to contracts which were entered into before the pre-information letter was received and which could not reasonably be suspended, reallocated or terminated on legal grounds)
- 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 whose assessment has not yet been updated to cover (the new rules on) data protection may rely on their internal systems, rules and procedures, provided that they ensure that personal data is:

- processed lawfully, fairly and in a transparent manner in relation to the data subject
- 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 personal data.

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 the 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>).

<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
- (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 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 unit 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 in line with the accepted standards in the respective field (if any).

In addition, the beneficiaries must — for the same period — keep adequate records and supporting documents to prove the number of units declared; 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, unit 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 continuously 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 statements (individual and consolidated; for all beneficiaries/affiliated entities)
- the explanation on the use of resources (or detailed cost reporting table, if required)
- the certificates on the financial statements (CFS): not applicable.

The **financial statements** must detail the contributions for the units implemented in the reporting period.

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

By signing the financial statements (directly in the Portal Periodic Reporting tool), the beneficiaries confirm that:

- the information provided is complete, reliable and true
- the unit contributions declared are eligible (see Article 6)
- the contributions 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)

Beneficiaries will have to submit also the financial statements of their affiliated entities (if any). In case of recoveries (see Article 22), beneficiaries will be held responsible also for the financial statements of their affiliated entities.

### **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.

Pre-financing 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

At beneficiary termination there will be no payment, but the grant must be provisionally closed for the beneficiary which leaves the consortium (and the affiliated entities which had to end their participation together with the beneficiary, if any).

Payments (if any) will be made with the next interim or final payment.

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 for all reporting periods, by calculating the unit contributions for the accepted units.

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:

$$\begin{aligned} & \{ \text{total accepted EU contribution for the beneficiary} \\ & \text{minus} \\ & \{ \text{pre-financing and interim payments received (if any)} \} \}. \end{aligned}$$

If the balance is **positive**, the amount will be included in the next interim or final payment to the consortium.

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.

The amounts will later on also be taken into account for the next interim or final payment.

### 22.3.3 Interim payments

Interim payments reimburse the eligible contributions claimed for the units 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. Its approval does not imply recognition of compliance, authenticity, completeness or correctness of its content.

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 unit contributions for the accepted units.

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 eligible contributions claimed for the remaining units implemented (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. Its approval does not imply recognition of compliance, authenticity, completeness or correctness of its content.

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 unit contributions for the accepted units.

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

If the resulting amount is higher than the maximum grant amount set out in Article 5.2, it will be limited to the latter.

#### 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:

$$\left\{ \left\{ \begin{array}{l} \text{total accepted EU contribution for the beneficiary} \\ \text{divided by} \\ \text{total accepted EU contribution for the action} \end{array} \right\} \times \left\{ \begin{array}{l} \text{final grant amount for the action} \\ \text{minus} \\ \text{prefinancing and interim payments received by the beneficiary (if any)} \end{array} \right\} \right\}$$

and

- (b) dividing the debt:

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

multiplied by

the amount to be recovered}.

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 unit 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:

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

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 2018/1046.

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 22.5, 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.

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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



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 rate applied by the European Central Bank (ECB) for its main refinancing operations in euros ('reference rate'), plus the rate specified in the Data Sheet (Point 4.2). The reference rate is the rate in force on the first day of the month in which the payment deadline expires, as published in the C series of the *Official Journal of the European Union*.

If the late-payment interest is lower than or equal to EUR 200, it will be paid to the coordinator only 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 29) 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

## 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

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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).

of the action and compliance with the obligations under the Agreement, including assessing unit 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 (including information on the use of resources). 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.

### 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.

## **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>
- 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 257 of EU Financial Regulation 2018/1046.

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

<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 2185/1996 of 11 November 1996 concerning on-the-spot checks and inspections carried out by the Commission in order to protect the European Communities' financial interests against fraud and other irregularities (OJ L 292, 15/11/1996, p. 2).

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 results of reviews, audits or investigations**

### **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**

Results 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 unit contributions**: the notification will include:

- (a) an invitation to submit observations on the list of grants affected by the findings
- (b) the request to submit revised financial statements for all grants affected
- (c) the correction rate for extrapolation, established 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, unit 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 beneficiary termination, interim payment, final payment or afterwards — reject any unit 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 unit 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 unit contributions, it will deduct them from the 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), 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 (see Article 25).

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 audit 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), 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.

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 units may be implemented. Ongoing units must be interrupted and no new units may be started. Unit contributions for activities implemented during grant suspension are not eligible (see Article 6.3).

### 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), 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
- (c) other:
  - (i) linked action issues: not applicable
  - (ii) the action has lost its scientific or technological relevance

### 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 units may be implemented. Ongoing units must be interrupted and no new units may be started. Unit contributions for activities implemented during suspension are not eligible (see Article 6.3).

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 unit contributions for activities implemented before the end of work date (see Article 22).

If the granting authority does not receive the report within the deadline, only unit 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:

- a **report on the distribution of payments** to the beneficiary concerned
- a **termination report** from the beneficiary concerned, for the open reporting period until termination, containing an overview of the progress of the work, the financial statement and the explanation on the use of resources
- 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 report submitted and taking into account the unit contributions for activities implemented before the end of work date (see Article 22).

The information in the termination report must also be included in the periodic report for the next reporting period (see Article 21).

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

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), 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 from other grants to this grant; see Article 25)
- (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

### 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 (see Article 22). Only units implemented until termination will be accepted.

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 unit 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, the financial statement, and the explanation on the use of resources
- (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 report submitted (see Article 22). Only units implemented until termination will be accepted.

The information in the termination report must also be included in the periodic report for the next reporting period (see Article 21).

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

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 135 to 145 EU Financial Regulation 2018/1046 and Articles 4 and 7 of Regulation 2988/95<sup>20</sup>).

## **SECTION 4 FORCE MAJEURE**

### **ARTICLE 35 — FORCE MAJEURE**

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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).



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).

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.

## **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**

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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).

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.*

<b>PROJECT</b>	
<i>Grant Preparation (General Information screen) — Enter the info.</i>	
<b>Project number:</b>	101064805
<b>Project name:</b>	Landslide and avalanchE Mechanics with Multiphysical dataA
<b>Project acronym:</b>	LEMMA
<b>Call:</b>	HORIZON-MSCA-2021-PF-01
<b>Topic:</b>	HORIZON-MSCA-2021-PF-01-01
<b>Type of action:</b>	HORIZON-TMA-MSCA-PF-EF
<b>Service:</b>	REA/A/02
<b>Project starting date:</b>	fixed date: 1 September 2022
<b>Project duration:</b>	24 months

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List of milestones (outputs/outcomes) .....	9
List of critical risks .....	9

## 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.*

Landslides and avalanches jointly cause approximately 150 deaths and €4.9 billion economic losses each year, with the impacts predicted to become more severe due to climate change. Mitigation and prevention of disasters requires accurate predictions of these phenomena, which due to their scale is only achievable via modelling and simulation. Accurate models of landslides in permafrost or avalanches must account for micro-scale (<1mm) processes such as cracks and shear bands that also involve thermal and hydrological effects that will be exacerbated by climate change. Such models do not currently exist. Further, this level of refinement is not computationally viable when modelling an entire mountainside, and so a new approach must be adopted.

This project will: 1) Develop new models for permafrost and snow subject to climate-change-induced loadings; 2) Use the new data-driven mechanics framework to transfer information from these models to the scale of the mountainside; and 3) Simulate the effects of climate change on the Mont-Blanc massif at Chamonix. This will combine the researcher's experience with shear band models with the supervisor's expertise in crack models and optimisation techniques. A secondment at a group specialising in simulating landslides and avalanches will provide the expertise to implement the simulation on a real mountainside.

This interdisciplinary project will ideally set the researcher for a career in academia in Europe, while benefiting the community at Chamonix, in particular the guide's association, as they will be able to plan adaptations and mitigations for the effects of climate change, ensuring their tourism industry remains viable. Specialised multiphysical models that are adapted to permafrost and snow will advance the state-of-the-art significantly, and the implementation of optimisation techniques in data-driven mechanics has wide applicability throughout civil and mechanical engineering, geology and environmental science.

## LIST OF PARTICIPANTS

### PARTICIPANTS

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

Number	Role	Short name	Legal name	Country	PIC
1	COO	INRIA	INSTITUT NATIONAL DE RECHERCHE EN INFORMATIQUE ET AUTOMATIQUE	FR	999547074
2	AP	UGA	UNIVERSITE GRENOBLE ALPES	FR	897379108
3	AP	EPFL	ECOLE POLYTECHNIQUE FEDERALE DE LAUSANNE	CH	999973971



## LIST OF WORK PACKAGES

<b>Work packages</b> <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	Research Data Management	1 - INRIA	1.00	1	24	D1.1 – Data Management Plan D1.2 – Career Development Plan D1.3 – Communication, Dissemination & Outreach Plan

**Work package WP1 – Research Data Management**

<b>Work Package Number</b>	WP1	<b>Lead Beneficiary</b>	1. INRIA
<b>Work Package Name</b>	Research Data Management		
<b>Start Month</b>	1	<b>End Month</b>	24

<b>Objectives</b>
Research Data Management

<b>Description</b>
Research Data Management

## STAFF EFFORT

Staff effort per participant		
<i>Grant Preparation (Work packages - Effort screen) — Enter the info.</i>		
Participant	WP1	Total Person-Months
1 - INRIA	1.00	1.00
Total Person-Months	1.00	1.00

## LIST OF DELIVERABLES

### Deliverables

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

*The labels used mean:*

*Public — fully open ( automatically posted online)*

*Sensitive — limited under the conditions of the Grant Agreement*

*EU classified —RESTREINT-UE/EU-RESTRICTED, CONFIDENTIEL-UE/EU-CONFIDENTIAL, SECRET-UE/EU-SECRET under Decision [2015/444](#)*

Deliverable No	Deliverable Name	Work Package No	Lead Beneficiary	Type	Dissemination Level	Due Date (month)
D1.1	Data Management Plan	WP1	1 - INRIA	DMP — Data Management Plan	PU - Public	6
D1.2	Career Development Plan	WP1	1 - INRIA	R — Document, report	PU - Public	6
D1.3	Communication, Dissemination & Outreach Plan	WP1	1 - INRIA	R — Document, report	PU - Public	23

**Deliverable D1.1 – Data Management Plan**

<b>Deliverable Number</b>	D1.1	<b>Lead Beneficiary</b>	1. INRIA
<b>Deliverable Name</b>	Data Management Plan		
<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
The Data Management Plan describes the data management life cycle for all data sets that will be collected, processed or generated by the action. It is a document describing what data will be collected, processed or generated and following what methodology and standards, whether and how this data will be shared and/or made open, and how it will be curated and preserved.

**Deliverable D1.2 – Career Development Plan**

<b>Deliverable Number</b>	D1.2	<b>Lead Beneficiary</b>	1. INRIA
<b>Deliverable Name</b>	Career Development Plan		
<b>Type</b>	R — Document, report	<b>Dissemination Level</b>	PU - Public
<b>Due Date (month)</b>	6	<b>Work Package No</b>	WP1

Description
A Career Development Plan will be established jointly by the supervisor(s) and the researcher. In addition to research objectives, this plan will comprise the researcher's training and career needs, including training on transferable skills, teaching, planning for publications and participation in conferences and events aiming at opening science and research to citizens. The Plan can be updated when needed.

**Deliverable D1.3 – Communication, Dissemination & Outreach Plan**

<b>Deliverable Number</b>	D1.3	<b>Lead Beneficiary</b>	1. INRIA
<b>Deliverable Name</b>	Communication, Dissemination & Outreach Plan		
<b>Type</b>	R — Document, report	<b>Dissemination Level</b>	PU - Public
<b>Due Date (month)</b>	23	<b>Work Package No</b>	WP1

Description
The plan describes the planned measures to maximize the impact of the project, including the dissemination and exploitation measures that are planned, and the target group(s) addressed. Regarding communication measures and public engagement strategy, the aim is to inform and reach out to society and show the activities performed, and the use and the benefits the project will have for citizens.

## **LIST OF MILESTONES**

(None)

## **LIST OF CRITICAL RISKS**

(None)

**SECTION 1: EXCELLENCE****1.1 Quality and pertinence of the project's research and innovation objectives****Quality and pertinence**

The European Union features significant mountainous regions that extend through several countries, the most prominent of which is the Alpine Arc, passing through France, Switzerland, Monaco, Italy, Liechtenstein, Austria, Germany, and Slovenia. This region is particularly vulnerable to the effects of climate change<sup>1</sup>, in particular an increased risk of dangerous events such as landslides and avalanches triggered by the effects of melting permafrost, increased rainfall, and rapid temperature changes<sup>2</sup>.

Over the period 1995-2014, 1370 deaths and 784 injuries occurred in Europe due to landslides, while the average economic damage amounted to approximately €4.9 billion (2021 values)<sup>3</sup>. Avalanches are similarly lethal, with 128 fatalities in the 2020-21 season<sup>4</sup>, and can impede the safe and economic operation of infrastructure in mountainous regions<sup>5</sup>. Significant tourist attractions such as hiking trails are increasingly being affected by climate change, to the extent where some are no longer safe to use<sup>6</sup>. Thus, there is a significant interest in being able to quantitatively predict areas of increased risk as the climate changes, so that informed decisions about the appropriate responses may be made. Due to the scale of the phenomena involved, the only way to make these predictions is via modelling and simulation.

In order to make these quantitative predictions, sophisticated techniques in mechanics such as cohesive zone models or higher order continuum models must be developed and applied to the problem in a way that spans scales from the initiation mechanisms, crack formation (on the order of micrometres) and shear bands (on the order of millimetres), to entire mountainsides (on the order of kilometres). In particular, the development of a constitutive modelling framework that can unify these scales, and be applied to a digital twin of a physical site while including the effects of thermal fluctuations and increasing presence of liquid water, is critical in being able to accurately capture all of the expected effects. Further, very large deformations are characteristic of landslides and avalanches, meaning that any numerical method must be sufficiently robust in these circumstances. While models for cracks and shear bands incorporating some thermal or phase-change effects exist, they are not sufficiently applicable to the task of modelling the physics of permafrost or snow, nor have they been implemented in an appropriately robust large-deformation numerical method, which is what the researcher proposes to perform in project LEMMA. The TRIPOP team at Inria Grenoble-Rhône-Alpes (GRA) has expertise in the development of mechanical models and their application to hazard reduction in the Alps, and will be the beneficiary, while the SLAB team at EPFL has expertise in the application of material models in large-deformation numerical frameworks, and will host the secondment. The researcher is specialised in developing models for crack propagation and shear band formation. Thus, together they are well-placed to bring together a range of scientific disciplines to address the scientific challenge of developing and implementing appropriate mechanical models for avalanches and landslides due to a changing climate.

**State of the art**

The modelling of crack formation is a long-standing and active area of research. Among several different modelling approaches, cohesive zone models (CZM) are a particularly high-fidelity approach, with a correspondingly large computational cost when used at scale<sup>7</sup>. CZM model the progression of cracks by incorporating a cohesion variable within the fracture process zone that exists ahead of a crack, with the crack advancing when the cohesion reaches zero. Within this particular approach, *extrinsic* CZM, which immediately weaken as the crack opens, are recognised as the most suitable in the case of fast dynamic cracking, as well as the most physically realistic, as they do not suppose any spurious (physically non-existent) strengthening across the crack face<sup>8</sup> (in contrast to *intrinsic* CZM, which have this spurious strengthening). The most advanced CZM include a coupling with friction, a strong enforcement of the non-interpenetration condition when cracks close, and an efficient numerical implementation exploiting convex optimisation<sup>9</sup>. While some extrinsic models exist that include temperature<sup>10</sup>, none exist that include a complete multi-physical coupling between the crack, friction, temperature and solid-fluid phase change, particularly in the context of snow and permafrost modelling.

<sup>1</sup> Keiler, Knight, and Harrison, "Climate Change and Geomorphological Hazards in the Eastern European Alps."

<sup>2</sup> Rist, "Hydrothermal Processes within the Active Layer above Alpine Permafrost in Steep Scree Slopes and Their Influence on Slope Stability."

<sup>3</sup> Haque et al., "Fatal Landslides in Europe."

<sup>4</sup> European Avalanche Warning Services, "Fatalities."

<sup>5</sup> POCTEFA, "SAPYRA – Sécurité Des Accès Pyrénéens Face Au Risque Avalache."

<sup>6</sup> "Massif Du Mont-Blanc: Le Réchauffement Compromet de Nombreuses Ascensions | Les Echos."

<sup>7</sup> Carter et al., "Parallel FEM Simulation of Crack Propagation-Challenges, Status, and Perspectives."

<sup>8</sup> Acary and Monerie, "Nonsmooth Fracture Dynamics Using a Cohesive Zone Approach."

<sup>9</sup> Collins-Craft, Bourrier, and Acary, "On the Formulation and Implementation of Extrinsic Cohesive Zone Models with Contact."

<sup>10</sup> Camacho and Ortiz, "Computational Modelling of Impact Damage in Brittle Materials."

Similarly, the modelling of shear bands has been of interest, particularly within the geomechanics community, for several decades. Their formation is understood to be of particular importance in the triggering of landslides<sup>11</sup>, as well as being the underlying mechanism observed in seismogenic faults<sup>12</sup>. The development of thermo-hydro-mechanical (THM) models<sup>13</sup> is relatively much further advanced within the field of shear band modelling when compared to CZM, but remains under-developed when applied to the specific problems of snow and permafrost, as research attention has been focused on the comparatively much easier to study problem of band formation in rocks and soils at room temperature. Similarly, these models have been implemented in favourable geometry that does not require specialised numerical techniques.

There are several different methods available to conduct an upscaling, where information is passed from the micro-scale to the macro-scale. One recently developed method is data-driven mechanics<sup>14</sup> (DDM), that uses techniques from data science<sup>15</sup> to find the appropriate state of the system to match the requirements of momentum balance. The viable states of the system are selected from a database that contain data points from experiments or numerical simulations. The key benefits of this method are that it removes many of the modeller-dependent constitutive assumptions that would otherwise be necessary to fully capture complex mechanical behaviours, and as the computationally costly simulations of the material model have already been performed at the data-generation stage, speed at the implementation stage is improved. The method has already demonstrated success when employed as a method of upscaling for geomechanics<sup>16</sup>. While there has been some attempt at capturing the fracture process itself in the DDM framework<sup>17</sup>, there has thus far been no use of DDM to upscale data generated using CZM or THM techniques.

In order to implement an upscaled model at the macro-scale which can be at the scale of kilometres, a numerical method must be numerically efficient and robust to very large deformations. A suitable method is the material point method (MPM), a well-developed mesh-free method. MPM techniques are frequently used in the numerical prediction of landslide and avalanche displacements<sup>18,19</sup>, typically with large-strain elasto-plastic models<sup>20</sup>. DDM has not yet been implemented in the MPM framework, and offers substantial potential benefits in reducing computational cost for a method that is otherwise demanding. Hence, the objectives of the project are:

- Objective 1 (O.1): Develop THM models for cracks and shear bands that are specialised for snow and permafrost (work packages WP2 and WP3);
- Objective 2 (O.2): Develop a DDM solver using data from these models (WP4); and
- Objective 3 (O.3): implement the DDM solver in MPM and apply to a reference problem (WP5).

The details of the work packages are listed in Section 3.1. It is clear that each of these objectives represents an achievable step beyond the state-of-the-art, as they involve refinements and new applications of existing techniques. The cumulative effect of each of these increments is a very significant advancement in the ability to accurately predict the likely effects of climate change on the risks of landslides and avalanches in the alpine environment. These scientific objectives will be met by delivering a software suite implementing the models and the DDM solver, and by studying a test-case site (Chamonix), part of the Mont Blanc massif, which crosses the borders between France, Italy and Switzerland.

## 1.2 Soundness of the proposed methodology

### **Overall methodology**

Each scientific objective has a corresponding methodology appropriate to the nature of the challenge.

Objective O.1 will be met by using the techniques of continuum thermo-mechanics to develop appropriate models. These techniques enable the development of material models that adhere to the laws of thermodynamics, and apply to both CZM and shear band models. Using this methodology, two models will be developed. The first of these is the multi-physical CZM (WP2). The purely mechanical part of the CZM is derived from the non-smooth modelling technique, which permits the model to rigorously enforce important behaviours such as non-interpenetration of the crack lips<sup>21</sup>. While an extrinsic CZM that includes temperature exists<sup>22</sup> in the context of

<sup>11</sup> Veveakis, Vardoulakis, and Di Toro, "Thermoporoelasticity of Creeping Landslides: The 1963 Vaiont Slide, Northern Italy."

<sup>12</sup> Sulem, "Stress Orientation Evaluated from Strain Localisation Analysis in Aigion Fault."

<sup>13</sup> Rattetz, Stefanou, and Sulem, "The Importance of Thermo-Hydro-Mechanical Couplings and Microstructure to Strain Localization in 3D Continua with Application to Seismic Faults. Part I: Theory and Linear Stability Analysis."

<sup>14</sup> Kirchdoerfer and Ortiz, "Data-Driven Computational Mechanics."

<sup>15</sup> Kirchdoerfer and Ortiz, "Data Driven Computing with Noisy Material Data Sets."

<sup>16</sup> Karapiperis et al., "Data-Driven Multiscale Modeling in Mechanics."

<sup>17</sup> Carrara et al., "Data-Driven Fracture Mechanics."

<sup>18</sup> Li et al., "The Mechanical Origin of Snow Avalanche Dynamics and Flow Regime Transitions."

<sup>19</sup> Mast et al., "Avalanche and Landslide Simulation Using the Material Point Method: Flow Dynamics and Force Interaction with Structures."

<sup>20</sup> Gaume et al., "Dynamic Anticrack Propagation in Snow."

<sup>21</sup> Acary and Monerie, "Nonsmooth Fracture Dynamics Using a Cohesive Zone Approach."

<sup>22</sup> Camacho and Ortiz, "Computational Modelling of Impact Damage in Brittle Materials."



rapid heating due to impact damage, and intrinsic CZM have been made use of in the context of hydraulic fracturing<sup>23</sup>, no model exists that properly integrates thermo-hydro effects in the context of phase change between solid and liquid of the surrounding matrix, or that allows temperature or level of hydration to be treated as a loading, rather than a byproduct of mechanical loading or not modelled, respectively. All of these aspects are critical to accurately capture the effects due to climate change, as loading can occur simply as a significant increase in temperature or a large rainfall event. The multi-physical nature of the proposed model presents a challenge, as the complexity of the model increases approximately with the square of the number of physical phenomena modelled (i.e a THM model is roughly nine times as complex as a purely mechanical model), making it potentially difficult to use and understand, and increasing the simulation time required to run it (which becomes very pertinent when the model must be run thousands of times to be implemented in a DDM framework). The key approach to minimise this challenge is to choose for each step the simplest possible model that is *adequate* to capture the relevant physical principles, rather than attempting the most refined possible model. This aids both the comprehensibility of the model and its simulation time. The simulation time will also be reduced by exploiting the Siconos software package<sup>24</sup>, developed by the TRIPOP team, which has a range of algorithms for the optimal solution of problems derived from non-smooth models. The second model is a multi-physical shear band model (WP3). Previous approaches to multi-physical modelling with respect to shear band formation have largely been focused on faults<sup>25</sup> and landslides<sup>26</sup>, hence the existing work in the field is closer to the intended project application. Some modifications must be made to adapt these models for snow and permafrost, in particular noting the role of water phase-change. The numerical implementation of the model will be carried out using the robust and fast DifferentialEquations.jl<sup>27</sup> package for the Julia programming language, and the linear stability analysis required to predict shear band width will be implemented in a Julia software suite the researcher developed during his PhD<sup>28</sup>. The challenges for this part of the project are much the same as for the multi-physical CZM, and have the same solutions, other than using DifferentialEquations.jl rather than Siconos. Thus, research objective O.1 will be met using continuum thermo-mechanics, exploiting the knowledge and previously developed software of both the host team and the researcher, and will be addressed in WP2 and WP3.

Objective O.2 is the development of a DDM solver, which will be met using the techniques of mathematical optimisation. In DDM, physical laws such as momentum balance are strictly enforced, while the typical constitutive laws that describe material behaviour are replaced by a database search process that finds the material state that best adheres to the enforced physical law. In the event no satisfactory point is found, on-the-fly simulations can be conducted to generate one. The challenge for this aspect of the project is to extend DDM to non-continuous media (e.g. two bodies in contact) while ensuring that additional physical laws such as non-interpenetration are respected. This challenge will be addressed by specifying an appropriate non-smooth metric for the phase space, and using the Siconos software package that is equipped with a range of algorithms for mathematical optimisation that are robust and efficient, and that are tailored to the solution of the optimisation problems arising from non-smooth behaviour. Thus, Objective O.2 will be addressed by using this pre-existing and well-tested software developed by the host team, and will be addressed in WP4.

Objective O.3 is using an implementation of the DDM solver in the MPM, and applying it to the Mont Blanc massif at Chamonix. An existing MPM code base that has demonstrated successful resolution of advanced constitutive models<sup>29,30</sup>, and which is used extensively by the secondment team at SLAB, in close cooperation with the code base developers, will be used. Inserting the DDM as a modular component of an existing MPM code base minimises the required development effort while ensuring that the overall system remains robust and efficient. The challenges for this task are ensuring that the implementation delivers physically realistic results at the field scale when the constitutive model is replaced with the DDM solver. This challenge will be resolved by validating the simulation on standard problems with known qualitatively correct solutions, such as ideal slopes<sup>31</sup>. Once reliable performance has been demonstrated, the MPM system will be applied to the problem of simulating landslides and avalanches due to climate change in Chamonix. This area has been extensively studied and measured by the EDYTEM laboratory of Université Savoie-Mont-Blanc, meaning that high-fidelity information is available to use for

<sup>23</sup> Sarris and Papanastasiou, "The Influence of the Cohesive Process Zone in Hydraulic Fracturing Modelling."

<sup>24</sup> Acary et al., "An Introduction to Siconos."

<sup>25</sup> Veakakis, Sulem, and Stefanou, "Modeling of Fault Gouges with Cosserat Continuum Mechanics: Influence of Thermal Pressurization and Chemical Decomposition as Coseismic Weakening Mechanisms."

<sup>26</sup> Seguí et al., "The Interplay between Phyllosilicates Fabric and Mechanical Response of Deep-Seated Landslides. The Case of El Forn de Canillo Landslide (Andorra)."

<sup>27</sup> Rackauckas and Nie, "DifferentialEquations.jl – A Performant and Feature-Rich Ecosystem for Solving Differential Equations in Julia."

<sup>28</sup> Collins-Craft, "Julia Constitutive Model Integration."

<sup>29</sup> Jiang et al., "The Material Point Method for Simulating Continuum Materials."

<sup>30</sup> Wolper et al., "CD-MPM: Continuum Damage Material Point Methods for Dynamic Fracture Animation."

<sup>31</sup> Li et al., "The Mechanical Origin of Snow Avalanche Dynamics and Flow Regime Transitions."

specific prediction purposes<sup>32</sup>. A collaboration with EDYTEM researchers is foreseen for the final stage of this objective, so that the existing data and extensive local knowledge can be exploited to best target specific area to simulate. Hence, objective O.3 will be completed using the expertise and software base of the secondment team, as well as with high-fidelity data at Chamonix, and will be addressed in WP5.

### Integration of methods and disciplines

The project and methodological approach is inherently cross-disciplinary. While the core discipline of the project is mechanics, which would typically fall within civil and mechanical engineering, it features significant interactions with other neighbouring disciplines. Of particular note is that DDM inherently demands the cross-disciplinary adoption of techniques from data science, in order to achieve solutions that are satisfactory within the realm of mechanics. In order to implement both mechanics and data science methods in an effective and efficient manner, techniques developed within applied mathematics for the solution of differential equations (MPM) and convex optimisation problems (cone complementarity problems) will be applied. Finally, the physical context in which the macro-scale method will be applied is the domain of geology, while the physical inputs to observe the mechanical changes effected are to be drawn from climate science. Thus, five separate disciplines are employed in the project, with particularly important contributions from mechanics and applied mathematics. The different disciplines implicated in each work package are listed in the table below:

	Disciplines				
Work Package	Mechanics	Applied mathematics	Data science	Geology	Climate science
WP2: CZM	***	**			
WP3: Shear band	***	**			
WP4: DDM		*	***		
WP5: MPM	***	**		**	**

The number of \* indicate the extent to which different disciplines are employed in different WPs, with three \* indicating the highest level of importance.

It should be noted that WP4 relies on WP2 and WP3, and WP5 relies on WP2, WP3 and WP4, meaning that certain disciplines are still required to deliver WP4 and WP5, even if they are not implicated in the WP itself.

### Gender dimension

No gender dimension is foreseen, as the project deals purely with physical data and its mathematical treatment.

### Open science practices and research data management

Open science practices will be implemented as a core part of the project. A key part of the project is the generation of data by means of repeated simulations of micro-scale models. These models will be made available in open code repositories as soon as it is available, for scrutiny, implementation and adaptation by other scientists and engineers, for their own use in both scientific and engineering work. This code will be accompanied by extensive documentation and references to the model that it simulates, and pending sufficient interest, an open code workshop will be held to support wider uptake. Further, the generated data itself will be made available through the open-access repository Zenodo, which is supported by the EU and operated by CERN. Zenodo stores data with a unique and searchable identifier, as well as the appropriate metadata, and is accessible over the internet. Thus data on Zenodo is inherently both *Findable* and *Accessible*. For this project data and metadata will be stored using the widely-used xdmf standard, and metadata will contain references to where its vocabulary is explained, and links to other relevant data sets. These protocols ensure that the data is *Interoperable*. The metadata will be made as rich as possible, by including durable links to descriptions of the models and codes that generated given data sets, ensuring that the data provenance is clear and the metadata meets the standards of the mechanics community. The data will be released under the permissive Apache licence. These protocols ensure that the data is *Reusable*. This ensures that all of the data generated in the project is managed under FAIR principles. Including these open science practices as part of the project ensures that the code base and the data of the project have the earliest and widest diffusion possible. This, in concert with the data management plan and the dissemination plans detailed in Section 2.2, will enable the researcher to gather feedback from the scientific community, and ameliorate any key weaknesses or shortcomings identified, thus meaning that the predictions made in WP5 to address O.3 are more likely to be robust and reliable.

### 1.3 Quality of the supervision, training and of the two-way transfer of knowledge between the researcher and the host.

#### Qualifications and experience of the supervisors

The supervisor at Inria will be Dr Vincent Acary. He is currently the team leader of the TRIPOP team at Inria GRA. This team is composed of four permanent full-time researchers and one researcher shared with another research

<sup>32</sup> Ravel, Magnin, and Deline, "Impacts of the 2003 and 2015 Summer Heatwaves on Permafrost-Affected Rock-Walls in the Mont Blanc Massif."

institute (INRAE Grenoble), as well as two associated university faculty members and two research engineers, three postdocs and four PhD students. Two of the current postdocs, and four of the PhD students are supervised by Dr Acary. In addition, he has previously supervised six postdocs, seven research engineers, four PhD students and supervised a further four students during PhD internships. Of his previously supervised postdocs, four continued in academia while the remainder are in private industry. His research interests relevant to this project lie in several areas of computational mechanics, in particular cohesive zone modelling, rigid-body mechanics and convex optimisation, in all of which he has over twenty years of experience, dating back to his PhD work. His main international collaborations are with Olivier Bruls (University of Liège) and Matthias Legrand (McGill University). He has led the the French national research agency ANR project SALADYN (2009-12, €950K), participated in the EU project SICONOS (2001-05, €2.8M) and the ANR projects VAL-AMS (2007-09, €261K), ChaSlim (2011-15, €370K) and DIGITSLID (2019-21, €338K), and the Auvergne-Rhône-Alpes region project SMART-PROTECT (2019-2022, €565K). In addition, the project will feature key input from Dr Franck Bourrier (Inria and INRAE), who has extensive expertise on the application of rigid-body mechanics to mountainous hazards such as rockfalls and landslides. TRIPOP also has extensive support for the software development and implementation required to deliver the project, through two research engineers, who are key contributors to the development of Siconos. The project will feature an academic secondment phase, where the researcher will be supervised by Dr Johan Gaume. He is an assistant professor at the École Polytechnique Fédérale de Lausanne (EPFL), and leads the Snow and Avalanche Simulation Laboratory (SLAB). This team is composed of four postdocs and four PhD students, all supervised by Dr Gaume. He is the co-supervisor of two additional PhD students. His research interests relevant to this project are the study of large-deformation problems such as avalanches via numerical methods, in particular using the MPM. He has worked in this problem area for over a decade, including during his PhD. His main international collaborations are with Chenfanfu Jiang and Joseph Teran (both at the University of California, Los Angeles). He has received over CHF 2M of financing from the Swiss National Science Foundation.

#### Planned training activities for the researcher

The researcher will be trained at three levels, by the supervisors, the host institutions, and by the Grenoble research community, primarily via Université Grenoble-Alpes (UGA). The primary research training method will be training-through-research, with more intensive training delivered by the project supervisors Dr Vincent Acary and Dr Johan Gaume as required. In the case of model development, where the researcher already has extensive experience, training will be as-needed, and thus dispersed throughout WP2 and WP3. For the areas where the researcher is less experienced, optimisation and MPM implementation, the training will be delivered intensively at the start of the work packages WP4 and WP5. Further, the researcher will attend courses made available by the UGA doctoral school to add breadth and depth to his knowledge of data science before starting WP4, and will attend courses made available by UGA GRICAD to strengthen his competences in high performance computing (HPC) and data management before starting WP5. GRICAD also offers support and training on improving code, which can be accessed as required. The researcher will also undertake extensive transversal training. The researcher will be trained in science communication to journalists and the wider public via a two day intensive workshop offered by the Inria Communications Office. The researcher will attend a two day course offered by the UGA doctoral school for teaching at the tertiary level. Dependent on student availability and interest, the researcher will take a role in the supervision of masters students during their research internships, where he will be trained in research supervision by his own supervisors. The researcher will participate in the monthly “Parlons Europe” sessions offered by Inria GRA, that trains researchers in scientific management and grant writing, particularly with respect to ERC projects. Finally, the researcher will undertake a workshop and intensive coaching offered by Inria, directed towards succeeding in the competitive process to obtain a permanent research position. The training and time allocated for each activity are listed in the table below:

Training activity	Training level	Type of skill trained: scientific (S), transversal (T)	Time
Model development	Supervisors	S: Research	~20 days in total, throughout WP2 and WP3
Algorithm implementation	Supervisors	S: Research	~5 days in total, at start of WP4
MPM implementation	Supervisors	S: Research, software development	~10 days in total, at start of WP5
Data science tools	Grenoble environment	S: Fundamental background, research, software utilisation	7 days, as available (to be completed before WP4 starts)
High performance computing, data stewardship	Grenoble environment	S: Research, software development, data maintenance	9 days, as available (to be completed before WP5 starts)
Project and grant management and applications	Host institutions	T: Project management and grant writing, particularly for the ERC	1 hour/month, throughout project duration (WP1)
Scientific communication	Host institutions	T: Scientific communication to a wider public	2 days, when available (WP6)

Teaching at the tertiary level	Grenoble environment	T: Lecturing and supervision of university students	2 days, as available
Gaining a permanent research position	Host institutions	T: Professional development	Up to 5 days, in the second year of the project

### Two-way transfer of knowledge

Inria will transfer knowledge to the researcher, particularly in the form of CZM and convex optimisation techniques, via training-through-research. This transfer will come via the main supervisor, as well as interactions with other members of the TRIPOP team, and will be supported by Inria's provision of resources. Software development principles will also be transferred to the researcher via interactions with the TRIPOP research engineers. EPFL will transfer knowledge to the researcher via training-through-research applied to the MPM. This transfer will be via the secondment supervisor, and will be supported by EPFL's provision of the appropriate resources for project implementation. Exposure to a wider network of researchers, such as the applied mathematicians working in optimisation or MPM, will serve to broaden the researcher's knowledge.

The researcher will also transfer knowledge to Inria. The researcher has extensive expertise in the modelling of shear band formation, particularly in the context of complex physical systems. His PhD thesis was centred on modelling shear bands in crushable granular media, and he will transfer his knowledge of the appropriate continuum modelling techniques, as well as the appropriate numerical approaches for successful analysis of shear band behaviour, a key part of the project. The researcher will also contribute to strengthening Inria's reputation in the mechanics community by integrating it within the ALERT Geomechanics community, that includes 33 universities or research institutes across Europe. The researcher also brings extensive contacts within the mechanics community in his home country of Australia, offering further opportunity to integrate Inria and strengthen its reputation in this field. This integration will take place via the dissemination of the scientific project in this community, the production of documentation for the code base, the delivery of scientific seminars to research groups in this community, and the teaching of courses, in particular at the doctoral school attached to the annual ALERT workshop.

#### 1. 4 Quality and appropriateness of the researcher's professional experience, competences and skills

The researcher is appropriately qualified to undertake this project. The researcher completed a PhD in geomechanics, with previously mentioned focus on shear band modelling of crushable granular media. As a consequence the researcher has expertise in the development of complex constitutive models that take into account the changing micro-structure of the material being modelled. In addition, the model the researcher developed during his PhD is embedded in the Cosserat continuum, a type of higher-order continuum. The use of higher-order continuum models is essential in order to be able to correctly model shear band formation, as in the absence of higher-order terms, shear bands are falsely predicted to have zero thickness. This in turn leads to gross inaccuracies when trying to model the behaviour of the overall system. This work resulted in a publication in the Journal of the Mechanics and Physics of Solids (JMPS), one of the most highly regarded journals in solid mechanics. Further, the researcher has presented his work at several selective international conferences, as well as several smaller seminars. Thus, parts of the researcher's expertise that are necessary for successful completion of the project lie outside those of both the host team (CZM and optimisation), and the secondment team (MPM). Each participant in the project has complementary skills necessary for the project's success.

The researcher has (since November 2020) been engaged as a postdoctoral scholar, working on the development of extrinsic cohesive zone models. These models are used to model crack propagation, and are particularly suitable in situations of rapid crack propagation. Further, the model is developed in an efficient numerical framework exploiting the structure of linear complementarity problems so that it can be resolved more rapidly than is typical for models of this type. The model also implements concepts from rigid-body mechanics, that ensure accurate physical behaviour when cracks are closed, or when fully cracked bodies impact each other<sup>33</sup>. This background means that the researcher is already well-integrated in the host team, and is well-placed to efficiently deliver WP2 and WP3.

## SECTION 2: IMPACT

### 2.1 Credibility of the measures to enhance the career perspectives and employability of the researcher and contribution to his/her skills development.

#### Expected skill development of the researcher

The researcher will further develop his existing scientific skills in continuum mechanics, with a particular emphasis on CZM, shear bands and multi-physical couplings, to be delivered via training-through-research and continued

<sup>33</sup> Collins-Craft, Bourrier, and Acary, "On the Formulation and Implementation of Extrinsic Cohesive Zone Models with Contact."



dissemination activities. The researcher will gain new expertise in mathematical optimisation and techniques from data science, delivered by training courses as well as training through research. The researcher will widen his knowledge of numerical simulation techniques, through the implementation of the MPM, and undertaking training courses in HPC techniques. The researcher's transversal skills will be developed via training courses in scientific communication and teaching at a university level, coaching for grant writing and management, and obtaining a permanent academic position. Thus, the researcher will develop all of the skills necessary to starting a career as a permanent academic researcher, through the training program listed in section 1.3.

### **Expected impact on the researcher's career perspectives**

The project is expected to substantially strengthen the researcher's employment prospects within academia. In the first instance, the relevance of studying the effects of climate change on a range of systems is likely to only increase in the future, and thus the knowledge and skills gained in the project will continue to be applicable all over the world. Secondly, the modelling and simulation techniques that will be developed and refined for the project are relevant for a very wide range of problem areas in mechanics, ranging from the natural landscapes, such as rocks, to artificial materials such as concrete and laminates. In particular, DDM is an area that is expected to receive increasing focus and attention in the near future.

The additional transversal skills and professional network developed in the project, as well as the coaching in obtaining a permanent academic position, strongly increase the researcher's prospects in finding a permanent academic post in Europe, both in his core disciplines of civil and mechanical engineering, but also in applied mathematics or geology. The host institution, Inria, offers specific positions to early career researchers that provide extensive support towards obtaining ERC grants, making such a position a logical next step after this fellowship.

## *2.2 Suitability and quality of the measures to maximise expected outcomes and impacts, as set out in the dissemination and exploitation plan, including communication activities.*

### **Dissemination, communication and exploitation activities**

The dissemination of the results will be targeted to mechanicians and members of adjacent communities such as geologists, in particular those focused on geomechanics. Key journals serving the relevant communities will be targeted, particularly those with Open Access (OA) policies. Corresponding wide-audience conferences will also highlight the project to a broad range of researchers. The researcher will also focus dissemination on specific scientific communities that he already has existing links with, such as the ALERT Geomaterials community (that is based in Grenoble). The yearly meeting in October is a particularly strong candidate for dissemination activities. Contacts in the researcher's native country of Australia, built during his PhD, will be exploited at highly selective conferences, as well the wider French mechanics community represented by the Mécamat organisation and its annual colloquium. Specific dissemination targets are listed in the table below:

Dissemination mode	Typical dissemination targets	Intended audience
Journals.	Mechanics journals such as JMPS (gold OA), geomechanics journals such as the Journal of Geophysical Research: Solid Earth (hybrid OA) and Open Geomechanics (diamond OA), and journals focusing on cold environments such as The Cryosphere (gold OA).	Mechanicians, geologists, environmental scientists, respectively.
Wide-audience conferences	International Congress of Theoretical and Applied Mechanics, EUROConference on Rock Mechanics and Rock Physics, GeoProc, and the American and European Geophysical Unions' congresses.	Mechanicians and geologists, particularly those interested in multi-physical processes. There is considerable overlap between these communities.
Narrow-focus conferences	ALERT Geomaterials workshop, Patterns in Geomechanics, Mécamat colloquium	European geomechanics researchers, global geomechanics researchers, and the French mechanics community respectively. The researcher already has extensive links with the first two scientific communities, while Dr Vincent Acary has long-standing ties to the third.

The preprints and postprints of journal articles and conference contributions will be made available on the durable open-access repository HAL that is supported by the French state scientific organisation CNRS, to allow free access to all the key research outputs of the project. In his dissemination activities, the researcher will highlight to the scientific community the power and flexibility of the DDM method, the high physical fidelity of the CZM and shear band models, and the pressing societal relevance of the scientific questions.

Communication will be targeted to the general public, with a special emphasis on residents of the Alpine Arc. General interest media that reaches the widest possible audience will be addressed via websites such as The Conversation, which has a large readership and publishes in several different languages. Inria also possesses a Communications Office, that will assist in targeting appropriate regional media outlets, such as newspapers and radio and television stations, so that residents of the Alpine Arc in particular are reached. Scientifically curious

members of the public will be addressed by participation in special scientific outreach events, and through regular media segments focusing on science. Specific communication targets are listed in the table below:

Communication mode	Typical communication targets	Intended audience
Websites	The Conversation, in both English and French language editions. This website has 42M readers each month across all editions, and articles can be freely re-used by other publications.	The general public
Alpine regional media	Regional newspapers such as Dauphiné Libéré (175K readers), Neue Zürcher Zeitung (240K readers). Radio and television stations such as France 3 Auvergne-Rhône-Alpes, Radio France Bleu Isère.	Residents of the Alpine Arc
Scientific outreach events and segments	Local scientific media segments such as the weekly discussion of Inria research projects on Radio France Bleu Isère, organised scientific outreach events such as The Pint of Science Festival, MSCA events such as the European Researchers' Night.	Scientifically curious members of the general public.

The communication strategy will emphasise the increased risks that are expected to be demonstrated due to the effects of climate change on the likelihood of avalanches and landslides. This will be accompanied with a call-to-action, that readers press their governments to address climate change at the global scale, while also putting in place mitigations and safety measures at the local scale, particularly within the alpine environment.

The exploitation of the work will be focused on two key audiences, engineers and the Chamonix guides association. The first of these will be targeted via attendance and presentation at the joint academic-industrial International Symposium on Rock Slope Stability, that occurs biannually in Chambéry, the neighbouring city to Grenoble. The researcher will highlight for the industrial audience the flexibility and computational efficiency of the method, as well as its open-access nature, allowing them to exploit it for industrial purposes. Secondly, the results of the project will be communicated via seminar to the association of mountain guides for Chamonix. The code for the project will be delivered to the association with a simplified user-friendly interface, allowing guides to run their own simulations on areas of concern on their personal computers. This will allow them to better assess the level of increased risk to their guided hiking trails, and plan safer routes over the Mont-Blanc massif that will be less affected by climate change, as well as communicate these results themselves in the regular seminars they hold for the public.

### Management of intellectual property

No intellectual property that is commercially exploitable is expected to be generated by this project. The underlying data and codes produced will be made publicly available, with the permissive Apache licence, so that other members of the scientific community or the wider public can further develop and use the project's results in their work.

### 2.3. The magnitude and importance of the project's contribution to the expected scientific, societal and economic impacts

#### Scientific

Scientifically, the project's aims of developing micro-scale constitutive models that are comprehensive in terms of the included physics (including thermal and hydro effects within the context of crack and shear band modelling for permafrost, snow pack etc) represents a significant increase over the state-of-the-art within the field. In addition, the framing of the models in terms of convex optimisation problems allows the creation of extremely numerically efficient models, relative to standard solution techniques. This is essential when running models at a large-scale, such as a mountainside, often requires tens or hundreds of CPUs running for hundreds of hours. Further, the data-driven paradigm adopted for the project represents a significant advance over the typical modelling approach adopted in geomechanics. The large numbers of parameters and assumptions that are used in the standard approach to constitutive modelling result in models where results are highly dependent on modeller choices, and models can become extremely inaccurate outside of their calibrated range. By using only micro-scale models, the project will constrain the constitutive assumptions to levels where they can be more accurately measured in laboratory or field tests. Thus, when using the data-driven mechanics paradigm to upscale to the field scale, fewer model assumptions are carried, and a significant reduction in the effect of subjective modeller choices occurs. This allows the macro-scale model to continue making accurate predictions under almost any conditions, as the micro-scale models that generate the data remain well-constrained and within their calibrated range. This is particularly important when considering that the implementation framework for the macro-scale model is the MPM, which is typically used in cases where very large deformations occur, placing models well outside their calibrated ranges.

The impact on the targeted scientific community is expected to be significant. Taking the ALERT Geomaterials community as an example, the 2021 workshop dedicated its first day to the study of landslides, while the second day was dedicated to machine learning and data-driven mechanics. The attached doctoral school was on the topic of constitutive modelling. This indicates a significant appetite within the community for exactly the advances that are offered by the project, which integrate constitutive modelling, data science and large-deformation implementations

in MPM. As a rough estimate, two-thirds of the ALERT community work in constitutive modelling, numerical methods, or their intersection, and it is expected that the advances made by the project will be of significant interest to anyone within that subset. This ratio, and the concurrent interest, is likely to hold for the wider (i.e. outside Europe) geomechanical community as well. Further interest from the wider mechanics community is expected, as the data-driven framework as applied to crack modelling in particular is of wide applicability across areas as broad as soft materials, laminates and advanced manufacturing such as 3D printing.

### Societal and economic

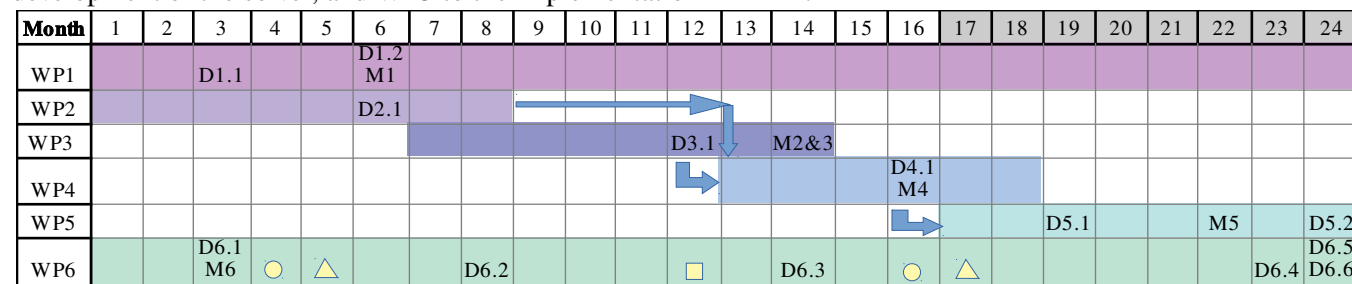
The societal and economic impacts of the project are closely intertwined. By applying the model to Chamonix, specific predictions of landslides and avalanches can be made. Thus, risk maps can be updated, showing where building may be allowed, where protection structures must be added and where infrastructure must be removed or adapted. This is expected to reduce mortality and economic damage from landslides and avalanches. As the tourist income of the village depends significantly on the Mont Blanc massif, accurate knowledge of the local consequences of climate change is particularly important to plan adaptation and mitigation strategies. While the exact numbers cannot be accurately calibrated in advance of the results of the project, between 1995-2014, 1370 deaths occurred from landslides and €4.9 billion (in 2021 values) of economic loss were incurred on average each year<sup>34</sup>. As landslides and avalanches will be more frequent under climate change, the risk will dramatically increase. Thus, being able to predict the required mitigation efforts is likely have a significant benefit both economically, and in terms of lives saved.

## SECTION 3: QUALITY AND EFFICIENCY OF THE IMPLEMENTATION

### 3.1 Quality and effectiveness of the work plan, assessment of risks and appropriateness of the effort assigned to work packages.

#### Overall structure of the work plan

The work plan is divided into 6 work packages, with WP1 devoted to project management, and WP6 to communication and dissemination. WP2 and WP3 relate to the development of the models, WP4 to the development of the solver, and WP5 to the implementation in MPM.



Gantt chart showing the allocated time in months from the start of the project. The months highlighted in grey indicate the period on secondment at EPFL. The arrows indicate the relations between the work packages. The triangles, circles and squares indicate ALERT conference, European researcher's night, and a Pint of Science respectively, assuming a project starting in June.

Work Package and effort	Aims, tasks (T), milestones (M), deliverables (D)
Work Package 1: Project management Researcher: 2 person-months Supervisors: 0.25 person-months	Aims: Monitoring and planning of project T1.1 Fortnightly meetings with supervisors, T1.2 Organisation of secondment period, T1.3 Training activities (other than training through research). D1.1 Career development plan, D1.2 Data management plan M1 Career development and data management plans complete
Work Package 2: Crack model Researcher: 5.5 person-months Supervisors: 0.5 person-months	Aims: Development of a multi-physics crack model and generation of micro-scale data from model T2.1 Model development, T2.2 Data generation, T2.3 Training through research D2.1 Model code and data-set
Work Package 3: Shear band model Researcher: 5.5 person-months Supervisors: 0.5 person-months	Aims: Development of a multi-physics shear band model and generation of micro-scale data from model T3.1 Model development, T3.2 Data generation, T3.3 Training through research D3.1 Model code and data-set M2&3 Both models complete
Work Package 4: Data-driven solver Researcher: 2 person-months Supervisors: 0.25 person-months	Aims: Implementation of data-driven solver T4.1 Solver development, T4.2 Training through research D4.1 Solver code M4 Solver complete
Work Package 5: MPM implementation Researcher: 7 person-months Supervisors: 0.5 person-months	Aims: Implementation of micro-scale models into macro-scale model via data-driven solver T5.1 Integration of data-driven solver into existing MPM code base, T5.2 Test macro-scale model on standard problems, T5.3 Apply macro-scale model to field-scale problems, T5.4 Training through research D5.1 MPM code with integrated solver, D5.2 Simplified interface to code M5 Field application at Chamonix complete

<sup>34</sup> Haque et al., "Fatal Landslides in Europe."

Work Package 6: Communication, dissemination and exploitation Researcher: 2 person-months Supervisors: 0.25 person-months	Aims: Communication, dissemination and outreach T6.1 Present conference communications T6.2 Write scientific papers T6.3 Write communication articles T6.4 Prepare communication and exploitation seminar D6.1 Dissemination and Exploitation plan D6.2 Paper for crack model, D6.3 Paper for shear band model, D6.4 Paper for MPM implementation, D6.5 Have communication articles published, D6.6 Deliver seminar for Chamonix guides M6 Dissemination and Exploitation plan complete
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### Mechanisms to assess and mitigate risk

As each milestone is achieved, the time taken to complete the task will be assessed to ensure that the project remains on track. Any unforeseen risks that reveal themselves will be considered, and mitigation measures will be put in place for the remaining work packages. The main risks to the successful completion of the project are listed below:

Risk description, probability of occurrence (P) and impact (I)	Risk management strategies
<b>Risk 1:</b> Multi-physical crack model takes longer than foreseen to develop and implement, simulation speed is slower than foreseen (WP2). <i>P=moderate, I=low.</i>	WP2 is scheduled to be completed 8 months before it is required, to be implemented in WP5, giving a very large buffer time to resolve issues. The model is to be an extension of one that the researcher has already developed, significantly aiding familiarity. In the worst case, one of either the temperature or hydraulic effects can be removed, while still capturing important climate-change-related processes.
<b>Risk 2:</b> Multi-physical shear band model takes longer than foreseen to develop and implement, simulation speed is slower than foreseen (WP3). <i>P=moderate, I=low.</i>	WP3 features less buffer time than WP2, but still has 2 months during which WP4 is to be completed as a buffer time to resolve issues. The multi-physical aspects of the shear band model are generally shared with those in WP2, meaning that the development time allocated to WP3 is over-estimated, giving further buffer time. and in the worst case, the same mitigation as WP2 can be applied.
<b>Risk 3:</b> Data-driven solver is difficult to integrate with other software (WP4). <i>P=low, I=moderate.</i>	WP4 features significant buffer time to allow iteration and debugging of its integration with other software (Siconos and MPM primarily). The expertise of TRIPOP research engineers will be exploited to ensure good code development practices, minimising the risk of failed integration. In the worst case, one of the models can be removed from the solver, to reduce the size of the task.
<b>Risk 4:</b> MPM implementation is slow or unreliable (WP5). <i>P=low, I=moderate.</i>	The MPM will be implemented using a well-established code base that is known to run quickly and reliably, minimising the risk of the implementation being poor. Further, standard tests are included as measures of both software reliability and simulation fidelity. In the worst case, the DDM component can be removed, and the developed material models simulated directly, however this will require smaller and less realistic simulations in order to remain computationally viable.
<b>Risk 5:</b> MPM implementation cannot be applied and disseminated (WP5 and WP6). <i>P=low, I=moderate.</i>	Even in the event where application to the Chamonix site proves impossible, the general principles of the implementation and their potential use there will still be disseminated.

### 3.2 Quality and capacity of the host institutions and participating organisations, including hosting arrangements.

#### Quality and capacity of the host institutions

The researcher will be hosted in the TRIPOP team of Inria, at the Centre Inria Grenoble-Rhône-Alpes, in the Grenoble metropolitan area. Inria will provide all of the standard research support required, including access to an office and workstation, Human Resources and Information Technology and library services. Inria is a signatory to the European Charter & Code for Researchers, and has been given the HR Excellence in Research Award, showing sustained support for researchers and the research environment. Inria also offers substantial support to its researchers in making applications to external funding agencies, with support at both the level of the national institute, as well as the local centre. TRIPOP has access to research engineers to aid in the development of numerical tools, as well as local computing resources.

As part of its integration in the Grenoble research environment, Inria GRA is associated with Université Grenoble-Alpes (UGA). UGA is a large research university, with 59,000 students (of which 2900 are PhDs), 3,100 researchers, and 3,700 support staff. Researchers at the university have been awarded 124 ERC grants since 2007. Through Inria, the researcher will have access to UGA high-performance computing (HPC) resources through the GRICAD service of the university. This service also provides technical support in the implementation of HPC by assisting researchers in deploying their codes in an efficient way to maximally exploit the available computational resources. Similarly, the researcher is able to access relevant courses offered by UGA, either through GRICAD, or the doctoral school.

The researcher will also perform a secondment at the École Polytechnique Fédérale de Lausanne (EPFL), where he will similarly have access to the standard research support required, such as office space and workstation, IT and HR support. The workstations are optimised for scientific computing, with substantial CPU, RAM and GPU resources, and access is available to EPFL's HPC cluster SCITAS. EPFL is a signatory to the European Charter & Code for Researchers. He will be integrated into the Snow and Avalanche Simulation Laboratory (SLAB), a team lead by Dr Johan Gaume, who currently supervises four postdoctoral researchers and four doctoral students. This integration will occur by the researcher participating in lab meetings, presenting his research work to date in an introductory seminar, as well as general participation in the life of the lab, such as taking a role in the partial supervision of masters students (where student availability and interest allows).



## Curriculum Vitae – Nicholas Anton Collins-Craft

### Experience

Postdoc in the TRIPOP team at Inria Grenoble-Rhône-Alpes, supervised by Dr Vincent Acary and Dr Franck Bourrier. Commenced 01/11/2020 (start delayed from 01/04/2020 due to the pandemic).

- Theoretical development of cohesive zone model for the propagation of cracks in quasi-brittle materials, using techniques from non-smooth analysis.
- Numerical implementation of the model in the Siconos software package, using convex optimisation algorithms.
- Industrial linkage with partner company Géolithe via Project SMART-PROTECT.

PhD student jointly between the SciGEM laboratory at the University of Sydney, and the CERMES team at École nationale des ponts et chaussées (ENPC). Jointly supervised under a cotutelle agreement by Professor Itai Einav (Sydney), Professeur Jean Sulem and Dr Ioannis Stefanou (ENPC). From 22/06/2015 to 01/05/2020.

- Experimental investigation of the effect of grain size polydispersity in controlling the width of shear band formation, using the experimental apparatus ACSA.
- Development and adaptation of image analysis techniques suitable to the non-rectilinear nature of the experimental apparatus.
- Theoretical development of a constitutive model integrating Breakage Mechanics with the Cosserat continuum, enabling length scale evolution to be included in geomechanical models.
- Theoretical and numerical study of shear band model predictions by means of linear stability analysis, and development of software suite in Julia to enable model integration and bifurcation analysis.
- Numerical study of shear band formation by means of the finite element method to enable accurate determination of post-localisation behaviour.

### Education

Doctor of Philosophy/Doctorat from the University of Sydney and Université Paris-Est (undertaken at the École nationale des ponts et chaussées).

Thesis title: *The effect of evolving micro-structural length scale on the macroscopic constitutive behaviour of granular media*. Commenced 22/06/2015, defended 22/11/2019, completed requirements 01/05/2020.

The University of Sydney is Australia's oldest university and forms part of the Group of Eight of elite Australian research universities. In the 2021 QS World University Rankings, the School of Civil Engineering was ranked 14<sup>th</sup> in the world. École nationale des ponts et chaussées is the world's oldest school of civil engineering, and one of France's most selective *grandes écoles*, being ranked 4<sup>th</sup> best by the Le Figaro rankings in 2021.

Bachelor of Engineering in Civil Engineering with First Class Honours and the University Medal from the University of Sydney.

Honours Thesis advisor: Professor Itai Einav.

Thesis title: *The Contribution of Granular Rotation to Improving the Efficiency of Heat Transfer*. Commenced 28/02/2011, completed 23/11/2014.

- Civil engineering degree completed with specialisations in wind engineering, foundation analysis, advanced analysis of steel structures, and advanced analysis of concrete structures.
- Graduated first in cohort with highest honours obtainable.

Certificate of Advanced Engineering from the University of Sydney.

Undertaken as an extension program in parallel with the Bachelor's degree.

Commenced 28/02/2011, completed 23/11/2014.

- Humanitarian engineering: developing a project for Engineers Without Borders to supply clean drinking water for the village of Devikulam in Kerala, India.
- Educational outreach: developing and delivering a teaching program for the Abbotsleigh School for Girls in Sydney, Australia, in order to encourage more girls to study engineering at the tertiary level.
- Product commercialisation: developing and pitching a business plan in order to attract financing from commercial investors.

*Journal Articles*

A Cosserat Breakage Mechanics model for brittle granular media,  
N. A. Collins-Craft, I. Stefanou, J. Sulem & I. Einav, in the *Journal of the Mechanics and Physics of Solids*, Volume 141, August 2020,  
<https://doi.org/10.1016/j.jmps.2020.103975>. Cited 11 times. JMPS is regarded as the premier journal in the field of mechanics of solids, and covers all areas and approaches to the field, from experimental to theoretical, and from the fundamentals of mechanics to newly discovered applications. It has an acceptance rate of 24%, and is typically read by researchers in all sub-specialisations of solid mechanics.

*Pre-prints*

On the formulation and implementation of extrinsic cohesive zone models with contact,  
N. A. Collins-Craft, F. Bourrier & V. Acary, preprint available on HAL at  
<https://hal.archives-ouvertes.fr/hal-03371667v1/>. Article for submission to JMPS.

*Software*

Julia constitutive model integration code,  
N. A. Collins-Craft, software suite for the numerical integration of constitutive models, available on github at  
[https://github.com/nickcollins-craft/julia\\_constitutive\\_model\\_integration](https://github.com/nickcollins-craft/julia_constitutive_model_integration).

*Conference Presentations*

International Congress of Theoretical and Applied Mechanics 2020+1, Milan, Italy,  
22/08/2021 – 27/08/2021.

*Unifying Breakage Mechanics with the Cosserat continuum to predict shear band localisation.* N. A. Collins-Craft, I. Stefanou, J. Sulem & I. Einav.

Micro2Macro 2018, Reggio Calabria, Italy, 29/05/2018 – 01/06/2018/

*A theory to predict shear band formation in granular media with evolving grain size distributions.* N. A. Collins-Craft, I. Stefanou, J. Sulem & I. Einav.

12<sup>th</sup> EURO-conference on Rock Physics & Geomechanics, Ma'ale HaHamisha,  
Israel, 05/11/2017 – 10/11/2017.

*A formulation of Breakage mechanics in the Cosserat continuum to predict shear band formation in granular media.* N. A. Collins-Craft, I. Stefanou, J. Sulem & I. Einav.

*Conference Posters*

Patterns in Geomechanics, Sydney, Australia, 29/01/2019 – 01/02/2019.

*The effect of grain size reduction on shear band formation.* N. A. Collins-Craft, I. Stefanou, J. Sulem & I. Einav.

AGU Fall meeting, Washington D.C., USA, 10/12/2018 – 14/12/2018.

*The effect of grain size reduction during shearing of granulated fault gouge. N. A. Collins-Craft, I. Stefanou, J. Sulem & I. Einav.*

Navier Seminar, Paris, France, 05/03/2018.

*Modelling crushable granular media in the Cosserat continuum. N. A. Collins-Craft, I. Stefanou, J. Sulem & I. Einav.*

ERC REALISM Kick-off Meeting, Paris, France, 15/03/2017

*Progress towards a constitutive model for crushable granular media using Cosserat continuum modelling. N. A. Collins-Craft, I. Stefanou, J. Sulem & I. Einav.*

#### *Invited Seminars*

TRIPOP seminar, Inria Grenoble-Rhône-Alpes, 07/12/2020.

*Predicting strain localisation in crushable granular media using the Cosserat continuum.*

CoQuake seminar, École centrale de Nantes, 02/06/2020.

*A Cosserat Breakage Mechanics model for brittle granular media, and An Introduction to Julia.*

Granular Forum, the University of Sydney, 20/06/2018.

*The effect of evolving micro-structural length scale on the macroscopic constitutive behaviour of granular media.*

CERMES seminar, École nationale des ponts et chaussées, 19/02/2018.

*The effect of evolving micro-structural length scale on the macroscopic constitutive behaviour of granular media.*

ENS seminar, École normale supérieure, 03/03/2017.

*The effect of evolving micro-structural length scale on the macroscopic constitutive behaviour of granular media.*

#### *Seminars to masters students*

MSROE seminar, École nationale des ponts et chaussées, 11/01/2018

*L'effet de l'évolution de l'échelle de longueur micro-structurel sur le comportement macroscopique constitutif des milieux granulaires (in French). Approximately 30 students.*

MSROE seminar, École nationale des ponts et chaussées, 05/01/2017.

*The effect of evolving micro-structural length scale on the macroscopic constitutive behaviour of granular media. Approximately 30 students.*

#### *Prizes, Scholarships and other academic achievements*

2017 Early Career Researcher grant to attend the 12<sup>th</sup> EURO-conference on Rock Physics & Geomechanics. Conference attendance fee waived.

2016 Postgraduate Research Support Scheme from the University of Sydney. School, accommodation and flight fees covered to attend a doctoral school in Perth, Western Australia.

2015 Australian Postgraduate Award, University of Sydney Merit Award, both from the University of Sydney, for three and a half years each, and totalling A\$30.5K per year.

2014 D. G. Walkom Prize for First Class Honours in Civil Engineering, Dean's List of Excellence in Academic Performance.

2013 D. Campbell-Allen Prize in Civil Engineering, invitation to the Summer Research Scholarship program.

2012 University of Sydney Academic Merit Prize, Dean's List of Excellence in Academic Performance, invitation to the Summer Research Scholarship program.

2011 University of Sydney Academic Merit Prize, Dean's List of Excellence in Academic Performance, invitation to the Summer Research Scholarship program.

2010 Roads and Maritime Services (a New South Wales state government entity) Scholarship in Civil Engineering, for length of the Bachelor's degree. A\$12,500 per year.

#### *Academic Service*

Reviewer for *Computational Mechanics*, *Powder Technology*, and *Computer Methods in Applied Mechanics and Engineering*.

*Computational Mechanics* and *Computer Methods in Applied Mechanics and Engineering* (CMAME) are both journals that focus on the application of numerical techniques to the resolution of complex problems in all fields of mechanics, from biomechanics to structural mechanics. They both have an emphasis on sophisticated mathematical models and advanced technical implementations., and are the leading journals for researchers working in computational mechanics. The journal impact factors are 4.014 for *Computational Mechanics* and 6.756 for CMAME.

*Powder Technology* focuses on the mechanics and characterisation of systems of particulate solids, ranging in scale from aerosols to mined materials. Experimental, numerical and theoretical approaches are included, and it is an important journal for researchers working in both granular physics and industrial processes. It has a journal impact factor of 5.134.

Organisational assistant for 6<sup>th</sup> International Conference on Coupled THMC Processes in Geosystems, Paris, France, 05/07/2017 – 07/07/2017.

#### *Previous academic employment*

The University of Sydney, 2015 - 2019.

Tutor for CIVL3411 Geotechnical Engineering (2015) and ENGG1801 Engineering Computing (2016), assignment marking and substitute tutor for CIVL2410 Soil Mechanics (2019).

École nationale des ponts et chaussées, 2017 - 2018.

Scientific English editing for a wide variety of scientific papers written by other researchers.

#### *Participation in financed projects*

European Research Council Starting Grant “Controlling earthQuakes (CoQuake)”

Participation in the CoQuake project, with principal investigator Ioannis Stefanou. All journal articles, conference presentations and poster presentations from 2018 onwards were performed in association with this project.

Australian Research Council Discovery Projects “Experimentally validated theory for the mixing of granular materials” and “Long-term chemically induced crumbling of unsaturated brittle geomaterials”

Participation in two simultaneous projects, with principal investigator Itai Einav. The

journal article was written in association with these projects.

### *Technical skills*

#### Theoretical constitutive modelling.

Specialisation in modelling the localisation of deformation.

- Higher order continuum mechanics, in particular the Cosserat continuum.
- *Linear stability analysis of mechanical systems.*
- Cohesive zone modelling of crack propagation.

#### Programming.

- Proficient in Python, Julia, MATLAB and Mathematica.
- Competent in C++.
- Some notions in Haskell, Fortran, Basic.

#### Software.

- Proficient in FeniCS, Siconos, LATEX and Microsoft Office suite.
- Competent in GIMP.
- Some notions in MOOSE.

#### Operating systems.

- Proficient in Microsoft Windows, Ubuntu Linux.

### *Citizenship*

Australian.

### *Languages*

English (mother tongue), French (proficient).

### *Contact Information*

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**SECTION 5: CAPACITY*****5.1 Overview of the Participating Organisations***

<b>Organisation role</b>	<b>PIC</b>	<b>Legal Entity Short Name</b>	<b>Academic organisation</b>	<b>Country</b>	<b>Name of Supervisor</b>
Beneficiary	999547074	Inria	Y	France	Vincent Acary
Associated partner linked to a beneficiary	897379108	UGA	Y	France	Vincent Acary
Associated partner for secondment	999973971	EPFL	Y	Switzerland	Johan Gaume

**5.2 Capacity of the Participating Organisations**

Beneficiary	
Institut de recherche en informatique et automatique, Inria, France	
	<p>Inria is the French national institute dedicated to research in computer science, applied mathematics, and control theory (<a href="http://www.inria.fr">http://www.inria.fr</a>). Founded in 1967, Inria's mission is twofold: to carry out frontier research and to ensure technology transfer, thus stimulating the economic and societal impact of its scientific achievements. Inria covers a wide spectrum of topics in the above-mentioned fields, as well as interdisciplinary topics, in particular in conjunction with the life, medical and environmental sciences. Inria's identity and strength are forged by its capacity to stimulate creativity in the digital sciences and to generate innovative technologies that, among other things, lie at the basis of more than 160 start-up companies. The institute has almost 200 research groups, spread throughout the country and gathered in eight research centres. 80% of these groups are joint with universities and other institutes in France and abroad. Inria has a workforce of 3,500 scientists with an annual budget of €236 million, 25% of which comes from direct contracts with industry and from projects granted by national, European and international funding agencies. Over the last decade, Inria has been very active in the FP7 and H2020 programs (ERC, FET and ICT). In particular, more than 50 ERC Starting, Consolidator, and Advanced grants, ten Proof-of-Concept grants, and one Synergy grant were awarded to Inria scientists by the European Research Council. Inria is involved in more than 160 H2020 funded projects for a total EU contribution of more than 95MEUR; including 4 FET-OPEN projects. Inria has a Technology Transfer, Innovation and Partnerships Department (TIPD) which organises research partnerships through bilateral collaboration with businesses and implements the transfer of the project teams' technology results to industry. In Grenoble, where the TRIPOP group is located, the TIPD team is composed of 6 permanent Partnership and Innovation Project Leaders. Inria is a signatory of the European Charter for Researchers and the Code of Conduct for the Recruitment of Researchers since 2006, and has been awarded the HRS4R label in 2019.</p>
Role and profile of supervisor	<p>Dr Vincent Acary is a Director of Research and team leader of the TRIPOP project-team at Inria Centre Grenoble-Rhône-Alpes, dedicated to non-smooth mechanics, control and optimisation of dynamical systems. This team is composed of four permanent full-time researchers and one researcher shared with another research institute (INRAE Grenoble), as well as two associated university faculty members and two research engineers, three postdocs and four PhD students.</p> <p>His role in the project is to supervise the researcher during the development of the constitutive models and data-driven mechanics solver, where his expertise in contact and fracture mechanics, convex optimisation and associated algorithms will be pertinent. He currently</p>
Key research facilities, Infrastructure and Equipment	<p>Inria provides standard research facilities such as an office and workstation to its researchers, as well as access to support mechanisms such as Human Resources, Information Technology, and experts in grant proposal preparation. Within the TRIPOP team, there is access to a server for calculation, and if necessary access to significant high performance computing resources through the GRICAD facility. TRIPOP has two research engineers available to assist in the development and implementation of research software during the project.</p> <p>The team is also linked to another research institute, Inrae, via Dr Franck Bourrier, who is attached to both. The team leader, Dr Vincent Acary, is also associated with UGA, as he is attached to the laboratory of applied mathematics.</p>
Previous and current involvement in EU-funded research and training programmes/actions/projects	<p>TRIPOP and its predecessor team BIPOP have participated in the EU project SICONOS (2001-05, €2.8M) and the (French national research agency) ANR projects VAL-AMS (2007-09, €261K), ChaSlim (2011-15, €370K) and DIGITSLID (2019-21, €338K), as well as the Auvergne-Rhône-Alpes region project SMART-PROTECT (2019-2022, €565K). Each of these projects has contributed to the development of relevant software and mathematical techniques that will be used in the project.</p>



Associated Partner linked to a beneficiary	
Université Grenoble Alpes, UGA, France	
Large French research university that carries out a full suite of research and teaching activities across numerous sites in the French Alps, concentrated within Grenoble and its neighbouring communes of Saint-Martin-d'Hères and Gières. The main project supervisor is academically affiliated with the university, and some university resources will be exploited for the project.	
Role and profile of supervisor	Dr Vincent Acary is academically affiliated with Laboratoire Jean Kuntzmann, the laboratory of applied mathematics of the university. This affiliation exists for the purposes of teaching at the bachelors and masters level, and for registration of PhD students.
Key research facilities, Infrastructure and Equipment	UGA will provide computational resources for the project under the aegis of GRICAD, the computational centre of UGA, which Inria has access to. The doctoral school will also be used for the delivery of training activities, relating to improving the researcher's knowledge of data science, high performance computing, and transversal skills such as teaching at the tertiary level..
Previous and current involvement in EU-funded research and training programmes/actions /projects	Due to the academic affiliation of TRIPOP with both Inria and UGA, the list of projects is duplicated here: EU project SICONOS (2001-05, €2.8M) and the (French national research agency) ANR projects VAL-AMS (2007-09, €261K), ChaSlim (2011-15, €370K) and DIGITSLID (2019-21, €338K), as well as the Auvergne-Rhône-Alpes region project SMART-PROTECT (2019-2022, €565K).



Associated Partner for secondment	
École polytechnique fédérale de Lausanne, EPFL, Switzerland	
Moderate sized technical university, specialising in engineering and science, as the leading federal technical university for the French-speaking part of Switzerland. The secondment organisation for the project. EPFL has over 6300 staff, and over 370 laboratories across a full range of scientific disciplines with an annual budget of CHF 1.06 billion. At the end of 2020, 161 ERC grants had been awarded to EPFL researchers. EPFL is a signatory of the European Charter for Researchers and the Code of Conduct for the Recruitment of Researchers since 2009.	
Role and profile of supervisor	Dr Johan Gaume is a professor and leader of the Snow and Avalanche Simulation Laboratory (SLAB), that sits within the institute for environmental engineering at EPFL. His role in the project is to supervise the researcher during the secondment, where his expertise in the material point method will be of crucial importance.
Key research facilities, Infrastructure and Equipment	EPFL provides standard research facilities such as an office and workstation to its researchers, as well as access to support mechanisms such as Human Resources and Information Technology. In particular, SLAB has access to the high-performance computing resources necessary to run the large simulations required to implement the model, via appropriately equipped workstations, and via the high performance computing cluster SCITAS.
Previous and current involvement in EU-funded research and training programmes/actions /projects	SLAB has participated in several Swiss National Science Foundation projects. The most important of these are “Multiscale analysis and modeling of slab avalanche release processes” (Ambizione scheme, 2016-2018, CHF 337K), “Unified modeling of snow and avalanche mechanics using the material point method” (Eccellenza scheme, 2019-2023, CHF 1.7M), and “A Material Point Method for Alpine Mass Movements in a Climate Change Context” (Spark scheme, 2020-2021, CHF 96K). Each of these projects has contributed to the development and application of MPM techniques that will be exploited during this project.

## **SECTION 6: ETHICS**

All information pertaining to ethics in this proposal is included in Part A.

## **SECTION 7: SECURITY SCREENING**

This project does not raise any issues pertaining to security.

ANNEX 2

ESTIMATED BUDGET FOR THE ACTION

	Estimated EU contribution								
	Estimated eligible unit contributions (per budget category)							Maximum grant amount <sup>1</sup>	
	A. Contributions for recruited researchers					B. Institutional contributions			Total
	A.1 Living allowance	A.2 Mobility allowance	A.3 Family allowance	A.4 Long-term leave allowance	A.5 Special needs allowance	B.1 Research, training and networking contribution	B.2 Management and indirect contribution		
Forms of funding	Unit contribution <sup>2</sup>	Unit contribution <sup>2</sup>	Unit contribution <sup>2</sup>	Unit contribution <sup>2</sup>	Unit contribution <sup>2</sup>	Unit contribution <sup>2</sup>	Unit contribution <sup>2</sup>	h = a + b + c + d + e + f + g	i
	a	b	c	d	e	f	g		
1 - INRIA	141 914.88	14 400.00	0.00	0.00	0.00	24 000.00	15 600.00	195 914.88	195 914.88
2 - UGA									
3 - EPFL									
Σ consortium	141 914.88	14 400.00	0.00	0.00	0.00	24 000.00	15 600.00	195 914.88	195 914.88

<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' estimated units).

<sup>2</sup> See Annex 2a 'Additional information on the estimated budget' for the details (units, amount per unit).

## **ANNEX 2a**

### **ADDITIONAL INFORMATION ON UNIT COSTS AND CONTRIBUTIONS**

#### **HE MSCA Doctoral Networks/Post-doctoral Fellowships and HE ERA Fellowships<sup>1</sup>**

##### **Contributions for recruited researchers — Living allowance**

Type: unit contributions

Units: months spent by the researcher(s) on the research training activities (person-months)

Amount per unit<sup>\*</sup>: see Annex 2

\* Amount calculated as follows:

{the monthly living allowance for researchers in MSCA-PF/MSCA-DN and ERA Fellowship actions multiplied by country-specific correction coefficient of *[OPTION by default: the country in which the researcher is recruited]**[OPTION for PF-Global Fellowships: the country where the associated partner hosting the researcher during the outgoing phase is located and the country in which the researcher is recruited (for the return phase and placements)]*}

The monthly living allowance and the country-specific correction coefficients are set out in the Horizon Europe Work Programme (MSCA Work Programme part) in force at the time of the call:

- for the monthly living allowance:
  - PF and ERA Fellowships: EUR 5 080
  - DN: EUR 3 400
- for the country-specific correction coefficients: see Work Programme (available on the [Funding & Tenders Portal Reference Documents](#) page).

##### **Contributions for recruited researchers — Mobility allowance**

Type: unit contributions

Units: months spent by the researcher(s) on the research training activities (person-months)

Amount per unit<sup>2</sup>: see Annex 2

##### **Contributions for recruited researchers — Family allowance**

Type: unit contributions

Units: months spent by the researcher(s) on the research training activities (person-months)

Amount per unit<sup>3</sup>: see Annex 2

##### **Contributions for recruited researchers — Long-term leave allowance**

Type: unit contributions

Units: months spent by the researcher(s) on long-term leave (person-months)

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<sup>1</sup> [Decision](#) of 16 March 2021 authorising the use of lump sum contributions and unit contributions for Marie Skłodowska-Curie actions under the Horizon Europe Programme.

<sup>2</sup> Same amount for all beneficiaries.

Amount for the mobility allowance set out in the Horizon Europe Work Programme (MSCA Work Programme part) in force at the time of the call (available on the [Funding & Tenders Portal Reference Documents](#) page).

<sup>3</sup> Same amount for all beneficiaries.

Average based on the amount for the family allowance set out in the Horizon Europe Work Programme (MSCA Work Programme part) in force at the time of the call (75% of the number of units with family, 25% without).

Amount per unit\*: see Annex 2

\*Amount calculated as follows:

{long-term leave allowance (i.e. the sum of the applicable living allowance and mobility allowance)  
multiplied by  
percentage of long-term leave allowance incurred by the beneficiary (i.e. costs incurred by the beneficiary  
divided by the long-term leave allowance)  
multiplied by  
number of months}

## **Contributions for recruited researchers — Special needs allowance**

Type: unit contributions

Units: number of special needs units (per recruited researcher) that were needed for implementing the action (person-months)

Amount per unit\*: see Annex 2

\*Amount calculated as follows:

{requested special needs unit  
multiplied by  
(1/number of months)}

The pre-defined special needs units are: EUR 3 000, EUR 4 500, EUR 6 000, EUR 9 500, EUR 13 000, EUR 18 500, EUR 27 500, EUR 35 500, EUR 47 500 and EUR 60 000.

## **Institutional contributions — Research, training and networking contribution**

Type: unit contributions

Units: months spent by the researcher(s) on the research training activities (person-months)

Amount per unit<sup>4</sup>: see Annex 2

## **Institutional contributions — Management and indirect contribution**

Type: unit contributions

Units: months spent by the researcher(s) on the research training activities (person-months)

Amount per unit<sup>5</sup>: see Annex 2

## **HE MSCA Staff Exchanges**<sup>6</sup>

### **Contributions for seconded staff — Top-up allowance**

Type: unit contributions

Units: months spent by the seconded staff member(s) on the research and innovation activities (person-months)

Amount per unit<sup>7</sup>: see Annex 2

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<sup>4</sup> Same amount for all beneficiaries.  
Amount for research, training and networking contribution set out in the Horizon Europe Work Programme (MSCA Work Programme part) in force at the time of the call (available on the [Funding & Tenders Portal Reference Documents](#) page).

<sup>5</sup> Same amount for all beneficiaries.  
Amount for management and indirect contribution set out in the Horizon Europe Work Programme (MSCA Work Programme part) in force at the time of the call (available on the [Funding & Tenders Portal Reference Documents](#) page).

<sup>6</sup> [Decision](#) of 16 March 2021 authorising the use of lump sum contributions and unit contributions for Marie Skłodowska-Curie actions under the Horizon Europe Programme.

<sup>7</sup> Same amount for all beneficiaries.  
Amount for the top-up allowance set out in the Horizon Europe Work Programme (MSCA Work Programme part) in force at the time of the call (available on the [Funding & Tenders Portal Reference Documents](#) page).

## **Contributions for seconded staff — Special needs allowance**

Type: unit contributions

Units: number of special needs units (per seconded staff member) that were needed for implementing the action (person-months)

Amount per unit<sup>\*</sup>: see Annex 2

\*Amount calculated as follows:  
{requested special needs unit  
multiplied by  
(1/number of months)}

The pre-defined special needs units are: EUR 3 000, EUR 4 500, EUR 6 000, EUR 9 500, EUR 13 000, EUR 18 500, EUR 27 500, EUR 35 500, EUR 47 500 and EUR 60 000.

## **Institutional contributions — Research, training and networking contribution**

Type: unit contributions

Units: months spent by the seconded staff member(s) on the research and innovation activities (person-months)

Amount per unit<sup>8</sup>: see Annex 2

## **Institutional contributions — Management and indirect contribution**

Type: unit contributions

Units: months spent by the seconded staff member(s) on the research and innovation activities (person-months)

Amount per unit<sup>9</sup>: see Annex 2

## **HE MSCA COFUND**<sup>10</sup>

### **COFUND contributions — COFUND allowance**

Type: unit contributions

Units: months spent by the researchers on the research training activities (person-months)

Amount per unit<sup>11</sup>: see Annex 2

### **COFUND contributions — Long-term leave allowance**

Type: unit contributions

Units: months spent by the researcher(s) on long-term leave ('person-months')

Amount per unit<sup>\*</sup>: see Annex 2

\*Amount calculated as follows:  
{long-term leave allowance (i.e. the applicable COFUND allowance)}

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<sup>8</sup> Same amount for all beneficiaries.  
Amount for research, training and networking contribution set out in the Horizon Europe Work Programme (MSCA Work Programme part) in force at the time of the call (available on the [Funding & Tenders Portal Reference Documents](#) page).

<sup>9</sup> Same amount for all beneficiaries.  
Amount for management and indirect contribution set out in the Horizon Europe Work Programme (MSCA Work Programme part) in force at the time of the call (available on the [Funding & Tenders Portal Reference Documents](#) page).

<sup>10</sup> [Decision](#) of 16 March 2021 authorising the use of lump sum contributions and unit contributions for Marie Skłodowska-Curie actions under the Horizon Europe Programme.

<sup>11</sup> Same amount for all beneficiaries.  
Amount for the COFUND allowance set out in the Horizon Europe Work Programme (MSCA Work Programme part) in force at the time of the call (available on the [Funding & Tenders Portal Reference Documents](#) page).

multiplied by  
percentage of long-term leave allowance incurred by the beneficiary (i.e. costs incurred by the beneficiary  
divided by the long-term leave allowance)  
multiplied by  
number of months}

## **COFUND contributions — Special needs allowance**

Type: unit contributions

Units: number of special needs units (per recruited researcher) that were needed for implementing the action ('person-months')

Amount per unit\*: see Annex 2

\*Amount calculated as follows:  
{ requested special needs unit  
multiplied by  
(1/number of months)}

The pre-defined special needs units are: EUR 3 000, EUR 4 500, EUR 6 000, EUR 9 500, EUR 13 000, EUR 18 500, EUR 27 500, EUR 35 500, EUR 47 500 and EUR 60 000.

ANNEX 4 HORIZON EUROPE MSCA UNIT MGA — MULTI + MONO

FINANCIAL STATEMENT FOR [PARTICIPANT NAME] FOR REPORTING PERIOD [NUMBER]

	EU contribution								
	Eligible unit contributions (per budget category)							Total	Requested EU contribution
	[OPTION for all MSCA ToA except COFUND: A. . Contributions for [ recruited researchers] [ seconded staff members] ][OPTION for COFUND: A. COFUND contributions]					[OPTION for all MSCA ToA except COFUND: B. Institutional contributions]			
	[OPTION for DN and PF : A.1 Living allowance]  [OPTION for SE: A.1 Top - up allowance]  [OPTION for COFUND: A.1 COFUND allowance]	[OPTION for DN and PF: A.2 Mobility allowance]	[OPTION for DN and PF: A.3 Family allowance]	[OPTION for all MSCA ToA except SE: A.4 Long-term leave allowance]	A.5 Special needs allowance	[ B.1 Research, training and networking contribution]	[ B.2 Management and indirect contribution]		
Forms of funding	Unit contribution <sup>1</sup>	[ Unit contribution <sup>1</sup> ]	[ Unit contribution <sup>1</sup> ]	[ Unit contribution <sup>1</sup> ]	Unit contribution <sup>1</sup>	[ Unit contribution <sup>1</sup> ]	[ Unit contribution <sup>1</sup> ]	h = a [ + b ]/[ + c] [ + d] + e [ + f] [ + g]	i
	a	[ b]	[ c]	[ d]	e	[ f]	[ g]		
XX – [short name beneficiary/affiliated entity]									

The beneficiary/affiliated entity hereby confirms that:

The information provided is complete, reliable and true.

The unit contributions declared are eligible (see Article 6).

The contributions 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, 20 and 25).

<sup>1</sup> See Annex 2a 'Additional information on the estimated budget' for the details (units, amount per unit).

## **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

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<sup>2</sup> European Code of Conduct for Research Integrity of ALLEA (All European Academies).

- respect for colleagues, research participants, society, ecosystems, cultural heritage and the environment
- accountability for the research from idea to publication, for its management and organisation, for training, supervision and mentoring, and for its wider impacts

and means that beneficiaries must ensure that persons carrying out research tasks follow the good research practices 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**

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 from it in the agreement on background — 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 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.

### 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 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), venue 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 the (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 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, 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.

### **Specific rules for MSCA actions**

When implementing MSCA Doctoral Networks (DN), Postdoctoral Fellowships (PF) and COFUND actions, the beneficiaries must respect the following conditions:

- take all measures to implement the principles set out in the Commission Recommendation on the European Charter for Researchers and the Code of Conduct for the Recruitment of Researchers<sup>3</sup> 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 employment contract, other direct contract or fixed-amount-fellowship agreement (see Article 6) specifies:
  - the name of the supervisor(s) for the research training activities
  - the starting date and duration of the research 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 for professional reasons is allowed and has been approved (and for MSCA-DN and MSCA-PF: 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

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<sup>3</sup> Commission Recommendation 2005/251/EC of 11 March 2005 on the European Charter for Researchers and on a Code of Conduct for the Recruitment of Researchers (OJ L 75, 22.3.2005, p. 67).

- 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 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 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 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
- 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 ‘Marie Skłodowska-Curie fellows’
- for MSCA-DN and MSCA-COFUND:

- advertise and publish vacancies internationally, including on the web-sites requested by the granting authority, indicating the gross salary (not including employer's social contributions) to be offered to the researcher
- recruit the researchers, following an open, transparent, merit-based, impartial and equitable recruitment procedure (for postdoctoral programmes in MSCA-COFUND: with regular selection rounds and international peer review), on the basis of:
  - their scientific skills and the relevance of their research experience
  - the impact of the proposed training on the researcher's career
  - a fair gender representation (by promoting genuine equal access opportunities throughout the recruitment process)

The selection committees must bring together diverse expertise, have an adequate gender balance and include members from different countries and with relevant experience to assess the candidates.

- ensure that no conflict of interest exists in or arises from the recruitment
- for MSCA-DN and MSCA-PF:
  - 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)
- for MSCA-COFUND where doctoral or post-doctoral programmes are implemented as financial support to third parties through implementing partners:
  - ensure that the implementing partners comply with the same standards and procedures for implementing the research training activities, including the recruitment and working conditions for researchers, the specific rules for MSCA-COFUND actions and the specific rules on ethics and research integrity set out in Annex 5
  - implement effective monitoring and oversight arrangements towards the implementing partners, covering all aspects relating to the action
  - ensure effective and reliable reporting by the implementing partners, covering the activities implemented, information on indicators, as well as the legality and regularity of the expenditure claimed
  - ensure that the implementing partners provide that the bodies mentioned in Article 25 (e.g. granting authority, OLAF, Court of Auditors (ECA), etc.) can exercise their rights also towards the final recipients.

When implementing Horizon Europe MSCA Staff Exchanges (MSCA-SE), the beneficiaries must respect the following conditions:

- take all measures to implement the principles set out in the Commission Recommendation on the European Charter for Researchers and the Code of Conduct for the Recruitment of Researchers<sup>4</sup> and ensure that the seconded staff and all participants involved in the action are aware of them
- ensure that the seconded staff enjoys at the place of the implementation at least the same standards and working conditions as those applicable to local staff holding a similar position
- assist the seconded staff with the administrative procedures related to their secondment
- inform the seconded staff about:
  - the description, conditions, location and timetable for the implementation of the secondment
  - the rights and obligations of the beneficiary toward the seconded staff under this Agreement
  - the obligation of the seconded staff to complete and submit — at the end of the secondment — the evaluation questionnaire and — two years later — the follow-up questionnaire provided by the granting authority
  - the arrangements related to the intellectual property rights between the beneficiary and the seconded staff (during the secondment and afterwards), in particular full access — on a royalty-free basis — for the staff to background and results needed for their activities under the action
  - the obligation of the seconded staff to maintain confidentiality (see Article 13)
  - the obligation of the seconded staff to ensure the visibility of EU funding in communications or publications and in applications for the protection of results (see Article 17)
- ensure that the seconded staff do not have to bear any costs for the implementation of the action as described in Annex 1
- provide training 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 seconded staff are adequately mentored
- ensure that the rights and obligations of the seconded staff remain unchanged during the secondment
- ensure full access — on a royalty-free basis — for the staff to background and results needed for their activities under the action

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<sup>4</sup> Commission Recommendation 2005/251/EC of 11 March 2005 on the European Charter for Researchers and on a Code of Conduct for the Recruitment of Researchers (OJ L 75, 22.3.2005, p. 67).

- if appropriate, ensure that seconded staff are reintegrated after the secondment
- ensure that the seconded staff are covered by an adequate medical insurance scheme
- ensure that the seconded staff have the relevant expertise for the action
- use the top-up allowance (see Article 6) to contribute to the subsistence, accommodation and travel of the seconded staff.

### **Specific rules for ERA Fellowship actions**

When implementing ERA Fellowships, the beneficiaries must respect the following conditions:

- take all measures to implement the principles set out in the Commission Recommendation on the European Charter for Researchers and the Code of Conduct for the Recruitment of Researchers<sup>5</sup> 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 employment contract, other direct contract or fixed-amount-fellowship agreement (see Article 6) specifies:
  - the name of the supervisor(s) for the research training activities
  - the starting date and duration of the research 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 for professional reasons is allowed and 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

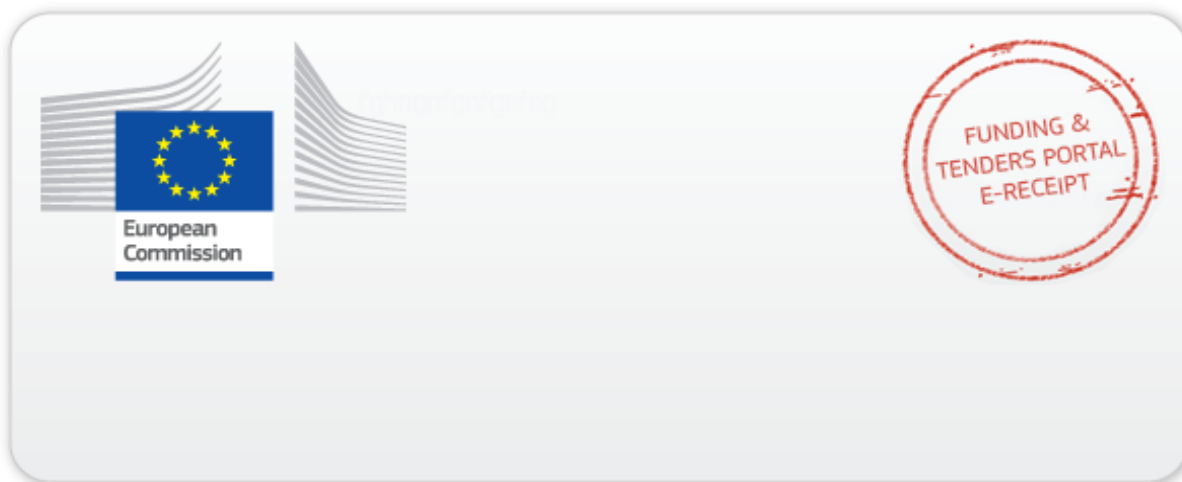
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<sup>5</sup> Commission Recommendation 2005/251/EC of 11 March 2005 on the European Charter for Researchers and on a Code of Conduct for the Recruitment of Researchers (OJ L 75, 22.3.2005, p. 67).

- 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 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 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 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
- 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 ‘ERA 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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