European Research Council
Executive Agency

Established by the European Commission

GRANT AGREEMENT

NUMBER — 803048 — CELLONGATE

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

on the one part,

the **European Research Council Executive Agency (ERCEA)** ('the Agency'), under the powers delegated by the European Commission ('the Commission'), represented for the purposes of signature of this Agreement by Head of Unit, European Research Council Executive Agency, Grant Management Department, Starting Grant , Niki ATZOULATOU,

and

on the other part,

'the beneficiary':

UNIVERZITA KARLOVA (CUNI), established in OVOCNY TRH 560/5, PRAHA 1 116 36, Czech Republic, VAT number: CZ00216208, represented for the purposes of signing the Agreement by Dean of the Faculty of Science, Jiří ZIMA, hosting and engaging the following '**principal investigator**':

- **FENDRYCH Matyas**, 1 November 1981, Czech Republic

If one or more beneficiaries accede to this Agreement (see Article 56), the beneficiary hosting and engaging the principal investigator becomes the '**principal beneficiary**'.

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

By signing the Agreement, the beneficiary accepts the grant and agrees to implement it under its responsibility and in accordance with the Agreement, with all the obligations and conditions it sets out.

The Agreement is composed of:

Terms and Conditions

Annex 1 Description of the action

Annex 2 Estimated budget for the action

2a Additional information on the estimated budget

Annex 3 Model Accession Form

Annex 4 Model for the financial statements

Annex 5 Model for the certificate on the financial statements

Annex 6 Model for the certificate on the methodology

TERMS AND CONDITIONS

TABLE OF CONTENTS

CHAPTER 1 GENERAL

ARTICLE 1 — SUBJECT OF THE AGREEMENT

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

CHAPTER 2 ACTION

ARTICLE 2 — ACTION TO BE IMPLEMENTED

The grant is awarded for the action entitled '**Unraveling the molecular network that drives cell growth in plants — CELLONGATE' ('action')**, as described in Annex 1.

ARTICLE 3 — DURATION AND STARTING DATE OF THE ACTION

The duration of the action will be **60 months** as of 01/01/2019 ('**starting date of the action**').

ARTICLE 4 — ESTIMATED BUDGET AND BUDGET TRANSFERS

4.1 Estimated budget

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

It contains the estimated eligible costs and the forms of costs, broken down by budget category (see Articles 5, 6).

4.2 Budget transfers

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

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

CHAPTER 3 GRANT

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

5.1 Maximum grant amount

The '**maximum grant amount**' is **EUR 1,498,750.00** (one million four hundred and ninety eight thousand seven hundred and fifty EURO).

5.2 Form of grant, reimbursement rate and forms of costs

The grant reimburses **100%** of the beneficiary's eligible costs for the action (see Article 6) ('**reimbursement of eligible costs grant**') (see Annex 2).

The estimated eligible costs of the action are EUR **1,498,750.00** (one million four hundred and ninety eight thousand seven hundred and fifty EURO).

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

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

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

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

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

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

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

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

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

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

5.3 Final grant amount — Calculation

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

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

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

Step 2 – Limit to the maximum grant amount

Step 3 – Reduction due to the no-profit rule

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

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

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

5.3.2 Step 2 — Limit to the maximum grant amount

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

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

The grant must not produce a profit.

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

The '**action's total eligible costs**' are the consolidated total eligible costs approved by the Agency.

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

The following are considered **receipts**:

(a) income generated by the action; if the income is generated from selling equipment or other assets purchased under the Agreement, the receipt is up to the amount declared as eligible under the Agreement;

(b) financial contributions given by third parties to the beneficiary specifically to be used for the action, and

(c) in-kind contributions provided by third parties free of charge and specifically to be used for the action, if they have been declared as eligible costs.

The following are however not considered receipts:

(a) income generated by exploiting the action's results (see Article 28);

(b) financial contributions by third parties, if they may be used to cover costs other than the eligible costs (see Article 6);

(c) financial contributions by third parties with no obligation to repay any amount unused at the end of the period set out in Article 3.

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

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

If the grant is reduced (see Article 43), the Agency will calculate the reduced grant amount by deducting the amount of the reduction (calculated in proportion to the improper implementation of the

action or to the seriousness of the errors, irregularities or fraud or breach of obligations, in accordance with Article 43.2) from the maximum grant amount set out in Article 5.1.

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

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

5.4 Revised final grant amount — Calculation

If — after the payment of the balance (in particular, after checks, reviews, audits or investigations; see Article 22) — the Agency rejects costs (see Article 42) or reduces the grant (see Article 43), it will calculate the '**revised final grant amount**'.

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

- in case of **rejection of costs**: by applying the reimbursement rate to the revised eligible costs approved by the Agency;
- in case of **reduction of the grant**: in proportion to the seriousness of the errors, irregularities or fraud or breach of obligations (see Article 43.2).

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

ARTICLE 6 — ELIGIBLE AND INELIGIBLE COSTS

6.1 General conditions for costs to be eligible

'**Eligible costs**' are costs that meet the following criteria:

(a) for **actual costs**:

(i) they must be actually incurred by the beneficiary;

(ii) they must be incurred in the period set out in Article 3, with the exception of costs relating to the submission of the periodic report for the last reporting period and the final report (see Article 20);

(iii) they must be indicated in the estimated budget set out in Annex 2;

(iv) they must be incurred in connection with the action as described in Annex 1 and necessary for its implementation;

(v) they must be identifiable and verifiable, in particular recorded in the beneficiary's accounts in accordance with the accounting standards applicable in the country where the beneficiary is established and with the beneficiary's usual cost accounting practices;

(vi) they must comply with the applicable national law on taxes, labour and social security, and

(vii) they must be reasonable, justified and must comply with the principle of sound financial management, in particular regarding economy and efficiency;

(b) for **unit costs**:

(i) they must be calculated as follows:

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

multiplied by

the number of actual units};

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

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

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

(i) they must be calculated by applying the flat-rate set out in Annex 2, and

(ii) the costs (actual costs or unit costs) to which the flat-rate is applied must comply with the conditions for eligibility set out in this Article.

6.2 Specific conditions for costs to be eligible

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

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

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

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

A. Direct personnel costs

Types of eligible personnel costs

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

If the beneficiary is a non-profit legal entity[1], it may also declare as personnel costs **additional remuneration** for personnel assigned to the action (including payments on the basis of supplementary contracts regardless of their nature), if:

(a) it is part of the beneficiary's usual remuneration practices and is paid in a consistent manner whenever the same kind of work or expertise is required;

(b) the criteria used to calculate the supplementary payments are objective and generally applied by the beneficiary, regardless of the source of funding used.

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

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

(a) if the person works full time and exclusively on the action during the full year: up to EUR 8 000;

(b) if the person works exclusively on the action but not full-time or not for the full year: up to the corresponding pro-rata amount of EUR 8 000, or

(c) if the person does not work exclusively on the action: up to a pro-rata amount calculated as follows:

{{EUR 8 000

divided by

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

multiplied by

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

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

(a) the person works under conditions similar to those of an employee (in particular regarding the way the work is organised, the tasks that are performed and the premises where they are performed);

(b) the result of the work carried out belongs to the beneficiary (unles exceptionally agreed otherwise), and

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

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

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

A.4 If the beneficiary is a small and medium-sized enterprise ('**SME**'), the **costs of** its **owner** who is working on the action and who does not receive a salary are eligible personnel costs, if they correspond to the amount per unit set out in Annex 2a multiplied by the number of actual hours worked on the action.

A.5 If the beneficiary is a **natural person not receiving a salary**, its **costs** are eligible personnel costs if they correspond to the amount per unit set out in Annex 2a multiplied by the number of actual hours worked on the action.

Calculation

Personnel costs must be calculated by the beneficiary as follows:

{{hourly rate

multiplied by

the number of actual hours worked on the action},

plus

for non-profit legal entities: additional remuneration to personnel assigned to the action under the conditions set out above (Point A.1)}.

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

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

{number of annual productive hours for the year (see below)

minus

total number of hours declared by the beneficiary for that person in that year for other EU or Euratom grants}.

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

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

{actual annual personnel costs (excluding additional remuneration) for the person

divided by

number of annual productive hours}.

using the personnel costs and the number of productive hours for each full financial year covered by the reporting period concerned. If a financial year is not closed at the end of the reporting period, the beneficiary must use the hourly rate of the last closed financial year available.

For the 'number of annual productive hours', the beneficiary may choose one of the following:

(i) 'fixed number of hours': 1 720 hours for persons working full time (or corresponding pro-rata for persons not working full time);

(ii) 'individual annual productive hours': the total number of hours worked by the person in the year for the beneficiary, calculated as follows:

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

plus

overtime worked

minus

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

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

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

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

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

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

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

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

divided by

{number of annual productive hours / 12}}

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

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

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

If parts of a basic remuneration are generated over a period longer than a month, the

beneficiary may include only the share which is generated in the month (irrespective of the amount actually paid for that month).

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

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

(i) for an SME owner or beneficiary that is a natural person: the hourly rate set out in Annex 2a (see Points A.4 and A.5 above), or

(ii) for personnel costs declared on the basis of the beneficiary's usual cost accounting practices: the hourly rate calculated by the beneficiary in accordance with its usual cost accounting practices, if:

- the cost accounting practices used are applied in a consistent manner, based on objective criteria, regardless of the source of funding;

- the hourly rate is calculated using the actual personnel costs recorded in the beneficiary's accounts, excluding any ineligible cost or costs included in other budget categories.

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

and

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

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

C. Direct costs of providing financial support to third parties

Not applicable

D. Other direct costs

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

D.2 The **depreciation costs of equipment, infrastructure or other assets** (new or second-hand) as recorded in the beneficiary's accounts are eligible, if they were purchased in accordance with Article 10.1.1 and written off in accordance with international accounting standards and the beneficiary's usual accounting practices.

The **costs of renting or leasing** equipment, infrastructure or other assets (including related duties,

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

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

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

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

(a) purchased specifically for the action and in accordance with Article 10.1.1 or

(b) contributed in kind against payment and in accordance with Article 11.1.

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

D.4 **Capitalised and operating costs of 'large research infrastructure'**[2] directly used for the action are eligible, if:

(a) the value of the large research infrastructure represents at least 75% of the total fixed assets (at historical value in its last closed balance sheet before the date of the signature of the Agreement or as determined on the basis of the rental and leasing costs of the research infrastructure[3]);

(b) the beneficiary's methodology for declaring the costs for large research infrastructure has been positively assessed by the Commission ('**ex-ante assessment**');

(c) the beneficiary declares as direct eligible costs only the portion which corresponds to the duration of the action and the rate of actual use for the purposes of the action, and

(d) they comply with the conditions as further detailed in the annotations to the H2020 grant agreements.

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

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

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

(a) they are declared on the basis of a unit cost calculated in accordance with the beneficiary's usual cost accounting practices;

(b) the cost accounting practices used are applied in a consistent manner, based on objective criteria, regardless of the source of funding;

(c) the unit cost is calculated using the actual costs for the good or service recorded in the beneficiary's accounts, excluding any ineligible cost or costs included in other budget categories.

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

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

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

E. Indirect costs

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

(a) costs of subcontracting and

(b) costs of in-kind contributions provided by third parties which are not used on the beneficiary's premises;

(c) not applicable;

(d) not applicable.

If the beneficiary receives an operating grant[4] financed by the EU or Euratom budget, it cannot declare indirect costs for the period covered by the operating grant, unless it can demonstrate that the operating grant does not cover any costs of the action.

F. Specific cost category(ies)

Not applicable

6.3 Conditions for costs of linked third parties to be eligible

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

not applicable

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

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

6.5 Ineligible costs

'**Ineligible costs**' are:

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

(i) costs related to return on capital;

(ii) debt and debt service charges;

(iii) provisions for future losses or debts;

(iv) interest owed;

(v) doubtful debts;

(vi) currency exchange losses;

(vii) bank costs charged by the beneficiary's bank for transfers from the Agency;

(viii) excessive or reckless expenditure;

(ix) deductible VAT;

(x) costs incurred during suspension of the implementation of the action (see Article 49);

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

6.6 Consequences of declaration of ineligible costs

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

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

CHAPTER 4 RIGHTS AND OBLIGATIONS OF THE PARTIES

SECTION 1 RIGHTS AND OBLIGATIONS RELATED TO IMPLEMENTING THE ACTION

ARTICLE 7 — GENERAL OBLIGATION TO PROPERLY IMPLEMENT THE ACTION

7.1 General obligation to properly implement the action

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

The beneficiary must ensure that the action tasks described in Annex 1 are performed under the guidance of the principal investigator.

7.2 Consequences of non-compliance

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

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

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

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

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

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

In these cases, the beneficiary retains sole responsibility towards the Agency for implementing the action.

ARTICLE 9 — IMPLEMENTATION OF ACTION TASKS BY A BENEFICIARY NOT RECEIVING EU FUNDING

Not applicable

ARTICLE 10 — PURCHASE OF GOODS, WORKS OR SERVICES

10.1 Rules for purchasing goods, works or services

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

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

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

10.1.2 If the beneficiary is a 'contracting authority' within the meaning of Directives 2004/18/EC[5] (or 2014/24/EU[6]) or a 'contracting entity' within the meaning of Directives 2004/17/EC[7] (or 2014/25/EU[8]) must comply with the applicable national law on public procurement.

10.2 Consequences of non-compliance

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

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

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

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

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

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

The beneficiary may declare costs related to the payment of in-kind contributions as eligible (see Article 6.1 and 6.2), up to the third parties' costs for the seconded persons, contributed equipment, infrastructure or other assets or other contributed goods and services. The costs will appear in the accounts of the beneficiary and will be considered as costs incurred by it (see Article 6.1 and 6.2).

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

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

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

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

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

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

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

11.2 Consequences of non-compliance

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

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

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

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

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

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

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

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

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

12.2 Consequences of non-compliance

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

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

ARTICLE 13 — IMPLEMENTATION OF ACTION TASKS BY SUBCONTRACTORS

13.1 Rules for subcontracting action tasks

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

Subcontracting may cover only a limited part of the action.

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

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

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

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

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

If the beneficiary is a 'contracting authority' within the meaning of Directive 2004/18/EC (or 2014/24/EU) or 'contracting entity' within the meaning of Directive 2004/17/EC (or 2014/25/EU), it must comply with the applicable national law on public procurement.

13.2 Consequences of non-compliance

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

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

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

ARTICLE 14 — IMPLEMENTATION OF ACTION TASKS BY LINKED THIRD PARTIES

Not applicable

ARTICLE 14a — IMPLEMENTATION OF ACTION TASKS BY INTERNATIONAL PARTNERS

Not applicable

ARTICLE 15 — FINANCIAL SUPPORT TO THIRD PARTIES

Not applicable

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

Not applicable

SECTION 2 RIGHTS AND OBLIGATIONS RELATED TO THE GRANT ADMINISTRATION

ARTICLE 17 — GENERAL OBLIGATION TO INFORM

17.1 General obligation to provide information upon request

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

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

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

The beneficiary must immediately inform the Agency of any of the following:

(a) **events** which are likely to affect significantly or delay the implementation of the action or the EU's financial interests, in particular:

(i) changes in its legal, financial, technical, organisational or ownership situation

(b) **circumstances** affecting:

(i) the decision to award the grant or

(ii) compliance with requirements under the Agreement.

17.3 Consequences of non-compliance

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

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

ARTICLE 18 — KEEPING RECORDS — SUPPORTING DOCUMENTATION

18.1 Obligation to keep records and other supporting documentation

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

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

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

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

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

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

18.1.2 Records and other documentation to support the costs declared

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

(a) for **actual costs**: adequate records and other supporting documentation to prove the costs declared, such as contracts, subcontracts, invoices and accounting records. In addition, the beneficiary' usual cost accounting practices and internal control procedures must enable direct reconciliation between the amounts declared, the amounts recorded in its accounts and the amounts stated in the supporting documentation;

(b) for **unit costs**: adequate records and other supporting documentation to prove the number of units declared. The beneficiary does not need to identify the actual eligible costs covered or to keep or provide supporting documentation (such as accounting statements) to prove the amount per unit.

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

The beneficiary may submit to the Commission, for approval, a certificate (drawn up in accordance with Annex 6) stating that its usual cost accounting practices comply with these conditions (‘**certificate on the methodology**’). If the certificate is approved, costs declared in line with this methodology will not be challenged subsequently, unless the beneficiary has concealed information for the purpose of the approval.

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

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

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

18.2 Consequences of non-compliance

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

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

ARTICLE 19 — SUBMISSION OF DELIVERABLES

19.1 Obligation to submit deliverables

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

19.2 Consequences of non-compliance

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

ARTICLE 20 — REPORTING — PAYMENT REQUESTS

20.1 Obligation to submit reports

The beneficiary must submit to the Agency (see Article 52) the scientific and financial reports set out in this Article. The financial report includes the requests for payment.

The reports must be drawn up using the forms and templates provided in the electronic exchange system (see Article 52).

20.2 Scientific reporting — Reporting periods

The action is divided into the following '**scientific reporting periods**':

- SRP1: from month 1 to month 30
- final SRP: from month 31 to 60.

The beneficiary must submit to the Agency a:

- '**periodic scientific report**' within 60 days after the end of each period (except the last one) and
- '**final scientific report**' within 60 days after the end of the last reporting period.

The **periodic scientific report** must include:

(a) information about the **scientific progress** of the work;

(b) **achievements and results** of the action, such as publications and a declaration of any major change of scientific strategy;

(c) information on whether and how open access has been provided to these results (see Article 29);

(d) a summary of the achievements of the action for publication by the Agency.

The **final scientific report** must:

(a) present the **final results, achievements and conclusions** of the action, and how they have been disseminated (including via scientific publications) (see Article 29);

(b) contain a summary of the achievements of the action, for publication by the Agency.

20.3 Financial reporting — Payment requests — Reporting periods

The action is divided into the following '**financial reporting periods**':
- FRP1: from month 1 to month 18
- FRP2: from month 19 to month 36
- FRP3: from month 37 to month 54
- final FRP: from month 55 to 60.

The beneficiary must — within 60 days after the end of each period — submit to the Agency a '**financial report**' for each reporting period.

The **financial report** must contain:

(a) information on the eligible costs, including a '**breakdown of direct costs table**' and a '**budget follow-up table**';

(b) an '**individual financial statement**' (see Annex 4) from each beneficiary for the reporting period concerned.

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

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

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

The final financial statements must also detail the **receipts of the action** (see Article 5.3.3).

The beneficiary must **certify** that:

- the information provided is full, reliable and true;
- the costs declared are eligible (see Article 6);
- the costs can be substantiated by adequate records and supporting documentation (see Article 18) that will be produced upon request (see Article 17) or in the context of checks, audits and investigations (see Article 22), and
- for the last reporting period: that all the receipts have been declared (see Article 5.3.3);

(c) a '**summary financial statement**', created automatically by the electronic exchange system, including the **request for interim payment** (or — for the last financial reporting period — the **request for payment of the balance**);

(d) for the last financial reporting period only: a '**certificate on the financial statements**' (see Annex 5) for the beneficiary, if it requests a total contribution of EUR 325 000 or more, as reimbursement of actual costs and unit costs calculated on the basis of its usual cost accounting practices (see Article 5.2 and Article 6.2).

20.4 Currency for financial statements and conversion into euro

Financial statements must be drafted in euro.

If the beneficiary has accounting established in a currency other than the euro, it must convert the costs recorded in their accounts into euro at the average of the daily exchange rates published in the C series of the *Official Journal of the European Union*, calculated over the corresponding reporting period.

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

If the beneficiary has accounting established in euro, it must convert costs incurred in another currency into euro according to its usual accounting practices.

20.5 Language of reports

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

20.6 Consequences of non-compliance

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

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

ARTICLE 21 — PAYMENTS AND PAYMENT ARRANGEMENTS

21.1 Payments to be made

The following payments will be made to the beneficiary:

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

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

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

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

The amount of the pre-financing payment will be EUR **599,500.00** (five hundred and ninety nine thousand five hundred EURO).

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

An amount of EUR **74,937.50** (seventy four thousand nine hundred and thirty seven EURO and fifty eurocents), corresponding to the 5% of the maximum grant amount (see Article 5.1), is retained by the Agency from the pre-financing payment and transferred into the '**Guarantee Fund**'.

21.3 Interim payments — Amount — Calculation

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

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

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

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

Step 1 – Application of the reimbursement rate

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

21.3.1 Step 1 — Application of the reimbursement rate

The reimbursement rate (see Article 5.2) is applied to the eligible costs (actual costs, unit costs, flat-rate costs; see Article 6) declared by the beneficiary (see Article 20) and approved by the Agency (see above) for the concerned reporting period.

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

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

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

minus

{pre-financing and previous interim payments}}.

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

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

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

If the total amount of earlier payments is lower than the final grant amount, the Agency will pay the balance within 90 days from receiving the financial report and the final scientific report (see Article 20.3), except if Articles 47 or 48 apply.

Payment is subject to the approval of the financial and final scientific reports. Their approval does not imply recognition of the compliance, authenticity, completeness or correctness of their content.

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

{{final grant amount (see Article 5.3)

minus

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

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

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

The amount to be paid may however be offset — without the beneficiary's consent — against any other amount owed by the beneficiary to the Agency, the Commission or another executive agency (under the EU or Euratom budget), up to the maximum EU contribution indicated, for the beneficiary, in the estimated budget (see Annex 2).

21.5 Notification of amounts due

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

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

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

21.6 Currency for payments

The Agency will make all payments in euro.

21.7 Payments to the beneficiary

Payments will be made to the beneficiary.

Payments to the beneficiary will discharge the Agency from its payment obligation.

21.8 Bank account for payments

All payments will be made to the following bank account:

Name of bank: KOMERCNI BANKA A.S.
Address of branch: NA PRIKOPE 33 PRAGUE, Czech Republic
Full name of the account holder: UK PRIRODOVEDECKA FAKULTA
Full account number (including bank codes):
IBAN code: CZ2501000349560921457021

21.9 Costs of payment transfers

The cost of the payment transfers is borne as follows:

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

21.10 Date of payment

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

21.11 Consequences of non-compliance

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

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

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

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

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

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

21.11.2 Not applicable

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

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

22.1.1 Right to carry out checks

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

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

The Agency or the Commission may also request additional information in accordance with Article 17.

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

22.1.2 Right to carry out reviews

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

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

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

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

The beneficiary must provide — within the deadline requested — any information and data in addition to deliverables and reports already submitted (including information on the use of resources).

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

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

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

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

The Agency or the Commission will formally notify the review report to the beneficiary, which has 30 days to formally notify observations ('**contradictory review procedure**').

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

22.1.3 Right to carry out audits

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

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

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

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

The beneficiary must provide — within the deadline requested — any information (including complete accounts, individual salary statements or other personal data) to verify compliance with the Agreement.

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

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

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

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

The '**final audit report**' will take into account observations by the beneficiary. The report will be formally notified to it.

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

The Agency or the Commission may also access the beneficiary' statutory records for the periodical assessment of unit costs or flat-rate amounts.

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

Under Regulations No 883/2013[12] and No 2185/96[13] (and in accordance with their provisions and

[12] 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)

procedures), the European Anti-Fraud Office (OLAF) may — at any moment during implementation of the action or afterwards — carry out investigations, including on-the-spot checks and inspections, to establish whether there has been fraud, corruption or any other illegal activity affecting the financial interests of the EU.

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

Under Article 287 of the Treaty on the Functioning of the European Union (TFEU) and Article 161 of the Financial Regulation No 966/2012[14], the European Court of Auditors (ECA) may — at any moment during implementation of the action or afterwards — carry out audits.

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

22.4 Checks, reviews, audits and investigations for international organisations

Not applicable

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

22.5.1 Findings in this grant

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

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

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

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

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

22.5.2 Findings in other grants

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

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).

[13] 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).

[14] Regulation (EU, Euratom) No 966/2012 of the European Parliament and of the Council of 25 October 2012 on the financial rules applicable to the general budget of the Union and repealing Council Regulation (EC, Euratom) No 1605/2002 (OJ L 298, 26.10.2012, p. 1).

(a) the beneficiary is found, in other EU or Euratom grants awarded under similar conditions, to have committed systemic or recurrent errors, irregularities, fraud or breach of obligations that have a material impact on this grant and

(b) those findings are formally notified to the beneficiary — together with the list of grants affected by the findings — no later than two years after the payment of the balance of this grant.

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

22.5.3 Procedure

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

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

(a) an invitation to submit observations on the list of grants affected by the findings;

(b) the request to submit **revised financial statements** for all grants affected;

(c) the **correction rate for extrapolation** established by the Agency or the Commission on the basis of the systemic or recurrent errors, to calculate the amounts to be rejected if the beneficiary:

(i) considers that the submission of revised financial statements is not possible or practicable or

(ii) does not submit revised financial statements.

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

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

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

or

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

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

(a) an invitation to submit observations on the list of grants affected by the findings and

(b) the flat-rate the Agency or the Commission intends to apply according to the principle of proportionality.

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

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

- the proposed alternative flat-rate, if accepted

or

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

22.6 Consequences of non-compliance

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

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

ARTICLE 23 — EVALUATION OF THE IMPACT OF THE ACTION

23.1 Right to evaluate the impact of the action

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

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

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

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

23.2 Consequences of non-compliance

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

SECTION 3 RIGHTS AND OBLIGATIONS RELATED TO BACKGROUND AND RESULTS

SUBSECTION 1 GENERAL

ARTICLE 23a — MANAGEMENT OF INTELLECTUAL PROPERTY

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

If the beneficiary is a university or other public research organisation it must take measures to implement the principles set out in Points 1 and 2 of the Code of Practice annexed to the Commission Recommendation on the management of intellectual property in knowledge transfer activities[15].

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

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

23a.2 Consequences of non-compliance

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

SUBSECTION 2 RIGHTS AND OBLIGATIONS RELATED TO BACKGROUND

ARTICLE 24 — AGREEMENT ON BACKGROUND

Not applicable.

ARTICLE 25 — ACCESS RIGHTS TO BACKGROUND

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

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

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

Waivers of access rights are not valid unless in writing.

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

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

Not applicable

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

Not applicable

25.4 Access rights for affiliated entities

Not applicable

25.5 Access rights for third parties

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

Not applicable

25.6 Consequences of non-compliance

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

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

SUBSECTION 3 RIGHTS AND OBLIGATIONS RELATED TO RESULTS

ARTICLE 26 — OWNERSHIP OF RESULTS

26.1 Ownership by the beneficiary that generates the results

The beneficiary owns the results it generates.

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

26.2 Joint ownership by several beneficiaries

Not applicable

26.3 Rights of third parties (including personnel and the principal investigator)

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

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

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

26.4 Agency ownership, to protect results

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

(a) the lack of protection is because protecting the results is not possible, reasonable or justified (given the circumstances);

(b) the lack of protection is because there is a lack of potential for commercial or industrial exploitation, or

(c) the beneficiary intends to transfer the results to a third party established in an EU Member State or associated country[16], which will protect them.

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

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

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

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

(a) the protection is stopped because of a lack of potential for commercial or industrial exploitation;

(b) an extension would not be justified given the circumstances.

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

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

26.5 Consequences of non-compliance

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

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

ARTICLE 27 — PROTECTION OF RESULTS — VISIBILITY OF EU FUNDING

27.1 Obligation to protect the results

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

(a) the results can reasonably be expected to be commercially or industrially exploited and

[16] For the definition, see 2.1(3) Rules for Participation Regulation No 1290/2013: '**associated country**' means a third country which is party to an international agreement with the Union, as identified Article 7 of the H2020 Framework Programme Regulation No 1291/2013. Article 7 sets out the conditions for association of non-EU countries to Horizon 2020.

(b) protecting them is possible, reasonable and justified (given the circumstances).

When deciding on protection, the beneficiary must consider its own legitimate interests.

27.2 Agency ownership, to protect the results

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

27.3 Information on EU funding

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

> "The project leading to this application has received funding from the European Research Council (ERC) under the European Union's Horizon 2020 research and innovation programme (grant agreement No 803048)".

27.4 Consequences of non-compliance

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

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

ARTICLE 28 — EXPLOITATION OF RESULTS

28.1 Obligation to exploit the results

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

(a) using them in further research activities (outside the action);

(b) developing, creating or marketing a product or process;

(c) creating and providing a service, or

(d) using them in standardisation activities.

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

28.2 Results that could contribute to European or international standards — Information on EU funding

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

> "Results incorporated in this standard have received funding from the European Research Council (ERC)

under the European Union's Horizon 2020 research and innovation programme (grant agreement No 803048)".

28.3 Consequences of non-compliance

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

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

ARTICLE 29 — DISSEMINATION OF RESULTS — OPEN ACCESS — VISIBILITY OF EU FUNDING

29.1 Obligation to disseminate results

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

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

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

29.2 Open access to scientific publications

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

In particular, it must:

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

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

(b) ensure open access to the deposited publication — via the repository — at the latest:

(i) on publication, if an electronic version is available for free via the publisher, or

(ii) within six months of publication (twelve months for publications in the social sciences and humanities) in any other case.

(c) ensure open access — via the repository — to the bibliographic metadata that identify the deposited publication, which must include a persistent identifier.

29.3 Open access to research data

Not applicable

29.4 Information on EU funding — Obligation and right to use the EU emblem and the ERC logo

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

(a) display the EU emblem, the ERC logo and

(b) include the following text:

> "This project has received funding from the European Research Council (ERC) under the European Union's Horizon 2020 research and innovation programme (grant agreement No 803048)".

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

For the purposes of its obligations under this Article, the beneficiary may use the EU emblem and the ERC logo without first obtaining approval from the Agency.

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

Moreover, the beneficiary may not appropriate the EU emblem, the ERC logo or any similar trademark or logo, either by registration or by any other means.

29.5 Disclaimer excluding Agency responsibility

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

29.6 Consequences of non-compliance

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

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

ARTICLE 30 — TRANSFER AND LICENSING OF RESULTS

30.1 Transfer of ownership

The beneficiary may transfer ownership of its results.

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

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

30.2 Granting licenses

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

(a) this does not impede the rights under Article 31 and

(b) not applicable.

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

30.3 Agency right to object to transfers or licensing

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

(a) it is to a third party established in a non-EU country not associated with Horizon 2020 and

(b) the Agency considers that the transfer or licence is not in line with EU interests regarding competitiveness or is inconsistent with ethical principles or security considerations.

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

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

The Agency may request additional information.

If the Agency decides to object to a transfer or exclusive licence, it must formally notify the beneficiary 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 Agency decision, within the period set out above;
- if the Agency objects;
- until the conditions are complied with, if the Agency objection comes with conditions.

30.4 Consequences of non-compliance

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

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

ARTICLE 31 — ACCESS RIGHTS TO RESULTS

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

The conditions set out in Article 25.1 apply.

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

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

Not applicable

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

Not applicable

31.4 Access rights of affiliated entities

Not applicable

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

The beneficiary must give access to its results — on a royalty-free basis — to EU institutions, bodies, offices or agencies, for developing, implementing or monitoring EU policies or programmes.

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

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

31.6 Access rights for principal investigator

The beneficiary must — on a royalty-free basis — give access to the principal investigator to results needed for his/her activities under the action.

31.7 Consequences of non-compliance

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

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

SECTION 4 OTHER RIGHTS AND OBLIGATIONS

ARTICLE 32 — WORKING CONDITIONS FOR THE PRINCIPAL INVESTIGATOR AND HIS/HER TEAM

32.1 Obligations towards the principal investigator and his/her team

The beneficiaries must respect the following working conditions for the principal investigator and his/her team:

(a) 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[17] — in particular regarding working conditions, transparent recruitment processes based on merit and career development — and ensure that the principal investigator, researchers and third parties involved in the action are aware of them;

(b) enter — before signature of the Agreement — into a '**supplementary agreement**' with the principal investigator, that specifies:

(i) the obligation of the beneficiary to meet its obligations under the Agreement;

(ii) the obligation of the principal investigator to supervise the scientific and technological implementation of the action;

(iii) the obligation of the principal investigator to assume the responsibility for the scientific reporting for the beneficiary and contribute to the financial reporting;

(iv) the obligation of the principal investigator to meet the time commitments for implementing the action as described in Annex 1;

(v) the obligation of the principal investigator to apply the beneficiary's usual management practices;

(vi) the obligation of the principal investigator to inform the beneficiary immediately of any events or circumstances likely to affect the Agreement (see Article 17), such as:

- a planned transfer of the action (or part of it) to a new beneficiary (see Article 56a);
- any personal grounds affecting the implementation of the action;
- any changes in the information that was used as a basis for signing the supplementary agreement;
- any changes in the information that was used as a basis for awarding the grant;

(vii) the obligation of the principal investigator to ensure the visibility of EU funding in communications or publications and in applications for the protection of results (see Articles 27, 28, 29 and 38);

(viii) the obligation of the principal investigator to uphold the intellectual property rights of the beneficiary during the implementation of the action and afterwards;

(ix) the obligation of the principal investigator to maintain confidentiality (see Article 36);

(x) for a transfer of the action (or part of it) to a new beneficiary (see Article 56a): the obligation of the principal investigator to:

- propose to the beneficiary (in writing) to what extent the action will be transferred and the details of the transfer arrangement;
- provide a statement to the beneficiary with the detailed results of the research up to the time of transfer;

[17] 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).

(xi) the right of the Commission and the Agency, the European Court of Auditors (ECA) and the European Anti-fraud Office (OLAF) to exercise their rights under Articles 22 and 23 also towards the principal investigator;

(xii) the applicable law and the country in which disputes must be settled;

(c) provide the principal investigator with a copy of the signed Agreement;

(d) guarantee the principal investigator scientific independence, in particular for the:

(i) use of the budget to achieve the scientific objectives;

(ii) authority to publish as senior author and invite as co-authors those who have contributed substantially to the work;

(iii) preparation of scientific reports for the action;

(iv) selection and supervision of the other team members (hosted and engaged by the beneficiary or other legal entities), in line with the profiles needed to conduct the research and in accordance with the beneficiary's usual management practices;

(v) possibility to apply independently for funding;

(vi) access to appropriate space and facilities for conducting the research;

(e) provide — during the implementation of the action — research support to the principal investigator and the team members (regarding infrastructure, equipment, access rights, products and other services necessary for conducting the research);

(f) support the principal investigator and provide administrative assistance, in particular for the:

(i) general management of the work and his/her team

(ii) scientific reporting, especially ensuring that the team members send their scientific results to the principal investigator;

(iii) financial reporting, especially providing timely and clear financial information;

(iv) application of the beneficiary's usual management practices;

(v) general logistics of the action;

(vi) access to the electronic exchange system (see Article 52);

(g) inform the principal investigator immediately (in writing) of any events or circumstances likely to affect the Agreement (see Article 17);

(h) ensure that the principal investigator enjoys adequate:

(i) conditions for annual, sickness and parental leave;

(ii) occupational health and safety standards;

(iii) insurance under the general social security scheme, such as pension rights;

(i) allow the transfer of the Agreement to a new beneficiary ('portability'; see Article 56a)

32.2 Consequences of non-compliance

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

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

ARTICLE 33 — GENDER EQUALITY

33.1 Obligation to aim for gender equality

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

33.2 Consequences of non-compliance

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

ARTICLE 34 — ETHICS AND RESEARCH INTEGRITY

34.1 Obligation to comply with ethical and research integrity principles

The beneficiary must carry out the action in compliance with:

(a) ethical principles (including the highest standards of research integrity)

and

(b) applicable international, EU and national law.

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

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

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

(a) aim at human cloning for reproductive purposes;

(b) intend to modify the genetic heritage of human beings which could make such changes heritable (with the exception of research relating to cancer treatment of the gonads, which may be financed), or

(c) intend to create human embryos solely for the purpose of research or for the purpose of stem cell procurement, including by means of somatic cell nuclear transfer.

The beneficiary must respect the highest standards of research integrity — as set out, for instance, in the European Code of Conduct for Research Integrity[18].

This implies notably compliance with the following essential principles:

- honesty;
- reliability;
- objectivity;
- impartiality;
- open communication;
- duty of care;
- fairness and
- responsibility for future science generations.

This means that the beneficiary must ensure that persons carrying out research tasks:

- present their research goals and intentions in an honest and transparent manner;
- design their research carefully and conduct it in a reliable fashion, taking its impact on society into account;
- use techniques and methodologies (including for data collection and management) that are appropriate for the field(s) concerned;
- exercise due care for the subjects of research — be they human beings, animals, the environment or cultural objects;
- ensure objectivity, accuracy and impartiality when disseminating the results;
- allow — as much as possible and taking into account the legitimate interest of the beneficiary — access to research data, in order to enable research to be reproduced;
- make the necessary references to their work and that of other researchers;
- refrain from practicing any form of plagiarism, data falsification or fabrication;
- avoid double funding, conflicts of interest and misrepresentation of credentials or other research misconduct.

34.2 Activities raising ethical issues

[18] The European Code of Conduct for Research Integrity of ALLEA (All European Academies) and ESF (European Science Foundation) of March 2011. http://ec.europa.eu/research/participants/data/ref/h2020/other/hi/h2020-ethics_code-of-conduct_en.pdf.

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

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

(a) any ethics committee opinion required under national law and

(b) any notification or authorisation for activities raising ethical issues required under national and/or European law

needed for implementing the action tasks in question.

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

34.3 Activities involving human embryos or human embryonic stem cells

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

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

34.4 Consequences of non-compliance

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

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

ARTICLE 35 — CONFLICT OF INTERESTS

35.1 Obligation to avoid a conflict of interests

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

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

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

35.2 Consequences of non-compliance

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

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

ARTICLE 36 — CONFIDENTIALITY

36.1 General obligation to maintain confidentiality

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

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

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

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

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

(a) need to know to implement the Agreement and

(b) are bound by an obligation of confidentiality.

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

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

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

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

Under the conditions set out in Article 4 of the Rules for Participation Regulation No 1290/2013[19], the Commission must moreover make available information on the results to other EU institutions, bodies, offices or agencies as well as Member States or associated countries.

The confidentiality obligations no longer apply if:

(a) the disclosing party agrees to release the other party;

(b) the information was already known by the recipient or is given to him without obligation of confidentiality by a third party that was not bound by any obligation of confidentiality;

(c) the recipient proves that the information was developed without the use of confidential information;

[19] Regulation (EU) No 1290/2013 of the European Parliament and of the Council of 11 December 2013 laying down the rules for participation and dissemination in "Horizon 2020 - the Framework Programme for Research and Innovation (2014-2020)" (OJ L 347, 20.12.2013 p.81).

(d) the information becomes generally and publicly available, without breaching any confidentiality obligation, or

(e) the disclosure of the information is required by EU or national law.

36.2 Consequences of non-compliance

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

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

ARTICLE 37 — SECURITY-RELATED OBLIGATIONS

37.1 Results with a security recommendation

Not applicable

37.2 Classified information

Not applicable

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

Not applicable

37.4 Consequences of non-compliance

Not applicable

ARTICLE 38 — PROMOTING THE ACTION — VISIBILITY OF EU FUNDING

38.1 Communication activities by the beneficiary

38.1.1 Obligation to promote the action and its results

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

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

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

38.1.2 Information on EU funding — Obligation and right to use the EU emblem and the ERC logo

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

(a) display the EU emblem and the ERC Logo and

(b) include the following text:

For communication activities: “This project has received funding from the European Research Council (ERC) under the European Union’s Horizon 2020 research and innovation programme (grant agreement No 803048)”.

For infrastructure, equipment and major results: “This *[infrastructure][equipment][insert type of result]* is part of a project that has received funding from the European Research Council (ERC) under the European Union’s Horizon 2020 research and innovation programme (grant agreement No 803048)”.

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

For the purposes of its obligations under this Article, the beneficiary may use the EU emblem and the ERC Logo without first obtaining approval from the Agency.

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

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

38.1.3 Disclaimer excluding Agency and Commission responsibility

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

38.2 Communication activities by the Agency and the Commission

38.2.1 Right to use the beneficiary’s materials, documents or information

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

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

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

The right to use a beneficiary’s or principal investigator’s materials, documents and information includes:

(a) **use for its own purposes** (in particular, making them available to persons working for the Agency, the Commission or any other EU institution, body, office or agency or body or institutions in EU Member States; and copying or reproducing them in whole or in part, in unlimited numbers);

(b) **distribution to the public** (in particular, publication as hard copies and in electronic or digital

format, publication on the internet, as a downloadable or non-downloadable file, broadcasting by any channel, public display or presentation, communicating through press information services, or inclusion in widely accessible databases or indexes);

(c) **editing or redrafting** for communication and publicising activities (including shortening, summarising, inserting other elements (such as meta-data, legends, other graphic, visual, audio or text elements), extracting parts (e.g. audio or video files), dividing into parts, use in a compilation);

(d) **translation**;

(e) giving **access in response to individual requests** under Regulation (EC) No 1049/2001[21], without the right to reproduce or exploit;

(f) **storage** in paper, electronic or other form;

(g) **archiving**, in line with applicable document-management rules, and

(h) the right to authorise **third parties** to act on its behalf or sub-license the modes of exploitation set out in points (b),(c),(d) and (f) to third parties if needed for the communication and publicising activities of the Agency or the Commission.

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

Where applicable (and if provided by the beneficiary or the principal investigator), the Agency or the Commission will insert the following information:

"© – [year] – [name of the copyright owner]. All rights reserved. Licensed to the European Research Council Executive Agency (ERCEA) and the European Union (EU) under conditions."

38.3 Consequences of non-compliance

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

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

ARTICLE 39 — PROCESSING OF PERSONAL DATA

39.1 Processing of personal data by the Agency and the Commission

Any personal data under the Agreement will be processed by the Agency or the Commission under Regulation No 45/2001[22] and according to the 'notifications of the processing operations' to the Data Protection Officer (DPO) of the Agency or the Commission (publicly accessible in the DPO register).

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

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

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

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

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

39.2 Processing of personal data by the beneficiary

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

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

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

39.3 Consequences of non-compliance

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

ARTICLE 40 — ASSIGNMENTS OF CLAIMS FOR PAYMENT AGAINST THE AGENCY

The beneficiary may not assign any of its claims for payment against the Agency to any third party, except if approved by the Agency on the basis of a reasoned, written request.

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

In no circumstances will an assignment release the beneficiary from its obligations towards the Agency.

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

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

41.1 Roles and responsibility towards the Agency

The beneficiary has full responsibility for implementing the action and complying with the Agreement.

The beneficiary is itself responsible for:

(a) monitoring that the action is implemented properly (see Article 7);

(b) informing the Agency immediately of any events or circumstances likely to affect significantly or delay the implementation of the action (see Article 17);

(c) submitting the deliverables and reports to the Agency (see Articles 19 and 20);

(d) submitting to the Agency in good time any documents or information required by it

and may not delegate or subcontract these tasks to any third party (including linked third parties).

41.2 Internal division of roles and responsibilities

Not applicable

41.3 Internal arrangements

Not applicable

41.4 Relationship with complementary beneficiaries — Collaboration agreement

Not applicable

41.5 Relationship with partners of a joint action — Coordination agreement

Not applicable

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

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

ARTICLE 42 — REJECTION OF INELIGIBLE COSTS

42.1 Conditions

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

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

42.2 Ineligible costs to be rejected — Calculation — Procedure

Ineligible costs will be rejected in full.

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

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

42.3 Effects

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

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

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

ARTICLE 43 — REDUCTION OF THE GRANT

43.1 Conditions

The Agency may — **at the payment of the balance** or **afterwards** — reduce the maximum grant amount (see Article 5.1), if:

(a) the beneficiary (or a natural person who has the power to represent or take decisions on its behalf) has committed:

  (i) substantial errors, irregularities or fraud or

  (ii) serious breach of obligations under the Agreement or during the award procedure (including improper implementation of the action, submission of false information, failure to provide required information, breach of ethical principles) or

(b) the beneficiary (or a natural person who has the power to represent or take decision on its behalf) has committed — in other EU or Euratom grants awarded to it under similar conditions — systemic or recurrent errors, irregularities, fraud or serious breach of obligations that have a material impact on this grant (**extension of findings from other grants to this grant**; see Article 22.5.2).

43.2 Amount to be reduced — Calculation — Procedure

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

Before reduction of the grant, the Agency will formally notify a '**pre-information letter**' to the beneficiary:

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

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

43.3 Effects

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

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

ARTICLE 44 — RECOVERY OF UNDUE AMOUNTS

44.1 Amount to be recovered — Calculation — Procedure

The Agency will — **at the payment of the balance** or **afterwards** — claim back amount that was paid but is not due under the Agreement.

44.1.1 Recovery after termination of a beneficiary's participation

Not applicable

44.1.2 Recovery at payment of the balance

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

- informing it of its intention to recover, the amount due as the balance and the reasons why;
- specifying that it intends to deduct the amount to be recovered from the amount retained for the Guarantee Fund; and
- inviting it to submit observations within 30 days of receiving notification.

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

- pay the difference between the amount to be recovered and the amount retained for the Guarantee Fund, **if the difference is positive** or

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

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

(a) by '**offsetting**' it — without the beneficiary's consent — against any amounts owed to the beneficiary by the Agency, the Commission or another executive agency (from the EU or Euratom budget).

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

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

(i) not applicable

(ii) by **taking legal action** (see Article 57) or by **adopting an enforceable decision** under Article 299 of the Treaty on the Functioning of the EU (TFEU) and Article 79(2) of the Financial Regulation No 966/2012.

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

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

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

44.1.3 Recovery of amounts after payment of the balance

If, the revised final grant amount (see Article 5.4) is lower than the final grant amount, the beneficiary must repay the difference to the Agency.

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

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

- inviting it to submit observations within 30 days of receiving notification.

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

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

(a) by '**offsetting**' it — without the beneficiary's consent — against any amounts owed to the beneficiary by the Agency, the Commission or another executive agency (from the EU or Euratom budget).

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

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

(i) not applicable

(ii) by **taking legal action** (see Article 57) or by **adopting an enforceable decision** under Article 299 of the Treaty on the Functioning of the EU (TFEU) and Article 79(2) of the Financial Regulation No 966/2012.

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

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

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

ARTICLE 45 — ADMINISTRATIVE SANCTIONS

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

SECTION 2 LIABILITY FOR DAMAGES

ARTICLE 46 — LIABILITY FOR DAMAGES

46.1 Liability of the Agency

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

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

46.2 Liability of the beneficiary

Except in case of force majeure (see Article 51), the beneficiary must compensate the Agency for

any damage it sustains as a result of the implementation of the action or because the action was not implemented in full compliance with the Agreement.

SECTION 3 SUSPENSION AND TERMINATION

ARTICLE 47 — SUSPENSION OF PAYMENT DEADLINE

47.1 Conditions

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

(a) it does not comply with the provisions of the Agreement (see Article 20);

(b) the technical reports or financial reports have not been submitted or are not complete or additional information is needed, or

(c) there is doubt about the eligibility of the costs declared in the financial statements and additional checks, reviews, audits or investigations are necessary.

47.2 Procedure

The Agency will formally notify the beneficiary of the suspension and the reasons why.

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

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

If the suspension exceeds two months, the beneficiary may request the Agency if the suspension will continue.

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

ARTICLE 48 — SUSPENSION OF PAYMENTS

48.1 Conditions

The Agency may — at any moment — suspend payments, in whole or in part, if:

(a) the beneficiary (or a natural person who has the power to represent or take decisions on its behalf) has committed or is suspected of having committed:

(i) substantial errors, irregularities or fraud or

(ii) serious breach of obligations under the Agreement or during the award procedure (including improper implementation of the action, submission of false information, failure to provide required information, breach of ethical principles) or

(b) the beneficiary (or a natural person who has the power to represent or take decisions on its behalf) has committed — in other EU or Euratom grants awarded to it under similar conditions — systemic or recurrent errors, irregularities, fraud or serious breach of obligations that have a material impact on this grant (**extension of findings from other grants to this grant**; see Article 22.5.2).

If suspension concerns the payment of the balance, — once suspension is lifted — the payment or the recovery of the amount(s) concerned will be considered the payment of the balance that closes the action.

48.2 Procedure

Before suspending payments, the Agency will formally notify the beneficiary:

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

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

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

If the conditions for resuming payments are met, the suspension will be **lifted**. The Agency will formally notify the beneficiary.

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

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

ARTICLE 49 — SUSPENSION OF THE ACTION IMPLEMENTATION

49.1 Suspension of the action implementation, by the beneficiary

49.1.1 Conditions

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

49.1.2 Procedure

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

- the reasons why and

- the expected date of resumption.

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

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

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

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

49.2 Suspension of the action implementation, by the Agency

49.2.1 Conditions

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

(a) the beneficiary (or a natural person who has the power to represent or take decisions on its behalf) has committed or is suspected of having committed:

  (i) substantial errors, irregularities or fraud or

  (ii) serious breach of obligations under the Agreement or during the award procedure (including improper implementation of the action, submission of false information, failure to provide required information, breach of ethical principles);

(b) the beneficiary (or a natural person who has the power to represent or take decisions on its behalf) has committed — in other EU or Euratom grants awarded to it under similar conditions — systemic or recurrent errors, irregularities, fraud or serious breach of obligations that have a material impact on this grant (**extension of findings from other grants to this grant**; see Article 22.5.2), or

(c) the action is suspected of having lost its scientific or technological relevance.

49.2.2 Procedure

Before suspending implementation of the action, the Agency will formally notify the beneficiary:

- informing it of its intention to suspend the implementation and the reasons why and

- inviting it to submit observations within 30 days of receiving notification.

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

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

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

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

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

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

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

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

ARTICLE 50 — TERMINATION OF THE AGREEMENT

50.1 Termination of the Agreement, by the beneficiary

50.1.1 Conditions and procedure

The beneficiary may — with the agreement of the principal investigator — terminate the Agreement.

The beneficiary must formally notify termination to the Agency (see Article 52), stating:

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

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

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

50.1.2 Effects

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

(i) a periodic financial report (for the open reporting period until termination; see Article 20.3) and

(ii) the final scientific report (see Article 20.3).

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

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

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

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

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

Not applicable

50.3 Termination of the Agreement, by the Agency

50.3.1 Conditions

The Agency may terminate the Agreement, if:

(a) not applicable;

(b) a change to the legal, financial, scientific organisational or ownership situation of the beneficiary is likely to substantially affect or delay the implementation of the action or calls into question the decision to award the grant;

(c) not applicable;

(d) implementation of the action is prevented by force majeure (see Article 51) or suspended by the beneficiary (see Article 49.1) and either:

(i) resumption is impossible, or

(ii) the necessary changes to the Agreement would call into question the decision awarding the grant or breach the principle of equal treatment of applicants;

(e) the beneficiary is declared bankrupt, being wound up, having its affairs administered by the courts, has entered into an arrangement with creditors, has suspended business activities, or is subject to any other similar proceedings or procedures under national law;

(f) the beneficiary (or a natural person who has the power to represent or take decisions on its behalf) has been found guilty of professional misconduct, proven by any means;

(g) the beneficiary does not comply with the applicable national law on taxes and social security;

(h) the action — with respect to the state of the art — is no longer of scientific or technological relevance or no longer has any breakthrough potential;

(i) not applicable;

(j) not applicable;

(k) the beneficiary (or a natural person who has the power to represent or take decisions on its behalf) has committed fraud, corruption, or is involved in a criminal organisation, money laundering or any other illegal activity;

(l) the beneficiary (or a natural person who has the power to represent or take decisions on its behalf) has committed:

(i) substantial errors, irregularities or fraud or

(ii) serious breach of obligations under the Agreement or during the award procedure

(including improper implementation of the action, submission of false information, failure to provide required information, breach of ethical principles);

(m) the beneficiary (or the natural person who has the power to represent or take decisions on its behalf) has committed — in other EU or Euratom grants awarded to it under similar conditions — systemic or recurrent errors, irregularities, fraud or serious breach of obligations that have a material impact on this grant (**extension of findings from other grants to this grant**; see Article 22.5.2);

(n) not applicable.

(o) the principal investigator is no longer in the position to continue working under the action.

50.3.2 Procedure

Before terminating the Agreement, the Agency will formally notify the beneficiary:

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

If the Agency does not receive observations or decides to pursue the procedure despite the observations it has received, it will formally notify to the beneficiary (with copy to the principal investigator) **confirmation** of the termination and the date it will take effect. Otherwise, it will formally notify the beneficiary (with copy to the principal investigator) that the procedure is not continued.

The termination will **take effect**:

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

50.3.3 Effects

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

(i) a periodic financial report (for the last open reporting period until termination) (see Article 20.3) and

(ii) a final scientific report (see Article 20.2).

If the Agreement is terminated for breach of the obligation to submit report(s) (see Articles 20.6 and 50.3.1(l)), the beneficiary may not submit any reports after termination.

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

The Agency will **calculate** the final grant amount (see Article 5.3) and the balance (see Article 21.4)

on the basis of the report(s) submitted. Only costs incurred until termination takes effect are eligible (see Article 6). Costs relating to contracts due for execution only after termination are not eligible.

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

The beneficiary may not claim damages due to termination by the Agency.

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

SECTION 4 FORCE MAJEURE

ARTICLE 51 — FORCE MAJEURE

'Force majeure' means any situation or event that:

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

The following cannot be invoked as force majeure:

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

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

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

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

CHAPTER 7 FINAL PROVISIONS

ARTICLE 52 — COMMUNICATION BETWEEN THE PARTIES

52.1 Form and means of communication

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

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

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

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

Communications in the electronic exchange system must be made by persons authorised according to the Participant Portal Terms & Conditions. For naming the authorised persons, the beneficiary must have designated — before the signature of this Agreement — a 'legal entity appointed representative (LEAR)'. The role and tasks of the LEAR are stipulated in his/her appointment letter (see Participant Portal Terms & Conditions).

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

52.2 Date of communication

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

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

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

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

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

52.3 Addresses for communication

The **electronic exchange system** must be accessed via the following URL:

https://ec.europa.eu/research/participants/portal/desktop/en/projects/

The Agency will formally notify the beneficiary in advance any changes to this URL.

Formal notifications on paper (only after the payment of the balance) addressed **to the Agency** must be sent to the official mailing address indicated on the Agency's website.

Formal notifications on paper (only after the payment of the balance) addressed **to the beneficiary** must be sent to its legal address as specified in the Participant Portal Beneficiary Register.

ARTICLE 53 — INTERPRETATION OF THE AGREEMENT

53.1 Precedence of the Terms and Conditions over the Annexes

The provisions in the Terms and Conditions of the Agreement take precedence over its Annexes.

Annex 2 takes precedence over Annex 1.

53.2 Privileges and immunities

Not applicable

ARTICLE 54 — CALCULATION OF PERIODS, DATES AND DEADLINES

In accordance with Regulation No 1182/71[23], periods expressed in days, months or years are calculated from the moment the triggering event occurs.

The day during which that event occurs is not considered as falling within the period.

ARTICLE 55 — AMENDMENTS TO THE AGREEMENT

55.1 Conditions

The Agreement may be amended, unless the amendment entails changes to the Agreement which would call into question the decision awarding the grant or breach the principle of equal treatment of applicants.

Amendments may be requested by any of the parties.

55.2 Procedure

The party requesting an amendment must submit a request for amendment signed in the electronic exchange system (see Article 52).

The request for amendment must include:

- the reasons why;
- the appropriate supporting documents.

The Agency may request additional information.

If the party receiving the request agrees, it must sign the amendment in the electronic exchange system within 45 days of receiving notification (or any additional information the Agency has requested). If it does not agree, it must formally notify its disagreement within the same deadline. The deadline may

[23] 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).

be extended, if necessary for the assessment of the request. If no notification is received within the deadline, the request is considered to have been rejected.

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

An amendment **takes effect** on the date agreed by the parties or, in the absence of such an agreement, on the date on which the amendment enters into force.

ARTICLE 56 — ACCESSION TO THE AGREEMENT

56.1 Addition of new beneficiaries

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

For this purpose, the beneficiary must submit a request for amendment in accordance with Article 55. It must include an Accession Form (see Annex 3) signed by the new beneficiary in the electronic exchange system (see Article 52).

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

If a new beneficiary is added, the grant becomes a multi-beneficiary grant and the ERC Multi-beneficiary Model Grant Agreement will apply.

ARTICLE 56a — TRANSFER OF THE AGREEMENT TO A NEW BENEFICIARY — PORTABILITY OF THE GRANT

56a.1 Conditions

The principal investigator may request the transfer of the action (or his/her part of it) to a new beneficiary, provided that the objectives of the action remain achievable.

The beneficiary may object only on the basis that the transfer is not possible under national law.

56a.2 Procedure

The beneficiary must formally notify a **request for amendment** to the Agency (see Article 55).

56a.3 Effects

The former beneficiary must agree with the principal investigator and the new beneficiary on a plan to transfer the intellectual property rights under the Agreement to the new beneficiary.

The Agency will request the former beneficiary to transfer to the new beneficiary any part of the pre-financing (see Article 21) not covered by an approved financial report.

If requested by the principal investigator, the Agency may require the former beneficiary to transfer to the new beneficiary the equipment purchased and used exclusively for the action (against reimbursement of the costs that have not yet been depreciated). The former beneficiary may object only on the basis that the transfer is not possible under national law.

ARTICLE 57 — APPLICABLE LAW AND SETTLEMENT OF DISPUTES

57.1 Applicable law

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

57.2 Dispute settlement

If a dispute concerning the interpretation, application or validity of the Agreement cannot be settled amicably, the General Court — or, on appeal, the Court of Justice of the European Union — has sole jurisdiction. Such actions must be brought under Article 272 of the Treaty on the Functioning of the EU (TFEU).

If a dispute concerns administrative sanctions, offsetting or an enforceable decision under Article 299 TFEU (see Articles 44, 45 and 46), the beneficiary must bring action before the General Court — or, on appeal, the Court of Justice of the European Union — under Article 263 TFEU. Actions against offsetting and enforceable decisions must be brought against the Commission (not against the Agency).

ARTICLE 58 — ENTRY INTO FORCE OF THE AGREEMENT

The Agreement will enter into force on the day of signature by the Agency or the beneficiary, depending on which is later.

SIGNATURES

For the beneficiary

Jiří ZIMA with ECAS id nzimajir signed in the Participant Portal on 07/11/2018 at 12:26:57 (transaction id SigId-98342-Bd3peTvztG3GSCoQr8EzNYJij8rxe4Y2Qg204xwhcZwBFeJuZiBFgDHXzzHRxIrxRrUC3S94WC0731vpuK5D2W0-Jj71zxYb8yrnFBsruTiWB0-AuKLld8W6iZU1rEiBay7CMC1yueqAkcqfRAhyMKLvpW). Timestamp by third party at Wed Nov 07 12:27:06 CET 2018

For the Agency

Signed by Niki ATZOULATOU with ECAS id atzouni as an authorised representative on 12-11-2018 18:29:10 (transaction id SigId-156032-zwhBDqtBIoFs2gr9DzrIfVdportYwa5GAcgNzNIfbwDCriAtY5To0ZMdE62GMZAoHeW3JwpVTiaeo5dzS2iFiWu-Jj71zxYb8yrnFBsruTiWB0-SXpl2bzJh1oWVP3GoEzOiUfES2gEDMYlVpxIuzfSUcNG) Mon Nov 12 18:29:16 CET 2018

European Research Council
Executive Agency

Established by the European Commission

ANNEX 1 (part A)

Starting Grant

NUMBER — 803048 — CELLONGATE

Table of Contents

1.1. The project summary

Project Number [1]	803048	Project Acronym [2]	CELLONGATE

One form per project

General information	
Project title [3]	Unraveling the molecular network that drives cell growth in plants
Starting date [4]	01/01/2019
Duration in months [5]	60
Call (part) identifier [6]	ERC-2018-STG
Topic	ERC-2018-STG ERC Starting Grant
Fixed EC Keywords	Cell differentiation, physiology and dynamics, Cell cycle, division and growth, Tissue organisation and morphogenesis in animals and plants (including biophysical approaches), Developmental genetics in animals and plants
Free keywords	Arabidopsis, cell wall, auxin, live-cell imaging, microfluidics

Abstract [7]

Plants differ strikingly from animals by the almost total absence of cell migration in their development. Plants build their bodies using a hydrostatic skeleton that consists of pressurized cells encased by a cell wall. Consequently, plant cells cannot migrate and must sculpture their bodies by orientation of cell division and precise regulation of cell growth. Cell growth depends on the balance between internal cell pressure – turgor, and strength of the cell wall. Cell growth is under a strict developmental control, which is exemplified in the Arabidopsis thaliana root tip, where massive cell elongation occurs in a defined spatio-temporal developmental window. Despite the immobility of their cells, plant organs move to optimize light and nutrient acquisition and to orient their bodies along the gravity vector. These movements depend on differential regulation of cell elongation across the organ, and on response to the phytohormone auxin. Even though the control of cell growth is in the epicenter of plant development, protein networks steering the developmental growth onset, coordination and termination remain elusive. Similarly, although auxin is the central regulator of growth, the molecular mechanism of its effect on root growth is unknown. In this project, I will establish a unique microscopy setup for high spatio-temporal resolution live-cell imaging equipped with a microfluidic lab-on-chip platform optimized for growing roots, to enable analysis and manipulation of root growth physiology. I will use developmental gradients in the root to discover genes that steer cellular growth, by correlating transcriptome profiles of individual cell types with the cell size. In parallel, I will exploit the auxin effect on root to unravel molecular mechanisms that control cell elongation. Finally, I am going to combine the live-cell imaging methodology with the gene discovery approaches to chart a dynamic spatio-temporal physiological map of a growing Arabidopsis root.

1.2. List of Beneficiaries

Project Number [1]	803048	Project Acronym [2]	CELLONGATE

List of Beneficiaries

No	Name	Short name	Country	Project entry month[8]	Project exit month
1	UNIVERZITA KARLOVA	CUNI	Czech Republic	1	60

1.3. Workplan Tables - Detailed implementation

1.3.1. WT1 List of work packages

No work packages indicated

1.3.2. WT2 list of deliverables

No deliverables indicated

1. Project number

The project number has been assigned by the Commission as the unique identifier for your project. It cannot be changed. The project number **should appear on each page of the grant agreement preparation documents (part A and part B)** to prevent errors during its handling.

2. Project acronym

Use the project acronym as given in the submitted proposal. It can generally not be changed. The same acronym **should appear on each page of the grant agreement preparation documents (part A and part B)** to prevent errors during its handling.

3. Project title

Use the title (preferably no longer than 200 characters) as indicated in the submitted proposal. Minor corrections are possible if agreed during the preparation of the grant agreement.

4. Starting date

Unless a specific (fixed) starting date is duly justified and agreed upon during the preparation of the Grant Agreement, the project will start on the first day of the month following the entry into force of the Grant Agreement (NB : entry into force = signature by the Commission). Please note that if a fixed starting date is used, you will be required to provide a written justification.

5. Duration

Insert the duration of the project in full months.

6. Call (part) identifier

The Call (part) identifier is the reference number given in the call or part of the call you were addressing, as indicated in the publication of the call in the Official Journal of the European Union. You have to use the identifier given by the Commission in the letter inviting to prepare the grant agreement.

7. Abstract

8. Project Entry Month

The month at which the participant joined the consortium, month 1 marking the start date of the project, and all other start dates being relative to this start date.

9. Work Package number

Work package number: WP1, WP2, WP3, ..., WPn

10. Lead beneficiary

This must be one of the beneficiaries in the grant (not a third party) - Number of the beneficiary leading the work in this work package

11. Person-months per work package

The total number of person-months allocated to each work package.

12. Start month

Relative start date for the work in the specific work packages, month 1 marking the start date of the project, and all other start dates being relative to this start date.

13. End month

Relative end date, month 1 marking the start date of the project, and all end dates being relative to this start date.

14. Deliverable number

Deliverable numbers: D1 - Dn

15. Type

Please indicate the type of the deliverable using one of the following codes:

R	Document, report
DEM	Demonstrator, pilot, prototype
DEC	Websites, patent fillings, videos, etc.
OTHER	
ETHICS	Ethics requirement
ORDP	Open Research Data Pilot

16. Dissemination level

Please indicate the dissemination level using one of the following codes:

PU	Public
CO	Confidential, only for members of the consortium (including the Commission Services)
EU-RES	Classified Information: RESTREINT UE (Commission Decision 2005/444/EC)
EU-CON	Classified Information: CONFIDENTIEL UE (Commission Decision 2005/444/EC)
EU-SEC	Classified Information: SECRET UE (Commission Decision 2005/444/EC)

17. Delivery date for Deliverable

Month in which the deliverables will be available, month 1 marking the start date of the project, and all delivery dates being relative to this start date.

18. Milestone number

Milestone number:MS1, MS2, ..., MSn

19. Review number

Review number: RV1, RV2, ..., RVn

20. Installation Number

Number progressively the installations of a same infrastructure. An installation is a part of an infrastructure that could be used independently from the rest.

21. Installation country

Code of the country where the installation is located or IO if the access provider (the beneficiary or linked third party) is an international organization, an ERIC or a similar legal entity.

22. Type of access

VA	if virtual access,
TA-uc	if trans-national access with access costs declared on the basis of unit cost,
TA-ac	if trans-national access with access costs declared as actual costs, and
TA-cb	if trans-national access with access costs declared as a combination of actual costs and costs on the basis of unit cost.

23. Access costs

Cost of the access provided under the project. For virtual access fill only the second column. For trans-national access fill one of the two columns or both according to the way access costs are declared. Trans-national access costs on the basis of unit cost will result from the unit cost by the quantity of access to be provided.

ERC Starting Grant 2018

Annex 1 to the Grant Agreement
(Description of the Action)
Part B

Action Acronym: CELLONGATE
Action number: 803048
Action Title: Unraveling the molecular network that drives cell growth in plants
Principal Investigator: Matyáš Fendrych
Host Institution: Charles University

TABLE OF CONTENTS

Curriculum Vitae

Matyáš Fendrych, Ph.D.
ORCID: orcid.org/0000-0002-9767-8699
Date of birth: 1st November 1981
Married, two children born 2012 and 2014
Nationality: Czech
URL for web site: https://www.natur.cuni.cz/biologie/biologie-rostlin/veda-a-vyzkum-1/cellgrowth

EDUCATION

2006 – 2011 Ph.D. Thesis: "The interface between secretory pathway and cytoskeleton – exocyst tethering complex and cortical cytoskeleton in plant cell morphogenesis". Institute of Experimental Botany ASCR, Prague, Czechia, Laboratory of Cell Biology, supervisor Prof. Viktor Žárský.

2001 – 2006 Master degree in Biology, Faculty of Science, Charles University in Prague, Czechia

CURRENT POSITION

Since December 2017
Group leader, Department of Experimental Plant Biology, Faculty of Science, Charles University in Prague, Czechia

PREVIOUS POSITIONS

2014 – 2017 Postdoc, laboratory of Jiří Friml, Institute of Science and Technology, Austria

2011 – 2014 Postdoc, laboratory of Moritz Nowack, Department of Plant Systems Biology, VIB, Ghent, Belgium

FELLOWSHIPS

2016 – 2017 FWF Austrian Science Fund, Lise Meitner Fellowship

2014 – 2016 IST Fellow programme, a Marie Curie FP7 co-fund

2011 – 2014 Omics@VIB fellowship, a Marie Curie FP7 co-fund.

SUPERVISION OF STUDENTS

2016 – 2017 Co-advisor of PhD thesis of Matouš Glanc, Department of Experimental Plant Biology, Faculty of Science, Charles University, Prague

2011 – 2014 Co-advisor of Master's thesis of Marlies Huysmans, Co-advisor of Bachelor's thesis of Kyra Kerkhofs, Department of Plant Systems Biology, VIB, Ghent, Belgium

2010 – 2011 Co-advisor of Master's thesis of Juraj Sekereš, Co-advisor of Bachelor's thesis of Jitka Ortmannová, Faculty of Science, Charles University, Prague, Czechia

Member of PhD thesis committee:

External: Anamika Rawat (Prof. Viktor Žárský, Institute of Experimental Botany, Prague)

Internal: Tomasz Nodzynski, Pawel Baster (Prof. Jiří Friml, Department of Plant Systems Biology, Ghent), Anas Abuzeineh (Prof. Eva Benková, Department of Plant Systems Biology, Ghent).

OTHER RESPONSIBILITIES

Manuscript reviewer for Plant Physiology, Plant Molecular Biology, PLoS Genetics; co-reviewer with postdoc supervisors for Nature, Nature Plants, PNAS, Plant Cell, Cell.

Since 2015, Review Editor the Editorial Board of Plant Traffic and Transport, Frontiers in Plant Science.

MAJOR COLLABORATIONS

Jiří Friml, IST Austria
Long-term collaboration on auxin perception for root growth regulation. (Our collaboration resulted in 6 publications).

Stefan Kepinski, University of Leeds, United Kingdom
Collaboration on auxin signalling during root gravitropism

Klaus Harter, University of Tuebingen, Germany
Established collaboration on brassinosteroid signalling in root growth control

Maria Akhmanova, IST Austria
Interdisciplinary collaboration on mathematical modelling of root hormonal signalling

Jeffrey Leung, INRA Versailles, France
Ongoing collaboration on physiology of ion transport during cell growth. (Our collaboration resulted in 1 publication)

Moritz Nowack, PSB-VIB, Ghent, Belgium
Long-term collaboration on cell biology of root growth and root cap cell death. (Our collaboration resulted in 4 publications)

Sergey Borisov, Graz University of Technology, Austria
Collaboration on development of molecular sensors and sensory nanoparticles for microscopy

Zdeněk Šlouka, University of Chemistry and Technology, Prague, Czechia
Established collaboration on development and fabrication of microfluidic chips and lab-on-chip methodology

Funding ID

On-going grants

Project Title	*Funding source*	*Amount (Euros)*	*Period*	*Role of the PI*	*Relation to current ERC proposal*
Visualization of root growth physiology and deciphering molecular mechanisms that govern root cell expansion in Arabidopsis	Czech Science Foundation (GACR), Junior project grant scheme	276,000	2018 – 2021 * I will terminate the grant by 31st December 2018 to dedicate my time to ERC StG.	Project design and supervision, 90% time commitment	Direct synergy with the ERC StG: this grant focuses on a subset of questions of the ERC StG, namely on protein molecular machinery that regulates root cell wall pH during growth. However, the budget of this junior grant is rather limited and therefore allows only for compromise solution in buying the equipment and services that would be necessary to properly address my research questions. The budget also is not sufficient to attract postdocs from abroad.
Primus: Unraveling the molecular network that steers cell growth in plant cells	Charles University - Primus Scheme	70,600	01.01.2019 - 31.12.2021	Project design and supervision	This project is granted by the university to young group leaders to help them build-up their teams. From the Primus, I will finance a 50% technician and 35% postdoc (returning from a maternity leave), both will support the ERC project.

Early achievements track-record

PUBLICATIONS

Total publications: 20 (see here)
Publications without PhD supervisor: 11
First author publications: 6 (one of them as corresponding author)
Sum of the times cited: 958 (Google Scholar)
h-index: 15 (Google Scholar)

Selected publications without the PhD supervisor:

Fendrych M, Leung J, and Friml J. (2016). TIR1/AFB-Aux/IAA auxin perception mediates rapid cell wall acidification and growth of Arabidopsis hypocotyls. **eLife** 5: e19048

In this paper I solved a long-standing question in auxin biology – namely how the hormone auxin triggers elongation of plant organs. This was possible thanks to a combination of traditional questions in the field of auxin biology with the innovative usage of genetically encoded sensors and modern microscope imaging methods. I established the methodological approach as well as the molecular physiology focus in my postdoc laboratory. Cited 10x (Scholar)

Fendrych M and Van Hautegem, T, Van Durme M, Olvera-Carrillo Y, Huysmans M, Karimi M, Lippens S, Guérin CJ, Krebs M, Schumacher K, Nowack MK. (2014). Programmed cell death controlled by ANAC033/SOMBRERO determines root cap organ size in Arabidopsis. **Current Biology**, 24: 931-40

In this paper we showed that the root cap organ of Arabidopsis roots achieves its organ size homeostasis by a balance between cell proliferation and cell death, a concept that has not been described in plants before. This paper was the first original experimental work from the starting laboratory of Moritz Nowack, and my discovery of the root cap cell death system changed the focus of the laboratory from seed and flower models to the root. This publication was also a basis for a successful ERC StG application of Moritz Nowack in 2014. The paper has collected 68 citations since 2014 (Scholar).

von Wangenheim D*, Hauschild R*, **Fendrych M***, Barone V, Benková E, Friml J. (2017). Live tracking of moving samples in confocal microscopy for vertically grown plant roots. **eLife** 6:e26792

***Joint first authorship**
In this paper we constructed a vertical microscope with automatic root tip recognition for long-term imaging of Arabidopsis roots. The BioRxiv preprint of the manuscript attracted a huge internet attention reaching an Altmetric score of 416, was featured on the Science web page (see below), and a movie from the paper won the 2017 Nikon Small World in Motion competition. Cited 1x (Scholar)

Selected publications with the PhD supervisor:

Fendrych M*, Synek L, Pečenková T, Drdová EJ, Sekereš J, de Rycke R, Nowack MK, Žárský V. (2013). Visualization of the exocyst complex dynamics at the plasma membrane of Arabidopsis thaliana. **Molecular Biology of the Cell**, 24:510-20;

*corresponding author
Here I used an advanced imaging approach to visualize exocytotic events on the plasma membrane of *Arabidopsis thaliana*, which has not been done before. Cited 53x (Scholar).

Fendrych M, Synek L, Pečenková T, Toupalová H, Cole R, Drdová E, Nebesářová J, Šedinová M, Hála M, Fowler JE, and Žárský V. (2010). The Arabidopsis exocyst complex is involved in cytokinesis and cell plate maturation. **Plant Cell**. 22:3053-65

In this paper I discovered that the vesicle-tethering complex exocyst is crucial for successful cell division of Arabidopsis thaliana. This paper is one of the top-papers of my PhD laboratory and was used as one of the profile publications of the Academy of Science of the Czech Republic for 2010 (pdf p.33). Cited 105x (Scholar).

INVITED LECTURES AT RESEARCH INSTITUTES AND UNIVERSITIES

2017 SFB 1101 colloquium, invited by Prof. Klaus Harter. Center for Plant Molecular Biology, University of Tuebingen, Germany (link)

2016 Institute colloquium, invited by Prof. Jeffrey Leung and Prof. Hermann Höfte, INRA Versailles, France

Institute seminar, invited by Dr. Martin Potocký, Institute of Experimental Botany, ASCR, Prague, Czechia (link)

2015 Department seminar, invited by Prof. Viktor Žárský, Department of Experimental Plant Biology, Faculty of Science, Charles University, Prague, Czechia (link)

ACADEMIC PRIZES AND RECOGNITION

2011 – Dean's Prize for the best PhD thesis, Faculty of Science, Charles University in Prague

2010 - Winner of the best lecture award – Prof. Milan Kutacek award at KEBR conference, Prague: Role of the exocyst complex in cytokinesis in Arabidopsis

JOURNAL COVERS AND MEDIA ATTENTION

Science, March 20, 2017 – Science shot about our paper:
http://www.sciencemag.org/news/2017/03/watching-plants-grow-has-never-been-exciting

Current Biology, May 5, 2014 – I authored an **issue cover** featuring our manuscript:
http://www.cell.com/current-biology/issue?pii=S0960-9822%2814%29X0009-6

Science, September 6, 2013 – I co-authored an **issue cover**:
http://www.sciencemag.org/content/341/6150.cover-expansion

Research proposal Part B2

Section a. State-of-the-art and objectives

STATE OF THE ART

One of the most striking differences between animals and plants is the almost total absence of cell migration in plant development. Plants build their bodies using a hydrostatic skeleton that consists of pressurized cells encased by a strong extracellular matrix – the cell wall[1]. Using pressurized water as the structural element requires minimal investment in building material. The most conspicuous example are plant leaves – essentially water-inflatable two-dimensional solar panels[2]. But there is a crucial consequence for plant multicellularity: plant cells *cannot* move; cells are tightly connected by shared cell walls which they deposit during cell division. Plant anatomy is therefore sculptured by orientation of cell division and a precise control of growth extent and its directionality. Cell growth depends on the balance between the turgor pressure[3] and the resistance of the cell wall to this pressure[4,5]. As turgor pressure has a scalar dimension, the anisotropy of the cell wall determines the direction of cell expansion and thus dictates the future cell shape [6]. The turgor pressure in plant cells reaches 0.3 – 1.2 MPa[6]; this is a considerable pressure, comparable to the range of pressures in tires of cars or race bicycles. Still, the primary cell walls have to cope with *massive* increase in cell volume – root cells reach 20x the original length in a couple of hours[7]. Plant cells evolved specific mechanisms how to solve the conflict between strength and extensibility of the wall and the regulation of internal pressure, but our understanding of these mechanisms is very limited[2]. Even though plant cells are immobile, plant organs perform oriented movements (tropisms) that are decisive for plant survival. By tropisms, plants optimize light, water and nutrient acquisition and navigate along the gravity vector. These movements are achieved by differential regulation of cell elongation across organs, and the phytohormone auxin is playing a central role in the process[8]. Even though root gravitropism has been extensively studied, the mechanistic basis of the cell elongation regulation is utterly unknown. By combining gene discovery in two model cases of cell elongation regulation – the root development and root response to auxin – with dynamic analysis of cell physiology using advanced microscopy and microfluidic lab-on-chip methods, I aim to reveal the molecular networks that underlie growth control in plant cells.

CELL ELONGATION IN THE DEVELOPMENTAL CONTEXT In the plant body, growth is restricted to several actively growing regions[9]. This is most prominent in the root, where all growth happens in the elongation zone; the rest of the root is embedded in soil and therefore growth is not possible anyway. The growing tip of the Arabidopsis root is a spectacular example of plant development and organ maintenance. Root tip is a structure that remains unchanged over a significant period of time, while its elements – the cells – flow through the structure and 'obey' the local differentiation clues (Figure 1). The organ dictates the zonation of cell differentiation, but at the same time the cells form the organ and dictate its shape. In the radial view, the Arabidopsis root comprises the stele, endodermis, cortex, epidermis, and the lateral root cap. The epidermis is further differentiated into hair cells and non-hair cells; trichoblasts and atrichoblasts[10]. Organ growth is controlled largely by the outer tissues, and epidermis in particular[11,12]. Along the longitudinal axis, the root tip can very roughly be divided into three zones: cells mitotically divide in the *meristematic* zone, massively elongate in the elongation zone, and finally differentiate in the *maturation* zone[13], Figure 1. Cells gradually progress from the stem cell state to differentiation[14]. The size of the meristem is influenced by the interplay of the cytokinin and auxin hormone pathways[15]. The longitudinal zonation is guided by a decaying gradient of the PLETHORA (PLT) transcription factors that are induced by auxin and their presence keeps the cell in an undifferentiated state. PLT protein gradient shape determines the boundaries between the slowly-dividing stems cells and transit-amplifying cells, and between the meristem and the elongation zone[16]. Interestingly, auxin in the physiological levels does not influence the longitudinal zonation on the timescale of minutes and hours, but leads to zonation change on the timescale of hours by changing the shape of the PLT gradient. This way the root can perform the fast auxin-driven gravitropic responses without affecting the longitudinal pattern of the root[16]. Before the massive elongation, cells gradually reprogram their transcription profile and physiology in the transition zone[13]. Then the cells initiate a massive elongation which is coordinated radially across the organ. Gibberellin level rises in the beginning of the elongation zone and positively correlates with cell length[17], but not necessarily with the cell

elongation rate (the longest cells do not actually elongate anymore[7]). After a developmentally-controlled time, cells cease their elongation and mature. Based on mathematical modelling, cell growth might lead to dilution of the hormone concentration and therefore cessation of growth[18], but this prediction is not supported by the hormone levels as visualized by the gibberellin sensor GPS1[17]. It is not clear how the onset and termination of elongation are developmentally controlled and coordinated; and the molecular and physiological pathways that control the process are elusive. I want to exploit the developmental gradient in the root tip to unravel proteins that execute cell elongation and the accompanying physiological processes.

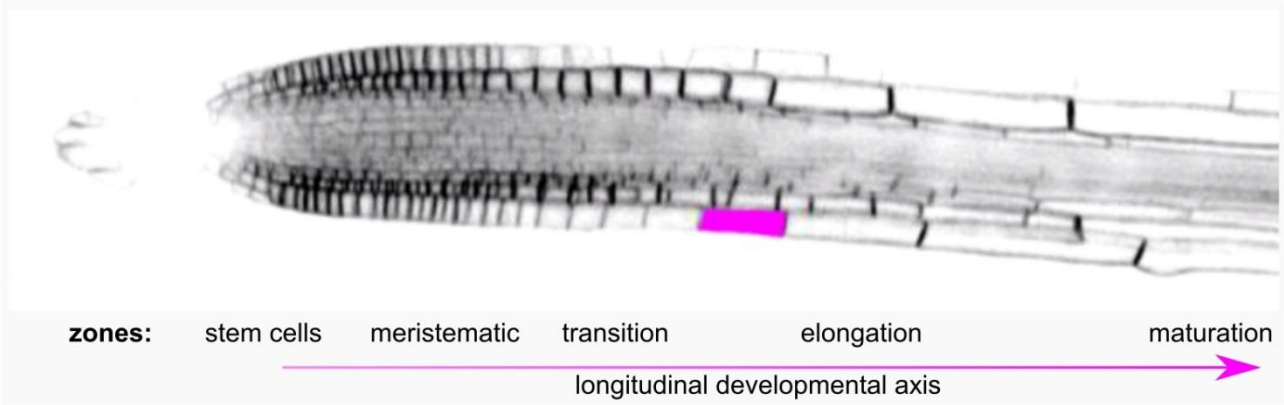


Figure 1: Cell elongation is the most striking feature of cell differentiation in the Arabidopsis root. An epidermal cell (in magenta) massively elongates and travels from the transition zone to the elongation zone within eight hours. Time-lapse movie of *Arabidopsis thaliana* root where the plasma membrane was marked by YFP-PIP1,4 protein[19]. Please open in Adobe Acrobat to play the movie, or view online movie 1.

HORMONAL CONTROL OF CELL ELONGATION: Many phytohormones influence root cell elongation. Root hydrotropism is mediated by Abscisic acid (ABA) signaling which does not involve auxin redistribution or detectable differential auxin response[20]. On the other hand, ABA promotes or inhibits root growth depending on the concentration used: the inhibitory effect of higher concentrations requires functional ethylene and auxin signaling[21]. Low ABA concentrations promote root elongation by increasing the length of the elongation zone[22], and this effect is dependent on functional auxin signaling and transport[21]. The gaseous hormone ethylene inhibits root cell elongation, but similarly to ABA, it acts via auxin synthesis and transport, and therefore auxin transporters have been identified in ethylene-resistance screens[23,24]. Gibberellin is a key promoter of plant cell growth and development. Blocking gibberellin signaling in the endodermis is sufficient to reduce root length[17,25]. It is however not clear, how gibberellin influences cell elongation at the molecular level. Brassinosteroid signaling is a crucial determinant of root growth extent[26], and it regulates expression of cell wall-related genes[27]. This pathway acts cell autonomously or on short distances and participates in the cell wall integrity sensing mechanism[28]. At the same time, brassinosteroid perception can directly activate the plasma membrane proton ATPases (PM H^+ATPase) which leads to increased transmembrane potential, presumably acidification of the cell wall, and cell expansion[29].

Auxin is the central regulator of root growth: auxin steers the cell cycle[30], under very low concentrations promotes, and from nanomolar concentrations rapidly inhibits cell elongation[31]. Root reaction to auxin is the basis for the gravitropic bending. Gravity is perceived in the columella root cap, auxin is channeled by the PIN2, ABCB, and AUX1 proteins to the lower epidermis of the root[32,33], where cells react by cessation of growth. Auxin thus acts as a mobile signal that at the same time triggers the reaction in cells that transport it. The current understanding of auxin action is the following: via an unknown, likely extracellular or membrane receptor, auxin triggers a rapid cell surface alkalinization and a calcium transient that lead to growth inhibition. Subsequently, the nuclear TIR1/AFB-Aux/IAA auxin coreceptor triggers expression of genes that reinforce the growth inhibition response[34–36]. How exactly the growth inhibition happens on the mechanistic basis is unknown. I have shown (Fendrych et al., *unpublished*; see Objective 3 for details) that auxin perception happens inside the cells and that the canonical TIR1/AFB-Aux/IAA coreceptor is mediating this rapid response via an unknown branch of the pathway that does not involve transcription regulation. The situation is strikingly different in the hypocotyl, where auxin triggers cell wall acidification and growth: I

have demonstrated[37] that hypocotyl elongation does not involve any rapid, non-transcriptional effects, but instead is caused by TIR1/AFB-Aux/IAA-mediated expression of the SAUR proteins that in turn activate the PM H^+ATPases[38]. The growth regulation in the root is thus fundamentally different from that of the aerial parts, and therefore might represent a root-specific solution tailored for gravitropism. In summary, we know that several other hormonal pathways tap into the auxin module to regulate root growth. Auxin thus lies in the epicenter of growth regulation. Still, after more than a hundred years of research[39], we do not fully understand the physiological processes that auxin influences, and we have no idea *how* is the auxin effect executed on the molecular level. I aim at filling this knowledge gap by identifying the signaling pathway that connects TIR1/AFB-Aux/IAA coreceptor with the growth inhibition machinery.

CELLULAR CONTROL OF ELONGATION: Growth depends on the balance between the cell wall properties and turgor pressure. The primary cell wall composition and anisotropy determine the directionality of growth. In rapidly elongating tissues, considerable mass of the cell wall is deposited before the expansion and it gets progressively thinner as the cell elongates[40]. The properties of the existing cell wall can be changed extremely rapidly by adjusting simple physical-chemical parameters, such as calcium availability, reactive oxygen species and pH[41]. Acidic cell wall pH stimulates the activity of expansins and hydrolytic enzymes that relax the wall, while alkaline pH stimulates enzyme activities that make the cell wall stiffer[2]. Cell wall pH and proton gradient is created by the plasma membrane auto-inhibitory plasma membrane H^+ATPases. In plants and fungi, these proton pumps build up the transmembrane potential and so energize most of plasma membrane processes[42]. PM H^+ATPases are therefore important for housekeeping functions of the cell and at the same time can influence the acidity of the cell wall and turgor pressure. Acidic cell wall pH partially correlates with the zones of active growth[43], for example in maize root tip there are two zones of low pH, and only one of them corresponds to the expanding elongation zone, and there is an interesting alkaline band in the position of the transition zone[44]. Another part of the growth equation – turgor pressure – depends on accumulation of osmotically active molecules, such as ions, carbohydrates and amino acids, and this process in turn depends on the membrane electrical potential. Even though most of the volume of the cell is occupied by the vacuole, and vacuoles are necessary for cell elongation[45,46], turgor is regulated on the plasma membrane (the apoplast-cytoplasm interface), and the cytoplasm and vacuole remain approximately isotonic[47]. Still, vacuoles are a crucial component in regulation of cell elongation[45]. Auxin, brassinosteroids, ABA, and peptide hormones converge on regulation of the activity of PM H^+-ATPases in various plant tissues[29,38,48,49], but how these crucial enzymes are regulated during root development is not known. Gravitropic stimulation or auxin addition to roots lead to cell wall and apoplast alkalinization, but the pathway leading from auxin to cell wall pH changes is essentially unknown. Finally, we have very little idea how cells perceive and adjust their turgor pressure in order to keep up or limit growth when needed.

LIVE IMAGING AS MICROSCOPIC PHYSIOLOGY: In the last decade, microscopy and live imaging have changed the way we understand growth and development. An amazing palette of fluorescent protein *sensors* enables us to visualize processes *in situ*, with high spatial resolution, but most importantly in real time. We have rapid sensors for auxin, gibberellin, and ABA hormone signaling[17,50,51], we can measure apoplast and cellular pH, and local concentrations of calcium, ATP, sucrose[52–56]. The modern live imaging became a visual, quantitative and spatially resolved equivalent to classical physiology and biochemistry. Such experiments, however, require approaches and setups dedicated for live-cell imaging. An ideal solution is the lab-on-chip microfluidic technology. Microfluidic devices integrate and miniaturize laboratory techniques into a microfluidic chip of a few square centimeters in size, and their usage in the plant field is increasing. Such devices coupled to advanced microscopes enable rapid and undisturbed treatments and analysis of samples during imaging[56]. The world on the microscale with low Reynolds number also gives access to previously utterly unimaginable experiments such as treatments of two sides of the root with different medium or measuring the stiffness of growing pollen tubes[57,58]. I will combine high spatio-temporal resolution live-cell imaging with the microfluidic technology to visualize, analyze, and manipulate the dynamics of cell elongation in Arabidopsis roots.

OBJECTIVES

Regulation of growth is arguably one of the most interesting and characteristic features of the plant lifestyle. It requires proper self-perception and mechanisms that tune the balance between the pressurized cytoplasm and the cell wall. Research has so far focused on understanding the upstream regulators of growth and differentiation and on the role of phytohormone pathways. While the biogenesis and composition of the cell wall has received a considerable attention, the molecular networks that are responsible for regulation of cell elongation are mostly unknown. Therefore I formulated the following objectives and questions:

1. Build a live-cell imaging setup for high-resolution, high-frequency imaging equipped with a microfluidic lab-on-chip platform optimized for growing roots.

2. Cell elongation is a differentiation feature shared by all cell types in the Arabidopsis root. How are the onset, coordination, and termination of elongation regulated? I will use developmental gradients in the root to discover genes that steer cellular growth.

3. Auxin is a central regulator of cell elongation. I will exploit the auxin effect on root to unravel molecular mechanisms that control cell elongation.

4. Cell elongation is an inherently dynamic process. What is the dynamics of phytohormone signaling, cell wall properties and cell wall pH during root development and reaction of root to stimuli? I will chart a spatio-temporal physiological map of a growing Arabidopsis root.

The live-cell imaging toolbox (**Objective 1**) that I am going to establish will be a worldwide-unique tool to study the molecular physiology of growth due to the combination of microfluidics, vertical sample position and fast and sensitive microscope. The gene discovery approach focusing on two complementary model situations of developmental growth regulation (**Objective 2**) and the effect of auxin on growth (**Objective 3**) will lead to identification of the core proteins that execute growth regulation in plant cells. Finally, the role of these proteins will be scrutinized and put into context using the biological framework that I will establish within **Objective 4**.

Section b. Methodology

OBJECTIVE 1: Establish a vertical imaging microfluidic platform for visualization of root cell elongation (months 1-24)

If we want to visualize and analyze root growth and cell elongation, we must take into account the temporal dimension of the process. Roots can react to stimuli in seconds[35], but their reaction can be completely different on the scale of hours or even days[16]. In the current literature, short-term responses are often mixed with those happening on a longer scale, and also the understanding of a short-term response is extremely vague. Further, live-cell imaging requires that the sample is in as optimal condition as possible, otherwise the studied process will be masked by the response to the observation itself. For example, because plant roots grow along the gravity vector, the horizontal sample orientation common in most microscopes forces root tips to constantly attempt to penetrate the microscopy glass. Since we are currently unable to modify the direction of gravity, the most effective way to position the root along the gravity vector is tilting the entire microscope body by 90 degrees[19].

Aim In order to visualize and analyze physiological processes in a growing root, I will establish and combine a set of very specific live-cell-imaging tools: a fluorescence microscope enabling high spatio-temporal resolution, vertical position of the sample, and a microfluidic platform allowing for rapid and undisturbed treatments of growing roots.

Methodology I will establish an imaging and root tip-tracking platform that will be built on around a vertically-positioned spinning-disk confocal microscope. Spinning-disk microscopes achieve very high temporal resolution and importantly impose low phototoxicity to the sample. Their construction is simpler than that of confocal laser-scanning microscopes, which is reflected in their lower price (well-equipped high-end setup costs 250,000 EUR). I have recently published a manuscript[19] describing the vertical-stage laser-scanning confocal microscope system equipped with a custom-built automated root tip tracking program

called TipTracker. I will utilize this experience to convert the spinning-disk setup to the vertical orientation and to implement the root tracking algorithm. With this I will create a setup tailored for high spatio-temporal resolution live-root imaging. In parallel, I will establish a low-cost solution for root growth analysis: vertically-placed flatbed scanners that will be controlled by AutoIt scripts to obtain time-lapse data.

Microfluidic devices such as the RootChip[56], enable extremely rapid (seconds) exchange of medium around the growing root, while the sample is continuously imaged by a microscope; Figure 2. The devices consist of a layer where the medium flows around growing roots, and pressurized valves that determine the path of the medium flow. The PDMS (Polydimethylsiloxane) silicon polymer used is 100% biocompatible and permeable to air, allowing for vigorous root growth in the channels. Together with Jack Merrin, a physicist and microfluidic expert at IST Austria, I have designed, built and optimized a RootChip tailored to the vertical position (Fendrych et al, *unpublished*). The aim of this objective is to develop and establish a microfluidic platform that will be used on the vertical spinning-disk microscope setup. I aim to improve the throughput and reliability of the root microfluidic devices, and implement parallel treatments of samples. Apart from the classical design, I will design and develop devices tailored to specific applications needed within the project, such as the PressureChip (see Objective 4).

Finally, I will automatize the control of image acquisition, root tip tracking, and also the control of the microfluidic setup. This setup is going to create large amounts of data, and therefore I will develop image analysis routines that will analyze the data in an unbiased way and will reduce the manual workload that is inherently connected with image analysis.

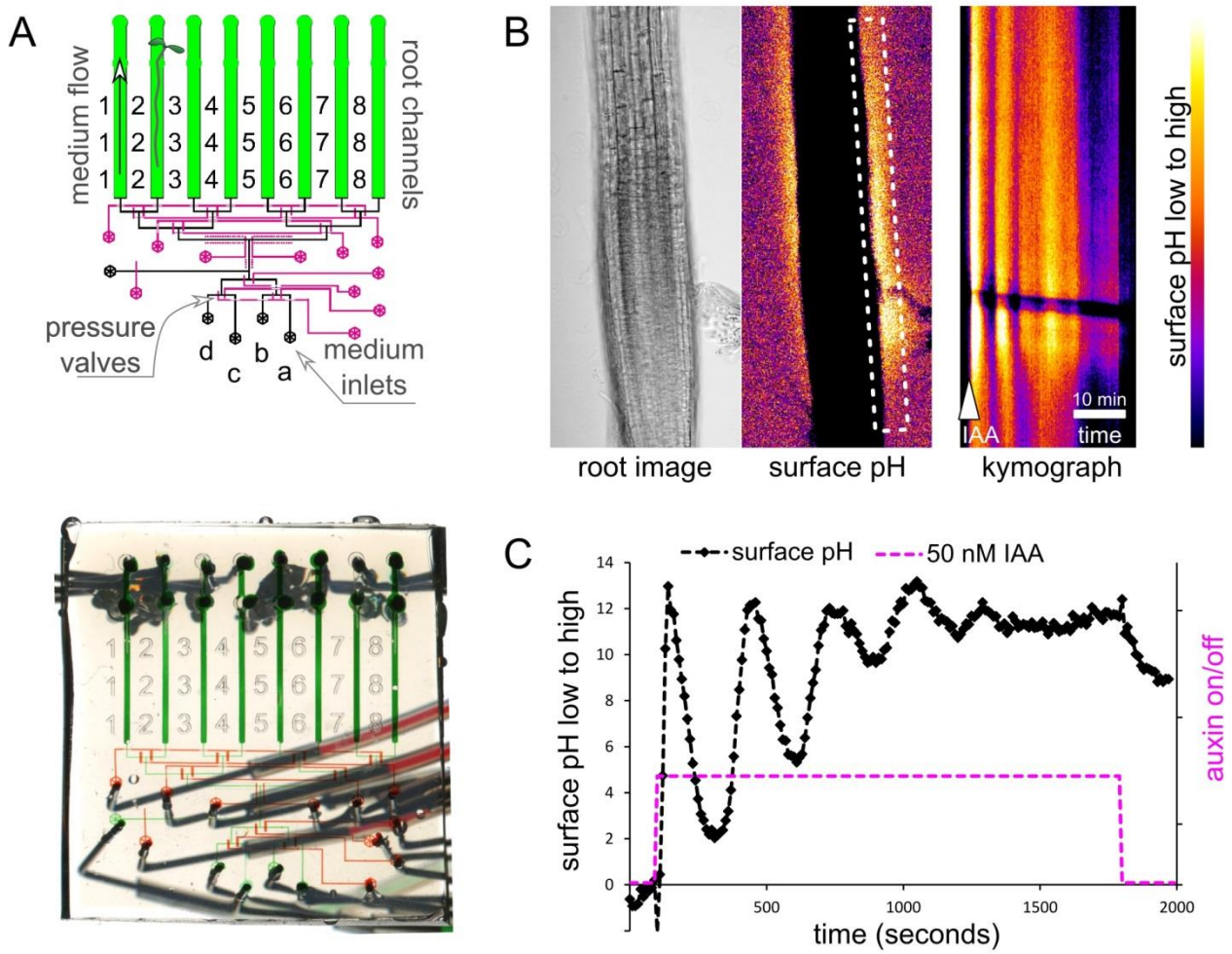


Figure 2: Microfluidic lab-on-chip devices are powerful tools for analysis of root behavior and physiological responses in high spatio-temporal resolution. A) a scheme of the vertical RootChip (top) and a photograph of an actual device (bottom) with the root medium colored in green and the control valve layer in red. B) An example of a lab-on-chip experiment, which occurs entirely within the microfluidic chip: Addition of 50nM

IAA auxin to a growing root results in an oscillatory rise in surface pH. Surface pH was visualized by the HPTS dye. On the right, a kymograph (time-space plot) of the highlighted area is shown, the point of IAA addition is marked by arrowhead. C) The graph depicts the quantification of root surface pH from (B), the presence of 50nM IAA is indicated by dotted magenta line.

Collaborations The device fabrication will be done in collaboration with the Laboratory of biomicrofluidics of Zdeněk Šlouka (University of Chemistry and Technology, Prague). I will continue my collaboration with Jack Merrin and Robert Hauschild (IST Austria) for the microfluidic approaches and image analysis, respectively.

Expected outcomes The purpose of Objective 1 is creating a platform that will enable me to visualize and quantify physiological processes that govern growth and cell elongation in the root. I am experienced in vertical imaging setups, root tracking, and designing and fabricating microfluidic devices; experience and tacit knowledge are the decisive factors in live-cell imaging and microfluidics in particular, and therefore I am convinced that my aims are feasible. In the combination with the microfluidic platform, I will be able to carry out extremely precise experiments and correctly analyze the reaction of roots to stimuli, such as hormones, gravity (the vertical setup enables makes gravitropic experiments) physical-chemical treatments (such as pH) and nutrients. Advanced live imaging has been the strength of my research since my PhD [19,37,53,59–61], and I aim at profiling my research group as experts in advanced live imaging and microfluidics. Mastering microfluidics is a very specific task with an enormous potential: future devices can be easily designed and fabricated and depend purely on the imagination of the members of the group. Apart from imaging growing roots, devices for pollen tubes, root hairs, single cells or germinating spores can be created. Finally, from my own experience I know that the interaction with physicists and material scientists inherent to Objective 1 will be extremely stimulating and beneficial for me and the members of my team.

OBJECTIVE 2: Use developmental gradients in the root to discover genes that steer cellular growth (months 12-36)

Cells in the root tip follow a longitudinal developmental gradient: in the so called transition zone (Figure 1), cells cease to divide and prepare for the rapid elongation that takes place in the elongation zone. After a developmentally-controlled time, the cells stop their elongation and mature[7,13]. It is not known how the onset, maintenance and termination of elongation is determined on the molecular level; however, the developmental transitions must involve changes in transcriptional profiles. Even though there is physical coupling between cells due to their shared walls, their developmental status and elongation extent is controlled to a large extent cell-autonomously. When PLT2 expression was induced in cell clones, cell elongation in those cells was inhibited even when they entered the elongations zone[16], which suggest that the elongation onset is transcriptionally programmed. The ‘outer’ root tissues – lateral root cap, epidermal trichoblasts, epidermal atrichoblasts and cortex initiate their elongation on slightly different position of the root[53,62], hinting again to a cell-autonomous control of the onset of elongation. These tissues are also decisive for the growth control[12,26]. Researchers usually focus on the *differences* among cell types in order to identify the cell fate decision factors. However, all the root cell types – both cell types of the epidermis, lateral root cap and the cortex – share one prominent feature: the rapid elongation within a limited timespan. To unravel the molecular control of cell elongation, I will perform transcriptome profiling of elongating cells based on their actual size. Transcriptome profiles of the cell files along the developmental gradient will give key insights into the regulation of cell elongation.

Aim I will obtain spatio-temporal transcriptional profiles of elongating cells by correlating their mRNA profiles with their actual *size*. Each cell type will be profiled separately. Comparing the individual datasets will lead to identification of gene modules that regulate and execute cell elongation.

Methodology The existing transcriptome profiles along the longitudinal axis are based on transverse sectioning the root[63,64], with one exception where GFP intensity gradients were used to sort the cells of the proximal meristem[14]. Manual sectioning is not very precise, and doesn’t allow high spatial resolution. But the main pitfall of this approach is that cells of the same type are not uniformly expanded in a given transversal section because cells are not aligned end-to-end, but rather follow a spiral pattern[65]. I will use Fluorescence Activated Cell Sorting (FACS) to separate the lateral root cap, trichoblast, atrichoblast and

cortex cells and further categorize them based on their volume. Size of the protoplasts cannot be reliably determined by FACS sorters, although the forward scatter channel provides some information about their shape. I will therefore approximate cell size by the intensity of a vacuolar-targeted RFP[66], Figure 3. Vacuoles constitute 90% of the cell volume, and their volume massively increases along the longitudinal root axis[46]. RFP targeted to the vacuole will therefore provide sufficient fluorescence intensity range that will be utilized during the FACS process. Experimental material will be created by introducing the vacuolar lumen marker line spRFP-AFVY[66] into marker lines expressing tissue-specific YFP (the SWELLINE marker set[67]) in the lateral root cap, trichoblasts, atrichoblasts, cortex, and a marker line including all of these cell types. Arabidopsis root tips will be protoplasted[68] and the cell types will be separated by FACS. Each cell type will be divided into five categories based on individual cell *volume* (Figure 3). To reduce the noise in the data, I will sort sufficient amount of protoplast to yield 100ng total RNA per sample and perform RNAsequencing without additional amplification of RNA. The RNAseq data will be processed within a Galaxy-based platform and the normalized reads will be analyzed using Bioconductor EdgeR package. Cell sorting will be performed at the Light Microscopy and Flow Cytometry facility (IMG, Prague).

The genes involved in cell elongation regulation and execution should follow similar expression dynamics regardless of the cell type. I will therefore identify coexpression gene clusters in the individual cell types, and in the entire experiment. The expression patterns will be then correlated with the elongation profiles and the dynamics of physiological processes, such as cell wall pH (see Objective 4).

In the initial phase of this subproject, I will verify the reliability the vacuole-intensity-based cell sorting by performing a small-scale FACS experiment and testing the expression of meristem-specific and maturation-zone specific genes using qRT-PCR. An alternative backup solution to the vacuolar RFP is usage of a staining of the vacuolar lumen using fluorescent dyes such as BCECF[46].

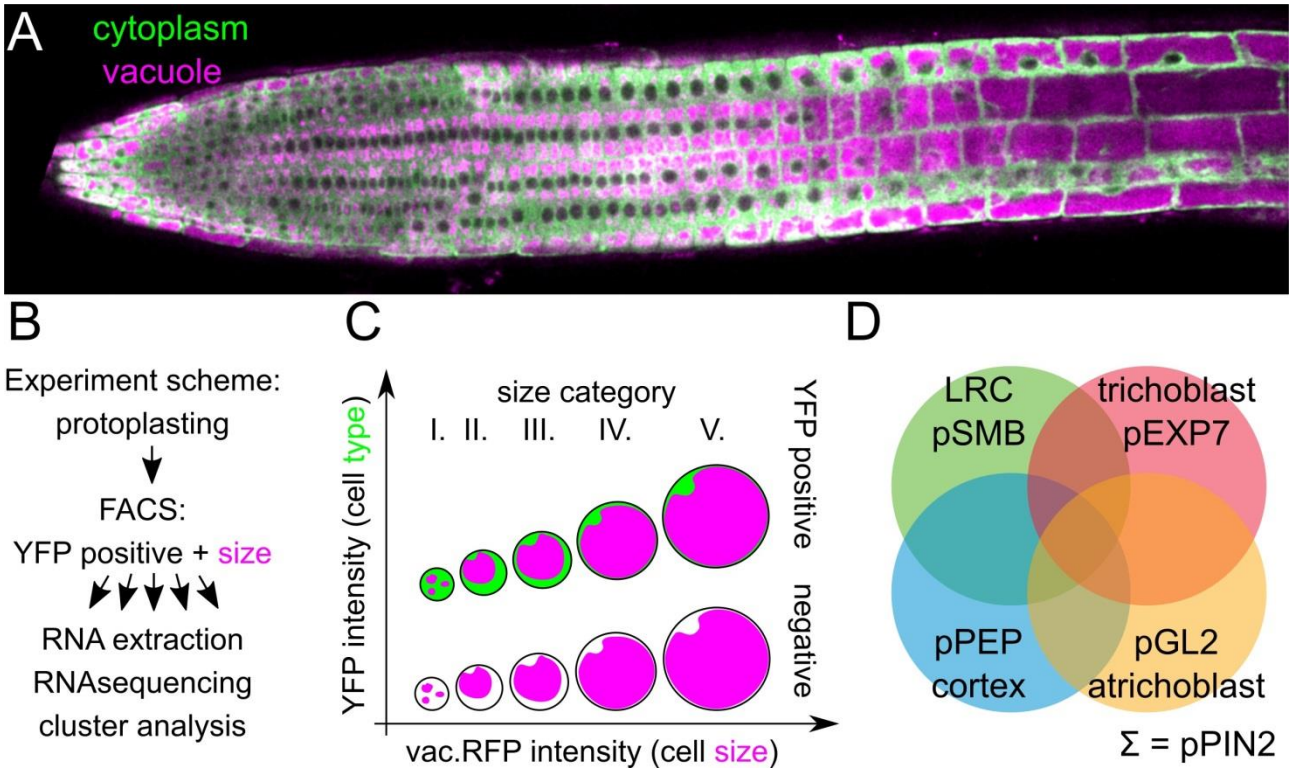


Figure 3: Individual cells will be categorized by their actual size using vacuolar staining intensity. A) The size of the vacuole (magenta) massively increases during root cell elongation. Arabidopsis root tip with vacuolar lumen marked by RFP, and cytoplasm by GFP[53]. B) Schematics of the size-sorting experiment. C) The illustration of the logic of the FACS experiment: individual cell types will be sorted by the presence of cell-specific YFP (vertical axis) and will be divided into size categories according to the intensity of their vacuolar RFP (horizontal axis). D) The cell types and promoters that will be studied in the experiment. The

PIN2-expression domain will be used as the sample that contains all the other 4 cell types. LRC stands for Lateral Root Cap.

Expected outcomes Due to the unique size-based sorting of the different cell types, my approach will resolve the transcriptome profile progression along the developmental axis. The project is feasible, because it does not require laborious generation of novel marker lines, but instead uses the existing material in an innovative manner. I will utilize my experience with FACS sorting and RNA profiling of nuclei from the seed endosperm of Arabidopsis that I performed during my postdoc with Moritz Nowack (PSB, Ghent). Objective 2 represents a purely explorative project and as such will yield novel candidate proteins that will range from upstream regulators to downstream executors of cell elongation. I will characterize the most promising gene candidates using the classical reverse genetics approach. I will focus on the phenotypic characterization of root growth, cell elongation using the tools and workflow developed in Objectives 1 and 4. As a side product, I will refine the existing differentiation datasets for the individual cell types of the Arabidopsis root tip, which can on its own open new areas of interesting research for the future.

OBJECTIVE 3: Exploit the auxin effect on root to unravel molecular mechanisms that control cell elongation (months 6-48)

The phytohormone auxin stimulates cell elongation of aerial tissues while it inhibits the elongation of root cells. This opposite effect forms the basis of the opposite gravitropic response of roots and shoots. The reaction of root to auxin is not understood, but the accepted explanation is that auxin triggers a very rapid (seconds) nontranscriptional reaction via an unknown extracellular or plasma membrane receptor. Later, the response is reinforced by the TIR1/AFB-Aux/IAA pathway that acts via regulation of gene transcription[35]. During my postdoc I have focused on the signaling that occurs during the rapid auxin-induced root growth inhibition, and I have discovered the following: Nanomolar concentrations of IAA trigger an immediate growth inhibition and alkalinization of the epidermal cell walls. The perception of IAA is *intracellular* – IAA needs to enter the cell in an AUX1 (auxin importer) dependent manner. Removal of IAA from the medium results in *immediate* resuming of the growth rate (Figure 4). The response thus does not depend on transcriptional regulation by the TIR1/AFB-Aux/IAA, which can be monitored earliest ca. 15 minutes after IAA application. The response, however, does require the TIR1/AFB-Aux/IAA pathway, because the mutations of the TIR1/AFB receptor interfere with the rapid auxin response, and the fast response can be dampened by the TIR1 inhibitor PEO-IAA[69]. These results demonstrate that the TIR1/AFB-Aux/IAA coreceptor has an unknown signaling branch that rapidly inhibits cell elongation in the root, and this branch of the pathway *doesn't involve the canonical gene regulation activity* (Fendrych et al., *unpublished*). Moreover, we have not much of a clue *what* is auxin regulating on the plasma membrane to inhibit root growth and rise the cell wall pH. Again, the dogma states that auxin inhibits the PM H^+ATPases, similarly to the Feronia-RALF module[43,49]. My preliminary data exclude this model: auxin application triggers an oscillatory rise of the root surface pH (Figure 2, online movie 2), in other words leads to an active removal of protons from the medium (also [34]). Artificial activation of PM H^+ATPases by genetic means[38] or the drug fusicoccin can neither prevent the auxin-triggered response, nor inhibit gravitropism (Fendrych et al, *in preparation*).

Aim Auxin triggers massive physiological changes that control cell wall pH and cell elongation. The signaling cascade starts at the TIR1/AFB-Aux/IAA coreceptor. But we have *no clue* how the signal gets transmitted and which proteins it regulates to achieve the observed effects. By bridging this knowledge chasm I aim to unveil the molecular players that lie at the core of cell elongation in the root.

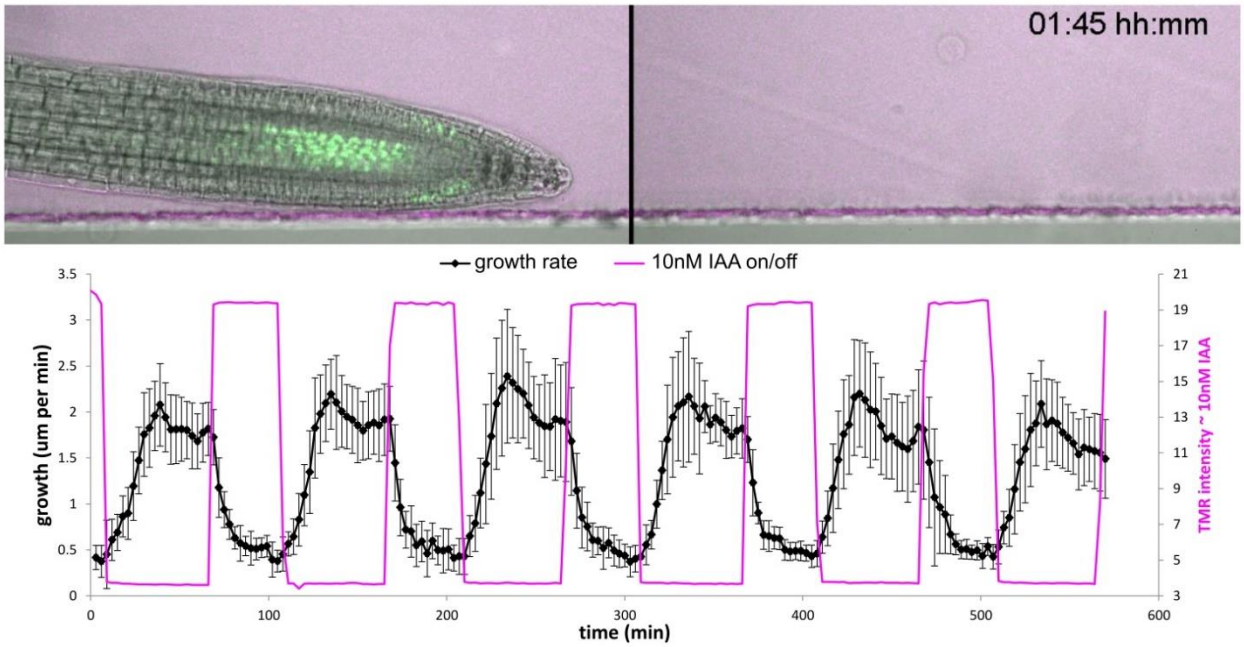


Figure 4: Auxin inhibition of root growth is a process not regulated by gene transcription. Arabidopsis DII-Venus marker line root growing in a microfluidic device reacts to addition of 10nM IAA (visualized in magenta using a dye) by an immediate cessation of growth. When auxin is removed, the root instantly starts to resume the growth rate. It is not possible that these two processes would involve switching on and off genes in the TIR1/AFB-Aux/IAA dependent manner, because transcription and translation reprogramming require more time. The graph shows quantification of growth rate of 4 roots; addition and removal of IAA is marked by the magenta line. Please open in Adobe Acrobat to see the movie, or watch online movie 3.

Methodology *Top-down approach*: The signaling pathway starts in the nucleus with the TIR1/AFB receptor that ubiquitinates Aux/IAA proteins[70]. It is, in my opinion, unlikely that the $SCF^{TIR1/AFB}$ E3 ubiquitin ligase could target other proteins then Aux/IAA in an IAA-dependent manner, because auxin is perceived by the *formation* of the TIR1/AFB – Aux/IAA – auxin complex, and the affinity of TIR1 *per se* to IAA is rather low[71].The obvious suspects are then the Aux/IAAs proteins which might transmit the signal depending on their ubiquitination status. I have observed that the induction of the dominant Aux/IAA *axr3-1*[72] leads to stimulation of growth and a partial inhibition of auxin response. I will analyze the subcellular localization of selected Aux/IAAs during application of IAA to find out whether they leave the cell nucleus after perception of auxin. These proteins are extremely short-lived, so I will use novel super-fast-maturing fluorescence proteins such as mNeonGreen[73] and immunolocalization via small tags (such as HA-tag). Further, to test whether the change in localization is involved in Aux/IAA action, I will manipulate the localization of selected dominant-negative Aux/IAAs[72] using the nucleus-cytoplasm shuffling glucocorticoid receptor tag[74], and analyze the effect on auxin-induced growth inhibition. To find out novel interactors of Aux/IAAs, I will perform a yeast-two-hybrid screen using a root-tip cDNA library. Finally, I will identify the interactors of ubiquitinated Aux/IAA by performing a co-immunoprecipitation combined with mass-spec identification of interactors using the HA-tagged versions as bait. The experiment will be done in the presence of a proteasome inhibitor and with or without a very short IAA treatment. So far, only other Aux/IAA and ARF proteins were determined as interactors of Aux/IAA[75], but by the proposed approach I should identify the next steps in the signaling cascade that connects the TIR pathway with the downstream growth-regulating events.

Bottom-up approach: The growth reaction of roots to IAA is extremely rapid and therefore should involve posttranslational modification of proteins that will change their activity, abundance or localization. The molecular executors of the auxin response can thus be identified by finding proteins that rapidly change their phosphorylation status. Therefore we[1] performed a global proteome and phosphoproteome analysis of root tips after short-term (2 min) application of IAA. We found several differentially phosphorylated proteins that

[1] This experiment was done during my postdoc in the Friml group and was performed in the Dolf Weijers laboratory; therefore these results will be part of a collaborative effort with my postdoc group.

are involved in cell wall regulation and ion translocation over the plasma membrane and the tonoplast. We also identified hypo or hyper phosphorylated proteins of unknown function. I will continue with characterization of selected candidate proteins; I will analyze their rapid auxin response, and choose those with clear deviation of the growth response for further work. In addition, I will perform further phosphoproteomic experiments after treatments that mimic the IAA action (such as the auxin efflux inhibitor NPA that leads to rapid inhibition of root cell elongation) or that have the opposite effect to IAA (such as the induction of dominant-negative Aux/IAA *axr3-1*). Proteins involved in the auxin response should show opposite phosphorylation status in the respective conditions. Mutants in the most promising candidates will be characterized with a special attention to the rapid response to auxin treatment.

Finally, I am going to determine the effectors of the growth regulation machinery using a PIN2 coexpression gene cluster. Root epidermis is the tissue responsible for growth regulation and gravitropic response[12]. Roots react to auxin in an opposite manner than the aerial tissues, despite the perception and signal transduction of these stimuli (light, gravity) is similar in both. A logical implication is that the root cells harbor a specific set of proteins that carry out the root-specific physiological responses. PIN2 together with AUX1 channel the shootward auxin flux to the lateral root cap and epidermis[76–78]. These cells are at the same time responsive to the auxin stimulus[12]. AUX1 protein is present in several plant tissues, while PIN2 is very specific for the lateral root cap, root cortex and epidermal cells[78,79]. Therefore I used PIN2 as a bait in coexpression analysis, and determined a PIN2 coexpression cluster (Figure 5), which contains several candidates that deserve a thorough analysis; SAUR37, CNGC14 and SKS genes. CNGC14 is involved in root growth regulation and the apoplastic pH and calcium response to auxin, but the mechanism is not clear[35]. The SAUR37 belongs to the Small Auxin Up RNA family[80], but it is not upregulated by auxin, and contains a putative calmodulin-binding domain. SKS genes – SKU5 similar – are tempting candidates as well, because the *sku5* mutant has a root growth phenotype resulting in root skewing[81]. I will analyze mutants in selected candidate genes using the workflow developed in Objectives 1 and 4. Those genes the mutants of which will show cell elongation defects during development or reaction to stimuli will be subject of the classical reverse genetic approach – promoter reporter fusions, protein localization, overexpression characterization. These proteins will also serve as a starting point for revealing the network of proteins involved in growth regulation.
Collaborations I am going to collaborate with Jiri Friml (IST Austria) on elucidating the unknown signaling branch of the TIR1/AFB-Au/IAA pathway.

Expected outcomes There has been the ongoing debate in the field of auxin research about the existence and nature of rapid, non-canonical responses to the hormone[36]. Root growth inhibition by auxin is an excellent example of such a response, but my unpublished data point to a direct involvement of the canonical TIR1/AFB receptor. Elucidating this unknown signaling pathway is extremely interesting on its own, but importantly it will lead me to those proteins that execute the extremely rapid regulation of cell elongation and cell wall pH. Objective 3 will yield candidate proteins that will be characterized using the methods developed in Objective 1 and 4. Thanks to my phenotyping approaches, I will be able to reveal even very subtle phenotypic defects in the candidate gene mutants. Only those proteins that show a clear auxin response and elongation defects will be characterized further using the classical cell biology approaches. As the next step, I will use the most promising proteins to further untangle the molecular network of growth regulation by finding their interaction networks. Auxin regulates the processes that are in the center of interest of my research, and I will use the auxin case as a handle to understand the molecular physiology of cell elongation.

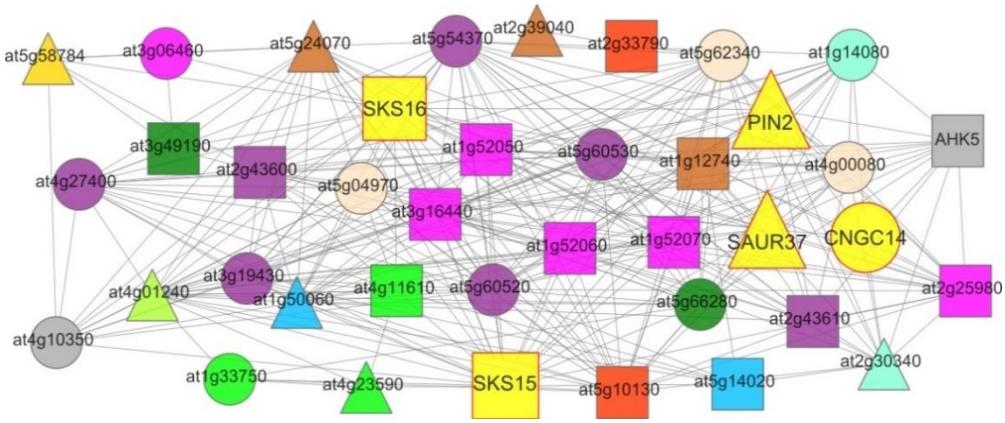


Figure 5: The root-specific growth reaction to auxin should be determined by a specific gene set present in the PIN2 expression domain. The PIN2 coexpression cluster was built by combining the AraNet (http://aranet.mpimp-golm.mpg.de/aranet) PIN2-containing cluster #124 with PIN2 epidermal cluster determined by the Genevestigator gene search tool.

OBJECTIVE 4: Chart a spatio-temporal physiological map of a growing Arabidopsis root (months 18-60)

Cell elongation and root growth are inherently dynamic processes, but researchers mostly assess the impact of treatments or gene disruptions as root length, or sometimes cell length after hours or days of the respective condition[43,82]. We also don't fully understand how the root cell elongation, hormone signaling, cell wall pH and turgor pressure are coordinated during normal growth and during reactions to environmental stimuli such as light and gravity. Even though the word "descriptive" is often used to belittle scientific work, a detailed description is the basis for correct understanding of any biological process.

Aim I aim at understanding the physiology of growth and root responses to treatments using vertical, time-resolved microscopy coupled to the microfluidic toolbox. I will focus on quantitative analysis of growth as such, visualization of dynamics of physiological processes using genetically encoded sensors and fluorescent dyes, and analysis of responses of root to phytohormones. Special attention will be dedicated to cell wall pH and its regulation.

Methodology

Growth. Cell elongation is developmentally controlled along the longitudinal root axis[7]. The extent to which each cell contributes to the growth of the root is studied by kinematic approaches that determine the relative elemental growth rates. I will determine the elemental growth rate using time-resolved imaging of vertically grown roots in combination with image analysis using the Particle Image Velocimetry methodology[83] (online movie 4). Growth and its distribution along the root tip will be analyzed in the mutants during normal growth and after stimulations that change the growth directionality (light and gravity). I will focus on mutants in auxin transport, auxin signaling, gibberellin signaling and mutants with modified activity of H^+ATPases (see below).

Sensors. I will analyze the phytohormone signaling during the progression of cells along the longitudinal root axis and during reaction to stimuli. Auxin signaling will be monitored by the existing genetic sensors DII-Venus and R2D2[50,84] and also using the fluorescently tagged Aux/IAAs developed in Objective 3. Gibberellin gradients will be visualized using the GPS1 FRET sensor[17]. A genetically encoded sensor or indicator dye for the *turgor* pressure is missing, and although hydrostatic pressure-sensitive fluorescent proteins exist[85], these are unlikely candidates for turgor measurements as they react only to extreme pressures. However, the ability to manipulate conditions in real time using microfluidic devices offers possibilities to determine the turgor pressure and osmolarity. I will estimate the osmotic pressure of elongating cells by varying the osmolarity of the medium in real time while monitoring the growth parameters of the root. This will be a modification of the Boyle-van't Hoff plot approach of measuring the turgor pressure[86]. Further, the turgor pressure can be approximated by changing the external pressure of the medium. Microfluidic devices are entirely based on pressure control, and I will develop a modified PressureChip that allows for regulating pressure in the root chamber. When the external pressure comes close to the value of the turgor component that is harnessed for growth, the cell elongation will cease. Such experiments are possible only using the microfluidic approach and high temporal resolution, where the primary responses to these treatments can be read out.

pH. Cell wall and root surface pH will be monitored using the HPTS dye[43] (Figure 2), and I will utilize newly developed HPTS derivatives with pKa values more suitable for the acidic cell wall environment. This way I will create a spatio-temporal map of cell wall pH in growing roots and its correlation with the relative elemental growth rates. Once the system is established for the control roots, I will focus on modulating the cell wall pH by tuning the activity of PM H^+ATPases pharmacologically (fusicoccin) and genetically by tissue-specific inducible expression of hyperactive version of the protein[82] and inhibitory PP2C-D phosphatases[38]. Finally, I will test known mutants in the auxin transport and signaling pathways, mutants in components of the cell wall perception machinery[87], and most importantly the mutant and transgenic lines generated within Objectives 2 and 3.

Hormones. Focusing on the dynamics of the process, I have shown that the nature of growth inhibition by auxin is totally different than it was believed (Fendrych et al, *unpublished*, see above). I am going to broaden my analysis to the very low concentrations of auxin that supposedly stimulate growth in a rapid manner[31]. I will re-analyze the influence of phytohormones that affect the cell elongation in the root, namely ethylene, gibberellin and brassinosteroids, in a high temporal resolution. I will study the effects of hormone addition and removal on the immediate growth regulation as well as the effect on the developmental zonation of cell elongation. I will focus on the dynamics of cell wall pH and its interplay with the hormone application. Finally, I will use the knowledge to challenge the candidate gene mutants.

Collaborations The pH sensor development will be done by my collaborator Sergey Borisov (Graz University of Technology, Austria), who is an expert on development of pH and oxygen fluorescent indicators. I will collaborate with Klaus Harter and his group (University of Tubingen, Germany) on the brassinosteroid-related work.

Expected outcomes While the Objective 1 aims at development of a new technology, Objectives 2 and 3 are focused on obtaining the genes, proteins and protein networks that regulate cell elongation in the root, Objective 4 aims at understanding the physiology of cell elongation and root responses to treatments. This is in fact the biological core of the project, and its results will serve as a vast resource for evaluating the phenotypes of the candidate gene mutants, and therefore will connect all parts of this proposal into one functional unit. Because my approach enables previously impossible experiments, the discovery potential of the dynamic study of root behavior is immense. Therefore I am convinced that I am going to significantly change the way we understand the root physiology, and that Objective 4 will open up new research lines for me and my team.

CONCLUSIONS AND OUTLOOK

The fine balance between cell wall properties and turgor regulation is one of the essences of being a plant, and the project I propose will advance our understanding of this fascinating phenomenon. To shed more light on the molecular players that regulate cell elongation, I combine two gene discovery case studies – the longitudinal developmental gradient in the root and the root reaction to auxin. It will be intriguing to find out whether these actually influence the same core protein network. Apart from the focus on cell elongation, the developmental transcriptome profile datasets will refine our understanding of how individual cell types progress towards acquisition of their cell fates.

It is shocking how little we know about some of the most fundamental processes as the regulation of cell elongation by auxin is. Elucidating of the mechanism of how the TIR1/AFB auxin receptor regulates cell elongation will significantly change the way we understand the auxin pathway. I therefore am convinced that basic research on one of the most common models – the Arabidopsis root – is still absolutely essential, and has a large discovery potential when addressed in an innovative way. The live-cell imaging toolbox I will establish represents a novel way how to 'look at' roots, and it will enable me to study processes in an unprecedented temporal resolution and precision. The setup and workflow I am going to create within this project are going to push the envelope of the methodological approaches in current experimental biology.

Understanding of growth regulation has a vast application potential. Developmental regulation of growth is necessary throughout plant development. Regulation of growth also underlies the phenomena of shade avoidance and phototropism that are important in competition for light[88], a key factor in the field conditions. The ability of the root tip to navigate through soil depends on perception of the directional signals such as gravity, light, humidity and nutrients, and it requires the proper differential elongation response. The ability to regulate growth is therefore a crucial determinant of the root system architecture.

Finally, plant roots have a spectacular ability to sense and modify the rhizosphere properties[89]. The pH of the rhizosphere is crucial for mobilization of nutrients, such as iron, and therefore, the mechanisms that the epidermis uses to regulate root surface pH are intimately linked not only to the regulation of growth, but also to nutrients acquisition from the soil[90].

REFERENCES

M. Fendrych, M. Akhmanova, J. Merrin, …, J. Friml, *unpublished*. Root growth inhibition by auxin - the fast nontranscriptional branch of the TIR1/AFB-Aux/IAA pathway?

M. Fendrych, L. Li, … J. Friml, *in preparation*. Regulation of cell wall pH during auxin-induced root growth inhibition.

1. H. Höfte, *Plant Cell Physiol.* **56**, 224–231 (2014).
2. H. Höfte, A. Voxeur, *Curr. Biol.* **27**, R865–R870 (2017).
3. P. M. Ray, P. B. Green, R. Cleland, *Nature*. **239**, 163–164 (1972).
4. A. N. J. Heyn, *Bot. Rev.* **6**, 515–574 (1940).
5. J. A. Lockhart, *J. Theor. Biol.* **8**, 264–275 (1965).
6. L. Braidwood, C. Breuer, K. Sugimoto, *New Phytol.* **201**, 388–402 (2014).
7. G. T. Beemster, T. I. Baskin, *Plant Physiol.* **116**, 1515–26 (1998).
8. H. Rakusová, M. Fendrych, J. Friml, *Curr. Opin. Plant Biol.* **23**, 116–123 (2015).
9. W. K. Silk, *Annu. Rev. Plant Physiol.* **35**, 479–518 (1984).
10. L. Dolan *et al.*, *Development*. **119**, 71–84 (1993).
11. U. Kutschera, K. J. Niklas, *J. Plant Physiol.* **164**, 1395–409 (2007).
12. R. Swarup *et al.*, *Nat. Cell Biol.* **7**, 1057–1065 (2005).
13. J.-P. Verbelen, *et al*, *Plant Signal. Behav.* **1**, 296–304 (2006).
14. J. R. Wendrich *et al.*, *Proc. Natl. Acad. Sci.* **I**, 201707400 (2017).
15. R. Dello Ioio *et al.*, *Curr. Biol.* **17**, 678–82 (2007).
16. A. P. Mähönen *et al.*, *Nature*. **515**, 125–129 (2014).
17. A. Rizza, A. Walia, V. Lanquar, W. B. Frommer, A. M. Jones, *Nat. Plants*. **3**, 803–813 (2017).
18. L. R. Band *et al.*, *Proc. Natl. Acad. Sci.* **109**, 7577–7582 (2012).
19. D. von Wangenheim, R Hauschild, M Fendrych, *et al.*, *Elife*. **6** (2017), doi:10.7554/eLife.26792.
20. D. Shkolnik, G. Krieger, R. Nuriel, H. Fromm, *Mol. Plant*. **9**, 757–759 (2016).
21. X. Li, L. Chen, B. G. Forde, W. J. Davies, *Front. Plant Sci.* **8**, 1493 (2017).
22. D. Dietrich *et al.*, *Nat. Plants*. **3**, 17057 (2017).
23. K. Růzicka *et al.*, *Plant Cell*. **19**, 2197–212 (2007).
24. Y. Hu, F. Vandenbussche, D. Van Der Straeten, Planta. 245, 467–489 (2017).
25. S. Ubeda-Tomás, G. T. S. Beemster, M. J. Bennett, *Trends Plant Sci.* **17**, 326–331 (2012).
26. Y. Fridman *et al.*, *Genes Dev.* **28**, 912–920 (2014).
27. Y. Sun *et al.*, *Dev. Cell*. **19**, 765–777 (2010).
28. S. Wolf *et al.*, *Proc. Natl. Acad. Sci.* **111**, 15261–15266 (2014).
29. K. Caesar *et al.*, *Plant J.*, 1–13 (2011).
30. S. Jurado *et al.*, *Plant Cell*. **22**, 3891–3904 (2010).
31. M. L. Evans, H. Ishikawa, M. A. Estelle, *Planta*. **194**, 215–222 (1994).
32. B. Noh, A. S. Murphy, E. P. Spalding, *Plant Cell*. **13**, 2441–2454 (2001).
33. J. Friml, J. Wiśniewska, E. Benková, K. Mendgen, K. Palme, *Nature*. **415**, 806–809 (2002).
34. G. B. Monshausen, N. D. Miller, A. S. Murphy, S. Gilroy, *Plant J.* **65**, 309–18 (2011).
35. H. W. Shih, C. L. Depew, N. D. Miller, G. B. Monshausen, *Curr. Biol.* **25**, 3119–3125 (2015).
36. O. Leyser, *Plant Physiol.*, in press, doi:10.1104/pp.17.00765.
37. M. Fendrych, J. Leung, J. Friml, *Elife*. **5**, 1–18 (2016).
38. A. K. Spartz *et al.*, *Plant Cell*. **26**, 2129–2142 (2014).
39. F. Went, K. Thimann, *Phytohormones* (1937).
40. P. Derbyshire, K. Findlay, M. C. McCann, K. Roberts, *J. Exp. Bot.* **58**, 2079–89 (2007).
41. S. Wolf, K. Hématy, H. Höfte, *Annu. Rev. Plant Biol.* **63**, 381–407 (2012).
42. J. Falhof, J. T. Pedersen, A. T. Fuglsang, M. Palmgren, *Mol. Plant*. **9**, 323–337 (2015).
43. E. Barbez, K. Dünser, A. Gaidora, T. Lendl, W. Busch, *Proc. Natl. Acad. Sci.*, 201613499 (2017).
44. W. S. Peters, H. H. Felle, *Plant Physiol.* **121**, 905–912 (1999).
45. K. Dunser, J. Kleine-Vehn, *Curr. Opin. Plant Biol.* **28**, 55–59 (2015).
46. F. Krüger, K. Schumacher, *Semin. Cell Dev. Biol.* (2017), doi:10.1016/j.semcdb.2017.07.008.
47. R. Hedrich, *Physiol. Rev.* **92**, 1777–1811 (2012).
48. S. Merlot *et al.*, *EMBO J.* **26**, 3216–3226 (2007).

49. M. Haruta, G. Sabat, K. Stecker, B. B. Minkoff, M. R. Sussman, *Science*. **343**, 408–11 (2014).
50. G. Brunoud *et al.*, *Nature*. **482**, 103–6 (2012).
51. R. Waadt, M. Krebs, J. Kudla, K. Schumacher, *New Phytol.*, 303–320 (2017).
52. K. S. K. Gjetting, C. K. Ytting, A. Schulz, A. T. Fuglsang, *J. Exp. Bot.* **63**, 3207–18 (2012).
53. M. Fendrych *et al.*, *Curr. Biol.* **24**, 931–940 (2014).
54. M. Krebs *et al.*, *Plant J.* **69**, 181–92 (2012).
55. V. De Col *et al.*, *Elife*. **6** (2017), doi:10.7554/eLife.26770.
56. G. Grossmann *et al.*, *Plant Cell*. **23**, 4234–4240 (2011).
57. C. E. Stanley, J. Shrivastava, R. Brugman, D. van Swaay, G. Grossmann, *bioRxiv*, 126987 (2017).
58. N. Shamsudhin *et al.*, *PLoS One*. **11**, e0168138 (2016).
59. M. Fendrych *et al.*, *Plant Cell*. **22**, 3053–3065 (2010).
60. M. Fendrych *et al.*, *Mol. Biol. Cell*. **24**, 510–20 (2013).
61. A. Kremer *et al.*, *J. Microsc.* **259**, 80–96 (2015).
62. C. Löfke *et al.*, *J. Exp. Bot.* **66**, 5103–5112 (2015).
63. S. M. Brady *et al.*, *Science*. **318**, 801–6 (2007).
64. A. Bruex *et al.*, *PLoS Genet.* **8**, e1002446 (2012).
65. S. F. Baum, J. G. Dubrovsky, T. L. Rost, *Am. J. Bot.* **89**, 908–920 (2002).
66. P. R. Hunter *et al*, *Plant Physiol.* **145**, 1371–82 (2007).
67. M. M. Marquès-Bueno *et al.*, *Plant J.* **85**, 320–333 (2016).
68. K. Birnbaum *et al.*, *Nat. Methods*. **2**, 615–9 (2005).
69. K. Hayashi *et al.*, *ACS Chem. Biol.* **7**, 590–8 (2012).
70. X. Tan *et al.*, *Nature*. **446**, 640–5 (2007).
71. M. Salehin, R. Bagchi, M. Estelle, *Plant Cell*. **27**, 9–19 (2015).
72. K. Knox, C. S. Grierson, O. Leyser, *Development*. **130**, 5769–5777 (2003).
73. N. C. Shaner *et al.*, *Nat. Methods*. **10**, 407–409 (2013).
74. B. Brockmann *et al.*, *Plant Cell Physiol.* **42**, 942–51 (2001).
75. J. Kim, K. Harter, A. Theologis, *Proc. Natl. Acad. Sci. U. S. A.* **94**, 11786–91 (1997).
76. E. P. Maher, S. J. Martindale, *Biochem. Genet.* **18**, 1041–53 (1980).
77. C. Luschnig, R. A. Gaxiola, P. Grisafi, G. R. Fink, *Genes Dev.* **12**, 2175–2187 (1998).
78. L. R. Band *et al.*, *Plant Cell*. **26**, 862–875 (2014).
79. L. R. Band *et al.*, *Proc. Natl. Acad. Sci. U. S. A.* **109**, 4668–4673 (2012).
80. H. Ren, W. M. Gray, *Mol. Plant*. **8**, 1–12 (2015).
81. J. C. Sedbrook, K. L. Carroll, K. F. Hung, P. H. Masson, C. R. Somerville, *Plant Cell*. **14**, 1635–1648 (2002).
82. D. Pacheco-Villalobos *et al.*, *Plant Cell*. **28**, 1009–1024 (2016).
83. W. Thielicke, E. J. Stamhuis, *J. Open Res. Softw.* **2**, e30 (2014).
84. C.-Y. Liao *et al.*, *Nat. Methods*. **12**, 207–210 (2015).
85. T. M. Watanabe *et al.*, *PLoS One*. **8**, e73212 (2013).
86. L. Beauzamy, N. Nakayama, A. Boudaoud, *Ann. Bot.* **114**, 1517–1533 (2014).
87. S. Wolf, H. Höfte, *Plant Cell*. **26**, 1848–1856 (2014).
88. O. Michaud, A.-S. Fiorucci, I. Xenarios, C. Fankhauser, *Proc. Natl. Acad. Sci. U. S. A.* **114**, 7444–7449 (2017).
89. M. Faget, S. Blossfeld, P. von Gillhaussen, U. Schurr, V. M. Temperton, *Front. Plant Sci.* **4**, 1–8 (2013).
90. S. Santi, W. Schmidt, *New Phytol.* **183**, 1072–1084 (2009).

Section c. Resources (including project costs)

I am asking for 80% of my salary (corresponds to 2000 EUR/month); I will dedicate ca.10 % of my time to teaching activities and 10% to other projects in the host department. Further, I request salary for 2 postdocs (3 and 2 years, 2000 EUR/month), 5-year salary for the equivalent of 2 PhD students (common duration in Czechia; 800 EUR/month; students receive an additional government stipend 400 EUR/month), and a 50% salary of a lab manager/technical assistant (800 EUR/month; second part of the salary will be covered by the Primus grant) and 50% of an administrator who will manage the financial aspect of the grant (800 EUR/month). The salaries were increased by 2.5% inflation rate for each year. The final figure includes the 34% social and health insurance and 1,5% social fund. An additional PhD student will be involved in the project, but part of the salary will be covered by the host. Also 3 master students will participate in the project by doing their Master's thesis – 1-year duration typically.

As specified in the methodology section above, I am asking for 250,000 EUR for obtaining a spinning disk confocal microscope that is absolutely essential for the success of the proposed project. The other equipment costs will be used to build the automatic microfluidic platform, again as described in the methodology section. These costs will be spent in the 1st two reporting periods of the project.

I estimated the consumables cost to be 34,000 EUR per year (plus 2.5% yearly inflation) including laptops, printer and small laboratory devices (binocular scope, thermal cycler, electrophoresis equipment, autoclave), molecular biology consumables: e.g. PCR enzymes and kits, cloning enzymes, DNA and RNA isolation kits, library preparation kits, antibodies, cloning kits and vectors, chemicals: e.g. general laboratory chemicals, drugs, hormones and hormone analogs and other laboratory equipment: e.g. pipettors, glassware, microfluidic equipment, 3D-printing cartridges, laboratory plastics: e.g. petri dishes, pipette tips, tubes, protective equipment, racks. For microscopy: glassware, microscopic chambers, fluorescent dyes and tracers. 15,000 EUR is planned to cover costs of Open Access publications. Other costs will cover costs for microscopy services within the department, and a first-level audit at the end of the project (ca. 11,000 EUR). Subcontracting costs (55,000 EUR) will cover the RNAseq NGS services, FACS costs and proteomic experiments. The travel costs are planned that each member of the team can attend one international conference per year, and part of the money is intended for collaboration visits of the postdocs and students.

Associated with document Ref. Ares(2018)5684245 - 07/11/2018

PART A : BUDGET TABLE FOR BENEFICIARY CUNI

Please enter duration in months[1]	**60**

Please indicate the % of working time the PI dedicates to the project over the period of the grant	**80.00**

Estimated eligible costs (per budget category)	
A. Direct Personnel costs:	
P.I.	**170 936.00**
Senior Staff	**0.00**
Post docs	**170 936.00**
Students	**136 749.00**
Other	**136 749.00**
Total Personnel:	**615 370.00**
D. Other Direct Costs:	
D.1 Travel	**36 000.00**
D.2 Equipment	**274 000.00**
D.3 Other goods and services (i.e. consumables, publications)	**204 630.00**
D.4 Costs of large research infrastructure	**0.00**
D5. Internally Invoiced Goods and Services	**25 000.00**
Total Other Direct Costs:	**539 630.00**
Total Direct Costs:	
E. Indirect Costs (25% of Direct Costs)	**288 750.00**
B.Subcontracting	**55 000.00**
Costs of in-kind contributions not used on premises (No indirect costs)	**0.00**
Total Estimated Budget:	**1 498 750.00**

[1] Duration of the action (see Article 3)

PART B : ESTIMATED BUDGET FOR THE ACTION

	Estimated eligible[1] costs (per budget category)								EU contribution			Additional information		
	A. Direct personnel costs				B. Direct costs of subcontracting	D. Other direct costs		E. Indirect costs[2]	Total costs	Reimbursement rate %	Maximum EU contribution[3]	Maximum grant amount[4]	Information for indirect costs	Information for auditors	Other information:
	A.1 Employees (or equivalent) A.2 Natural persons under direct contract A.3 Seconded persons		A.4 SME owners without salary A.5 Beneficiaries that are natural persons			D.1 Travel D.2 Equipment D.3 Other goods and services *[D.4 Costs of large research infrastructure]*	D.5 Costs of internally invoiced goods and services						Estimated costs of in-kind contributions not used on premises	Declaration of costs under Point D.4	Estimated costs of beneficiaries/ linked third parties not receiving funding/ international partners
Form of costs[5]	Actual	Unit[6]	Unit[7]		Actual	Actual	Unit[8]	Flat-rate[9] 25%							
	a	Total b	No hours	Total c	d	e	Total f	g = 0,25 * (a+b+c+e+f-l)	h = a+b+c +d+e+f+g	i	j	k	l	Yes/No	
1. CUNI	615 370.00	0.00	0	0.00	55 000.00	514 630.00	25 000.00	288 750.00	1 498 750.00	100.00	1 498 750.00	1 498 750.00	0.00	No	n/a

[1] See Article 6 for the eligibility conditions.
[2] Indirect costs covered by an operating grant (received under any EU or Euratom funding programme; see Article 6.5.(b)) are ineligible under the GA. Therefore, a beneficiary/linked third party that receives an operating grant during the action's duration cannot declare indirect costs for the year(s)/reporting period(s) covered by the operating grant, unless it can demonstrate that the operating grant does not cover any costs of the action (see Article 6.2.E).
[3] This is the theoretical amount of EU contribution that the system calculates automatically (by multiplying all the budgeted costs by the reimbursement rate). This theoretical amount is capped by the 'maximum grant amount' (that the Commission/Agency decided to grant for the action) (see Article 5.1).
[4] The 'maximum grant amount' is the maximum grant amount decided by the Commission/Agency. It normally corresponds to the requested grant, but may be lower.
[5] See Article 5 for the forms of costs.
[6] Unit : hours worked on the action; costs per unit (hourly rate) : calculated according to beneficiary's usual accounting practice.
[7] See Annex 2a 'Additional information on the estimated budget' for the details (costs per hour (hourly rate)).
[8] Unit and costs per unit: calculated according to the beneficiary's usual accounting practice.
[9] Flat rate : 25% of eligible direct costs, from which are excluded: direct costs of subcontracting and costs of in-kind contributions not used on premises (see Article 6.2.E).
[10] See Article 9 for beneficiaries not receiving funding.
[11] Only for linked third parties that receive funding.

ANNEX 2a

ADDITIONAL INFORMATION ON THE ESTIMATED BUDGET

- **Instructions and footnotes in blue will not appear in the text generated by the IT system (since they are internal instructions only).**
- **For options *[*in square brackets*]*: the applicable option will be chosen by the IT system. Options not chosen will automatically not appear.**
- **For fields in [grey in square brackets] (even if they are part of an option as specified in the previous item): IT system will enter the appropriate data.**

⚠ **Transitory period: Until SyGMa fully supports Annex 2a, you must prepare it manually (using this template by choosing and deleting the options/entering the appropriate data).**
For the 'unit cost tables': either fill them out manually or use currently existing tables from Annex 1 or the proposal.
The document can then be uploaded in SyGMa and attached to the grant agreement.

Unit cost for SME owners/natural beneficiaries without salary

1. Costs for a *[*SME owner*][*beneficiary that is a natural person*]* not receiving a salary

Units: hours worked on the action

Amount per unit ('hourly rate'): calculated according to the following formula:

{the monthly living allowance for researchers in MSCA-IF actions / 143 hours}
multiplied by
{country-specific correction coefficient of the country where the beneficiary is established}

The monthly living allowance and the country-specific correction coefficients are set out in the Work Programme (section 3 MSCA) in force at the time of the call:

- for calls *before* Work Programme 2018-2020:
  - for the monthly living allowance: **EUR 4 650**
  - for the country-specific correction coefficients: see Work Programme 2014-2015 and Work Programme 2016-2017 (available on the Participant Portal Reference Documents page)
- for calls *under* Work Programme 2018-2020:
  - for the monthly living allowance: **EUR 4 880**
  - for the country-specific correction coefficients: see Work Programme 2018-2020 (available on the Participant Portal Reference Documents page)

[additional OPTION for beneficiaries/linked third parties that have opted to use the unit cost (in the proposal/with an amendment): For the following beneficiaries/linked third parties, the amounts per unit (hourly rate) are fixed as follows:

- beneficiary/linked third party [short name]: EUR [insert amount]
- beneficiary/linked third party [short name]: EUR [insert amount]

[same for other beneficiaries/linked third parties, if necessary] *]*

Estimated number of units: see Annex 2

ⓘ print format A4 landscape

MODEL ANNEX 4 FOR H2020 ERC MGA — MONO

FINANCIAL STATEMENT FOR BENEFICIARY [name]/ LINKED THIRD PARTY [name] FOR REPORTING PERIOD [reporting period]

	Eligible[1] costs (per budget category)									Receipts	EU contribution			Additional information
	A. Direct personnel costs				B. Direct costs of subcontracting	D. Other direct costs			E. Indirect costs[2]	Total costs	Receipts	Reimbursement rate %	Maximum EU contribution[3]	Requested EU contribution	Information for indirect costs :
	A.1 Employees (or equivalent) A.2 Natural persons under direct contract A.3 Seconded persons		A.4 SME owners without salary A.5 Beneficiaries that are natural persons without salary			D.1 Travel D.2 Equipment D.3 Other goods and services	*[D.4 Costs of large research infrastructure]*	D.5 Costs of internally invoiced goods and services			Receipts of the action, to be reported in the last reporting period, according to Article 5.3.3				Costs of in-kind contributions not used on premises
Form of costs[4]	Actual	Unit	Unit		Actual	Actual	Actual	Unit	**Flat-rate[5]** 25%						
	a	Total b	No hours	Total c	d	e	*[f]*	Total g	h=0,25x(a+b+c+e+*[f]* +g -n)	i = a+b+c+d+e+*[f]* +g +h	j	k	l	m	n
[short name beneficiary/linked third party]															

The beneficiary/linked third party hereby confirms that:
The information provided is complete, reliable and true.
The costs declared are eligible (see Article 6).
The costs can be substantiated by adequate records and supporting documentation that will be produced upon request or in the context of checks, reviews, audits and investigations (see Articles 17, 18 and 22).
For the last reporting period: that all the receipts have been declared (see Article 5.3.3).

ⓘ Please declare all eligible costs, even if they exceed the amounts indicated in the estimated budget (see Annex 2). Only amounts that were declared in your individual financial statements can be taken into account lateron, in order to replace other costs that are

[1] See Article 6 for the eligibility conditions

[2] The indirect costs claimed must be free of any amounts covered by an operating grant (received under any EU or Euratom funding programme; see Article 6.2.E). If you have received an operating grant during this reporting period, you cannot claim ~~any~~ indirect costs, unless you can demonstrate that the operating grant does not cover any costs of the action.

[3] This is the *theoretical* amount of EU contribution that the system calculates automatically (by multiplying the reimbursement rate by the total costs declared). The amount you request (in the column 'requested EU contribution') may be less.

[4] See Article 5 for the forms of costs

[5] Flat rate : 25% of eligible direct costs, from which are excluded: direct costs of subcontracting and costs of in-kind contributions not used on premises (see Article 6.2.E)

ANNEX 5

MODEL FOR THE CERTIFICATE ON THE FINANCIAL STATEMENTS

- **For options [*in italics in square brackets*]: choose the applicable option. Options not chosen should be deleted.**
- **For fields in [grey in square brackets]: enter the appropriate data**

TABLE OF CONTENTS

Terms of Reference for an Independent Report of Factual Findings on costs declared under a Grant Agreement financed under the Horizon 2020 Research and Innovation Framework Programme

This document sets out the '**Terms of Reference (ToR)**' under which

[OPTION 1: [insert name of the beneficiary] ('the Beneficiary')] [OPTION 2: [insert name of the linked third party] ('the Linked Third Party'), third party linked to the Beneficiary [insert name of the beneficiary] ('the Beneficiary')]

agrees to engage

[**insert legal name of the auditor**] ('the Auditor')

to produce an independent report of factual findings ('the Report') concerning the Financial Statement(s)[1] drawn up by the *[Beneficiary] [Linked Third Party]* for the Horizon 2020 grant agreement [insert number of the grant agreement, title of the action, acronym and duration from/to] ('the Agreement'), and

to issue a 'Certificate on the Financial Statements (CFS)' referred to in Article 20.4 of the Agreement based on the compulsory reporting template stipulated by the Commission.

The Agreement has been concluded under the Horizon 2020 Research and Innovation Framework Programme (H2020) between the Beneficiary and *[OPTION 1: the European Union, represented by the European Commission ('the Commission')][OPTION 2: the European Atomic Energy Community (Euratom,) represented by the European Commission ('the Commission')][OPTION 3: the [Research Executive Agency (REA)] [European Research Council Executive Agency (ERCEA)] [Innovation and Networks Executive Agency (INEA)] [Executive Agency for Small and Medium-sized Enterprises (EASME)] ('the Agency'), under the powers delegated by the European Commission ('the Commission').]*

The *[Commission] [Agency]* is mentioned as a signatory of the Agreement with the Beneficiary only. The *[European Union][Euratom][Agency]* is not a party to this engagement.

1.1 Subject of the engagement

The beneficiary must submit to the *[Commission][Agency]* the final report within 60 days following the end of the last reporting period which should include, amongst other documents, a CFS for itself and for each of its linked third parties that requests a total contribution of EUR 325 000 or more, as reimbursement of_actual costs and unit costs calculated on the basis of its usual cost accounting practices (see Article 20.4 of the Agreement). The CFS must cover all reporting periods of the beneficiary or linked third party indicated above.

The CFS is composed of two separate documents:

- The Terms of Reference ('the ToR') to be signed by the *[Beneficiary] [Linked Third Party]* and the Auditor;
- The Auditor's Independent Report of Factual Findings ('the Report') to be issued on the Auditor's letterhead, dated, stamped and signed by the Auditor (or the competent public officer) which includes the agreed-upon procedures ('the Procedures') to be performed by the Auditor, and the standard factual findings ('the Findings') to be confirmed by the Auditor.

[1] By which costs under the Agreement are declared (see template 'Model Financial Statements' in Annex 4 to the Grant Agreement).

If the CFS must be included in the final report according to Article 20.4 of the Agreement, the request for payment of the balance relating to the Agreement cannot be made without the CFS. However, the payment for reimbursement of costs covered by the CFS does not preclude the Commission*[, Agency]*, the European Anti-Fraud Office and the European Court of Auditors from carrying out checks, reviews, audits and investigations in accordance with Article 22 of the Agreement.

1.2 Responsibilities

The *[Beneficiary] [Linked Third Party]:*

- must draw up the Financial Statement(s) for the action financed by the Agreement in compliance with the obligations under the Agreement. The Financial Statement(s) must be drawn up according to the *[Beneficiary's] [Linked Third Party's]* accounting and book-keeping system and the underlying accounts and records;
- must send the Financial Statement(s) to the Auditor;
- is responsible and liable for the accuracy of the Financial Statement(s);
- is responsible for the completeness and accuracy of the information provided to enable the Auditor to carry out the Procedures. It must provide the Auditor with a written representation letter supporting these statements. The written representation letter must state the period covered by the statements and must be dated;
- accepts that the Auditor cannot carry out the Procedures unless it is given full access to the *[Beneficiary's] [Linked Third Party's]* staff and accounting as well as any other relevant records and documentation.

The Auditor:

- *[Option 1 by default:* is qualified to carry out statutory audits of accounting documents in accordance with Directive 2006/43/EC of the European Parliament and of the Council of 17 May 2006 on statutory audits of annual accounts and consolidated accounts, amending Council Directives 78/660/EEC and 83/349/EEC and repealing Council Directive 84/253/EEC or similar national regulations*]*.
- *[Option 2 if the Beneficiary or Linked Third Party has an independent Public Officer:* is a competent and independent Public Officer for which the relevant national authorities have established the legal capacity to audit the Beneficiary*]*.
- *[Option 3 if the Beneficiary or Linked Third Party is an international organisation:* is an [internal] [external] auditor in accordance with the internal financial regulations and procedures of the international organisation*]*.

The Auditor:

- must be independent from the Beneficiary *[and the Linked Third Party]*, in particular, it must not have been involved in preparing the *[Beneficiary's] [Linked Third Party's]* Financial Statement(s);
- must plan work so that the Procedures may be carried out and the Findings may be assessed;
- must adhere to the Procedures laid down and the compulsory report format;
- must carry out the engagement in accordance with this ToR;
- must document matters which are important to support the Report;
- must base its Report on the evidence gathered;
- must submit the Report to the *[Beneficiary] [Linked Third Party]*.

The Commission sets out the Procedures to be carried out by the Auditor. The Auditor is not responsible for their suitability or pertinence. As this engagement is not an assurance engagement, the Auditor does not provide an audit opinion or a statement of assurance.

1.3 Applicable Standards

The Auditor must comply with these Terms of Reference and with[2]:

- the International Standard on Related Services ('ISRS') 4400 *Engagements to perform Agreed-upon Procedures regarding Financial Information* as issued by the International Auditing and Assurance Standards Board (IAASB);
- the *Code of Ethics for Professional Accountants* issued by the International Ethics Standards Board for Accountants (IESBA). Although ISRS 4400 states that independence is not a requirement for engagements to carry out agreed-upon procedures, the *[Commission][Agency]* requires that the Auditor also complies with the Code's independence requirements.

The Auditor's Report must state that there is no conflict of interests in establishing this Report between the Auditor and the Beneficiary *[and the Linked Third Party]*, and must specify - if the service is invoiced - the total fee paid to the Auditor for providing the Report.

1.4 Reporting

The Report must be written in the language of the Agreement (see Article 20.7).

Under Article 22 of the Agreement, the Commission*[, the Agency]*, the European Anti-Fraud Office and the Court of Auditors have the right to audit any work that is carried out under the action and for which costs are declared from [*the European Union*] [*Euratom*] budget. This includes work related to this engagement. The Auditor must provide access to all working papers (e.g. recalculation of hourly rates, verification of the time declared for the action) related to this assignment if the Commission*[, the Agency]*, the European Anti-Fraud Office or the European Court of Auditors requests them.

1.5 Timing

The Report must be provided by *[*dd Month yyyy*]*.

1.6 Other terms

[*The [Beneficiary] [Linked Third Party] and the Auditor can use this section to agree other specific terms, such as the Auditor's fees, liability, applicable law, etc. Those specific terms must not contradict the terms specified above.*]

[legal name of the Auditor]	[legal name of the *[Beneficiary][Linked Third Party]*]
[name & function of authorised representative]	[name & function of authorised representative]
[dd Month yyyy]	[dd Month yyyy]
Signature of the Auditor	Signature of the *[Beneficiary][Linked Third Party]*

[2] Supreme Audit Institutions applying INTOSAI-standards may carry out the Procedures according to the corresponding International Standards of Supreme Audit Institutions and code of ethics issued by INTOSAI instead of the International Standard on Related Services ('ISRS') 4400 and the Code of Ethics for Professional Accountants issued by the IAASB and the IESBA.

Independent Report of Factual Findings on costs declared under Horizon 2020 Research and Innovation Framework Programme

(To be printed on the Auditor's letterhead)

To
[name of contact person(s)], [Position]
[[*Beneficiary's*] [*Linked Third Party's*] name]
[Address]
[dd Month yyyy]

Dear [Name of contact person(s)],

As agreed under the terms of reference dated [dd Month yyyy]

with *[OPTION 1: [insert name of the beneficiary] ('the Beneficiary')] [OPTION 2: [insert name of the linked third party] ('the Linked Third Party'), third party linked to the Beneficiary [insert name of the beneficiary] ('the Beneficiary')],*

we

[name of the auditor] ('the Auditor'),

established at

[full address/city/state/province/country],

represented by

[name and function of an authorised representative],

have carried out the procedures agreed with you regarding the costs declared in the Financial Statement(s)[3] of the *[Beneficiary] [Linked Third Party]* concerning the grant agreement [insert grant agreement reference: number, title of the action and acronym] ('the Agreement'),

with a total cost declared of

[total amount] EUR,

and a total of actual costs and unit costs calculated in accordance with the *[Beneficiary's] [Linked Third Party's]* usual cost accounting practices' declared of

[sum of total actual costs and total unit costs calculated in accordance with the *[Beneficiary's] [Linked Third Party's]* usual cost accounting practices] EUR

and **hereby provide our Independent Report of Factual Findings ('the Report')** using the compulsory report format agreed with you.

The Report

Our engagement was carried out in accordance with the terms of reference ('the ToR') appended to this Report. The Report includes the agreed-upon procedures ('the Procedures') carried out and the standard factual findings ('the Findings') examined.

The Procedures were carried out solely to assist the *[Commission] [Agency]* in evaluating whether the *[Beneficiary's] [Linked Third Party's]* costs in the accompanying Financial Statement(s) were

[3] By which the Beneficiary declares costs under the Agreement (see template 'Model Financial Statement' in Annex 4 to the Agreement).

declared in accordance with the Agreement. The *[Commission] [Agency]* draws its own conclusions from the Report and any additional information it may require.

The scope of the Procedures was defined by the Commission. Therefore, the Auditor is not responsible for their suitability or pertinence. Since the Procedures carried out constitute neither an audit nor a review made in accordance with International Standards on Auditing or International Standards on Review Engagements, the Auditor does not give a statement of assurance on the Financial Statements.

Had the Auditor carried out additional procedures or an audit of the *[Beneficiary's] [Linked Third Party's]* Financial Statements in accordance with International Standards on Auditing or International Standards on Review Engagements, other matters might have come to its attention and would have been included in the Report.

Not applicable Findings

We examined the Financial Statement(s) stated above and considered the following Findings not applicable:

Explanation (to be removed from the Report):

*If a Finding was not applicable, it must be marked as '**N.A**.' ('Not applicable') in the corresponding row on the right-hand column of the table and means that the Finding did not have to be corroborated by the Auditor and the related Procedure(s) did not have to be carried out.*

The reasons of the non-application of a certain Finding must be obvious i.e.

i) if no cost was declared under a certain category then the related Finding(s) and Procedure(s) are not applicable;

ii) if the condition set to apply certain Procedure(s) are not met the related Finding(s) and those Procedure(s) are not applicable. For instance, for 'beneficiaries with accounts established in a currency other than euro' the Procedure and Finding related to 'beneficiaries with accounts established in euro' are not applicable. Similarly, if no additional remuneration is paid, the related Finding(s) and Procedure(s) for additional remuneration are not applicable.

List here all Findings considered not applicable for the present engagement and explain the reasons of the non-applicability.

….

Exceptions

Apart from the exceptions listed below, the *[Beneficiary] [Linked Third Party]* provided the Auditor all the documentation and accounting information needed by the Auditor to carry out the requested Procedures and evaluate the Findings.

Explanation (to be removed from the Report):

- *If the Auditor was not able to successfully complete a procedure requested, it must be marked as '**E**' ('Exception') in the corresponding row on the right-hand column of the table. The reason such as the inability to reconcile key information or the unavailability of data that prevents the Auditor from carrying out the Procedure must be indicated below.*
- *If the Auditor cannot corroborate a standard finding after having carried out the corresponding procedure, it must also be marked as '**E**' ('Exception') and, where possible, the reasons why the Finding was not fulfilled and its possible impact must be explained here below.*

List here any exceptions and add any information on the cause and possible consequences of each exception, if known. If the exception is quantifiable, include the corresponding amount.

….

Example (to be removed from the Report):

1. *The Beneficiary was unable to substantiate the Finding number 1 on … because ….*
2. *Finding number 30 was not fulfilled because the methodology used by the Beneficiary to calculate unit costs was different from the one approved by the Commission. The differences were as follows: …*
3. *After carrying out the agreed procedures to confirm the Finding number 31, the Auditor found a difference of _____ EUR. The difference can be explained by …*

Further Remarks

In addition to reporting on the results of the specific procedures carried out, the Auditor would like to make the following general remarks:

Example (to be removed from the Report):

1. *Regarding Finding number 8 the conditions for additional remuneration were considered as fulfilled because …*
2. *In order to be able to confirm the Finding number 15 we carried out the following additional procedures: ….*

Use of this Report

This Report may be used only for the purpose described in the above objective. It was prepared solely for the confidential use of the *[Beneficiary] [Linked Third Party]* and the [*Commission*] [*Agency*], and only to be submitted to the [*Commission*] [*Agency*] in connection with the requirements set out in Article 20.4 of the Agreement. The Report may not be used by the *[Beneficiary] [Linked Third Party]* or by the [*Commission*] [*Agency*] for any other purpose, nor may it be distributed to any other parties. The [*Commission*] [*Agency*] may only disclose the Report to authorised parties, in particular to the European Anti-Fraud Office (OLAF) and the European Court of Auditors.

This Report relates only to the Financial Statement(s) submitted to the *[Commission] [Agency]* by the *[Beneficiary] [Linked Third Party]* for the Agreement. Therefore, it does not extend to any other of the [*Beneficiary's*] [*Linked Third Party's*] Financial Statement(s).

There was no conflict of interest[4] between the Auditor and the Beneficiary *[and Linked Third Party]* in establishing this Report. The total fee paid to the Auditor for providing the Report was EUR _____ (including EUR_____ of deductible VAT).

We look forward to discussing our Report with you and would be pleased to provide any further information or assistance.

[legal name of the Auditor]
[name and function of an authorised representative]
[dd Month yyyy]
Signature of the Auditor

[4] A conflict of interest arises when the Auditor's objectivity to establish the certificate is compromised in fact or in appearance when the Auditor for instance:
- was involved in the preparation of the Financial Statements;
- stands to benefit directly should the certificate be accepted;
- has a close relationship with any person representing the beneficiary;
- is a director, trustee or partner of the beneficiary; or
- is in any other situation that compromises his or her independence or ability to establish the certificate impartially.

Agreed-upon procedures to be performed and standard factual findings to be confirmed by the Auditor

The European Commission reserves the right to i) provide the auditor with additional guidance regarding the procedures to be followed or the facts to be ascertained and the way in which to present them (this may include sample coverage and findings) or to ii) change the procedures, by notifying the Beneficiary in writing. The procedures carried out by the auditor to confirm the standard factual finding are listed in the table below.

If this certificate relates to a Linked Third Party, any reference here below to 'the Beneficiary' is to be considered as a reference to 'the Linked Third Party'.

The 'result' column has three different options: 'C', 'E' and 'N.A.':

- 'C' stands for 'confirmed' and means that the auditor can confirm the 'standard factual finding' and, therefore, there is no exception to be reported.
- 'E' stands for 'exception' and means that the Auditor carried out the procedures but cannot confirm the 'standard factual finding', or that the Auditor was not able to carry out a specific procedure (e.g. because it was impossible to reconcile key information or data were unavailable),
- 'N.A.' stands for 'not applicable' and means that the Finding did not have to be examined by the Auditor and the related Procedure(s) did not have to be carried out. The reasons of the non-application of a certain Finding must be obvious i.e. i) if no cost was declared under a certain category then the related Finding(s) and Procedure(s) are not applicable; ii) if the condition set to apply certain Procedure(s) are not met then the related Finding(s) and Procedure(s) are not applicable. For instance, for 'beneficiaries with accounts established in a currency other than the euro' the Procedure related to 'beneficiaries with accounts established in euro' is not applicable. Similarly, if no additional remuneration is paid, the related Finding(s) and Procedure(s) for additional remuneration are not applicable.

Ref	Procedures	Standard factual finding	Result (C / E / N.A.)
A	**ACTUAL PERSONNEL COSTS AND UNIT COSTS CALCULATED BY THE BENEFICIARY IN ACCORDANCE WITH ITS USUAL COST ACCOUNTING PRACTICE**		
	The Auditor draws a sample of persons whose costs were declared in the Financial Statement(s) to carry out the procedures indicated in the consecutive points of this section A. (*The sample should be selected randomly so that it is representative. Full coverage is required if there are fewer than 10 people (including employees, natural persons working under a direct contract and personnel seconded by a third party), otherwise the sample should have a minimum of 10 people, or*		

Ref	Procedures	Standard factual finding	Result (C / E / N.A.)
	10% of the total, whichever number is the highest) The Auditor sampled _____ people out of the total of _____ people.		
A.1	**PERSONNEL COSTS** <u>For the persons included in the sample and working under an employment contract or equivalent act (general procedures for individual actual personnel costs and personnel costs declared as unit costs)</u> To confirm standard factual findings 1-5 listed in the next column, the Auditor reviewed following information/documents provided by the Beneficiary: ○ a list of the persons included in the sample indicating the period(s) during which they worked for the action, their position (classification or category) and type of contract; ○ the payslips of the employees included in the sample; ○ reconciliation of the personnel costs declared in the Financial Statement(s) with the accounting system (project accounting and general ledger) and payroll system; ○ information concerning the employment status and employment conditions of personnel included in the sample, in particular their employment contracts or equivalent; ○ the Beneficiary's usual policy regarding payroll matters (e.g. salary policy, overtime policy, variable pay); ○ applicable national law on taxes, labour and social security and ○ any other document that supports the personnel costs declared. The Auditor also verified the eligibility of all components of the retribution (see Article 6 GA) and recalculated the personnel costs for employees included in the sample.	1) The employees were i) directly hired by the Beneficiary in accordance with its national legislation, ii) under the Beneficiary's sole technical supervision and responsibility and iii) remunerated in accordance with the Beneficiary's usual practices.	
		2) Personnel costs were recorded in the Beneficiary's accounts/payroll system.	
		3) Costs were adequately supported and reconciled with the accounts and payroll records.	
		4) Personnel costs did not contain any ineligible elements.	
		5) There were no discrepancies between the personnel costs charged to the action and the costs recalculated by the Auditor.	

Ref	Procedures	Standard factual finding	Result (C / E / N.A.)
	Further procedures if 'additional remuneration' is paid To confirm standard factual findings 6-9 listed in the next column, the Auditor: o reviewed relevant documents provided by the Beneficiary (legal form, legal/statutory obligations, the Beneficiary's usual policy on additional remuneration, criteria used for its calculation, the Beneficiary's usual remuneration practice for projects funded under national funding schemes…); o recalculated the amount of additional remuneration eligible for the action based on the supporting documents received (full-time or part-time work, exclusive or non-exclusive dedication to the action, usual remuneration paid for projects funded by national schemes) to arrive at the applicable FTE/year and pro-rata rate (see data collected in the course of carrying out the procedures under A.2 'Productive hours' and A.4 'Time recording system'). *'ADDITIONAL REMUNERATION' MEANS ANY PART OF THE REMUNERATION WHICH EXCEEDS WHAT THE PERSON WOULD BE PAID FOR TIME WORKED IN PROJECTS FUNDED BY NATIONAL SCHEMES.* *IF ANY PART OF THE REMUNERATION PAID TO THE EMPLOYEE QUALIFIES AS "ADDITIONAL REMUNERATION" AND IS ELIGIBLE UNDER THE PROVISIONS OF ARTICLE 6.2.A.1, THIS CAN BE CHARGED AS ELIGIBLE COST TO THE ACTION UP TO THE FOLLOWING AMOUNT:* *(A) IF THE PERSON WORKS FULL TIME AND EXCLUSIVELY ON THE ACTION DURING THE FULL YEAR: UP TO EUR 8 000/YEAR;* *(B) IF THE PERSON WORKS EXCLUSIVELY ON THE ACTION BUT NOT FULL-TIME OR NOT FOR THE FULL YEAR: UP TO THE CORRESPONDING PRO-RATA AMOUNT OF EUR 8 000, OR* *(C) IF THE PERSON DOES NOT WORK EXCLUSIVELY ON THE ACTION: UP TO A PRO-RATA AMOUNT CALCULATED IN ACCORDANCE TO ARTICLE 6.2.A.1.*	6) The Beneficiary paying "additional remuneration" was a non-profit legal entity. 7) The amount of additional remuneration paid corresponded to the Beneficiary's usual remuneration practices and was consistently paid whenever the same kind of work or expertise was required. 8) The criteria used to calculate the additional remuneration were objective and generally applied by the Beneficiary regardless of the source of funding used. 9) The amount of additional remuneration included in the personnel costs charged to the action was capped at EUR 8,000 per FTE/year (up to the equivalent pro-rata amount if the person did not work on the action full-time during the year or did not work exclusively on the action).	
	Additional procedures in case "unit costs calculated by the Beneficiary in accordance with its usual		

Ref	Procedures	Standard factual finding	Result (C / E / N.A.)
	cost accounting practices" is applied: Apart from carrying out the procedures indicated above to confirm standard factual findings 1-5 and, if applicable, also 6-9, the Auditor carried out following procedures to confirm standard factual findings 10-13 listed in the next column: o obtained a description of the Beneficiary's usual cost accounting practice to calculate unit costs;. o reviewed whether the Beneficiary's usual cost accounting practice was applied for the Financial Statements subject of the present CFS; o verified the employees included in the sample were charged under the correct category (in accordance with the criteria used by the Beneficiary to establish personnel categories) by reviewing the contract/HR-record or analytical accounting records; o verified that there is no difference between the total amount of personnel costs used in calculating the cost per unit and the total amount of personnel costs recorded in the statutory accounts; o verified whether actual personnel costs were adjusted on the basis of budgeted or estimated elements and, if so, verified whether those elements used are actually relevant for the calculation, objective and supported by documents.	10) The personnel costs included in the Financial Statement were calculated in accordance with the Beneficiary's usual cost accounting practice. This methodology was consistently used in all H2020 actions.	
		11) The employees were charged under the correct category.	
		12) Total personnel costs used in calculating the unit costs were consistent with the expenses recorded in the statutory accounts.	
		13) Any estimated or budgeted element used by the Beneficiary in its unit-cost calculation were relevant for calculating personnel costs and corresponded to objective and verifiable information.	
	<u>For natural persons included in the sample and working with the Beneficiary under a direct contract other than an employment contract, such as consultants (no subcontractors).</u> To confirm standard factual findings 14-17 listed in the next column the Auditor reviewed following information/documents provided by the Beneficiary:	14) The natural persons worked under conditions similar to those of an employee, in particular regarding the way the work is organised, the tasks that are performed and the premises	

Ref	Procedures	Standard factual finding	Result (C / E / N.A.)
	o the contracts, especially the cost, contract duration, work description, place of work, ownership of the results and reporting obligations to the Beneficiary; o the employment conditions of staff in the same category to compare costs and; o any other document that supports the costs declared and its registration (e.g. invoices, accounting records, etc.).	where they are performed.	
		15) The results of work carried out belong to the Beneficiary, or if not, the Beneficiary has obtained all necessary rights to fulfil its obligations as if those results were generated by itself.	
		16) Their costs were not significantly different from those for staff who performed similar tasks under an employment contract with the Beneficiary.	
		17) The costs were supported by audit evidence and registered in the accounts.	
	<u>For personnel seconded by a third party and included in the sample (not subcontractors)</u> To confirm standard factual findings 18-21 listed in the next column, the Auditor reviewed following information/documents provided by the Beneficiary: o their secondment contract(s) notably regarding costs, duration, work description, place of work and ownership of the results; o if there is reimbursement by the Beneficiary to the third party for the resource made available (in-kind contribution against payment): any documentation that supports the costs declared (e.g. contract, invoice, bank payment, and proof of registration in its accounting/payroll, etc.) and reconciliation of the Financial Statement(s) with the accounting system (project accounting and	18) Seconded personnel reported to the Beneficiary and worked on the Beneficiary's premises (unless otherwise agreed with the Beneficiary).	
		19) The results of work carried out belong to the Beneficiary, or if not, the Beneficiary has obtained all necessary rights to fulfil its obligations as if those results	

Ref	Procedures	Standard factual finding	Result (C / E / N.A.)
	general ledger) as well as any proof that the amount invoiced by the third party did not include any profit; o if there is no reimbursement by the Beneficiary to the third party for the resource made available (in-kind contribution free of charge): a proof of the actual cost borne by the Third Party for the resource made available free of charge to the Beneficiary such as a statement of costs incurred by the Third Party and proof of the registration in the Third Party's accounting/payroll; o any other document that supports the costs declared (e.g. invoices, etc.).	were generated by itself.	
		If personnel is seconded against payment: 20) The costs declared were supported with documentation and recorded in the Beneficiary's accounts. The third party did not include any profit.	
		If personnel is seconded free of charge: 21) The costs declared did not exceed the third party's cost as recorded in the accounts of the third party and were supported with documentation.	
A.2	**PRODUCTIVE HOURS** To confirm standard factual findings 22-27 listed in the next column, the Auditor reviewed relevant documents, especially national legislation, labour agreements and contracts and time records of the persons included in the sample, to verify that: o the annual productive hours applied were calculated in accordance with one of the methods described below, o the full-time equivalent (FTEs) ratios for employees not working full-time were correctly calculated.	22) The Beneficiary applied method [*choose one option and delete the others*] [**A**: 1720 hours] [**B**: the 'total number of hours worked'] [**C**: 'annual standard productive hours' used correspond to usual accounting practices]	

Ref	Procedures	Standard factual finding	Result (C / E / N.A.)
	If the Beneficiary applied method B, the auditor verified that the correctness in which the total number of hours worked was calculated and that the contracts specified the annual workable hours. If the Beneficiary applied method C, the auditor verified that the 'annual productive hours' applied when calculating the hourly rate were equivalent to at least 90 % of the 'standard annual workable hours'. The Auditor can only do this if the calculation of the standard annual workable hours can be supported by records, such as national legislation, labour agreements, and contracts. *BENEFICIARY'S PRODUCTIVE HOURS' FOR PERSONS WORKING FULL TIME SHALL BE ONE OF THE FOLLOWING METHODS:* ***A.*** *1720 ANNUAL PRODUCTIVE HOURS (PRO-RATA FOR PERSONS NOT WORKING FULL-TIME)* ***B.*** *THE TOTAL NUMBER OF HOURS WORKED BY THE PERSON FOR THE BENEFICIARY IN THE YEAR (THIS METHOD IS ALSO REFERRED TO AS 'TOTAL NUMBER OF HOURS WORKED' IN THE NEXT COLUMN). THE CALCULATION OF THE TOTAL NUMBER OF HOURS WORKED WAS DONE AS FOLLOWS: ANNUAL WORKABLE HOURS OF THE PERSON ACCORDING TO THE EMPLOYMENT CONTRACT, APPLICABLE LABOUR AGREEMENT OR NATIONAL LAW PLUS OVERTIME WORKED MINUS ABSENCES (SUCH AS SICK LEAVE OR SPECIAL LEAVE).* ***C.*** *THE STANDARD NUMBER OF ANNUAL HOURS GENERALLY APPLIED BY THE BENEFICIARY FOR ITS PERSONNEL IN ACCORDANCE WITH ITS USUAL COST ACCOUNTING PRACTICES (THIS METHOD IS ALSO REFERRED TO AS 'STANDARD ANNUAL PRODUCTIVE HOURS' IN THE NEXT COLUMN). THIS NUMBER MUST BE AT LEAST 90% OF THE STANDARD ANNUAL WORKABLE HOURS.* *'ANNUAL WORKABLE HOURS' MEANS THE PERIOD DURING WHICH THE PERSONNEL MUST BE WORKING, AT THE EMPLOYER'S DISPOSAL AND CARRYING OUT HIS/HER ACTIVITY OR DUTIES UNDER THE EMPLOYMENT*	23) Productive hours were calculated annually. 24) For employees not working full-time the full-time equivalent (FTE) ratio was correctly applied. *If the Beneficiary applied method B.* 25) The calculation of the number of 'annual workable hours', overtime and absences was verifiable based on the documents provided by the Beneficiary. 25.1) The Beneficiary calculates the hourly rates per full financial year following procedure A.3 (method B is not allowed for beneficiaries calculating hourly rates per month). *If the Beneficiary applied method C.* 26) The calculation of the number of 'standard annual workable hours' was verifiable based on the documents provided by the Beneficiary.	

Ref	Procedures	Standard factual finding	Result (C / E / N.A.)
	CONTRACT, APPLICABLE COLLECTIVE LABOUR AGREEMENT OR NATIONAL WORKING TIME LEGISLATION.	27) The 'annual productive hours' used for calculating the hourly rate were consistent with the usual cost accounting practices of the Beneficiary and were equivalent to at least 90 % of the 'annual workable hours'.	
A.3	**HOURLY PERSONNEL RATES** I) For unit costs calculated in accordance to the Beneficiary's usual cost accounting practice (unit costs): If the Beneficiary has a "Certificate on Methodology to calculate unit costs " (CoMUC) approved by the Commission, the Beneficiary provides the Auditor with a description of the approved methodology and the Commission's letter of acceptance. The Auditor verified that the Beneficiary has indeed used the methodology approved. If so, no further verification is necessary. If the Beneficiary does not have a "Certificate on Methodology" (CoMUC) approved by the Commission, or if the methodology approved was not applied, then the Auditor: o reviewed the documentation provided by the Beneficiary, including manuals and internal guidelines that explain how to calculate hourly rates; o recalculated the unit costs (hourly rates) of staff included in the sample following the results of the procedures carried out in A.1 and A.2. II) For individual hourly rates: The Auditor: o reviewed the documentation provided by the Beneficiary, including manuals and internal guidelines that explain how to calculate hourly rates; o recalculated the hourly rates of staff included in the sample (recalculation of all hourly rates if	28) The Beneficiary applied [*choose one option and delete the other*]: [Option I: "Unit costs (hourly rates) were calculated in accordance with the Beneficiary's usual cost accounting practices"] [Option II: Individual hourly rates were applied]	
		For option I concerning unit costs and if the Beneficiary applies the methodology approved by the Commission (CoMUC): 29) The Beneficiary used the Commission-approved methodology to calculate hourly rates. It corresponded to the organisation's usual cost accounting practices and was applied consistently for all activities irrespective of the	

Ref	Procedures	Standard factual finding	Result (C / E / N.A.)
	the Beneficiary uses annual rates, recalculation of three months selected randomly for every year and person if the Beneficiary uses monthly rates) following the results of the procedures carried out in A.1 and A.2; ○ (only in case of monthly rates) confirmed that the time spent on parental leave is not deducted, and that, if parts of the basic remuneration are generated over a period longer than a month, the Beneficiary has included only the share which is generated in the month.	source of funding.	
	"UNIT COSTS CALCULATED BY THE BENEFICIARY IN ACCORDANCE WITH ITS USUAL COST ACCOUNTING PRACTICES": *IT IS CALCULATED BY DIVIDING THE TOTAL AMOUNT OF PERSONNEL COSTS OF THE CATEGORY TO WHICH THE EMPLOYEE BELONGS VERIFIED IN LINE WITH PROCEDURE A.1 BY THE NUMBER OF FTE AND THE ANNUAL TOTAL PRODUCTIVE HOURS OF THE SAME CATEGORY CALCULATED BY THE BENEFICIARY IN ACCORDANCE WITH PROCEDURE A.2.* *HOURLY RATE FOR INDIVIDUAL ACTUAL PERSONAL COSTS:* *IT IS CALCULATED FOLLOWING ONE OF THE TWO OPTIONS BELOW:* *A) [OPTION BY DEFAULT] BY DIVIDING THE ACTUAL ANNUAL AMOUNT OF PERSONNEL COSTS OF AN EMPLOYEE VERIFIED IN LINE WITH PROCEDURE A.1 BY THE NUMBER OF ANNUAL PRODUCTIVE HOURS VERIFIED IN LINE WITH PROCEDURE A.2(FULL FINANCIAL YEAR HOURLY RATE);* *B) BY DIVIDING THE ACTUAL MONTHLY AMOUNT OF PERSONNEL COSTS OF AN EMPLOYEE VERIFIED IN LINE WITH PROCEDURE A.1 BY 1/12 OF THE NUMBER OF ANNUAL PRODUCTIVE HOURS VERIFIED IN LINE WITH PROCEDURE A.2 (MONTHLY HOURLY RATE).*	*For option I concerning unit costs and if the Beneficiary applies a methodology not approved by the Commission:* 30) The unit costs re-calculated by the Auditor were the same as the rates applied by the Beneficiary. *For option II concerning individual hourly rates:* 31) The individual rates re-calculated by the Auditor were the same as the rates applied by the Beneficiary. 31.1) The Beneficiary used only one option (per full financial year or per month) throughout each financial year examined. 31.2) The hourly rates do not include additional remuneration.	
A.4	**TIME RECORDING SYSTEM** To verify that the time recording system ensures the fulfilment of all minimum requirements and that	32) All persons recorded their time dedicated to the action on a **daily/**	

Ref	Procedures	Standard factual finding	Result (C / E / N.A.)
	the hours declared for the action were correct, accurate and properly authorised and supported by documentation, the Auditor made the following checks for the persons included in the sample that declare time as worked for the action on the basis of time records: ○ description of the time recording system provided by the Beneficiary (registration, authorisation, processing in the HR-system); ○ its actual implementation; ○ time records were signed at least monthly by the employees (on paper or electronically) and authorised by the project manager or another manager; ○ the hours declared were worked within the project period; ○ there were no hours declared as worked for the action if HR-records showed absence due to holidays or sickness (further cross-checks with travels are carried out in B.1 below) ; ○ the hours charged to the action matched those in the time recording system. *ONLY THE HOURS WORKED ON THE ACTION CAN BE CHARGED. ALL WORKING TIME TO BE CHARGED SHOULD BE RECORDED THROUGHOUT THE DURATION OF THE PROJECT, ADEQUATELY SUPPORTED BY EVIDENCE OF THEIR REALITY AND RELIABILITY (SEE SPECIFIC PROVISIONS BELOW FOR PERSONS WORKING EXCLUSIVELY FOR THE ACTION WITHOUT TIME RECORDS).*	**weekly/ monthly** basis using a **paper/computer-based** system. (*delete the answers that are not applicable)*	
		33) Their time-records were authorised at least monthly by the project manager or other superior.	
		34) Hours declared were worked within the project period and were consistent with the presences/absences recorded in HR-records.	
		35) There were no discrepancies between the number of hours charged to the action and the number of hours recorded.	
	<u>If the persons are working exclusively for the action and without time records</u> For the persons selected that worked exclusively for the action without time records, the Auditor verified evidence available demonstrating that they were in reality exclusively dedicated to the action and that the Beneficiary signed a declaration confirming that they have worked exclusively for the action.	36) The exclusive dedication is supported by a declaration signed by the Beneficiary and by any other evidence gathered.	
B	**COSTS OF SUBCONTRACTING**		
B.1	**The Auditor obtained the detail/breakdown of subcontracting costs and sampled _____ cost**	37) The use of claimed	

Ref	Procedures	Standard factual finding	Result (C / E / N.A.)
	items selected randomly (*full coverage is required if there are fewer than 10 items, otherwise the sample should have a minimum of 10 item, or 10% of the total, whichever number is highest*). To confirm standard factual findings 37-41 listed in the next column, the Auditor reviewed the following for the items included in the sample: o the use of subcontractors was foreseen in Annex 1; o subcontracting costs were declared in the subcontracting category of the Financial Statement; o supporting documents on the selection and award procedure were followed; o the Beneficiary ensured best value for money (key elements to appreciate the respect of this principle are the award of the subcontract to the bid offering best price-quality ratio, under conditions of transparency and equal treatment. In case an existing framework contract was used the Beneficiary ensured it was established on the basis of the principle of best value for money under conditions of transparency and equal treatment). In particular, i. if the Beneficiary acted as a contracting authority within the meaning of Directive 2004/18/EC (or 2014/24/EU) or of Directive 2004/17/EC (or 2014/25/EU), the Auditor verified that the applicable national law on public procurement was followed and that the subcontracting complied with the Terms and Conditions of the Agreement. ii. if the Beneficiary did not fall under the above-mentioned category the Auditor verified that the Beneficiary followed their usual procurement rules and respected the Terms and Conditions of the Agreement.. For the items included in the sample the Auditor also verified that: o there were signed agreements between the Beneficiary and the subcontractor; o there was evidence that the services were provided by subcontractor;	subcontracting costs was foreseen in Annex 1 and costs were declared in the Financial Statements under the subcontracting category. 38) There were documents of requests to different providers, different offers and assessment of the offers before selection of the provider in line with internal procedures and procurement rules. Subcontracts were awarded in accordance with the principle of best value for money. *(When different offers were not collected the Auditor explains the reasons provided by the Beneficiary under the caption "Exceptions" of the Report. The Commission will analyse this information to evaluate whether these costs might be accepted as eligible)* 39) Not Applicable 40) All subcontracts were supported by signed agreements between the Beneficiary and the	

Ref	Procedures	Standard factual finding	Result (C / E / N.A.)
		subcontractor.	
		41) There was evidence that the services were provided by the subcontractors.	
C	**COSTS OF PROVIDING FINANCIAL SUPPORT TO THIRD PARTIES**		
C.1	**The Auditor obtained the detail/breakdown of the costs of providing financial support to third parties and sampled _____ cost items selected randomly** (*full coverage is required if there are fewer than 10 items, otherwise the sample should have a minimum of 10 item, or 10% of the total, whichever number is highest*). The Auditor verified that the following minimum conditions were met: a) the maximum amount of financial support for each third party did not exceed EUR 60 000, unless explicitly mentioned in Annex 1; b) the financial support to third parties was agreed in Annex 1 of the Agreement and the other provisions on financial support to third parties included in Annex 1 were respected.	42) All minimum conditions were met	
D	**OTHER ACTUAL DIRECT COSTS**		
D.1	**COSTS OF TRAVEL AND RELATED SUBSISTENCE ALLOWANCES** **The Auditor sampled _____ cost items selected randomly** (*full coverage is required if there are fewer than 10 items, otherwise the sample should have a minimum of 10 item, or 10% of the total, whichever number is the highest*).	43) Costs were incurred, approved and reimbursed in line with the Beneficiary's usual policy for travels.	

Ref	Procedures	Standard factual finding	Result (C / E / N.A.)
	The Auditor inspected the sample and verified that: o travel and subsistence costs were consistent with the Beneficiary's usual policy for travel. In this context, the Beneficiary provided evidence of its normal policy for travel costs (e.g. use of first class tickets, reimbursement by the Beneficiary on the basis of actual costs, a lump sum or per diem) to enable the Auditor to compare the travel costs charged with this policy; o travel costs are correctly identified and allocated to the action (e.g. trips are directly linked to the action) by reviewing relevant supporting documents such as minutes of meetings, workshops or conferences, their registration in the correct project account, their consistency with time records or with the dates/duration of the workshop/conference; o no ineligible costs or excessive or reckless expenditure was declared (see Article 6.5 MGA).	44) There was a link between the trip and the action.	
		45) The supporting documents were consistent with each other regarding subject of the trip, dates, duration and reconciled with time records and accounting.	
		46) No ineligible costs or excessive or reckless expenditure was declared.	
D.2	**DEPRECIATION COSTS FOR EQUIPMENT, INFRASTRUCTURE OR OTHER ASSETS** **The Auditor sampled _____ cost items selected randomly** (*full coverage is required if there are fewer than 10 items, otherwise the sample should have a minimum of 10 item, or 10% of the total, whichever number is the highest*). For "equipment, infrastructure or other assets" [from now on called "asset(s)"] selected in the sample the Auditor verified that: o the assets were acquired in conformity with the Beneficiary's internal guidelines and procedures; o they were correctly allocated to the action (with supporting documents such as delivery note invoice or any other proof demonstrating the link to the action) o they were entered in the accounting system; o the extent to which the assets were used for the action (as a percentage) was supported by reliable documentation (e.g. usage overview table);	47) Procurement rules, principles and guides were followed.	
		48) There was a link between the grant agreement and the asset charged to the action.	
		49) The asset charged to the action was traceable to the accounting records and the underlying documents.	
		50) The depreciation method used to charge the asset to the action was in line with the applicable rules of the Beneficiary's country and the Beneficiary's usual	

Ref	Procedures	Standard factual finding	Result (C / E / N.A.)
	The Auditor recalculated the depreciation costs and verified that they were in line with the applicable rules in the Beneficiary's country and with the Beneficiary's usual accounting policy (e.g. depreciation calculated on the acquisition value). The Auditor verified that no ineligible costs such as deductible VAT, exchange rate losses, excessive or reckless expenditure were declared (see Article 6.5 GA).	accounting policy.	
		51) The amount charged corresponded to the actual usage for the action.	
		52) No ineligible costs or excessive or reckless expenditure were declared.	
D.3	**COSTS OF OTHER GOODS AND SERVICES** **The Auditor sampled _____ cost items selected randomly** (*full coverage is required if there are fewer than 10 items, otherwise the sample should have a minimum of 10 item, or 10% of the total, whichever number is highest*). For the purchase of goods, works or services included in the sample the Auditor verified that: o the contracts did not cover tasks described in Annex 1; o they were correctly identified, allocated to the proper action, entered in the accounting system (traceable to underlying documents such as purchase orders, invoices and accounting); o the goods were not placed in the inventory of durable equipment; o the costs charged to the action were accounted in line with the Beneficiary's usual accounting practices; o no ineligible costs or excessive or reckless expenditure were declared (see Article 6 GA). In addition, the Auditor verified that these goods and services were acquired in conformity with the	53) Contracts for works or services did not cover tasks described in Annex 1.	
		54) Costs were allocated to the correct action and the goods were not placed in the inventory of durable equipment.	
		55) The costs were charged in line with the Beneficiary's accounting policy and were adequately supported.	
		56) No ineligible costs or excessive or reckless expenditure were declared. For internal invoices/charges only the cost element was charged, without any	

Ref	Procedures	Standard factual finding	Result (C / E / N.A.)
	Beneficiary's internal guidelines and procedures, in particular: o if Beneficiary acted as a contracting authority within the meaning of Directive 2004/18/EC (or 2014/24/EU) or of Directive 2004/17/EC (or 2014/25/EU), the Auditor verified that the applicable national law on public procurement was followed and that the procurement contract complied with the Terms and Conditions of the Agreement. o if the Beneficiary did not fall into the category above, the Auditor verified that the Beneficiary followed their usual procurement rules and respected the Terms and Conditions of the Agreement. For the items included in the sample the Auditor also verified that: o the Beneficiary ensured best value for money (key elements to appreciate the respect of this principle are the award of the contract to the bid offering best price-quality ratio, under conditions of transparency and equal treatment. In case an existing framework contract was used the Auditor also verified that the Beneficiary ensured it was established on the basis of the principle of best value for money under conditions of transparency and equal treatment); *SUCH GOODS AND SERVICES INCLUDE, FOR INSTANCE, CONSUMABLES AND SUPPLIES, DISSEMINATION (INCLUDING OPEN ACCESS), PROTECTION OF RESULTS, SPECIFIC EVALUATION OF THE ACTION IF IT IS REQUIRED BY THE AGREEMENT, CERTIFICATES ON THE FINANCIAL STATEMENTS IF THEY ARE REQUIRED BY THE AGREEMENT AND CERTIFICATES ON THE METHODOLOGY, TRANSLATIONS, REPRODUCTION.*	mark-ups. 57) Procurement rules, principles and guides were followed. There were documents of requests to different providers, different offers and assessment of the offers before selection of the provider in line with internal procedures and procurement rules. The purchases were made in accordance with the principle of best value for money. *(When different offers were not collected the Auditor explains the reasons provided by the Beneficiary under the caption "Exceptions" of the Report. The Commission will analyse this information to evaluate whether these costs might be accepted as eligible)*	
D.4	**AGGREGATED CAPITALISED AND OPERATING COSTS OF RESEARCH INFRASTRUCTURE** The Auditor ensured the existence of a positive ex-ante assessment (issued by the EC Services) of the cost accounting methodology of the Beneficiary allowing it to apply the guidelines on direct costing for	58) The costs declared as direct costs for Large Research Infrastructures (in the appropriate line of the Financial Statement)	

Ref	Procedures	Standard factual finding	Result (C / E / N.A.)
	large research infrastructures in Horizon 2020. ***In the cases that a positive ex-ante assessment has been issued*** *(see the standard factual findings 58-59 on the next column)**,*** The Auditor ensured that the beneficiary has applied consistently the methodology that is explained and approved in the positive ex ante assessment; ***In the cases that a positive ex-ante assessment has NOT been issued*** *(see the standard factual findings 60 on the next column),* The Auditor verified that no costs of Large Research Infrastructure have been charged as direct costs in any costs category; ***In the cases that a draft ex-ante assessment report has been issued with recommendation for further changes*** *(see the standard factual findings 60 on the next column),* • The Auditor followed the same procedure as above (when a positive ex-ante assessment has NOT yet been issued) and paid particular attention (testing reinforced) to the cost items for which the draft ex-ante assessment either rejected the inclusion as direct costs for Large Research Infrastructures or issued recommendations.	comply with the methodology described in the positive ex-ante assessment report. 59) Any difference between the methodology applied and the one positively assessed was extensively described and adjusted accordingly. 60) The direct costs declared were free from any indirect costs items related to the Large Research Infrastructure.	
D.5	**Costs of internally invoiced goods and services** **The Auditor sampled cost items selected randomly** (*full coverage is required if there are fewer than 10 items, otherwise the sample should have a minimum of 10 item, or 10% of the total, whichever number is highest*). To confirm standard factual findings 61-65 listed in the next column, the Auditor: o obtained a description of the Beneficiary's usual cost accounting practice to calculate costs of internally invoiced goods and services (unit costs); o reviewed whether the Beneficiary's usual cost accounting practice was applied for the Financial	61) The costs of internally invoiced goods and services included in the Financial Statement were calculated in accordance with the Beneficiary's usual cost accounting practice. 62) The cost accounting practices used to calculate the costs of internally invoiced goods and services were applied by the	

Ref	Procedures	Standard factual finding	Result (C / E / N.A.)
	Statements subject of the present CFS; o ensured that the methodology to calculate unit costs is being used in a consistent manner, based on objective criteria, regardless of the source of funding; o verified that any ineligible items or any costs claimed under other budget categories, in particular indirect costs, have not been taken into account when calculating the costs of internally invoiced goods and services (see Article 6 GA); o verified whether actual costs of internally invoiced goods and services were adjusted on the basis of budgeted or estimated elements and, if so, verified whether those elements used are actually relevant for the calculation, and correspond to objective and verifiable information. o verified that any costs of items which are not directly linked to the production of the invoiced goods or service (e.g. supporting services like cleaning, general accountancy, administrative support, etc. not directly used for production of the good or service) have not been taken into account when calculating the costs of internally invoiced goods and services. o verified that any costs of items used for calculating the costs internally invoiced goods and services are supported by audit evidence and registered in the accounts.	Beneficiary in a consistent manner based on objective criteria regardless of the source of funding.	
		63) The unit cost is calculated using the actual costs for the good or service recorded in the Beneficiary's accounts, excluding any ineligible cost or costs included in other budget categories.	
		64) The unit cost excludes any costs of items which are not directly linked to the production of the invoiced goods or service.	
		65) The costs items used for calculating the actual costs of internally invoiced goods and services were relevant, reasonable and correspond to objective and verifiable information.	
E	**USE OF EXCHANGE RATES**		
E.1	a) For Beneficiaries with accounts established in a currency other than euros **The Auditor sampled _____ cost items selected randomly and verified that the exchange rates used for converting other currencies into euros were in accordance with the following rules established in the Agreement** (*full coverage is required if there are fewer than 10 items, otherwise the*	66) The exchange rates used to convert other currencies into Euros were in accordance with the rules established of the Grant Agreement and there was	

Ref	Procedures	Standard factual finding	Result (C / E / N.A.)
	sample should have a minimum of 10 item, or 10% of the total, whichever number is highest): *COSTS RECORDED IN THE ACCOUNTS IN A CURRENCY OTHER THAN EURO SHALL BE CONVERTED INTO EURO AT THE AVERAGE OF THE DAILY EXCHANGE RATES PUBLISHED IN THE C SERIES OF OFFICIAL JOURNAL OF THE EUROPEAN UNION (https://www.ecb.int/stats/exchange/eurofxref/html/index.en.html), DETERMINED OVER THE CORRESPONDING REPORTING PERIOD.* *IF NO DAILY EURO EXCHANGE RATE IS PUBLISHED IN THE OFFICIAL JOURNAL OF THE EUROPEAN UNION FOR THE CURRENCY IN QUESTION, CONVERSION SHALL BE MADE AT THE AVERAGE OF THE MONTHLY ACCOUNTING RATES ESTABLISHED BY THE COMMISSION AND PUBLISHED ON ITS WEBSITE (http://ec.europa.eu/budget/contracts_grants/info_contracts/inforeuro/inforeuro_en.cfm), DETERMINED OVER THE CORRESPONDING REPORTING PERIOD.*	no difference in the final figures.	
	b) For Beneficiaries with accounts established in euros **The Auditor sampled _____ cost items selected randomly and verified that the exchange rates used for converting other currencies into euros were in accordance with the following rules established in the Agreement** (*full coverage is required if there are fewer than 10 items, otherwise the sample should have a minimum of 10 item, or 10% of the total, whichever number is highest)*: *COSTS INCURRED IN ANOTHER CURRENCY SHALL BE CONVERTED INTO EURO BY APPLYING THE BENEFICIARY'S USUAL ACCOUNTING PRACTICES.*	67) The Beneficiary applied its usual accounting practices.	

[legal name of the audit firm]
[name and function of an authorised representative]
[dd Month yyyy]
<Signature of the Auditor>

ANNEX 6

MODEL FOR THE CERTIFICATE ON THE METHODOLOGY

- **For options [*in italics in square brackets*]: choose the applicable option. Options not chosen should be deleted.**
- **For fields in [grey in square brackets]: enter the appropriate data.**

TABLE OF CONTENTS

Terms of reference for an audit engagement for a methodology certificate in connection with one or more grant agreements financed under the Horizon 2020 Research and Innovation Framework Programme

This document sets out the '**Terms of Reference (ToR)**' under which

[OPTION 1: [insert name of the beneficiary] ('the Beneficiary')] [OPTION 2: [insert name of the linked third party] ('the Linked Third Party'), third party linked to the Beneficiary [insert name of the beneficiary] ('the Beneficiary')]

agrees to engage

[**insert legal name of the auditor**] ('the Auditor')

to produce an independent report of factual findings ('the Report') concerning the *[Beneficiary's] [Linked Third Party's]* usual accounting practices for calculating and claiming direct personnel costs declared as unit costs ('the Methodology') in connection with grant agreements financed under the Horizon 2020 Research and Innovation Framework Programme.

The procedures to be carried out for the assessment of the methodology will be based on the grant agreement(s) detailed below:

[title and number of the grant agreement(s)] ('the Agreement(s)')

The Agreement(s) has(have) been concluded between the Beneficiary and *[OPTION 1: the European Union, represented by the European Commission ('the Commission')][OPTION 2: the European Atomic Energy Community (Euratom,) represented by the European Commission ('the Commission')][OPTION 3: the [Research Executive Agency (REA)] [European Research Council Executive Agency (ERCEA)] [Innovation and Networks Executive Agency (INEA)] [Executive Agency for Small and Medium-sized Enterprises (EASME)] ('the Agency'), under the powers delegated by the European Commission ('the Commission').]*.

The *[Commission] [Agency]* is mentioned as a signatory of the Agreement with the Beneficiary only. The *[European Union] [Euratom] [Agency]* is not a party to this engagement.

1.1 Subject of the engagement

According to Article 18.1.2 of the Agreement, the beneficiary *[and linked third parties]* that *[declares][declare]* direct personnel costs as unit costs calculated in accordance with its [their] usual cost accounting practices may submit to the *[Commission] [Agency]*, for approval, a certificate on the methodology ('CoMUC') stating that there are adequate records and documentation to prove that *[its][their]* cost accounting practices used comply with the conditions set out in Point A of Article 6.2.

The subject of this engagement is the CoMUC which is composed of two separate documents:

- the Terms of Reference ('the ToR') to be signed by the *[Beneficiary] [Linked Third Party]* and the Auditor;

- the Auditor's Independent Report of Factual Findings ('the Report') issued on the Auditor's letterhead, dated, stamped and signed by the Auditor which includes; the standard statements ('the Statements') evaluated and signed by the *[Beneficiary] [Linked Third Party]*, the agreed-upon procedures ('the Procedures') performed by the Auditor and the standard factual findings ('the Findings') assessed by the Auditor. The Statements, Procedures and Findings are summarised in the table that forms part of the Report.

The information provided through the Statements, the Procedures and the Findings will enable the Commission to draw conclusions regarding the existence of the *[Beneficiary's] [Linked Third Party's]* usual cost accounting practice and its suitability to ensure that direct personnel costs claimed on that basis comply with the provisions of the Agreement. The Commission draws its own conclusions from the Report and any additional information it may require.

1.2 Responsibilities

The parties to this agreement are the *[Beneficiary] [Linked Third Party]* and the Auditor.

The *[Beneficiary] [Linked Third Party]:*

- is responsible for preparing financial statements for the Agreement(s) ('the Financial Statements') in compliance with those Agreements;
- is responsible for providing the Financial Statement(s) to the Auditor and enabling the Auditor to reconcile them with the *[Beneficiary's] [Linked Third Party's]* accounting and bookkeeping system and the underlying accounts and records. The Financial Statement(s) will be used as a basis for the procedures which the Auditor will carry out under this ToR;
- is responsible for its Methodology and liable for the accuracy of the Financial Statement(s);
- is responsible for endorsing or refuting the Statements indicated under the heading 'Statements to be made by the Beneficiary/ Linked Third Party' in the first column of the table that forms part of the Report;
- must provide the Auditor with a signed and dated representation letter;
- accepts that the ability of the Auditor to carry out the Procedures effectively depends upon the *[Beneficiary] [Linked Third Party]* providing full and free access to the *[Beneficiary's] [Linked Third Party's]* staff and to its accounting and other relevant records.

The Auditor:

- *[Option 1 by default: is qualified to carry out statutory audits of accounting documents in accordance with Directive 2006/43/EC of the European Parliament and of the Council of 17 May 2006 on statutory audits of annual accounts and consolidated accounts, amending Council Directives 78/660/EEC and 83/349/EEC and repealing Council Directive 84/253/EEC or similar national regulations]*.
- *[Option 2 if the Beneficiary or Linked Third Party has an independent Public Officer: is a competent and independent Public Officer for which the relevant national authorities have established the legal capacity to audit the Beneficiary]*.
- *[Option 3 if the Beneficiary or Linked Third Party is an international organisation: is an [internal] [external] auditor in accordance with the internal financial regulations and procedures of the international organisation]*.

The Auditor:

- must be independent from the Beneficiary *[and the Linked Third Party]*, in particular, it must not have been involved in preparing the Beneficiary's *[and Linked Third Party's]* Financial Statement(s);
- must plan work so that the Procedures may be carried out and the Findings may be assessed;
- must adhere to the Procedures laid down and the compulsory report format;
- must carry out the engagement in accordance with these ToR;
- must document matters which are important to support the Report;
- must base its Report on the evidence gathered;
- must submit the Report to the *[Beneficiary] [Linked Third Party]*.

The Commission sets out the Procedures to be carried out and the Findings to be endorsed by the Auditor. The Auditor is not responsible for their suitability or pertinence. As this engagement is not an assurance engagement the Auditor does not provide an audit opinion or a statement of assurance.

1.3 Applicable Standards

The Auditor must comply with these Terms of Reference and with[1]:

- the International Standard on Related Services ('ISRS') 4400 *Engagements to perform Agreed-upon Procedures regarding Financial Information* as issued by the International Auditing and Assurance Standards Board (IAASB);
- the *Code of Ethics for Professional Accountants* issued by the International Ethics Standards Board for Accountants (IESBA). Although ISRS 4400 states that independence is not a requirement for engagements to carry out agreed-upon procedures, the Commission requires that the Auditor also complies with the Code's independence requirements.

The Auditor's Report must state that there was no conflict of interests in establishing this Report between the Auditor and the Beneficiary *[and the Linked Third Party]* that could have a bearing on the Report, and must specify – if the service is invoiced - the total fee paid to the Auditor for providing the Report.

1.4 Reporting

The Report must be written in the language of the Agreement (see Article 20.7 of the Agreement).

Under Article 22 of the Agreement, the Commission*[the Agency]*, the European Anti-Fraud Office and the Court of Auditors have the right to audit any work that is carried out under the action and for which costs are declared from [*the European Union*] [*Euratom*] budget. This includes work related to this engagement. The Auditor must provide access to all working papers related to this assignment if the Commission, *[the Agency]*, the European Anti-Fraud Office or the European Court of Auditors requests them.

1.5 Timing

The Report must be provided by [dd Month yyyy].

1.6 Other Terms

[The [Beneficiary] [Linked Third Party] and the Auditor can use this section to agree other specific terms, such as the Auditor's fees, liability, applicable law, etc. Those specific terms must not contradict the terms specified above.]

[legal name of the Auditor]	[legal name of the [Beneficiary] [Linked Third Party]]
[name & title of authorised representative]	[name & title of authorised representative]
[dd Month yyyy]	[dd Month yyyy]
Signature of the Auditor	Signature of the *[Beneficiary] [Linked Third Party]*

[1] Supreme Audit Institutions applying INTOSAI-standards may carry out the Procedures according to the corresponding International Standards of Supreme Audit Institutions and code of ethics issued by INTOSAI instead of the International Standard on Related Services ('ISRS') 4400 and the Code of Ethics for Professional Accountants issued by the IAASB and the IESBA.

Independent report of factual findings on the methodology concerning grant agreements financed under the Horizon 2020 Research and Innovation Framework Programme

(To be printed on letterhead paper of the auditor)

To
[name of contact person(s)], [Position]
[[Beneficiary's] [Linked Third Party's] name]
[Address]
[dd Month yyyy]

Dear [Name of contact person(s)],

As agreed under the terms of reference dated [dd Month yyyy]

with *[OPTION 1: [insert name of the beneficiary] ('the Beneficiary')] [OPTION 2: [insert name of the linked third party] ('the Linked Third Party'), third party linked to the Beneficiary [insert name of the beneficiary] ('the Beneficiary')]*,

we

[name of the auditor] ('the Auditor'),

established at

[full address/city/state/province/country],

represented by

[name and function of an authorised representative],

have carried out the agreed-upon procedures ('the Procedures') and provide hereby our Independent Report of Factual Findings ('the Report'), concerning the *[Beneficiary's] [Linked Third Party's]* usual accounting practices for calculating and declaring direct personnel costs declared as unit costs ('the Methodology').

You requested certain procedures to be carried out in connection with the grant(s)

[title and number of the grant agreement(s)] ('the Agreement(s)').

The Report

Our engagement was carried out in accordance with the terms of reference ('the ToR') appended to this Report. The Report includes: the standard statements ('the Statements') made by the *[Beneficiary] [Linked Third Party]*, the agreed-upon procedures ('the Procedures') carried out and the standard factual findings ('the Findings') confirmed by us.

The engagement involved carrying out the Procedures and assessing the Findings and the documentation requested appended to this Report, the results of which the Commission uses to draw conclusions regarding the acceptability of the Methodology applied by the *[Beneficiary] [Linked Third Party]*.

The Report covers the methodology used from [dd Month yyyy]. In the event that the *[Beneficiary] [Linked Third Party]* changes this methodology, the Report will not be applicable to any Financial Statement[2] submitted thereafter.

[2] Financial Statement in this context refers solely to Annex 4 of the Agreement by which the Beneficiary declares costs under the Agreement.

The scope of the Procedures and the definition of the standard statements and findings were determined solely by the Commission. Therefore, the Auditor is not responsible for their suitability or pertinence.

Since the Procedures carried out constitute neither an audit nor a review made in accordance with International Standards on Auditing or International Standards on Review Engagements, we do not give a statement of assurance on the costs declared on the basis of the *[Beneficiary's] [Linked Third Party's]* Methodology. Had we carried out additional procedures or had we performed an audit or review in accordance with these standards, other matters might have come to its attention and would have been included in the Report.

Exceptions

Apart from the exceptions listed below, the *[Beneficiary] [Linked Third Party]* agreed with the standard Statements and provided the Auditor all the documentation and accounting information needed by the Auditor to carry out the requested Procedures and corroborate the standard Findings.

List here any exception and add any information on the cause and possible consequences of each exception, if known. If the exception is quantifiable, also indicate the corresponding amount.

…..

Explanation of possible exceptions in the form of examples (to be removed from the Report):

i. the [Beneficiary] [Linked Third Party] did not agree with the standard Statement number … because…;

ii. the Auditor could not carry out the procedure … established because …. (e.g. due to the inability to reconcile key information or the unavailability or inconsistency of data);

iii. the Auditor could not confirm or corroborate the standard Finding number … because ….

Remarks

We would like to add the following remarks relevant for the proper understanding of the Methodology applied by the [Beneficiary] [Linked Third Party] or the results reported:

Example (to be removed from the Report):

Regarding the methodology applied to calculate hourly rates …

Regarding standard Finding 15 it has to be noted that …

The [Beneficiary] [Linked Third Party] explained the deviation from the benchmark statement XXIV concerning time recording for personnel with no exclusive dedication to the action in the following manner: …

Annexes

Please provide the following documents to the auditor and annex them to the report when submitting this CoMUC to the Commission:

1. Brief description of the methodology for calculating personnel costs, productive hours and hourly rates;
2. Brief description of the time recording system in place;
3. An example of the time records used by the [*Beneficiary] [Linked Third Party*];
4. Description of any budgeted or estimated elements applied together with an explanation as to why they are relevant for calculating the personnel costs and how they are based on objective and verifiable information;

5. A summary sheet with the hourly rate for direct personnel declared by the [*Beneficiary*] [*Linked Third Party*] and recalculated by the Auditor for each staff member included in the sample (the names do not need to be reported);
6. A comparative table summarising for each person selected in the sample a) the time claimed by the [*Beneficiary*] [*Linked Third Party*] in the Financial Statement(s) and b) the time according to the time record verified by the Auditor;
7. A copy of the letter of representation provided to the Auditor.

Use of this Report

This Report has been drawn up solely for the purpose given under Point 1.1 Reasons for the engagement.

The Report:

- is confidential and is intended to be submitted to the Commission by the [*Beneficiary*] [*Linked Third Party*] in connection with Article 18.1.2 of the Agreement;
- may not be used by the [*Beneficiary*] [*Linked Third Party*] or by the Commission for any other purpose, nor distributed to any other parties;
- may be disclosed by the Commission only to authorised parties, in particular the European Anti-Fraud Office (OLAF) and the European Court of Auditors.
- relates only to the usual cost accounting practices specified above and does not constitute a report on the Financial Statements of the [*Beneficiary*] [*Linked Third Party*].

No conflict of interest[3] exists between the Auditor and the Beneficiary *[and the Linked Third Party*] that could have a bearing on the Report. The total fee paid to the Auditor for producing the Report was EUR _____ (including EUR _____ of deductible VAT).

We look forward to discussing our Report with you and would be pleased to provide any further information or assistance which may be required.

Yours sincerely

[legal name of the Auditor]
[name and title of the authorised representative]
[dd Month yyyy]
Signature of the Auditor

[3] A conflict of interest arises when the Auditor's objectivity to establish the certificate is compromised in fact or in appearance when the Auditor for instance:
- was involved in the preparation of the Financial Statements;
- stands to benefit directly should the certificate be accepted;
- has a close relationship with any person representing the beneficiary;
- is a director, trustee or partner of the beneficiary; or
- is in any other situation that compromises his or her independence or ability to establish the certificate impartially.

Statements to be made by the Beneficiary/Linked Third Party ('the Statements') and Procedures to be carried out by the Auditor ('the Procedures') and standard factual findings ('the Findings') to be confirmed by the Auditor

The Commission reserves the right to provide the auditor with guidance regarding the Statements to be made, the Procedures to be carried out or the Findings to be ascertained and the way in which to present them. The Commission reserves the right to vary the Statements, Procedures or Findings by written notification to the Beneficiary/Linked Third Party to adapt the procedures to changes in the grant agreement(s) or to any other circumstances.

If this methodology certificate relates to the Linked Third Party's usual accounting practices for calculating and claiming direct personnel costs declared as unit costs any reference here below to 'the Beneficiary' is to be considered as a reference to 'the Linked Third Party'.

Please explain any discrepancies in the body of the Report.	
Statements to be made by Beneficiary	**Procedures to be carried out and Findings to be confirmed by the Auditor**
A. Use of the Methodology I. The cost accounting practice described below has been in use since *[*dd Month yyyy*]*. II. The next planned alteration to the methodology used by the Beneficiary will be from [dd Month yyyy*]*.	**Procedure:** ✓ The Auditor checked these dates against the documentation the Beneficiary has provided. **Factual finding:** 1. The dates provided by the Beneficiary were consistent with the documentation.
B. Description of the Methodology III. The methodology to calculate unit costs is being used in a consistent manner and is reflected in the relevant procedures. *[Please describe the methodology your entity uses to calculate personnel costs, productive hours and hourly rates, present your description to the Auditor and annex it to this certificate]* *[If the statement of section "B. Description of the methodology" cannot be endorsed by the Beneficiary or there is no written methodology to calculate unit costs it should be listed here below and reported as exception by the Auditor in the main Report of Factual Findings:* *- ...]*	**Procedure:** ✓ The Auditor reviewed the description, the relevant manuals and/or internal guidance documents describing the methodology. **Factual finding:** 2. The brief description was consistent with the relevant manuals, internal guidance and/or other documentary evidence the Auditor has reviewed. 3. The methodology was generally applied by the Beneficiary as part of its usual costs accounting practices.
C. **Personnel costs**	**Procedure:**

Please explain any discrepancies in the body of the Report.	
Statements to be made by Beneficiary	**Procedures to be carried out and Findings to be confirmed by the Auditor**
General IV. The unit costs (hourly rates) are limited to salaries including during parental leave, social security contributions, taxes and other costs included in the remuneration required under national law and the employment contract or equivalent appointing act; V. Employees are hired directly by the Beneficiary in accordance with national law, and work under its sole supervision and responsibility; VI. The Beneficiary remunerates its employees in accordance with its usual practices. This means that personnel costs are charged in line with the Beneficiary's usual payroll policy (e.g. salary policy, overtime policy, variable pay) and no special conditions exist for employees assigned to tasks relating to the European Union or Euratom, unless explicitly provided for in the grant agreement(s); VII. The Beneficiary allocates its employees to the relevant group/category/cost centre for the purpose of the unit cost calculation in line with the usual cost accounting practice; VIII. Personnel costs are based on the payroll system and accounting system. IX. Any exceptional adjustments of actual personnel costs resulted from relevant budgeted or estimated elements and were based on objective and verifiable information. *[Please describe the 'budgeted or estimated elements' and their relevance to personnel costs, and explain how they were reasonable and based on objective and verifiable information, present your explanation to the Auditor and annex it to this certificate].* X. Personnel costs claimed do not contain any of the following ineligible costs: costs related to return on capital; debt and debt service charges; provisions for future losses or debts; interest owed; doubtful debts; currency exchange losses; bank costs charged by the Beneficiary's bank for transfers from the Commission/Agency; excessive or reckless expenditure; deductible VAT or costs incurred during suspension of the implementation of the action. XI. Personnel costs were not declared under another EU or Euratom grant (including grants awarded by a Member State and financed by the EU budget and grants awarded by bodies other than the Commission/Agency for the purpose of implementing the EU or Euratom budget in the same period, unless the Beneficiary can demonstrate that the operating grant does not cover any costs of	*The Auditor draws a sample of employees to carry out the procedures indicated in this section C and the following sections D to F.* *[The Auditor has drawn a random sample of 10 employees assigned to the Horizon 2020 action(s). If fewer than 10 employees are assigned to the Horizon 2020 action(s), the Auditor has selected all employees assigned to the Horizon 2020 action(s), complemented by other employees irrespective of their assignments until he has reached 10 employees.].* For this sample: ✓ the Auditor reviewed all documents relating to personnel costs such as employment contracts, payslips, payroll policy (e.g. salary policy, overtime policy, variable pay policy), accounting and payroll records, applicable national tax , labour and social security law and any other documents corroborating the personnel costs claimed; ✓ in particular, the Auditor reviewed the employment contracts of the employees in the sample to verify that: i. they were employed directly by the Beneficiary in accordance with applicable national legislation; ii. they were working under the sole technical supervision and responsibility of the latter; iii. they were remunerated in accordance with the Beneficiary's usual practices; iv. they were allocated to the correct group/category/cost centre for the purposes of calculating the unit cost in line with the Beneficiary's usual cost accounting practices; ✓ the Auditor verified that any ineligible items or any costs claimed under other costs categories or costs covered by other types of grant or by other grants financed from the European Union budget have not been taken into account when calculating the personnel costs; ✓ the Auditor numerically reconciled the total amount of personnel costs used to calculate the unit cost with the total amount of personnel costs recorded in the statutory accounts and the payroll system. ✓ to the extent that actual personnel costs were adjusted on the basis of budgeted or estimated elements, the Auditor carefully examined those elements and checked the information source to confirm that they correspond

Please explain any discrepancies in the body of the Report.	
Statements to be made by Beneficiary	**Procedures to be carried out and Findings to be confirmed by the Auditor**
the action). <u>If additional remuneration as referred to in the grant agreement(s) is paid</u> XII. The Beneficiary is a non-profit legal entity; XIII. The additional remuneration is part of the beneficiary's usual remuneration practices and paid consistently whenever the relevant work or expertise is required; XIV. The criteria used to calculate the additional remuneration are objective and generally applied regardless of the source of funding; XV. The additional remuneration included in the personnel costs used to calculate the hourly rates for the grant agreement(s) is capped at EUR 8 000 per full-time equivalent (reduced proportionately if the employee is not assigned exclusively to the action). *[If certain statement(s) of section "C. Personnel costs" cannot be endorsed by the Beneficiary they should be listed here below and reported as exception by the Auditor in the main Report of Factual Findings:* - *...]*	to objective and verifiable information; ✓ if additional remuneration has been claimed, the Auditor verified that the Beneficiary was a non-profit legal entity, that the amount was capped at EUR 8 000 per full-time equivalent and that it was reduced proportionately for employees not assigned exclusively to the action(s). ✓ the Auditor recalculated the personnel costs for the employees in the sample. **Factual finding:** 4. All the components of the remuneration that have been claimed as personnel costs are supported by underlying documentation. 5. The employees in the sample were employed directly by the Beneficiary in accordance with applicable national law and were working under its sole supervision and responsibility. 6. Their employment contracts were in line with the Beneficiary's usual policy; 7. Personnel costs were duly documented and consisted solely of salaries, social security contributions (pension contributions, health insurance, unemployment fund contributions, etc.), taxes and other statutory costs included in the remuneration (holiday pay, thirteenth month's pay, etc.); 8. The totals used to calculate the personnel unit costs are consistent with those registered in the payroll and accounting records; 9. To the extent that actual personnel costs were adjusted on the basis of budgeted or estimated elements, those elements were relevant for calculating the personnel costs and correspond to objective and verifiable information. The budgeted or estimated elements used are: — (indicate the elements and their values). 10. Personnel costs contained no ineligible elements; 11. Specific conditions for eligibility were fulfilled when additional remuneration was paid: a) the Beneficiary is registered in the grant agreements as a non-profit legal entity; b) it was paid according to objective criteria generally applied regardless of the source of funding used and c) remuneration was capped at EUR 8 000 per full-time equivalent (or up to up to the equivalent pro-rata amount if the person did not work on the action full-time during the year or did not work exclusively on the action).

Please explain any discrepancies in the body of the Report.	
Statements to be made by Beneficiary	**Procedures to be carried out and Findings to be confirmed by the Auditor**
D. Productive hours XVI. The number of productive hours per full-time employee applied is *[delete as appropriate]*: A. 1720 productive hours per year for a person working full-time (corresponding pro-rata for persons not working full time). B. the total number of hours worked in the year by a person for the Beneficiary C. the standard number of annual hours generally applied by the beneficiary for its personnel in accordance with its usual cost accounting practices. This number must be at least 90% of the standard annual workable hours. If method B is applied XVII. The calculation of the total number of hours worked was done as follows: annual workable hours of the person according to the employment contract, applicable labour agreement or national law plus overtime worked minus absences (such as sick leave and special leave). XVIII. 'Annual workable hours' are hours during which the personnel must be working, at the employer's disposal and carrying out his/her activity or duties under the employment contract, applicable collective labour agreement or national working time legislation. XIX. The contract (applicable collective labour agreement or national working time legislation) do specify the working time enabling to calculate the annual workable hours. If method C is applied XX. The standard number of productive hours per year is that of a full-time equivalent. XXI. The number of productive hours per year on which the hourly rate is based i) corresponds to the Beneficiary's usual accounting practices; ii) is at least 90% of the standard number of workable (working) hours per year. XXII. Standard workable (working) hours are hours during which personnel are at the Beneficiary's disposal preforming the duties described in the relevant	**Procedure (same sample basis as for Section C: Personnel costs):** ✓ The Auditor verified that the number of productive hours applied is in accordance with method A, B or C. ✓ The Auditor checked that the number of productive hours per full-time employee is correct. ✓ If method B is applied the Auditor verified i) the manner in which the total number of hours worked was done and ii) that the contract specified the annual workable hours by inspecting all the relevant documents, national legislation, labour agreements and contracts. ✓ If method C is applied the Auditor reviewed the manner in which the standard number of working hours per year has been calculated by inspecting all the relevant documents, national legislation, labour agreements and contracts and verified that the number of productive hours per year used for these calculations was at least 90% of the standard number of working hours per year. **Factual finding:** General 12. The Beneficiary applied a number of productive hours consistent with method A, B or C detailed in the left-hand column. 13. The number of productive hours per year per full-time employee was accurate. If method B is applied 14. The number of 'annual workable hours', overtime and absences was verifiable based on the documents provided by the Beneficiary and the calculation of the total number of hours worked was accurate. 15. The contract specified the working time enabling to calculate the annual workable hours. If method C is applied 16. The calculation of the number of productive hours per year corresponded to

Please explain any discrepancies in the body of the Report.	
Statements to be made by Beneficiary	**Procedures to be carried out and Findings to be confirmed by the Auditor**
employment contract, collective labour agreement or national labour legislation. The number of standard annual workable (working) hours that the Beneficiary claims is supported by labour contracts, national legislation and other documentary evidence. *[If certain statement(s) of section "D. Productive hours" cannot be endorsed by the Beneficiary they should be listed here below and reported as exception by the Auditor:* - *...]*	the usual costs accounting practice of the Beneficiary. 17. The calculation of the standard number of workable (working) hours per year was corroborated by the documents presented by the Beneficiary. 18. The number of productive hours per year used for the calculation of the hourly rate was at least 90 % of the number of workable (working) hours per year.
E. Hourly rates The hourly rates are correct because: XXIII. Hourly rates are correctly calculated since they result from dividing annual personnel costs by the productive hours of a given year and group (e.g. staff category or department or cost centre depending on the methodology applied) and they are in line with the statements made in section C. and D. above. *[If the statement of section 'E. Hourly rates' cannot be endorsed by the Beneficiary they should be listed here below and reported as exception by the Auditor:* - *...]*	**Procedure** ✓ The Auditor has obtained a list of all personnel rates calculated by the Beneficiary in accordance with the methodology used. ✓ The Auditor has obtained a list of all the relevant employees, based on which the personnel rate(s) are calculated. For 10 employees selected at random (same sample basis as Section C: Personnel costs): ✓ The Auditor recalculated the hourly rates. ✓ The Auditor verified that the methodology applied corresponds to the usual accounting practices of the organisation and is applied consistently for all activities of the organisation on the basis of objective criteria irrespective of the source of funding. **Factual finding:** 19. No differences arose from the recalculation of the hourly rate for the employees included in the sample.
F. Time recording XXIV. Time recording is in place for all persons with no exclusive dedication to one Horizon 2020 action. At least all hours worked in connection with the grant agreement(s) are registered on a **daily/weekly/monthly** basis *[delete as appropriate]* using a **paper/computer-based system** *[delete as appropriate]*; XXV. For persons exclusively assigned to one Horizon 2020 activity the Beneficiary has either signed a declaration to that effect or has put arrangements in place to record their working time;	**Procedure** ✓ The Auditor reviewed the brief description, all relevant manuals and/or internal guidance describing the methodology used to record time. The Auditor reviewed the time records of the random sample of 10 employees referred to under Section C: Personnel costs, and verified in particular: ✓ that time records were available for all persons with not exclusive assignment to the action;

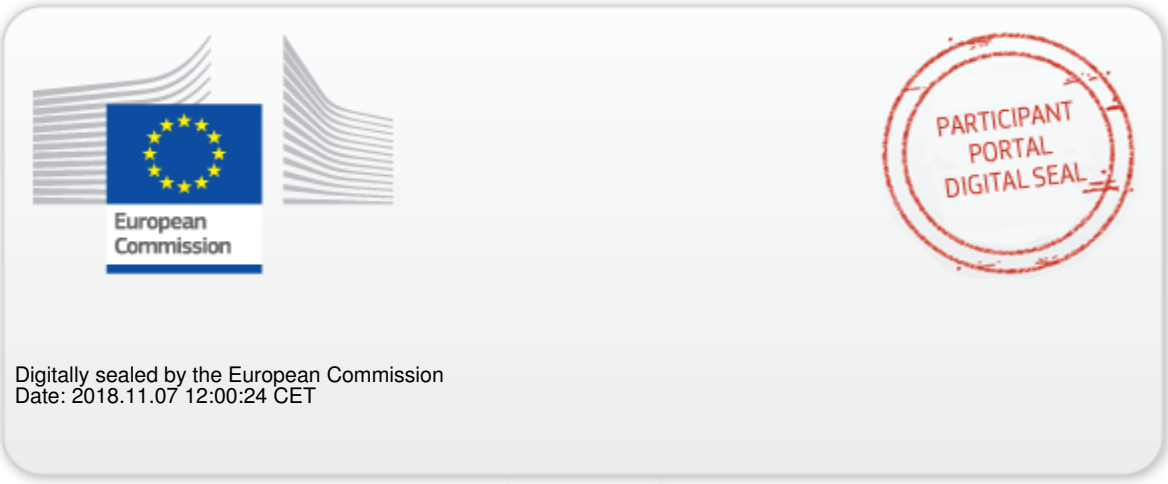
Please explain any discrepancies in the body of the Report.	
Statements to be made by Beneficiary	**Procedures to be carried out and Findings to be confirmed by the Auditor**
XXVI. Records of time worked have been signed by the person concerned (on paper or electronically) and approved by the action manager or line manager at least monthly; XXVII. Measures are in place to prevent staff from: i. recording the same hours twice, ii. recording working hours during absence periods (e.g. holidays, sick leave), iii. recording more than the number of productive hours per year used to calculate the hourly rates, and iv. recording hours worked outside the action period. XXVIII. No working time was recorded outside the action period; XXIX. No more hours were claimed than the productive hours used to calculate the hourly personnel rates. *[Please provide a brief description of the time recording system in place together with the measures applied to ensure its reliability to the Auditor and annex it to the present certificate[1]].* *[If certain statement(s) of section "F. Time recording" cannot be endorsed by the Beneficiary they should be listed here below and reported as exception by the Auditor:* - *...]*	✓ that time records were available for persons working exclusively for a Horizon 2020 action, or, alternatively, that a declaration signed by the Beneficiary was available for them certifying that they were working exclusively for a Horizon 2020 action; ✓ that time records were signed and approved in due time and that all minimum requirements were fulfilled; ✓ that the persons worked for the action in the periods claimed; ✓ that no more hours were claimed than the productive hours used to calculate the hourly personnel rates; ✓ that internal controls were in place to prevent that time is recorded twice, during absences for holidays or sick leave; that more hours are claimed per person per year for Horizon 2020 actions than the number of productive hours per year used to calculate the hourly rates; that working time is recorded outside the action period; ✓ the Auditor cross-checked the information with human-resources records to verify consistency and to ensure that the internal controls have been effective. In addition, the Auditor has verified that no more hours were charged to Horizon 2020 actions per person per year than the number of productive hours per year used to calculate the hourly rates, and verified that no time worked outside the action period was charged to the action. **Factual finding:** 20. The brief description, manuals and/or internal guidance on time recording provided by the Beneficiary were consistent with management reports/records and other documents reviewed and were generally applied by the Beneficiary to produce the financial statements.

[1] The description of the time recording system must state among others information on the content of the time records, its coverage (full or action time-recording, for all personnel or only for personnel involved in H2020 actions), its degree of detail (whether there is a reference to the particular tasks accomplished), its form, periodicity of the time registration and authorisation (paper or a computer-based system; on a daily, weekly or monthly basis; signed and countersigned by whom), controls applied to prevent double-charging of time or ensure consistency with HR-records such as absences and travels as well as it information flow up to its use for the preparation of the Financial Statements.

Please explain any discrepancies in the body of the Report.	
Statements to be made by Beneficiary	**Procedures to be carried out and Findings to be confirmed by the Auditor**
	21. For the random sample time was recorded or, in the case of employees working exclusively for the action, either a signed declaration or time records were available; 22. For the random sample the time records were signed by the employee and the action manager/line manager, at least monthly. 23. Working time claimed for the action occurred in the periods claimed; 24. No more hours were claimed than the number productive hours used to calculate the hourly personnel rates; 25. There is proof that the Beneficiary has checked that working time has not been claimed twice, that it is consistent with absence records and the number of productive hours per year, and that no working time has been claimed outside the action period. 26. Working time claimed is consistent with that on record at the human-resources department.

[official name of the** [Beneficiary] [Linked Third Party]**]
[name and title of authorised representative]
[dd Month yyyy]
<***Signature of the** [Beneficiary] [Linked Third Party]*>

[official name of the Auditor]
[name and title of authorised representative]
[dd Month yyyy]
<***Signature** of the Auditor*>



Digitally sealed by the European Commission
Date: 2018.11.07 12:00:24 CET

This document is digitally sealed. The digital sealing mechanism uniquely binds the document to the modules of the Participant Portal of the European Commission, to the transaction for which it was generated and ensures its integrity and authenticity.

Any attempt to modify the content will lead to a breach of the electronic seal, which can be verified at any time by clicking on the digital seal validation symbol.