EUROPEAN RESEARCH EXECUTIVE AGENCY (REA)

REA.B – Green Europe
B.3 – Biodiversity, Circular Economy and Environment

GRANT AGREEMENT

Project 101135275 — CSSBoost

PREAMBLE

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

on the one part,

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

and

on the other part,

1. 'the coordinator':

POLYTECHNEIO KRITIS (TUC), PIC 924773848, established in BUILDING E4, TECHNICAL UNIVERSITY CAMPUS COUNOUPIDIANA, CHANIA 731 00, Greece,

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

2. **MAGGIOLI SPA (MAG)**, PIC 996621457, established in VIA DEL CARPINO 8, SANTARCANGELO DI ROMAGNA 47822, Italy,

3. **CAS SOFTWARE AG (CAS)**, PIC 999797334, established in CAS WEG 1-5, KARLSRUHE 76131, Germany,

4. **KRUMEDIA GMBH (KRUM)**, PIC 910473332, established in FAUTENBRUCHSTRASSE 46, KARLSRUHE 76137, Germany,

5. **TECHNOLOGIEZENTRUM HORB GMBH & CO. KG (TZHORB)**, PIC 884476362, established in GESCHWISTER-SCHOLL-STRASSE 10, HORB AM NECKAR 72160, Germany,

6. **BWCON RESEARCH GGMBH (BWCON)**, PIC 891746415, established in SEYFFERSTRASSE 34, STUTTGART 70197, Germany,

7. **WIRTSCHAFTSFORDERUNG ZUKUNFTSREGIONNORDSCHWARZWALD GMBH (WFG)**, PIC 928898579, established in WESTLICHE KARL-FRIEDRICH-STRASSE 29-31, PFORZHEIM 75172, Germany,

8. **UNIVERSITA POLITECNICA DELLE MARCHE (UNIVPM)**, PIC 999866689, established in PIAZZA ROMA 22, ANCONA 60121, Italy,

9. **CICLI INTEGRATI IMPIANTI PRIMARI SPA (CIIP)**, PIC 891922276, established in VIALE DELLA REPUBBLICA 24, ASCOLI PICENO 63100, Italy,

10. **FUNDACIO UNIVERSITARIA BALMES (UVIC)**, PIC 999837977, established in CARRER PEROT ROCAGUINARDA 17, VIC BARCELONA 08500, Spain,

11. **ELLINIKO MESOGEIAKO PANEPISTIMIO (HMU)**, PIC 899132771, established in ESTAVROMENOS, HERAKLION 71004, Greece,

12. **MESOGEIAKO KENTRO IKANOTITON AGRODIATROFIS IDIOTIKI KEFALAIOUCHIKI ETAIREIA (MACC)**, PIC 888255288, established in IKAROU KAI ARCHIMIDOUS 1, HERAKLION 71601, Greece,

13. **PERIFEREIAKI ANAPTYXIAKI ETAIRIA KRITIS AE (CRETE)**, PIC 887183147, established in PLATEIA ELEFTHERIAS 1, CHANIA 73134, Greece,

14. **PARTICLE SUMMARY (PARTICLE)**, PIC 907400372, established in RUA DA VENEZUELA N 29 14 E, LISBON 1500 618, Portugal,

15. **COMPANHIA CARRIS DE FERRO DE LISBOA, E.M., S.A. (CARRIS)**, PIC 904315481, established in RUA 1 DE MAIO, 103, LISBOA 1300 472, Portugal,

16. **ADRESTIA EREVNITIKI IDIOTIKI KEFALAIOUXIKI ETAIREIA (ADR)**, PIC 893378925, established in LYSIMAXOU KALOKAIRINOU 20, IRAKLEIO 71202, Greece,

17. **MOTONIOUS IKE (MOTON)**, PIC 882855880, established in MARMARAS VARYPETROU, CHANIA 731 00, Greece,

18. **ACCELIGENCE LTD (ACCELI)**, PIC 900037005, established in MENADROU 1 FLOOR 4 OFFICES 401-402, NICOSIA 1066, Cyprus,

19. **SOCIAL CRM RESEARCH CENTER E.V. (SCRC)**, PIC 915192576, established in GRIMMAISCHE STR 12, LEIPZIG 04109, Germany,

20. **ASSOCIATION OF CITIES AND REGIONS FOR SUSTAINABLE RESOURCE MANAGEMENT (ACR+)**, PIC 952441061, established in AVENUE DES ARTS 3-4-5, BRUXELLES 1210, Belgium,

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

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

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

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

The Agreement is composed of:

Preamble

Terms and Conditions (including Data Sheet)

Annex 1 Description of the action[1]

Annex 2 Estimated budget for the action

Annex 2a Additional information on unit costs and contributions (if applicable)

Annex 3 Accession forms (if applicable)[2]

Annex 3a Declaration on joint and several liability of affiliated entities (if applicable)[3]

Annex 4 Model for the financial statements

Annex 5 Specific rules (if applicable)

[1] Template published on Portal Reference Documents.
[2] Template published on Portal Reference Documents.
[3] Template published on Portal Reference Documents.

TERMS AND CONDITIONS

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DATA SHEET

1. General data

Project summary:

Project summary
CSSBoost aims to overcome technological and non-technological CE barriers, minimise CSS application and operational risks and decisively stimulate and maximise the Circular Economy and Bioeconomy Transition in any EU city/region or group of regions. To pursue this, CSSBoost develops a novel CSS Application Framework that views a CSS as a composite living entity that operates and evolves within a CE/CSS Ecosystem and Market, an open (physical) space of city, regional or multi-regional scope, encompassing an area's existing CE market, its value chains and its entire external environment, even extra-regional entities and markets. It also introduces the methodological concept of the CSSBoost Integrated Solution that involves the integration of one or more CSS within a digital environment, enhanced by tailored methodology and procedures. This physical system is virtualised, monitored, analysed and assessed by developing the key CSSBoost innovation, the Virtual Regional CE/CSS Ecosystem and Market (VCEM). CSSBoost designs a set of diverse Exemplary CSSs, both as transition tools and to validate and promote its ideas by applying and demonstrating them in five city, regional and interregional Pilot Cases. The exemplary CSSs respond to different challenges, barriers, needs and feasibilities across EU and target different product value chains, as delineated in the EU's Circular Economy Action Plan (Water, Food, and Nutrients; Plastics; Batteries & Vehicles). CSSBoost develops both its innovations and pilots by applying a rigorous SotA co-creation environment and instruments and SSH methods and procedures. It also develops replication, organisational, business and exploitation plans for the uptake, replication and upscaling of its solutions, as well as education and training programs and social innovation actions.

Keywords:

- Circular economy
- New industrial value chains
- Regional development
- Social innovation
- Circular Systemic Solution, Circular Economy Transition; Digitalisation; Digital Twins; Knowledge Graphs; Twin Transition

Project number: 101135275

Project name: Boosting Circular Systemic Solutions through Virtual Regional Circular Economy Spaces

Project acronym: CSSBoost

Call: HORIZON-CL6-2023-CIRCBIO-02

Topic: HORIZON-CL6-2023-CircBio-02-1-two-stage

Type of action: HORIZON Innovation Actions

Granting authority: European Research Executive Agency

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

Project starting date: fixed date: 1 June 2024

Project end date: 30 November 2027

Project duration: 42 months

Consortium agreement: Yes

2. Participants

List of participants:

N°	Role	Short name	Legal name	Ctry	PIC	Total eligible costs (BEN and AE)	Max grant amount
1	COO	TUC	POLYTECHNEIO KRITIS	EL	924773848	1 196 250.00	1 196 250.00

N°	Role	Short name	Legal name	Ctry	PIC	Total eligible costs (BEN and AE)	Max grant amount
2	BEN	MAG	MAGGIOLI SPA	IT	996621457	865 000.00	605 500.00
3	BEN	CAS	CAS SOFTWARE AG	DE	999797334	996 875.00	697 812.50
4	BEN	KRUM	KRUMEDIA GMBH	DE	910473332	439 375.00	307 562.50
5	BEN	TZHORB	TECHNOLOGIEZENTRUM HORB GMBH & CO. KG	DE	884476362	418 750.00	293 125.00
6	BEN	BWCON	BWCON RESEARCH GGMBH	DE	891746415	281 250.00	281 250.00
7	BEN	WFG	WIRTSCHAFTSFORDERUNG ZUKUNFTSREGIONNORDSCHWARZWALD GMBH	DE	928898579	245 000.00	245 000.00
8	BEN	UNIVPM	UNIVERSITA POLITECNICA DELLE MARCHE	IT	999866689	621 875.00	621 875.00
9	BEN	CIIP	CICLI INTEGRATI IMPIANTI PRIMARI SPA	IT	891922276	350 000.00	245 000.00
10	BEN	UVIC	FUNDACIO UNIVERSITARIA BALMES	ES	999837977	367 750.00	367 750.00
11	BEN	HMU	ELLINIKO MESOGEIAKO PANEPISTIMIO	EL	899132771	801 250.00	801 250.00
12	BEN	MACC	MESOGEIAKO KENTRO IKANOTITON AGRODIATROFIS IDIOTIKI KEFALAIOUCHIKI ETAIREIA	EL	888255288	722 375.00	505 662.50
13	BEN	CRETE	PERIFEREIAKI ANAPTYXIAKI ETAIRIA KRITIS AE	EL	887183147	351 250.00	245 875.00
14	BEN	PARTICLE	PARTICLE SUMMARY	PT	907400372	721 250.00	504 875.00
15	BEN	CARRIS	COMPANHIA CARRIS DE FERRO DE LISBOA, E.M., S.A.	PT	904315481	431 250.00	301 875.00
16	BEN	ADR	ADRESTIA EREVNITIKI IDIOTIKI KEFALAIOUXIKI ETAIREIA	EL	893378925	582 062.50	407 443.75
17	BEN	MOTON	MOTONIOUS IKE	EL	882855880	449 500.00	314 650.00
18	BEN	ACCELI	ACCELIGENCE LTD	CY	900037005	595 625.00	416 937.50
19	BEN	SCRC	SOCIAL CRM RESEARCH CENTER E.V.	DE	915192576	403 125.00	403 125.00
20	BEN	ACR+	ASSOCIATION OF CITIES AND REGIONS FOR SUSTAINABLE RESOURCE MANAGEMENT	BE	952441061	427 500.00	427 500.00
21	AP	ICL	IMPERIAL COLLEGE OF SCIENCE TECHNOLOGY AND MEDICINE	UK	999993468	0.00	0.00
Total						11 267 312.50	9 190 318.75

Coordinator:

– POLYTECHNEIO KRITIS (TUC)

3. Grant

Maximum grant amount, total estimated eligible costs and contributions and funding rate:

Total eligible costs (BEN and AE)	Funding rate (%)	Maximum grant amount (Annex 2)	Maximum grant amount (award decision)
11 267 312.50	70, 100	9 190 318.75	9 190 318.75

Grant form: Budget-based

Grant mode: Action grant

Budget categories/activity types:

- A. Personnel costs
  - A.1 Employees, A.2 Natural persons under direct contract, A.3 Seconded persons
  - A.4 SME owners and natural person beneficiaries

- B. Subcontracting costs

- C. Purchase costs
  - C.1 Travel and subsistence
  - C.2 Equipment
  - C.3 Other goods, works and services

- D. Other cost categories
  - D.2 Internally invoiced goods and services

- E. Indirect costs

Cost eligibility options:

- In-kind contributions eligible costs

- Parental leave

- Project-based supplementary payments

- Average personnel costs (unit cost according to usual cost accounting practices)

- Limitation for subcontracting

- Travel and subsistence:
  - Travel: Actual costs
  - Accommodation: Actual costs
  - Subsistence: Actual costs

- Equipment: depreciation only

- Indirect cost flat-rate: 25% of the eligible direct costs (categories A-D, except volunteers costs, subcontracting costs, financial support to third parties and exempted specific cost categories, if any)

- VAT: Yes

- Other ineligible costs

Budget flexibility: Yes (no flexibility cap)

4. Reporting, payments and recoveries

4.1 Continuous reporting (art 21)

Deliverables: see Funding & Tenders Portal Continuous Reporting tool

4.2 Periodic reporting and payments

Reporting and payment schedule (art 21, 22):

Reporting					Payments	
Reporting periods			Type	Deadline	Type	Deadline (time to pay)
RP No	Month from	Month to				
					Initial prefinancing	30 days from entry into force/10 days before starting date – whichever is the latest
1	1	20	Periodic report	60 days after end of reporting period	Interim payment	90 days from receiving periodic report
2	21	42	Periodic report	60 days after end of reporting period	Final payment	90 days from receiving periodic report

Prefinancing payments and guarantees:

Prefinancing payment	
Type	Amount
Prefinancing 1 (initial)	7 352 255.00

Reporting and payment modalities (art 21, 22):

Mutual Insurance Mechanism (MIM): Yes

MIM contribution: 5% of the maximum grant amount (459 515.94), retained from the initial prefinancing

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

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

Exception for revenues: Yes

No-profit rule: Yes

Late payment interest: ECB + 3.5%

Bank account for payments:

GR0701406600660002001005389 CRBAGRAA

Conversion into euros: Double conversion

Reporting language: Language of the Agreement

4.3 Certificates (art 24):

Certificates on the financial statements (CFS):

Conditions:

Schedule: only at final payment, if threshold is reached

Standard threshold (beneficiary-level):

- financial statement: requested EU contribution to costs ≥ EUR 430 000.00

Special threshold for beneficiaries with a systems and process audit(see Article 24): financial statement: requested EU contribution to costs ≥ EUR 725 000.00

4.4 Recoveries (art 22)

First-line liability for recoveries:

Beneficiary termination: Beneficiary concerned

Final payment: Each beneficiary for their own debt

After final payment: Beneficiary concerned

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

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

Joint and several liability of affiliated entities — n/a

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

Suspension and termination:

Additional suspension grounds (art 31)

Additional termination grounds (art 32)

Applicable law (art 43):

Standard applicable law regime: EU law + law of Belgium

Dispute settlement forum (art 43):

Standard dispute settlement forum:

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

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

6. Other

Specific rules (Annex 5): Yes

Standard time-limits after project end:

Confidentiality (for X years after final payment): 5

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

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

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

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

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

CHAPTER 1 GENERAL

ARTICLE 1 — SUBJECT OF THE AGREEMENT

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

ARTICLE 2 — DEFINITIONS

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

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

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

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

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

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

Affiliated entities (AE) — Entities affiliated to a beneficiary within the meaning of Article 187 of EU Financial Regulation 2018/1046[4] which participate in the action with similar rights and obligations as the beneficiaries (obligation to implement action tasks and right to charge costs and claim contributions).

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

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

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

In-kind contributions — In-kind contributions within the meaning of Article 2(36) of EU Financial

[4] For the definition, see Article 187 Regulation (EU, Euratom) 2018/1046 of the European Parliament and of the Council of 18 July 2018 on the financial rules applicable to the general budget of the Union, amending Regulations (EU) No 1296/2013, (EU) No 1301/2013, (EU) No 1303/2013, (EU) No 1304/2013, (EU) No 1309/2013, (EU) No 1316/2013, (EU) No 223/2014, (EU) No 283/2014, and Decision No 541/2014/EU and repealing Regulation (EU, Euratom) No 966/2012 ('EU Financial Regulation') (OJ L 193, 30.7.2018, p. 1): "**affiliated entities** [are]:
(a) entities that form a sole beneficiary [(i.e. where an entity is formed of several entities that satisfy the criteria for being awarded a grant, including where the entity is specifically established for the purpose of implementing an action to be financed by a grant)];
(b) entities that satisfy the eligibility criteria and that do not fall within one of the situations referred to in Article 136(1) and 141(1) and that have a link with the beneficiary, in particular a legal or capital link, which is neither limited to the action nor established for the sole purpose of its implementation".

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

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

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

Grave professional misconduct — Any type of unacceptable or improper behaviour in exercising one's profession, especially by employees, including grave professional misconduct within the meaning of Article 136(1)(c) of EU Financial Regulation 2018/1046.

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

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

CHAPTER 2 ACTION

ARTICLE 3 — ACTION

The grant is awarded for the action **101135275** — **CSSBoost** ('action'), as described in Annex 1.

ARTICLE 4 — DURATION AND STARTING DATE

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

CHAPTER 3 GRANT

ARTICLE 5 — GRANT

5.1 Form of grant

The grant is an action grant[8] which takes the form of a budget-based mixed actual cost grant (i.e. a

[5] Directive (EU) 2017/1371 of the European Parliament and of the Council of 5 July 2017 on the fight against fraud to the Union's financial interests by means of criminal law (OJ L 198, 28.7.2017, p. 29).
[6] OJ C 316, 27.11.1995, p. 48.
[7] Council Regulation (EC, Euratom) No 2988/95 of 18 December 1995 on the protection of the European Communities financial interests (OJ L 312, 23.12.1995, p. 1).
[8] For the definition, see Article 180(2)(a) EU Financial Regulation 2018/1046: '**action grant**' means an EU grant to finance "an action intended to help achieve a Union policy objective".

grant based on actual costs incurred, but which may also include other forms of funding, such as unit costs or contributions, flat-rate costs or contributions, lump sum costs or contributions or financing not linked to costs).

5.2 Maximum grant amount

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

5.3 Funding rate

The funding rate for costs is 100% of the eligible costs for beneficiaries that are non-profit legal entities[9] and 70% of the eligible costs for beneficiaries that are profit legal entities.

Contributions are not subject to any funding rate.

5.4 Estimated budget, budget categories and forms of funding

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

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

Annex 2 also shows the types of costs and contributions (forms of funding)[10] to be used for each budget category.

If unit costs or contributions are used, the details on the calculation will be explained in Annex 2a.

5.5 Budget flexibility

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

However:

- changes to the budget category for volunteers (if used) always require an amendment
- changes to budget categories with lump sums costs or contributions (if used; including financing not linked to costs) always require an amendment
- changes to budget categories with higher funding rates or budget ceilings (if used) always require an amendment
- addition of amounts for subcontracts not provided for in Annex 1 either require an amendment or simplified approval in accordance with Article 6.2

[9] For the definition, see Article XX of the Horizon Europe Framework Programme and Rules for Participation Regulation (EU) XXX: '**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.

[10] See Article 125 EU Financial Regulation 2018/1046.

- other changes require an amendment or simplified approval, if specifically provided for in Article 6.2

- flexibility caps: not applicable.

ARTICLE 6 — ELIGIBLE AND INELIGIBLE COSTS AND CONTRIBUTIONS

In order to be eligible, costs and contributions must meet the **eligibility** conditions set out in this Article.

6.1 General eligibility conditions

The **general eligibility conditions** are the following:

(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 4 (with the exception of costs relating to the submission of the final periodic report, which may be incurred afterwards; see Article 21)

(iii) they must be declared under one of the budget categories set out in Article 6.2 and 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 or contributions (if any):

(i) they must be declared under one of the budget categories set out in Article 6.2 and Annex 2

(ii) the units must:

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

- be necessary for the implementation of the action and

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

(c) for flat-rate costs or contributions (if any):

(i) they must be declared under one of the budget categories set out in Article 6.2 and Annex 2

(ii) the costs or contributions to which the flat-rate is applied must:

- be eligible
- relate to the period set out in Article 4 (with the exception of costs or contributions relating to the submission of the final periodic report, which may be incurred afterwards; see Article 21)

(d) for lump sum costs or contributions (if any):

(i) they must be declared under one of the budget categories set out in Article 6.2 and Annex 2

(ii) the work must be properly implemented by the beneficiary in accordance with Annex 1

(iii) the deliverables/outputs must be achieved in the period set out in Article 4 (with the exception of deliverables/outputs relating to the submission of the final periodic report, which may be achieved afterwards; see Article 21)

(e) for unit, flat-rate or lump sum costs or contributions according to usual cost accounting practices (if any):

(i) they must fulfil the general eligibility conditions for the type of cost concerned

(ii) the cost accounting practices must be applied in a consistent manner, based on objective criteria, regardless of the source of funding

(f) for financing not linked to costs (if any): the results must be achieved or the conditions must be fulfilled as described in Annex 1.

In addition, for direct cost categories (e.g. personnel, travel & subsistence, subcontracting and other direct costs) only costs that are directly linked to the action implementation and can therefore be attributed to it directly are eligible. They must not include any indirect costs (i.e. costs that are only indirectly linked to the action, e.g. via cost drivers).

In-kind contributions provided by third parties free of charge may be declared as eligible direct costs by the beneficiaries which use them (under the same conditions as if they were their own, provided that they concern only direct costs and that the third parties and their in-kind contributions are set out in Annex 1 (or approved ex post in the periodic report, if 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; 'simplified approval procedure').

6.2 Specific eligibility conditions for each budget category

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

Direct costs

A. Personnel costs

A.1 Costs for employees (or equivalent) are eligible as personnel costs if they fulfil the general eligibility conditions and are related to personnel working for the beneficiary under an employment contract (or equivalent appointing act) and assigned to the action.

They must be limited to salaries (including net payments during parental leave), social security contributions, taxes and other costs linked to the remuneration, if they arise from national law or the employment contract (or equivalent appointing act) and be calculated on the basis of the costs actually incurred, in accordance with the following method:

{daily rate for the person

multiplied by

number of day-equivalents worked on the action (rounded up or down to the nearest half-day)}.

The daily rate must be calculated as:

{annual personnel costs for the person

divided by

215}.

The number of day-equivalents declared for a person must be identifiable and verifiable (see Article 20).

The actual time spent on parental leave by a person assigned to the action may be deducted from the 215 days indicated in the above formula.

The total number of day-equivalents declared in EU grants, for a person for a year, cannot be higher than 215, minus time spent on parental leave (if any).

For personnel which receives supplementary payments for work in projects (project-based remuneration), the personnel costs must be calculated at a rate which:

- corresponds to the actual remuneration costs paid by the beneficiary for the time worked by the person in the action over the reporting period
- does not exceed the remuneration costs paid by the beneficiary for work in similar projects funded by national schemes (‘national projects reference’)
- is defined based on objective criteria allowing to determine the amount to which the person is entitled

and

- reflects the usual practice of the beneficiary to pay consistently bonuses or supplementary payments for work in projects funded by national schemes.

The national projects reference is the remuneration defined in national law, collective labour agreement or written internal rules of the beneficiary applicable to work in projects funded by national schemes.

If there is no such national law, collective labour agreement or written internal rules or if the project-

based remuneration is not based on objective criteria, the national project reference will be the average remuneration of the person in the last full calendar year covered by the reporting period, excluding remuneration paid for work in EU actions.

If the beneficiary uses average personnel costs (unit cost according to usual cost accounting practices), the personnel costs must fulfil the general eligibility conditions for such unit costs and the daily rate must be calculated:

- using the actual personnel costs recorded in the beneficiary's accounts and excluding any costs which are ineligible or already included in other budget categories; the actual personnel costs may be adjusted on the basis of budgeted or estimated elements, if they are relevant for calculating the personnel costs, reasonable and correspond to objective and verifiable information

and

- according to usual cost accounting practices which are applied in a consistent manner, based on objective criteria, regardless of the source of funding.

A.2 and **A.3 Costs for natural persons working under a direct contract** other than an employment contract and costs for **seconded persons by a third party against payment** are also eligible as personnel costs, if they are assigned to the action, fulfil the general eligibility conditions and:

(a) work 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) and

(b) the result of the work belongs to the beneficiary (unless agreed otherwise).

They must be calculated on the basis of a rate which corresponds to the costs actually incurred for the direct contract or secondment and must not be significantly different from those for personnel performing similar tasks under an employment contract with the beneficiary.

A.4 The work of **SME owners** for the action (i.e. owners of beneficiaries that are small and medium-sized enterprises[11] not receiving a salary) or **natural person beneficiaries** (i.e. beneficiaries that are natural persons not receiving a salary) may be declared as personnel costs, if they fulfil the general eligibility conditions and are calculated as unit costs in accordance with the method set out in Annex 2a.

B. Subcontracting costs

Subcontracting costs for the action (including related duties, taxes and charges, such as non-deductible or non-refundable value added tax (VAT)) are eligible, if they are calculated on the basis

[11] For the definition, see Commission Recommendation 2003/361/EC: micro, small or medium-sized enterprise (SME) are enterprises

- engaged in an economic activity, irrespective of their legal form (including, in particular, self- employed persons and family businesses engaged in craft or other activities, and partnerships or associations regularly engaged in an economic activity) and

- employing fewer than 250 persons (expressed in 'annual working units' as defined in Article 5 of the Recommendation) and which have an annual turnover not exceeding EUR 50 million, and/or an annual balance sheet total not exceeding EUR 43 million.

of the costs actually incurred, fulfil the general eligibility conditions and are awarded using the beneficiary's usual purchasing practices — provided these ensure subcontracts with best value for money (or if appropriate the lowest price) and that there is no conflict of interests (see Article 12).

Beneficiaries that are 'contracting authorities/entities' within the meaning of the EU Directives on public procurement must also comply with the applicable national law on public procurement.

Subcontracting may cover only a limited part of the action.

The tasks to be subcontracted 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 (or may be approved ex post in the periodic report, if the use of subcontracting 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; 'simplified approval procedure').

C. Purchase costs

Purchase costs for the action (including related duties, taxes and charges, such as non-deductible or non-refundable value added tax (VAT)) are eligible if they fulfil the general eligibility conditions and are bought using the beneficiary's usual purchasing practices — provided these ensure purchases with best value for money (or if appropriate the lowest price) and that there is no conflict of interests (see Article 12).

Beneficiaries that are 'contracting authorities/entities' within the meaning of the EU Directives on public procurement must also comply with the applicable national law on public procurement.

C.1 Travel and subsistence

Purchases for **travel, accommodation** and **subsistence** must be calculated as follows:

- travel: on the basis of the costs actually incurred and in line with the beneficiary's usual practices on travel
- accommodation: on the basis of the costs actually incurred and in line with the beneficiary's usual practices on travel
- subsistence: on the basis of the costs actually incurred and in line with the beneficiary's usual practices on travel .

C.2 Equipment

Purchases of **equipment, infrastructure or other assets** used for the action must be declared as depreciation costs, calculated on the basis of the costs actually incurred and written off in accordance with international accounting standards and the beneficiary's usual accounting practices.

Only the portion of the costs that corresponds to the rate of actual use for the action during the action duration can be taken into account.

Costs for **renting or leasing** equipment, infrastructure or other assets are also eligible, if they do not exceed the depreciation costs of similar equipment, infrastructure or assets and do not include any financing fees.

C.3 Other goods, works and services

Purchases of **other goods, works and services** must be calculated on the basis of the costs actually incurred.

Such goods, works and services include, for instance, consumables and supplies, promotion, dissemination, protection of results, translations, publications, certificates and financial guarantees, if required under the Agreement.

D. Other cost categories

D.2 Internally invoiced goods and services

Costs for internally invoiced goods and services directly used for the action may be declared as unit cost according to usual cost accounting practices, if and as declared eligible in the call conditions, if they fulfil the general eligibility conditions for such unit costs and the amount per unit is calculated:

- using the actual costs for the good or service recorded in the beneficiary's accounts, attributed either by direct measurement or on the basis of cost drivers, and excluding any cost which are ineligible or already included in other budget categories; the actual costs may be adjusted on the basis of budgeted or estimated elements, if they are relevant for calculating the costs, reasonable and correspond to objective and verifiable information

and

- according to usual cost accounting practices which are applied in a consistent manner, based on objective criteria, regardless of the source of funding.

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

This cost will not be taken into account for the indirect cost flat-rate.

Indirect costs

E. Indirect costs

Indirect costs will be reimbursed at the flat-rate of 25% of the eligible direct costs (categories A-D, except volunteers costs, subcontracting costs, financial support to third parties and exempted specific cost categories, if any).

Contributions

Not applicable

6.3 Ineligible costs and contributions

The following costs or contributions are **ineligible**:

(a) costs or contributions that do not comply with the conditions set out above (Article 6.1 and 6.2), in particular:

(i) costs related to return on capital and dividends paid by a beneficiary

(ii) debt and debt service charges

(iii) provisions for future losses or debts

(iv) interest owed

(v) currency exchange losses

(vi) bank costs charged by the beneficiary's bank for transfers from the granting authority

(vii) excessive or reckless expenditure

(viii) deductible or refundable VAT (including VAT paid by public bodies acting as public authority)

(ix) costs incurred or contributions for activities implemented during grant agreement suspension (see Article 31)

(x) in-kind contributions by third parties: not applicable

(b) costs or contributions declared under other EU grants (or grants awarded by an EU Member State, non-EU country or other body implementing the EU budget), except for the following cases:

(i) Synergy actions: not applicable

(ii) if the action grant is combined with an operating grant[12] running during the same period and the beneficiary can demonstrate that the operating grant does not cover any (direct or indirect) costs of the action grant

(c) costs or contributions for staff of a national (or regional/local) administration, for activities that are part of the administration's normal activities (i.e. not undertaken only because of the grant)

(d) costs or contributions (especially travel and subsistence) for staff or representatives of EU institutions, bodies or agencies

(e) other :

(i) country restrictions for eligible costs: not applicable

(ii) costs or contributions declared specifically ineligible in the call conditions.

6.4 Consequences of non-compliance

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

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

[12] For the definition, see Article 180(2)(b) of EU Financial Regulation 2018/1046: '**operating grant**' means an EU grant to finance "the functioning of a body which has an objective forming part of and supporting an EU policy".

CHAPTER 4 GRANT IMPLEMENTATION

SECTION 1 CONSORTIUM: BENEFICIARIES, AFFILIATED ENTITIES AND OTHER PARTICIPANTS

ARTICLE 7 — BENEFICIARIES

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

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

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

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

The beneficiaries (and their action) must remain eligible under the EU programme funding the grant for the entire duration of the action. Costs and contributions will be eligible only as long as the beneficiary and the action are eligible.

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

(a) Each beneficiary must:

(i) keep information stored in the Portal Participant Register up to date (see Article 19)

(ii) inform the granting authority (and the other beneficiaries) immediately of any events or circumstances likely to affect significantly or delay the implementation of the action (see Article 19)

(iii) submit to the coordinator in good time:

- the prefinancing guarantees (if required; see Article 23)
- the financial statements and certificates on the financial statements (CFS) (if required; see Articles 21 and 24.2 and Data Sheet, Point 4.3)
- the contribution to the deliverables and technical reports (see Article 21)
- any other documents or information required by the granting authority under the Agreement

(iv) submit via the Portal data and information related to the participation of their affiliated entities.

(b) The coordinator must:

(i) monitor that the action is implemented properly (see Article 11)

(ii) act as the intermediary for all communications between the consortium and the granting authority, unless the Agreement or granting authority specifies otherwise, and in particular:

- submit the prefinancing guarantees to the granting authority (if any)
- request and review any documents or information required and verify their quality and completeness before passing them on to the granting authority
- submit the deliverables and reports to the granting authority
- inform the granting authority about the payments made to the other beneficiaries (report on the distribution of payments; if required, see Articles 22 and 32)

(iii) distribute the payments received from the granting authority to the other beneficiaries without unjustified delay (see Article 22).

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

However, coordinators which are public bodies may delegate the tasks set out in Point (b)(ii) last indent and (iii) above to entities with 'authorisation to administer' which they have created or which are controlled by or affiliated to them. In this case, the coordinator retains sole responsibility for the payments and for compliance with the obligations under the Agreement.

Moreover, coordinators which are 'sole beneficiaries'[13] (or similar, such as European research infrastructure consortia (ERICs)) may delegate the tasks set out in Point (b)(i) to (iii) above to one of their members. The coordinator retains sole responsibility for compliance with the obligations under the Agreement.

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

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

- the internal organisation of the consortium
- the management of access to the Portal
- different distribution keys for the payments and financial responsibilities in case of recoveries (if any)
- additional rules on rights and obligations related to background and results (see Article 16)

[13] For the definition, see Article 187(2) EU Financial Regulation 2018/1046: "Where several entities satisfy the criteria for being awarded a grant and together form one entity, that entity may be treated as the **sole beneficiary**, including where it is specifically established for the purpose of implementing the action financed by the grant."

- settlement of internal disputes
- liability, indemnification and confidentiality arrangements between the beneficiaries.

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

ARTICLE 8 — AFFILIATED ENTITIES

Not applicable

ARTICLE 9 — OTHER PARTICIPANTS INVOLVED IN THE ACTION

9.1 Associated partners

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

- **IMPERIAL COLLEGE OF SCIENCE TECHNOLOGY AND MEDICINE (ICL)**, PIC 999993468

Associated partners must implement the action tasks attributed to them in Annex 1 in accordance with Article 11. They may not charge costs or contributions to the action and the costs for their tasks are not eligible.

The tasks must be set out in Annex 1.

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

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

9.2 Third parties giving in-kind contributions to the action

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

Third parties giving in-kind contributions do not implement any action tasks. They may not charge costs or contributions to the action, but the costs for the in-kind contributions are eligible and may be charged by the beneficiaries which use them, under the conditions set out in Article 6. The costs will be included in Annex 2 as part of the beneficiaries' costs.

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

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

9.3 Subcontractors

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

Subcontractors must implement their action tasks in accordance with Article 11. The costs for the subcontracted tasks (invoiced price from the subcontractor) are eligible and may be charged by the beneficiaries, under the conditions set out in Article 6. The costs will be included in Annex 2 as part of the beneficiaries' costs.

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

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

9.4 Recipients of financial support to third parties

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

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

ARTICLE 10 — PARTICIPANTS WITH SPECIAL STATUS

10.1 Non-EU participants

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

- to respect general principles (including fundamental rights, values and ethical principles, environmental and labour standards, rules on classified information, intellectual property rights, visibility of funding and protection of personal data)

- for the submission of certificates under Article 24: to use qualified external auditors which are independent and comply with comparable standards as those set out in EU Directive 2006/43/EC[14]

- for the controls under Article 25: to allow for checks, reviews, audits and investigations (including on-the-spot checks, visits and inspections) by the bodies mentioned in that Article (e.g. granting authority, OLAF, Court of Auditors (ECA), etc.).

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

10.2 Participants which are international organisations

[14] Directive 2006/43/EC of the European Parliament and of the Council of 17 May 2006 on statutory audits of annual accounts and consolidated accounts or similar national regulations (OJ L 157, 9.6.2006, p. 87).

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

- to respect general principles (including fundamental rights, values and ethical principles, environmental and labour standards, rules on classified information, intellectual property rights, visibility of funding and protection of personal data)

- for the submission of certificates under Article 24: to use either independent public officers or external auditors which comply with comparable standards as those set out in EU Directive 2006/43/EC

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

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

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

10.3 Pillar-assessed participants

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

'Pillar-assessment' means a review by the European Commission on the systems, rules and procedures which participants use for managing EU grants (in particular internal control system, accounting system, external audits, financing of third parties, rules on recovery and exclusion, information on recipients and protection of personal data; see Article 154 EU Financial Regulation 2018/1046).

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

- record-keeping (Article 20): may be done in accordance with internal standards, rules and procedures

- currency conversion for financial statements (Article 21): may be done in accordance with usual accounting practices

- guarantees (Article 23): for public law bodies, prefinancing guarantees are not needed

- certificates (Article 24):

    - certificates on the financial statements (CFS): may be provided by their regular internal or external auditors and in accordance with their internal financial regulations and procedures

    - certificates on usual accounting practices (CoMUC): are not needed if those practices are covered by an ex-ante assessment

and use the following specific rules, for:

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

- checks, reviews, audits and investigations by the EU (Article 25): will be conducted taking into account the rules and procedures specifically agreed between them and the framework agreement (if any)

- impact evaluation (Article 26): will be conducted in accordance with the participant's internal rules and procedures and the framework agreement (if any)

- grant agreement suspension (Article 31): certain costs incurred during grant suspension are eligible (notably, minimum costs necessary for a possible resumption of the action and costs relating to contracts which were entered into before the pre-information letter was received and which could not reasonably be suspended, reallocated or terminated on legal grounds)

- grant agreement termination (Article 32): the final grant amount and final payment will be calculated taking into account also costs relating to contracts due for execution only after termination takes effect, if the contract was entered into before the pre-information letter was received and could not reasonably be terminated on legal grounds

- liability for damages (Article 33.2): the granting authority must be compensated for damage it sustains as a result of the implementation of the action or because the action was not implemented in full compliance with the Agreement only if the damage is due to an infringement of the participant's internal rules and procedures or due to a violation of third parties' rights by the participant or one of its employees or individual for whom the employees are responsible.

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

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

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

- eligibility (Article 6)

- consortium roles and set-up (Articles 7-9)

- security and ethics (Articles 13, 14)

- IPR (including background and results, access rights and rights of use), communication, dissemination and visibility (Articles 16 and 17)

- information obligation (Article 19)

- payment, reporting and amendments (Articles 21, 22 and 39)

- rejections, reductions, suspensions and terminations (Articles 27, 28, 29-32)

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

Participants whose assessment has not yet been updated to cover (the new rules on) data protection may rely on their internal systems, rules and procedures, provided that they ensure that personal data is:

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

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

Pillar-assessed participants that have also concluded a framework agreement with the EU, may moreover — under the same conditions as those above (i.e. not call into question the decision awarding the grant or breach the principle of equal treatment of applicants or beneficiaries) — rely on the provisions set out in that framework agreement.

SECTION 2 RULES FOR CARRYING OUT THE ACTION

ARTICLE 11 — PROPER IMPLEMENTATION OF THE ACTION

11.1 Obligation to properly implement the action

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

11.2 Consequences of non-compliance

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

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

ARTICLE 12 — CONFLICT OF INTERESTS

12.1 Conflict of interests

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

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

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

12.2 Consequences of non-compliance

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

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

ARTICLE 13 — CONFIDENTIALITY AND SECURITY

13.1 Sensitive information

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

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

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

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

(a) need to know it in order to implement the Agreement and

(b) are bound by an obligation of confidentiality.

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

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

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

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

The confidentiality obligations no longer apply if:

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

(b) the information becomes publicly available, without breaching any confidentiality obligation

(c) the disclosure of the sensitive information is required by EU, international or national law.

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

13.2 Classified information

The parties must handle classified information in accordance with the applicable EU, international or national law on classified information (in particular, Decision 2015/444[15] and its implementing rules).

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

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

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

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

13.3 Consequences of non-compliance

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

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

ARTICLE 14 — ETHICS AND VALUES

14.1 Ethics

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

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

14.2 Values

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

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

14.3 Consequences of non-compliance

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

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

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

ARTICLE 15 — DATA PROTECTION

15.1 Data processing by the granting authority

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

For grants where the granting authority is the European Commission, an EU regulatory or executive agency, joint undertaking or other EU body, the processing will be subject to Regulation 2018/1725[16].

15.2 Data processing by the beneficiaries

The beneficiaries must process personal data under the Agreement in compliance with the applicable EU, international and national law on data protection (in particular, Regulation 2016/679[17]).

They must ensure that personal data is:

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

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

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

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

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

15.3 Consequences of non-compliance

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

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

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

16.1 Background and access rights to background

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

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

(a) held by the beneficiaries before they acceded to the Agreement and

(b) needed to implement the action or exploit the results.

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

16.2 Ownership of results

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

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

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

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

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

(a) **use for its own purposes** (in particular, making them available to persons working for the granting authority or any other EU service (including institutions, bodies, offices, agencies, etc.) or EU Member State institution or body; copying or reproducing them in whole or in part, in unlimited numbers; and communication through press information services)

(b) **distribution to the public** (in particular, publication as hard copies and in electronic or digital format, publication on the internet, as a downloadable or non-downloadable file, broadcasting

by any channel, public display or presentation, communicating through press information services, or inclusion in widely accessible databases or indexes)

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

(d) **translation**

(e) **storage** in paper, electronic or other form

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

(g) the right to authorise **third parties** to act on its behalf or sub-license to third parties the modes of use set out in Points (b), (c), (d) and (f), if needed for the information, communication and publicity activity of the granting authority

(h) **processing**, analysing, aggregating the materials, documents and information received and **producing derivative works**.

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

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

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

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

16.4 Specific rules on IPR, results and background

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

16.5 Consequences of non-compliance

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

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

ARTICLE 17 — COMMUNICATION, DISSEMINATION AND VISIBILITY

17.1 Communication — Dissemination — Promoting the action

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

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

17.2 Visibility — European flag and funding statement

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

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

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

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

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

17.3 Quality of information — Disclaimer

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

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

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

17.4 Specific communication, dissemination and visibility rules

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

17.5 Consequences of non-compliance

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

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

ARTICLE 18 — SPECIFIC RULES FOR CARRYING OUT THE ACTION

18.1 Specific rules for carrying out the action

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

18.2 Consequences of non-compliance

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

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

SECTION 3 GRANT ADMINISTRATION

ARTICLE 19 — GENERAL INFORMATION OBLIGATIONS

19.1 Information requests

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

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

19.2 Participant Register data updates

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

19.3 Information about events and circumstances which impact the action

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

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

(i) changes in their legal, financial, technical, organisational or ownership situation (including changes linked to one of the exclusion grounds listed in the declaration of honour signed before grant signature)

(ii) linked action information: not applicable

(b) **circumstances** affecting:

(i) the decision to award the grant or

(ii) compliance with requirements under the Agreement.

19.4 Consequences of non-compliance

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

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

ARTICLE 20 — RECORD-KEEPING

20.1 Keeping records and supporting documents

The beneficiaries must — at least until the time-limit set out in the Data Sheet (see Point 6) — keep records and other supporting documents to prove the proper implementation of the action in line with the accepted standards in the respective field (if any).

In addition, the beneficiaries must — for the same period — keep the following to justify the amounts declared:

(a) for actual costs: adequate records and supporting documents to prove the costs declared (such as contracts, subcontracts, invoices and accounting records); in addition, the beneficiaries' usual accounting and internal control procedures must enable direct reconciliation between the amounts declared, the amounts recorded in their accounts and the amounts stated in the supporting documents

(b) for flat-rate costs and contributions (if any): adequate records and supporting documents to prove the eligibility of the costs or contributions to which the flat-rate is applied

(c) for the following simplified costs and contributions: the beneficiaries do not need to keep specific records on the actual costs incurred, but must keep:

(i) for unit costs and contributions (if any): adequate records and supporting documents to prove the number of units declared

(ii) for lump sum costs and contributions (if any): adequate records and supporting documents to prove proper implementation of the work as described in Annex 1

(iii) for financing not linked to costs (if any): adequate records and supporting documents to prove the achievement of the results or the fulfilment of the conditions as described in Annex 1

(d) for unit, flat-rate and lump sum costs and contributions according to usual cost accounting practices (if any): the beneficiaries must keep any adequate records and supporting documents to prove that their cost accounting practices have been applied in a consistent manner, based on objective criteria, regardless of the source of funding, and that they comply with the eligibility conditions set out in Articles 6.1 and 6.2.

Moreover, the following is needed for specific budget categories:

(e) for personnel costs: time worked for the beneficiary under the action must be supported by declarations signed monthly by the person and their supervisor, unless another reliable time-record system is in place; the granting authority may accept alternative evidence supporting the time worked for the action declared, if it considers that it offers an adequate level of assurance

(f) additional record-keeping rules: not applicable

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

If there are on-going checks, reviews, audits, investigations, litigation or other pursuits of claims under the Agreement (including the extension of findings; see Article 25), the beneficiaries must keep these records and other supporting documentation until the end of these procedures.

The beneficiaries must keep the original documents. Digital and digitalised documents are considered originals if they are authorised by the applicable national law. The granting authority may accept non-original documents if they offer a comparable level of assurance.

20.2 Consequences of non-compliance

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

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

ARTICLE 21 — REPORTING

21.1 Continuous reporting

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

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

21.2 Periodic reporting: Technical reports and financial statements

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

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

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

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

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

The financial part of the periodic report includes:

- the financial statements (individual and consolidated; for all beneficiaries/affiliated entities)
- the explanation on the use of resources (or detailed cost reporting table, if required)
- the certificates on the financial statements (CFS) (if required; see Article 24.2 and Data Sheet, Point 4.3).

The **financial statements** must detail the eligible costs and contributions for each budget category and, for the final payment, also the revenues for the action (see Articles 6 and 22).

All eligible costs and contributions incurred should be declared, even if they exceed the amounts indicated in the estimated budget (see Annex 2). Amounts that are not declared in the individual financial statements will not be taken into account by the granting authority.

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

- the information provided is complete, reliable and true
- the costs and contributions declared are eligible (see Article 6)
- the costs and contributions can be substantiated by adequate records and supporting documents (see Article 20) that will be produced upon request (see Article 19) or in the context of checks, reviews, audits and investigations (see Article 25)
- for the final periodic report: all the revenues have been declared (if required; see Article 22).

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

21.3 Currency for financial statements and conversion into euros

The financial statements must be drafted in euro.

Beneficiaries with general accounts established in a currency other than the euro must convert the costs recorded in their accounts into euro, at the average of the daily exchange rates published in the C series of the *Official Journal of the European Union* (ECB website), calculated over the corresponding reporting period.

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

Beneficiaries with general accounts in euro must convert costs incurred in another currency into euro according to their usual accounting practices.

21.4 Reporting language

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

21.5 Consequences of non-compliance

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

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

ARTICLE 22 — PAYMENTS AND RECOVERIES — CALCULATION OF AMOUNTS DUE

22.1 Payments and payment arrangements

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

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

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

The cost of payment transfers will be borne as follows:

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

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

22.2 Recoveries

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

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

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

22.3 Amounts due

22.3.1 Prefinancing payments

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

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

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

For **additional prefinancings** (if any), the amount due, schedule and modalities are also set out in the Data Sheet (see Point 4.2). However, if the statement on the use of the previous prefinancing payment shows that less than 70% was used, the amount set out in the Data Sheet will be reduced by the difference between the 70% threshold and the amount used.

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

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

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

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

22.3.2 Amount due at beneficiary termination — Recovery

In case of beneficiary termination, the granting authority will determine the provisional amount due for the beneficiary concerned. Payments (if any) will be made with the next interim or final payment.

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

Step 1 — Calculation of the total accepted EU contribution

Step 1 — Calculation of the total accepted EU contribution

The granting authority will first calculate the 'accepted EU contribution' for the beneficiary for all reporting periods, by calculating the 'maximum EU contribution to costs' (applying the funding rate to the accepted costs of the beneficiary), taking into account requests for a lower contribution to costs and CFS threshold cappings (if any; see Article 24.5) and adding the contributions (accepted unit, flat-rate or lump sum contributions and financing not linked to costs, if any).

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

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

{total accepted EU contribution for the beneficiary

minus

{prefinancing and interim payments received (if any)}}.

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

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

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

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

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

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

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

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

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

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

22.3.3 Interim payments

Interim payments reimburse the eligible costs and contributions claimed for the implementation of the action during the reporting periods (if any).

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

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

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

Step 1 — Calculation of the total accepted EU contribution

Step 2 — Limit to the interim payment ceiling

Step 1 — Calculation of the total accepted EU contribution

The granting authority will calculate the 'accepted EU contribution' for the action for the reporting period, by first calculating the 'maximum EU contribution to costs' (applying the funding rate to the accepted costs of each beneficiary), taking into account requests for a lower contribution to costs, and CFS threshold cappings (if any; see Article 24.5) and adding the contributions (accepted unit, flat-rate or lump sum contributions and financing not linked to costs, if any).

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

Step 2 — Limit to the interim payment ceiling

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

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

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

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

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

The final payment (payment of the balance) reimburses the remaining part of the eligible costs and contributions claimed for the implementation of the action (if any).

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

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

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

Step 1 — Calculation of the total accepted EU contribution

Step 2 — Limit to the maximum grant amount

Step 3 — Reduction due to the no-profit rule

Step 1 — Calculation of the total accepted EU contribution

The granting authority will first calculate the 'accepted EU contribution' for the action for all reporting periods, by calculating the 'maximum EU contribution to costs' (applying the funding rate to the total accepted costs of each beneficiary), taking into account requests for a lower contribution to costs, CFS threshold cappings (if any; see Article 24.5) and adding the contributions (accepted unit, flat-rate or lump sum contributions and financing not linked to costs, if any).

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

Step 2 — Limit to the maximum grant amount

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

Step 3 — Reduction due to the no-profit rule

If the no-profit rule is provided for in the Data Sheet (see Point 4.2), the grant must not produce a profit (i.e. surplus of the amount obtained following Step 2 plus the action's revenues, over the eligible costs and contributions approved by the granting authority).

'Revenue' is all income generated by the action, during its duration (see Article 4), for beneficiaries that are profit legal entities (— with the exception of income generated by the exploitation of results, which are not considered as revenues).

If there is a profit, it will be deducted in proportion to the final rate of reimbursement of the eligible costs approved by the granting authority (as compared to the amount calculated following Steps 1 and 2 minus the contributions).

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

{final grant amount

minus

{prefinancing and interim payments made (if any)}}.

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

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

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

For grants where the granting authority is the European Commission or an EU executive agency,

offsetting may also be done against amounts owed to other Commission services or executive agencies.

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

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

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

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

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

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

{{{total accepted EU contribution for the beneficiary

divided by

total accepted EU contribution for the action}

multiplied by

final grant amount for the action},

minus

{prefinancing and interim payments received by the beneficiary (if any)}}

and

(b) dividing the debt:

{{amount calculated according to point (a) for the beneficiary concerned

divided by

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

multiplied by

the amount to be recovered}.

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

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

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

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

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

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

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

Step 1 — Calculation of the revised total accepted EU contribution

Step 1 — Calculation of the revised total accepted EU contribution

The granting authority will first calculate the 'revised accepted EU contribution' for the beneficiary, by calculating the 'revised accepted costs' and 'revised accepted contributions'.

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

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

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

{{total accepted EU contribution for the beneficiary

divided by

total accepted EU contribution for the action}

multiplied by

final grant amount for the action}.

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

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

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

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

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

22.4 Enforced recovery

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

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

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

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

(b) financial guarantee(s): not applicable

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

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

(e) by taking legal action (see Article 43) or, provided that the granting authority is the European Commission or an EU executive agency, by adopting an enforceable decision under Article 299 of the Treaty on the Functioning of the EU (TFEU) and Article 100(2) of EU Financial Regulation 2018/1046.

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

The amount to be recovered will be increased by **late-payment interest** at the rate set out in Article 22.5, from the day following the payment date in the debit note, up to and including the date the full payment is received.

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

Bank charges incurred in the recovery process will be borne by the beneficiary, unless Directive 2015/2366[18] applies.

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

22.5 Consequences of non-compliance

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

22.5.1 If the granting authority does not pay within the payment deadlines (see above), the beneficiaries are entitled to **late-payment interest** at the rate applied by the European Central Bank (ECB) for its main refinancing operations in euros ('reference rate'), plus the rate specified in the Data Sheet (Point 4.2). The reference rate is the rate in force on the first day of the month in which the payment deadline expires, as published in the C series of the *Official Journal of the European Union*.

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

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

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

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

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

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

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

ARTICLE 23 — GUARANTEES

Not applicable

ARTICLE 24 — CERTIFICATES

24.1 Operational verification report (OVR)

Not applicable

24.2 Certificate on the financial statements (CFS)

If required by the granting authority (see Data Sheet, Point 4.3), the beneficiaries must provide certificates on their financial statements (CFS), in accordance with the schedule, threshold and conditions set out in the Data Sheet.

The coordinator must submit them as part of the periodic report (see Article 21).

The certificates must be drawn up using the template published on the Portal, cover the costs declared on the basis of actual costs and costs according to usual cost accounting practices (if any), and fulfil the following conditions:

(a) be provided by a qualified approved external auditor which is independent and complies with Directive 2006/43/EC[19] (or for public bodies: by a competent independent public officer)

(b) the verification must be carried out according to the highest professional standards to ensure that the financial statements comply with the provisions under the Agreement and that the costs declared are eligible.

The certificates will not affect the granting authority's right to carry out its own checks, reviews or audits, nor preclude the European Court of Auditors (ECA), the European Public Prosecutor's Office (EPPO) or the European Anti-Fraud Office (OLAF) from using their prerogatives for audits and investigations under the Agreement (see Article 25).

If the costs (or a part of them) were already audited by the granting authority, these costs do not need to be covered by the certificate and will not be counted for calculating the threshold (if any).

24.3 Certificate on the compliance of usual cost accounting practices (CoMUC)

Not applicable

24.4 Systems and process audit (SPA)

Beneficiaries which:

- use unit, flat rate or lump sum costs or contributions according to documented (i.e. formally approved and in writing) usual costs accounting practices (if any) or

- have formalised documentation on the systems and processes for calculating their costs and contributions (i.e. formally approved and in writing), have participated in at least 150 actions under Horizon 2020 or the Euratom Research and Training Programme (2014-2018 or 2019-2020) and participate in at least 3 ongoing actions under Horizon Europe or the Euratom Research and Training Programme (2021-2025 or 2026-2027)

may apply to the granting authority for a systems and process audit (SPA).

This audit will be carried out as follows:

Step 1 – Application by the beneficiary.

Step 2 – If the application is accepted, the granting authority will carry out the systems and process audit, complemented by an audit of transactions (on a sample of the beneficiary's Horizon Europe or the Euratom Research and Training Programme financial statements).

Step 3 – The audit result will take the form of a risk assessment classification for the beneficiary: low, medium or high.

Low-risk beneficiaries will benefit from less (or less in-depth) ex-post audits (see Article 25) and a higher threshold for submitting certificates on the financial statements (CFS; see Articles 21 and 24.2 and Data Sheet, Point 4.3).

[19] Directive 2006/43/EC of the European Parliament and of the Council of 17 May 2006 on statutory audits of annual accounts and consolidated accounts or similar national regulations (OJ L 157, 9.6.2006, p. 87).

24.5 Consequences of non-compliance

If a beneficiary does not submit a certificate on the financial statements (CFS) or the certificate is rejected, the accepted EU contribution to costs will be capped to reflect the CFS threshold.

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

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

25.1 Granting authority checks, reviews and audits

25.1.1 Internal checks

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

25.1.2 Project reviews

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

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

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

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

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

For **on-the-spot visits**, the beneficiary concerned must allow access to sites and premises (including to the outside experts) and must ensure that information requested is readily available.

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

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

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

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

25.1.3 Audits

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

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

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

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

For **on-the-spot** visits, the beneficiary concerned must allow access to sites and premises (including for the external audit firm) and must ensure that information requested is readily available.

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

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

The auditors will formally notify the draft audit report to the beneficiary concerned, which has 30 days from receiving notification to make observations (contradictory audit procedure).

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

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

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

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

25.3 Access to records for assessing simplified forms of funding

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

25.4 OLAF, EPPO and ECA audits and investigations

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

- the European Anti-Fraud Office (OLAF) under Regulations No 883/2013[20] and No 2185/96[21]
- the European Public Prosecutor's Office (EPPO) under Regulation 2017/1939
- the European Court of Auditors (ECA) under Article 287 of the Treaty on the Functioning of the EU (TFEU) and Article 257 of EU Financial Regulation 2018/1046.

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

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

25.5 Consequences of checks, reviews, audits and investigations — Extension of results of reviews, audits or investigations

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

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

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

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

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

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

25.5.2 Extension from other grants

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

(a) the beneficiary concerned is found, in other EU grants awarded under similar conditions, to

[20] Regulation (EU, Euratom) No 883/2013 of the European Parliament and of the Council of 11 September 2013 concerning investigations conducted by the European Anti-Fraud Office (OLAF) and repealing Regulation (EC) No 1073/1999 of the European Parliament and of the Council and Council Regulation (Euratom) No 1074/1999 (OJ L 248, 18/09/2013, p. 1).

[21] Council Regulation (Euratom, EC) No 2185/96 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).

have committed systemic or recurrent errors, irregularities, fraud or breach of obligations that have a material impact on this grant and

(b) those findings are formally notified to the beneficiary concerned — together with the list of grants affected by the findings — within the time-limit for audits set out in the Data Sheet (see Point 6).

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

If the extension concerns **rejections of costs or contributions**: the notification will include:

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

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

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

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

(ii) does not submit revised financial statements.

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

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

(b) the **correction rate for extrapolation**, established on the basis of the systemic or recurrent errors and the principle of proportionality.

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

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

25.6 Consequences of non-compliance

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

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

ARTICLE 26 — IMPACT EVALUATIONS

26.1 Impact evaluation

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

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

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

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

26.2 Consequences of non-compliance

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

CHAPTER 5 CONSEQUENCES OF NON-COMPLIANCE

SECTION 1 REJECTIONS AND GRANT REDUCTION

ARTICLE 27 — REJECTION OF COSTS AND CONTRIBUTIONS

27.1 Conditions

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

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

Ineligible costs or contributions will be rejected.

27.2 Procedure

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

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

27.3 Effects

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

ARTICLE 28 — GRANT REDUCTION

28.1 Conditions

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

(a) the beneficiary (or a person having powers of representation, decision-making or control, or person essential for the award/implementation of the grant) has committed:

(i) substantial errors, irregularities or fraud or

(ii) serious breach of obligations under this Agreement or during its award (including improper implementation of the action, non-compliance with the call conditions, submission of false information, failure to provide required information, breach of ethics or security rules (if applicable), etc.), or

(b) the beneficiary (or a person having powers of representation, decision-making or control, or person essential for the award/implementation of the grant) has committed — in other EU grants awarded to it under similar conditions — systemic or recurrent errors, irregularities, fraud or serious breach of obligations that have a material impact on this grant (see Article 25).

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

28.2 Procedure

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

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

28.3 Effects

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

SECTION 2 SUSPENSION AND TERMINATION

ARTICLE 29 — PAYMENT DEADLINE SUSPENSION

29.1 Conditions

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

(a) the required report (see Article 21) has not been submitted or is not complete or additional information is needed

(b) there are doubts about the amount to be paid (e.g. ongoing audit extension procedure, queries about eligibility, need for a grant reduction, etc.) and additional checks, reviews, audits or investigations are necessary, or

(c) there are other issues affecting the EU financial interests.

29.2 Procedure

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

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

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

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

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

ARTICLE 30 — PAYMENT SUSPENSION

30.1 Conditions

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

(a) a beneficiary (or a person having powers of representation, decision-making or control, or person essential for the award/implementation of the grant) has committed or is suspected of having committed:

(i) substantial errors, irregularities or fraud or

(ii) serious breach of obligations under this Agreement or during its award (including improper implementation of the action, non-compliance with the call conditions, submission of false information, failure to provide required information, breach of ethics or security rules (if applicable), etc.), or

(b) a beneficiary (or a person having powers of representation, decision-making or control, or person essential for the award/implementation of the grant) has committed — in other EU grants awarded to it under similar conditions — systemic or recurrent errors, irregularities, fraud or serious breach of obligations that have a material impact on this grant.

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

30.2 Procedure

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

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

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

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

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

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

During the suspension, no prefinancing will be paid to the beneficiaries concerned. For interim payments, the periodic reports for all reporting periods except the last one (see Article 21) must not contain any financial statements from the beneficiary concerned (or its affiliated entities). The coordinator must include them in the next periodic report after the suspension is lifted or — if suspension is not lifted before the end of the action — in the last periodic report.

ARTICLE 31 — GRANT AGREEMENT SUSPENSION

31.1 Consortium-requested GA suspension

31.1.1 Conditions and procedure

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

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

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

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

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

During the suspension, no prefinancing will be paid. Costs incurred or contributions for activities implemented during grant suspension are not eligible (see Article 6.3).

31.2 EU-initiated GA suspension

31.2.1 Conditions

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

(a) a beneficiary (or a person having powers of representation, decision-making or control, or person essential for the award/implementation of the grant) has committed or is suspected of having committed:

(i) substantial errors, irregularities or fraud or

(ii) serious breach of obligations under this Agreement or during its award (including improper implementation of the action, non-compliance with the call conditions, submission of false information, failure to provide required information, breach of ethics or security rules (if applicable), etc.), or

(b) a beneficiary (or a person having powers of representation, decision-making or control, or person essential for the award/implementation of the grant) has committed — in other EU grants awarded to it under similar conditions — systemic or recurrent errors, irregularities, fraud or serious breach of obligations that have a material impact on this grant

(c) other:

(i) linked action issues: not applicable

(ii) the action has lost its scientific or technological relevance, for EIC Accelerator actions: the action has lost its economic relevance, for challenge-based EIC Pathfinder actions and Horizon Europe Missions: the action has lost its relevance as part of the Portfolio for which it has been initially selected

31.2.2 Procedure

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

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

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

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

Once the conditions for resuming implementation of the action are met, the granting authority will formally notify the coordinator a **lifting of suspension letter**, in which it will set the suspension end date and invite the coordinator to request an amendment of the Agreement to set the resumption

date (one day after suspension end date), extend the duration and make other changes necessary to adapt the action to the new situation (see Article 39) — unless the grant has been terminated (see Article 32). The suspension will be **lifted** with effect from the suspension end date set out in the lifting of suspension letter. This date may be before the date on which the letter is sent.

During the suspension, no prefinancing will be paid. Costs incurred or contributions for activities implemented during suspension are not eligible (see Article 6.3).

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

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

ARTICLE 32 — GRANT AGREEMENT OR BENEFICIARY TERMINATION

32.1 Consortium-requested GA termination

32.1.1 Conditions and procedure

The beneficiaries may request the termination of the grant.

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

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

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

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

32.1.2 Effects

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

The granting authority will calculate the final grant amount and final payment on the basis of the report submitted and taking into account the costs incurred and contributions for activities implemented before the end of work date (see Article 22). Costs relating to contracts due for execution only after the end of work are not eligible.

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

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

After termination, the beneficiaries' obligations (in particular Articles 13 (confidentiality and security), 16 (IPR), 17 (communication, dissemination and visibility), 21 (reporting), 25 (checks,

reviews, audits and investigations), 26 (impact evaluation), 27 (rejections), 28 (grant reduction) and 42 (assignment of claims)) continue to apply.

32.2 Consortium-requested beneficiary termination

32.2.1 Conditions and procedure

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

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

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

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

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

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

32.2.2 Effects

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

(i) a **report on the distribution of payments** to the beneficiary concerned

(ii) a **termination report** from the beneficiary concerned, for the open reporting period until termination, containing an overview of the progress of the work, the financial statement, the explanation on the use of resources, and, if applicable, the certificate on the financial statement (CFS; see Articles 21 and 24.2 and Data Sheet, Point 4.3)

(iii) a second **request for amendment** (see Article 39) with other amendments needed (e.g. reallocation of the tasks and the estimated budget of the terminated beneficiary; addition of a new beneficiary to replace the terminated beneficiary; change of coordinator, etc.).

The granting authority will calculate the amount due to the beneficiary on the basis of the report submitted and taking into account the costs incurred and contributions for activities implemented before the end of work date (see Article 22). Costs relating to contracts due for execution only after the end of work are not eligible.

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

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

If the granting authority does not receive the report on the distribution of payments within the deadline, it will consider that:

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

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

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

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

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

32.3 EU-initiated GA or beneficiary termination

32.3.1 Conditions

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

(a) one or more beneficiaries do not accede to the Agreement (see Article 40)

(b) a change to the action or the legal, financial, technical, organisational or ownership situation of a beneficiary is likely to substantially affect the implementation of the action or calls into question the decision to award the grant (including changes linked to one of the exclusion grounds listed in the declaration of honour)

(c) following termination of one or more beneficiaries, the necessary changes to the Agreement (and their impact on the action) would call into question the decision awarding the grant or breach the principle of equal treatment of applicants

(d) implementation of the action has become impossible or the changes necessary for its continuation would call into question the decision awarding the grant or breach the principle of equal treatment of applicants

(e) a beneficiary (or person with unlimited liability for its debts) is subject to bankruptcy proceedings or similar (including insolvency, winding-up, administration by a liquidator or court, arrangement with creditors, suspension of business activities, etc.)

(f) a beneficiary (or person with unlimited liability for its debts) is in breach of social security or tax obligations

(g) a beneficiary (or person having powers of representation, decision-making or control, or person essential for the award/implementation of the grant) has been found guilty of grave professional misconduct

(h) a beneficiary (or person having powers of representation, decision-making or control, or person essential for the award/implementation of the grant) has committed fraud, corruption, or is involved in a criminal organisation, money laundering, terrorism-related crimes (including terrorism financing), child labour or human trafficking

(i) a beneficiary (or person having powers of representation, decision-making or control, or person essential for the award/implementation of the grant) was created under a different jurisdiction with the intent to circumvent fiscal, social or other legal obligations in the country of origin (or created another entity with this purpose)

(j) a beneficiary (or person having powers of representation, decision-making or control, or person essential for the award/implementation of the grant) has committed:

  (i) substantial errors, irregularities or fraud or

  (ii) serious breach of obligations under this Agreement or during its award (including improper implementation of the action, non-compliance with the call conditions, submission of false information, failure to provide required information, breach of ethics or security rules (if applicable), etc.)

(k) a beneficiary (or person having powers of representation, decision-making or control, or person essential for the award/implementation of the grant) has committed — in other EU grants awarded to it under similar conditions — systemic or recurrent errors, irregularities, fraud or serious breach of obligations that have a material impact on this grant (extension of findings from other grants to this grant; see Article 25)

(l) despite a specific request by the granting authority, a beneficiary does not request — through the coordinator — an amendment to the Agreement to end the participation of one of its affiliated entities or associated partners that is in one of the situations under points (d), (f), (e), (g), (h), (i) or (j) and to reallocate its tasks, or

(m) other:

  (i) linked action issues: not applicable

  (ii) the action has lost its scientific or technological relevance, for EIC Accelerator actions: the action has lost its economic relevance, for challenge-based EIC Pathfinder actions and Horizon Europe Missions: the action has lost its relevance as part of the Portfolio for which it has been initially selected

32.3.2 Procedure

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

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

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

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

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

32.3.3 Effects

(a) for **GA termination**:

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

The granting authority will calculate the final grant amount and final payment on the basis of the report submitted and taking into account the costs incurred and contributions for activities implemented before termination takes effect (see Article 22). Costs relating to contracts due for execution only after termination are not eligible.

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

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

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

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

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

(b) for **beneficiary termination**:

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

(i) a **report on the distribution of payments** to the beneficiary concerned

(ii) a **termination report** from the beneficiary concerned, for the open reporting period until termination, containing an overview of the progress of the work, the financial

statement, the explanation on the use of resources, and, if applicable, the certificate on the financial statement (CFS; see Articles 21 and 24.2 and Data Sheet, Point 4.3)

(iii) a **request for amendment** (see Article 39) with any amendments needed (e.g. reallocation of the tasks and the estimated budget of the terminated beneficiary; addition of a new beneficiary to replace the terminated beneficiary; change of coordinator, etc.).

The granting authority will calculate the amount due to the beneficiary on the basis of the report submitted and taking into account the costs incurred and contributions for activities implemented before termination takes effect (see Article 22). Costs relating to contracts due for execution only after termination are not eligible.

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

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

If the granting authority does not receive the report on the distribution of payments within the deadline, it will consider that:

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

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

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

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

SECTION 3 OTHER CONSEQUENCES: DAMAGES AND ADMINISTRATIVE SANCTIONS

ARTICLE 33 — DAMAGES

33.1 Liability of the granting authority

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

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

33.2 Liability of the beneficiaries

The beneficiaries must compensate the granting authority for any damage it sustains as a result of the implementation of the action or because the action was not implemented in full compliance with the Agreement, provided that it was caused by gross negligence or wilful act.

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

ARTICLE 34 — ADMINISTRATIVE SANCTIONS AND OTHER MEASURES

Nothing in this Agreement may be construed as preventing the adoption of administrative sanctions (i.e. exclusion from EU award procedures and/or financial penalties) or other public law measures, in addition or as an alternative to the contractual measures provided under this Agreement (see, for instance, Articles 135 to 145 EU Financial Regulation 2018/1046 and Articles 4 and 7 of Regulation 2988/95[22]).

SECTION 4 FORCE MAJEURE

ARTICLE 35 — FORCE MAJEURE

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

'Force majeure' means any situation or event that:

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

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

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

CHAPTER 6 FINAL PROVISIONS

ARTICLE 36 — COMMUNICATION BETWEEN THE PARTIES

36.1 Forms and means of communication — Electronic management

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

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

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

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

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

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

36.2 Date of communication

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

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

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

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

36.3 Addresses for communication

The Portal can be accessed via the Europa website.

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

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

ARTICLE 37 — INTERPRETATION OF THE AGREEMENT

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

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

Annex 2 takes precedence over Annex 1.

ARTICLE 38 — CALCULATION OF PERIODS AND DEADLINES

In accordance with Regulation No 1182/71[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.

'Days' means calendar days, not working days.

ARTICLE 39 — AMENDMENTS

39.1 Conditions

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

Amendments may be requested by any of the parties.

39.2 Procedure

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

The coordinator submits and receives requests for amendment on behalf of the beneficiaries (see Annex 3). If a change of coordinator is requested without its agreement, the submission must be done by another beneficiary (acting on behalf of the other beneficiaries).

The request for amendment must include:

- the reasons why
- the appropriate supporting documents and
- for a change of coordinator without its agreement: the opinion of the coordinator (or proof that this opinion has been requested in writing).

The granting authority may request additional information.

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

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

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

[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).

ARTICLE 40 — ACCESSION AND ADDITION OF NEW BENEFICIARIES

40.1 Accession of the beneficiaries mentioned in the Preamble

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

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

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

40.2 Addition of new beneficiaries

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

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

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

Additions are also possible in mono-beneficiary grants.

ARTICLE 41 — TRANSFER OF THE AGREEMENT

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

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

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

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

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

The beneficiaries may not assign any of their claims for payment against the granting authority to

any third party, except if expressly approved in writing by the granting authority on the basis of a reasoned, written request by the coordinator (on behalf of the beneficiary concerned).

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

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

ARTICLE 43 — APPLICABLE LAW AND SETTLEMENT OF DISPUTES

43.1 Applicable law

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

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

43.2 Dispute settlement

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

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

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

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

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

ARTICLE 44 — ENTRY INTO FORCE

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

SIGNATURES

For the coordinator

Konstantinos Alketas Oungrinis with ECAS id n00brslb signed in the Participant Portal on 13/05/2024 at 17:34:26 (transaction id SigId-34942-MQ43MHt6Reg8iXBlyENulHoK3uh1zrvlcGtiJb4CUMYrkJmacTHSCEUj7MzntgcYbedIpJvLK4vfzNifNRCExBG-yntOf97TTHqGzTPAPycp26-1XAFfPtc8B9y0rfT24FuHjxNI4DS8Y8zTeIUJK8r3jP8w6MUVe7xIzJweMwruY0CBmR9zg114odVSf02hY0dfeG). Timestamp by third party at 2024.05.13 17:34:32 CEST

For the granting authority

Signed by Arnoldas MILUKAS with ECAS id milukar as an authorised representative on 14-05-2024 09:18:14 (transaction id SigId-38067-zyW5U0UvyO3d0wwOq7jXAYBDe55xNOX99iChISHeVD1MXBtJHuztxjFhVi3KrMClOWL4n6jFr7Pt8MYoNJIbzsG-yntOf97TTHqGzTPAPycp26-fLHqykItoKzZINf1KeZK0pJYIgmDAIfgwMnNe90NOEDCatqRToy8RnVK0RMEFfINI269mUi5ngQVWLllKHSRpi)
2024.05.14 09:18:23 CEST

ANNEX 1

Horizon Europe (HORIZON)

Description of the action (DoA)

Part A

Part B

DESCRIPTION OF THE ACTION (PART A)

COVER PAGE

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

PROJECT *Grant Preparation (General Information screen) — Enter the info.*	
Project number:	101135275
Project name:	Boosting Circular Systemic Solutions through Virtual Regional Circular Economy Spaces
Project acronym:	CSSBoost
Call:	HORIZON-CL6-2023-CIRCBIO-02
Topic:	HORIZON-CL6-2023-CircBio-02-1-two-stage
Type of action:	HORIZON-IA
Service:	REA/B/03
Project starting date:	fixed date: 1 June 2024
Project duration:	42 months

TABLE OF CONTENTS

PROJECT SUMMARY

Project summary

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

Use the project summary from your proposal.

CSSBoost aims to overcome technological and non-technological CE barriers, minimise CSS application and operational risks and decisively stimulate and maximise the Circular Economy and Bioeconomy Transition in any EU city/region or group of regions. To pursue this, CSSBoost develops a novel CSS Application Framework that views a CSS as a composite living entity that operates and evolves within a CE/CSS Ecosystem and Market, an open (physical) space of city, regional or multi-regional scope, encompassing an area's existing CE market, its value chains and its entire external environment, even extra-regional entities and markets. It also introduces the methodological concept of the CSSBoost Integrated Solution that involves the integration of one or more CSS within a digital environment, enhanced by tailored methodology and procedures. This physical system is virtualised, monitored, analysed and assessed by developing the key CSSBoost innovation, the Virtual Regional CE/CSS Ecosystem and Market (VCEM). CSSBoost designs a set of diverse Exemplary CSSs, both as transition tools and to validate and promote its ideas by applying and demonstrating them in five city, regional and interregional Pilot Cases. The exemplary CSSs respond to different challenges, barriers, needs and feasibilities across EU and target different product value chains, as delineated in the EU's Circular Economy Action Plan (Water, Food, and Nutrients; Plastics; Batteries & Vehicles). CSSBoost develops both its innovations and pilots by applying a rigorous SotA co-creation environment and instruments and SSH methods and procedures. It also develops replication, organisational, business and exploitation plans for the uptake, replication and upscaling of its solutions, as well as education and training programs and social innovation actions.

LIST OF PARTICIPANTS

PARTICIPANTS

Grant Preparation (Beneficiaries screen) — Enter the info.

Number	Role	Short name	Legal name	Country	PIC
1	COO	TUC	POLYTECHNEIO KRITIS	EL	924773848
2	BEN	MAG	MAGGIOLI SPA	IT	996621457
3	BEN	CAS	CAS SOFTWARE AG	DE	999797334
4	BEN	KRUM	KRUMEDIA GMBH	DE	910473332
5	BEN	TZHORB	TECHNOLOGIEZENTRUM HORB GMBH & CO. KG	DE	884476362
6	BEN	BWCON	BWCON RESEARCH GGMBH	DE	891746415
7	BEN	WFG	WIRTSCHAFTSFORDERUNG ZUKUNFTSREGIONNORDSCHWARZWALD GMBH	DE	928898579
8	BEN	UNIVPM	UNIVERSITA POLITECNICA DELLE MARCHE	IT	999866689
9	BEN	CIIP	CICLI INTEGRATI IMPIANTI PRIMARI SPA	IT	891922276
10	BEN	UVIC	FUNDACIO UNIVERSITARIA BALMES	ES	999837977
11	BEN	HMU	ELLINIKO MESOGEIAKO PANEPISTIMIO	EL	899132771
12	BEN	MACC	MESOGEIAKO KENTRO IKANOTITON	EL	888255288

PARTICIPANTS

Grant Preparation (Beneficiaries screen) — Enter the info.

Number	Role	Short name	Legal name	Country	PIC
			AGRODIATROFIS IDIOTIKI KEFALAIOUCHIKI ETAIREIA		
13	BEN	CRETE	PERIFEREIAKI ANAPTYXIAKI ETAIRIA KRITIS AE	EL	887183147
14	BEN	PARTICLE	PARTICLE SUMMARY	PT	907400372
15	BEN	CARRIS	COMPANHIA CARRIS DE FERRO DE LISBOA, E.M., S.A.	PT	904315481
16	BEN	ADR	ADRESTIA EREVNITIKI IDIOTIKI KEFALAIOUXIKI ETAIREIA	EL	893378925
17	BEN	MOTON	MOTONIOUS IKE	EL	882855880
18	BEN	ACCELI	ACCELIGENCE LTD	CY	900037005
19	BEN	SCRC	SOCIAL CRM RESEARCH CENTER E.V.	DE	915192576
20	BEN	ACR+	ASSOCIATION OF CITIES AND REGIONS FOR SUSTAINABLE RESOURCE MANAGEMENT	BE	952441061
21	AP	ICL	IMPERIAL COLLEGE OF SCIENCE TECHNOLOGY AND MEDICINE	UK	999993468

LIST OF WORK PACKAGES

Work packages

Grant Preparation (Work Packages screen) — Enter the info.

Work Package No	Work Package name	Lead Beneficiary	Effort (Person-Months)	Start Month	End Month	Deliverables
WP1	Project Management	1 - TUC	70.00	1	42	D1.1 – Data Management Plan (v1) D1.2 – Data Management Plan (v2) D1.3 – Data Management Plan (final)
WP2	CSSBoost Application Framework and Design of Solutions for the Pilot Cases	11 - HMU	141.00	1	28	D2.1 – CSS Inventory D2.2 – Application Planning Toolkit D2.3 – Stakeholders' Engagement Plan D2.4 – Baselines, Use Cases and Application Plans D2.5 – CSSBoost Application Framework
WP3	CSS Lifecycle Management and CE Stakeholders Decision Support Services	3 - CAS	237.00	8	38	D3.1 – CSS Lifecycle Management and CE Stakeholders Decision Support Services (v1) D3.2 – Advanced Adaptation and Scenario Assessment Services (final) D3.3 – Circular Value Chain Planning and Multi-Criteria Configuration Services (final) D3.4 – CE Risk Analysis and Assessment Services (final) D3.5 – AI Inference for Operational Flows Forecasting Problem Detection and Response Services (final) D3.6 – Dynamic and On-demand LCA and Sustainability Balanced Scorecards of CSS Value Chains (final) D3.7 – CSS Marketplace and P2P Trading Services (final)

Work packages

Grant Preparation (Work Packages screen) — Enter the info.

Work Package No	Work Package name	Lead Beneficiary	Effort (Person-Months)	Start Month	End Month	Deliverables
						D3.8 – CSS Promotion, Communication and Citizens Participation Services (final)
WP4	CE/CSS Ecosystem Virtualisation and Digital Platform Development	2 - MAG	263.00	4	40	D4.1 – Architecture and Specifications for Digital System D4.2 – CE/CSS Ecosystem Knowledge Core D4.3 – CE/CSS Data Spaces and Data Acquisition System D4.4 – Digital Twin Models of Regional CE Ecosystem and Market D4.5 – Visualisations of Regional CE Ecosystem and Market D4.6 – Regional Information Sharing Platform (v1) D4.7 – Regional Information Sharing Platform (final)
WP5	CSSBoost Solution Integration, Demonstration and Evaluation in Pilot Cases	8 - UNIVPM	470.00	6	41	D5.1 – Pilot Setup, Demonstration, Monitoring and Evaluation Plans D5.2 – Integrated Pilot 1 Activities Report D5.3 – Integrated Pilot 2 Activities Report D5.4 – Integrated Pilot 3 Activities Report D5.5 – Integrated Pilot 4 Activities Report D5.6 – Integrated Pilot 5 Activities Report D5.7 – Pilots Circularity and Sustainability Assessment and Validation (v1) D5.8 – Pilots Circularity and Sustainability Assessment and Validation (final) D5.9 – CSSBoost Solutions Evidence Base

Work packages

Grant Preparation (Work Packages screen) — Enter the info.

Work Package No	Work Package name	Lead Beneficiary	Effort (Person-Months)	Start Month	End Month	Deliverables
WP6	Solution Uptake, Replication, Business Planning and Exploitation	6 - BWCON	157.00	4	42	D6.1 – Upscale and Replication Plans and Guidelines D6.2 – Market Analysis and Business Plans for CSSBoost Solutions (v1) D6.3 – Market Analysis and Business Plans for CSSBoost Solutions (final) D6.4 – Circular Economy Investment Plans for CSS and CSSBoost Solutions D6.5 – CSSBoost Assets Exploitation and IPR Plan (v1) D6.6 – CSSBoost Assets Exploitation and IPR Plan (final) D6.7 – CSSBoost Open Circularity EcoSphere
WP7	Outreach Activities for Impact Maximisation	20 - ACR+	191.00	1	42	D7.1 – Dissemination and Communication Plan (v1) D7.2 – Dissemination and Communication Plan (final) D7.3 – First Policy Brief for Regional CE Transition D7.4 – Second Policy Brief for Regional CE Transition D7.5 – Training and Education Material and Curricula D7.6 – Social Innovation Actions Plan D7.7 – Social Innovation Activity Report

Work package WP1 – Project Management

Work Package Number	WP1	Lead Beneficiary	1 - TUC
Work Package Name	Project Management		
Start Month	1	End Month	42

Objectives

To manage the project through careful internal communication procedures, activity planning, financial management, technical and administrative coordination, organisation of meetings, centralisation of project findings, risk management, problem solving, reporting, quality control and involvement of external experts. In addition, to monitor and steer the project, ensuring that contractual, legal, social, ethical and gender equality requirements are respected and applied, while safeguarding data and intellectual property rights.

Description

Task 1.1: Project Coordination and Management; Lead: TUC; Participants: ALL; Duration: M01-M42
This Task will set and implement the management process for the consortium, and lead, coordinate, and manage the project accordingly. TUC, as Project Coordinator (PC), will be the main interface with the EC and will implement the general administrative and financial coordination in accordance with the Grant Agreement (GA) stipulated with the EC and the Consortium Agreement (CA) with the partners. The Task will also prepare the consortium meetings and produce internal periodic activity reports, used to feed the official technical and financial reports to be submitted to the EC. CSSBoost will use management tools with online workspaces, specially designed for collaborative projects. A Project Management Handbook and guides for the collaborative space will be produced on M03 and will be included in the first contractual periodic report (M20).

Task 1.2: Quality Monitoring and Risk Management; Lead: ICL; Duration: M01-M42
This Task will ensure the implementation of an adequate risk management system that allows timely and accurate registration of potential risks and barriers to the achievement of the expected impacts. This will guarantee that the project's scientific & technical results and deliverables are produced following high-quality standards and that risks are continuously assessed and managed following the four subsequent steps: a) risk identification, b) risk quantification, c) risk response, d) risk control and report. Quality assurance processes will be set up, defining the project's organisation, roles and responsibilities with emphasis on quality control and assurance activities. The Task will be led by Prof. Evina Katsou (ICL), the project's dedicated Risk Officer.. All potential issues arising during the project will be reported in the contractual periodic reports (M20/42). A Quality Assurance and Risk Management Plan will be produced in M03, and will be included in the first contractual periodic report (M20), to provide a single point of reference to be followed

Task 1.3: Data Management and Protection; Lead: HMU; Duration: M01-M42
This Task will implement the Data Management Strategy, as detailed in §1.2.9 of Part B. A Data Management Plan (DMP) will provide an overview of data sets collected, processed and generated, any IPR associated with the data sets, the procedures to make data publicly available through data repositories, and personal data management approaches with due consideration to GDPR. The Task will be led by Prof. Evagelos Markakis (HMU), the project's dedicated Data Officer. HMU also oversees the CSSBoost framework and its information model and confidentiality and develops services related to e-commerce and trading, as well as the Open Circularity EcoSphere. All these activities raise a multitude of issues related to data management, visibility and protection, particularly data collected from regional partners or produced by the pilot operations. For this reason, some of HMU effort has been redirected to this Task. The DMP will be compiled in M06 (D1.1) and updated during the project in M24 (D1.2) and M42 (D1.3).

Task 1.4: Legal, Social, Ethics and Gender Requirements and Monitoring; Lead: UNIVPM; Duration: M01-M42
This Task will determine the legal, social and ethics requirements that the project must comply with, including gender issues and personal data protection. CSSBoost foresees interactions with persons outside the consortium mostly in T2.2 (co-creation activities), WP5 (pilot activities) and WP7 (external stakeholders' engagement in communication, dissemination and networking activities). Social and ethics issues, potentially arising from the CSS and value chains established in the pilots, will be assessed and acted on. All relevant activities will be subject to ethics review and approval procedures by the institution conducting them. The Task will be led by Prof. Francesco Fatone (UNIVPM), the project's dedicated Ethics Officer. UNIVPM also leads the pilots and some of its effort concerning social issues and SSH has been redirected to this Task. Of particular concern will be ethics and social issues related to the interactions with citizens and the Market, behavioural change and citizen science instruments used, as well as issues related to the establishment

of CoPs, educational programs and social innovation actions, requiring increased social participation. A person with appropriate background in ethics (Ethics Mentor) will also be appointed in the first 2 months of the project, to monitor the currently identified issues The activities of the Ethics Officer will be reported in the contractual periodic reports (M20/42).

Task 1.5: External Advisory Board and Liaison with CCRI-CSO; Lead: TUC; Duration: M01-M42
A project External Advisory Board (EAB) will be set up to evaluate project work and provide feedback to outcomes and accomplishments. It will also advise on linking up with other projects and initiatives to increase impact. The EAB will involve at least 4 experts from a range of disciplines (Circularity, ICT, Engineering, Process, etc.) covering the multi-disciplinary space related to the CSSBoost activities. The members of the EAB will be identified in the first periodic repot, including their letters of acceptance. This Task will also establish a liaison with the CCRI Coordination and Support Office (CCRI-CSO), ensuring that CSSBoost activities will be carried out in coordination and cooperation with the office, following the guidelines and the mentality of the CCRI. All recommendations from the EAB and the CCRI-CSO will be included in the contractual periodic reports (M20/42).

Work package WP2 – CSSBoost Application Framework and Design of Solutions for the Pilot Cases

Work Package Number	WP2	**Lead Beneficiary**	11 - HMU
Work Package Name	CSSBoost Application Framework and Design of Solutions for the Pilot Cases		
Start Month	1	**End Month**	28

Objectives
To develop a novel Application Framework for the CSSBoost integrated solutions and apply it to design the solutions to be implemented in the pilot cases. It pursues these objectives by: Analysing and classifying existing CSS practices and applications; Employing stakeholder co-creation processes and SSH procedures; Defining, pre-assessing and planning a set of enriched integrated CSSBoost solutions for the project pilot areas.

Description
Task 2.1: CSS Practices and Application Planning Methodology; Lead: TUC; Participants: MAG, CAS, CIIP, HMU, MACC, CRETE, PARTICLE, CARRIS, ADR, MOTON, ACCELI; Duration: M01-M14 This Task will analyse CE and CSS-related background knowledge and experience, including results of previous projects and applications worldwide, to acquire transferable knowledge for CSS application. A comprehensive Inventory of existing CSS practices, technologies and application cases will be identified, classified and assessed, with respect to capacity, efficiency, replicability and key factors of their operative environments. Based on this analysis, a CSS Application Planning Toolkit (APT) will be developed to be used by T2.3 for pilot solutions design, WP3 for the provision of stakeholder services and WP5 for the support and evaluation of pilot solutions. The ATP will include: (i) A database with the complete CE/CSS inventory; (ii) Methods for CSS selection and configuration (iii) Methods for CSS evaluation and for assessing feasibility, viability, sustainability; (iv) Methods for qualitative risk pre-assessment and contingency tables, addressing technical, safety, security, social, environmental, financial and legal aspects of CSS applications; (v) Procedural roadmaps to overcome barriers and take advantage of leverage points. The assessment of CSSs (part iii) will be based on a suitable multi-criteria methodology, to rank practices and technologies based on pre-defined criteria and objectives with the relevant stakeholders. This can facilitate the exploitation of the CSSBoost solutions (in T6.4) providing a strategic planning tool for circular solutions on a regional level. Results will be reported in D2.1 (inventory) in M10 and D2.2 (toolkit) in M14. Task 2.2: Empowerment and Engagement of Stakeholders in SSH and Co-Creation Environments; Lead: ACCELI; Participants: TZHORB, WFG, CIIP, MACC, CRETE, SCRC; Duration: M01-M12 This Task will engage stakeholders in SSH and CSSBoost pilot activities by establishing efficient co-creation environments and organising five (four regional and one multiregional) Communities of Practice (CoPs). Prior to engagement, a comprehensive analysis will be conducted, by answering strategic ‘who’, ‘what’, ‘how’ and ‘when’ questions related to the reasons why each stakeholder is important for the project and to the benefits could gain from collaborating in the CSSBoost activities. This analysis will identify and categorise the relevant stakeholders (e.g. local communities, first responders, policy-makers, public authorities, investors, organisations, volunteers and other key actors), in order to understand their roles, interests, influence, and potential contribution to CSS mapping, design and

implementation (inline to the CCRI methodology). Engagement instruments will include: (i) networking with the CCRI, the EU CSS space and related projects, (ii) regional Living Labs (LLs) and (iii) thematic Focus Groups and Workshops. A dynamic network analysis within the context of a quintuple helix participatory approach will be followed, to identify the complete chains of relationships between CSS impacts and the affected community. Within these environments, pilot requirements and quality criteria will be determined and properly formulated. Also, opportunities, potential technological and non-technological barriers, risks, leverage points and constraints for CSS in general and CSSBoost solutions in particular will be analysed and assessed. Various local social, political and ideological aspects and governance structures will be examined to identify where risk, benefits and impacts are generated. A Stakeholders' Engagement Plan (SEP) will be delivered by the end of the Task. Throughout the duration of the project, the CoPs will be engaged by regular (physical and virtual) meetings, attracting new stakeholders and they will be leveraged as real-world testbeds for testing and validating the CSSBoost solutions and setting in motion pilot-specific social innovation actions. The SEP will be a living document, continuously updated, defining and monitoring the governance of the stakeholders' engagement process in terms of planning, managing and monitoring the activities and commitments of interested parties. The SEP will be delivered in M12 (D2.3)

Task 2.3: Baseline Analysis, Specification and Assessment Methodology of Exemplary CSS; Lead: ICL; Participants: TUC, MAG, CAS, UNIVPM, CIIP, HMU, PARTICLE, CARRIS, ADR; Duration: M01-M16
This Task will design and plan the application of five exemplary integrated CSSBoost solutions to be piloted and demonstrated (in WP5) at the pilot regions. Baselines (As-Is situations) for all cases will be identified, to be used as the basis for pilot assessment (T5.7). The entire regional CE markets and their environments will be reviewed and analysed based on the knowledge acquired in T2.2, including any relevant pre-existing CE practises, streams and value chains. The baseline analysis will consider and apply appropriate Metabolism Approaches (e.g., urban metabolism, territorial metabolism, etc.) that enable the mapping, quantification and benchmarking of the main resources, materials and waste flows in the corresponding areas. Afterwards, user requirements from T2.2 and methods and tool developed in T2.1, will be used as a basis to develop specific Use Case Scenarios in pilot regions (To-Be situations) and to define in detail their Application Plans, with their business goals and quality criteria. This Task will also develop guidelines for a holistic and systemic circularity and sustainability assessment of CSS. The guidelines will follow and advance the CCRI methodology and the corresponding Self Assessment Tool. Circularity and sustainability assessment will be based on the ISO 14040 and the new draft ISO 59020 on circularity measurement and assessment, integrating material/substance flow analysis (M/SFA), LCA, LCC, social impact assessment and natural capital accounting to enable the evaluation of the value created by the solutions, as well the created value sharing among the different stakeholders. The guidelines will be produced in M12 and will be followed to conduct both the preliminary assessment of the solutions and the ex-post assessment of the solutions (T5.7). The results of this Task will be reported in D2.4 (M16).

Task 2.4: Holistic Application Framework for CSSBoost Solution; Lead: HMU; Participants: TUC, TZHORB, BWCON, CIIP, MACC, CRETE, PARTICLE, CARRIS, ADR, MOTON, SCRC, ACR+; Duration: M01-M28
This Task will use information and knowledge gained by T2.2 co-creation activities and input from WP3-7, to fully develop the CSSBoost concepts and produce a novel holistic Application Framework for CSSBoost integrated solution (as detailed in §1.2.1.3 of Part B). The framework will target the optimum application, assessment and lifecycle management of CSS and tie them together under a common methodological frame, fully aligned with CCRI methodology, EU CEAP directives, EU bioeconomy strategy and ISO 59000 series. The CSSBoost generic Integrated Solution package (§1.2.1.2 of Part B) will be specified, complemented by the holistic and systemic circularity and sustainability assessment guidelines developed in T2.3. In addition, the functional requirements for the CSSBoost decision support methodologies and tools and the regional information sharing platform, will be determined, for various use case classes (region/CSS type/stakeholder class combinations). The framework will be complemented by defining a generic CSS Social Innovation Package, further specialising it for the pilot regions. Building on T2.2 results, social provisions for the optimum application and operation of CSSBoost solutions will be analysed, targeting civil society acceptance, behavioural change and stakeholder activation and participation. The results will be further employed in WP4 to develop respective tools and in WP5 to design the architecture of the digital system. A preliminary, internal to the consortium, version of the framework will be produced in M12 (incl. the assessment guidelines). The final version of the framework, incl. additional knowledge gained by WP3-7 will be delivered in M28 (D2.5).

Work package WP3 – CSS Lifecycle Management and CE Stakeholders Decision Support Services

Work Package Number	WP3	**Lead Beneficiary**	3 - CAS
Work Package Name	CSS Lifecycle Management and CE Stakeholders Decision Support Services		

Start Month	8	End Month	38

Objectives
To develop or adapt comprehensive information, technical knowledge and decision support methodologies and tools, providing services to each major stakeholder class involved in CE and aimed at boosting CSS performance, promoting CE and expanding its range. In WP4 these will be paired with advanced user and machine interfaces and integrated into the digital platform.

Description
All services and tools will be delivered in two rounds. First-round versions will be delivered in M18 (D3.1) to be integrated in the simplified version of the digital platform (T3.6) and support the 1st phase of the pilot activities. The second-round versions of the services and the corresponding tools will be delivered in M38 (D3.2-D3.8) to be integrated to the full version of the digital platform and support the 2nd phase of the pilot activities. Task 3.1: Advanced Adaptation and Scenario Assessment Services; Lead: TUC; Participants: MAG, UNIVPM, ADR, MOTON; Duration: M08-M38 This Task will utilise the holistic CE/CSS Ecosystem and Market models (developed in T4.4), providing advanced simulation services. A live image of the VCEM, updated in near-real-time, will be provided and the simulation mechanism will be used to make copies of the current models, apply parametric or even structural (e.g. new value chain) changes to them, and run a detailed simulation & assessment, in safe mode and in isolation from the digital shadow, i.e. without interrupting its update or disturbing its state. Such simulations of alternative scenarios can be used to evaluate projected conditions or proposed measures, before their actual occurrence or application, and to support tactical and strategic decision (assess proposed schemes or actions as part of a CE environment adaptation support mechanism, test contingency scenarios in response to feedback from other tools, etc.). The services will be delivered in M18 (D3.1 – first round version) and M38 (D3.2 – final version). Task 3.2: Circular Value Chain Planning and Multi-Criteria Configuration Services; Lead: CAS; Participants: MAG, KRUM; Duration: M08-M38 This Task will develop a set of technical decision support services oriented towards prospective and dynamic circular value chain (producers, processors, end-users) and financiers that will facilitate the formation of new CE business partnerships. The following software components shall be integrated and demonstrated, supported by a detailed software architecture that shall ensure the replicability and scalability of the solution: (i) CSSBoost Reverse and multi-criteria Configurator with interfaces to user specifications, LCA databases and governmental metrics (KPIs); (ii) Supply chain digital model with integrated industrial data on production capacity. The outcomes of these services (tools) would be a digital model of the supply chain. Services will include finding optimal CE matches taking also into account governmental objectives, infrastructure, logistics and technology solutions, availability and feasibility. The services will: (a) Propose alternatives and configurations of their technical feasibility using a semantic and AI based approach on the characteristics of the resource streams; (b) Assess the economic viability of all technically feasible CE schemes. Value chain, industry and CE streams assessment services will be based on the dynamic and on-demand use of both the T3.5 assessment module and the expected final KPIs by the end users. This Task will also develop the Digital Product Passports to be applied in Pilot 3. The services will be delivered in M18 (D3.1 – first round version) and M38 (D3.3 – final version). Task 3.3: CE Risk Analysis and Assessment Services; Lead: ICL; Participants: UNIVPM; Duration: M08-M38 This Task will develop a dynamic CE Risk Assessment Tool (Circ-RAT) considering the economic, social, environmental, and technological dimensions. Simulation services (T3.1) based on DT models will be integrated to enable the investigation of alternative scenarios and supervised and unsupervised ML techniques will be applied to predict process and supply chain risks that could deteriorate performance, predict key parameters of the system, and provide fast insights into CSSBoost pilots performance. Circ-RAT will identify the cases and conditions under which the CSS supply chains perform better in terms of circularity and sustainability. Additionally, if unintended changes occur to the system, circularity hotspots and risks will be identified and mitigation measures will be proposed. The services will be delivered in M18 (D3.1 – first round version) and M38 (D3.4 – final version). Task 3.4: AI Inference for Operational Flows Forecasting Problem Detection and Response Services; Lead: MAG; Participants: TUC, ADR; Duration: M08-M38 This Task will develop a KC-based cognitive component that enhances the intelligence and autonomy of CSSBoost solutions and their lifecycle management, using AI methods to investigate, ‘understand’ and ‘act’ dynamically on incoming data. The component will encapsulate an array of AI services for inference of occurring events or emerging

needs/opportunities for optimisation, imbalances or anomalies in the monitored value chains, as well as logistics optimisation and supply-demand predictive balancing. Prescriptive analytics for event/problem detection will also be developed. Anomaly detection services will produce events, risk prediction and root cause analysis for detected anomalies/problems. Upon event/problem/opportunity detection, expert knowledge from the KC will be coupled with ML approaches to allow data-driven understanding of underlying causal relations. Proactive or remedial actions will be recommended to prevent a problem, adjust the involved CE processes or value chains or take advantage of emerging opportunities. The services will be delivered in M18 (D3.1 – first round version) and M38 (D3.5 – final version).

Task 3.5: Dynamic and On-demand LCA and Sustainability Balanced Scorecards of CSS Value Chains; Lead: TUC; Participants: UNIVPM, MOTON; Duration: M08-M38
This Task will develop a dynamic assessment methodology and tools to assess CE/CSS viability, efficiency and sustainability at various aggregation levels (industry, CE stream, CSS, value chain, sector, region/market). At the CSS value chain and regional ecosystem levels, a novel dynamic LCA methodology will be developed for assessing the environmental and economic impacts of the discharge and/or disposal on one side vs its recycling in CSS schemes on the other, dynamically (using live data) or in summary over a time period (e.g. fiscal). To quantify sustainability performance in a balanced and comprehensive way, a Sustainability Balanced Scorecard (SBS) methodology will be implemented, easing the assessment of circularity potential and impact across the value chain. A two-fold approach will be followed where at first the criteria for circularity and value chain performance will be studied while later on specific KPIs, customised to each pilot case will be defined. The major part of the analysis is done dynamically, following changes in the monitoring data streams signalled by appropriate triggers. Provision for benchmarking a process, industry, value chain or region, to assess its position against competition or progress in time, will also be made in that context. The services will be delivered in M18 (D3.1 – first round version) and M38 (D3.6 – final version).

Task 3.6: CSS Marketplace and P2P Trading Services; Lead: HMU; Participants: BWCON, MACC, CRETE, PARTICLE, CARRIS, ADR; Duration: M08-M38
This Task will develop a technology, feedstock, product and resource Marketplace aimed at all stakeholders, SMEs, consultants and product users. The Marketplace will be enhanced with the information and knowledge contained in the Technology Evidence Base (T5.8), providing technology data, operational, legal and regulatory aspects. It will offer an open innovation environment to allow a diversity of CE-related professionals and companies to upload information about their by-products, feedstock, tools, technologies, products and services. Provided services include support for development and marketing products and services, information queries and reporting. This will be complemented by focusing in the lower (peer-to-peer, P2P) level of the CE market, with the purpose of empowering active participation of companies and citizens, providing increased flexibility in a decentralised business model. The P2P trading information network will use blockchain and smart contract-based techniques to allow assigning identities to participants, safe transactions with privacy and transaction flow control, while at the same time providing insights and additional leverage for regulating circular value chains. The services will be delivered in M18 (D3.1 – first round version) and M38 (D3.7 – final version).

Task 3.7: CSS Promotion, Communication and Citizens Participation Services; Lead: CAS; Participants: MAG, TZHORB, BWCON, MACC, CRETE, PARTICLE, ADR; Duration: M08-M38
This Task will develop information services that enable citizens to have positive impacts on CE/CSS application and expansion. At a first level citizen awareness regarding CE/CSS and their impact on society will be pursued, aiming at inducing behavioural changes. Toward this goal, suitable information about the CE environment and its current state and prospects will be provided combined with promotion communication techniques, as well as a personal nudge engine and smartphone apps that will provide information, through a CE performance calculator, citizen observation tool and an expert system offering advice about options and recommended actions. On a second level, the communication and support of direct benefits to citizens from the regional CE environment will be pursued, targeting opportunities for education and training, job creation and availability, business start-up, etc. The services will be delivered in M18 (D3.1 – first round version) and M38 (D3.8 – final version).

Work package WP4 – CE/CSS Ecosystem Virtualisation and Digital Platform Development

Work Package Number	WP4	**Lead Beneficiary**	2 - MAG
Work Package Name	CE/CSS Ecosystem Virtualisation and Digital Platform Development		
Start Month	4	**End Month**	40

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Objectives
To develop the top level of CSSBoost integrated solutions, the Regional Information Sharing Platform and its key digital components. It will integrate all services, tools and components, developed in WP3, and develop methods and components needed for the monitoring and sharing of information generated by one or more CSS or a CE ecosystem and CE market, as well as base functionalities and user interfaces. In this context WP4 will: (i) Design the platform's software architecture, services, data and functional models and specs, in T4.1; (ii) Develop a CE-specific ontology, taxonomy and data model, in T4.2; (iii) Design an interoperable distributed IoT real-time monitoring smart network for CSSs and value chains, in T4.3; (iv) Develop a networking layer with distributed edge modules for data communication across multiple domains; (v) Develop a CE/CSS specific Data Space, in T4.3. (vi) Develop a semantic-enabled context broker will be developed with comprehensive provisions for dta homogenisation an information confidentiality, in T4.3; (vii) Develop a dynamic hierarchical (multi-stage) cognitive model for the regional CE ecosystem and CE market, including CSSs and their value chains, in T4.4; (viii) Develop visualisation module for the CSS Ecosystem and Market including generic and pilot-specific dashboards, in T4.5; (ix) Integrate all modules developed in WP4-5 to produce the CSSBoost Digital Platform.

Description
Task 4.1: Architecture and Technical Specifications for the CSSBoost Digital System; Lead: MAG; Participants: TUC, CAS, KRUM, UNIVPM, HMU, MACC, CRETE, PARTICLE, ADR, MOTON, ACCELI; Duration: M04-M18 This Task, in line with T2.4, will elaborate on the functional and not functional requirements and will develop the software architecture and for the CSSBoost digital platform and VCEM. This will take the form of components diagrams with the incorporation of the tools to be developed in WP3. It will also define the basic interactions among components along with indicative data flows for the pilots illustrating how the tools developed in WP3 and WP4 will work together. Centralised, distributed, federated and mesh architectures will be analysed and selected depending on regional specificities. The architecture and the specs will be delivered in M18 (D4.1). Task 4.2: Knowledge Core Representation and Semantic Framework; Lead: HMU; Participants: MAG, CAS, KRUM, PARTICLE, ADR, MOTON, ACCELI, ACR+; Duration: M08-M28 This Task will fully utilise all available knowledge about the CE/CSS Ecosystem and Market by developing a Knowledge Graph (KG) model representation, maintained in the Knowledge Core (KC) of the system. All relevant pieces of knowledge regarding the CE/CSS environment will be either represented within the network's structure or connected to it. CE knowledge will include regulations, facts and rules, e.g., about circularity clauses in public procurement offers. Data retrieval will also be redirected through and controlled by the KC. As a result, the KC will enable the integration of heterogeneous, even unstructured, data from diverse sources, allowing for flexible and smart knowledge and data querying, enabling cognitive capabilities in the CDT. The KC will be delivered in M28 (D4.2). Task 4.3: CE/CSS Data Spaces and Data Acquisition System; Lead: PARTICLE; Participants: MAG, HMU, ADR; Duration: M04-M18 This Task will design and implement the Data Acquisition and Management System (DAMS). The data acquisition component will include a distributed smart IoT monitoring network and storage of regional scope, that ensure continuous, uninterrupted acquisition of reliable, cyber-secure and homogenised data that will enable timely and comprehensive knowledge of CSS resources, streams, supply and demand, stakeholders and transactions. It will also perform edge processing within the distributed architecture, allowing large datasets to be stored across heterogeneous computer resources and provide data integrity mechanisms. The data management and sharing component of DAMS will collect, validate, secure, manage and provide all information relevant to CE/CSS. A CE/CSS Data Space will be developed which will handle three types of data, namely open (available to all such as region sustainability KPIs), shared (available to specific groups such as factories, waste collection, service providers, etc.) and closed (sensitive data for limited access, or data that need to be protected based on GDPR). The IDS-RAM3 reference architecture will be followed to achieve sharing different types of data among users in a trusted and secure way. A semantic-enabled context broker will be developed for homogenising information from different data sources, enabling compatibility with reference architectures (e.g. FIWARE) and providing context information to support data visualisation, exploration and analytics for CE. The DAMS will be delivered in M18 (D4.3). Task 4.4 Digital Twin Modelling of the Regional CE Ecosystem and Market; Lead: MAG; Participants: TUC, MAG, ADR; Duration: M08-M28 This Task will develop a dynamic and hierarchical composite of DT models for individual value chains, as well as the entire regional CE Ecosystem and Market. To this end, it will incorporate combined city/regional/ interregional models defined in T4.2 and will create dynamic value chains and CE/CSS entities, all of them participating in the pilot

ecosystems. This combination is innovative and will be realised through different hierarchical networks of DTs: from basic level (atomic entity) to network level (e.g., a CE value chain), to network of networks (city/regional level, etc.). In each DT and hierarchy – depending on the needs for monitoring and decision-making – relevant tools and services (developed in WP3) will be integrated. The DTs will be delivered in M28 (D4.4).

Task 4.5: Visualisations of the Regional CE Ecosystem and Market; Lead: KRUM; Participants: MAG, ACCELI; Duration: M08-M30
This Task will create the necessary visualisations for the CSS Ecosystem and Market. Generic UIs and pilot-specific dashboards will be developed in a smart way to allow for ease of configuration per user. As a basis, the Smart City platform of KRUM will be used, and wherever possible, generic dashboard widgets will be created, which will be easily deployed per pilot case and with limited development effort. Specific visualisation tools will also be integrated within the platform through widgets. The visualisation module will be delivered in M30 (D4.5).

Task 4.6: Integrated Regional Information Sharing Platform; Lead: MAG; Participants: TUC, CAS, KRUM, UNIVPM, HMU, MACC, CRETE, PARTICLE, ADR, MOTON, ACCELI, ACR+; Duration: M13-M40
This Task will follow the architecture and functional model specified in T4.1 to integrate all digital components developed by WP3 and WP4 into a web digital platform that will enable the lifecycle management of the CSS to be integrated in WP5 on a regional level, as well as the sharing of information among all CE stakeholders and the provision to them of decision support services, according to the CSSBoost solutions Application Framework (T2.4) and its information management strategy. The platform integration will be done in 7 successive layers: (a) integration of T4.2 and T 4.4 components into a CDT; (b) connection of DAMS to the CDT; (c) integration of CDT, DAMS and the visualisation module of T4.5 in the web platform; (d) integration of WP3 tools and services into the platform; (e) exporting services and tools to all users and providing a set of tailored interfaces, and (f) customising the platform for specific use cases. A data and communications bus will connect all components, while data pipelines will ensure that the dynamic model will be continuously updated with real-time information. Applications Programming Interfaces will be created for all internal digital services, to be used in developing and providing the tools and services as well as future addition of new tools. A simplified version of the web platform with the DAMS and the first-round version of the pilot-supporting tools will be delivered in M18 (D4.6). The full version of the platform will be delivered in M40 (D4.7).

Work package WP5 – CSSBoost Solution Integration, Demonstration and Evaluation in Pilot Cases

Work Package Number	WP5	**Lead Beneficiary**	8 - UNIVPM
Work Package Name	CSSBoost Solution Integration, Demonstration and Evaluation in Pilot Cases		
Start Month	6	**End Month**	41

Objectives
To implement customised integrated CSSBoost solutions and to demonstrate and assess them in five city/regional/ multiregional pilots, against scenarios, goals and requirements set by pilots' stakeholders. In this context WP5 will: (i) Organise and mobilise regional actors/stakeholders, in T5.1; (ii) Develop demonstration, validation and evaluation program, in T5.1; (iii) Prepare and deploy tailored integrated CSSBoost solutions and establish their value chains. In T5.2-5.6; (iv) Demonstrate and validate the CSSBoost solutions, in T5.2-5.6; (v) Perform a circularity and sustainability assessment and validation of the CSSBoost solutions to the pilot cases, in T5.7; (vi) Derive info for the commercialisation, replication and upscaling of CSSBoost solutions by developing a Technology Evidence Base, in T5.8.

Description
Task 5.1: Pilots Preparation and Activity Planning; Lead: UNIVPM Participants: TUC, MAG, CAS, KRUM, TZHORB, WFG, CIIP, UVIC, HMU, MACC, CRETE, PARTICLE, CARRIS, ADR, MOTON, ACR+; Duration: M6-M15 This Task, in collaboration with T2.2, will engage pilot case partners in framing and planning all pilot activities, including the demonstration, validation and evaluation of solutions. It will deal with the following activities: (i) Design the implementation (in T5.2-T5.6) of the use case scenarios (T2.3) in each pilot, defining the overall strategy and the means; (ii) Determine assessment and validation procedures and tools in accordance to the methodology laid out by the CSSBoost Application Framework (T2.4); (iii) Develop demonstration action plans, organisation plans, schedules and contingency tables. Results will be reported in M15 (D5.1).

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Pilot Operations (T5.2-T5.6)
All pilot operations will be carried out in T5.2-5.6 starting with tabletop exercises, involving the CoPs established in each area (T2.2) in scenario-based discussions. Then, the customised for each case CSSBoost information sharing platform (T4.6) will be deployed and the plan of T5.1 will be operationalised. The demonstration and validation activities for each pilot area (as presented in §1.2.3 of Part B) will be held in 2 phases: In Phase I (M19-30) pilot CSS will be implemented, value chains established, activated and demonstrated, with the data acquisition subsystem and essential support tools installed and used for monitoring and evaluation. In Phase II (M31-40) the entire information sharing platform with full array of services and tools will be deployed and demonstrated at full scale. Pilot activities reports will be delivered at the end of the 2nd phase (D5.2-D5.6 M40).

Task 5.2: Pilot 1: Agricultural, Livestock and Food Processing By-Products Valorisation CSS in Crete, Greece; Lead: MACC; Participants: TUC, MAG, TZHORB, HMU, CRETE, CARRIS, ADR, ACCELI, ACR+; Duration: M16-M40
Three (3) CSS value chains will be established: (a) Fertiliser and soil improvement materials produced from livestock production biomass (scale: from 0.2/10 to 1/10 of wool produced from the total number of animals in Crete; full capacity: 2,300 tons/year, 1,250 of them being in Rethymnon); (b) Novel plant bio-stimulants produced from agricultural/agro-food wastes (scale: from 0.2/1,000 to 1/1,000 of production; full capacity: 100,000 tons/year of tomatoes in Lasithi area)); c) Healthier versions of bread and bakery products produced from food processing by-products (scale: from 1/500,000 to 3/500,000 of recycled materials; full capacity: 5,000 tons of flour products/month). Agricultural and food waste streams will be identified and the potential of secondary processing into reusable forms of food will be explored. An essential pilot activity will tackle the problems of (i) widely scattered sources, (ii) variable composition and (iii) inconstant production rates, by quantifying temporal and spatial distributions of waste types, quantities and qualities. Also, locations most suitable for collection centres will be identified and plans developed for transportation, storage and logistics. in each value chain a research laboratory (providing expertise and in-depth product testing) will collaborate with a company (providing end-product evaluation and easing transfer to the production lines). The results will be reported in D5.2 (M40).

Task 5.3 Pilot 2: Water Reuse and Nutrients Recovery CSS in Marche, Italy; Lead: UNIVPM; Participants: TUC, MAG, TZHORB, CIIP, HMU, CARRIS, ACCELI, ACR+; Duration: M16-M40
Two (2) CSS value chains will be established from multiple wastewater sources: (a) water for irrigation and nature restoration (scale: pilot plant treating from 0.2 to 1 m3/h of wastewater); (b) nutrients for agriculture (scale: lab/pilot scale valorising from 100 g up to 1 kg/d of biomass). Feasibility and applicability of at least 3 alternative scenarios (NBS, co-digestion, thermo-chemical) will be evaluated to select the best solution for regional conditions and needs. A demo plant will be realised and evaluated in 6 steps: (i) hydrogeological water balance assessment; (ii) mass balance of sewage sludge, livestock wastes, aquaculture and food industry wastes; (iii) pilot plant implementation on site with a pre-filtration module and combination of different NBS to boost wastewater for environmental needs; (iv) pilot thermochemical process implementation at pilot scale for co-treatment of dried sewage sludge and dried harvested plants and nutrients recovery; (v) Demonstration and end-products assessment in controlled experimental conditions (pot trials) and field trials; (vi) overall regional CSS assessment, of both wastewater reuse and nutrient recovery potential with water-mass-energy-carbon balance estimation. As a result, regional WWTP's wastewater will be treated by NBS for agricultural reuse and ecosystem preservation. The fertilizers performance will be demonstrated first at the laboratory scale and then in the field. The results will be reported in D5.3 (M40).

Task 5.4 Pilot 3: Conventional Plastics and Bioplastics Recycling CSS in Nordschwarzwald, Germany; Lead: CAS; Participants: TUC, MAG, KRUM, TZHORB, WFG, HMU, CARRIS, ACCELI, ACR+; Duration: M16-M40
Two (2) CSS value chains will be established for recycling of: (a) conventional plastics(scale: from 25% to 50% of recycled materials, full capacity: 30 tsd. tons of plastic packaging to be processed); and (b) bioplastics (scale: from 25% to 50% use scale of decomposed plastics; full capacity: 3.5 tsd. tons of plastic packaging to be processed). The entire range of plastic waste sources and types generated in the region will be assessed vs opportunities, potential demand and capacities of industries and other stakeholders that mayl be engaged. The pilot value chains will be centered on a multinational consumer goods company to be engaged in plastic packaging recycling. A a multi-criteria reverse configurator will be deployed on the CSSBoost platform to simulate and configure the optimal product based on conventional plastics or bioplastics that fits user requirements. The pilot will follow 5 steps: (i) advanced material identification technology accurately identifies plastic types used in each product, distinguishing between conventional plastics and bioplastics having different properties, products, users and uses; (ii) In collaboration with recycling partners, waste management companies, and consumers, used plastic packaging will be collected at end-of-life and sorted according to composition, so as to process conventional plastics and bioplastics separately; (iii) a digital product passport will be implemented in order to track each phase of the plastic product's journey from production to recycling, allowing stakeholders to monitor progress and impacts; (iv) recycling options will be recommended for each sorted plastic type; (v) all opportunities for remanufacturing or reusing plastic components will be explored. The results will be reported in D5.4 (M40).

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Task 5.5: Pilot 4: Public Transport Vehicles Recycling and Valorisation CSS in Lisbon, Portugal; Lead: PARTICLE; Participants: TUC, MAG, TZHORB, UVIC, HMU, CARRIS, ADR, MOTON, ACCELI, ACR+; Duration: M16-M40
Two (2) CSS value chains will be established: (a) use of recyclable materials, more durable products and transition energy sources to reduce carbon footprint and waste (scale: from 5% of fleet, i.e. 35 busses and 3 trams, to 10% of fleet, i.e. 70 buses and 5 trams); (b) material recovery at vehicle end-of-life disposal (scale: from 5% of fleet, i.e. 35 busses and 3 trams, to 10% of fleet, i.e. 70 buses and 5 trams), particularly through the reutilisation or recycling of assets currently under-valued, such as 12V batteries and the automotive shredder residue (ASR, 20–25% of vehicle mass). All steps in vehicle components' lifecycle management will be addressed, with a view to reducing use of non-renewal elements, converting materials to new uses (cradle-to-cradle), extending components' life and replacing components with more environmental-friendly. Sustainable business practices, integrating and streamlining the vehicle parts value-chain to support a balanced and sustainable vehicle life-cycle will be established on the basis of a detailed analysis of current operations and their impacts. The CSSBoost platform will then be used to share results of the pilot value chains across the entire vehicle production/maintenance/replacement ecosystem and its stakeholders (incl. bus manufacturers, bus component manufacturers, suppliers of maintenance services and suppliers of recycling services, providers of electric motorcycles and bicycles, private bus operators). The results will be reported in D5.5 (M40).

Task 5.6: Pilot 5: Multi-Regional, Multinational CSS; Lead: UVIC Participants: TUC, MAG, CAS, KRUM, TZHORB, WFG, CIIP, HMU, MACC, CRETE, PARTICLE, CARRIS, ADR, MOTON, ACCELI, ACR+,; Duration: M16-M40
Potential intersections, synergies and interoperability, between different CSS value chains and key sectors, will be investigated on an interregional level, with a view to maximizing CSS impact. Cross-Sector intersections examined will include at least: (a) synergies/impacts between water reuse / nutrient recovery CSSs and the plastics, packaging, textiles & construction sectors; (b) synergies/impacts between livestock / agricultural wastes recycling CSSs and the textile and food sectors; (c)synergies/impacts between recycled plastic and bioplastic CSSs and the product packaging and plastic products sector; (d) synergies/impacts between all pilot CSS types and the electronics / ICT sector. In parallel, regional, cross-regional and cross-country CSS growth opportunities and barriers (e.g. SWOT, PESTLE) will be explored and economies as well as diseconomies of scale (e.g., due to transport, distribution, logistics) in CE will be evaluated, with a view to promoting cross-regional and/or cross-country schemes. Also, regulatory and other harmonization issues between different regions/countries will be identified. On this basis, virtual CSSs will be defined, incorporating all critical aspects and entities of each CSS type and its CE/CSS Ecosystem and Market, in order to create an interregional Knowledge Base that will include regulatory framework, regional and EU policies, synergies/impacts, growth & financing opportunities, barriers, economies & diseconomies of scale and business models. This KB will be used to produce configuration and promotion/expansion guidelines for CSS value chains in an interregional or multi-national environment. The virtual CSSs will target the enablement of multi-regional cooperation between diverse actors and stakeholders (technology providers, resources suppliers, waste processors/ transformers, product designers, producers, distributors, financiers, etc.), by establishing a common knowledge background and a common open information space (Circularity EcoSphere, developed in cooperation with T6.5), by opening communication channels, encouraging information exchange and mediating between them. Finally, Interoperability measures, regulations and policies for the pilot CSSs will be investigated and their interregional opportunities identified, selected, prioritized and action planed on a preliminary level. The results will be reported in D5.6 (M40).

Task 5.7: Pilots Circularity and Sustainability Assessment and Validation; Lead: ICL; Participants: TUC, CAS, TZHORB, WFG, UNIVPM, CIIP, HMU, MACC, CRETE, PARTICLE, CARRIS, MOTON, ACCELI, SCRC, ACR+; Duration: M13-M20, M31-M41
This Task aims at the holistic and systemic circularity and sustainability assessment and validation of the implemented CSSBoost solutions to the pilot cases, following the framework and methodology developed in WP2. The pilot cases will be evaluated individually, in two iterations: i) Preliminary Assessment (prior to the actual implementation of the solutions), and ii) Ex-Post Assessment using actual data generated from the operation of the solutions. The preliminary assessment will provide a first indication of the expected sustainability and circularity results of the proposed solutions, their alignment with socio-economic and environmental needs and targets, ensuring that they are viable, that the pre-defined needs and challenges can be effectively and efficiently addressed, and the current condition of the area and the targeted value chains are expected to improve. After finishing the Phase I pilot operations (and collection of data), the second iteration of the assessment will commence, with the application of the same methods and indicators deployed in the first iteration but using actual operational data. The goal is not only to evaluate and validate the CSSBoost solutions applied but also to investigate discrepancies from the targets, thresholds and goals defined in the previous iteration. The results of every iteration of the circularity and sustainability assessment will be reported in D5.7 and D5.8 (M20 and M41), will be communicated to the pilot leaders and will be available to the platform to continuously improve the system.

Task 5.8: CSSBoost Technology Evidence Base; Lead: ACCELI; Participants: TUC, CAS, KRUM, UNIVPM, CIIP, HMU, MACC, PARTICLE, CARRIS, ADR, MOTON, ACR+; Duration: M16-M41
This Task will collect and organise pilot information in a web Technology Evidence Base (TEB), including technology

data, case factsheets, operational, legal and regulatory contexts, business opportunities and economic prospects. It will include a public domain, user-updated, CSS practices and technologies info space, based on input from T2.1 and extended by the experience obtained in T5.2-6 on design, deployment and operation of CSSBoost solutions. An interactive Replication Roadmap Tool, implementing the replication workflow of CSSBoost solutions developed in T6.1, will also be developed and integrated in the TEB. The TEB will be used stand-alone to support CoPs and LLs, as well as a resource integrated in the CSSBoost digital platform to support further exploitation and dissemination. A preliminary version will be published on the web in M24, with a final version, complete with pilot experiences, in M41 (D5.9), including findings from all pilots, key lessons learned and recommendations, results from the pilot evaluations and the replication roadmap.

Work package WP6 – Solution Uptake, Replication, Business Planning and Exploitation

Work Package Number	WP6	**Lead Beneficiary**	6 - BWCON
Work Package Name	Solution Uptake, Replication, Business Planning and Exploitation		
Start Month	4	**End Month**	42

Objectives

To bring together experiences and results from the pilots and combine them into a strategy for ensuring and facilitating the uptake, replication and scaling of the developed solutions, providing also information on key barriers identified, to avoid their emergence at early stages of the replication. In this context: Market analysis determines best strategies for the solutions uptake; Replication and upscaling plans are developed, including governance, regulation and business planning; An exploitation plan assesses the market potential of the project's innovations. Finally, the solutions' potential for creating channels for their own uptake are taken fully advantage of and augmented by an Open Circularity EcoSphere that consolidates knowledge & experience gained.

Description

Task 6.1: Solutions Upscale and Replication Planning; Lead: UVIC; Participants: MAG, CAS, KRUM, TZHORB, MACC, CRETE, PARTICLE, CARRIS, ADR, MOTON, ACCELI; Duration: M06-M42
This Task will determine generic upscaling and replication strategies for the CSSBoost solutions and will develop corresponding plans. The Upscaling Plan will consider several factors, such as the assessment of the current CE status in the region, available and unexploited resources, interoperability, costs, current and future feedstock needs, product demand projections, etc. The Replication Plan will consider pilot results and will be developed in-line with the EU CEAP and CCRI methodology. Comprehensive recommendations for interoperability and standardisation will be appended, aiming to enable cooperation, synergistic relations and partnerships and unhindered info exchange and transactions between stakeholders, value chains, sectors, regions, and nations. The plan will also address organisation and governance aspects of (i) the management and regulation of CSSBoost integrated solutions; (ii) the integrated management of regional CE ecosystems, and (iii) the CSSBoost platform. A Technical Workflow will detail all steps for the CSSBoost solutions application and the utilisation of tools and services and will be used in T5.8 to implement the replication roadmap tool. The Task will be carried out in close collaboration and coordination with the CCRI-CSO, involving also the pilot stakeholder as well as stakeholders from other interested cities/regions, acting as a "think tank" for exchanging knowledge on good practices, and ensuring a high awareness and potential for replications on other areas. The plans will be delivered in M42 (D6.1).

Task 6.2: Market Analysis, Business Planning and Governance; Lead: BWCON Participants: TZHORB, MACC, CRETE, PARTICLE, CARRIS, ADR, MOTON, ACCELI, ACR+; Duration: M06-M42
This Task will produce generic and pilot-specific business plans for CSSBoost solutions. Market Analysis will be carried out primarily in the pilot regions and secondarily at the EU level, for the assessment of market potential of project solutions and their optimal positioning. PESTLE, SWOT and other tried methods will be utilised; opportunities, barriers and critical factors identified and assessed, using also relevant input from T2.1. The analysis will provide information defining a CSSBoost Business Planning Package. This will define CSS solutions and the business-related VCEM services as cohesive sets of CE market services and products for exploitation. One generic and five custom (for each pilot region) business plans will be produced for developing CE/CSS value chains. They will describe the CSS customers and the needs they seek to address, value propositions highlighting how the proposed CSS will address these needs and create extra benefits. They will also identify novel business models, market procedures, rules for stakeholder interrelations, business transactions and information rights, to maximise benefits for all stakeholders and ensure profitability in the

long run. Governance will target the even distribution of impacts, benefits, costs, expenses, and externalities among stakeholders to foster consensus. Task results concerning market analysis and identification of business models will be reported in M18 (D6.2), to provide input to T2.4 (Application Framework) and T6.3 (CEIP), and a final report will be produced in M42 (D6.3).

Task 6.3: Financial Analysis and Circular Economy Investment Plan; Lead: TZHORB; Participants: CRETE, PARTICLE, CARRIS, ADR, MOTON, ACCELI, ACR+; Duration: M19-M42
This Task will perform a financial analysis to identify and assess concrete investment opportunities to implement the CSSBoost respective CSS. It will produce one generic and five custom (for each pilot region) Circular Economy Investment Plans (CEIP) to ensure the financial viability of the circular business cases. CEIP development will follow the CCRI guidelines, using results and outcomes from WP5-6, in order to: (i) Conduct a cost-benefit analysis and cash flow analysis based on the developed business plans (T6.2); (ii) Assess the cash flow characteristics; (iii) Prepare a financial budget; (iv) Define the overall development stage of the CSS, using the pilot reports of WP5; (i) Understand a risk profile of the targeted CSS and/or its elements (vi) Identify suitable funding options and assess what is the preferred public or private funding type. The plans will be delivered in M42 (D6.4).

Task 6.4: Exploitation of Project Results and IPR Issues; Lead: MOTON; Participants: MAG, CAS, TZHORB, CRETE, PARTICLE, CARRIS, ACCELI, ACR+; Duration: M06-M42
This Task will perform all necessary activities for the exploitation of CSSBoost exploitable assets. The project's Key Exploitable Results (KER) will be identified, and a plan will be developed for their exploitation, using the Exploitation Canvas Template and certified methods to unlock creativity (e.g., Lego® Serious Play®). A business-oriented, stakeholder-inclusive approach will be applied from the outset to ensure impact of CSSBoost innovations. Business development practices (e.g., New Product Development), standards and co-creation processes will be used to redefine project innovations which might be used as potential products to be exploited by partners and local SMEs. A cautious IPR assessment will be provided so that NDA and IPR imperatives for all partners are fully respected. An initial Exploitation Plan will be produced in M06 (D6.5) to ensure that the exploitation concept is taken into account in the pilot implementation and related IPR are clarified. A final version will be elaborated in M42 (D6.6) with contributions from all partners co-created through multiple workshops.

Task 6.5: CSSBoost Open Circularity EcoSphere; Lead: HMU; Participants: CAS, PARTICLE, CARRIS, ADR; Duration: M04-M42
This Task capitalises on information compiled by WP2-5, to develop the CSSBoost Open Circularity EcoSphere (CES), a consumer-centric knowledge base, intended to foster cross-border collaboration among diverse global (worldwide) stakeholders, by storing and organising information about: (i) Design for circular products (ensuring their durability, repairability and recyclability); (ii) Resource management efficiency (material selection, energy-efficiency practises, etc.); (iii) Supply chain optimisation inflection points. The CES's main goal is to acquire and seamlessly provide information about the entire lifecycle of CSS development, to various stakeholders outside the project, by utilising a FAIR (Findable, Accessible, Interoperable, and Reusable) mechanism, thereby enhancing data sharing and, as a result, driving the adoption of CE principles. CES will also incorporate sustainability assessment results to provide understanding of environmental impacts across product life cycles, allowing stakeholders to identify areas for improvement and implement environmentally responsible practises. CES will be implemented by creating multiple connectors with well-known communication protocols like as MQTT, HTTP, etc., while ensuring security by using encrypted routes (e.g., TLS). The CES complete with pilot experiences and links to the TEB of T5.8, will be delivered in M42 (D6.7).

Work package WP7 – Outreach Activities for Impact Maximisation

Work Package Number	WP7	**Lead Beneficiary**	20 - ACR+
Work Package Name	Outreach Activities for Impact Maximisation		
Start Month	1	**End Month**	42

Objectives
To maximise, through communication, dissemination, networking and clustering, the project's visibility and propagation of its results and knowledge gained, paving the way for the widespread uptake and realisation of CSSBoost solutions. Also, to augment the project's social profile, supporting the pilots and their sustainability after the end of project, and developing social innovation actions and life-long learning activities.

Description
Task 7.1: Strategic Project Communication and Dissemination of Project Results; Lead: ADR; Participants: ALL; Duration: M01-M42 This Task will devise the dissemination and communication strategy and implement the corresponding communication and dissemination activities listed in §2.2.3 of Part B. A Dissemination and Communication Plan for project duration will be delivered in M06 (D7.1), and a plan for future dissemination and communication activities will be delivered in M42 (D7.2). The progress of all related activities will be reported in the contractual periodic reports (M20 and M42). Task 7.2: Networking, Clustering and Other Outreach Activities; Lead: ACR+; Participants: ALL; Duration: M01-M42 This Task will realise a set of extroverted and outreaching activities targeted to maximise the project's visibility, impact and info inputs, with a view to promote CSSBoost solutions and enhance replicability in other regions, as well as to obtain input for CSSBoost development. It will seek to establish contacts and liaising with other projects financed under the same topic and other relevant Horizon projects and national/regional initiatives, to establish a core cluster and discuss cross-fertilisation and the implementation of joint activities. This task will also produce two Policy Briefs out of the CSSBoost activities/outcomes to be released, related to regional CE Transition. The exact topics to be covered will be defined in collaboration with the CCRI-CSO and the stakeholder groups, so as to reflect their needs, but also their experiences. A Networking and Clustering Plan will be delivered in M06 and included in (D7.1), and the related activities will be reported in the contractual periodic reports (M20 and M42). The first Policy Brief will be delivered mid-term (M18 – D7.3) and second one at the end of the project (M42 – D7.4). Task 7.3: CSS-Related Training, Education and Life-Long Learning; Lead: TUC; Participants: ICL, TZHORB, BWCON, UNIVPM, UVIC, HMU, MACC, PARTICLE, CARRIS, ADR, SCRC, ACR+,; Duration: M19-M42 This Task will develop a Training and Education Innovation Package, aiming to provide appropriate tools to train personnel in CSSBoost and platform use and utilisation, as well as to educate new scientists and engineers and enhance the skills of professionals involved in CE/CSS. An analysis of feedback from CSSBoost partners will identify key issues needed by various classes of stakeholders, generic and specific competences expected from staff on different levels and skills and competencies currently lacking. Available knowledge will be classified & compiled and appropriate educational & material and curricula developed, based on a MOOC-based (Massive Open Online Course) Micro-Credentials model. Courses and material will be designed to be relevant to the labour market and completely modular, so that public stakeholders, SMEs, company staff, consultants and research institutes can follow dedicated modules to improve specific skills provide certification. A course management system will be used to handle the developed material and provide tailored access to all stakeholders. The material will be tested during a two-track intensive course which will take place on the TUC premises, open to students and professionals. The platform with the education material and curricula will be delivered in M42 (D7.5). Task 7.4: Social Innovation Actions for CSSBoost CSS; Lead: SCRC; Participants: TUC, CRETE, PARTICLE, CARRIS, ACR+; Duration: M04-M42 This Task, in cooperation with T2.2, WP5 and stakeholders co-creation, will design, initiate and support a set of Social Innovation Actions at the pilot regions, aiming to promote and/or facilitate application and growth of CSS/CE and maximise CSSBoost impact. They will be developed based on citizen science and transformable intelligent environments concepts and supported by the CSSBoost digital platform. An action plan will be reported on M16 (D7.6) and a final activity report on M42 (D7.7). The task includes the following Subtasks: Subtask 7.4.1: Social Innovation Methods and Toolsets (M04-M42) Lead: SCRC A Social Innovation Framework with methods, services, actions and tools for supporting CE/CSS-oriented cooperation, citizen participation, citizen science and citizen observations approaches will be developed and tested. Services will be designed for activating and involving citizens, civil societies and businesses through the whole lifecycle of a CSS use case, focusing on communication, data access respecting confidentiality, information sharing, impact visualisation and feedback through quest/res, problem reporting and ideation. These will ensure collaborative approach involving experts and differentiated perspectives by applying the concept of Social Customer Relationship Management (SCRM). The framework will support (i) the development of CSSBoost platform, services, tools and pilots; (ii) evaluation of CSSBoost solutions from SSH perspective; (iii) customisation and personalisation of platform and services to user types and local requirements; (iv) feeding T7.3 with insights on training methods and material; (v) overcoming social barriers; (vi) ensure wide dissemination. Social services will be designed following the customer dominant logic (CDL) approach. The framework will contribute to overall CSSBoost concept development, will be fully tested at the Nordschwarzwald pilot region and then generalized c and transferred into the other use cases, as well as packaged for general use in other future CSS/CE cases. The results will be reported in D7.7 (M42). Subtask 7.4.2: Citizen Science and FabLab-Based Action (M04-M42) Lead: SCRC Citizens, civil societies and businesses will be activated in local citizen science environments that will co-create, help

optimise and communicate socio-economic aspects of the CSSBoost solutions and the piloted CSSs. Citizen science toolsets of levels 1-3 (framing, research, legacy) will be applied: (1) identification of motivators and requirements from citizens and actors perspectives; (2) research questions designed and analysed; (3) requirements engineering and dissemination activity planning feedback. Methods will be developed for analysis, modelling, evaluation, management and CSSBoost tools support of citizen science participants experience and progress paths. By project's end, these environments and toolset will have been gradually generalized and converted into FabLabs pursuing the upscaling of the piloted CSS and the replication of CSSBoost solutions to other sectors. The FabLabs will thus target the design of new CE-optimised products (e.g. new plastics in Nordschwarzwald), as well as waste collection, treatment and residuals' disposal, collaborative business models, CE management, info privacy management, financing, education and training. The results will be reported in D7.7 (M42).

Subtask 7.4.3: Transformable Intelligent Environments Action (M04-M42); Lead: TUC
This bottom-up action will design and fabricate paradigms of transformable intelligent environments (TIE) in the region of Crete, to support and extend the pilot CSS. The action will consider people and technology as an integral system with distributed intelligence emerging where and when needed using the appropriate resources to enable the formulation of adaptable "nodes" that use as much technology as needed for the required tasks. The nodes operate without need of central control, since they have learned the necessary skills and can produce/procure the necessary resources. The concept is perfectly fitted to the Cretan CSS, which depends on a large number of waste remote producers, an open number of waste transformers and a large number of end-product users. Since these are too many, the task will group teal TIE nodes into virtual nodes, so as to provide to them knowledge, information and make them act as distributed intelligence. Schools and civil institutions in rural areas that will be the catchment areas for the pilot CSS waste resources, as well as the target product consumers, will be used as catalysts for engaging of all local community citizens, admins and businesses. Educational activities (T7.3) will be integrated and young people will be cultivated as entrepreneurs with a CE mentality, while parents will be pressured to be accountable for their actions and forces into more active participation. Workshops will focus on bottom-up processes such as producing sheep wool fertiliser, food by-product delicacies with new 3D printing methods of nutritious "paste", rhizobia fertiliser and green manure. A TIE lab at TUC will be overall focal point of the task, following the steps: (i) identify appropriate communities and node centres; (ii) build trust with community people through participatory activities; (iii) workshops on CSS-related subjects identified by the community as useful/ interesting/desirable; (iv) training in tools of digital fabrication and IoT; (v) creating mock-ups/proof of concepts to be tested; (vi) community decides best proposals; (vii) community-driven creation of finished product batch; (vii) integrate community in CSSBoost ecosystem allowing them to develop new products. Lessons learnt will be generalized in a concise manual (reported in D7.7) and by means of this, as well as interaction between pilot experts, will be adapted to other regions for potential application after project's end. The results will be reported in D7.7 (M42).

STAFF EFFORT

Staff effort per participant

Grant Preparation (Work packages - Effort screen) — Enter the info.

Participant	WP1	WP2	WP3	WP4	WP5	WP6	WP7	Total Person-Months
1 - TUC	35.00	19.00	44.00	22.00	18.00		36.00	174.00
2 - MAG	1.00	4.00	57.00	65.00	12.00	7.00	2.00	148.00
3 - CAS	1.00	4.00	34.00	4.00	29.00	6.00	3.00	81.00
4 - KRUM	1.00		7.00	29.00	10.00	2.00	2.00	51.00
5 - TZHORB	1.00	4.00	5.00		8.00	23.00	4.00	45.00
6 - BWCON	1.00	1.00	4.00			15.00	4.00	25.00
7 - WFG	1.00	2.00			17.00		2.00	22.00
8 - UNIVPM	9.00	5.00	16.00	4.00	45.00		8.00	87.00
9 - CIIP	1.00	16.00			44.00		4.00	65.00
10 - UVIC	1.00				35.00	18.00	7.00	61.00
11 - HMU	9.00	16.00	20.00	34.00	16.00	15.00	8.00	118.00
12 - MACC	1.00	13.00	10.00	9.00	55.00	9.00	10.00	107.00
13 - CRETE	1.00	6.00	4.00	6.00	30.00	5.00	12.00	64.00
14 - PARTICLE	1.00	6.00	9.00	32.00	30.00	8.00	9.00	95.00
15 - CARRIS	1.00	5.00	4.00		35.00	8.00	8.00	61.00
16 - ADR	1.00	5.00	15.00	26.00	16.00	5.00	19.00	87.00
17 - MOTON	1.00	7.00	8.00	4.00	21.00	25.00	2.00	68.00
18 - ACCELI	1.00	17.00		24.00	29.00	8.00	4.00	83.00
19 - SCRC	1.00	7.00			5.00		26.00	39.00

Staff effort per participant

Grant Preparation (Work packages - Effort screen) — Enter the info.

Participant	WP1	WP2	WP3	WP4	WP5	WP6	WP7	Total Person-Months
20 - ACR+	1.00	4.00		4.00	15.00	3.00	21.00	48.00
Total Person-Months	70.00	141.00	237.00	263.00	470.00	157.00	191.00	1529.00

LIST OF DELIVERABLES

Deliverables

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Deliverable No	Deliverable Name	Work Package No	Lead Beneficiary	Type	Dissemination Level	Due Date (month)
D1.1	Data Management Plan (v1)	WP1	11 - HMU	DMP — Data Management Plan	PU - Public	6
D1.2	Data Management Plan (v2)	WP1	11 - HMU	DMP — Data Management Plan	PU - Public	24
D1.3	Data Management Plan (final)	WP1	11 - HMU	DMP — Data Management Plan	PU - Public	42
D2.1	CSS Inventory	WP2	1 - TUC	R — Document, report	PU - Public	10
D2.2	Application Planning Toolkit	WP2	1 - TUC	OTHER	PU - Public	14
D2.3	Stakeholders' Engagement Plan	WP2	18 - ACCELI	R — Document, report	PU - Public	12
D2.4	Baselines, Use Cases and Application Plans	WP2	21 - ICL	R — Document, report	PU - Public	16
D2.5	CSSBoost Application Framework	WP2	11 - HMU	R — Document, report	PU - Public	28
D3.1	CSS Lifecycle Management and CE Stakeholders Decision Support Services (v1)	WP3	3 - CAS	OTHER	PU - Public	18
D3.2	Advanced Adaptation and Scenario Assessment Services (final)	WP3	1 - TUC	OTHER	PU - Public	38
D3.3	Circular Value Chain Planning and Multi-Criteria Configuration Services (final)	WP3	3 - CAS	OTHER	PU - Public	38

Deliverables

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Deliverable No	Deliverable Name	Work Package No	Lead Beneficiary	Type	Dissemination Level	Due Date (month)
D3.4	CE Risk Analysis and Assessment Services (final)	WP3	21 - ICL	OTHER	PU - Public	38
D3.5	AI Inference for Operational Flows Forecasting Problem Detection and Response Services (final)	WP3	2 - MAG	OTHER	PU - Public	38
D3.6	Dynamic and On-demand LCA and Sustainability Balanced Scorecards of CSS Value Chains (final)	WP3	1 - TUC	OTHER	PU - Public	38
D3.7	CSS Marketplace and P2P Trading Services (final)	WP3	11 - HMU	OTHER	PU - Public	38
D3.8	CSS Promotion, Communication and Citizens Participation Services (final)	WP3	3 - CAS	OTHER	PU - Public	38
D4.1	Architecture and Specifications for Digital System	WP4	2 - MAG	R — Document, report	PU - Public	18
D4.2	CE/CSS Ecosystem Knowledge Core	WP4	11 - HMU	R — Document, report	PU - Public	28
D4.3	CE/CSS Data Spaces and Data Acquisition System	WP4	14 - PARTICLE	R — Document, report	PU - Public	18
D4.4	Digital Twin Models of Regional CE Ecosystem and Market	WP4	2 - MAG	R — Document, report	PU - Public	28

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Deliverable No	Deliverable Name	Work Package No	Lead Beneficiary	Type	Dissemination Level	Due Date (month)
D4.5	Visualisations of Regional CE Ecosystem and Market	WP4	4 - KRUM	R — Document, report	PU - Public	30
D4.6	Regional Information Sharing Platform (v1)	WP4	2 - MAG	OTHER	PU - Public	18
D4.7	Regional Information Sharing Platform (final)	WP4	2 - MAG	OTHER	PU - Public	40
D5.1	Pilot Setup, Demonstration, Monitoring and Evaluation Plans	WP5	8 - UNIVPM	R — Document, report	PU - Public	15
D5.2	Integrated Pilot 1 Activities Report	WP5	12 - MACC	DEM — Demonstrator, pilot, prototype	PU - Public	40
D5.3	Integrated Pilot 2 Activities Report	WP5	8 - UNIVPM	DEM — Demonstrator, pilot, prototype	PU - Public	40
D5.4	Integrated Pilot 3 Activities Report	WP5	3 - CAS	DEM — Demonstrator, pilot, prototype	PU - Public	40
D5.5	Integrated Pilot 4 Activities Report	WP5	14 - PARTICLE	DEM — Demonstrator, pilot, prototype	PU - Public	40
D5.6	Integrated Pilot 5 Activities Report	WP5	10 - UVIC	DEM — Demonstrator, pilot, prototype	PU - Public	40
D5.7	Pilots Circularity and Sustainability Assessment and Validation (v1)	WP5	21 - ICL	R — Document, report	PU - Public	20

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Deliverable No	Deliverable Name	Work Package No	Lead Beneficiary	Type	Dissemination Level	Due Date (month)
D5.8	Pilots Circularity and Sustainability Assessment and Validation (final)	WP5	21 - ICL	R — Document, report	PU - Public	41
D5.9	CSSBoost Solutions Evidence Base	WP5	18 - ACCELI	OTHER	PU - Public	41
D6.1	Upscale and Replication Plans and Guidelines	WP6	10 - UVIC	R — Document, report	PU - Public	42
D6.2	Market Analysis and Business Plans for CSSBoost Solutions (v1)	WP6	6 - BWCON	R — Document, report	PU - Public	18
D6.3	Market Analysis and Business Plans for CSSBoost Solutions (final)	WP6	6 - BWCON	R — Document, report	PU - Public	42
D6.4	Circular Economy Investment Plans for CSS and CSSBoost Solutions	WP6	5 - TZHORB	R — Document, report	SEN - Sensitive	42
D6.5	CSSBoost Assets Exploitation and IPR Plan (v1)	WP6	17 - MOTON	R — Document, report	SEN - Sensitive	6
D6.6	CSSBoost Assets Exploitation and IPR Plan (final)	WP6	17 - MOTON	R — Document, report	SEN - Sensitive	42
D6.7	CSSBoost Open Circularity EcoSphere	WP6	11 - HMU	R — Document, report	PU - Public	42
D7.1	Dissemination and Communication Plan (v1)	WP7	16 - ADR	R — Document, report	PU - Public	6
D7.2	Dissemination and Communication Plan (final)	WP7	16 - ADR	R — Document, report	PU - Public	42

Deliverables

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Deliverable No	Deliverable Name	Work Package No	Lead Beneficiary	Type	Dissemination Level	Due Date (month)
D7.3	First Policy Brief for Regional CE Transition	WP7	20 - ACR+	DEC —Websites, patent filings, videos, etc	PU - Public	18
D7.4	Second Policy Brief for Regional CE Transition	WP7	20 - ACR+	DEC —Websites, patent filings, videos, etc	PU - Public	42
D7.5	Training and Education Material and Curricula	WP7	1 - TUC	R — Document, report	PU - Public	42
D7.6	Social Innovation Actions Plan	WP7	19 - SCRC	R — Document, report	PU - Public	16
D7.7	Social Innovation Activity Report	WP7	19 - SCRC	R — Document, report	PU - Public	42

Deliverable D1.1 – Data Management Plan (v1)

Deliverable Number	D1.1	Lead Beneficiary	11 - HMU
Deliverable Name	Data Management Plan (v1)		
Type	DMP — Data Management Plan	Dissemination Level	PU - Public
Due Date (month)	6	Work Package No	WP1

Description
Initial report describing the research data generated in the project and how they will be published. (Linked to Task 1.3)

Deliverable D1.2 – Data Management Plan (v2)

Deliverable Number	D1.2	Lead Beneficiary	11 - HMU
Deliverable Name	Data Management Plan (v2)		
Type	DMP — Data Management Plan	Dissemination Level	PU - Public
Due Date (month)	24	Work Package No	WP1

Description
Intermediate report describing the research data generated in the project and how they will be published. (Linked to Task 1.3)

Deliverable D1.3 – Data Management Plan (final)

Deliverable Number	D1.3	Lead Beneficiary	11 - HMU
Deliverable Name	Data Management Plan (final)		
Type	DMP — Data Management Plan	Dissemination Level	PU - Public
Due Date (month)	42	Work Package No	WP1

Description
Final report describing the research data generated in the project and how they will be published. (Linked to Task 1.3)

Deliverable D2.1 – CSS Inventory

Deliverable Number	D2.1	Lead Beneficiary	1 - TUC
Deliverable Name	CSS Inventory		
Type	R — Document, report	Dissemination Level	PU - Public
Due Date (month)	10	Work Package No	WP2

Description

Report providing an inventory of existing CSS practices, technologies and application cases, with information regarding capacity, efficiency, replicability and key factors of their operative environments. (Linked to Task 2.1)

Deliverable D2.2 – Application Planning Toolkit

Deliverable Number	D2.2	**Lead Beneficiary**	1 - TUC
Deliverable Name	Application Planning Toolkit		
Type	OTHER	**Dissemination Level**	PU - Public
Due Date (month)	14	**Work Package No**	WP2

Description
Software tool including database with the complete CSS inventory and methods for CSS selection, evaluation, risk pre-assessment. (Linked to task 2.1)

Deliverable D2.3 – Stakeholders' Engagement Plan

Deliverable Number	D2.3	**Lead Beneficiary**	18 - ACCELI
Deliverable Name	Stakeholders' Engagement Plan		
Type	R — Document, report	**Dissemination Level**	PU - Public
Due Date (month)	12	**Work Package No**	WP2

Description
Report outlining the plan and living document for stakeholders' co-creation activities. (Linked to Task 2.2)

Deliverable D2.4 – Baselines, Use Cases and Application Plans

Deliverable Number	D2.4	**Lead Beneficiary**	21 - ICL
Deliverable Name	Baselines, Use Cases and Application Plans		
Type	R — Document, report	**Dissemination Level**	PU - Public
Due Date (month)	16	**Work Package No**	WP2

Description
Report providing baseline analysis, use case scenarios and application plans of exemplary pilot CSS. (Linked to Task 2.3)

Deliverable D2.5 – CSSBoost Application Framework

Deliverable Number	D2.5	**Lead Beneficiary**	11 - HMU
Deliverable Name	CSSBoost Application Framework		
Type	R — Document, report	**Dissemination Level**	PU - Public
Due Date (month)	28	**Work Package No**	WP2

Description

Report on the Application Framework for the CSSBoost Integrated Solutions, including assessment guidelines. (Linked to Task 2.4)

Deliverable D3.1 – CSS Lifecycle Management and CE Stakeholders Decision Support Services (v1)

Deliverable Number	D3.1	**Lead Beneficiary**	3 - CAS
Deliverable Name	CSS Lifecycle Management and CE Stakeholders Decision Support Services (v1)		
Type	OTHER	**Dissemination Level**	PU - Public
Due Date (month)	18	**Work Package No**	WP3

Description
Initial versions of services and tools to support each major stakeholder class involved in CSS. (Linked to Tasks 3.1, 3.2, 3.3, 3.4, 3.5, 3.6 and 3.7)

Deliverable D3.2 – Advanced Adaptation and Scenario Assessment Services (final)

Deliverable Number	D3.2	**Lead Beneficiary**	1 - TUC
Deliverable Name	Advanced Adaptation and Scenario Assessment Services (final)		
Type	OTHER	**Dissemination Level**	PU - Public
Due Date (month)	38	**Work Package No**	WP3

Description
Final version of the advanced adaptation and scenario assessment services. (Linked to Task 3.1)

Deliverable D3.3 – Circular Value Chain Planning and Multi-Criteria Configuration Services (final)

Deliverable Number	D3.3	**Lead Beneficiary**	3 - CAS
Deliverable Name	Circular Value Chain Planning and Multi-Criteria Configuration Services (final)		
Type	OTHER	**Dissemination Level**	PU - Public
Due Date (month)	38	**Work Package No**	WP3

Description
Final version of the circular value chain planning and multi-criteria configuration services. (Linked to Task 3.2)

Deliverable D3.4 – CE Risk Analysis and Assessment Services (final)

Deliverable Number	D3.4	**Lead Beneficiary**	21 - ICL
Deliverable Name	CE Risk Analysis and Assessment Services (final)		
Type	OTHER	**Dissemination Level**	PU - Public
Due Date (month)	38	**Work Package No**	WP3

Description
Final version the circular-economy risk analysis and assessment services. (Linked to Task 3.3)

Deliverable D3.5 – AI Inference for Operational Flows Forecasting Problem Detection and Response Services (final)

Deliverable Number	D3.5	**Lead Beneficiary**	2 - MAG
Deliverable Name	AI Inference for Operational Flows Forecasting Problem Detection and Response Services (final)		
Type	OTHER	**Dissemination Level**	PU - Public
Due Date (month)	38	**Work Package No**	WP3

Description
Final version of the artificial inteligence inference for operational flows forecasting Problem detection and response services. (Linked to Task 3.4)

Deliverable D3.6 – Dynamic and On-demand LCA and Sustainability Balanced Scorecards of CSS Value Chains (final)

Deliverable Number	D3.6	**Lead Beneficiary**	1 - TUC
Deliverable Name	Dynamic and On-demand LCA and Sustainability Balanced Scorecards of CSS Value Chains (final)		
Type	OTHER	**Dissemination Level**	PU - Public
Due Date (month)	38	**Work Package No**	WP3

Description
Final version of the dynamic and on-demand LCA and sustainability balanced scorecards of CSS value chains services. (Linked to Task 3.5)

Deliverable D3.7 – CSS Marketplace and P2P Trading Services (final)

Deliverable Number	D3.7	**Lead Beneficiary**	11 - HMU
Deliverable Name	CSS Marketplace and P2P Trading Services (final)		
Type	OTHER	**Dissemination Level**	PU - Public
Due Date (month)	38	**Work Package No**	WP3

Description
Final version of the CSS marketplace and p3p trading services. (Linked to Task 3.6)

Deliverable D3.8 – CSS Promotion, Communication and Citizens Participation Services (final)

Deliverable Number	D3.8	**Lead Beneficiary**	3 - CAS

Deliverable Name	CSS Promotion, Communication and Citizens Participation Services (final)		
Type	OTHER	Dissemination Level	PU - Public
Due Date (month)	38	Work Package No	WP3

Description
Final version of the CSS promotion, communication and citizens participation services. (Linked to Task 3.7)

Deliverable D4.1 – Architecture and Specifications for Digital System

Deliverable Number	D4.1	Lead Beneficiary	2 - MAG
Deliverable Name	Architecture and Specifications for Digital System		
Type	R — Document, report	Dissemination Level	PU - Public
Due Date (month)	18	Work Package No	WP4

Description
Functional and not functional requirements & architecture for the digital platform (Linked to Task 4.1)

Deliverable D4.2 – CE/CSS Ecosystem Knowledge Core

Deliverable Number	D4.2	Lead Beneficiary	11 - HMU
Deliverable Name	CE/CSS Ecosystem Knowledge Core		
Type	R — Document, report	Dissemination Level	PU - Public
Due Date (month)	28	Work Package No	WP4

Description
Report presenting the CSSBoost Knowledge Graph model representation of all relevant pieces of knowledge regarding the CE/CSS Ecosystem and Market. (Linked to Task 4.2)

Deliverable D4.3 – CE/CSS Data Spaces and Data Acquisition System

Deliverable Number	D4.3	Lead Beneficiary	14 - PARTICLE
Deliverable Name	CE/CSS Data Spaces and Data Acquisition System		
Type	R — Document, report	Dissemination Level	PU - Public
Due Date (month)	18	Work Package No	WP4

Description
Report presenting the CSSBoost data acquisition & management system and CE data spaces. (Linked to Task 4.3)

Deliverable D4.4 – Digital Twin Models of Regional CE Ecosystem and Market

Deliverable Number	D4.4	Lead Beneficiary	2 - MAG

Deliverable Name	Digital Twin Models of Regional CE Ecosystem and Market		
Type	R — Document, report	Dissemination Level	PU - Public
Due Date (month)	28	Work Package No	WP4

Description
Report presenting the development of the network of interconnected DT representations of the physical system. (Linked to Task 4.4)

Deliverable D4.5 – Visualisations of Regional CE Ecosystem and Market

Deliverable Number	D4.5	Lead Beneficiary	4 - KRUM
Deliverable Name	Visualisations of Regional CE Ecosystem and Market		
Type	R — Document, report	Dissemination Level	PU - Public
Due Date (month)	30	Work Package No	WP4

Description
Report presenting the visualisation module of the physical system, including dashboard widgets. (Linked to Task 4.5)

Deliverable D4.6 – Regional Information Sharing Platform (v1)

Deliverable Number	D4.6	Lead Beneficiary	2 - MAG
Deliverable Name	Regional Information Sharing Platform (v1)		
Type	OTHER	Dissemination Level	PU - Public
Due Date (month)	18	Work Package No	WP4

Description
Initial version of the integrated CSSBoost digital platform with the DAMS and the first-round version of the pilot-supporting tools. (Linked to Task 4.6)

Deliverable D4.7 – Regional Information Sharing Platform (final)

Deliverable Number	D4.7	Lead Beneficiary	2 - MAG
Deliverable Name	Regional Information Sharing Platform (final)		
Type	OTHER	Dissemination Level	PU - Public
Due Date (month)	40	Work Package No	WP4

Description
Final improved version of the integrated CSSBoost digital platform with services, tools and interfaces. (Linked to Task 4.6)

Associated with document Ref. Ares(2024)3214972 - 02/05/2024

Deliverable D5.1 – Pilot Setup, Demonstration, Monitoring and Evaluation Plans

Deliverable Number	D5.1	**Lead Beneficiary**	8 - UNIVPM
Deliverable Name	Pilot Setup, Demonstration, Monitoring and Evaluation Plans		
Type	R — Document, report	**Dissemination Level**	PU - Public
Due Date (month)	15	**Work Package No**	WP5

Description
Report with demonstration validation and evaluation plan for each pilot case, including organisation plans, schedules and contingency tables, (Linked to Task 5.1)

Deliverable D5.2 – Integrated Pilot 1 Activities Report

Deliverable Number	D5.2	**Lead Beneficiary**	12 - MACC
Deliverable Name	Integrated Pilot 1 Activities Report		
Type	DEM — Demonstrator, pilot, prototype	**Dissemination Level**	PU - Public
Due Date (month)	40	**Work Package No**	WP5

Description
Report on the activities performed in pilot case 1, with links to the corresponding demonstrators, and the operations conducted in the execution of the pilot case. This final version concerns the activities in Phase II, (Linked to Task 5.2)

Deliverable D5.3 – Integrated Pilot 2 Activities Report

Deliverable Number	D5.3	**Lead Beneficiary**	8 - UNIVPM
Deliverable Name	Integrated Pilot 2 Activities Report		
Type	DEM — Demonstrator, pilot, prototype	**Dissemination Level**	PU - Public
Due Date (month)	40	**Work Package No**	WP5

Description
Report on the activities performed in pilot case 2, with links to the corresponding demonstrators, and the operations conducted in the execution of the pilot case. This final version concerns the activities in Phase II, (Linked to Task 5.3)

Deliverable D5.4 – Integrated Pilot 3 Activities Report

Deliverable Number	D5.4	**Lead Beneficiary**	3 - CAS
Deliverable Name	Integrated Pilot 3 Activities Report		
Type	DEM — Demonstrator, pilot, prototype	**Dissemination Level**	PU - Public
Due Date (month)	40	**Work Package No**	WP5

Description
Report on the activities performed in pilot case 3, with links to the corresponding demonstrators, and the operations conducted in the execution of the pilot case. This final version concerns the activities in Phase II, (Linked to Task 5.4)

Deliverable D5.5 – Integrated Pilot 4 Activities Report

Deliverable Number	D5.5	**Lead Beneficiary**	14 - PARTICLE
Deliverable Name	Integrated Pilot 4 Activities Report		
Type	DEM — Demonstrator, pilot, prototype	**Dissemination Level**	PU - Public
Due Date (month)	40	**Work Package No**	WP5

Description
Report on the activities performed in pilot case 4, with links to the corresponding demonstrators, and the operations conducted in the execution of the pilot case. This final version concerns the activities in Phase II, (Linked to Task 5.5)

Deliverable D5.6 – Integrated Pilot 5 Activities Report

Deliverable Number	D5.6	**Lead Beneficiary**	10 - UVIC
Deliverable Name	Integrated Pilot 5 Activities Report		
Type	DEM — Demonstrator, pilot, prototype	**Dissemination Level**	PU - Public
Due Date (month)	40	**Work Package No**	WP5

Description
Report on the activities performed in pilot case 5, with links to the corresponding demonstrators, and the operations conducted in the execution of the pilot case. This final version concerns the activities in Phase II, (Linked to Task 5.6)

Deliverable D5.7 – Pilots Circularity and Sustainability Assessment and Validation (v1)

Deliverable Number	D5.7	**Lead Beneficiary**	21 - ICL
Deliverable Name	Pilots Circularity and Sustainability Assessment and Validation (v1)		
Type	R — Document, report	**Dissemination Level**	PU - Public
Due Date (month)	20	**Work Package No**	WP5

Description
Report on preliminary holistic and systemic circularity and sustainability assessment and validation of the implemented CSSBost solutions in the pilot cases (Linked to Task 5.7)

Deliverable D5.8 – Pilots Circularity and Sustainability Assessment and Validation (final)

Deliverable Number	D5.8	**Lead Beneficiary**	21 - ICL
Deliverable Name	Pilots Circularity and Sustainability Assessment and Validation (final)		

Type	R — Document, report	Dissemination Level	PU - Public
Due Date (month)	41	Work Package No	WP5

Description
Report on e-post holistic and systemic circularity and sustainability assessment and validation of the implemented CSSBost solutions in the pilot cases (Linked to Task 5.7)

Deliverable D5.9 – CSSBoost Solutions Evidence Base

Deliverable Number	D5.9	Lead Beneficiary	18 - ACCELI
Deliverable Name	CSSBoost Solutions Evidence Base		
Type	OTHER	Dissemination Level	PU - Public
Due Date (month)	41	Work Package No	WP5

Description
Technology evidence base including technology data, case factsheets, operational, legal and regulatory contexts, business opportunities and economic prospects from pilot cases. Final version including findings from all pilots, key lessons learned and recommendations, results from the pilot evaluations and the replication roadmap (Linked to Task 5.8)

Deliverable D6.1 – Upscale and Replication Plans and Guidelines

Deliverable Number	D6.1	Lead Beneficiary	10 - UVIC
Deliverable Name	Upscale and Replication Plans and Guidelines		
Type	R — Document, report	Dissemination Level	PU - Public
Due Date (month)	42	Work Package No	WP6

Description
Report with generic upscaling and replication strategies for the CSSBoost solutions (Linked to Task 6.1)

Deliverable D6.2 – Market Analysis and Business Plans for CSSBoost Solutions (v1)

Deliverable Number	D6.2	Lead Beneficiary	6 - BWCON
Deliverable Name	Market Analysis and Business Plans for CSSBoost Solutions (v1)		
Type	R — Document, report	Dissemination Level	PU - Public
Due Date (month)	18	Work Package No	WP6

Description
Report on market potential of project solutions and identification of business models (Linked to Task 6.2)

Deliverable D6.3 – Market Analysis and Business Plans for CSSBoost Solutions (final)

Deliverable Number	D6.3	Lead Beneficiary	6 - BWCON

Deliverable Name	Market Analysis and Business Plans for CSSBoost Solutions (final)		
Type	R — Document, report	Dissemination Level	PU - Public
Due Date (month)	42	Work Package No	WP6

Description
Final report on market analysis and business planning including a generic and custom (for each pilot region) business plans for developing CE/CSS value chains potential of project solutions. (Linked to Task 6.2)

Deliverable D6.4 – Circular Economy Investment Plans for CSS and CSSBoost Solutions

Deliverable Number	D6.4	Lead Beneficiary	5 - TZHORB
Deliverable Name	Circular Economy Investment Plans for CSS and CSSBoost Solutions		
Type	R — Document, report	Dissemination Level	SEN - Sensitive
Due Date (month)	42	Work Package No	WP6

Description
Report on the identification and assessment of investment opportunities to implement the CSSBoost respective CSS (Linked to Task 6.3)

Deliverable D6.5 – CSSBoost Assets Exploitation and IPR Plan (v1)

Deliverable Number	D6.5	Lead Beneficiary	17 - MOTON
Deliverable Name	CSSBoost Assets Exploitation and IPR Plan (v1)		
Type	R — Document, report	Dissemination Level	SEN - Sensitive
Due Date (month)	6	Work Package No	WP6

Description
Report on the identification of Key Exploitable Results (KERs) and plan development for their exploitation. First version presenting an initial Exploitation Plan. (Linked to Task 6.4)

Deliverable D6.6 – CSSBoost Assets Exploitation and IPR Plan (final)

Deliverable Number	D6.6	Lead Beneficiary	17 - MOTON
Deliverable Name	CSSBoost Assets Exploitation and IPR Plan (final)		
Type	R — Document, report	Dissemination Level	SEN - Sensitive
Due Date (month)	42	Work Package No	WP6

Description
Report on identification of Key Exploitable Results (KERs) and plan development for their exploitation. Final version with contributions from all partners co-created through multiple workshops (Linked to Task 6.4)

Associated with document Ref. Ares(2024)3214972 - 02/05/2024

Deliverable D6.7 – CSSBoost Open Circularity EcoSphere

Deliverable Number	D6.7	Lead Beneficiary	11 - HMU
Deliverable Name	CSSBoost Open Circularity EcoSphere		
Type	R — Document, report	Dissemination Level	PU - Public
Due Date (month)	42	Work Package No	WP6

Description
Report presenting the CSSBoost Open Circularity Ecosphere, a consumer-centric knowledge base for cross-border collaboration among diverse stakeholders, completed with pilot experiences and links to the CSSBoost Solutions Evidence Base. (Linked to Task 6.5)

Deliverable D7.1 – Dissemination and Communication Plan (v1)

Deliverable Number	D7.1	Lead Beneficiary	16 - ADR
Deliverable Name	Dissemination and Communication Plan (v1)		
Type	R — Document, report	Dissemination Level	PU - Public
Due Date (month)	6	Work Package No	WP7

Description
Report presenting the project's dissemination & communication and networking & clustering strategy. (Linked to Tasks 7.1 and 7.2)

Deliverable D7.2 – Dissemination and Communication Plan (final)

Deliverable Number	D7.2	Lead Beneficiary	16 - ADR
Deliverable Name	Dissemination and Communication Plan (final)		
Type	R — Document, report	Dissemination Level	PU - Public
Due Date (month)	42	Work Package No	WP7

Description
Report presenting the plan for future dissemination and communication activities. (Linked to Tasks 7.1 and 7.2)

Deliverable D7.3 – First Policy Brief for Regional CE Transition

Deliverable Number	D7.3	Lead Beneficiary	20 - ACR+
Deliverable Name	First Policy Brief for Regional CE Transition		
Type	DEC —Websites, patent filings, videos, etc	Dissemination Level	PU - Public
Due Date (month)	18	Work Package No	WP7

Description
First policy brief in collaboration with the CCRI-CSO and the stakeholders. (Linked to Task 7.2)

Associated with document Ref. Ares(2024)3214972 - 02/05/2024

Deliverable D7.4 – Second Policy Brief for Regional CE Transition

Deliverable Number	D7.4	Lead Beneficiary	20 - ACR+
Deliverable Name	Second Policy Brief for Regional CE Transition		
Type	DEC —Websites, patent filings, videos, etc	Dissemination Level	PU - Public
Due Date (month)	42	Work Package No	WP7

Description
Second policy brief out of the CSSBoost activities/outcomes in collaboration with the CCRI-CSO and the stakeholders. (Linked to Task 7.2)

Deliverable D7.5 – Training and Education Material and Curricula

Deliverable Number	D7.5	Lead Beneficiary	1 - TUC
Deliverable Name	Training and Education Material and Curricula		
Type	R — Document, report	Dissemination Level	PU - Public
Due Date (month)	42	Work Package No	WP7

Description
Report on the training and educational platform with education material and curricula. (Linked to Task 7.3)

Deliverable D7.6 – Social Innovation Actions Plan

Deliverable Number	D7.6	Lead Beneficiary	19 - SCRC
Deliverable Name	Social Innovation Actions Plan		
Type	R — Document, report	Dissemination Level	PU - Public
Due Date (month)	16	Work Package No	WP7

Description
Report presenting the action plan on the social innovation actions on the pilot areas. (Linked to Task 7.4)

Deliverable D7.7 – Social Innovation Activity Report

Deliverable Number	D7.7	Lead Beneficiary	19 - SCRC
Deliverable Name	Social Innovation Activity Report		
Type	R — Document, report	Dissemination Level	PU - Public
Due Date (month)	42	Work Package No	WP7

Description
Report presenting the outcomes from the social innovation actions on the pilot areas during the duration of the project. (Linked to Task 7.4)

LIST OF MILESTONES

Milestones

Grant Preparation (Milestones screen) — Enter the info.

Milestone No	Milestone Name	Work Package No	Lead Beneficiary	Means of Verification	Due Date (month)
1	Knowledge Integration: CSSBoost Application Framework	WP2	11 - HMU	Complete first version of the Application Framework	12
2	1st Vertical Integration: Start of pilot demonstration Phase 1	WP2, WP4, WP5, WP3	2 - MAG	First version of integrated prototypes for phase 1 pilot activities completed and delivered (D2.4, D3.1, D4.1, D4.3, D4.6, D5.1, D5.3)	18
3	Completion of the digital twins	WP4	2 - MAG	Digital Twin models completed and delivered (D4.4)	28
4	2nd Vertical Integration: Start of pilot demonstration Phase 2	WP4, WP5, WP3	2 - MAG	Second version of integrated prototypes for phase 2 pilot activities completed and delivered (D4.2, D4.4, D4.5)	31
5	End of pilot demonstration and evaluation	WP5	8 - UNIVPM	All activities performed and reported in all pilot cases (D5.2)	40
6	Final Vertical Integration	WP7, WP4, WP5, WP6	1 - TUC	All CSSBoost activities completed and impact ascertained (D4.7, D5.4, D5.5, D6.1, D6.3, D6.4, D6.6, D6.7, D7.2, D7.5, D7.7)	42

LIST OF CRITICAL RISKS

Critical risks & risk management strategy

Grant Preparation (Critical Risks screen) — Enter the info.

Risk number	Description	Work Package No(s)	Proposed Mitigation Measures
1	A partner underperforms and/or leaves the consortium either by its own decision or by a decision from the Project Steering Committee	WP2, WP7, WP5, WP4, WP1, WP3, WP6	Preventive Measures: a) Continuous and Effective Monitoring of Partner's progress; b) Inform the Project Manager in case a partner is reluctant for cooperation. c) Discussion in project boards in case a partner is reluctant to cooperation. Corrective Actions: a) Inform the Project Officer for the partner's withdrawal and reallocation. Communication with all partners, redistribution of tasks. Re-allocation of the partner's effort to the remaining partners; b) If critical competencies lack in existing partners, then new partners should be found; c) If the leaving party refers to a service provider or a pilot case, the consortium will identify new ones with the same profile.
2	Inadequate coordination of activities at pilot level	WP5	Preventive Measures: The responsible partner for the deliverables will communicate, at an early stage, an overview of the deliverable so that any disagreements are timely identified. Local people will be involved in day-to-day management, to keep communication short, and interact directly with local stakeholders out of the consortium. Corrective Actions: Coordination will be ensured by proper management structure, including a pilot committee focusing on monitoring/management of cases. Local management will report frequently to timely intercept problems.
3	Delays are estimated in a particular result due for a Project Milestone	WP2, WP7, WP4, WP5, WP1, WP3, WP6	Preventive Measures: a) Continuous monitoring of the WP activities, Communication with WP leader; b) Effective allocation and planning of work from the WP leader. Corrective Actions: Analysis of causes for the delay and actions may include: a) Assigning activities to other partners; b) Re-allocation of the effort to the partners; c) Definition of more analytical schedule.
4	Reluctance from pilot partners to provide data due to confidentiality and security issues.	WP5	Preventive Measures: a) Consortium agreement with terms regarding access to data and existing knowledge; b) Additional confidentiality agreements between the pilot partners and the supporting technology partners for the knowledge/ data which is characterized as "sensitive" and "confidentiality"

Critical risks & risk management strategy

Grant Preparation (Critical Risks screen) — Enter the info.

Risk number	Description	Work Package No(s)	Proposed Mitigation Measures
5	Organisational resistance to change, bureaucratic inefficiency, and a lack of dynamism can impede the effective deployment of CSSs.	WP5	Preventive Measures: a) Implement robust change management strategies, including training and employee engagement, to facilitate organisational adaptation. Corrective Actions: Apply lean methodologies to streamline processes and reduce administrative inefficiencies.
6	Problems with the deployment of the Digital platform or the individual solutions to the pilots.	WP4, WP3	Preventive Measures: a) Dedicated Work Package (WP4) and Task (T4.6) for the integration of the platform/solutions in a multi-phase process, including a mock-up training & pre-testing exercise; b) Design for integration and integration iterations with guidelines produced in different project phases. Corrective Actions: a) After each phase/step, the platform/solutions progress and status will be re-evaluated based on case study feedback and amendments will be made, towards the final adapted version.
7	Failure to develop the key CSSBoost application framework	WP2	Preventive Measures: CSSBoost consortium has been carefully assembled in order to include major players in the corresponding fields, with complementary know-how and expertise. Corrective Actions: The outcomes of first prototyping, integration and piloting, will result in the redefinition of the implementation plan, incorporating corrective actions.
8	Poor performance of CSSBoost solutions as a whole	WP4, WP5, WP3	Preventive Measures: The CSSBoost integration starts early in the duration of the project in order to be able to do testing in dry run conditions (Individual components). Corrective Actions: All pilot operators will review the circumstances on a frequent basis to ensure that poor performance concerns are discovered early, and an adequate solution is provided. The system's engineers will analyse the causes of the deterioration to find a solution to avoid such problems in the future.
9	Possible negative research results from the feasibility and efficiency points of view	WP2, WP7, WP4, WP5, WP1, WP3, WP6	Preventive Measures: a) Proactive quality assurance will run through the project identifying targeted outcomes that are not viable or cannot be obtained efficiently. Corrective Actions: To address efficiency concerns, the project may investigate alternative CE paradigms, such as distributed decision for localization instantiation. As per feasibility,

Critical risks & risk management strategy

Grant Preparation (Critical Risks screen) — Enter the info.

Risk number	Description	Work Package No(s)	Proposed Mitigation Measures
			CSSBoost will evaluate the applicability of complementary methodologies capable of achieving the desired goals.
10	Failure to satisfy the needs and expectations of the end-users with the implemented solution	WP4, WP5, WP6	Preventive Measures: Provide analytical definition of the solution specification early in the project combined with workshop with solution developers. Corrective Actions: The internal reviewing process for all project deliverables and reports, plus the contribution of Advisory Board, will ensure high quality project results, by requesting revision of the outcomes/submitted Deliverables, if required.
11	Changes in legislative framework in one or more European Countries	WP2, WP7, WP4, WP5, WP1, WP3, WP6	Preventive Measures: There will be a continuous monitoring and update of possible adoption of new laws and rules by the European Nations throughout the project, from the initial development of the case studies (WP4) until the replicability and scalability analysis (T6.1)

PROJECT REVIEWS

Project Reviews

Grant Preparation (Reviews screen) — Enter the info.

Review No	**Timing** (month)	**Location**	**Comments**
RV1	22	to be confirmed	RP1 (M1-M20)
RV2	42	to be confirmed	RP2 (M21-M42)

CSSBoost

Boosting Circular Systemic Solutions through Virtual Regional Circular Economy Spaces

History of Changes

No	Date	Section in DoA	Nature of change and reason
Annex I – Part A			
A1	23/01/2024	Beneficiaries and Associate Partners	Moved participant 2 (Imperial College London/ICL) from Beneficiary to Associated Partner and the budget allocated to ICL has been deleted, because the participant is established in a non-eligible country (UK).
A2	24/01/2024	Work Packages	Changed the end dates of: - Task 4.6 from M42 to M40, - WP4 from M42 to M40, - Task 5.7 from M42 to M41, - Task 5.8 from M42 to M41, and - WP5 from M42 to M41, due to the changes in the dates of the deliverables (see change A14).
A3	19/01/2024	Deliverables	Added a new deliverable (D7.3 “First Policy Brief for Regional CE Transition”, M18), in Task 7.2), corresponding to a second policy brief, since compulsory for all projects.
A4	22/01/2024	Deliverables	Changed the dissemination level of the deliverables: - D1.1, D1.2, D1.3 “Data Management Plan v1, v2 and final” (D1.2a, D1.2b, D1.2c in the proposal), and - D6.2, D6.3 “Market Analysis and Business Plans for CSSBoost Solutions v1 and final” (D6.2a, D6.2b in the proposal), from SEN to PU.
A5	24/01/2024	Summary of Staff Effort	Removed all PMs allocated to partner ICL (6 PMs for WP1, 11 PMs for WP2, 13 PMs for WP3, 14 PMs for WP5 and 5 PMs for WP7), because this partner has been removed from the beneficiaries and inserted as an associate partner. In total, the number of PMs allocated to the beneficiaries has been reduced by 49 PMs (from 1578 to 1529).
A6	18/02/2024	Deliverables	Removed the following deliverables indicated in the proposal: - D1.1 “Project Management Handbook”, - D1.3a, D1.3b, D1.3c “Ethics Requirements and Gender Equality Plan”, - D7.1b “Dissemination and Communication Plans and Activity Report (v2)”, - D7.2a “Networking and Clustering Plan and Activities Report (v1)”, and - D7.2b “Networking and Clustering Plan and Activities Report (v2)”, because the subject is covered by the Technical Reports.
A7	18/02/2024	Deliverables	Removed the following deliverables indicated in the proposal: - D2.4a “CSSBoost Application Framework (v1)", - D4.1a “Architecture and Specifications for Digital System (v1)”, - D4.6b “Regional Information Sharing Platform (v2)”, - D5.2a “Integrated Pilots Activities Report (v1)”,

No	Date	Section in DoA	Nature of change and reason
			- D5.4a "CSSBoost Solutions Evidence Base (v1)", and - D6.5a "CSSBoost Open Circularity EcoSphere (v1)", to align better the report with the reporting period and to avoid having two versions of the same deliverable within the same reporting period.
A8	18/02/2024	Deliverables and Work Packages	Deliverables D3.2-D3.8 (D3.1b in the proposal) moved to M38, to be aligned with the integration work in WP5. For the same reason, Tasks 3.1-3.7, as well as WP3, extended to M38.
A9	18/02/2024	Deliverables and Work Packages	Deliverable D6.5 "CSSBoost Assets Exploitation and IPR Plan (v1)" (D6.4a in the proposal) moved to M06 according to the Guidance. For the same reason, the starting date of Task 6.4 and WP6, changed to M04 (from M06).
A10	21/02/2024	Deliverables and Work Packages	Deliverable D2.5 "CSSBoost Application Framework" (D2.4b in the proposal) moved to M28 to align better the report with the reporting period. For the same reason, Task 2.4 and WP2, extended to M28.
A11	18/03/2024	Deliverables	Deliverable D3.1b in the proposal (CSS Lifecycle Management and CE Stakeholders Decision Support Services) broken in 7 separate deliverables (D3.2-D3.8, one for each of the Tasks 3.1-3.7.
A12	18/03/2024	Deliverables	Deliverable D5.2b in the proposal (Integrated Pilots Activities Report) broken in 5 separate deliverables (D5.2-D5.6, one for each of the Tasks 5.1-5.6. The type of these deliverables has been defined as "DEM".
Shortcomings Identified in the ESR			
A13	25/01/2024	Work Packages	Added comprehensive list of activities to be performed in the beginning of the description of WP4 and WP5. Also, added detailed descriptions for Tasks 5.2, 5.3, 5.4, 5.5 and 5.6, based on the presentation of pilot cases in Part B. Addressing the ESR comment "*Some work package (WP) descriptions do not provide sufficiently specific information about the activities to be conducted (e.g. WP4 and WP5) and there is insufficient information for monitoring progress.*".
A14	24/01/2024	Deliverables and Work Packages	Changed the dates of the deliverables: - D4.7 "Regional Information Sharing Platform (final)" (D4.6c in the proposal) from M42 to M40, - D5.8 "Pilots Circularity and Sustainability Assessment and Validation (final)" (D5.3b in the proposal) from M42 to M41, and - D5.9 "CSSBoost Solutions Evidence Base" (D5.4b in the proposal) from M42 to M41, to address the shortcoming identified in the ESR "*several deliverables are due in Month 42, which allows little flexibility in the case of setbacks in the corresponding deliverables. There is also overlap between several milestones and corresponding deliverables and several of these are due at the same time.*".
A15	25/01/2024	Milestones	Inserted more clear description on the means of verification of milestones and added a milestone for the completion of the digital twins on M28, addressing the ESR comment "*The milestones are also not sufficiently convincing for project monitoring (e.g. no milestones for completion of the cognitive digital twin).*".
A16	09/02/2024	Work Packages	Inserted explanation of the role of partners HMU (in Task 1.3) and UNIVPM (in Task 1.4), addressing the ESR comment "*In some cases, the indicated effort for some*

No	Date	Section in DoA	Nature of change and reason
			partners in some of the WPs is not sufficiently justified in the corresponding description (e.g. disproportionately high effort in WP1 for Partners 9 and 12).”
Annex I – Part B			
B1	14/01/2024	Whole Document	Removed sections 3.1.2 (Detailed Work Package Description), 3.1.4 (List of Deliverables), 3.1.5 (List of Milestones), 3.1.6 (Critical Risk for Implementation) and 3.1.7 (Summary of Staff Effort), according to EC guides.
B2	14/01/2024	Introduction	Added Table of Content.
B3	24/01/2024	Timing of Activities (Gantt Chart) (§3.1.2)	Updated Gantt Chart, to be consistent with the new WPs/Tasks durations, deliverables numbering/dates and indicating the Milestones and the Reporting Periods.
B4		Demonstrators Summary Table (§1.2.4)	Added demonstrators summary table, as recommended for all IA projects.
B5	25/01/2024	Consortium as a Whole (§3.2.1)	Added more details about the Associate Partner ICL, including the Tasks it contributes and the total budget requested from its own national funding authority.
B6	14/01/2024	Ethics (Section 4)	Added Ethics section, according to the requirements for HE projects.
B7	14/01/2024	Ethics (Section 4)	Added, §4.1-Ethics Self-Assessment from Part A of the proposal, including §4.1.1-Ethical dimension of the objectives, methodology and likely impact and §4.1.2-Compliance with ethical principles and relevant legislations), according to EC guides.
B8	26/01/2024	Ethics (Section 4)	Added §4.2-Identified Ethics Issues, addressing the ethics issue identified in the Ethics Summary Report, concerning the appointment of an Ethics mentor.
B9	14/01/2024	Ethics (Section 4)	Added §4.2-Consortium Declarations, according to EC guides.
B10	09/02/2024	Purchase Costs Justification (§3.1.3)	Added a more detailed description of the equipment cost of partner 8/UNIVPM, split by major cost items.
B11	18/03/2024	Regional Circular Systemic Solutions (§1.2.3)	Added, at the end of the section, an explanation of "Short-Term” and “Mid-Long Term” outcomes.
Shortcomings Identified in the ESR			
B12	25/01/2024	Strategic Objectives and CSSBoost Offerings (§1.1.2)	Added a paragraph at the end of §1.1.2, addressing the ESR comment “*The contribution of the proposed digital solution to increased circular ventures is not sufficiently convincing.*”.
B13	25/01/2024	Ambition with Respect to the State-of-the-Art (§1.1.4) and Maturity of CSSBoost Technological Enablers (§1.1.5)	Added references regarding the state-of-the-art of all CSSBoost innovations (§1.1.4) and added an extra column in the table of §1.1.5 presenting the challenges that the technological solutions will address, addressing the ESR comment “*The proposal lacks a detailed and well-referenced review of the current state-of-the-art. The specific challenges that the proposed innovative solutions will address are also not elaborated in a sufficiently coherent way.*”.
B14	25/01/2024	Maturity of CSSBoost Technological Enablers (§1.1.5)	Added a paragraph and a figure at the end of §1.1.5, addressing the ESR comment “*The proposed advances in TRLs are not elaborated in sufficient detail in the proposal, with insufficient explanation of the qualified steps to reach the desired TRLs. This is therefore not fully convincing.*”.
B15	25/01/2024	Regional Circular Systemic Solutions (Pilot Cases) (§1.2.3)	Added an extra section, named “E. Digital Solutions to be Demonstrated and Validated” in the description of each pilot case, addressing the ESR comment “*The overall coherence of the methodology is not fully clear. The conceptual link between the implementation of the*

No	Date	Section in DoA	Nature of change and reason
			digital solution and the pilot cases is not sufficiently explained and it is not clear to what extent different pilot cases will contribute to different components of the digital solution.".
B16	25/01/2024	Inter-Disciplinary Approach (§1.2.6)	Added a paragraph and a figure at the end of §1.2.6, addressing the ESR comment "*The proposal does not explain in sufficient detail how inputs and methods from different disciplines will be actually integrated in pursuit of the objectives.*".
B17	25/01/2024	Open Science Practices (§1.2.9)	Added text in the "Open and FAIR Data" point of §1.2.9, addressing the ESR comment "*FAIR principles are not specifically referred to.*".
B18	25/01/2024	Project's Pathways Towards Impact (§2.1)	Replaced Figure 6 with a more informative, addressing the ESR comment "*Some descriptions of the pathways to impact are too generic and connections between the pathways and the expected impacts are not always elaborated in sufficient detail. For example, it is not fully convincing how the introduction of a cyber-physical system will contribute to significant increased circularity.*". Note: The second part of this comment has also been addressed by the changes made when addressing the comment on how the digital system increases circular ventures.
B19	25/01/2024	Exploitation strategies (§2.2.5)	Added a Table at the of §2.2.5 providing detailed information on potential Key Exploitable Results, addressing the ESR comment "*Key exploitable results are not sufficiently described in the proposal.*".
B20	25/01/2024	Consortium Overview and Rational (§3.2.1)	Added text at the end of §3.2.1, addressing the ESR comment "*The complementarity of partners for achieving the proposed project objectives is not sufficiently clear, with little discussion of potential interactions and synergies. Moreover, industrial/commercial involvement may be inadequate to ensure full exploitation of results.*"
Annex II			
C1	22/02/2024	Estimated Budget for the Action	Due to the transition of participant ICL (Imperial College London/ICL) from beneficiary to associated partner (see change A1), the estimated budget for the action has been changed to: - Total costs reduced from 11,876,437.5 Euro to 11,267,312.5 Euro. - Requested EU Contribution and Maximum Grant Amount, reduced from 9,799,433.75 Euro to 9,190,318.75 Euro. The difference(609,125 Euro) is the budget foreseen in the proposal for ICL

Table of Content

Acronyms

AI	Artificial Intelligence	IoT	Internet-of-Things
APT	Application Planning Toolkit	IPR	Intellectual Property Rights
CA	Consortium Agreement	KB	Knowledge Base
CCRI	Circular Cities and Regions Initiative	KC	Knowledge Core
CSO	Coordination and Support Office	KER	Key Exploitable Results
CDT	Cognitive Digital Twin	KG	Knowledge Graph
CE	Circular Economy	LL	Living Lab
CEAP	Circular Economy Plan	LCA	Life Cycle Assessment
CEIP	Circular Economy Investment Plan	MCDA	Multi-Criteria Decision Analysis
CES	Circularity EcoSphere	ML	Machine Learning
CoP	Community of Practice	MOOC	Massive Open Online Course
CPS	Cyber-Physical Systems	MMI	Man-Machine interfaces
CS	Circular Solutions	NBS	Nature Based Solutions

CSS	Circular Systemic Solution	PSM	Process Simulation Modelling
DAMS	Data Acquisition, Management and Sharing	RAM	Reference Architecture Model
DMP	Data Management Plan	SAT	Self Assessment Tool
DT	Digital Twins	SBS	Sustainability Balanced Scorecard
EAB	External Advisory Board	SDG	Sustainable Development Goal
EOSC	European Open Science Cloud	SEP	Stakeholders' Engagement Plan
FAIR	Findable, Accessible, Interoperable, Reusable	SSH	Social Sciences and Humanities
GA	Grant Agreement	VCEM	Virtual Regional Ecosystem and Market
IDS	International Data Space	VSD	Value Sensitive Design

1 Excellence

#@REL-EVA-RE@#

1.1 Objectives and Ambition

#@PRJ-OBJ-PO@#

1.1.1 Challenges and Motivation

The technical, economic and environmental concerns associated with Circular Economy (CE) have been well researched, with a number of solutions developed and applied around the EU. However, these are not sufficient for achieving anything more than some steps towards **CE Transition** which in most EU regions is still far from target. The European Council of Auditors recently reported that "*There is only limited evidence that the CE action plans had influenced circular-economy activities in the member states*"[1]. Three motives converge to make the need to *boost and accelerate CE transition* more urgent: (i) the need to sustain non-replaceable natural resources, (ii) climate change, and (iii) a growing need to promote lifestyle change towards resource conservation.

A main reason behind slow progress in CE transition is the fact that circular business models usually take place on a micro-level (an individual firm) and are thus limited in their ability to realise the systemic implementation of CE principles that often span across firms and other stakeholders in a city or region or group of cities and regions. The **Circular Systemic Solution** (CSS) concept[2], if correctly and extensively applied, points to the right direction. However, the full deployment of circular systems in cities and regions still needs to be unlocked. Small-scale solutions are more applicable and controllable, but large-scale solutions are vulnerable to systemic barriers and organisational and governance inefficiencies of CE, which have not been as well researched and managed. Also, CSSs are susceptible to changes in social and economic conditions, changes that are ever-present during the recent years and still expected for the foreseeable future.

A CSS is a multi-actor entity in which interdependent actors play complementary roles. These include for-profit companies, public services, governmental bodies, municipalities and cities, academic & research institutions, non-profit organisations, consumers and citizens. Such an **Ecosystem** is a complex systemic undertaking, especially if viewed as evolving in time and operating in regional **Market** conditions. It emerges or is created around a common, system-level goal related to resource circularity, and may involve the creation of CE knowledge, CE businesses, and economic value[3]. There are technologies to select and configure, barriers to overcome, risks to predict and manage, instruments, business models and governance conditions to be considered and optimised. The conceptualisation of a CE/CSS ecosystem and the regional market is a fundamental issue for any research project based on this theme. Where to draw the boundaries of the ecosystem, what the relevant structure is, and how the ecosystem evolves are important issues.

The CE transition has also been hampered by low levels of knowledge exchange among CE actors, particularly industries and commercial entities, who are afraid of losing market share. The need for newer financial and governance green instruments to drive the innovations on a larger scale has also contributed to the slow adoption of the CE paradigm. On the socio-economic level, the empowerment and engagement of citizens in **Social Innovation Actions** can contribute to elaborating stronger innovations to face challenging problems. Furthermore, and in alignment with the CCRI, a CE-centric quintuple helix cohesions could contribute to CSS development at the intersection of different stakeholder groups (civil society being a key element) and stipulate newer **Business Models, Financial Strategies and Investment Plans** for the implementation of CSS.

In addition to the CE transition, the EU is currently engaged in another transition, the **Digitalisation**. Emerging digital technologies, such as Artificial Intelligence (AI), Internet-of-Things (IoT), Big Data Analytics, Digital Twins (DT) and Cyber-Physical Systems (CPS) can be considered as the main drivers of the digital transition. By collecting, managing, and processing data and information, as well as creating knowledge about all entities in the CE ecosystem and its market, digital technologies can enable automated decision making. This can help overcome some of the barriers limiting the uptake of CE opportunities and the obstacles to scaling up CE

[1] Circular Economy: Slow transition by member states despite EU action. Special Report from the European Council of Auditors. 2023.
[2] Projects applying innovative circular models involving different actors, value-chains, levels of government & governance.
[3] L.A.Stenroos, P.Ritala, L.D.W.Thomas. Circular economy ecosystems: A typology, definitions, and implications. Edward Elgar, 2021.

solutions. The OECD report on 'The Circular Economy in Cities and Regions'[4] identifies three major approaches to using digitalisation in the transition to a CE: (i) improve knowledge, connections and information sharing, (ii) make business models, products and processes more circular, and (iii) strengthen the role of citizens and consumers.

Nowadays it is recognised that the digital and ecological/circular transformation of our economy can only lead to success if it is understood as a joint task. This double or **Twin Transition**[5] is considered the key to adopting a circular development model because the two transitions reinforce each other. It is well known that there are many barriers to digital transition and circular economy alone, but when combined they face another set of barriers. In a systemic environment where CSSs develop and operate, these barriers can be of different types: technological (integration of digital technologies and product design), attitudinal (risk aversion and perception of sustainability), operational (supply chain management and infrastructure), structural (unclear responsibility distribution and missing exchange of info), or financial (financial profitability and measuring financial benefits).

1.1.2 Strategic Objectives and CSSBoost Offerings

CSSBoost responds to these challenges by pursuing the following five (5) **Strategic Objectives**:

A. Maximise the adoption and impact of any CSS, by applying it within an enabling integrated environment.
B. Extend this environment to energise and manage the entire CE transition in cities, regions or their groupings.
C. Beyond the implementation phase, maximise also CSS sustainability and growth along its entire lifecycle.
D. Enable setting-up knowledge exchange, CE relations and interoperability between different regions/cities.
E. Target the decisive advancement of CE in specific EU regions and promote CE methods and mind-set.

To pursue these, CSSBoost defines the concept of the **CE/CSS Ecosystem and Market**, an open (physical) space of city, regional or multi-regional scope, encompassing an area's existing CE market, its value chains and its entire external environment, even extra-regional entities and markets where relevant. This complex physical system is digitally virtualised, dynamically monitored, analysed, assessed and 'understood' by developing and applying the key CSSBoost innovation, the **Virtual Regional CE/CSS Ecosystem and Market** (VCEM). Digital understanding is achieved by modelling the ecosystem, storing expert knowledge about it, about entities relations and about CE in general (related technologies, practices, applications, etc.), and utilising artificial cognition and machine learning (ML). This has the additional benefit of producing considerable amounts of region-specific knowledge and data, transferable for use both inside and outside it, overcoming over-specialisation and regionalisation. On this basis, a range of **Services** are developed, tailored to: (a) The optimum CSS implementation and initiation, overcoming barriers; (b) Supporting CSS **Lifecycle Management** to ensure risk management, sustainability, growth, upscaling; (c) Provide support to key classes of CE actors, to ensure their activation and viability.

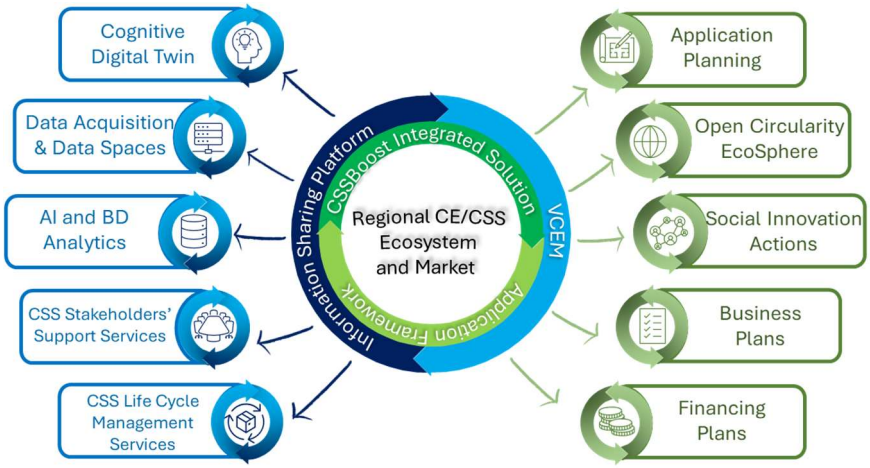


Figure 1 *CSSBoost offerings.*

These services are offered through a digital **Information Sharing Platform** of area-wide scope that allows also for communication and continuous updating of systemic information, as well as for information sharing between stakeholders. Through VCEM and platform, a unique **Cyber-Physical System** (CPS) is created, able to decisively boost CE. The system is fully capable of extending further than any single CSS, to nurture, assess and monitor the entire CE transition in the area. Multiple CSS and non-systemic Circular Solutions (CS) can be proposed, designed, customised, evaluated, applied, monitored, assessed, optimised and promoted by the provided tools, services and measures which are designed to bridge the gap between the techno-economic and the social dimensions.

To practically apply these concepts, CSSBoost develops a novel **CSS Application Framework** that views a CSS as a composite living entity that operates and evolves within the described CE/CSS Ecosystem and Market, activating potential stakeholders and exploiting available resources. It also introduces the methodological concept of the CSSBoost **Integrated Solution** that involves the integration of one or more CSS within the described robust digital environment, enhanced by tailored methodology and procedures, to create a CPS for optimum application, monitoring and assessment, lifecycle management and coordinated CE growth.

CSSBoost also designs a set of diverse **Exemplary CSSs** both as transition tools and to validate and promote its ideas by applying and demonstrating them in four regional **Pilot Cases** that respond to different challenges,

[4] https://www.oecd.org/regional/the-circular-economy-in-cities-and-regions-10ac6ae4-en.htm
[5] https://joint-research-centre.ec.europa.eu/jrc-news-and-updates/twin-green-digital-transition-how-sustainable-digital-technologies-could-enable-carbon-neutral-eu-2022-06-29_en

barriers, needs and feasibilities across EU and targeting different value chains, as delineated in the EU's Circular Economy Action Plan (CEAP) (Food, Water and Nutrients; Plastics; Batteries & Vehicles). A fifth **Interregional and Multinational** pilot is also developed, combining the value chains of the regional pilots, boosting interregional and cross border cooperation. Pilots are supported, even after the project's end, through **Social Innovation Actions** and **Life-Long Learning** educational programs that help making further inroads into the social dimension of CE.

CSSBoost develops its innovations by applying a rigorous SotA **Co-creation Environment** and instruments, and SSH methods and procedures. It also develops **Replication**, **Business**, **Exploitation** and **Investment** plans for the uptake, replication, upscaling and financing of its solutions. Replication is further empowered by developing and offering on the web a technical evidence base and an open circularity ecosphere encapsulating all experiences and knowledge gained by the project and its partners.

The CSSBoost **Digital Solutions** are co-created so as to respond to the requirements and quality criteria set by all classes of stakeholders and prospective CSS actors in order for them to be activated in circular ventures. The overall strategy for the digital solution is to provide to each and every class of (actual or prospective) regional stakeholders the knowledge, information and motivation needed for them to decide to enter into and sustain circular endeavours. This knowledge/info is designed to directly and effectively support all related key decisions, but also to decisively modulate stakeholder attitudes by promoting familiarity, motivation and confidence in starting or participating in circular ventures, while at the same time removing uncertainties. This strategy is applied at all main phases of any circular venture, as follows: (i) *Investigation and Feasibility Phase*: Visualization and assessment of the entire CSS/CE environment and its entities, resources and opportunities, on an open regional-scale platform, prior to any venture, enables feasibility analysis and prospective stakeholders communication and mediation, while inspiring confidence in the decision support they will receive when starting/participating in a venture. (ii) *CSS & Value Chain Initiation Phase*: CSS/value chain initiation tools, business models, data and knowledge and roadmaps are provided to support easy and risk-free ventures. (iii) *CSS Sustainment and Expansion Phase*: Comprehensive and effective CSS lifecycle management tools for all classes of CSS stakeholders/participants allowing for the optimization of costs, benefits and revenues, risk management, adaptation to changes, p2p trading and business expansion.

1.1.3 Specific Objectives and Expected Key Results

CSBoost follows an **Objectives and Key Results** framework to drive and execute the project's innovations. The consortium addresses 12 (Methodological/Circular/Digital/Business-Operational/Social/Governance) **Specific Objectives** (OB), each pursued in specific WPs/Tasks to ensure several measurable **Key Results** (KR).

OB1	Create a novel CE/CSS application framework that will unify research in technical, economic and social fields to create a robust context and lifecycle management methodology for coordinated CE/CSS growth and optimum integration and application of CSSs overseen by the CSSBoost digital solution. *(WP2)*

KR#1.1: CSSBoost Application Framework applied in pilots. *(T2.4, D2.5)*

OB2	Develop CSS application planning tools and use them to design a set of diverse exemplary CSSs, tailored to specific needs and conditions, prepared and bundled to be demonstrated at the CSSBoost pilots and subsequently used as transition tools through upscaling, replication & exploitation planning. (*WP2*)

KR#2.1: CSS Inventory and Application Planning Toolkit, applied in preparing KR#2.2. *(T2.1, D2.2)*
KR#2.2: Five CSS design and application plans, ready to be applied at respective pilots and planned for upscaling, replication and exploitation advancing knowledge, in close cooperation with the CCRI-CSO. *(T2.3, D2.4)*

OB3	Develop a comprehensive package of CSS lifecycle management services for monitoring, optimisation, adaptation and technical support, able to ensure CSS viability, sustainability and expansion. *(WP3)*

KR#3.1: Advanced adaptation and scenario assessment services package prototype. *(T3.1, D3.2)*
KR#3.2: Value chain planning, optimisation, and actor support services package prototype. *(T3.2, D3.3)*
KR#3.3: Dynamic CE/CSS ecosystem and market risk assessment services and tool. *(T3.3, D3.4)*

OB4	Develop an array of stakeholder-oriented services, targeted to each major class of CE/CSS stakeholders, enabling their own activation through info, assessment, communication and promotion. *(WP3)*

KR#4.1: Stakeholder activation services package, incl. CE/CSS marketplace and P2P trading. *(T3.6, D3.7)*
KR#4.2: Promotion, communication and citizen participation tools. *(T3.7, D3.8)*

OB5	Develop AI analytics, diagnostics and inference services enabling CE/CSS Ecosystem and Market dynamic monitoring, analysis, assessment and diagnosis. *(WP3)*

KR#5.1: AI inference, forecasting, demand response, problem detection and response module. *(T3.4, D3.5)*
KR#5.2: CSS value chain dynamic LCA and sustainability balanced scorecards module. *(T3.5, D3.6)*

OB6	Develop a CE/CSS-specific cognitive DT able to virtualise entire city, regional, or interregional CE markets and ecosystems, incl. CSSs and value chains, enabling their dynamic monitoring, analysis, assessment and diagnosis, and supporting their lifecycle management and provision of services to all stakeholders. *(WP4)*

KR#6.1: Dynamic DT model prototypes of CSS and regional CE/CSS Ecosystem and Market with customised versions for the pilot regions. *(T4.4, D4.4)*
KR#6.2: Knowledge Graph prototypes virtualising knowledge about CE/CSS Ecosystem and Market. *(T4.2, D4.2)*

OB7	Develop a novel data acquisition system of regional scope, including data spaces to enable communication & data sharing with confidentiality provisions, across all active and potential CE actors/stakeholders. *(WP4)*

KR#7.1: Data Acquisition, Management and Sharing System with Data Spaces with customised versions deployed to the pilot cases. *(T4.3, D4.3)*

OB8	Develop a digital platform of regional scope that integrates all previous KRs and provides all CSSBoost lifecycle management services and tools to its end-users, with security and confidentiality. *(WP4)*

KR#8.1: Personalised visualisations of the CE/CSS Ecosystem and market. *(T4.5, D4.5)*
KR#8.2: Front-end with advanced man-machine interfaces prototypes. *(T4.6, D4.7)*
KR#8.2: Generic and pilot region-specific prototypes of CSSBoost Information Sharing Platform. *(T4.6, D4.7)*

OB9	Apply the KR#2.2 prototype CSS in multiple diverse pilots across EU, integrating them with the KR#8.3 digital platform and services, under methodology and procedures specified by the application framework of KR#1.1, and demonstrate, evaluate and validate the resulting CSSBoost integrated solutions. *(WP5)*

KR#9.1: Pilot demonstrations and evaluation completed & combined activities. *(T5.2-7, D5.2-D5.6)*
KR#9.2: CSSBoost solutions Technical Evidence Base published on the Web. *(T5.8, D5.9)*

OB10	Plan, facilitate and ensure the uptake, replication and upscaling of CSSBoost solutions, to any city, region or group of regions across EU. *(WP6)*

KR#10.1: Sustainability & upscaling plans for pilot regions. *(T6.1, D6.1)*
KR#10.2: CE market analysis and business models and plans for CSSBoost solutions and the pilots. *(T6.2, D6.3)*
KR#10.3: Investment plans for the implementation of CSSBoost solutions *(T6.3, D6.4)*

OB11	Maximise CSSBoost's impact through communication, dissemination, networking, clustering, training & education and social innovation actions. (*WP7*)

KR#11.1: Communication, dissemination, networking, clustering activities. *(T7.1-2, D7.1-4)*
KR#11.2: Education & training course designs and multimedia educational content. *(T7.3, D7.5)*
KR#11.3: Social innovation actions planned and initiated at pilots and activity report delivered. *(T7.6, D7.7)*

OB12	Boost alliance and coalitions with relevant quintuple helix stakeholders to co-create regional CSS solutions, foster cross-border collaboration among diverse stakeholders and produce policy briefs. (*WP2,6,7*)

KR#12.1: Four regional and one multiregional Communities of Practice. *(T2.2, D2.3)*
KR#12.2: CSSBoost Circular EcoSphere, a consumer-centric knowledge base, published on the Web. *(T6.5, D6.7)*
KR#12.3: Policy briefs related to CE transition in cities and regions, in collaboration with CCRI-CSO. *(T7.2, D7.3-4)*

Methodological	Circular	Digital	Business-Operational	Social	Governance

1.1.4 Ambition with Respect to the State-of-the-Art

The key CSSBoost innovation is the VCEM (virtualisation of CE/CSS Market & Ecosystem) that allows the optimum integration of CSSs, their lifecycle management and the provision of critical services to stakeholders through the digital platform. CSSBoost develops all its beyond SotA innovative solutions as essential steps along the pathway that leads from the VCEM concept to its full realisation and from there to its actual services and practical results.

INNOVATION: Virtualisation of the Entire CE/CSS Ecosystem and Market

SotA: Platforms based on DTs are a late development, mainly in the industrial sector, and, within the Industry 4.0 paradigm, transform the way humans interact with engineered systems. DT cognition is a novel approach that plays a critical role in the ability of a DT to self-determine the possible ways of improving its status.[6,7]
Beyond SotA: CSSBoost will virtualise entire (regional/city/interregional) CE markets and their internal and external environment, including CSSs, product value chains, actors, stakeholders, resources & conditions, using DT technologies, based on a cognitive knowledge core and connected to external inputs through a data acquisition system. The resulting Cognitive Digital Twin (CDT) will be applied to the realisation of the CSSBoost key concept, the VCEM, a novel CE/CSS-specific cyber-physical system. The VCEM will be fully dynamic and automatically self-adaptable, since it represents a physical system that is in continuous flux and changes dynamically. The VCEM will also apply circularity assessment, valorising on the CCRI methodology and SAT-Self Assessment Tool and going beyond, advancing this methodology by facilitating a novel resource classification framework that utilises the principles of resource traceability and environmental science to disentangle the circularity of complex resource flows, supporting standardisation (ISO 59020), adapted for the first time to regional applications.

INNOVATION: CSS Risk Analysis and Assessment

SotA: Dynamic risk assessment (DRA) continuously evaluates and manages risks as they evolve in rapidly changing environments[8]. Unlike traditional static assessments that are conducted periodically, DRA considers

[6] K. Kalaboukas, J. Rožanec, A. Košmerlj, D. Kiritsis and G. Arampatzis. Implementation of Cognitive Digital Twins in Connected and Agile Supply Networks – an Operational model. Applied Science, 2021. DOI: 10.20944/preprints202103.0005.v1
[7] Kalaboukas, D. Kiritsis and G. Arampatzis. Governance Framework for Autonomous and Cognitive Digital Twins in Agile Supply chains. Accepted for publication in Computers in Industry, Special Issue "Autonomous, Context-Aware, Adaptive Digital Twins", 2022.
[8] A. Raveendran,V.R. Renjith,G. Madhu. A comprehensive review on dynamic risk analysis methodologies. Journal of Loss preventions in process industries. v76, 2022.

the fluid nature of risks and the need to adapt to new information & changing circumstances. **Beyond SotA**: CSSBoost will develop a CE-DRA methodology and a corresponding tool, representing an innovative advance beyond the current state of risk assessment. The tool will revolutionise risk management by incorporating DT models and a multidimensional perspective comprising economic, social, and technological factors. It will continuously evaluate and manage risks in real-time, adapting to the dynamic character of CE initiatives. It will provide invaluable insights into CSSBoost pilot performance, identify circularity hotspots and associated risks, and facilitate the selection of operational strategies that seamlessly align with CSSBoost's mission to promote circularity and sustainability. This dynamic approach to risk assessment in the context of CE initiatives signifies a significant advancement in the field, facilitating more informed decisions and proactive risk management.

INNOVATION: Dynamic and On-Demand Life Cycle Assessment of Circular Value Chains

SotA: A widely used methodology for the environmental impact assessment of a service, product, or system in general is LCA. In the last few years, the emergence of IoT sensors, which provide (near) real-time measurements of inventory data has created the need for dynamic/live (in contrast to static/conventional) LCA. However, a standardised methodology for the implementation of a dynamic LCA does not currently exist. **Beyond SotA**: CSSBoost will develop a standardised methodology for dynamic LCA[9], which will be validated through the CSSBoost pilots. A novel tool will be developed, allowing the incorporation of all dynamic components, offering a holistic approach. The dynamic aspect of LCA will not be limited to the dynamic (process or system) inventory but can also involve dynamic characterisation factors, whose values might change in the medium and long-term.

INNOVATION: Sustainability Balanced Scorecards for Circular Value Chains

SotA: Sustainability Balanced Scorecards (SBS) is a vital tool to satisfy a range of sustainability management needs for companies in the process of implementation of a sustainable strategy[10]. However, SBS has been extensively applied in regional systemic and non-systemic circular solutions. **Beyond SotA**: CSSBoost will develop an innovative SBS framework, easing the assessment of circularity potential and impact across the CSS value chain. SBS will be combined with dynamic LCA, allowing for a more balanced view of a value chain's overall impact on society, the environment as well as its financial performance.

INNOVATION: CE/CSS Ecosystem & Market Knowledge Core

SotA: To fully virtualise a physical system and take advantage of all knowledge domains, especially when a market is involved, all relevant knowledge must be represented and utilised. Many SotA, yet well-tested complementary or alternative methods for knowledge engineering, such as knowledge base systems exist[11]. However, there is still a need for a dedicated, in-depth application of advanced yet practical knowledge engineering to regional CE ecosystems encompassing all knowledge domains involved. **Beyond SotA**: CSSBoost will use existing advanced knowledge engineering methods to model and represent all knowledge relevant to the VCEM into a Knowledge Repository and make it an integral part of its virtualisation system. All knowledge about the regional CE ecosystem, incl. relations between all its entities and factors, expert/business rules and KPIs, will be coded in a Knowledge Graph, linked to all incoming data, with machine learning tools, forming a CE Knowledge Core.

INNOVATION: Real-Time Monitoring and CE/CSS Data Spaces

SotA: Companies and citizens are still reluctant to share data, creating data silos and impeding the adoption and growth of circular solutions at a regional level. The International Data Space (IDS) is a data space influencing standards and technologies as well as governance models for the data economy, to facilitate the secure and standardised exchange and easy linkage of data[12]. Such advances have not yet been applied widely or been standardised in CE markets and CSSs. **Beyond SotA**: CSSBoost will develop a Data Acquisition, Management and Sharing system that acquires and homogenises information from diverse sources, respecting any confidentiality clauses requested by its producers. CSSBoost aims to develop a Data Space, that allows different and competing stakeholders that may not trust each other to interconnect and share transactions. The CSSBoost Data Space will follow a semantics-based, ontology-driven governance approach to support the creation, specialisation, update, storage, and maintenance of the data access policies Participants in the Data Space can exchange data through connectors ensuring secure data exchange and processing in a controlled decentralised environment.

INNOVATION: Dynamic CE/CSS Ecosystem & Market Modelling and Simulation

SotA: A simulation is a complete virtual run of a model for a sufficient period of time. Throughout that period, flows and state changes are estimated, and system status statistics are calculated to produce assessment KPIs. **Beyond SotA**: CSSBoost will make use of a broad set of existing methodologies, extended to support (i) dynamic modelling of the entire CE/CSS Ecosystem and Market, and (ii) advanced simulation services on top of the dynamic models. The models will be made dynamic by linking to, and receiving real-time data from the DTs, maintaining a digital shadow image of the physical system. The urban/territorial metabolism paradigm will be used to model the inflows, outflows, accumulation and transformation of resources in the area. The paradigm will be

[9] J. Hagen, L. Büth, J. Haupt, F. Cerdas, C. Herrmann. Live LCA in learning factories: real time assessment of product life cycles environmental impacts. Procedia Manufacturing. V. 45, 2020.
[10] E.G. Hansen, S. Schaltegger. Sustainability Balanced Scorecards and their Architectures: Irrelevant or Misunderstood. Journal of Business Ethics 150, 2018.
[11] Y. Xiao, S. Zheng, X. Du, J. Shi, J. Hong. Knowledge graph-based manufacturing process planning: A state-of-the-art review. Journal of Manufacturing Systems. V.70, 2023.
[12] International Data Spaces Association (2019). Reference Architecture Model, Version 3.0 April 2019.

extended to support the systemic nature of CSS, by modelling the relevant actors, considering their roles with respect to the use and transformation of resources and their interactions, including synergies and trade-offs. Simulations will be created, run and evaluated in complete isolation from the shadow model and will be used to assess alternative scenarios (Advanced Adaptation and Scenario Assessment Services).

INNOVATION: AI Analytics, Diagnostics & Inference

SotA: AI analytics, diagnostics, and inference for circularity and sustainability leverage the power of ML and AI to revolutionise how these crucial aspects are approached[13]. AI's capabilities extend to various aspects of circularity and sustainability, such as tracing material flows to identify waste, predicting environmental impacts to guide sustainable decision-making, designing circular products and processes, and monitoring and optimising circular systems. **Beyond SotA**: CSSBoost will develop advanced AI mechanisms to induce cognitive behaviour in the underlying cyber-physical entities. Deep ML algorithms for descriptive, predictive, and prescriptive analytics provide meaningful insights on incoming data, for emergent situation inference, proactive and reactive actions recommendation. Additionally, AI-driven circularity and sustainability solutions will evolve to provide real-time, monitoring and optimisation that adapts dynamically to changing conditions. To ensure the trustworthiness of AI, governance techniques will make AI services explicable and modifiable, incorporating humans for feedback and continuous training, while explainability and trust are bolstered by deductive reasoning.

INNOVATION: CSSBoost Open Circularity EcoSphere

SotA: While several research endeavours attempt to address the barriers to CE transitions by providing information and best practises, there is still a need for a tailored, dedicated, and in-depth knowledge base that will cover all aspects of the CE. **Beyond SotA**: CSSBoost will develop the Circularity EcoSphere (CES), a novel consumer-centric knowledge base, intended to foster cross-border collaboration among diverse stakeholders across the EU by storing and organising a wide range of CE topics, including circular business models, supply chain optimisation, waste reduction strategies, and sustainable product design, all tailored to specific needs and interests. CES will allow various stakeholders from across Europe to not only discover, conceptualise, test, and consume information, but also contribute their insights, experiences, and success stories about circular economy, resulting in a thriving circular ecosystem with resource efficiency and environmental stewardship.

INNOVATION: P2P Trading Services and Marketplace

SotA: Current P2P trading platforms designed for circular cities represents a groundbreaking digital ecosystem that fundamentally transforms urban resource management[14]. These platforms connect businesses, communities, and individuals to facilitate resource exchanges in accordance with CE principles, acting as a dynamic mediator. **Beyond SotA**: CSSBoost P2P trading service will go beyond SotA, utilising sophisticated AI algorithms, to identify exchangeable surplus resources, raw materials, and circular products, thereby promoting resource efficiency and reducing waste. Moreover, smart contracts and blockchain technology will provide secure and transparent transactions, as well as an immutable ledger for tracking the history of resource transfers. The services will be supported by a circular product Marketplace, which showcases products designed with durability, repairability, and recycling in mind, encouraging the adoption of circular design principles.

INNOVATION: Advanced SSH Stakeholder Co-Creation Environments

SotA: Stakeholder engagement practices and tools bring together different stakeholders to explore insights, ideas, and issues. Existing technocratic approaches for mapping social value and hazards are limited to building simple and straightforward links between the effects of the intended intervention and the impacted community, with expert-driven rather than participatory procedures used. **Beyond SotA**: CSSBoost establishes advanced SSH stakeholder co-creation environments, envisioning a shift in the understanding, assessment, and engagement with social value and hazards in the context of CE/CSS. These next-generation settings will use powerful simulation and visualisation tools (provided through the digital platform) to tap into stakeholders' collective intelligence. They will enable proactive detection and mitigation of social and environmental problems by merging real-time data with predictive modelling. These sophisticated environments will use immersive technologies like DTs and AI to build highly dynamic and realistically engaging co-creation places. To ensure that human values and ethical concerns are accounted for in the design and implementation of CSS solutions, the co-creation environment will follow a Value Sensitive Design (VSD)[15] approach. Here, values that are deliberately embedded in specific design features of the solutions and values that emerge during their implementation and use – resulting in intended and unintended impacts – as well as values that are related to the initial purpose of the solutions and values that are potentially beyond their purpose (e.g., fairness and justice) will be considered.

[13] Wuest, T., et al. (2016). Machine learning in manufacturing: advantages, challenges, and applications. Production & Manufacturing Research 4(1), 23-45.

[14] A. Nadeem. A survey on peer-to-peer energy trading for local communities: Challenges, applications, and enabling technologies. Front. Comput. Sci., 2022.

[15] B. Friedman, P.H. Kahn Jr., A. Borning, A. Huldtgren. Value Sensitive Design and Information Systems. In book: Human-computer interaction in management information systems: FoundationsPublisher: M. E. Sharpe. 2006

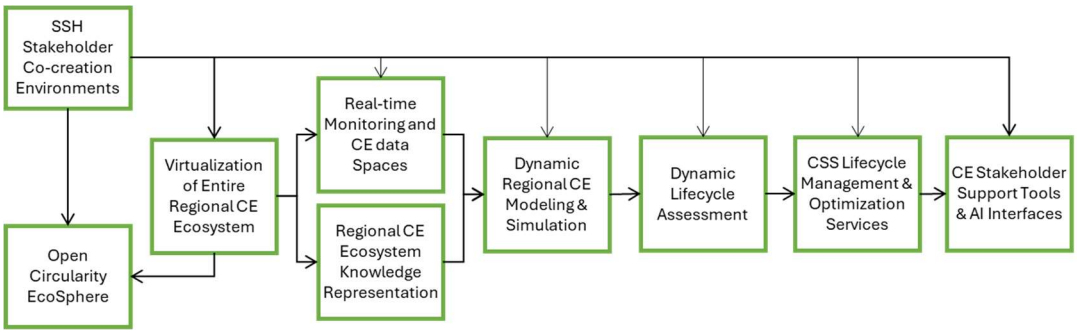
1.1.5 Maturity of CSSBoost Technological Enable

In order to implement its beyond SotA innovations, CSSBoost adapts and extends existing results of research and innovation actions (§1.2.5), as well as pre-commercial software and services. These technologies have already been demonstrated, mainly in other sectors (e.g., industry), reaching a **Technology Readiness Level** (TRL) of 4-6. During the CSSBoost the technologies will be adapted to support the CE/CSS environment, will be validated and demonstrated in the operational environment of the pilot CSSs, reaching a TRL of 6-8. The following table outlines the technological enablers, their scope in CSSBoost, and the TRLs at the project's beginning and end.

Technology	CSSBoost Scope	Challenges &Technological Gaps to be Addressed	Partner	TRL
MIRA–DT integration platform	Regional information sharing platform	Currently platforms support tier-1 of a hierarchical approach to DT modelling – atomic DTs and DT networks. CSSBoost will develop multi-level hierarchical DT modelling. City/region-based knowledge graphs will be incorporated and a network of networks approach in DT modelling will be created, able to perform at different levels. Particular enhancements are: a) Map entity-relations representations, CA resources and opportunities and backend services for DT at city/regional level b) Provide basic AI services for supply chains monitoring, assessment and optimization c) Integration of citizen-engagement tools on top of supply chain DTs where user-generated information will be utilized by supply chain actors"	MAG	6→8
Circ-RAT–CE Risk Assessment Tool	CE Risk analysis and assessment service	Addresses the need for dynamic, real-time risk assessment in rapidly changing environments, moving beyond traditional static assessments. It uniquely integrates DT models with AI for comprehensive, multi-dimensional risk analysis.	ICL	5→7
Circularity Assessment Tool	Assessment methodology of exemplary CSSs	Fills the gap in systematic, criteria-based assessment and strategic planning for CSS implementations. Offers a structured approach to evaluate the multi-faceted impact of CSSs, covering technical, safety, security, circularity, social, environmental, financial, and legal aspects.	ICL	5→7
PSM–Process Simulation Modelling	Advanced adaptation and scenario assessment service	The major technological challenge/gap is the creation of a tool with the concept of Digital Twin as a core technology and not as an additional feature. This tool will be advanced for this exact reason and will be easily adjustable to each individual case that will be applied. Another challenge/gap to be addressed is to enable the operation of the tool at multiple levels (actor, value chain, CSS, multiple CSS, region).	TUC	6→8
D-LCA–Dynamic LCA tool	Dynamic and on demand LCA service	The major technological challenge/gap is the creation of a tool capitalizing the emergence of IoT sensors, which provide (near) real-time measurements of inventory data, to calculate LCA indicators in dynamic way (operational mode).	TUC	5→7
MERLIN–Green Configurator	Configuration of complex products in CSS value chains	Currently, the tool has an interface to a single LCA database and is not capable of integrating a comprehensive LCA assessment across multiple KPIs (indicators) simultaneously. Also, there is no concept for integration on a digital product passport to this configuration yet.	CAS	6→8
Smart City–City Monitor & visualise	Visualisations of the CSS and the CE ecosystem	Currently, advanced libraries for visualisation do exist. They are in use in the area of CO_2 monitoring but have to be adapted and integrated in order to cover the needs of the value chains in CSSBoost.	KRUM	6→8
TRACK–Asset Tracking	Circular value chain planning and visualisation	The technological challenge/gap being addressed refers to the delivery of a tool specifically designed to address the CSS value chain of a transportation provider, being Transport a key sector in the CSS domain. TRACK will enable the application of the added-value CSSBoost	PARTICLE	4→7

Technology	CSSBoost Scope	Challenges &Technological Gaps to be Addressed	Partner	TRL
		Platform tools by incorporating monitoring properties and metrics to the use case on Public Transport. TRACK will also be extended to support data spaces and data acquisition functions defined in CSSBoost.		
SHAPES Marketplace	CSS Marketplace	The technological challenge/gap being addressed refers to the delivery of a tool specifically designed to provide access and enable participation to CSS value chains of the general public enabling the sharing of Circularity oriented services.	HMU	5→7
T-NOVA P2P Trading Platform	P2P trading services	The main target will be to enable the trading of resources and services related to circularity and will try to identify business and new business areas for the circularity.	HMU	5→7
EMERGE-KBEST Platform	CSSBoost open circularity ecosphere	The technological challenge/gap being addressed refers to the replicability of specific best practice in the CSSBoost open circularity.	HMU	5→7
ROBINSON Evidence Base and Replication Tool	Technology evidence base. replication roadmap tool	Lack of a comprehensive and systematic tool to assist stakeholders in the selection of appropriate technological and organisational elements, ensuring a tailored design for the targeted area. Also, a lack of systematic guidance through the crucial phases of contextual adaptation and business planning, modifying the solutions to align with local regulations, culture, and economic conditions.	TUC	4→6
Municipium– Inform citizens/ businesses	Communication and citizens participation	There is no implementation for city/region-wide and active/interventional public participation networks in CSS/CE context. It will be enhanced with integration with supply chains and city-based DTs functionalities	MAG	6→8

CSSBoost develops all its beyond SotA innovative solutions as essential steps along the pathway that leads from the VCEM concept to its full realization and from there to its actual services and practical results. This innovation pathway is outlined in the next conceptual diagram. Methods and other elements of these solutions are brought to CSSBoost from other related projects (as indicated in section 1.2.4) and are integrated and extended to create the proposed innovative results, reaching a TRL 6-8 and advancing the Integration Readiness Level of the whole system.



#§PRJ-OBJ-PO§#

1.2 Methodology

#@CON-MET-CM@# #@COM-PLE-CP@#

1.2.1 Concept Development and Methodological Specification

To fulfil the strategic objectives of §1.1.2, CSSBoost follows two *directions* at the same time: (i) Prepare the application, maximise impact and ensure sustainability and upscaling of any specific CSS, including a range of diverse exemplary CSSs designed and applied at the pilots and replicable at any EU area; (ii) Boost the entire CE transition in cities, regions or their groupings. This double aim is made possible by taking advantage of the *synergies* and *trade-offs* emerging in local, regional and multiregional CE environments. The concept of synergy is central in economy (in CE in particular), since a multitude of different sectors, actors, stakeholders, interests and motives have to be brought together and work seamlessly towards a common goal and in an acceptable by all equilibrium. In this context, CSSBoost innovations are grounded on the following novel methodological concepts.

1.2.1.1 *The CSSBoost CE/CSS Ecosystem and Market*

To explore all possible synergies and trade-offs, CSSBoost adopts a broader view and wraps up, not only a particular CSS, but all regional CSSs, other non-systemic Circular Solutions (CSs), CE streams and value chains,

potential resources, stakeholders and operational activities, within a novel *digitally enabled open space of local, regional and interregional scope*, the **CE/CSS Ecosystem and Market**. This open space consists of 3 levels (Figure 2): (I) **Regional CE Market** with one or more applied CSSs plus other CSs; (II) **Regional External CE Environment** in which the CE Market operates, including actors, stakeholders, socio-economic, environmental and regulative conditions and policies, as well as all relations and interactions between all entities; (III) **Extra-Regional Environment**, including other regional CE markets and actors that transact with levels I and II, national/ international strategies, as well as available technologies. From this perspective, a CSS is viewed not as a self-contained solution, but as an *integral part of the city/regional/interregional CE Market and Ecosystem and a step on the region's CE Transition Pathway*. Thus, CSSBoost aims at making any CSS fully aware of its CE environment and taking advantage of this knowledge to achieve its targets. In this context, the same flexible methods and tools, needed to optimise and ensure sustainability of a particular CSS, can be also applied to any CSS application and, beyond that, to the management, regulation and growth of the entire regional CE ecosystem, by overcoming barriers, discovering or creating new synergies and exploiting to the full the available CE potential. Moreover, the same environment and tools could be used to define and plan a strategic pathway for the regional CE transition.

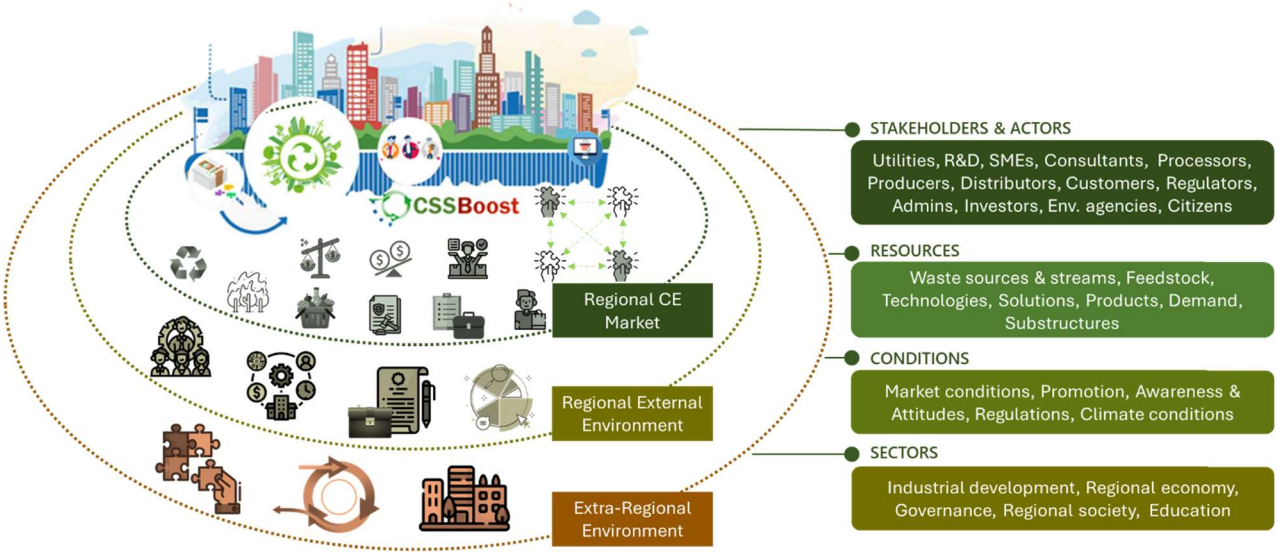


Figure 2 *CSSBoost local, regional and interregional CE/CSS Ecosystem and Market.*

1.2.1.2 *The CSSBoost Integrated Solution*

From the viewpoint of the CE/CSS Ecosystem and Market, CSSBoost develops a novel framework for CSS applications and a robust yet holistic and flexible digital environment around any CSS to be applied in any area, introducing the concept of a **CSSBoost Integrated Solution**. The term 'integrated' is used with the double meaning of (Figure 3): (a) Integrating each individual CSS within the CSSBoost physical and digital environment, as well as planning its application to create a complete, self-managed CSS *solution package* (vertical integration); (b) Integrating the new vertical integrated CSSs, as well as all other existing CSSs, CE value chains, CE solutions, streams, resources and stakeholders, within a holistic regional cyber-physical system, the VCEM (see §1.2.2.1), enabled by that same framework and digital system (horizontal integration). The CSSBoost integrated solutions, can adapt to any CSS type, any CE ecosystem and any point along the CE transition and be applied at multiple systemic levels, dynamically adapting to changes in its volatile environment as the CE transition progresses.

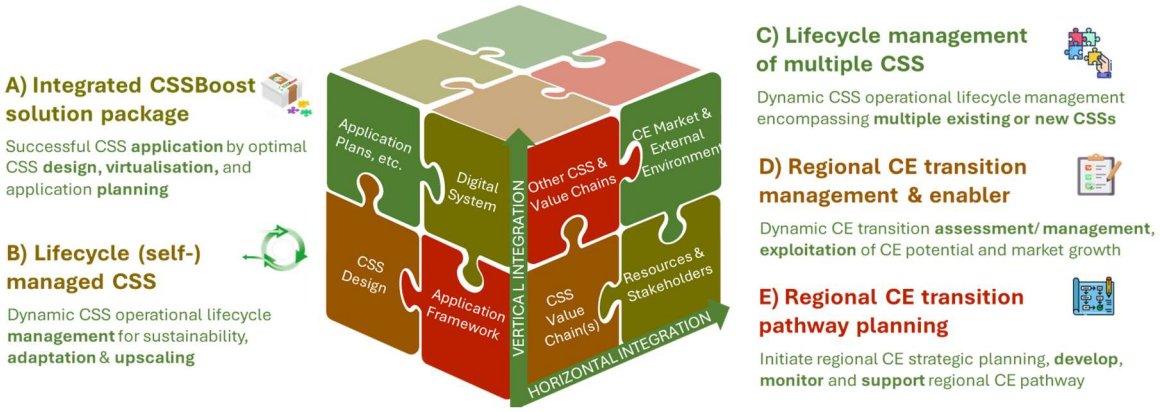


Figure 3 *Definition of CSSBoost Integrated Solution and its functional levels.*

1.2.1.3 *The CSSBoost Application Framework and its Co-Creation Environments*

CSSBoost develops (in WP2) an entirely novel **Application Framework** that ties together all factors and provides a comprehensive and robust set of specifications, methods, directions, expert rules and roadmaps governing all

key aspects of a CSSBoost solution's application and management. Thus, it governs *CSSBoost solutions development*, but is also a critical part of any CSSBoost solution application, since it details the methodology for *customising and deploying* it in response to local conditions and requirements. The overall conceptualisation approach devotes to valorise the CCRI methodological approach and capitalise, build on and advance available knowledge and experience such as the SAT and its principles, structure, and mentality. The CSSBoost integrated solution is built by *a stepwise extension of its scope* through the following *five functional levels* (see also Figure 3):

A) At a lower level, a CSSBoost integrated solution is focused on *implementing a new CSS*. It determines all design options/parameters, transformation technologies, products and value chains, players and roles, production targets, instruments for promotion and overcoming barriers, business models, governance, etc. It considers, assesses and takes care of local resources, regulations, risks, leverages, opportunities, logistics, markets, competition, stakeholders, attitudes and awareness, environment pressure factors, costs and financing, etc.
B) At middle level, the solution's scope is extended in the temporal dimension, considering a CSS as a *dynamic and transformable entity* in a changing environment (e.g., technologies, markets, products). During its *lifecycle* (see §1.2.1.4), the sustainability and viability of the CSS must be ensured. It can/must be expanded and upscaled (in volume, products, area, actors); gain momentum, create new value chains; influence and be influenced by the CE market and find extra-regional markets; face completion, risks and threats (e.g., changes in feedstock, technologies, product demand, lifestyle, environment and climate change), etc.
C) At the next step, a CSSBoost solution widens its scope to integrate *multiple CSSs*. The same factors that govern a specific CSS's application and management, apply in establishing or managing any other CSSs, while it is relatively straightforward to upgrade the digital system, to model, monitor and manage multiple CSSs.
D) At *a* higher level, the integration's scope is extended to include all dimensions of the *city/regional/interregional CE transition*, for the solution to become its key enabler. Extensions will provide the capability to: assess the area's unexploited CE potential; find or develop new markets and business relationships and establish links with external regions and markets; activate and match new CE players and stakeholders; assist in the introduction of circularity clauses in public tenders; promote CE practices, awareness & behavioural change.
E) Stepping up in scope, the CSSBoost solution integrates the interfaces, procedures and methodologies needed to assist regional administrators, regulators and policy makers, at or near the start of the regional CE transition, to initiate strategic planning, to analyse and assess their CE ecosystem and formulate, to agree, oversee and support a *Regional CE Transition Pathway*.

1.2.1.4 *The Lifecycle of a CSSBoost Integrated Solution*

A CSSBoost solution starts as an environmental sustainability problem to be solved, followed by 6 dynamic **lifecycle stages**, each with different characteristics and support requirements. During its lifecycle, a CSSBoost solution needs to be aware of its internal/external environment, to be able to adapt, and include its own *lifecycle management capability*. Figure 4 depicts the CSSBoost solution lifecycle stages and the requirements from the CSSBoost lifecycle management system, developed as part of the CSSBoost digital system (see §1.2.2.3).

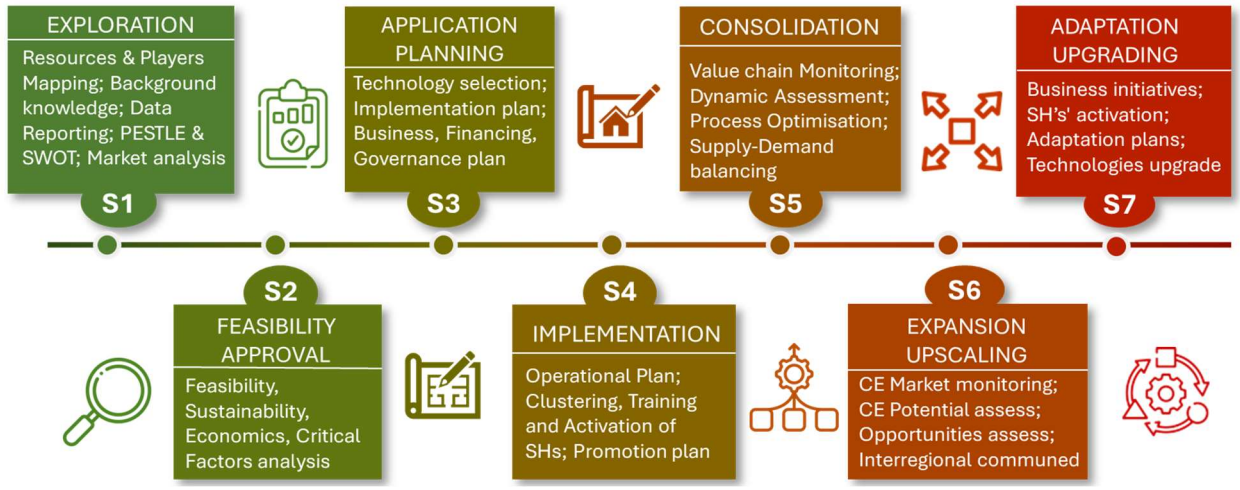


Figure 4 *CSSBoost solution lifecycle management and potential key support requirements.*

1.2.2 Technological Approach

1.2.2.1 *Virtual CE/CSS Ecosystem & Market: The Cyber-Physical System*

To create CSSBoost integrated solutions, the project develops, as its *key innovation*, a novel type of area-wide multi-level *Cyber-Physical System*, the **Virtual CE/CSS Ecosystem and Market** (VCEM), the conceptual architecture of which is schematically depicted in Figure 5. VCEM is realised through the virtualisation and support of all 3 levels of the *Physical System* which drives and operates CE in an area, the CE/CSS Ecosystem and Market, (the Physical Layer in Figure 5). Its key function is to automatically and dynamically monitor and assess at any time the CE/CSS status, performance, prospects and optimisation/growth opportunities and create information for the support of the CSS lifecycle management services and CE stakeholder support tools. A *Digital (Cyber)*

System is developed to realise VCEM, consisting of 3 layers (Figure 5): (a) the *Virtualisation and Intelligence* layer that virtualises the physical system and provides digital cognition capacities; (b) the *AI Agents and Services* layer that provides cognitive computational components and additional tools for CSS lifecycle management and decision support; and (c) the *Integration and Interfaces* layer that, after developing a data space & data acquisition service, integrates all digital components and provides man-machine and machine-machine Interfaces.

1.2.2.2 *VCEM Virtualisation and Intelligence Layer: The CE/CSS Cognitive Digital Twin*

The intelligence core of the CSSBoost digital system is implemented as a CE/CSS-specific **Cognitive Digital Twin** (CDT), an entirely novel concept that virtualises the physical system and provides the VCEM with cognitive capacity. It consists of 2 components (developed in WP4):

– **Dynamic DT System Models**: Implements a dynamic (updated in real-time) and modular (consisting of replaceable and expandable models) network of interconnected *Digital Twin* representations of the physical system. Through this approach the VCEM is able to monitor and manage different hierarchies of regional entities. The models DTs are continuously updated by being connected in shadow mode to the DAMS (§1.2.2.4).

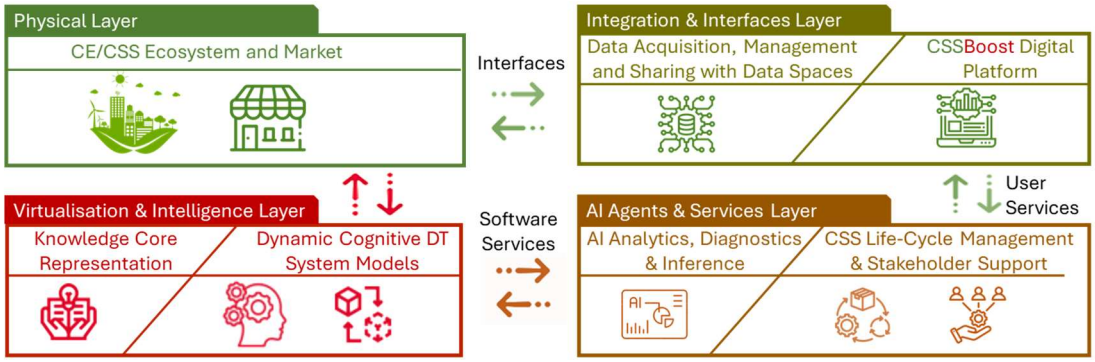


Figure 5 *VCEM conceptual architecture.*

– **Knowledge Core Representation**: Represents in a *Knowledge Base* (KB) the (expert) knowledge available about the physical system, as well as the available CSS typology, technologies, practices, methods, tools, KPIs etc. Knowledge is stored in the form of a *Knowledge Graph* connected to the DAMS. Through this connection, all data access is redirected through the KB to produce intelligent and semantically enriched results.

1.2.2.3 *AI Agents and Services Layer: CSS Lifecycle Management and Stakeholders Decision Support*

On top of the CDT, 2 components (developed in WP3-7) use it to implement the digital system's services and tools:

– **AI Analytics, Diagnostics & Inference**: Utilises logical inference mechanisms for knowledge extraction and formalisation, collaborative learning, and deductive reasoning to induce cognitive behaviour in the underlying cyber-physical entities. It analyses and 'understands' the state and behaviour of the physical system through big data analytics, AI inference, and resolution of unforeseen circumstances. Using a novel methodology (based on ISO 59020) for assessing circularity through a resource accounting framework, a holistic dynamic assessment (including dynamic LCA and SBS) of CSS performance is supplied.

– **CSS Life-Cycle Management & Stakeholder Support**: Uses CDT intelligence and the information it processes to 'materialise' VCEM to end-users, by providing an array of information sharing, promotion, knowledge, computation and communication services and tools needed. This layer is modular; Services are either developed in-project or adapted from existing tools, as plug-in modules. They are grouped in two categories: (a) *CSS lifecycle management services*, supporting both operational (short-term) and tactical (medium-to-long-term) management decisions and (b) *stakeholder-oriented services*, targeted to specific stakeholders, aiming to support their involvement in CE or to energise their CE activation, as shown in the following Table:

Functional Service Group	Target Users/Uses	Purpose
(a) CSS Lifecycle Management Services		
Analytics, assessments and visualisation	Operational/tactical managers	CSS operational, tactical and business management
Value chain and process planning	Operational/tactical managers	Optimise process parameters, logistics, supply-demand balance, etc.
Reverse and multi-criteria optimisation	Product managers/final end users	Finding the optimal product and supply chain model for specific user requirements
Dynamic risk assessment and management	Actors' strategic management	Safeguard CSS from lifecycle risks and dangers
P2P Trading	Value chain actors	Business partnerships formation and trading
Notification for contingencies, & recommendation of corrective actions	Actors' operational management	Support CSS operational and process management in real time
Adaptation scenario building and assessment	Area administrators, Actors	Assess proposals and adapt to external changes
(b) CE/CSS Stakeholder-Oriented Services and Tools		

Functional Service Group	Target Users/Uses	Purpose
CE Market and CE progress, assessments, regulation and strategic plan.	Area administrators, regulators	Support regional/city strategic decisions/policies about CE
Regional CE showcase, evidence base & info space	All other regions/cities	Demonstrate CSS, technologies, practices &provide an information space for replication
Introduction new structural elements for market growth (CSS, CS, value chains)	Area administrators, Actors	Select and configure CSS, technologies, best business partners, etc.
Personalised information, knowledge, advice	All stakeholders	AI-assisted information and knowledge
Communication, consultation and networking	All stakeholders	Personal/group communications and consultations
Promotion and other CE growth Instruments	Admins, Stakeholders	Recommend promotion, CE instruments (push/pull)
Virtual marketplace	Actors, Developer, Service providers	Technology, knowledge & services market and e-commerce
Citizen science/observation	Citizens	Monitor recyclable wastes, CSS products, behaviours

1.2.2.4 *Integration and Interfacing Layer: The Information Sharing Platform*

The top digital layer develops a web platform of regional/interregional scope that allows for the integration of all components and communication between the cyber and the physical parts of the system and exports the digital services. There are 2 main components for this linking:

- **Data Acquisition, Management and Sharing (DAMS) with Data Spaces**: The dynamic services provided by the digital platform are enabled by data streams resulting from the near-real-time monitoring of key nodes or processes of the CSS(s) and value chain(s), or by data sets relevant to the CE ecosystem and updated at various time frames/intervals. Due to the multi-sector/multi-stakeholder CE scope, DAMS collects and manages data of diverse sources, types and time frames, while CSSBoost services combine different data sets. DAMS homogenises all data on the basis of novel CE/CSS *Data Space*. Besides data security and integrity, the issues of data privacy and governance are given high priority. **Data Privacy** protection comprises stringent measures to secure sensitive data, such as anonymisation, encryption, access controls, and audit trails. **Data Governance** (i) defines data inputs/processing/outputs per user/service; (ii) makes agreements/contracts on confidentiality and other data sharing polices; also authorisation/ownership/accountability for raw data inputs; (iii) ensures FAIR treatment of data; (iv) agrees on meta-data ownership for DT processed data accountability.
- **CSSBoost Digital Platform with Interfaces**: A specifically designed front-end for the CSSBoost Information Sharing Platform is developed and expose all services and tools to the end users by innovative *Man-Machine Interfaces* specialised for each service/tool type. An administration and test interface (back-end) will also be provided with comprehensive system management services, incl. configuration functions, diagnostics and scheduled smart operations. The platform will also contain *Machine-Machine Interfaces* and APIs to enable interoperability with other IT systems, as well as plug-in tools added to the platform.

1.2.3 Regional Circular Systemic Solutions (Pilot Cases)

The CSSBoost integrated solution will be demonstrated and validated by developing four city/regional-scope CSSs in pilot areas with very different conditions across Europe, as well as one multiregional pilot.

Pilot 1: Agricultural, Livestock and Food Processing By-Products Valorisation CSS	**Region**: Crete, Greece

A. Summary and Key Features

Description: This case targets the recycling of a wide range of waste types and sources of organic origin, generated in the region of Crete, whilst also assessing opportunities for engaging relevant regional industries and stakeholders. A composite CSS will establish, promote and support three value chains for recovery and valorisation of diverse biomass. **Scale**: Entire island of area 8,336 km^2 (6.3% of the total area of the Greek territory), economy based on agriculture, livestock (~50% population working in agriculture and agro-food processing/packaging) and tourism. **Sectors involved**: (5) Biotech, food, agriculture, animal farming, rural/urban. **Key value chain actors**: In-Crete, Bioresearch Laboratories S.A., Mills of Crete, Proud Farm Group of Producers IKE, Agrofilia, American Farm School. **Pilot Team**: MACC, CRETE, HMU, TUC. **Strategic CE ambition**: The region of Crete has set a goal to become a zero-emission island by 2030, and CE is a priority in achieving this goal, inline to the National CE Strategy that is part of the relevant European strategy.

B. Present Status and Background

Agriculture and animal farming is of critical importance for the region, serving local needs, the huge tourist market, and exports. Most cultivated land consists of small farms with a large percentage of greenhouses. Stock breeding also plays an extremely important role for the local population and for tourism. Many industries are involved in the processing, packaging and shipping of agro-food products. Some CE efforts have already been made, but many products and by-products of agricultural activities are still considered wastes. Agricultural and livestock activities produce a large amount of biomass wastes. Significant amounts of lamb wool and leather are regarded as wastes;

vegetables not suitable for the market (e.g., due to appearance), and plants at the end of their lifecycle are disposed. In agro-food processing (e.g., oat, carob), a significant portion of the crop is wasted, although it maintains its nutritional value; while end-of-life plants, such as legume crops, are treated as waste although they can be used to produce bio-stimulants compatible with local plants, as well as green manure suitable for increasing yield in many crops. At the other end of the food chain, bread is the most widely consumed staple, making it an ideal vehicle for nutrient delivery. Increasing trends toward healthier diets indicate that a market niche for bakery products with demonstrated health advantages has recently emerged. Adding by-products of food processing with high nutritional value to breads confers several benefits: (a) the provision of alternative ways to introduce food crops such as carob and oats and their associated nutrients into people's diets; (b) the creation of novel bakery products with commercial potential due to nutritional value; (c) the re-introduction of rejected plant-based ingredients into the food chain which contribute to clean labels and product quality.

C. Challenges and Barriers

- Lack of awareness and understanding among stakeholders.
- Limited access to financing, to support investments in new technologies, infrastructure, and business models.
- Fragmented value chains and supply chains, making CE implementation challenging.
- Regulatory and policy barriers, in supporting CE principles.
- Technological limitations, in technologies regarding resource recovery, recycling, and remanufacturing.
- Cultural and behavioural factors, including changes in consumer behaviour and cultural norms.
- Infrastructure constraints, e.g., in efficient waste management systems, recycling facilities, transport networks.

D. Key Elements and Activities of Pilot Program

The CSS to be established is composed of 3 value chains: **(a) Fertiliser and materials for soil improvement** produced using biomass from **livestock production** (e.g., sheep wool & skin). Since this has widely scattered sources, a variable composition and an inconstant production rate, an essential pilot activity is to quantify yearly amount, distribution and types of waste, identify locations most suitable for collection centres and plan for transportation, storage and logistics. Products can provide required useful trace elements to the plants and help in keeping water in soil. SotA treatment and methods valorisation will be identified. **(b) New types of plant bio-stimulants** produced from **agricultural/ agro-food wastes** (e.g., legume crops). Residues will be treated as well in order to be incorporated into the soil as green manure, able to help in increase crop yield (e.g., canola, maize, potato, wheat). This is a most promising approach for sustainable agriculture and a potentially vital constituent of integrated crop-soil management, being a renewable source of nutrients and promoting crop and soil health. Pilot activities will identify the bio-stimulant types to be employed for specific plants and conditions for sustainable agriculture, and accurate labels and instructions for effective use will be made, giving them a competitive edge against existing commercial products. **(c) More nutritious (low glycaemic index) versions of bread and other bakery products** produced from **food processing by-products** (e.g., oat/carob processing, oat-based beverage, molasses extraction from carob) and thus reintroduced in the (human or animal) food chain as food ingredients to be consumed by all population segments. The pilot will identify food waste streams at the local level and explore the potential of secondary processing into reusable forms of food. Pilot activities are designed so that in each value chain a research laboratory will collaborate with a company, the former providing expertise and the latter the end-product evaluation and easing the transfer to the production line: For value chain (a) the collected material will be processed to produce fertiliser/soil enhancer pellets by mechanical methods, the pellets' physiochemical properties will be ascertained and be tested in vegetable farming to evaluate applicability and improvement requirements. For value chain (b) several native leguminous plant species will be tested for the presence of plant growth-promoting endophytic bacteria. Faba bean crops will be harvested from various sites with different soil types and distinct bioclimatic conditions. Rhizobial bacterial strains will be isolated, characterized and used to investigate their ability to promote plant growth. The pilot will collaborate with farmers identified as suppliers of legume crops. For value chain (c) a pilot-scale production will be followed by nutritional evaluation, shelf-life stability testing, and finally, product optimisation for scaling-up and commercialisation.

E. Digital Solutions to be Demonstrated and Validated

The components used for regional ecosystem analysis, process optimisation, citizens' communication & participation, logistics and CSS marketplace will be configured and validated.

F. Ambition and Expected Outcomes

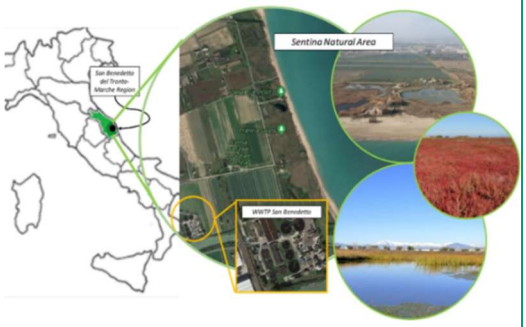
The CSS to be established and the value chains demonstrated will benefit the farmer community, as well as the industrial agro-food sector in various ways. The farmers will be able to dispose of waste while earning extra income and helping their lands and plants become healthier and more productive. The industry, particularly producers of fertilisers and materials for soil improvement, flour producers, bakeries, confectioneries, producers of textile and leather-based products, etc., will receive new products with a competitive advantage and potentially new export markets. Furthermore, the region will be empowered to sustain a more environmentally friendly economy, which can directly affect tourism. At a later stage, the value chains will be expanded, upscaled and improved by the addition of laboratories and enterprises so that their products can be specialised and optimised towards particular needs, and new products can be developed. Potential new actors are producers of fertilisers, materials for soil improvement, flour, textiles, leather-based items, as well as bakeries, confectionaries, etc.

KPI		Target

	Current	Short Term*	Mid-Long Term*
Annual reduction of total generated waste regarding sheep wool	2250 tons	1125 tons	550 tons
Improved Soil Nutrients and Moisture	Standard	20%	35%
Improved Nutritional Value of bread	Standard	20%	30%

Pilot 2: Water Reuse and Nutrients Recovery CSS | **Region**: Marche, Italy

A. Summary and Key Features



Description: This case enables and promotes water reuse and nutrient recovery in the region of Marche, integrated with agricultural, industrial and natural environment components. A composite CSS will establish, promote and support two value chains for water reuse and nutrient recovery. **Scale**: The peri-urban area of the Municipality of San Benedetto del Tronto with a natural reserve and multiple agricultural and agro-industrial land uses (25.4 km^2 area, population of 47,000, 610,000 tourists in summer). **Sectors involved**: (7) Water, food, agriculture, industry, urban/rural, nature eco-services, energy. **Key value chain actors**: Comune di San Benedetto del Tronto/COMSBT (stakeholder, municipal governance), flora-horticultural district of Acquaviva-Grottammare, CIIP (water utility), numerous farmers & agro-food industries (olive oil, wine, processed fruit, vegetables, meat, fish, milk derivatives, etc.). **Pilot Team**: UNIVPM, UVIC, CIIP. **Strategic CE ambition**: Reuse of wastewater for irrigation and ecosystem restoration; bio-fertiliser production from organic waste

B. Present Status and Background

The peri-urban area of Comune di San Benedetto del Tronto consists of a Natural Reserve, an industrial zone around it and the Tronto Valley with industry and agriculture. The Sentina Natural Reserve (Natura 2000) has a coastline with small dunes and natural vegetation while its main part consists of natural wetlands which provide shelter for many bird species and which constitute sites of touristic, recreational and educational activities. In the last few years, this area has experienced water stress, especially in summer. Around the Reserve and in the Tronto valley there are several agro-food industries and a flora-horticultural district, with high water and fertiliser demand. CIIP manages drinking water production and distribution, the sewer system and wastewater treatment in the area. To date, conventional water sources are utilised for all the above, including irrigation and feeding the natural ponds of the Sentina Natural Area during drought seasons. Fertilisers are also provided by conventional fossil fuel sources. However, the aforementioned sources of water are limited and not able to satisfy water demand in summer. During the last decades, the area began to suffer from water scarcity, making the issue of water availability critical. The water demand for agricultural activities is not fully satisfied, and there is the risk of the smaller ponds drying up, rendering this unique and fragile ecosystem severely endangered. Water scarcity can also produce negative impacts to the agricultural economy. Hence, as a possible solution to the water shortage, the reuse of treated wastewater has been proposed by upgrading the WWTP. Currently, no wastewater reuse is performed in the entire Marche Region, which is significantly affected by water stress conditions. The regional authority of Marche plans to increase the treatment and valorisation of sewage sludge and other organic wastes in the Region in the near future. In this context, in the Basso Tenna WWTP, 30 km from Tronto, CIIP plans to realise a centralized hub to collect the dewatered sewage sludge and other organic wastes from the area, to valorise them in terms of energy and resource recovery through a thermal drying process. The annual amount of sludge treated by the dryer will be approximately 6000 tons and it can be further fed with other organic wastes from the territory up to a treatment capacity of 8000 tons. The treatment of these organic wastes represents an important opportunity to recover bio-fertilisers.

C. Challenges and Barriers

- Social barriers, related to the acceptance by farmers and food consumers of the use of resources (treated wastewater, bio-fertilisers) recovered by organic wastes. in agriculture
- Technical barriers to the creation of centralised hubs for the management and treatment of sewage sludge and other organic waste including logistic organisation aspects and the realisation of functional infrastructures.
- Economic and market challenges for the commercialisation of bio-fertilisers. These new products need to be competitive in terms of agronomic performance and costs when compared to traditional synthetic fertilisers.

D. Key Elements and Activities of Pilot Program

The CSS to be established is composed of 2 value chains, producing, **from multiple wastewater sources**, **(a) water for irrigation and nature restoration**, and **(b) nutrients for agriculture**. The pilot will evaluate feasibility and applicability of various alternative scenarios on the basis of the environmental footprint and the best approach that addresses different local requirements will be promoted. Pilot scenarios will include: (a) Wastewater reuse with application of nature-base solutions for mitigation in water source withdrawal; (b) Valorisation of organic wastes and sewage sludge at the regional level, with energy and nutrient recovery through a co-digestion process for sustainable use of energy and mitigation of fossil fertiliser production; (c) Valorising organic wastes through thermo-chemical processes for nutrient recovery for bio-fertiliser production. The evaluation will follow the following steps: (i) Assessment of hydrogeological water balance between water supply availability and water

demand/needs for the ecosystem restoration, to evaluate the needed reclamation activities of non-conventional water sources. (ii) Mass balance assessment of sewage sludge, livestock wastes, aquaculture and food industry waste, to evaluate feasibility and requirements of anaerobic co-digestion processes. (iii) Pilot plant implementation with a pre-filtration module and a combination of different NBS (horizontal and vertical constructed wetlands) as refinement treatments to boost wastewater reuse for environmental needs. (iv) Pilot thermochemical process implementation for testing the co-treatment of dried sewage sludge and dried harvested plants from the constructed wetlands in various operative conditions. Recovery of nutrients (N and P) from ashes, tested and optimised by using chemical leaching and precipitation. (v) Demonstration and assessment of the end-products performance as substitutes to current mineral fertilisers, the key objective being to analyse nitrogen, phosphorus and carbon dynamics of the derived bio-based fertilisers as compared to mineral fertilisers in controlled experimental conditions (pot trials) and field trials. (vi) Overall regional CSS assessment, of both wastewater reuse and nutrient recovery potential with water-mass-energy-carbon balance estimation. A demo plant will be realised on site, consisting of a pre-filtration device and a combination of different NBSs (i.e., horizontal constructed wetlands and vertical constructed wetlands) as refinement treatments to boost wastewater reuse from San Benedetto WWTP for the environmental needs of the Natural Reserve and for agricultural reuse. In addition, a thermochemical process at the pilot scale will be studied at UNIVPM facilities, to simulate and test the co-treatment of the area's (i) municipal wastewater, (ii) dried (even co-digested) sewage sludge and livestock wastes, (iii) aquaculture and food processing industry wastes and (v) dried harvested plants from the constructed wetland of the WWTP under different operative conditions (e.g., temperature and ratio between substrates) aiming to optimise nutrient extraction (N and P) from the produced char/ashes by chemical leaching and precipitation processes. The end-product performance as fertilisers will be demonstrated first at the laboratory scale and then in the field. Particularly, the recovery bio-fertilisers may be used for the agricultural activities located in the Sentina Natural Reserve. The final wastewater effluent of WWTP will be treated by NBS for the implementation of agricultural reuse and ecosystem preservation by supplying water to the natural ponds of the Natural Reserve.

E. Digital Solutions to be Demonstrated and Validated

The components for quality/quantity monitoring, and scenario assessment will be configured and validated/

F. Ambition and Expected Outcomes

Wastewater reuse pilot application can be replicated in other WWTP managed by CIIP and be upscaled to all the territory. In the Marche Region centralised treatment plants are planned or have been realised for the treatment of sewage sludge and organic wastes coming from different areas e.g., CIIP plans a centralised hub for treatment and valorisation of sewage sludge and organic wastes by thermal drying. Hence, a successful practice for treatment of organic waste and recovery of bio-fertilisers can be potentially replicated in the whole regional territory.

KPI	Current	Target	
		Short Term*	Mid-Long Term**
Treatments of nutrient rich biomass to produce bio-fertilisers	0	6 million kg/y	20 million kg/y
Amount of reutilised wastewater	0	9 million m^3/y	30 million m^3/y
Reduction of the use of fossil-based fertilisers in agriculture	0	5%	20%
Implementation of nature-based solutions to treat wastewater	0	1 plant	5 plants

Pilot 3: Conventional Plastics and Bioplastics Recycling CSS | **Region**: North Black Forest, Germany

A. Summary and Key Features

Description: This pilot targets a comprehensive recycling of all plastic waste in the region, including both plastic and bioplastic products. It seeks to engage all relevant regional industries and stakeholders in two key value chains: supporting a bioplastics-oriented value chain and establishing a digital product passport for eco-friendly products. The goal is to create a closed-loop circular system for plant-based and conventional plastics, optimise the supply chain to meet specific user requirements while ensuring that it remains regional, and provide more transparency and shared responsibility through the implementation of a digital product passport for the entire product life cycle. **Scale**: more than 400 SMEs specialised in innovation/production/ processing of plastic materials, with >40% employees working in industrial sector. **Sectors involved (3):** bioplastics, energy, recycling. **Key value chain actors**: TZHorb (all industrial stakeholders in the plastic sector), The North Black Forest Regiont (WFG), BwCOM (research) **Pilot Team**: TZHORB, WFG, BWCOM, CAS, KRUM. **Strategic CE ambition** The North Black Forest region aims to establish a circular system solution for its largest industry, the plastic industry, with the goal of creating a dynamic and entirely regionally based supply chain.

B. Present Status and Background

Despite increased awareness of plastic waste's environmental challenges and a commitment to transitioning to a CE, the current state in the plastics sector in North Black Forest falls short. Currently, the focus is on limited mechanical recycling in 4 steps: (i) waste collection; (ii) separation by type; (iii) cleaning and shredding; (iv) melting and reprocessing. Collection and process efficiency, transparency over the entire life cycle and product quality are quite limited. A transition to chemical recycling, in which the materials are broken down into their components

(monomers or composites), is necessary. To truly address these issues, a shift to chemical recycling, breaking materials down into their components, is imperative. Furthermore, there is a pressing need to restructure the supply chain, which is predominantly based in Asia. An independent supply chain would not only enhance regional business opportunities but also reduce costs. Proper collection and processing of plastics can help the region close the loop, reducing external dependencies and retaining valuable resources within the local economy. The TZHorb area boasts a plastics cluster of approximately 400 SMEs specialising in R&D, production, and plastic processing, supported by the TZHORB Inno Center. This cluster provides state-of-the-art laboratories, testing facilities, prototyping equipment, R&D support and sustainable solutions for eco-friendly plastics, recycling tech, and waste reduction. Additionally, it offers startup incubation with mentorship, funding, and co-working spaces. This concentrated expertise and advanced technology make the region a significant player in the global plastics market, contributing to various local value chains in precision mechanics, mechanical engineering, toolmaking, medical equipment, and more, thanks to its strategic location, robust infrastructure, and skilled workforce.

C. Challenges and Barriers

- Plastics recycling infrastructure not sufficiently developed to handle the vast amounts of plastic waste.
- Many plastic products are difficult to recycle due to complex material compositions or contamination.
- Lack of closed-loop systems hinders the reintegration of recycled plastics into new products.
- Barriers in scalability, cost, and compatibility with existing recycling processes (limited use of bioplastics).
- inconsistent and not harmonised regulatory landscape of plastic wastes management.
- Consumer behaviour and awareness; consumers lack the motivation to actively participate in recycling efforts.
- Increased energy costs and pressure from current legislation for more sustainable CE Systems
- Economic and market challenges; Plastic recycling struggle to compete with low cost, non-recycled plastic.

D. Key Elements and Activities of Pilot Program

The CSS to be established is composed of 2 value chains, recycling and reprocessing of **(a) conventional plastics value chain**, and **(b) bioplastics**. The entire range of plastic waste sources and types generated in the region will be assessed, as well as the existing opportunities and the potential industries and other stakeholders that will be engaged in them. The value chains revolve around a multinational consumer goods company that implements CE to plastic packaging of products to increase sustainability and reduce its environmental footprint. Supported by the CSSBoost platform, a multi-criteria reverse configurator will be enhanced with LCA and supply chain relevant data in order to simulate and configure the most optimal product based on conventional plastics or bioplastics that fits the initial user requirements. in just 5 steps: (1) Advanced material identification technology accurately identifies plastic types used in each product, including whether they are conventional plastics or bioplastics derived from renewable sources. Their polymer base bestows different properties, products, users and uses, e.g., polyethylene (LDPE, HDPE), polypropylene (PP), polyvinyl chloride (PVC), composites (e.g., fiber-reinforced/FRP); (2) In collaboration with recycling partners, waste management companies, and consumers, used plastic packaging will be collected at end of life and sorted according to material composition. Conventional plastics and bioplastics will be processed separately; (3) A digital product passport will be implemented in order to track each phase of the plastic product's journey through producing and recycling, providing transparency, allowing company and stakeholders to monitor the progress and impacts; (4) Recycling options will be recommended for the sorted plastic types, based on material composition, e.g., mechanical recycling (shredding-melting-reformation) for conventional plastics, composting or biodegradation for bioplastics; (5) Opportunities for remanufacturing or reusing plastic components will be explored to extend products' life cycle and reduce demand for new virgin plastics.

E. Digital Solutions to be Demonstrated and Validated

The components used for wastes/products tracing, p2p trading, value chain configuration, circularity assessment and personalised information will be configured and validated.

F. Ambition and Expected Outcomes

The pilot will enable the initiation, development and upscaling of a holistic regional plastics recycle CSS that targets all types and sources of wastes, implementing a holistic strategy to minimise plastic residuals and ensure viability/ sustainability of the supply chain at the regional level, by: (i) extending product lifespans through reuse and remanufacturing; (ii) promoting bioplastics, especially in packaging; (iii) creating closed-loop business models between recycling facilities, producers, and end-users in order to reduce virgin plastic use and create value cooperatively; (iv) optimising plastics production processes, as well as storage and transportation, to minimise material wastage, and implementing closed-loop systems to reintegrate pre-consumer wastes and by-products back into the production processes; (v) introducing innovations via a reverse configuration approach and digital product passports; (vi) optimising the recycling processes.

KPI	Current	Target	
		Short Term*	Mid-Long Term**
Energy consumption over the entire value chain		10%	15%
Collaborative tracking of environmental and sustainability parameters	any	100%	100%
Energy cost savings		15%	20%
Greenhouse emissions reduction over the entire value chain		10%	15%
Single-use plastics reduction in production		20%	20%
Increase of the sustainable raw material sources		30%	30%

Pilot 4: Public Transport Vehicle Recycling and Valorisation CSS | **Region**: Lisbon, Portugal

A. Summary and Key Features

Description: This case investigates, enables and promotes a "green" transition, vehicle parts and material reclaiming, waste reduction, recycling and valorisation in the transport sector. A CSS in the city of Lisbon, with multiple value chains, will be piloted aiming at recycling, waste reducing and valorising public transport vehicle maintenance and end-of-life by-products. **Scale**: Lisbon Metropolitan Area 100 km^2, 700+ buses, 50 trams. **Sectors involved**: (6) Transport, Chemical, Metals, Plastics, Urban, Energy (including electrical batteries). **Key value chain actors**: CARRIS (waste supply, collector, distributor). **Pilot Team**: PARTICLE, CARRIS, MOTON. **Strategic CE ambition**: Circular economy model in transportation.

B. Present Status and Background

Transport is critical for economic activities and their growth, enhancing competitiveness and reducing inequities. The transport industry accounts for 4.3% of Portugal's Gross Domestic Product (GDP). CARRIS is the biggest bus operator in Portugal with >700 buses, 50 trams, >130 million passengers/year, serving a population of 2.8 million. There is a large yearly amount of waste and by-products generated: (a) hazardous materials: (2021) 274 tons end of life vehicles, 502 tons water and oily mud waste, 53 tons used oils, 9.5 tons engine filters and fluids, 0.7 tons fluorescent lamps; (b) non-hazardous materials: 26 tons metals, 7 tons glass, 30 tons rubber & plastics, 18 tons wood. Of these, only 56% are currently subject to valuation, the remaining 44% being disposed. The Sector is also one of the top greenhouse gas emitters, while the production of vehicle components remains a carbon-intensive process. Thus, the transport sector would greatly benefit from the adoption of a CE model to minimise pollution and waste, extend product lifecycles and promote sharing and repurposing of resources. CARRIS performs a thorough mid-life review and maintenance of its bus fleet, which allows it to maintain a good operational status. This also reduces materials' consumption while maintaining high service quality and reliability standards. The maintenance of CARRIS's bus fleet is performed sustainably, using its own water resources for cleaning, and applying selective recovery of residues, including oils, plastics, metals, and glass. Currently, CARRIS is undertaking a gradual fleet renovation effort with 180 new natural gas and 49 electric vehicles aiming to decrease greenhouse gas emissions and reduce the fleet's carbon footprint. A significant reduction in motor oils and filter waste (currently 9.5 tons) is also expected, as well as a large reduction in fuel costs and dangerous waste (e.g., motor oil and filters, currently >510 tons/year). CARRIS is also adopting digital transition measures, including eco-driving and fuel consumption monitoring systems. Despite existing adopted CE practices, 44% of waste and by-products of maintenance and end-of-life vehicle disposal are still discarded.

C. Challenges and Barriers

- With the uptake of *electrification in transport*, new waste treatment, reuse and disposal challenges are created by a new generation of *batteries that include rare materials*.
- Solving the arising problems necessitates *involvement of a diverse group of different stakeholders*, including vehicle manufacturers/suppliers, component manufacturers/suppliers, maintenance and recycling service providers.
- Electric vehicle introduction is fairly recent, and vehicle and battery types rapidly change in time, so that there are still *uncertainties concerning mid-life maintenance and end-of-life recycling*.
- Public transport serves numerous urban and rural municipalities with strong societal concerns forming a network of connections to society and citizens. This complex ecosystem of transport companies, industries, businesses and communities influences behaviours and policies at the local, regional, national and global levels. The views and perspectives of the ecosystem need to be duly and systematically assessed.

D. Key Elements and Activities of Pilot Program

The CSS to be established is composed of 2 value chains, build on CARRIS's current CE experience and recycling culture to **(a) use of recyclable materials**, more durable products and transition energy sources to reduce carbon footprint and waste (e.g., replacing fluorescent lamps with LEDs; replacing fossil energy sources with electricity and natural gas; increasing the percentage of vehicles refurbished or remanufactured and resold to developing countries); **(b) material recovery at vehicle end-of-life disposal**, particularly through the reutilisation or recycling of assets currently under-valued, such as 12V batteries and the automotive shredder residue (ASR), namely the plastics, rubber, textile and fibre materials that represent 20–25% of vehicle mass. All steps in vehicle components' lifecycle management will be addressed, with a view to reducing use of non-renewal elements, converting materials to new uses (cradle-to-cradle), extending components' life and replacing components with new ones having a lower environmental footprint. A thorough analysis of current operations, impact and requirements, using experience and data provided by operators and their ecosystem, will enable the development of sustainable business practices, integrating and streamlining the vehicle parts value-chain to support a balanced and sustainable vehicle life-cycle in the bus ecosystem. The new CSS model for Lisbon's bus transport sector will be applied in a CARRIS-controlled value chain and its results will be shared across the entire vehicle production/maintenance/replacement ecosystem, involving as actors and stakeholders bus manufacturers and suppliers, bus component manufacturers,

suppliers of maintenance services and suppliers of recycling services. The CSSBoost platform will be used for analysis, visualisation, scenario simulation, providing personalised information to actors and CSS optimisation. Lisbon providers of electric motorcycles and bicycles (Lisbon Mobility ecosystem), as well as Portuguese private bus operators (including tourism services) will be fully engaged in the pilot as interested stakeholders. MOTON will facilitate the pilot stakeholder engagement and the interconnection with automotive manufacturers and suppliers through its expertise, domain knowledge and industry connections as well as the transition of the CSS solution to motorcycles through its specialisation in two and three wheeled motorcycles. In addition, it will support the spread of the CSS solution by transferring knowledge to Greece and across Europe.

E. Digital Solutions to be Demonstrated and Validated

The components for analysis, visualisation, optimisation, scenario simulation and personalised information to actors will be configured and validated.

F. Ambition and Expected Outcomes

The pilot results can be sustained by enabling their integration in CARRIS's sustainability policy, involving maintenance programmes and procurement procedures. The pilot CSS can be scaled up by promoting the cross-fertilisation to relevant stakeholders in the Lisbon mobility sector, in the Portuguese bus transportation sector and within international organisations such as the International Bus Benchmarking Group (IBBG), the working groups of the Union Internationale du Transport Public (UITP) and the activities conducted within the POLIS – Cities and Regions for Transport Innovation. A long-term ambition is the uptake of the solutions by the private transport sector.

KPI	Current	Target	
		Short Term*	Mid-Long Term**
Percentage of eco-friendly (natural gas and electricity) vehicles	27%	40%	70%
Percentage of fossil fuel in fleet energy consumption	56%	40%	20%
Percentage of natural gas and electricity in fleet energy consumption	44%	60%	80%
Total generated waste	1448 tons	1000 tons	500 tons
Total dangerous waste	869 tons	600 tons	200 tons
Increase of residues valuation rate	56%	30%	10%
Increase of re-use and recycling of under-valued assets	44%	70%	90%
Inclusion of environmental criteria in procurement procedures	2	4	6

Pilot 5: Interregional Multi-National Value Chain CSS | **Region**: Pilot regions 1-4 in concert & EU

A. Summary and Key Features

Description: The Interregional Multinational Value Chain Pilot is an innovative and ambitious initiative that aims to herald in a new era of sustainability, circularity, and cross-industry collaboration. This pilot aspires to amalgamate the value chains of the four CSSBoost pilots, in developing a customised interregional/multinational web-based pilot that addresses four generic value chains leaning on the topics of the CSSBoost pilots: vehicles and batteries, agriculture/agro-food/livestock, wastewater, and plastics/bioplastics. The ultimate goal of this novel and ambitious endeavour will be the delivery of a comprehensive CSS that will investigate, demonstrate and supervise this united ecosystem of diverse but critical value chains, and their intersectional characteristics and interoperability that could generate potential growth opportunities, enhanced engagement of regional multinational actors and boost their internal links, increased circularity in performed circular practices, and potential combined methodologies, technologies and knowledge that could produce improved environmental impacts at a interregional, multinational level. **Scale**: European Level. **Sectors involved**: All sectors of the four pilots and their intersection region. **Key value chain actors**: All key value chain actors identified in the four CSSBoost pilots. **Pilot Team**: All Pilots leaders and technical development partners. **Strategic CE ambition**: Interregional CSS to investigate and perform circularity maximisation and growth opportunities among four critical value chains in EU regions.

B. Present Status and Background

According to the "twin transitions" main pillar, the EU Green Deal, digitalisation is one of the cornerstones in achieving a more sustainable circular economy. Under this scope, a tailored, fully capable, and interoperable digital CSS system could show the path for producing reliable systemic solutions, which would be adjustable, replicable, and expandable. Currently, the circular systemic solutions implementation is deployed at the urban and/or regional scale, considering the situation, characteristics, and opportunities of the specific investigated region. A virtual transition to interregional, or even the European level, could accelerate a heralding of new era in circular systemic solution development and implementation, especially for the product value chains identified as of high-importance and circularity potential in 2020 CEAP. Included among them are Electronics and ICT, Batteries and Vehicles, Packaging, Plastic, Textiles, Construction & Buildings, Food, Water and Nutrients.

C. Challenges and Barriers

- *Economic*: A key point for the successful CSS upscaling and replication is access to a critical mass of public and private investment. The delivery of an advanced CEIP addressing interregional value chains and coupling growth opportunities with diverse financial dynamics, is rather challenging.

- *Environmental*: The general EU's consumption footprint presents an improving character of -8,4% between 2012 and 2020, but levels continue to exceed planetary boundaries. To have a homogenous environmental impact analysis to equally address product value chains from different sectors is promising, but quite challenging.
- *Social*: Trigger and encourage consumer environmental activities (which currently have no measurable index) and accelerate active participation in social innovation actions.
- *Technical*: Despite the twin transition being on the frontline, the virtual representation of an intertwined, interregional ecosystem deploying four different product value chain sectors, is a challenging novelty.

D. Key Elements and Activities of Pilot Program

The interregional multinational CSS is composed mainly of the product value chains that represent key sectors involved in pilots 1-4: a) food, water and nutrients, connected to the 1st pilot and the 2nd pilot, b) plastic, connected to the 3rd pilot, and c) batteries and vehicles, connected to the 4th pilot. Potential intersections between the value chains, could be further investigated to advance this pilot's impact and importance under the environmental, social and economic aspects, such as: a.1) investigating the impact of CSS of water reuse and nutrient recovery in multiple sectors (plastics, packaging, textiles, construction & buildings) and vice versa, a.2) investigating the impact of livestock (wool) and agriculture in the textile sector and vice versa, b.1) investigating the impact of the produced CSS of plastic and bioplastic in the packaging sector, and vice versa, c.1) investigating the impact of the produced CSS in the electronics and ICT sector, and vice versa. And other possibly inter-connections that could be identified and investigated. To realise this highly ambitious plan, the pilot incorporates all the critical aspects of a CSS, according to the CE/CSS Ecosystem and Market, starting from creating an interregional knowledge base, including regulatory framework, EU policies, financing opportunities, and business models. This solution will identify, solve, and provide configuration guidelines under an interregional environment, at a multi-national, or even EU level. The virtual CSS will bring together various regional and multinational actors and stakeholders, to expand the CE cooperation potential at the interregional level (i.e., technology providers, resources provider, waste processors/transformers, product designers, producers, distributors, financiers, etc.), to establish communication channels and mediate between them, encouraging information and knowledge exchange. Multinational guidelines and interregional actors' contributions will facilitate design, simulate and assess feasibility of various extra-regional extensions, virtual value chains and interoperability measures for the pilot CSSs, as well as identify new interregional CE opportunities and select and prioritise the most feasible and do some preliminary implementation/ action planning. New business models will be created, regulations, legislations, policies, business rules, business models, data sets, confidentiality, will be pointed out for resolving under proposed EU policies and, harmonisation and interoperability solutions. This CSS solution will explore growth opportunities and evaluate economies of scale in CE, aiming to promote cross-regional and/or cross-country schemes. Moreover, it will explore and evaluate any CE-related diseconomies of scale (e.g., in transport, distribution, logistics) and propose measures and business models in response, before going beyond to replicability and scalability facilitation.

E. Digital Solutions to be Demonstrated and Validated

The Evidence Base and EcoSphere components will be demonstrated and validated.

F. Ambition and Expected Outcomes

This aspiring CSS puts the product value chains in a holistic perspective, aiming to augment the circularity of the four CSS pilots and deliver a comprehensive model of CSSs, for the improvement of *social, environmental* and *financial* outcomes and to produce measurable impacts and improvements on key product value chains of the 2020 CEAP, to empower the circularity index across the regions, and to deliver interregional best practices and policy briefing.

KPI	Current	Target	
		Short Term*	Mid-Long Term**
Advance circularity and sustainability in key product value chains in 2020 CEAP (number of value chains addressed)	N/A	5	7
Circularity Index (resource optimisation, waste reduction, and eco-friendly materials)	N/A	20%	30%
Interregional, multinational best practices in advancing circularity	N/A	1	3

* Short Term Outcome: What will be achieved during the project implementation.

** Mid-Long Term Outcome: What will be achieved after the end of the project, when the solutions will be scaled up to full capacity.

1.2.4 Demonstrators Summary Table

WP/ Task	Deliverable number	Pilot/ Demonstrator	Description	Location (facility/ city/ region)	Partners	Scale/ Capacity	Start and end TRL	Type and volume of Input materials/ products	Type and volume of output materials/ products
WP5, Task 5.2	D5.2	Pilot 1: Agricultural, Livestock and Food Processing By-Products Valorisation CSS	More nutritious (low glycaemic index) versions of bread and other bakery products	Crete, Greece	MACC, CRETE, HMU, TUC	From 1/500,000 up to 3/500,000 use scale of recycled materials. Full facility capacity = 5,000 tons of flour products/month	4→7	From 20 up to 100 kg/year of food (oat, carob, beverages, molasses…) by-products	From 100 up to 350 kg/year of nutritiously enriched flour
WP5, Task 5.2	D5.2	Pilot 1: Agricultural, Livestock and Food Processing By-Products Valorisation CSS	Fertiliser and materials for soil improvement produced using biomass from livestock production	Crete, Greece	MACC, CRETE, HMU, TUC	From 0.2/10 up to 1/10 of wool produced from the total number of animals in Crete (which is 2,300 tons/year, 1,250 of them being in Rethymnon)	4→7	Wool used as by product (from the animals in the use case) from 100 up to 500 tons/year	The produced wool pellet can reach from 50 up to 200 tons/year
WP5, Task 5.2	D5.2	Pilot 1: Agricultural, Livestock and Food Processing By-Products Valorisation CSS	New types of plant bio-stimulants	Crete, Greece	MACC, CRETE, HMU, TUC	From 0.2/1,000 up to 1/1,000. Production of 100,000 tons/year of tomatoes in Lasithi area	4→7	From 20 up to 100 tons/year of Faba beans wastes	From 10 up to 50 tons/year tomatoes of improved quality
WP5, Task 5.3	D5.3	Pilot 2: Water Reuse and Nutrients Recovery CSS	Water for irrigation and nature restoration	Marche, Italy	UNIVPM, UVIC, CIIP	Pilot plant treating from 0.2 up to 1 m^3/h of wastewater	5→7	From 0.2 up to 1 m^3/h of effluent wastewater	From 0.2 up to 1 m^3/h of treated wastewater
WP5, Task 5.3	D5.3	Pilot 2: Water Reuse and Nutrients Recovery CSS	Nutrients for agriculture	Marche, Italy	UNIVPM, UVIC, CIIP	Lab/pilot scale valorising from 100 g up to 1 kg/d of biomass	4→6	From 100 g up to 1 kg/d of biomass	From 0.05 up to 0.5 kg/d of produced char for fertilizers extraction
WP5, Task 5.4	D5.4	Pilot 3: Conventional Plastics and Bioplastics Recycling CSS	Conventional plastics	North Black Forest, Germany	CAS, MAG, TZHORB, WFG, BWCOM, KRUM	From 25% up to 50% use scale of recycled materials. Full Facility capacity 30 tsd. tons of plastic packaging to be processed	4→7	From 20 up to 28 tsd. tons plastic packaging collected and processed	From 10 up to 20 tsd. tons components from reused plastics

WP/ Task	Deliverable number	Pilot/ Demonstrator	Description	Location (facility/ city/ region)	Partners	Scale/ Capacity	Start and end TRL	Type and volume of Input materials/ products	Type and volume of output materials/ products
WP5, Task 5.4	D5.4	Pilot 3: Conventional Plastics and Bioplastics Recycling CSS	Bioplastics	North Black Forest, Germany	CAS, MAG, TZHORB, WFG, BWCOM, KRUM	From 25% up to 50% use scale of decomposed plastics. Full Facility capacity 3.5 tsd. tons of plastic packaging to be processed	3→6	From 1.5 up to 2.5 tsd. tons plastic packaging collected	From 0.5 up to 2 tons components from bioplastics
WP5, Task 5.5	D5.5	Pilot 4: Public Transport Vehicle Recycling and Valorisation CSS	Use of recyclable materials from public transport vehicles	Lisbon, Portugal	PARTICLE, CARRIS, MOTON	Apply from 5% of fleet (i.e. 35 busses and 3 trams) up to 10% of fleet (i.e. 70 buses and 5 trams).	5→7	Total generated waste: from 400 up to 1,200 tons. Total dangerous waste: from 300 up to 800 tons Total non-dangerous waste: from 100 up to 500 tons	
WP5, Task 5.5	D5.5	Pilot 4: Public Transport Vehicle Recycling and Valorisation CSS	Material recovery at vehicle end-of-life disposal	Lisbon, Portugal	PARTICLE, CARRIS, MOTON	Apply from 5% of fleet (i.e. 35 busses and 3 trams) up to 10% of fleet (i.e. 70 buses and 5 trams).	5→7	Re-use and recycling of under-valued assets: from 10 up to 38 tons	Residues valuation rate: from 1 up to 3 tons. Re-use and recycling of under-valued assets: from 10 up to 38 tons.

1.2.5 Synergies with International Research and Innovation Activities

Most of the consortium partners have vast experience in R&D and innovation projects and they were involved in European and National projects with themes relevant and related to the CSSBoost. Some of the projects considered for cooperation and technology transfer are listed in the following Table.

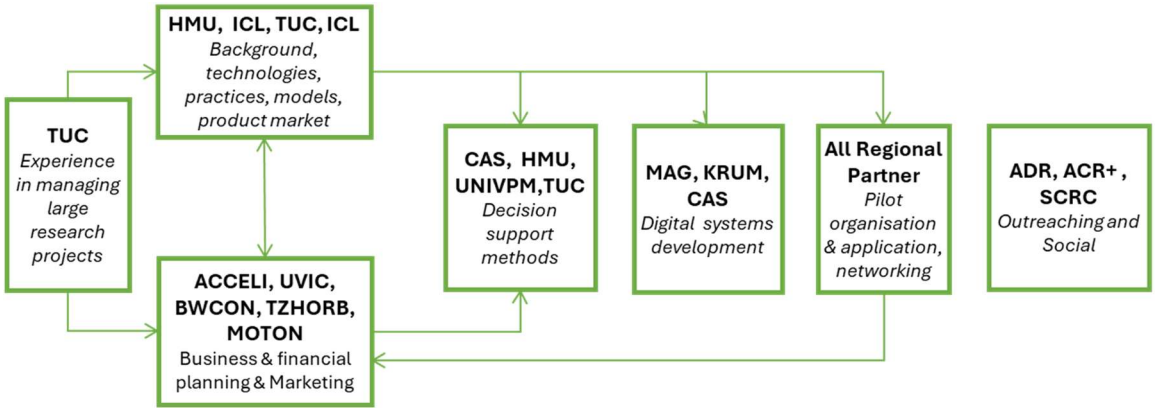
Project	Partners	Short Description	Linking to CSSBoost
FACTLOG	TUC, MAG	Enhancing energy and resource efficiency in process industries	AI-driven optimisation, Cognitive DTs, Dynamic modelling and simulation
AquaSPICE	TUC, MAG, ACCELI	Materializing circular water use in process industries	Analytics and process optimisation, Dynamic LCA
ROBINSON	TUC	Integrated EMS for islands with industrial activities	Technology evidence base, Replication roadmaps, Business planning
HYDROUSA	UNIVPM	Nature-based solutions for management water to produce valuable resources	Sustainability assessment methodology. Benchmark for the CSS related to water.
Digital Water City	UNIVPM	Water-Energy-Food-Ecosystem nexus using digital solutions and twinning.	Efficient solutions for water treatment. Digital solution for water in CE routes.
ULTIMATE (H2020)	UNIVPM	Water Smart Industrial Symbiosis	Digital solutions for the management of circular and regional value chains
NUTRIBUDGET	UVIC	Help agriculture to intensify sustainably by optimising yields.	Decision support for advisors, European policy makers.

Project	Partners	Short Description	Linking to CSSBoost
NOVAFERT	UVIC	Orientate production & application of alternative fertilising products	Technical, economic, and environmental feasibility assessment
TRUSTEE	HMU	Focuses on European Data Spaces.	Knowledge repository. Data Spaces.
PQ-REACT	HMU	Focuses on cybersecurity and privacy.	Cybersecurity in data acquisition system.
SHAPES	HMU	Focus on Medical Protocol Knowledge repository	Holistic application framework
EMERGE	HMU	Focus on best practice sharing of chemical experiments	CSSBoost Open Circularity EcoSphere and Knowledge handling
UP2030	MAG	Guide cities through the socio-technical transitions	Circular Value Chain Planning and Actors Support Services
PlooTo	MAG, TUC, ACCELI	Waste reduction and end-to-end traceability of Secondary Raw Materials	Sustainability Balanced Scorecards. Digital Product Passports. Digital Twins.
SECANT	ADR	Develops a platform to enhance the capabilities of organisations' stakeholders,	Promotion, Communication and Citizens Participation Services. Risk Analysis.
BIORECER	ICL	BIOlogical Resources CERtification schemes	Track and traceability framework of circular value chains
HYDROUSA	ICL	Demonstration of water loops with innovative regenerative business models	Environmental and Human Health risk assessment; Circular Risk Assessment;
CRONUS	ICL	Capture and Reuse Of biogenic gases for Negative-emission - sustainable biofUelS	Safe and Sustainable by Design (SSbD) framework
CONCIRMY	CAS	Configurator for the Circular Economy (BMBF)	Configuration of products with sustainable indicators
TREEADS	ACCELI, TUC, ADR	Focus on Public safety Knowledge repository and Marketplace	Holistic Application Framework and the Marketplace.

1.2.6 Inter-Disciplinary Approach

CSSBoost has assembled a wide range of expertise needed to develop and integrate innovative solutions, test and validate the technologies, as well as communicate, disseminate, and exploit the innovations produced to ensure real impact. Specifically, CSSBoost brings together expertise and real-world experience covering all the range of partners requested by the call and incorporating into the project as follows: (a) Public administrations [CRETE, WFG]; (b) Utilities [CARRIS, CIIP]; (c) Private sector services, industries and start-ups and SMEs [CAS, MAG, TZHORB, KRUM, PARTICLE, ADR, MOTON, ACCELI]; (d) Research institutions [TUC, BWCON, ICL, UNIVPM, UVIC, HMU]; (e) Scientific and innovator communities including incubators and accelerators [ACR+,TZHORB, MACC]; (f) Financial intermediaries with a focus on environmental and social impact [BWCON, SCRC]; (g) Venture capitalists and business angels [TZHORB]; (h) Civil society, including citizens; and non-governmental organisations and philanthropy [ACR+, SCRC]. An appropriate implementation strategy based on an agile methodology, the formulation of a well-balanced workplan, and the involvement of partners that are well-positioned across the various phases of the project's research and innovation value chain all contribute to the project's strong interconnection of all the aforementioned roles.

The partners' classification into the above 8 complementary categories demonstrate the coverage of the entire spectrum of possible viewing angles on the topic and the project objectives. Partners' interactions and synergies take place in the context of the Work Plan (see also Figure in §3.1.1), as described by the following diagram.



1.2.7 Gender Dimension and Other Social and Ethics Issues

In accordance with EU's Gender Equality Strategy 2020-2025 and the Sustainable Development Goal (SDG) #5 – Gender Equality, CSSBoost puts special emphasis on the role of the gender dimension regarding environmental, social, technical and financial perspectives of the CSSs to explore. An inclusive approach will be followed, ensuring that all social factors (incl. gender, ethnical, socioeconomic, cultural, age and disability) are considered

and integrated into the R&I activities to produce excellent research to the benefit of all European citizens. The project team, work programme and solutions are by design gender neutral:

- Starting from the beginning, an **Ethics Requirements and Gender Equality Plan** will be developed in T1.4, defining the requirements and pathway to ensure that the gender dimension is fully considered and integrated within CSSBoost activities. This gender analysis will focus on taking measures and establishing good practices considering critical gender factors and challenges contributing to gender equality and meeting the particular needs of each gender according to Horizon Europe Gender Equality Requirements.
- CSSBoost will ensure that all data generated and disseminated are disaggregated by sex, and other intersectional factors, to ensure traceability of possible causes of different impacts between women and men of CE Transition parameters. This approach will be embedded in the **Data Management Plan** developed in T1.3, the **Technology Evidence Base** developed in T5.8 and in the **Policy Brief** produced in T7.2.
- Particular attention will be given to gender and social equality in citizen participation activities, citizen science practices and other **Social Innovation Actions** designed and implemented in T7.4.
- Special attention will be given during the implementation of technical WPs (WP3-4) in providing equal opportunities to all regardless of sex, religion, age, income, education, disability, ethnicity etc.
- Gender and intersectional equality will be a priority of the project during the pilot implementations and the validation of the results (WP5). CSSBoost will be piloted and demonstrated in four locations in Europe, which are geographically split, making it necessary to address cultural, social, and idiosyncratic determinants in a sensible way, especially within stakeholder engagement for co-creation (T2.2) and outreach actions (WP7).

1.2.8 Role of Social Sciences and Humanities

Within CSSBoost, special attention will be paid to *Social Sciences and Humanities* (SSH). The success of any scheme, technology and/or tool heavily depends on social acceptance and consent of the benefits of the CE/CSS concepts, irrespective of the technological achievements. To boost CE transition, targeting EU sustainability goals and the objectives of the CCRI, the project promotes transformational and behavioural changes, as well as acceptance and cooperation by stakeholders/end-users. Furthermore, the CSSBoost integrated solutions promote widespread citizens' participation and citizen science practices as the basis for its social innovation actions, giving citizens, irrespective of status/gender, a front-row position. Hence:

- A generic CSS **Social Innovation Package** will be produced in T2.4 as part of the CSSBoost Application Framework and a set of **Social Instruments** for setting up regional CSS ecosystems will be defined.
- A number of **Social Innovation Actions**, mainly based on a *citizens science* approach and the concept of *transformable intelligent environments*, will be designed and applied to the pilot regions in T7.4.
- Dedicated educational and life-long **Learning Activities** will be developed in T7.3, aiming to educate new scientists and engineers and enhance the skills of professionals involved in CE/CSS.
- Social aspects will be introduced in the analysis of **Non-Technological Barriers**, focusing on fair sharing of benefits, civil society acceptance and citizens consumer behaviour. Measures and procedural roadmaps for overcoming the identified socio-economic barriers will be included and detailed in the methodologies for the development of the CSSBoost framework (T2.4) and business and governance plans (T6.2).
- CSSBoost includes actions for **Stakeholder Engagement** at the regional level for co-creation activities, ensuring a stakeholder-inclusive approach and following a value sensitive design approach (T2.2).
- SHH also play an important role in the services provided by the platform (WP3-4), with the inclusion of **Stakeholder Activation** and **Citizens Participation** services, so as to enhance social acceptance of CS/CSS.

1.2.9 Open Science Practices

CSSBoost will follow *Open Science and Open Data* practices to remove barriers to knowledge and data sharing to offer R&Ds and regions an ecosystem for innovation and sharing of ideas and knowledge that may advance CE and bring to society a return of investment in our research. In this context:

- **Open and FAIR Data**: CSSBoost will manage data in accordance with the principles of FAIR data management[16](Findable, Accessible, Interoperable and Re-usable data), aiming to maximise access to, and re-use of research data generated by the project. It will ensure FAIR treatment of data particularly in relation to T6.5 and WP7. CSSBoost intends to publish Ontologies, Semantic Context Brokers and Datasets it generates through Open Science tools, i.e. OpenAIREe, making available through European Open Science Cloud (EOSC) modules and data sets at the public EOSC Marketplace.
- **Open-Source/Use Software**: The software developed by the involved partners will be made available as open-source, or open-use, which will be published in selected online and publicly accessible repositories. The CSSBoost partners already have a track record of contributions and experience in managing open codebases, tools, models, and communities and will strive to select a business-friendly license (e.g., MPL, LGPL, Apache 2.0) for their open results.
- **Open Access Publications**: All journal publications will be made available with the highest standard (Gold Open Access). They will be also made available on the project's website and in the zenodo open access

[16] https://ec.europa.eu/research/participants/data/ref/h2020/grants_manual/hi/oa_pilot/h2020-hi-oa-data-mgt_en.pdft

repository. CSSBoost will publish a minimum of three articles in the Open Research Europe Publishing Platform, including one project overview article at the beginning of the project and a concluding article providing a summary of the project's main research offerings and achievements at the end of the project.

- **Open Innovation**: CSSBoost will promote open innovation in national and international collaborations and networks. It will strive to actively utilise the potential of collaboration with partners' academic and business networks as well as other HEU clusters, and to collaborate with stakeholders in the public and private sector.

1.2.10 Strategy on Data Management and Management of other Research Outputs

The CSSBoost **Data Management Plan** (DMP), developed in T1.3, will be a living document that presents a plan on handling data during and after the end of the project: what data will be collected and processed, which methodology and standards will be applied, whether data will be shared or made open access and how data will be curated and preserved. The DMP will address the production, collection and processing of data and scientific publications. It will provide detailed information on the project data lifecycle and privacy, and the project's policies for data collection, storage, access, sharing, protection, retention, and destruction. All consortium members will refer to this DMP if questions about CSSBoost data policies and practices arise. Data management in CSSBoost will be respectful of and aligned with the project's internal ethics protocol, defined in T1.4, to ensure consortium partners meet adequate ethical standards. The team responsible for data management comes from HMU, for quality assurance from ICL and for ethics requirement from UNIVPM.

CSSBoost Parties (legally represented partners) agree that any background, results, confidential information and all data/information that is provided, disclosed or otherwise made available between the Parties during the implementation of the pilot and/or exploitation activities, will not include personal data as defined by Article 2, Section (a) of the Data Protection Directive (95/46/EEC) and applicable local implementing local legislation; or, as from May, 25th 2018, Article 4 of the General Data Protection Regulation. The Data Protection Directive, its implementing local legislation and the General Data Protection Regulation are hereinafter collectively referred to as the **Data Protection Legislation**. Accordingly, each Party will ensure that all data and information contained in shared information is anonymised such that it is no longer personal data, prior to providing the shared information to such other Parties. Each Party that provides or otherwise makes shared information available to any other Party, represents that, as per applicable Data Protection Legislation: (i) it has the authority to disclose the shared information, if any, which it provides to the Parties; (ii) where legally required and relevant, it has a legal ground to provide the shared information; and (iii) there is no restriction in place that would prevent any such other party from using the shared information for the purpose of this action and the exploitation thereof.

1.2.11 Technical Robust AI

CSSBoost's AI algorithms will be reliable and technically robust in three areas: (a) AI model transparency through interpretability and explainability features used for model design and data description during model conceptualization. An explainability-by-design method will be used during architectural design to promote AI model transparency. If "glass-box" explainable models (e.g., causal analysis models) perform well, they will be chosen over "black-box" models (e.g., Deep Learning). XAI methods like DeepLift, LIME, and SHAP will be used to interpret "black box" models and increase trustworthiness as needed. (b) AI MODEL RELIABILITY, detecting early weaknesses and adopting technical remedies to ensure the system cannot be manipulated or fail. (c) AI model data protection through proper control points, especially for sensitive data. A DPIA-based approach to assess the social impact of the AI system will also be provided.

#@CON-MET-CM@# #@COM-PLE-CP@#

2 Impact

#@IMP-ACT-IA@#

2.1 Project's Pathways Towards Impact

CSSBoost concepts, methodology, practices are developed and activities are designed, in the context of CCRI's "Methodology for Implementation of a Circular Economy at the Local and Regional Scale" [17], the "European Green Deal", the "EU Circular Economy Action Plan"[18], the "Bioeconomy Strategy"[19] and the "Europe Fit for the Digital Age"[20]. CSSBoost will decisively contribute towards the **Expected Outcomes** (EO) specified in the call (§2.1.1) and the long-term **Expected Wider Impacts** (EWI) specified in the Destination "Circular Economy and Bioeconomy Sectors" (§2.1.2. A well-planned pathway is followed towards the expected impact, leading from general objective and vision, through special objectives and related scheduled project activities to project results output and, through both, to specific practical, on-the-field, outcomes, that generate the expected impact. This pathway is summarised in Figure 6 , while the particulars of its stages are further analysed in other sections of the document.

[17] https://research-and-innovation.ec.europa.eu/research-area/environment/circular-economy/circular-cities-and-regions-initiative_en
[18] https://environment.ec.europa.eu/strategy/circular-economy-action-plan_en
[19] https://research-and-innovation.ec.europa.eu/research-area/environment/bioeconomy/bioeconomy-strategy_en
[20] https://commission.europa.eu/strategy-and-policy/priorities-2019-2024/europe-fit-digital-age_en

Figure 6 *The CSSBoost impact pathway.*

2.1.1 Project Contribution to the Expected Medium-Term Outcomes Related to the Call

EO#1: Significantly increased circularity, reduced GHG emissions and where relevant increased carbon removal, in product value chains, and efficient valorisation of local resources in cities, regions or groupings.

CSSBoost contribution: A new approach to enable and optimise CSS application and boost circularity is proposed, encapsulated in a novel CSS Application Framework and a set of CSS, digital solutions, tools and methods to apply it. CSS are applied integrated within a digital environment that not only eases and optimises their implementation, helping overcome any barriers, but also intensely supports their lifecycle management, so as to mitigate risks, ensure sustainability and energise expansion, upscaling and linking to extra-regional markets. CSSs are viewed as integral part of the local (e.g. regional) CE Ecosystem and its CE Market. Consequently, the CSSBoost digital environment virtualises the entire CE Ecosystem, monitors its entities, relations, CE value chains, resource and product flows, so as to take advantage of any opportunities for CSS advancement, new value chains or to anticipate risks. Thus, the same digital environment creates a unique area-wide cyber-physical system that is used to plan new CSS or CS and nurture and empower the entire CE transition and CE Market growth in the area by offering CE stakeholders activation tools. Besides the circularity potential that CSSBoost solutions create, their immediate deployment in 4 EU cities/regions and the establishment of 4 pilot CSS and 7 value chains of critical local priorities, will substantially increase circularity and carbon removal, reduce GHG emissions and improve valorisation of resources by the project's end.

Challenges: Regulative, social, business, financing and behavioural barriers need to be overcome during CSS implementation phase. Corporate mentality due to competitive past experiences must be changed to a CE cooperation mentality. Also, any competitive edge (e.g. lower costs, attractiveness) of traditional products vs CE products must be mitigated by suitable measures. At later lifecycle stages, CE value chains must become viable, sustainable and self-growing ecosystems, effectively utilising local resources and taking advantage of extra-regional opportunities, to support environmental well-being and achieve outcomes tangible to citizens.

Mitigation measures: The CSS Application Framework and assorted tools offer a range of methods, business models and instruments (economic, regulative, promotion, behavioural change) for optimum CSS design, overcoming critical barriers, achieving required critical factors states, at CSS implementation stage. Also, detailed

business, governance and strategic plans are offered for the replication of CSS solutions at any area type. The CSSBoost digital system offers CSS value chain optimization, growth and risk management tools that ensure sustainability and upscaling, while its Data Sharing Platform provides tools and services to all classes of (potential) CE stakeholders in the area to enable their behavioural change, activation and participation in the CE transition. In the 4 pilot regions, the project will optimally design and nurture the pilot CSS and establish and ensure viability of their value chains (plastics, food, bio-stimulants, nutrients, water, vehicle batteries & parts), following EU CEAP. Respective Social Innovation Actions will be initiated to connect these to the local social dimensions. A 5th pilot pursues cross-border collaboration increasing value chains' viability.

Scale: 7 CSS value chains are established in pilot regions, with specific KPIs identified for each case to make impact trustworthy and quantifiable. In pilot#1, a range of waste from biologic origin is recycled: (i) livestock production (e.g. sheep wool & skin), *reducing difficult to manage sheep wool wastes by 550 tons*, easing environmental burden; (ii) agriculture (e.g., plants at production end), *minimising use of chemicals in agriculture* and *exploit bio-stimulants* from agro-food wastes; (iii) agro-food processing by-products, valorising by-products through bakery channels. In pilot#2, water recycling will help establish value-chains of (i) water reuse and (ii) nutrient recovery, *increasing the amount of reutilised wastewater* in the region of *Marche by 21 million m^3/y* and *facilitating 5 NBS* to treat wastewater. Pilot#3 aims at comprehensive recycling of plastic waste with a full range of recycled plastic and bioplastic end-products, expecting 15% *reduction in energy consumption* over the value chain, -15% *energy costs*, 20% *single-use plastics reduction,* 30% *increase of RES integration*. Pilot#4 targets the efficient management of hazardous waste from P.T. vehicles (water & oily mud waste, used oils, engine filter and fluids, fluorescent lamps, glass, rubber & plastics, wood, metal), expecting 70% *increase of eco-friendly vehicles, 20% fossil-fuels* reduction in vehicle fleet, while addressing regional policy by *introducing 6 (4 new) environmental criteria* in procurement procedures.

Significance: Agriculture is responsible for 59% of total freshwater use in Europe, and significant percentage of water bodies are affected by pollution from agriculture.[21] Groundwater supplies the 65% of drinking water and 25% of water for agricultural irrigation in the 27 EU Member States, therefore, its preservation is critical in the European territories. Forced by the new EU Regulation on Batteries, CSSBoost foresees to empower the re-use, repurposing and recycling of batteries from P.T. and other buses and shared vehicles, promote sustainable mobility by increasing the public transport use and micro-mobility. Greening transportation in EU is a challenging issue. Demand for batteries is expanded rapidly, expecting to increase 14-fold globally by 2030, and EU could account for 17% in total of that demand, according to the EC's estimations[22]. The entire transport sector accounts for ~25% of total GHGs in Europe[23], CCSBoost provides CCSs for multiple value chains in transport sector, focused on the recycling and valorisation of materials derived from vehicle maintenance and end-of-life by-products. The plastics industry in EU involves ~52.000 companies with ~400€ billion turnover.

Map to Key Results: KR#1.1, KR#2, KR#2.2, KR#3.2, KR#3.3, KR#8.1, KR#8.3, KR#9.2, KR#9.3, KR#10.1

EO#2: Creation of business opportunities and jobs in the circular economy at urban and/or regional scale.

CSSBoost contribution: *Business, Exploitation and Investment Plans* for CSS and CSSBoost solutions are developed (WP6), which address also the creation of business opportunities and jobs, through an in-depth market analysis, business and financing models, etc. The CE Ecosystem virtualization (VCEM) models and monitors the CE market, while the powerful information sharing platform offered allows business-enabling information and job positions available to be shared among all regional stakeholders, incl. citizens. Additional powerful tools, such as CE market and business opportunities assessment, electronic marketplace and P2P trading, further energize the creation of business opportunities and jobs. These are further supported by the extensive education and training programs and material developed (WP7) for administering the required knowledge and skills. Further, business and jobs creation is actively pursued in the pilot regions through citizens, businesses and other stakeholders engagement in the Living Labs and Social Innovation Actions.

Challenges: Region-specific CE opportunities must be continuously identified and also translated into job openings and required skills, as well as channels for providing them, taking into account the regulatory, financing and educational frameworks at regional, national and EU levels. This knowledge must be used to put interested stakeholders into contact to create partnerships and also incorporated and in CE policies and promotion instruments and linked/disseminated to the social strata needing and/or able to take advantage.

Mitigation measures: The developed business and investment plans provide knowledge and instructions for initiating policies and attracting funding for a mitigation strategy. They are targeted primarily to pilot regions, but directions are given for adapting to any other area. The provided digital environment is able to identify, assess and inform stakeholders about potential prospects and business opportunities, considering wastes production, other resources, industries, regulations, financing, end-product demand and competition. Through the information sharing platform and its partnership creation, P2P and Marketplace tools, a business germination environment is

[21] https://www.eea.europa.eu/en/topics/in-depth/water
[22] https://environment.ec.europa.eu/news/new-law-more-sustainable-circular-and-safe-batteries-enters-force-2023-08-17_en
[23] https://www.eea.europa.eu/en/topics/in-depth/transport-and-mobility

created, which is further extended in the pilot regions through Living Labs and FabLabs. The consortium includes partners with expertise in providing full support to businesses and start-ups notably: TZHORB (helps plastics technology companies contact inventors and realize products and patents). BWCON (supports evaluation of business modelling and commercialisation strategy for startups and fosters entrepreneurship by coaching, training, consulting), MACC (technology transfer, support for introduction of innovation, IPR, business networking and problem solving for agro-food businesses), etc.

Significance: *One generic and* 5 *specific Circular Economy Investments Plans* are elaborated to ensure financial viability of circular business cases and valorise the available growth opportunities at each of the 4 regional pilots. The *5th pilot use case* will deliver an *integrated Circular Economy Investments Plan*, taking into consideration opportunities at EU level, for urban, peri-urban, and rural areas of an EU territory.

Scale: The plastics industry in EU employs close to 1,5 million people, in about 52.000 companies, having a turnover of 400€ billion.[24] The water supply, sewerage, waste management and remediation activities sector accounts for 1.6 million jobs in EU in 2020, in about 78.000 enterprises[25], while the numbers for the food sector rise up to 4.6 million employees (food and drink industry for 2022), generating a turnover of 1.1€ trillion, making it one of the largest manufacturing industries in Europe.[26] According to Eurostat, 6.2 million people employed in the transport sector in EU.[27] In Nordschwarzwald >400 SMEs specialise in innovation, production, processing of plastic materials and ~40% employees work in industry. In Crete, >50% population works in agriculture and agro-food processing/packaging, shaping an economy based on agriculture. In Lisbon, public transport of the metropolitan area is covered involving 750+ PT vehicles in a radius of 100km^2.

Map to Key Results: KR#1.1, KR#2.1-2.2, KR#4.1-4.2, KR#11.1-11.3, KR#12.1, KR#12.2

EO#3: Increased uptake and participation of citizens in circular and climate-neutral practices.

CSSBoost contribution: A *human-centred* approach is followed aiming at a resilient CE system that puts in the frontline the prosperity of *people*, the environment and finance[28], by enabling the active involvement of local societies by encompassing citizens into VCEM and offering dedicated Information Sharing Platform's services for citizen behavioural change, activation, participation and citizen science/observation. To develop CSSBoost framework and solutions, an innovative combination of *stakeholder co-creation environments and methodology* is devised and followed. Co-creation processes are set in central position to provide input and expertize knowledge on the CE ecosystem and all relations, factors, quality criteria and requirements involved, including customisation, personalisation and system configuration needs, in all application modes and CSS lifecycle stages. All pilots will initiate *Social Innovation Actions (WP7)*, based on citizens science and transformable intelligent environments concepts. CSSBoost digital system services will empower citizens to be massively engaged in them. CSSBoost and CE/CSS human-centred character will be strategically supported, even after the project's end, by these actions and by *Life-Long Learning Educational programs and material (WP7)*. VCEM and Platform will be a viable, interactive system, accessible to all, introducing the inclusiveness aspect in CSSs application. R*egional* and *multiregional Communities of Practices will also be established, as well as an EU-level Open Circular EcoSphere*, a dedicated consumer-centric environment, that encloses all relevant information for enhancing knowledge and fostering cross-border collaboration among diverse global stakeholders.

Challenges: Social, psychological and technological barriers to citizen participation must be removed, by providing access / contact points and activities that allow citizens to enter the decision-making process and support them with expert knowledge and tools.

Mitigation measures: CSSBoost provides personalized user-friendly interfaces accessible to all individuals while observing information confidentiality where relevant. The platform prominently emphasises a co-creation approach, facilitating dynamic and straightforward citizen involvement. Implementing targeted engagement activities ensures active participation, thereby enabling a mitigation plan. The Consortium involves two partners, with extensive expertise in social innovation activities. SCRC (T7.4 leader) focuses on the central areas of relationship management and integrated social CRM while the TIE Lab of TUC organises social innovation actions based on the transformable intelligent environments concept. Furthermore, the experience of ACR+ (WP7 leader) in dissemination and communication activities and its wide network of associates cities and regions, ensures the project's visibility and propagation of its results and knowledge gained.

Significance: CCSBoost has a robust and powerful plan (section 2.2.3) of engagement and dissemination activities, enrolling over *300 end-user entities* (citizens and directly concerned residents), conducting more than 15 workshops, exhibitions, awareness campaigns and liaison activities. 4 regional and 1 multi-regional communities of practice, to encourage and guide regions and cities in enabling active community participation

[24] https://plasticseurope.org/wp-content/uploads/2022/10/PE-PLASTICS-THE-FACTS_V7-Tue_19-10-1.pdf
[25] https://ec.europa.eu/eurostat/statistics-explained
[26] https://www.fooddrinkeurope.eu/resource/data-trends-of-the-european-food-and-drink-industry-2022/
[27] https://ec.europa.eu/eurostat/web/products-eurostat-news/w/ddn-20230207-1
[28] https://ellenmacarthurfoundation.org/topics/circular-economy-introduction/overview

Scale: The bottom-up action engagement has been investigated as an effective approach to accelerate climate mitigation and adaptation efforts, suggesting the education, awareness, and inclusive procedures for successful citizens participation.[29]. Based on this, CSSBoost context encompasses the inclusive approach, and promotes acknowledgement and awareness of all triggered stakeholders, including citizens.

Map to Key Results: KR#1.1, KR#2.1, KR#2.2, KR#11.1, KR#11.2, KR#11.3, KR12.1, KR#12.2

EO#4: Enhanced knowledge transfer between the cities, regions or their groupings involved in the proposals financed under this topic and other cities and regions in EU Member States and Associated Countries.

CSSBoost contribution: Adopting the EU CEAP, CSSBoost focuses on the active and sufficient cooperation of *CCRI's bodies* for receiving the *know-how from expertise actors* (Coordination Office, Support Office, Advisory Board, already selected and successfully implemented pilots, etc.), and *exchange the knowledge and experience* gained from CSSBoost throughout the project lifetime. Therefore, a *win-win situation* is created: the wider dissemination and exploitation of results and knowledge transfer through the cooperation of a robust network, and the further enhancement of the CCRI network in digital and CE market areas. The CSSBoost *builds on the CCRI's methodology* (addressed in WP2), incorporates CCRI's principles, objectives and goals (addressed in WP6), being a valuable part of the *CCRI strategy* and plan, and in *close cooperation with CCRI-CSO*, for being supported by the CSO in empower the synergies and identify complementarities with other CCS *Pilots, strengthen cooperation, knowledge and experience transfer*, and accelerate the dialogues with wider stakeholders, achieving exceptional dissemination. Moreover, a number of tools are developed to support the exchange of knowledge gained in the project to local, regional and worldwide stakeholders. VCEM integrates an *Inventory of existing CSS practices, technologies & application cases* in T2.1, a *Technology Evidence Base* in T5.8 and the *Open Circularity EcoSphere* in T6.5, facilitating knowledge transfer to all CCRI pilots, cities, regions and associated countries. Finally, CSSBoost develops *Life-Long Learning Educational* programs in T7.3 to enhance the knowledge transfer.

Challenges: Propose a comprehensive and dependable methodological framework, along with associated tools, to effectively tackle forthcoming CCS pilots in the CCRI, as well as in various regional contexts. Furthermore, this approach seeks to facilitate broader impact, replicability, and scalability of CCS initiatives.

Mitigation measures: The primary mitigation strategy is to improve engagement and outcomes within the EU by leveraging existing knowledge and experience. This will be accomplished by integrating artificial intelligence and machine learning technologies. The objective is to foster connections with the CCRI by fostering relationships and interoperability between various regions. Moreover, this initiative aims to provide a wealth of knowledge and best practises (CoPs, LLs) to engage relevant stakeholders across Europe.

Significance: CSSBoost delivers *one* integrated knowledge repository, the *Open Circular* EcoSphere, which is expected to be used by over *300 end-users*, and to be accessed by over *3000 visitors*, until the end of project-lifetime. Furthermore, over *100 employees (new scientists, engineers)* will follow *>5 tailored educational courses*/programs and will be trained. 4 regional, 1 multi-regional CoPs and a knowledge pool.

Scale: The last decade, EU has put in the frontline actions to improve connections of research centres and high-level institutes, with business and industrial sectors.[30] "Generating new knowledge and turning into product and services is crucial to maintain and enhance the EU's competitiveness", as reported the EU Commissioners for Science & Research, and Enterprise & Industry. Transforming Europe into a "single market for knowledge" requires increasing public investments in research, but also to deliver a targeted strategy to support this process. Under this general scope, CCRI combines knowledge sharing with technical and financial support, aiming to endorse stakeholders of regions and cities across EU, and encourage knowledge transfer within the CCRI community [31].

Map to Key Results: KR#4.1, KR#4.2, KR#5.1-5.2, KR#6.1, 6.2, KR#7.1, KR#8.1-8.3, KR#9.1-9.3, KR#10.1-10.3, KR#11.1-11.3, KR#12.1-12.3

EO#5: More effective widespread uptake and easier replication, scalability and visibility of circular systemic solutions and hence multiplication of their economic, social and environmental benefits.

CSSBoost contribution: To ensure replication and upscaling of CSSBoost solutions and methodology, generic *Uptake, Replication, Governance, Business and Financial plans*, guidelines and interoperability notes are produced in WP6. The tailored plans and guidelines will be part of *the CSSBoost Holistic Application Framework*, which serves as a guideline on holistic and systemic circularity and sustainability assessment of CSS and standardised indicators. According to the *CCRI methodological framework*, scenarios modelling, and impact analysis are a dominant element when the proposed solutions represent a great performance and have measurable and valuable impact at regional and interregional value chains, affecting a wide range of sectors and stakeholders. CSSBoost conquers this challenge *by elaborating the VCEM* that utilises artificial cognition and machine learning technology for delivering a cognitive DT able to virtualise the entire city, regional or interregional markets.

[29] https://www.mdpi.com/2071-1050/14/6/3701
[30] https://ec.europa.eu/invest-in-research/pdf/download_en/knowledge_transfe_07.pdf
[31] https://circular-cities-and-regions.ec.europa.eu/about

Challenges: The main challenge revolves around the attainment of a sufficient degree of preparedness in terms of replicability and scalability within the context of CSS plans.

Mitigation measures: The centrepiece of a CSSBoost integrated solution is one (or more) CSS. For these, a methodological approach for selection, design, planning and application is followed. This is based on a *CSS Inventory*, of technologies, practices and applications, researched and evaluated. Based on the inventory, a *CSS Application Planning Toolkit* is developed (in WP2) with methods and tools for CSS selection, evaluation, feasibility, configuration, etc. Additionally, a *Technology Evidence Base* is produced (in WP5) that provides evidence on CSSBoost solutions and their application, together with an interactive *Replication Roadmap Tool*, implementing a replication workflow of CSSBoost solutions. CSSBoost will also involve the universities, research centers and industrial partners participating in the In-Crete innovation alliance, to collect scenarios and needs and strengthen the uptake and replicability of the solutions.

Significance: CSSBoost brings together experiences and results from the pilot use cases to structure strategies for ensuring and facilitating the uptake, replication and scaling of developed solutions, aspiring to perform a significant impact in society, environment and economy. CSSBoost pilots put in the *frontline critical value-chains* that staring into *viable sectors* at regional and interregional level: plastics/bioplastics, agriculture/livestock/food, transportation and water/agriculture. To this end, it generates *five CSS design and application plans*, ready to be applied at respective pilots and planned for upscaling, replication and exploitation, advancing knowledge and support from CCRI-CSO in implementation.

Scale: Boosting the replicability and scalability potential in systemic circular economy solutions has been already investigated in EU funded projects[32]. Replication and upscaling of successful CSSs point out the way to EU available funding to support CE, which goes hand to hand with the CEIP-Circular Economy Investment Plan, and the relevant funding support: Horizon Europe, LIFE programs, Regional Policy support to CE, etc.[33]

Map to Key Results: KR#10.1, KR#10.2, KR#10.3, KR#11.1, KR#12.2

EO#6: Contribution to achieving the policy targets of the European Green Deal, CEAP, EU bioeconomy strategy and the European industrial strategy at local, regional, national, European and international levels.

CSSBoost contribution: CSSBoost extraordinary characteristic is the employment of *numerous SotA technologies* for circular value chains, sustainability enforcement and technology uptake, into a holistic approach, the VCEM system. This highly integrated approach, goes beyond SotA, maximises the impact of any CSS, energises and boosts the CE transition in cities, regions or group of regions, and enables setting-up relations and interoperability, applying in handy the overall EU policies.

Challenges: The challenge is to develop and present an all-encompassing methodological framework that promotes inclusivity and addresses the implementation of policies aimed at enhancing circularity and expansion throughout Europe.

Mitigation measures: CSSBoost is a framework which strengthens the integrated CCRI methodology by integrating multiple EU Policies that are relevant to the subject matter, ensuring effective mitigation strategies aligned with EU Policies.

Significance: The project responds to policies outlined in the call and exploits their principles and objectives by delivering its own *Policy Brief* of outcomes. It incorporates EU Green Deal, CEAP (initial-2015, and updated-2020), key-product value chain approach, the new Industrial Strategy, Action Plan for Critical Raw Materials, Zero Pollution Action Plan. Moreover, it delivers *five customised CEIPs*, with the 5th one being reported considering input at EU level.

Map to Key Results: KR#1.1, KR#2.2, KR#10.3, KR#12.3Concluding, CSSBoost achieves to address the generic expected outcomes that outlined in the call, such as:

- To support delivery of solution to implement the Green Deal, CEAP and bioeconomy strategy (link with EO#6).
- To support the transition towards a sustainable, regenerative, inclusive and just circular economy at local and regional scale, boosting interregional and cross border cooperation (link with EO#4, EO#5).
- Form part of the demonstration projects for the implementation of the European Commission's Circular Cities and Regions Initiative (link with EO#4, EO#5).
- Provide policymakers, public and private investors and local communities with concrete and demonstrated examples of circular systemic solutions (link with EO#1, EO#5).

The key challenges, requirements and their mitigations actions presented in detail in EOS presented above in this section. However, additional economic, technological, social, and environmental barriers need to be addressed through targeted mitigation measures to ensure the successful implementation.

[32] https://treasource.eu/treasource-a-new-european-project-to-develop-systemic-circular-economy-solutions-in-cities-and-regions
[33] https://circulareconomy.europa.eu/platform/en/financing-circular-economy

2.1.2 Project Contribution to the Long-Term Wider Impacts Related to the Destination

EWI#1: Develop the circular economy and bioeconomy sectors (*Social, Environmental, Economy)*

EU plans to create a sustainable, inclusive, fair, and clean CE and bioeconomy in European areas, which will boost economic growth, protect the environment, and bring people together. In order to do this, CSSBoost chooses regions that want to use their resources, reduce GHGs at the local level, and take advantage of their location to close the loop of supply chains locally. For example, Crete is an island in the Mediterranean Sea that wants to develop sustainable value chains by recovering materials and reusing food wastes to get them back into the food chain for humans or animals. This way, they won't have to ship products or food from the Greek mainland. On the other hand, Nordschwarzwald wants to show a regional strategic plan for a comprehensive recycling of plastic trash and show how bioplastics can be made from recyclable resources, such as plant-based materials, addressing the regional bioeconomy in its entirety. Measurable and obvious added value is made through regional growth and opportunities, environmental sustainability, and getting more locals to take part and use the services.

EWI#2: Ensure natural resources are used and managed in sustainable and circular manner *(Environmental)*

In recent years, the EU has prioritised the implementation of regulations aimed at mitigating environmental footprints, achieving climate-neutrality, reducing pollution, and enhancing resource efficiency. Taking into account the crucial elements of Destination 4, namely the promotion of a clean environment and the elimination of pollution, which encompass concepts such as environmental sustainability, circularity of bio-based systems, and the mitigation of environmental impacts and pollution in food systems, the CSSBoost pilots are specifically designed to effectively and comprehensively tackle these challenges. The proposed replication and exploitation plan aims to provide support in pertinent case studies throughout Europe, so enabling the sharing of knowledge and experience in comparable situations of vulnerability.

EWI#3: Prevent and remove pollution *(Environmental)*

The transition from fossil-based and carbon-intensive value chains and systems to those based on sustainable biological resources has been facilitated by the implementation of biotechnology solutions, as well as improved access to financial resources and technical support. CSSBoost aims to establish an inclusive Regional CE Ecosystem and Market, which effectively engages all stakeholders, including producers, policymakers, decision-makers, and customers/citizens, at various levels ranging from local to regional and beyond. The exchange of knowledge and information, including sensitive or critical data, inside this expansive and inclusive network, facilitates the provision of financial backing and guarantees technical aid throughout the supply chain.

EWI#4: Unlock the full potential and benefits of the circular economy and the bioeconomy, with clean secondary raw materials, ensuring competitiveness and guaranteeing healthy soil, air, fresh and marine water for all, through better understanding of planetary boundaries and wide deployment and market uptake of innovative technologies and other solutions, notably in primary production and bio-based systems *(Environmental, Economy, Social)*

CSSBoost develops a framework that valorises and expands upon the CCRI methodology by incorporating several strategies, including the "key product value chain" approach. It aims to expedite progress in critical areas of intervention, such as batteries and cars, packaging, plastic, food, water, and nutrients. The integration of digital technologies enables the comprehensive representation of CSS environments, while the innovative framework establishes a strong connection with all stakeholders in a value chain to effectively combine inclusiveness, health, safety, and sustainability aspects in financing and processes. This proposal outlines a dynamic framework that facilitates ongoing surveillance, evaluation, and enhancement to actively foster growth and knowledge dissemination among various stakeholders within a value chain (such as manufacturers, retailers, consumers, citizens, and public administrators) in specific regions of the European Union. These regions encompass diverse geographical settings, including insular, rural, urban, and peri-urban areas.

EWI#5: Enlargement of marine and freshwater biological resources *(Environmental)*

One of the primary goals of CSSBoost is to oversee, regulate, and enhance industrial processes with the aim of promoting the reuse, recovery, and valorisation of various waste materials, including bioplastics, livestock waste, food waste, organic waste, and sewage sludge. To accomplish this objective, the CSSBoost idea encompasses the visualisation of the entire value chain ecosystem, incorporating all relevant stakeholders, with the goal of developing a comprehensive solution that promotes the green and digital transition in accordance with the standards outlined in the EU CEAP. The pilot cases have been focused on industrial processes and their digitalization to achieve continuous monitoring, management, and optimisation. The creation of the VCEM will prioritise the significance of effective decision-making and the development of appropriate guidelines. The key elements of the VCEM include the Knowledge Repository and the Digital Information Sharing Platform. These components will collect and disseminate essential feedback and information required for the formulation of guidelines, roadmaps, upscaling strategies and exploitation plans, facilitating the decision-making process.

2.1.3 Project Contribution to the Circular Cities and Regions Initiative Objectives

Apart from the specific CSSs demonstrated in the pilot regions, CSSBoost contributes to the wider objectives of the CCRI by developing, testing, validating and making available "**Cross Cutting Support/Governance** (CCSG)" CSSs, as presented in the "Methodology for the implementation of a CE at the local and regional scale".

CCSG-CSS#1: Joint long-term strategy development and stakeholder engagement.

CSSBoost facilitates the involvement of several stakeholders, fostering dialogue and shared understanding around the concept of CE through an open platform that offers information and communication services.

CCSG-CSS#2: Support the links and exchanges of the Organised Waste Market (OWM).

CSSBoost supports for the facilitation of links and exchanges within the Organised Wastes Market (OWM) through the provision of an online market and trading area. This virtual marketplace operates on a P2P trading system.

CCSG-CSS#3: Creating or Supporting Waste Recycling.

CSSBoost aims to facilitate collaboration and coordination among many stakeholders engaged or potentially engaged in the field of CE. This platform seeks to increase their efforts and expand their reach through activities such as activity modelling, communication, and clustering. Additionally, this initiative presents emerging technologies, concepts, and tools, such as Digital Product Passports, Sustainability Balanced Scorecards, and Traceability Strategies. These innovations aim to propel supply chains towards circularity and resiliency.

CCSG-CSS#4: Circular procurement clauses.

CSSBoost incorporates circularity procurement clauses into public offers as a means to incentivise service providers and foster the adoption of CE. These clauses encompass a range of measures, including the integration of CE information, development of CE roadmaps and utilisation of AI inference to assess various circumstances.

2.2 Measures to Maximise Impact

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2.2.1 Strategy for Impact Creation and Maximisation

The impact strategy is aligned with the CSSBoost delivery models. In each model, it will include awareness creation activities (WP7), utilisation of existing networks and marketing (WP6). The main principles (Figure 7) are:

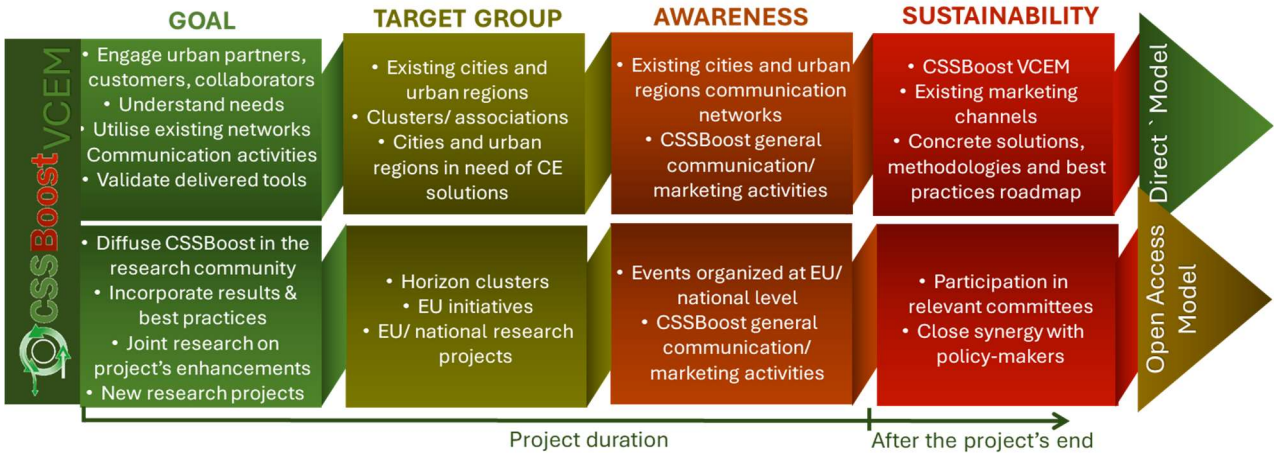

Figure 7 *CSSBoost impact creation strategy in the two delivery models*.

Creating value to the market and pilot cases: CSSBoost will transform novel ideas, deploy EU project prototypes and commercial platforms into a holistic framework and a set of reference implementation tools and best practices that will be deployed in different pilot case contexts. The proposed scientific approach will be validated by the pilot sites, thus creating a comprehensive value proposition and initial success stories. To achieve this, the project will – from its beginning (in T2.2) – engage all pilot case stakeholders to the development cycle. CSSBoost offerings will be built considering: a) *Market business needs*: the consortium will utilise existing partners' networks (both domain specific and regional CE actors) and collaborations to create a community of stakeholders that will validate the approach and technology. b) *Business and operational requirements*: Specific operational scenarios/business cases together with impact drivers/barriers will provide the input for the definition of the proposed approach for each pilot. Based on these scenarios the consortium will develop (in T2.4) the functional requirements of the CSSBoost services and tools.

Developing new market opportunities and market penetration channels: The consortium will seek market opportunities for CSSBoost. This will be achieved through a set of activities: a) *Awareness creation*, through technological and scientific dissemination as well as various marketing activities, aiming at advertising the project offerings to all potential end-users. b) *Demos to potential "buyers"*. CSSBoost "buyers" are not only municipalities

and cities; they are also companies and industries, in need for circular supply chains operation, where the developed solutions could be integrated with their systems to provide enhanced functionalities to their customers. The goal is to get feedback on fitness for purpose, suitability and ease of adoption to different cases, CSSBoost business models, and initial "buyer" interest.

2.2.2 Defined Target Groups

As part of preparing this application, relevant stakeholders have been identified. The dissemination plans will be focused on delivering tailored messages and deliverables to *targeted groups*. At the beginning of the project, a more extensive stakeholder analysis will be performed to enable specific and properly targeted activities.

Stakeholder Group	Example Actor	Relevance to CSSBoost	Example CSSBoost Outcome (Short & Long term)
ENABLER *Framework instigator*	Regional government; Local authority agency; EU and international policy maker.	Identify bottlenecks & optimise system; Economic development & financing; Environmental sustainability	Testing and validation of CSSBoost business modelling techniques; Replication of CSSBoost.
PROVIDER *Knowledge ecosystem*	University; Research & Technology Organisation; Innovation professionals.	Knowledge application and distribution; Grow body of knowledge; Support new technology, awareness.	Attend CSSBoost capacity training; New innovative CE solutions, methodologies, best practices.
UTILISER *Value partners*	Circular Cities and Regions Initiative; Consultancy firms; Industrial actors.	Primary users in new markets; Improve products, profitability and skill in field; Collaborators and catalysts for delivery.	New business development for Circular Cities and Regions Initiatives.
END USER *Point of delivery & uptake/ failure*	Citizens and directly concerned residents; Local and regional authorities; NGOs.	Key to sustainable service and product design; Provides feedback and improvement loops; Definitive to success or failure of project.	Use of CSSBoost co-designed products, services or scenarios; Sustainable behaviour change over time.
FACILITATOR *Financial provisions*	Investors; Public and private finance institutions; Crowd funding platforms.	Navigate complex financing issues; Ensure CSSBoost and replication projects are sustainable and achievable.	Effective solutions for CE management; Proven models, results and relationships to facilitate finance.

2.2.3 Dissemination and Communication Activities

Plan for the dissemination of project results. All CSSBoost partners will work to achieve a maximum transfer of information and shareable research results to the audiences that can make the best use of it. The project dissemination plan (D7.1) and its intended impacts will create awareness, understanding and action to benefit CSSBoost during the project and an accelerated take up of CSSs for the deployment of the CE in cities and regions – including well after the funding period. To achieve this, a dissemination strategy and plan will be deeply incorporated with the overall CSSBoost communications and exploitation strategy and activities to proactively deliver targeted content, at the right moment, with the right frequency to a broad set of professional audiences, the end users and the media across Europe. At a pan-European level, CSSBoost will play a leadership role in reaching a broad audience of key stakeholders i.e., professionals, practitioners, policy makers and the scientific community, building on T7.2, dedicated to helping create a 'tipping point' for the network of European networks, EU projects, and accompanying EU actions in standards and monitoring. The CSSBoost dissemination strategy will leverage a maximum number of individual and collective professional networks and spheres of influence at both levels and engage them with high-value content accordingly. This ranges from international associations and standards committees to extensive consortium links with renowned academic conferences and journals.

As the leader of Work Package 7, ACR+ (Association of Cities and Regions for Sustainable Resource management) will collaborate with all of the project's partners to determine which partners have a low or high value of power and influence on the overall success of the project and its dissemination goals, along with a pre-defined target indicator of the communication and engagement relationship that is desired for each group. During the course of the project, it is anticipated that a diverse range of highly interested organisations, events, publications, and other organisations will be widely identified, maintaining a healthy balance between the local and the European levels. According to the level of significance and impact that each input carries, it will be placed in one of four categories: "monitor," "satisfy," "inform," and "manage closely."

Key dissemination objectives

Dissemination stakeholder analysis according to influence and interest at European and local levels with targeted actions and desired *'monitor, inform, satisfy, manage'* relationship statuses assigned:

- ✓ Build awareness and trust in project ambitions with high quality content across multiple channels.
- ✓ Develop targeted messages for professional stakeholder segments at European and local levels.
- ✓ Create a favourable environment for replication and exploitation in target markets and technologies.
- ✓ Support CSSBoost open innovation methodologies to aid dissemination.
- ✓ Embody the EC Open Access Strategy to better build on previous research results.

From knowledge economy to broad socio-ecological transition: CSSBoost communication & dissemination essentials.

WHAT to communicate/disseminate or exploit:

- ✓ Compelling, credible content for distribution to high-volume media.
- ✓ Clear and credible results, outcomes and experiences.
- ✓ Powerful visual content.
- ✓ Education and interaction opportunities with CSSBoost.
- ✓ Features, Advantages, Challenges and Benefits of CSSBoost initiatives for each specific target audience.

To WHOM:

A quintuple helix ecosystem of interdependent, connected audiences, each with their own viewpoints, storylines, objectives, testimonials and target audiences at both European and local/regional level.

HOW to communicate and disseminate – channels:

Awareness. Aims at making the project and its vision known in the relevant target groups. Primary instruments will be the project brand and communication items and the presence in digital media (i.e., website, social media, e-newsletters, video etc.), the presentation to conferences and industry events, the press and media activities.

Scientific and technological achievements. Primary instruments will be the presentation of research articles and technical demonstrations at key conferences and workshops, peer-reviewed publications, articles in research focused media, the liaison and cross fertilisation activities with other EU projects and relevant organisations/associations. Team members will be encouraged to prepare public results in a form suitable for publication.

Demonstrators. The direction is dedicated to evaluate the CSSBoost solutions developed in the project as a proof of concept. Primary target groups will be cities, regions, research community and standardisation bodies. The goal is to demonstrate the benefits provided by CSSBoost, as well as of the numerous opportunities offered by the underlying framework through target workshops and training activities.

Communication activities. The strategic approach for CSSBoost communication will be based on the Lasswell model[34] of five levels of communication (who – Source, what – Message, in which channel or through which medium, to whom – the audience, and to what effect) and will be developed in accordance with the EC's recommendations on Communication/Dissemination. The Communication Strategy will secure that there is a clear agreement amongst partners about the following key elements: (a) the specific objectives for each of the target audiences already mentioned in §2.2.1; (b) the channels/ means to be used according to their special needs and nature; (c) the activities to be performed in each development phase and the material to be released depending on the project progress; (d) the specific plan and timeline to be followed for the performance of the respective activities; (e) the key measures for evaluating the effectiveness of communication and dissemination efforts, the procedures to be followed and the roles of all participants in the communication flow. A consistent plan for efficiently allocating time and resources in the performance of CSSBoost dissemination and communication activities will be also created from M06 and will be presented in D7.1. The effectiveness of the CSSBoost strategic approach and planning for communication and dissemination will be constantly evaluated through dedicated performance indicators as shown in the Table below and will be thoroughly reported in the contractual periodic reports.

		Expected Performance		
	Activity and criteria (KPI)	**Year 1**	**Year 2 - 3**	**Year 4 & beyond**
CSSBoost Communication and Dissemination Strategy and Tools	Communication strategy & plan (review)	Positive	Positive (update)	Positive (update)
	Website (number of visitors)	300	800	1.500
	Social media (no of followers/Views/Impressions)	1400	2500	3600
	Social media campaigns (number)	1	≥2	≥2
	Project videos (number)	≥ 0	≥ 1	≥ 1
	Video views on YouTube (number)	0	>150	≥250
	Communications kit (brochures and posters)	≥2	≥ 2 (Updated)	≥ 2 (Updated)
	Printed material distributed (number)	300	500	600
	e-Newsletter (number)	2	≥ 2	≥ 4

[34] Lasswell, Harold, "The Structure and Function of Communication in Society. The Communication of Ideas.", Editor Bryson, L., New York: Institute for Religious and Social Studies, 1948

	Expected Performance			
	Activity and criteria (KPI)	Year 1	Year 2 - 3	Year 4 & beyond
CSSBoost Awareness Raising and Community Building	Peer reviewed publications (number)	≥ 2	≥ 7	≥ 10
	Workshops (number)	1	≥2	≥3
	End Users attending workshops (number)	40	≥ 60	≥ 80
	Project events in conferences/congresses (number)	≥ 1	≥ 2	≥ 2
	Presentations in conferences/congresses (number)	≥8	≥10	≥20
	Demonstrations/exhibitions (number)		≥1	≥2
	Awareness Campaigns (number)	≥2	≥2	≥2
	Final event attendees (number)			≥ 150
	End Users Engaged (number)	≥ 50	≥ 200	≥ 400
	CCRI Projects contacted (number)	≥ 5	≥ 10	≥ 12
	Liaison activities performed (number)	≥ 3	≥ 8	≥ 10
	Discussions in fora, committees & organisations	≥ 5	≥ 5	≥ 5
	Standardisation bodies reached (number)	≥1	≥2	≥2
	Upskilling educational courses (number)		≥3	≥5
	Scientists participated in courses and trained		≥50	≥100

2.2.4 Knowledge Management and IPR

The principles of IPR exploitation will comply with the DESCA Model Consortium Agreement. **General principles**: The general principles for handling Knowledge and Intellectual Property Rights within CSSBoost are stated hereunder and will be settled in a consortium agreement to be signed by the CSSBoost consortium at the project start. These principles are in line with Horizon Intellectual Property Rights recommendations. **Results/Background**: All results of the project (inventions, software, databases) and attached rights are called results. Background is the information and attached rights which are held by participants prior to their accession to the grant agreement (no side ground) and which are needed to carry out the project or to use its results. Background will be clearly identified within the consortium agreement and when applicable, granting of access rights will be clearly specified. **Ownership**: Each participant will own the results it generates. **Joint ownership**: When the results are generated jointly and it is impossible to determine the respective share of the work, participants will have to reach an agreement. Rules to do so will be defined in the consortium agreement. **Notifications/ Objections**: prior notification of transfer only to the other participants who may object if it would adversely affect their access rights or who may waive their rights to be notified in advance regarding specific third parties (e.g., mother companies). The Commission may object to transfers to third parties established in non-associated third countries for ethical, competitiveness or security reasons (where appropriate: requirements to notify the Commission). **Protection, use and dissemination**: Results capable of industrial or commercial application must be protected considering legitimate interests. Prior notice of dissemination must be given to other participants (not to Commission, unless no protection, in which case the latter may request to protect on its own behalf). Any dissemination such as publications and patent applications must indicate the Community financial assistance. **Access right**: Partners may define the background needed in any manner and may exclude specific background (not necessarily prior to signature of EC grant agreement). It is possible to grant exclusive licences to background and results if the other partners waive their access rights and depending on previous agreements. The EC may object to exclusive licences being granted to third parties established in non-associated third countries for ethical, competitiveness or security reasons (where appropriate, a requirement to notify the Commission will apply). Partners may agree to additional or more favourable access rights than those provided for in the consortium agreement. At a preliminary stage, partners agreed on open access publishing. However, in the future, partners may opt for gold or green access to peer-reviewed scientific publications, which might result from the project, depending on the type of information to be published.

2.2.5 Exploitation strategies

Exploitation is seen as a key enabler for the success of CSSBoost. Hence all partners are aware of, and are committed to, the exploitation of the project's results, to create value and improve their competitive advantages. The *CSSBoost Assets Exploitation and IPR Plan* (D6.5, D6.6) will identify appropriate targets for exploiting the output and include measures on how to build upon and re-use the advances achieved as well as a commercial and business strategy for the project results. The CSSBoost exploitation strategy will be composed of three main goals.

1. Initial Market Analysis and Business Model(s) (T6.2): The potential market will be defined in line with the project's objectives and the latest available market data. The market analysis will define and segment the potential opportunities for project's solutions, as well as describe the value chains serving each technology. Business models will be established taking into account the outcomes of the market analysis, the identified value chains and intended customers, and will map how CSSBoost will create and deliver value by identifying: (a) the relevant customer segments; (b) the value proposition; (c) the channels to deliver the value proposition to

customers; (d) the resources required, (e) the activities to be performed, and (f) the required partnership. The elements above will be linked to revenue and cost streams, which will be further quantified in the business plan.

2. IPR Management (T6.4): The IPR Plan will be elaborated to protect the property of the project's background and results, as defined in §2.2.4. The plan will also manage IPR and ownership distribution among project partners. Activities and methodology defined in plan will be fine-tuned and agreed among all partners towards the project end when final project outcomes have been generated.

3. Strategy for long-term sustainability (T6.4): Each participating partner will be required to submit an Individual Exploitation Plan, outlining their specific objectives for the exploitation of each individual asset, in accordance with their own business and research strategies. The motivations of the partners will be classified into categories of exploitation actions, *including extending and expanding TRL, promoting to the market, redistributing, internal exploitation, assigning or licencing to third parties, further research, and integration within existing networks or lines of business*. Each category will have specific tangible actions and plans associated with it. The consortium will additionally offer a *Joint Exploitation Plan* that will identify the partner value chains of both the entire consortium and smaller firms. The consortium will maintain a tight and ongoing collaboration with CCRI-CSO in order to secure support for the implementation of pilots, as well as for the dissemination and coordination operations.

The following table presents the potential Key Exploitable Results (KERs):

KER	Partner	Technology Description	Target Market	Exploitation Pathway
MIRA–DT *DT Integration platform*	MAG	Platform to model assets and networks as digital twins with basic monitoring capabilities.	City authorities; supply chain industrial partners.	MAG will promote the DT modelling solution through its commercial network (currently > 6000 municipalities in Italy and > 1400 in Spain).
Circ-RAT *CE Risk Assessment Tool*	ICL	A dynamic CE Risk Assessment Tool integrating Digital Twin (DT) models and machine learning techniques. It evaluates economic, social, environmental, and technological risks in supply chains and provides performance insights for pilots.	Circular supply chain industrial actors; Regional authorities; Regulators; Consultancy firms; Researchers.	New spinoff/start-up/Joint venture; Product sales; Commercial licensing or subscription-based access.
Circularity Assessment Tool	ICL	A comprehensive methodology and tool for selecting, configuring, and evaluating CSSs. Includes a CE/CSS inventory database, multi-criteria assessment tools for feasibility, viability, circular paternity, and sustainability, along with procedural roadmaps.	Researchers; Consultancy firms; Circular supply chain industrial actors; Regional authorities; Regulators.	Academic and industry workshops; training programs; consultancy services.
PSM *Process Simulation Modelling Tool*	TUC	An innovative tool to simulate and model processes or systems and the interrelation of inputs/outputs. based on a robust Material Flow Networks (MFN) framework. Able to perform simulations of the system under what-if scenarios focusing not only on the system itself and its product value chain(s) but also on external connections and actors and the effect they might have.	Researchers, Consultancy firms; Circular supply chain industrial actors; Regional authorities; Regulators.	New spinoff/start-up/Joint venture; Consultancy service; Product sales.
D-LCA *Dynamic LCA tool*	TUC	A novel Dynamic and on-Demand LCA module, offering environmental impact assessment in (near) real-time or in summary over a time period. The module is integrated in the PSM tool, providing life cycle assessment services to the dynamic simulation models and external access through the PSM's Application Programming Interface (API).	Researchers; Consultancy firms; Circular supply chain industrial actors; Regional authorities; Regulators.	New spinoff/start-up/Joint venture; Consultancy service; Product sales.

KER	Partner	Technology Description	Target Market	Exploitation Pathway
MERLIN *Green Configurator*	CAS	Green Configuration visualizes the sustainability of variant-rich products and complex services and enables the configuration of products according to their environmental goals.	Manufacturing companies; Industrial actors.	CAS will promote the outcome through its industrial network and social channels. Direct market update is expected three months by the end of the project.
Smart City *City Monitor & visualise*	KRUM	An advanced visualisation module for different aspects of the CSS, including technical monitoring, material flow, attribute data, competencies and capacities.	Energy and production industry.	Market uptake is expected within six months after the end of the project, target is initially the existing customer base.
TRACK *Asset Tracking*	PARTICLE	Novel tool to plan and visualise the aspects of CSS value chain, providing a clear visualisation of the transportation assets in a geo-referenced map, assisting to optimise the use of resources, plan for pre-emptive maintenance interventions and track the associated waste management and recycling process.	Transport market	Direct sale; Licensing agreement.
SHAPES Marketplace	HMU	SHAPES Marketplace is targeting on enabling a common repository for services oriented in elderly support.	Researchers; Consultancy firms; Circular supply chain industrial actors; Regional authorities; Regulators.	New spinoff/start-up/Joint venture; Consultancy service; Product sales.
T-NOVA P2P Trading Platform	HMU	Brokering service providing the trading of NFV Services and targeting on utilising the trading algorithms.	Researchers; Consultancy firms; Circular supply chain industrial actors; Regional authorities; Regulators	New spinoff/start-up/Joint venture; Consultancy service; Product sales.
EMERGE-KBEST Platform	HMU	EMERGE Platform is able to on-board Experiments in the area of Printed electronics in order to capture the knowledge in building the experiment. The platform is working in a step-by -step manner simplifying the input and replicability of the experiment.	Researchers; Consultancy firms; Circular supply chain industrial actors; Regional authorities; Regulators.	New spinoff/start-up/Joint venture; Consultancy service; Product sales.
Evidence Base and Replication Roadmap Tool	TUC	The Replication Roadmap Tool uses the information stored in the corresponding Evidence Base, to assist, in a systematic way, stakeholders in adopting the solutions developed and demonstrated in innovation actions, across diverse locales. contextual adaptation and business planning.	Regional authorities; Consultancy firms; Researchers; Technology providers; Industrial actors.	New spinoff/start-up/Joint venture; Consultancy service; Product sales.
Municipium *Inform citizens/ businesses*	MAG	A mobile app where citizens are informed on city-based events and other info.	City authorities; Supply chain industrial partners; Citizens.	MAG will promote the app through its commercial network (currently > 6000 municipalities in Italy and > 1400 in Spain).

2.3 Summary – Key Element of the Impact Section

SPECIFIC NEEDS	EXPECTED RESULTS	D & E & C MEASURES
✓ Delivery of CSS deployed at **urban/regional scale**, addressing at least one **product value chain**, involving and actively engage all **relevant actors**. ✓ **CSSs** that address sufficiently **environmental, economic, social, governance, regulatory, technology, science** dimensions that hinder the transition to circular economy. ✓ **Analysis** and **quantification** of economic, social, environmental **benefits** and **trade-offs**, identify **weakness** and **causes**. ✓ CSSs with high **replicability** and **scalability, policy-briefing, proven** and **measurable transition** to CE.	✓ A Virtual Regional **CE/CSS Ecosystem and Market** that generates **Integrated Solutions**, based on a novel **Application Framework** that ties together specifications and actors, to offer **replicable** and **expandable CCSs**, bringing together all relevant actors/stakeholders. ✓ An **Open Circular EcoSphere**, a knowledge repository that empowers **replication** and **exploitation**, creating knowledge transfer channels to all cities/regions. ✓ **4 CSSs at city/regional level** addressing over **9 product value chains**, and **1 interregional multinational CSS** addressing **multiple** product value chains across **EU territories**. ✓ Contribution to governance through **4 regional** and **1 multiregional Communities of Practices**, delivery of CSSBoost **Policy Brief**.	✓ Dissemination to CCRI community regions, and all interested cities, regions, and their groupings, through the partners' robust networks ✓ **5 custom-made Circular Economy Investment Plans-CEIPs**, to ensure financial viability and valorise growth opportunities. ✓ Over **300 end-users' entities** enrolling in over **15 workshops, exhibitions, awareness campaigns and liaison activities**. ✓ Over **12 CCRI projects** contacted ✓ Over **5 Fife-Long learning educational courses**. ✓ Over **2 Standardisation** bodies reached ✓ 10 peer review publications ✓ **2** social media campaigns, **1** video, **1** project website, at least **1500 unique** visitors, **4** newsletters, **2** project events in conference, over **20** confs presentations.
TARGET GROUPS	**OUTCOMES**	**IMPACTS**
✓ **Enablers**: regional government actors, local authorities' agencies, EU and international policymakers ✓ **Providers**: Research centers, universities-high level educational institutions, technology organisations, innovation professionals. ✓ **Utilisers**: CCRI, consultative firms, industrial actors, regions and cities opt for CE transition and practices ✓ **End-users**: Citizens and directly concerned residents, local and regional authorities, NGOs ✓ **Facilitators**: Investors, public and private finance institutions, business angels and venture capitalists, crowd funding forms.	✓ **4 key supply chains** (vehicles & batteries, plastic & bioplastic, food, water & nutrients) to increase by **25% the circularity**, improve by **20% their environmental impact**, enhance by **20% capacity building** in societies located. ✓ **Advancing CCRI methodological** and **implementation** approach to generate integrated CSSs, fully operable. ✓ **Escalate business opportunities** in CE and **economic growth** at local / regional and EU level. ✓ **Social Innovation Actions** and citizens enabling in CE practices. ✓ **EcoSphere** development to facilitate **enabling cooperation** with other CSS Pilots, **knowledge** and **experience** transfer. ✓ **Over 100 personnel** enrolled in educational programs and courses focused on life-long learning	✓ **Reduce** by **15%** the energy consumption on *plastics and bioplastics value chains* and single-use plastics in production processes **by 20%**. ✓ **Improved** nutritional value of bread by **30%**, and soil nutrients and moisture by **35%** *in agro-food supply chains*. ✓ **Increased** amount of reutilised wastewater by **over 70%** in water supply chains, and **reduction of fossil-based fertilisers** in agriculture **by 20%**. ✓ Reduction of generated waste in **vehicles recycling supply chains** of about **65%**. **Increase** re-use and recycling of under-value assets by **90%**.

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3.1 Work Plan and Resources

3.1.1 Work Plan Overview and Rationale

CSSBoost project is implemented in 42 months and in 7 Work Packages (WPs). WP1 provides project coordination and management. WP2 has the critical role of developing the overall concept, co-creating the Application Framework and designing the exemplary CSSs to be implemented in the pilot areas. Especially T2.2 is a co-creation hub, for all WPs, providing generic and pilot-specific information and expert knowledge. WP3 develops the functional modules/services required to manage and optimise the lifecycle management of CSS in a region as well as the tools to support the decisions of regional CE stakeholders.

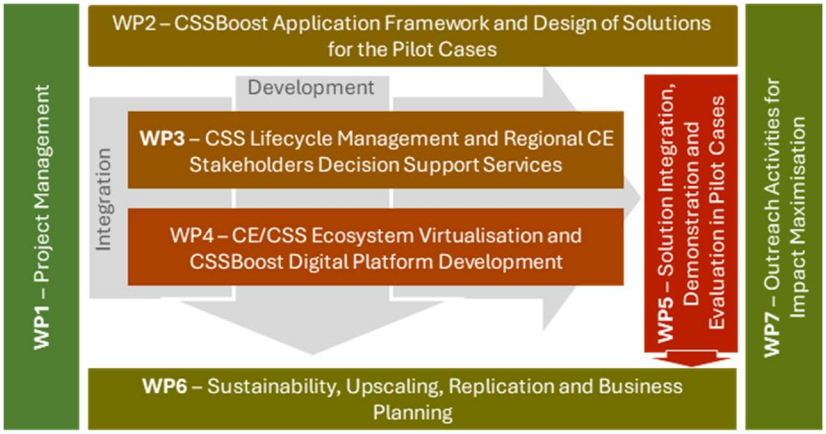

Figure 8 *CSSBoost overall work plan.*

WP4 develops the cognitive digital system, employing data acquisition, knowledge engineering, DT and AI technologies to virtualise holistically entire cities, regional or interregional CE/CSS Ecosystems and Markets. It also develops the top level of CSSBoost integrated solutions, the Digital Information Sharing Platform, integrating all services, tools and components developed in WP3. The digital platform is deployed in the pilot areas in WP5 to support the implementation and demonstration of the integrated CSSBoost solutions. All development processes, as well as the pilots feed results to WP6, the role of which is to ensure that solutions developed can be replicated and upscaled, producing plans for their market uptake and exploitation. WP7 complements it, by ensuring that all pilots are properly supported by communication, training and social innovation activities, and all project results are optimally disseminated to the CE main actors.

3.1.2 Timing of Activities (Gantt Chart)

No	Leader	M1	M2	M3	M4	M5	M6	M7	M8	M9	M10	M11	M12	M13	M14	M15	M16	M17	M18	M19	M20	M21	M22	M23	M24	M25	M26	M27	M28	M29	M30	M31	M32	M33	M34	M35	M36	M37	M38	M39	M40	M41	M42
WP1	**TUC**																																										
T1.1	TUC																																										
T1.2	ICL																																									
T1.3	HMU						D1.1																		D1.2																		D1.3
T1.4	UNIVPM																																										
T1.5	TUC																																									
WP2	**HMU**																																									
T2.1	TUC										D2.1				D2.2																												
T2.2	ACCELI												D2.3																														
T2.3	ICL																D2.4																										
T2.4	HMU																												D2.5														
WP3	**CAS**																																										
T3.1	TUC																																						D3.2				
T3.2	CAS																																						D3.3				
T3.3	ICL																																						D3.4				
T3.4	MAG																		D3.1																				D3.5				
T3.5	TUC																																						D3.6				
T3.6	HMU																																						D3.7				
T3.7	MAG																																						D3.8				
WP4	**MAG**																																										
T4.1	MAG																		D4.1																								
T4.2	HMU																												D4.2														
T4.3	PARTICLE																		D4.3																								
T4.4	MAG																												D4.4														
T4.5	KRUM																														D4.5												
T4.6	MAG																		D4.6																							D4.7		
WP5	**UNIVPM**																																										
T5.1	UNIVPM															D5.1																												
T5.2	MACC																Table Top Exersise					Phase I																				D5.2		
T5.3	UNIVPM																Table Top Exersise					Phase I																				D5.3		
T5.4	CAS																Table Top Exersise					Phase I																				D5.4		
T5.5	PARTICLE																Table Top Exersise					Phase I																				D5.5		
T5.6	UVIC																Table Top Exersise					Phase I																				D5.6		
T5.7	ICL													Preliminary Assessment							D5.7																					D5.8	
T5.8	ACCELI																																									D5.9	
WP6	**BWCON**																																										
T6.1	UVIC																																										D6.1
T6.2	BWCON																		D6.2																								D6.3
T6.3	TZHORB																																										D6.4
T6.4	MOTON						D6.5																																				D6.6
T6.5	HMU																																										D6.7
WP7	**ACR+**																																										
T7.1	ADR						D7.1																																				D7.2
T7.2	ACR+																		D7.3																								D7.4
T7.3	TUC																																										D7.5
T7.4	SCRC																D7.6																											D7.7
		M1	M2	M3	M4	M5	M6	M7	M8	M9	M10	M11	M12	M13	M14	M15	M16	M17	M18	M19	M20	M21	M22	M23	M24	M25	M26	M27	M28	M29	M30	M31	M32	M33	M34	M35	M36	M37	M38	M39	M40	M41	M42

MS1 MS2 MS3 MS4 MS5 MS6

1st Reporting Period 2nd Reporting Period

3.1.3 Purchase Costs Justification

8. UNIVPM	Cost (€)	Justification
Equipment	60000	Design and realisation of a prototype to treat wastewater by nature-based solution and recover biomass for bio-fertilisers production **(WP5, Task 5.3)**. The prototype pilot has a total cost of 60000 € (100% funded) and includes: - 5500€: costs for tanks and piping; - 11000€: pumps and electromechanical components; - 10500€: probes; - 33000€: constructed wetland units; All those costs include transport, assembling and installation of protype components
Remains	46000	
Total	106000	
10. UVIC	**Cost (€)**	**Justification**
Other	31000	7700€: Lab analysis: reactives, lab material, etc. **(WP5, T5.3)**; 2500€: Pot test material (pots, shovels, gloves, etc). **(WP5, T5.3)**; 4800€: International conference fees (**WP7, T7.1**); 5000€: Dissemination/communication (video, printed material, etc.) **(WP7, T7.1)**; 5000€: Organisation meetings costs (catering, rental room, etc. **(WP6, T6.1)**; 6000€: Open access fees **(WP7, T7.1).**
Remains	19200	
Total	50200	

3.2 Capacity of Participants & Consortium as a Whole

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3.2.1 Consortium Overview and Rational

The CSSBoost consortium brings together *21 organisations* from *8 different EU Members States and Associated Countries* (Greece, Germany, Italy, Belgium, Spain, Portugal, Cyprus and United Kingdom). The consortium bears strong interest and relevance to the project objectives and is highly committed to the delivery of excellence in the areas of CE and CSS, also to trigger the interest of citizens and CE market stakeholders to ensure their active participation and investment.

CSSBoost will be coordinated by the Technical University of Crete (TUC), represented by two impendent but collaborating research groups: (i) The Industrial and Digital Innovations Research Group (indigo) with outstanding scientific expertise in digital and circular technologies & practices and strong experience in managing research and innovation projects (the indigo team participates in 9 Horizon projects being the Technical Coordinator of the AquaASPICE, SPIRE project); (ii) The Transformable Intelligent Environments Laboratory (TIE Lab), to support the implementation of the corresponding social innovation action. Prof. George Arampatzis, the Project Coordinator, is also the founder and coordinator of the "In-Crete" innovation alliance that brings together research centers & industry partners to promote circular innovation in the island of Crete and in the Mediterranean.

The project's consortium involves five pilot cases involving an ecosystem of partners around each one:

1. MACC, innovating in agro-food sector, leads the pilot case in the region of Crete (Greece). CRETE represents the regional authority while HMU with the Pashiphae Lab and TUC provide scientific support.
2. UNIVPM, through the team of WWEELab innovating in water recovery research, leads the pilot case in the region of Marche (Italy). CIIP is the regional water utility while UVIC provides scientific support.
3. CAS, an experienced enterprise in technologies adaptation and deployment, leads the pilot case in the region of Nordschwarzwald (Germany). TZHORB represents a Hub with more than 120 stakeholders, established to foster innovation and R&D in plastics industry and collaboration between businesses. WFG represents the regional authority while BWCON provides research in plastics sector.
4. PARTICLE, a Portuguese start-up with a technology drive, leads the pilot in Lisbon (Portugal). CARRIS is the is the biggest public transport operator in Portugal while MOTON provides technology expertise in two and three wheeled electric motorcycles.
5. UVIC, through the BETA Technological Centre, leads the interregional multinational pilot case. This case is also supported by all other pilots' partners.

The consortium also involves an Associate Partner from UK, a research group from the department of Civil and Environmental Engineering of Imperial College London (ICL), providing strong expertise in sustainability and

circularity assessment and leading Tasks 1.2, 2.3, 3.3 and 5.1. ICL, as an associate partner, is linked to the whole consortium and receives funding from its own national funding authority. The total budget of ICL is 609 125.00 €.

Moreover, the ICT sector is strongly represented in CSSBoost in the fields of digital and software technologies (MAG, CAS, KRUM, PARTICLE, HMU), enabling services for data spaces, advanced analytics, digital platforms, etc. ACCELI, provides its experience in supporting stakeholder engagement activities while MOTON supports the exploitation actions. The social CRM Research Center of CRC (SCRC) leads the social innovation activities and the corresponding citizen science actions. Finally, ACR+ (an international network of cities and regions for sustainable resource management) leads WP7 and the corresponding outreaching activities.

The complementarity of partners for achieving the proposed project objectives is depicted in the Figure of §1.2.5.

Industrial/commercial involvement is ensured by assigning Task 2.2 specifically for stakeholders' engagement and co-creation. T2.2, besides stakeholders directly involved in the pilots, also engages all classes of regional CE (prospective) stakeholders, including entrepreneurs, industries and other value chain actors, in order to understand their needs, requirements, barriers and criteria, and also encourage them to be involved in circular ventures. This activity is intensified by establishing specific instruments for their involvement, such as Living Labs, Cops and workshops, which will be operable during the project's duration (CoPs will be maintained even after it) and they are expected to involve additional stakeholders, enhanced also by T7.2 networking activities. Task 1.5 is designed so as to provide, both to project partners and such external stakeholders (engaged through T2.2, the pilots and WP8 outreaching activities) links to CCRI, CCRI-CSO and familiarize them with opportunities and other issues arising from CEAP and CEIP. Information from these potential stakeholders' audit and responses will be input to the development of regional upscaling and replication plans in T6.1, financial analysis and investment plans in T6.3, exploitation plan in T6.4 and education & training programs in T7.3. Therefore, there will be a strong synergy between activities/results of these 4 tasks towards CSSBoost results exploitation and impact creation.

After the project's end, CoPs and Social Innovation Actions will be active to engage industrial, commercial and other stakeholders (e.g. potential start-ups) and activate them in circular ventures assisted by CSSSBoost innovations and the education/training programs developed. Also, the developed EcoShpere will help industrial/commercial engagement in exploitation.

The consortium's ability to involve external industrial/commercial stakeholders in the exploitation of results is ascertained by the fact that:

- In Pilot 1 (Crete), the key partner MACC is a regional agro-food network industrial/commercial companies, which it can readily engage.
- In Pilot 2 (Marche), the key partner CIIP (water utility) will engage large agricultural water users, as well as fertilizer producers.
- In Pilot 3 (North Black Forest), the key partner TZHORB is a regional industrial technology hub with a network of industrial and commercial entities to be engaged in results exploitation.
- In Pilot 4 (Lisbon), the key partner CARRIS is the main regional public transport provider and will fully engage recycling industries, providers of electric motorcycles and bicycles as well as private bus operators.
- In addition, partner ACR+ is an NGO resources circularity network providing contacts with a multitude of industrial and commercial companies interested in CE.

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4 Ethics

4.1 Ethics Self Assessment

4.1.1 Ethical dimension of the objectives, methodology and likely impact

Objectives of the activities: CSSBoost aims to support regional circular economy transition, and activate citizens to participate in circular and climate-neutral practices. Instruments and services applied to this purpose must be made more attractive, convincing and ultimately more effective. Towards this goal, CSSBoost combines circular and digital innovations. The main digital offering of the project is the Virtual Regional CE/CSS Ecosystem and Market (VCEM) and the novel CSSBoost digital Information Sharing Platform. The project activities will be implemented in 5 different pilot areas in four different EU regions (Greece, Italy, Germany and Portugal) without any discriminatory consideration of the areas involved and with the aim of transfer models, technology, environmental, social and AI-based solutions in all the regions so that the local stakeholders (local communities, first responders, policy-makers, public authorities, investors, organisations, volunteers and other key actors) can all benefit from the project results and outcomes. CSSBoost will only obtain feedback from the pilot users (i.e. through workshops, focus groups, questionnaires, etc.) with regard to their experience with the project's concepts and tools but no personal data. However, all data will be fully anonymized and thus not reducible to individual persons (de-identified according to EU cybersecurity best practices). Furthermore, before involving the pilot users or other interested parties, an informed consent form will provide clearly the description of data collection, procedures of data collection, anonymization and control following the EC guidelines. Methodology: The

CSSBoost methodology will guarantee full compliance with the ethical principles and with the national and international legislation protecting the right of the individuals. To ensure the compliance, the consortium will be supported by TUC (Prof. George Arampatzis is officially a regular member of the Research Ethics Committee at the Technical University of Crete) providing a solid ethical and legal inventory, estimating all the implications and constraints to the project activities, especially with regards to Task 2.2 (Empowerment and Engagement of Stakeholders in SSH and Co-Creation Environments), Task 7.1 (: Strategic Project Communication and Dissemination of Project Results), Task 7.2 (Networking, Clustering and Other Outreach Activities), Task 7.3 (: CSS-Related Training, Education and Life-Long Learning) and Task 7.4 (Social Innovation Actions for CSSBoost CSS). The AI-based activities will also be monitored and supervised through a detailed evaluation aiming to develop trustworthy AI recommendations and considering gaps, suboptimal developments, amendments and being focused on the EU strategy for human-centred and trustworthy AI. Impact of the activities: the project activities will exclude all discriminations regarding the stakeholder's involvement to guarantee that all the project outcomes and outputs can constitute a technological benefit in the different areas where the digital platform will be deployed.

4.1.2 Compliance with ethical principles and relevant legislations

CSSBoost guarantees compliance with the ethical principles and relevant local, national, European and international legislation. To do so, an External Advisory Board (EAB) will be appointed to monitor the project activities. The Ethical Manager (Prof. Francesco Fatone – UNIVPM) will be responsible and accountable for this compliance, providing all relevant recommendations and suggestions to address the WP leaders and the project coordinator. Regarding data protection, the CSSBoost research activities will comply with the highest ethical standards and applicable international, EU and national law: in particular, the European General Data Protection Regulation (GDPR 2016/679), national data protection laws and other relevant legislation. Gathering, exchanging, and processing of personal data will be performed taking full account of the principles of privacy and data protection and with minimal intrusion of the individuals' privacy. All partners will follow the requirements of the GDPR.

4.2 Identified Ethics Issues

The Ethics Appraisal Report identified the following issue:

> *Only few ethics issues have been identified in Part A, therefore it is important to ascertain that a person with appropriate background in Ethics (ethics mentor) will be monitoring the currently identified issues.*

The Consortium will appoint an Ethics Mentor, a representative from UNIVPM (the leader of Task 1.4 - Legal, Social, Ethics and Gender Requirements and Monitoring) in the first 2 months of the project. The details will be provided in the “Project Management Handbook” that will be included in the first contractual periodic report. S/he will be responsible to ensure that all legal, ethical, societal and gender equality issues related to the project’s research are properly considered and any relevant conventions and best practices are respected.

4.3 Consortium Declarations

- The Consortium confirms that compliance with ethical principles and applicable international, EU and national law in the implementation of research activities not originally envisaged (or not described in detail) in the DoA will be ensured. The Consortium also confirms that any ethical concerns raised by those activities will be handled following rigorously the recommendations provided in the European Commission Ethics Self-Assessment Guidelines
- The consortium confirms that for any applicable ethics issue, the guidance provided in the European Commission Ethics Self-Assessment Guidelines will be rigorously followed.

ANNEX 2

ESTIMATED BUDGET FOR THE ACTION

	Estimated eligible[1] costs (per budget category)										Estimated EU contribution[2]			
	Direct costs								Indirect costs	Total costs	EU contribution to eligible costs			Maximum grant amount[6]
	A. Personnel costs			B. Subcontracting costs	C. Purchase costs			D. Other cost categories	E. Indirect costs[3]		Funding rate %[4]	Maximum EU contribution[5]	Requested EU contribution	
	A.1 Employees (or equivalent) A.2 Natural persons under direct contract A.3 Seconded persons		A.4 SME owners and natural person beneficiaries	B. Subcontracting	C.1 Travel and subsistence	C.2 Equipment	C.3 Other goods, works and services	D.2 Internally invoiced goods and services	E. Indirect costs					
Forms of funding	Actual costs	Unit costs (usual accounting practices)	Unit costs[7]	Actual costs	Actual costs	Actual costs	Actual costs	Unit costs (usual accounting practices)	Flat-rate costs[8]					
	a1	a2	a3	b	c1	c2	c3	d2	e = 0,25 * (a1 + a2 + a3 + c1 + c2 + c3)	f = a + b + c + d + e	U	g = f * U%	h	m
1 - TUC	870 000.00	0.00	0.00	0.00	20 000.00	30 000.00	37 000.00	0.00	239 250.00	1 196 250.00	100	1 196 250.00	1 196 250.00	1 196 250.00
2 - MAG	666 000.00	0.00	0.00	0.00	20 000.00	0.00	6 000.00	0.00	173 000.00	865 000.00	70	605 500.00	605 500.00	605 500.00
3 - CAS	769 500.00	0.00	0.00	0.00	20 000.00	0.00	8 000.00	0.00	199 375.00	996 875.00	70	697 812.50	697 812.50	697 812.50
4 - KRUM	331 500.00	0.00	0.00	0.00	20 000.00	0.00	0.00	0.00	87 875.00	439 375.00	70	307 562.50	307 562.50	307 562.50
5 - TZHORB	315 000.00	0.00	0.00	0.00	20 000.00	0.00	0.00	0.00	83 750.00	418 750.00	70	293 125.00	293 125.00	293 125.00
6 - BWCON	205 000.00	0.00	0.00	0.00	20 000.00	0.00	0.00	0.00	56 250.00	281 250.00	100	281 250.00	281 250.00	281 250.00
7 - WFG	176 000.00	0.00	0.00	0.00	20 000.00	0.00	0.00	0.00	49 000.00	245 000.00	100	245 000.00	245 000.00	245 000.00
8 - UNIVPM	391 500.00	0.00	0.00	0.00	20 000.00	60 000.00	26 000.00	0.00	124 375.00	621 875.00	100	621 875.00	621 875.00	621 875.00
9 - CIIP	260 000.00	0.00	0.00	0.00	20 000.00	0.00	0.00	0.00	70 000.00	350 000.00	70	245 000.00	245 000.00	245 000.00
10 - UVIC	244 000.00	0.00	0.00	0.00	19 200.00	0.00	31 000.00	0.00	73 550.00	367 750.00	100	367 750.00	367 750.00	367 750.00
11 - HMU	590 000.00	0.00	0.00	0.00	20 000.00	20 000.00	11 000.00	0.00	160 250.00	801 250.00	100	801 250.00	801 250.00	801 250.00
12 - MACC	502 900.00	0.00	0.00	0.00	15 000.00	0.00	60 000.00	0.00	144 475.00	722 375.00	70	505 662.50	505 662.50	505 662.50
13 - CRETE	256 000.00	0.00	0.00	0.00	20 000.00	5 000.00	0.00	0.00	70 250.00	351 250.00	70	245 875.00	245 875.00	245 875.00
14 - PARTICLE	532 000.00	0.00	0.00	0.00	20 000.00	15 000.00	10 000.00	0.00	144 250.00	721 250.00	70	504 875.00	504 875.00	504 875.00
15 - CARRIS	305 000.00	0.00	0.00	0.00	20 000.00	20 000.00	0.00	0.00	86 250.00	431 250.00	70	301 875.00	301 875.00	301 875.00
16 - ADR	430 650.00	0.00	0.00	0.00	20 000.00	10 000.00	5 000.00	0.00	116 412.50	582 062.50	70	407 443.75	407 443.75	407 443.75
17 - MOTON	319 600.00	0.00	0.00	0.00	20 000.00	20 000.00	0.00	0.00	89 900.00	449 500.00	70	314 650.00	314 650.00	314 650.00
18 - ACCELI	456 500.00	0.00	0.00	0.00	20 000.00	0.00	0.00	0.00	119 125.00	595 625.00	70	416 937.50	416 937.50	416 937.50
19 - SCRC	292 500.00	0.00	0.00	0.00	20 000.00	0.00	10 000.00	0.00	80 625.00	403 125.00	100	403 125.00	403 125.00	403 125.00
20 - ACR+	312 000.00	0.00	0.00	0.00	20 000.00	0.00	10 000.00	0.00	85 500.00	427 500.00	100	427 500.00	427 500.00	427 500.00
21 - ICL														
Σ consortium	8 225 650.00	0.00	0.00	0.00	394 200.00	180 000.00	214 000.00	0.00	2 253 462.50	11 267 312.50		9 190 318.75	9 190 318.75	9 190 318.75

[1] See Article 6 for the eligibility conditions. All amounts must be expressed in EUR (see Article 21 for the conversion rules).
[2] The consortium remains free to decide on a different internal distribution of the EU funding (via the consortium agreement; see Article 7).
[3] Indirect costs already covered by an operating grant (received under any EU funding programme) are ineligible (see Article 6.3). Therefore, a beneficiary/affiliated entity that receives an operating grant during the action duration cannot declare indirect costs for the year(s)/reporting period(s) covered by the operating grant, unless they can demonstrate that the operating grant does not cover any costs of the action. This requires specific accounting tools. Please immediately contact us via the EU Funding & Tenders Portal for details.
[4] See Data Sheet for the funding rate(s).
[5] This is the theoretical amount of the EU contribution to costs, if the reimbursement rate is applied to all the budgeted costs. This theoretical amount is then capped by the 'maximum grant amount'.
[6] The 'maximum grant amount' is the maximum grant amount decided by the EU. It normally corresponds to the requested grant, but may be lower.
[7] See Annex 2a 'Additional information on the estimated budget' for the details (units, cost per unit).
[8] See Data Sheet for the flat-rate.

ANNEX 2a

ADDITIONAL INFORMATION ON UNIT COSTS AND CONTRIBUTIONS

SME owners/natural person beneficiaries without salary (Decision C(2020) 7115[1])

Type: unit costs

Units: days spent working on the action (rounded up or down to the nearest half-day)

Amount per unit (daily rate): calculated according to the following formula:

{EUR 5 080 / 18 days = **282,22**}
multiplied by
{country-specific correction coefficient of the country where the beneficiary is established}

The country-specific correction coefficients used are those set out in the Horizon Europe Work Programme (section Marie Skłodowska-Curie actions) in force at the time of the call (see Portal Reference Documents).

HE and Euratom Research Infrastructure actions[2]

Type: unit costs

Units[3]: see (for each access provider and installation) the unit cost table in Annex 2b

Amount per unit*: see (for each access provider and installation) the unit cost table in Annex 2b

* Amount calculated as follows:

For trans-national access:

$$\frac{\text{average annual total trans-national access costs to the installation (over past two years[4])}}{\text{average annual total quantity of trans-national access to the installation (over past two years[5])}}$$

For virtual access:

$$\frac{\text{total virtual access costs to the installation (over the last year[6])}}{\text{total quantity of virtual access to the installation (over the last year[7])}}$$

Euratom staff mobility costs[8]

Monthly living allowance

Type: unit costs

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1 Commission Decision of 20 October 2020 authorising the use of unit costs for the personnel costs of the owners of small and medium-sized enterprises and beneficiaries that are natural persons not receiving a salary for the work carried out by themselves under an action or work programme (C(2020)7715).

2 Decision of 19 April 2021 authorising the use of unit costs for the costs of providing trans-national and virtual access in Research Infrastructure actions under the Horizon Europe Programme (2021-2027) and the Research and Training Programme of the European Atomic Energy Community (2021-2025).

3 Unit of access (e.g. beam hours, weeks of access, sample analysis) fixed by the access provider in proposal.

4 In exceptional and duly justified cases, the granting authority may agree to a different reference period.

5 In exceptional and duly justified cases, the granting authority may agree to a different reference period.

6 In exceptional and duly justified cases, the granting authority may agree to a different reference period.

7 In exceptional and duly justified cases, the granting authority may agree to a different reference period.

8 Decision of 15 March 2021 authorising the use of unit costs for mobility in co-fund actions under the Research and Training Programme of the European Atomic Energy Community (2021-2025).

Units: months spent by the seconded staff member(s) on research and training in fission and fusion activities (person-month)

Amount per unit*: see (for each beneficiary/affiliated entity and secondment) the unit cost table in Annex 2b

* Amount calculated as follows from 1 January 2021:
{**EUR 4 300** multiplied by
country-specific correction coefficient** of the country where the staff member is seconded}[9]

**Country-specific correction coefficients as from 1 January 2021[10]

EU-Member States[11]

Country / Place	Coefficient (%)
Bulgaria	59,1
Czech Rep.	85,2
Denmark	131,3
Germany Bonn Karlsruhe Munich	101,9 95,8 98 113,9
Estonia	82,3
Ireland	129
Greece	81,4
Spain	94,2
France	120,5
Croatia	75,8
Italy Varese	95 90,7
Cyprus	78,2
Latvia	77,5
Lithuania	76,6
Hungary	71,9
Malta	94,7
Netherlands	113,9
Austria	107,9
Poland	70,9
Portugal	91,1
Romania	66,6
Slovenia	86,1

[9] Unit costs for living allowances are calculated by using a method of calculation similar to that applied for the secondment to the European Commission of seconded national experts (SNEs).

[10] ⚠ For the financial statements, the amount must be adjusted according to the actual place of secondment.
The revised coefficients were adopted in the Decision authorising the use of unit costs for the Fusion Programme co-fund action under the Research and training Programme of the European Atomic Energy Community 2021-2025. They are based on the 2020 Annual update of the remuneration and pensions of the officials and other servants of the European Union and the correction coefficients applied thereto (OJ C 428, 11.12.2020) to ensure purchasing power parity. The revised coefficient are applied as from 1 January 2021 through an amendment to the grant agreement.

[11] No correction coefficient shall be applicable in Belgium and Luxembourg.

Slovakia	80,6
Finland	118,4
Sweden	124,3

Third countries

Country/place	Coefficient (%)
China	82,2
India	72,3
Japan	111,8
Russia	92,7
South Korea	92,3
Switzerland	129.2
Ukraine	82.3
United Kingdom	97.6
United States	101,4 (New-York) 90,5 (Washington)

Mobility allowance

Type: Unit costs

Units: months spent by the seconded staff member(s) on research and training in fission and fusion activities (person-month)

Amount per unit: **EUR 600** per person-month; see (for each beneficiary/affiliated entity and secondment) the unit cost table in Annex 2b

Family allowance

Type: unit costs

Units: months spent by the seconded staff member(s) on research and training in fission and fusion activities (person-month)

Amount per unit: **EUR 660** per person-month; see (for each beneficiary/affiliated entity and secondment) the unit cost table in Annex 2b

Education allowance

Type: Unit costs

Units: months spent by the seconded staff member(s) on research and training in fission and fusion activities (person-month)

Amount per unit*: see (for each beneficiary/affiliated entity and secondment) the unit cost table in Annex 2b

*Amount calculated as follows from 1 January 2021:
{EUR 283.82 x number of dependent children[12]**}**

[12] For the estimated budget (Annex 2): an average should be used. (⚠ For the financial statements, the number of children (and months) must be adjusted according to the actual family status at the moment the secondment starts.)

ANNEX 3

ACCESSION FORM FOR BENEFICIARIES

MAGGIOLI SPA (MAG), PIC 996621457, established in VIA DEL CARPINO 8, SANTARCANGELO DI ROMAGNA 47822, Italy,

hereby agrees

to become beneficiary

in Agreement No 101135275 — CSSBoost ('the Agreement')

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

and mandates

the coordinator to submit and sign in its name and on its behalf any **amendments** to the Agreement, in accordance with Article 39.

By signing this accession form, the beneficiary accepts the grant and agrees to implement it in accordance with the Agreement, with all the obligations and terms and conditions it sets out.

SIGNATURE

For the beneficiary

Donato Todisco with ECAS id n007bcdh signed in the Participant Portal on 14/05/2024 at 09:24:25 (transaction id SigId-38208-rEtzcCP2bxBllitiixTBNUozLnndxqcOPah4KwYO8a7OHghVverC94T66Mpja6LOTLNvD7Mw4f9npIsx06PBov-yntOf97TTHqGzTPAPycp26-kS99zkww9F5FRTUwoGOFH0DVYXtWQgqcMnayxN9g5o9lOznhUuF86q3a0F2CSU2YJ50j3n5lfacO8h8cIjVzapm). Timestamp by third party at 2024.05.14 09:24:29 CEST

ANNEX 3

ACCESSION FORM FOR BENEFICIARIES

CAS SOFTWARE AG (CAS), PIC 999797334, established in CAS WEG 1-5, KARLSRUHE 76131, Germany,

hereby agrees

to become beneficiary

in Agreement No 101135275 — CSSBoost ('the Agreement')

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

and mandates

the coordinator to submit and sign in its name and on its behalf any **amendments** to the Agreement, in accordance with Article 39.

By signing this accession form, the beneficiary accepts the grant and agrees to implement it in accordance with the Agreement, with all the obligations and terms and conditions it sets out.

SIGNATURE

For the beneficiary

Spiros ALEXAKIS with ECAS id nalexasp signed in the Participant Portal on 21/05/2024 at 10:06:12 (transaction id SigId-7698-TrNyTpHzUvpqpufPX3J2pgQKlmSSX8sCDVzTmlcrfoGK1gmzzTXpqJ0QA7hrYPEYgA1WGfb8qOaLCB9l69sVDoW-jpJZscgsw0KDbQkMPDydyW-VTR9KiiFLS1aV86O8unZDNxRLkZyxFlMxDSOmRyisEfEntujoWqd6NToNflJXp1JzshVi006p5V29AI1qRczGa). Timestamp by third party at 2024.05.21 10:06:19 CEST

ANNEX 3

ACCESSION FORM FOR BENEFICIARIES

KRUMEDIA GMBH (KRUM), PIC 910473332, established in FAUTENBRUCHSTRASSE 46, KARLSRUHE 76137, Germany,

hereby agrees

to become beneficiary

in Agreement No 101135275 — CSSBoost ('the Agreement')

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

and mandates

the coordinator to submit and sign in its name and on its behalf any **amendments** to the Agreement, in accordance with Article 39.

By signing this accession form, the beneficiary accepts the grant and agrees to implement it in accordance with the Agreement, with all the obligations and terms and conditions it sets out.

SIGNATURE

For the beneficiary

Michael KRUTWIG with ECAS id nkrutmic signed in the Participant Portal on 16/05/2024 at 17:01:16 (transaction id SigId-12135-juMsPVzRljexkGSMLTeuECQlfZDXT15YqY6j7bGhlqnOw2zIOOdqqtKiLADJOztdVoB56LhEi5bRcXznI4nSQES-yntOf97TTHq5dFosMotCJW-DM3UhXBS0kzzVzjrJLRm2RfetvTIYu1dhqUIA4nM3L4oJFW8R882YpAONZO0p7jJWQBnkzxmUGPEtaLGpm4q71u). Timestamp by third party at 2024.05.16 17:01:21 CEST

ANNEX 3

ACCESSION FORM FOR BENEFICIARIES

TECHNOLOGIEZENTRUM HORB GMBH & CO. KG (TZHORB), PIC 884476362, established in GESCHWISTER-SCHOLL-STRASSE 10, HORB AM NECKAR 72160, Germany,

hereby agrees

to become beneficiary

in Agreement No 101135275 — CSSBoost ('the Agreement')

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

and mandates

the coordinator to submit and sign in its name and on its behalf any **amendments** to the Agreement, in accordance with Article 39.

By signing this accession form, the beneficiary accepts the grant and agrees to implement it in accordance with the Agreement, with all the obligations and terms and conditions it sets out.

SIGNATURE

For the beneficiary

Dejan Micic with ECAS id n00dvwwg signed in the Participant Portal on 21/05/2024 at 11:15:29 (transaction id SigId-9297-Wu6Jp5p13zfLtppzcxNfkf8v1PKU43tLSLXi6W4443BQP9NCKmXFpC1eOr7tks3JwVszlCF2mO3FrDUh5huOgRG-jpJZscgsw0KDbQkMPDydyW-KSfEUAGCim2nKDzzL8CbVqQ5LoG2XIyDwXLq1J1wUroZzSljWZt41O5Wa7bsZh8Krmxo4a4YzI2vF05dmD8pqx8). Timestamp by third party at 2024.05.21 11:15:36 CEST

ANNEX 3

ACCESSION FORM FOR BENEFICIARIES

BWCON RESEARCH GGMBH (BWCON), PIC 891746415, established in SEYFFERSTRASSE 34, STUTTGART 70197, Germany,

hereby agrees

to become beneficiary

in Agreement No 101135275 — CSSBoost ('the Agreement')

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

and mandates

the coordinator to submit and sign in its name and on its behalf any **amendments** to the Agreement, in accordance with Article 39.

By signing this accession form, the beneficiary accepts the grant and agrees to implement it in accordance with the Agreement, with all the obligations and terms and conditions it sets out.

SIGNATURE

For the beneficiary

Jürgen JÄHNERT with ECAS id njaehjue signed in the Participant Portal on 14/05/2024 at 20:05:23 (transaction id SigId-1193-TKUsgOWigxMNlWZhm566hzfXeGrZdK9fjfCdZk4WIp7IxHmxFfbhgs1A0psTdCzJf66OgEQrrOXWncd0IpnvCE-jpJZscgsw0Kj6b3J8H594y-9SexviZYcKtyGRMrZmBzfopB50RpqSzwxFSk4htKac6nVvG3qBYLTnNVXgEGti7qrzKfB80lfcIq7eOHEzOy8zo). Timestamp by third party at 2024.05.14 20:05:29 CEST

ANNEX 3

ACCESSION FORM FOR BENEFICIARIES

WIRTSCHAFTSFORDERUNG ZUKUNFTSREGIONNORDSCHWARZWALD GMBH (WFG), PIC 928898579, established in WESTLICHE KARL-FRIEDRICH-STRASSE 29-31, PFORZHEIM 75172, Germany,

hereby agrees

to become beneficiary

in Agreement No 101135275 — CSSBoost ('the Agreement')

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

and mandates

the coordinator to submit and sign in its name and on its behalf any **amendments** to the Agreement, in accordance with Article 39.

By signing this accession form, the beneficiary accepts the grant and agrees to implement it in accordance with the Agreement, with all the obligations and terms and conditions it sets out.

SIGNATURE

For the beneficiary

ANNEX 3

ACCESSION FORM FOR BENEFICIARIES

UNIVERSITA POLITECNICA DELLE MARCHE (UNIVPM), PIC 999866689, established in PIAZZA ROMA 22, ANCONA 60121, Italy,

hereby agrees

to become beneficiary

in Agreement No 101135275 — CSSBoost ('the Agreement')

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

and mandates

the coordinator to submit and sign in its name and on its behalf any **amendments** to the Agreement, in accordance with Article 39.

By signing this accession form, the beneficiary accepts the grant and agrees to implement it in accordance with the Agreement, with all the obligations and terms and conditions it sets out.

SIGNATURE

For the beneficiary

Gian Luca Gregori with ECAS id n002zvrr signed in the Participant Portal on 17/05/2024 at 10:33:55 (transaction id SigId-17806-QyeBzidYL0pDmhS2NMqzliczoOnAL8gaTAzrIwZ3Llh4GHsYveBfRTjSVndFzSKSBKgeCqaO1zwglvVYPU2UWSCm-yntOf97TTHq5dFosMotCJW-zm0EJsy9WMRb9zzzohjJdCc7P1IMkBGwnKR3ORx5EROzOTt7yTsWikg0SbRFCvg7sAJW19ijcnSI3YgFo5I13Zs). Timestamp by third party at 2024.05.17 10:34:02 CEST

ANNEX 3

ACCESSION FORM FOR BENEFICIARIES

CICLI INTEGRATI IMPIANTI PRIMARI SPA (CIIP), PIC 891922276, established in VIALE DELLA REPUBBLICA 24, ASCOLI PICENO 63100, Italy,

hereby agrees

to become beneficiary

in Agreement No 101135275 — CSSBoost ('the Agreement')

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

and mandates

the coordinator to submit and sign in its name and on its behalf any **amendments** to the Agreement, in accordance with Article 39.

By signing this accession form, the beneficiary accepts the grant and agrees to implement it in accordance with the Agreement, with all the obligations and terms and conditions it sets out.

SIGNATURE

For the beneficiary

Maddalena Ciancaleoni with ECAS id n00f1reg signed in the Participant Portal on 22/05/2024 at 17:14:50 (transaction id SigId-12803-NCE5fkV2vTcSkDGSD5i56lbvhAzNj90YzL3sQbTT6ByeCiZMN2y3zTL0LY9XDK6NKCCY3LZgL8WFEQ64OkjGGIG-yntOf97TTHqoPPtGMdHyoy-TwVewZT5CwhO8AgRhDaAYHU36WPaY4wKzv0BIASeiYvLM2hKZ2bw340l5J2DFtmXV4DeghYXwtKI0PD91ibHK8). Timestamp by third party at 2024.05.22 17:14:56 CEST

ANNEX 3

ACCESSION FORM FOR BENEFICIARIES

FUNDACIO UNIVERSITARIA BALMES (UVIC), PIC 999837977, established in CARRER PEROT ROCAGUINARDA 17, VIC BARCELONA 08500, Spain,

hereby agrees

to become beneficiary

in Agreement No 101135275 — CSSBoost ('the Agreement')

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

and mandates

the coordinator to submit and sign in its name and on its behalf any **amendments** to the Agreement, in accordance with Article 39.

By signing this accession form, the beneficiary accepts the grant and agrees to implement it in accordance with the Agreement, with all the obligations and terms and conditions it sets out.

SIGNATURE

For the beneficiary

Marc Mussons Torras with ECAS id ncodinjo signed in the Participant Portal on 14/05/2024 at 09:57:35 (transaction id SigId-38825-WZgtAz IDSX3K6RiS8zzfhzjwgLzc40WhHQpBR9Hu914A3Ni5mjzS0xgizXkJqxC upb2Yd3zQLOeejehNKukdzqiAm-yntOf97TTHqGzTPAPycp26-kitfnMP mYkJaslXwjBBAVmi0phjFZ9VmWkNU3o21mrUikhy4umHt76T6DGMT CQm9zKeMTPzilWA9vH3QhZ90eZ). Timestamp by third party at 2024.05.14 09:57:44 CEST

ANNEX 3

ACCESSION FORM FOR BENEFICIARIES

ELLINIKO MESOGEIAKO PANEPISTIMIO (HMU), PIC 899132771, established in ESTAVROMENOS, HERAKLION 71004, Greece,

hereby agrees

to become beneficiary

in Agreement No 101135275 — CSSBoost ('the Agreement')

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

and mandates

the coordinator to submit and sign in its name and on its behalf any **amendments** to the Agreement, in accordance with Article 39.

By signing this accession form, the beneficiary accepts the grant and agrees to implement it in accordance with the Agreement, with all the obligations and terms and conditions it sets out.

SIGNATURE

For the beneficiary

ANNEX 3

ACCESSION FORM FOR BENEFICIARIES

MESOGEIAKO KENTRO IKANOTITON AGRODIATROFIS IDIOTIKI KEFALAIOUCHIKI ETAIREIA (MACC), PIC 888255288, established in IKAROU KAI ARCHIMIDOUS 1, HERAKLION 71601, Greece,

hereby agrees

to become beneficiary

in Agreement No 101135275 — CSSBoost ('the Agreement')

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

and mandates

the coordinator to submit and sign in its name and on its behalf any **amendments** to the Agreement, in accordance with Article 39.

By signing this accession form, the beneficiary accepts the grant and agrees to implement it in accordance with the Agreement, with all the obligations and terms and conditions it sets out.

SIGNATURE

For the beneficiary

Michail Katharakis with ECAS id n00ce8p6 signed in the Participant Portal on 14/05/2024 at 10:22:29 (transaction id SigId-39364-0jSoA3XGpGFC2tfuwop1QzdTEL0rSFzxS2H2m3zziQe82vWjW6zQHSRooxFVFavMbx070XSYjAjNu5S2zlfW91Im-yntOf97TTHqGzTPAPycp26-7LN8CzN5DFuVaYk9Rd2Db2Z5pwfbWsrpEEIJJXNxwAzUFWrzvRyXzWzXXuWPxq0G3g02EFADGsAk3ixB1YMwquzW). Timestamp by third party at 2024.05.14 10:22:35 CEST

ANNEX 3

ACCESSION FORM FOR BENEFICIARIES

PERIFEREIAKI ANAPTYXIAKI ETAIRIA KRITIS AE (CRETE), PIC 887183147, established in PLATEIA ELEFTHERIAS 1, CHANIA 73134, Greece,

hereby agrees

to become beneficiary

in Agreement No 101135275 — CSSBoost ('the Agreement')

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

and mandates

the coordinator to submit and sign in its name and on its behalf any **amendments** to the Agreement, in accordance with Article 39.

By signing this accession form, the beneficiary accepts the grant and agrees to implement it in accordance with the Agreement, with all the obligations and terms and conditions it sets out.

SIGNATURE

For the beneficiary

ANNEX 3

ACCESSION FORM FOR BENEFICIARIES

PARTICLE SUMMARY (PARTICLE), PIC 907400372, established in RUA DA VENEZUELA N 29 14 E, LISBON 1500 618, Portugal,

hereby agrees

to become beneficiary

in Agreement No 101135275 — CSSBoost ('the Agreement')

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

and mandates

the coordinator to submit and sign in its name and on its behalf any **amendments** to the Agreement, in accordance with Article 39.

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SIGNATURE

For the beneficiary

Marco Manso with ECAS id n0028i5l signed in the Participant Portal on 15/05/2024 at 10:42:46 (transaction id SigId-5528-1hwV25TzmI1NXG7nZ0LC4EEjx3QpKMyghkORfCTuwGllaxzZVcKUuypKM94wZ69NnScMYjlROq5Ra66strNM9J-jpJZscgsw0Kj6b3J8H594y-ea1RkLSiP9aeN6gSlChbguaveOfYjOaj8gjcdbhWPBvPtx3XjFrnMnY9MYCzMjvyavy0X78iXMYyEgCzcsyhB3). Timestamp by third party at 2024.05.15 10:42:51 CEST

ANNEX 3

ACCESSION FORM FOR BENEFICIARIES

COMPANHIA CARRIS DE FERRO DE LISBOA, E.M., S.A. (CARRIS), PIC 904315481, established in RUA 1 DE MAIO, 103, LISBOA 1300 472, Portugal,

hereby agrees

to become beneficiary

in Agreement No 101135275 — CSSBoost ('the Agreement')

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

and mandates

the coordinator to submit and sign in its name and on its behalf any **amendments** to the Agreement, in accordance with Article 39.

By signing this accession form, the beneficiary accepts the grant and agrees to implement it in accordance with the Agreement, with all the obligations and terms and conditions it sets out.

SIGNATURE

For the beneficiary

ANNEX 3

ACCESSION FORM FOR BENEFICIARIES

ADRESTIA EREVNITIKI IDIOTIKI KEFALAIOUXIKI ETAIREIA (ADR), PIC 893378925, established in LYSIMAXOU KALOKAIRINOU 20, IRAKLEIO 71202, Greece,

hereby agrees

to become beneficiary

in Agreement No 101135275 — CSSBoost ('the Agreement')

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

and mandates

the coordinator to submit and sign in its name and on its behalf any **amendments** to the Agreement, in accordance with Article 39.

By signing this accession form, the beneficiary accepts the grant and agrees to implement it in accordance with the Agreement, with all the obligations and terms and conditions it sets out.

SIGNATURE

For the beneficiary

Almpertos Markakis with ECAS id n003mqqw signed in the Participant Portal on 15/05/2024 at 09:57:00 (transaction id SigId-4459-zbG91gw ywlcVcD7fxj9pZldW6dVoUjv50JOobtbtngBzzRQMN5lCEndWtGvKAiGM MmZ4xGAQKK7ibsIZwFfJVoW-jpJZscgsw0Kj6b3J8H594y-Bd5G66qSWK 5u2U8MhegOKadxepunPXHiHm0L3QhfppVlJ10PjMUyUarluAw6WAML X9c0H44aF2subjxL8vO3WW). Timestamp by third party at 2024.05.15 09:57:07 CEST

ANNEX 3

ACCESSION FORM FOR BENEFICIARIES

MOTONIOUS IKE (MOTON), PIC 882855880, established in MARMARAS VARYPETROU, CHANIA 731 00, Greece,

hereby agrees

to become beneficiary

in Agreement No 101135275 — CSSBoost ('the Agreement')

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

and mandates

the coordinator to submit and sign in its name and on its behalf any **amendments** to the Agreement, in accordance with Article 39.

By signing this accession form, the beneficiary accepts the grant and agrees to implement it in accordance with the Agreement, with all the obligations and terms and conditions it sets out.

SIGNATURE

For the beneficiary

Polychronis Spanoudakis with ECAS id n00cbn2t signed in the Participant Portal on 17/05/2024 at 12:30:10 (transaction id SigId-20568-82F4ZRWAEN3AhoezonbD1P4twI63C0MVWiiSpXzzRLpDknruFKQCW7YGYIacnzhMVnWCX5ykzZk0yN8dzqOrhScW-yntOf97TTHq5dFosMotCJW-YPi5YAy2aeQMRSAHZNIjjSwYdepFLaEwikECOonRyjVrAJtYGZWE0BUYzQyGYWeMAfGngIfGYOcbvtzwsHgjgq). Timestamp by third party at 2024.05.17 12:30:16 CEST

ANNEX 3

ACCESSION FORM FOR BENEFICIARIES

ACCELIGENCE LTD (ACCELI), PIC 900037005, established in MENADROU 1 FLOOR 4 OFFICES 401-402, NICOSIA 1066, Cyprus,

hereby agrees

to become beneficiary

in Agreement No 101135275 — CSSBoost ('the Agreement')

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

and mandates

the coordinator to submit and sign in its name and on its behalf any **amendments** to the Agreement, in accordance with Article 39.

By signing this accession form, the beneficiary accepts the grant and agrees to implement it in accordance with the Agreement, with all the obligations and terms and conditions it sets out.

SIGNATURE

For the beneficiary

Pantelis Velanas with ECAS id n002nu1o signed in the Participant Portal on 14/05/2024 at 11:03:18 (transaction id SigId-40295-WnzGJwpvzRxqq61VJnAuZ29Zx9N8kK1wjxoeSk8NztAhRP2mS3k8pn3L4xzV3WUvRg7JWkq0FdvXuqCdgY3wHOG-yntOf97TTHqGzTPAPycp26-PEf4IU1Uv8cageIZe4dPh3GshJ9G8wHXCTzN1UWCE2BFoSTrpMCWpgOKCV7JPEPVFSalP0jMOisOxxNg3e0yDy). Timestamp by third party at 2024.05.14 11:03:24 CEST

ANNEX 3

ACCESSION FORM FOR BENEFICIARIES

SOCIAL CRM RESEARCH CENTER E.V. (SCRC), PIC 915192576, established in GRIMMAISCHE STR 12, LEIPZIG 04109, Germany,

hereby agrees

to become beneficiary

in Agreement No 101135275 — CSSBoost ('the Agreement')

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

and mandates

the coordinator to submit and sign in its name and on its behalf any **amendments** to the Agreement, in accordance with Article 39.

By signing this accession form, the beneficiary accepts the grant and agrees to implement it in accordance with the Agreement, with all the obligations and terms and conditions it sets out.

SIGNATURE

For the beneficiary

Olaf REINHOLD with ECAS id nreinhol signed in the Participant Portal on 17/05/2024 at 14:12:04 (transaction id SigId-22444-a5wK5tAsyK6h0gNgX1So2F4FfDdLM0TVuwjzzUfj6Xztqf4fofG6bfmeENftFMCwsNNJ3JMwii1O27Sn1cto3r0-yntOf97TTHq5dFosMotCJW-CLjCjYurZST5zjHZyeguzhXp3UOdg0K6ivjHTozKFvzHv0giiBmJdPPp9VnOlOsR2PC01vzSiYzVtwSj9yrlZNlG). Timestamp by third party at 2024.05.17 14:12:08 CEST

ANNEX 3

ACCESSION FORM FOR BENEFICIARIES

ASSOCIATION OF CITIES AND REGIONS FOR SUSTAINABLE RESOURCE MANAGEMENT (ACR+), PIC 952441061, established in AVENUE DES ARTS 3-4-5, BRUXELLES 1210, Belgium,

hereby agrees

to become beneficiary

in Agreement No 101135275 — CSSBoost ('the Agreement')

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

and mandates

the coordinator to submit and sign in its name and on its behalf any **amendments** to the Agreement, in accordance with Article 39.

By signing this accession form, the beneficiary accepts the grant and agrees to implement it in accordance with the Agreement, with all the obligations and terms and conditions it sets out.

SIGNATURE

For the beneficiary

Francoise BONNET with ECAS id nbonnfan signed in the Participant Portal on 14/05/2024 at 10:26:41 (transaction id SigId-39450-zf4bX6I0JWdnKipQ6HOeRbKk3heao5eWk6wWPlHDNp7Ss5hA3FqUXNOK5q8HCVzzHrzR7tjp4zt4ZOZztSuVRxh0-yntOf97TTHqGzTPAPycp26-hQpzXgjriZ5wsKUvhb4KadZi0YcsWnW6hrIeiTBHSdlnXRFtSZqRQvzu7qjgAvFpqv4Z5yWIFXv7KAw90ATfaD). Timestamp by third party at 2024.05.14 10:26:49 CEST

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

	Eligible[1] costs (per budget category)																	EU contribution[2]				Revenues
	Direct costs															Indirect costs	Total costs	EU contribution to eligible costs			Total requested EU contribution	Income generated by the action
	A. Personnel costs			B. Subcontracting costs	C. Purchase costs			D. Other cost categories								E. Indirect costs[2]		Funding rate %[3]	Maximum EU contribution[4]	Requested EU contribution		
	A.1 Employees (or equivalent) A.2 Natural persons under direct contract A.3 Seconded persons		A.4 SME owners and natural person beneficiaries	B. Subcontracting	C.1 Travel and subsistence	C.2 Equipment	C.3 Other goods, works and services	[D.1 Financial support to third parties]	D.2 Internally invoiced goods and services	[D.3 Transnational access to research infrastructure unit costs]	[D.4 Virtual access to research infrastructure unit costs]	*[OPTION for HE PCP/PPI:* D.5 PCP/PPI procurement costs*]*	*[OPTION for Euratom Programme Cofund Actions:* D.6 Euratom Cofund staff mobility costs*]*	*[OPTION for HE ERC Grants:* D.7 ERC additional funding*]*	*[OPTION for HE ERC Grants:* D.8 ERC additional funding (subcontracting, FSTP and internally invoiced goods and services)*]*	E. Indirect costs						
Forms of funding	Actual costs	Unit costs (usual accounting practices)	Unit costs[5]	Actual costs	Actual costs	Actual costs	Actual costs	[Actual costs]	Unit costs (usual accounting practices)	[Unit costs[5]]	[Unit costs[5]]	[Actual costs]	[Unit costs[5]]	[Actual costs]	[Actual costs]	Flat-rate costs[6]						
	a1	a2	a3	b	c1	c2	c3	[d1a]	d2	[d3]	[d4]	[d5]	[d6]	[d7]	[d8]	e = 0,25 * (a1 + a2 + a3 ~~+b+~~ c1 +c2 + c3 ~~+ d1a + d2 + d3 + d4 (+ d5][+ d6]~~ [+d7] ~~[+ d8]~~)	f = a+b+c+d+e	U	g = f*U%	h	m	n
XX – [short name beneficiary/affiliated entity]																						

The beneficiary/affiliated entity hereby confirms that:

The information provided is complete, reliable and true.

The costs and contributions declared are eligible (see Article 6).

The costs and contributions can be substantiated by adequate records and supporting documentation that will be produced upon request or in the context of checks, reviews, audits and investigations (see Articles 19, 20 and 25).

For the last reporting period: that all the revenues have been declared (see Article 22).

① Please declare all eligible costs and contributions, 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 costs/contributions that are found to be ineligible.

[1] See Article 6 for the eligibility conditions. All amounts must be expressed in EUR (see Article 21 for the conversion rules).

[2] If you have also received an EU operating grant during this reporting period, you cannot claim indirect costs - unless you can demonstrate that the operating grant does not cover any costs of the action. This requires specific accounting tools. Please contact us immediately via the Funding & Tenders Portal for details.

[3] See Data Sheet for the reimbursement rate(s).

[4] This is the *theoretical* amount of EU contribution to costs that the system calculates automatically (by multiplying the reimbursement rates by the costs declared). The amount you request (in the column 'requested EU contribution') may be less.

[5] See Annex 2a 'Additional information on the estimated budget' for the details (units, cost per unit).

[6] See Data Sheet for the flat-rate.

ANNEX 5

SPECIFIC RULES

CONFIDENTIALITY AND SECURITY (— ARTICLE 13)

Sensitive information with security recommendation

Sensitive information with a security recommendation must comply with the additional requirements imposed by the granting authority.

Before starting the action tasks concerned, the beneficiaries must have obtained all approvals or other mandatory documents needed for implementing the task. The documents must be kept on file and be submitted upon request by the coordinator to the granting authority. If they are not in English, they must be submitted together with an English summary.

For requirements restricting disclosure or dissemination, the information must be handled in accordance with the recommendation and may be disclosed or disseminated only after written approval from the granting authority.

EU classified information

If EU classified information is used or generated by the action, it must be treated in accordance with the security classification guide (SCG) and security aspect letter (SAL) set out in Annex 1 and Decision 2015/444[1] and its implementing rules — until it is declassified.

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

Action tasks involving EU classified information may be subcontracted only with prior explicit written approval from the granting authority and only to entities established in an EU Member State or in a non-EU country with a security of information agreement with the EU (or an administrative arrangement with the Commission).

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

ETHICS (— ARTICLE 14)

Ethics and research integrity

The beneficiaries must carry out the action in compliance with:

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

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

and

- applicable EU, international and national law, including the EU Charter of Fundamental Rights and the European Convention for the Protection of Human Rights and Fundamental Freedoms and its Supplementary Protocols.

No funding can be granted, within or outside the EU, for activities that are prohibited in all Member States. No funding can be granted in a Member State for an activity which is forbidden in that Member State.

The beneficiaries must pay particular attention to the principle of proportionality, the right to privacy, the right to the protection of personal data, the right to the physical and mental integrity of persons, the right to non-discrimination, the need to ensure protection of the environment and high levels of human health protection.

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

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

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

Activities involving research on human embryos or human embryonic stem cells may be carried out only if:

- they are set out in Annex 1 or
- the coordinator has obtained explicit approval (in writing) from the granting authority.

In addition, the beneficiaries must respect the fundamental principle of research integrity — as set out in the European Code of Conduct for Research Integrity[2].

This implies compliance with the following principles:

- reliability in ensuring the quality of research reflected in the design, the methodology, the analysis and the use of resources
- honesty in developing, undertaking, reviewing, reporting and communicating research in a transparent, fair and unbiased way

[2] European Code of Conduct for Research Integrity of ALLEA (All European Academies).

- respect for colleagues, research participants, society, ecosystems, cultural heritage and the environment

- accountability for the research from idea to publication, for its management and organisation, for training, supervision and mentoring, and for its wider impacts

and means that beneficiaries must ensure that persons carrying out research tasks follow the good research practices including ensuring, where possible, openness, reproducibility and traceability and refrain from the research integrity violations described in the Code.

Activities raising ethical issues must comply with the additional requirements formulated by the ethics panels (including after checks, reviews or audits; see Article 25).

Before starting an action task raising ethical issues, the beneficiaries must have obtained all approvals or other mandatory documents needed for implementing the task, notably from any (national or local) ethics committee or other bodies such as data protection authorities.

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

VALUES (— ARTICLE 14)

Gender mainstreaming

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

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

Definitions

Access rights — Rights to use results or background.

Dissemination — The public disclosure of the results by appropriate means, other than resulting from protecting or exploiting the results, including by scientific publications in any medium.

Exploit(ation) — The use of results in further research and innovation activities other than those covered by the action concerned, including among other things, commercial exploitation such as developing, creating, manufacturing and marketing a product or process, creating and providing a service, or in standardisation activities.

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

FAIR principles — ‘findability’, ‘accessibility’, ‘interoperability’ and ‘reusability’.

Open access — Online access to research outputs provided free of charge to the end-user.

Open science — An approach to the scientific process based on open cooperative work, tools and diffusing knowledge.

Research data management — The process within the research lifecycle that includes the organisation, storage, preservation, security, quality assurance, allocation of persistent identifiers (PIDs) and rules and procedures for sharing of data including licensing.

Research outputs — Results to which access can be given in the form of scientific publications, data or other engineered results and processes such as software, algorithms, protocols, models, workflows and electronic notebooks.

Scope of the obligations

For this section, references to ‘beneficiary’ or ‘beneficiaries’ do not include affiliated entities (if any).

Agreement on background

The beneficiaries must identify in a written agreement the background as needed for implementing the action or for exploiting its results.

Where the call conditions restrict control due to strategic interests reasons, background that is subject to control or other restrictions by a country (or entity from a country) which is not one of the eligible countries or target countries set out in the call conditions and that impact the exploitation of the results (i.e. would make the exploitation of the results subject to control or restrictions) must not be used and must be explicitly excluded from it in the agreement on background — unless otherwise agreed with the granting authority.

Ownership of results

Results are owned by the beneficiaries that generate them.

However, two or more beneficiaries own results jointly if:

- they have jointly generated them and
- it is not possible to:
  - establish the respective contribution of each beneficiary, or
  - separate them for the purpose of applying for, obtaining or maintaining their protection.

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

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

- at least 45 days advance notice and
- fair and reasonable compensation.

The joint owners may agree — in writing — to apply another regime than joint ownership.

If third parties (including employees and other personnel) may claim rights to the results, the beneficiary concerned must ensure that those rights can be exercised in a manner compatible with its obligations under the Agreement.

The beneficiaries must indicate the owner(s) of the results (results ownership list) in the final periodic report.

Protection of results

Beneficiaries which have received funding under the grant must adequately protect their results — for an appropriate period and with appropriate territorial coverage — if protection is possible and justified, taking into account all relevant considerations, including the prospects for commercial exploitation, the legitimate interests of the other beneficiaries and any other legitimate interests.

Exploitation of results

Beneficiaries which have received funding under the grant must — up to four years after the end of the action (see Data Sheet, Point 1) — use their best efforts to exploit their results directly or to have them exploited indirectly by another entity, in particular through transfer or licensing.

If, despite a beneficiary's best efforts, the results are not exploited within one year after the end of the action, the beneficiaries must (unless otherwise agreed in writing with the granting authority) use the Horizon Results Platform to find interested parties to exploit the results.

If results are incorporated in a standard, the beneficiaries must (unless otherwise agreed with the granting authority or unless it is impossible) ask the standardisation body to include the funding statement (see Article 17) in (information related to) the standard.

Additional exploitation obligations

Where the call conditions impose additional exploitation obligations (including obligations linked to the restriction of participation or control due to strategic assets, interests, autonomy or security reasons), the beneficiaries must comply with them — up to four years after the end of the action (see Data Sheet, Point 1).

Where the call conditions impose additional exploitation obligations in case of a public emergency, the beneficiaries must (if requested by the granting authority) grant for a limited period of time specified in the request, non-exclusive licences — under fair and reasonable conditions — to their results to legal entities that need the results to address the public emergency and commit to rapidly and broadly exploit the resulting products and services at fair and reasonable conditions. This provision applies up to four years after the end of the action (see Data Sheet, Point 1).

Additional information obligation relating to standards

Where the call conditions impose additional information obligations relating to possible standardisation, the beneficiaries must — up to four years after the end of the action (see Data Sheet, Point 1) — inform the granting authority, if the results could reasonably be expected to contribute to European or international standards.

Transfer and licensing of results

Transfer of ownership

The beneficiaries may transfer ownership of their results, provided this does not affect compliance with their obligations under the Agreement.

The beneficiaries must ensure that their obligations under the Agreement regarding their results are passed on to the new owner and that this new owner has the obligation to pass them on in any subsequent transfer.

Moreover, they must inform the other beneficiaries with access rights of the transfer at least 45 days in advance (or less if agreed in writing), unless agreed otherwise in writing for specifically identified third parties including affiliated entities or unless impossible under the applicable law. This notification must include sufficient information on the new owner to enable the beneficiaries concerned to assess the effects on their access rights. The beneficiaries may object within 30 days of receiving notification (or less if agreed in writing), if they can show that the transfer would adversely affect their access rights. In this case, the transfer may not take place until agreement has been reached between the beneficiaries concerned.

Granting licences

The beneficiaries may grant licences to their results (or otherwise give the right to exploit them), including on an exclusive basis, provided this does not affect compliance with their obligations.

Exclusive licences for results may be granted only if all the other beneficiaries concerned have waived their access rights.

Granting authority right to object to transfers or licensing — Horizon Europe actions

Where the call conditions in Horizon Europe actions provide for the right to object to transfers or licensing, the granting authority may — up to four years after the end of the action (see Data Sheet, Point 1) — object to a transfer of ownership or the exclusive licensing of results, if:

- the beneficiaries which generated the results have received funding under the grant
- it is to a legal entity established in a non-EU country not associated with Horizon Europe, and
- the granting authority considers that the transfer or licence is not in line with EU interests.

Beneficiaries that intend to transfer ownership or grant an exclusive licence must formally notify the granting authority before the intended transfer or licensing takes place and:

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

The granting authority may request additional information.

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

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

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

A beneficiary may formally notify a request to waive the right to object regarding intended transfers or grants to a specifically identified third party, if measures safeguarding EU interests are in place. If the granting authority agrees, it will formally notify the beneficiary concerned within 60 days of receiving notification (or any additional information requested).

Granting authority right to object to transfers or licensing — Euratom actions

Where the call conditions in Euratom actions provide for the right to object to transfers or licensing, the granting authority may — up to four years after the end of the action (see Data Sheet, Point 1) — object to a transfer of ownership or the exclusive or non-exclusive licensing of results, if:

- the beneficiaries which generated the results have received funding under the grant
- it is to a legal entity established in a non-EU country not associated to the Euratom Research and Training Programme 2021-2025 and
- the granting authority considers that the transfer or licence is not in line with the EU interests.

Beneficiaries that intend to transfer ownership or grant a licence must formally notify the granting authority before the intended transfer or licensing takes place and:

- identify the specific results concerned
- describe in detail the results, the new owner or licensee and the planned or potential exploitation of the results, and
- include a reasoned assessment of the likely impact of the transfer or licence on EU interests, in particular regarding competitiveness as well as consistency with

ethical principles and security considerations (including the defence interests of the EU Member States under Article 24 of the Euratom Treaty).

The granting authority may request additional information.

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

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

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

A beneficiary may formally notify a request to waive the right to object regarding intended transfers or grants to a specifically identified third party, if measures safeguarding EU interests are in place. If the granting authority agrees, it will formally notify the beneficiary concerned within 60 days of receiving notification (or any additional information requested).

Limitations to transfers and licensing due to strategic assets, interests, autonomy or security reasons of the EU and its Member States

Where the call conditions restrict participation or control due to strategic assets, interests, autonomy or security reasons, the beneficiaries may not transfer ownership of their results or grant licences to third parties which are established in countries which are not eligible countries or target countries set out in the call conditions (or, if applicable, are controlled by such countries or entities from such countries) — unless they have requested and received prior approval by the granting authority.

The request must:

- identify the specific results concerned
- describe in detail the new owner and the planned or potential exploitation of the results, and
- include a reasoned assessment of the likely impact of the transfer or license on the strategic assets, interests, autonomy or security of the EU and its Member States.

The granting authority may request additional information.

Access rights to results and background

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

Requests to exercise access rights and the waiver of access rights must be in writing.

Unless agreed otherwise in writing with the beneficiary granting access, access rights do not include the right to sub-license.

If a beneficiary is no longer involved in the action, this does not affect its obligations to grant access.

If a beneficiary defaults on its obligations, the beneficiaries may agree that that beneficiary no longer has access rights.

Access rights for implementing the action

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

- informed the other beneficiaries that access to its background is subject to restrictions, or

- agreed with the other beneficiaries that access would not be on a royalty-free basis.

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

Access rights for exploiting the results

The beneficiaries must grant each other access — under fair and reasonable conditions — to results needed for exploiting their results.

The beneficiaries must grant each other access — under fair and reasonable conditions — to background needed for exploiting their results, unless the beneficiary that holds the background has — before acceding to the Agreement — informed the other beneficiaries that access to its background is subject to restrictions.

Requests for access must be made — unless agreed otherwise in writing — up to one year after the end of the action (see Data Sheet, Point 1).

Access rights for entities under the same control

Unless agreed otherwise in writing by the beneficiaries, access to results and, subject to the restrictions referred to above (if any), background must also be granted — under fair and reasonable conditions — to entities that:

- are established in an EU Member State or Horizon Europe associated country

- are under the direct or indirect control of another beneficiary, or under the same direct or indirect control as that beneficiary, or directly or indirectly controlling that beneficiary and

- need the access to exploit the results of that beneficiary.

Unless agreed otherwise in writing, such requests for access must be made by the entity directly to the beneficiary concerned.

Requests for access must be made — unless agreed otherwise in writing — up to one year after the end of the action (see Data Sheet, Point 1).

Access rights for the granting authority, EU institutions, bodies, offices or agencies and national authorities to results for policy purposes — Horizon Europe actions

In Horizon Europe actions, the beneficiaries which have received funding under the grant must grant access to their results — on a royalty-free basis — to the granting authority, EU institutions, bodies, offices or agencies for developing, implementing and monitoring EU policies or programmes. Such access rights do not extend to beneficiaries' background.

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

For actions under the cluster 'Civil Security for Society', such access rights also extend to national authorities of EU Member States for developing, implementing and monitoring their policies or programmes in this area. In this case, access is subject to a bilateral agreement to define specific conditions ensuring that:

- the access rights will be used only for the intended purpose and
- appropriate confidentiality obligations are in place.

Moreover, the requesting national authority or EU institution, body, office or agency (including the granting authority) must inform all other national authorities of such a request.

Access rights for the granting authority, Euratom institutions, funding bodies or the Joint Undertaking Fusion for Energy — Euratom actions

In Euratom actions, the beneficiaries which have received funding under the grant must grant access to their results — on a royalty-free basis — to the granting authority, Euratom institutions, funding bodies or the Joint Undertaking Fusion for Energy for developing, implementing and monitoring Euratom policies and programmes or for compliance with obligations assumed through international cooperation with non-EU countries and international organisations.

Such access rights include the right to authorise third parties to use the results in public procurement and the right to sub-license and are limited to non-commercial and non-competitive use.

Additional access rights

Where the call conditions impose additional access rights, the beneficiaries must comply with them.

COMMUNICATION, DISSEMINATION, OPEN SCIENCE AND VISIBILITY (— ARTICLE 17)

Dissemination

Dissemination of results

The beneficiaries must disseminate their results as soon as feasible, in a publicly available format, subject to any restrictions due to the protection of intellectual property, security rules or legitimate interests.

A beneficiary that intends to disseminate its results must give at least 15 days advance notice to the other beneficiaries (unless agreed otherwise), together with sufficient information on the results it will disseminate.

Any other beneficiary may object within (unless agreed otherwise) 15 days of receiving notification, if it can show that its legitimate interests in relation to the results or background would be significantly harmed. In such cases, the results may not be disseminated unless appropriate steps are taken to safeguard those interests.

Additional dissemination obligations

Where the call conditions impose additional dissemination obligations, the beneficiaries must also comply with those.

Open Science

Open science: open access to scientific publications

The beneficiaries must ensure open access to peer-reviewed scientific publications relating to their results. In particular, they must ensure that:

- at the latest at the time of publication, a machine-readable electronic copy of the published version or the final peer-reviewed manuscript accepted for publication, is deposited in a trusted repository for scientific publications

- immediate open access is provided to the deposited publication via the repository, under the latest available version of the Creative Commons Attribution International Public Licence (CC BY) or a licence with equivalent rights; for monographs and other long-text formats, the licence may exclude commercial uses and derivative works (e.g. CC BY-NC, CC BY-ND) and

- information is given via the repository about any research output or any other tools and instruments needed to validate the conclusions of the scientific publication.

Beneficiaries (or authors) must retain sufficient intellectual property rights to comply with the open access requirements.

Metadata of deposited publications must be open under a Creative Common Public Domain Dedication (CC 0) or equivalent, in line with the FAIR principles (in particular machine-actionable) and provide information at least about the following: publication (author(s), title, date of publication, publication venue); Horizon Europe or Euratom funding; grant project name, acronym and number; licensing terms; persistent identifiers for the publication, the authors involved in the action and, if possible, for their organisations and the grant. Where applicable, the metadata must include persistent identifiers for any research output or any other tools and instruments needed to validate the conclusions of the publication.

Only publication fees in full open access venues for peer-reviewed scientific publications are eligible for reimbursement.

Open science: research data management

The beneficiaries must manage the digital research data generated in the action (‘data’) responsibly, in line with the FAIR principles and by taking all of the following actions:

- establish a data management plan (‘DMP’) (and regularly update it)

- as soon as possible and within the deadlines set out in the DMP, deposit the data in a trusted repository; if required in the call conditions, this repository must be federated in the EOSC in compliance with EOSC requirements

- as soon as possible and within the deadlines set out in the DMP, ensure open access — via the repository — to the deposited data, under the latest available version of the Creative Commons Attribution International Public License (CC BY) or Creative Commons Public Domain Dedication (CC 0) or a licence with equivalent rights, following the principle 'as open as possible as closed as necessary', unless providing open access would in particular:

    - be against the beneficiary's legitimate interests, including regarding commercial exploitation, or

    - be contrary to any other constraints, in particular the EU competitive interests or the beneficiary's obligations under this Agreement; if open access is not provided (to some or all data), this must be justified in the DMP

- provide information via the repository about any research output or any other tools and instruments needed to re-use or validate the data.

Metadata of deposited data must be open under a Creative Common Public Domain Dedication (CC 0) or equivalent (to the extent legitimate interests or constraints are safeguarded), in line with the FAIR principles (in particular machine-actionable) and provide information at least about the following: datasets (description, date of deposit, author(s), venue and embargo); Horizon Europe or Euratom funding; grant project name, acronym and number; licensing terms; persistent identifiers for the dataset, the authors involved in the action, and, if possible, for their organisations and the grant. Where applicable, the metadata must include persistent identifiers for related publications and other research outputs.

Open science: additional practices

Where the call conditions impose additional obligations regarding open science practices, the beneficiaries must also comply with those.

Where the call conditions impose additional obligations regarding the validation of scientific publications, the beneficiaries must provide (digital or physical) access to data or other results needed for validation of the conclusions of scientific publications, to the extent that their legitimate interests or constraints are safeguarded (and unless they already provided the (open) access at publication).

Where the call conditions impose additional open science obligations in case of a public emergency, the beneficiaries must (if requested by the granting authority) immediately deposit any research output in a repository and provide open access to it under a CC BY licence, a Public Domain Dedication (CC 0) or equivalent. As an exception, if the access would be against the beneficiaries' legitimate interests, the beneficiaries must grant non-exclusive licenses — under fair and reasonable conditions — to legal entities that need the research output to address the public emergency and commit to rapidly and broadly exploit the resulting products and services at fair and reasonable conditions. This provision applies up to four years after the end of the action (see Data Sheet, Point 1).

Plan for the exploitation and dissemination of results including communication activities

Unless excluded by the call conditions, the beneficiaries must provide and regularly update a plan for the exploitation and dissemination of results including communication activities.

SPECIFIC RULES FOR CARRYING OUT THE ACTION (— ARTICLE 18)

Implementation in case of restrictions due to strategic assets, interests, autonomy or security of the EU and its Member States

Where the call conditions restrict participation or control due to strategic assets, interests, autonomy or security, the beneficiaries must ensure that none of the entities that participate as affiliated entities, associated partners, subcontractors or recipients of financial support to third parties are established in countries which are not eligible countries or target countries set out in the call conditions (or, if applicable, are controlled by such countries or entities from such countries) — unless otherwise agreed with the granting authority.

The beneficiaries must moreover ensure that any cooperation with entities established in countries which are not eligible countries or target countries set out in the call conditions (or, if applicable, are controlled by such countries or entities from such countries) does not affect the strategic assets, interests, autonomy or security of the EU and its Member States.

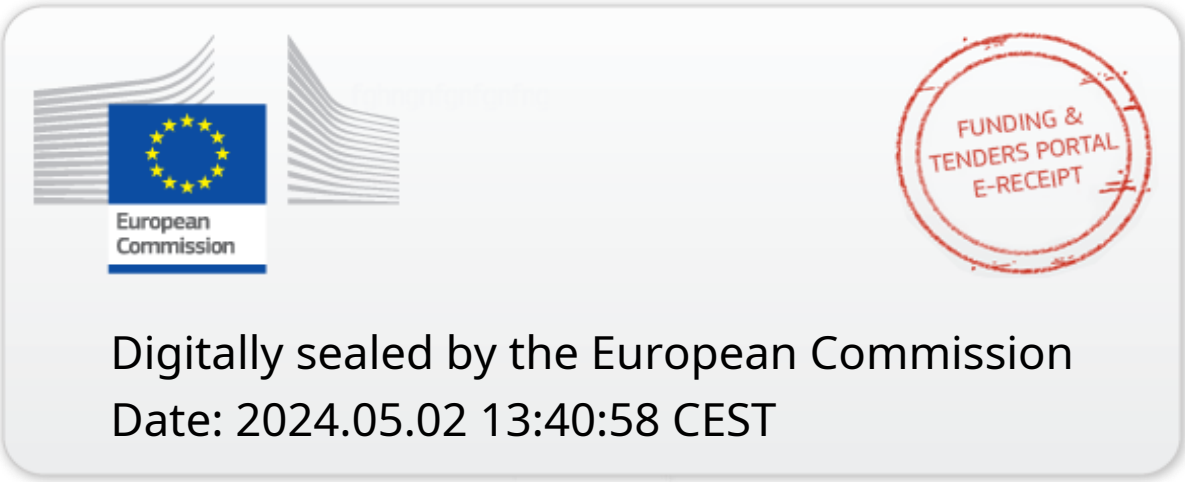
Recruitment and working conditions for researchers

The beneficiaries must take all measures to implement the principles set out in the Commission Recommendation on the European Charter for Researchers and the Code of Conduct for the Recruitment of Researchers[3], in particular regarding:

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

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

[3] 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).



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