EUROPEAN COMMISSION
Research Executive Agency (REA)
Director

AMENDMENT Reference No AMD-665826-1

Grant Agreement: 665826 — Participatory Engagement with Scientific and Technological Research through Performance (PERFORM)

The parties agree to amend the Grant Agreement as follows ('Amendment'):

1 . Addition of a new beneficiary

The following new beneficiary is added:

- FUNDACIO PER A LA UNIVERSITAT OBERTA DE CATALUNYA (UOC) — as from 1 November 2015

This implies the **following changes** to the Grant Agreement:

- The new beneficiary and the accession date is added to the **Preamble**:

  *"**FUNDACIO PER A LA UNIVERSITAT OBERTA DE CATALUNYA (UOC)** ES3, NA, established in AVENIDA TIBIDABO 39, BARCELONA 08035, Spain, ESG60667813 represented for the purposes of signing the Agreement by — as from 1 November 2015"*

2. Change of coordinator

As from 1 November 2015, UNIVERSITAT AUTONOMA DE BARCELONA will no longer assume the role of coordinator and will be replaced by FUNDACIO PER A LA UNIVERSITAT OBERTA DE CATALUNYA.

This implies the **following changes** to the Grant Agreement:

- The new coordinator and the handover date are added to the **Preamble**:

  UNIVERSITAT AUTONOMA DE BARCELONA (UAB), 022, established in CAMPUS DE LA UAB BELLATERRA, CERDANYOLA BARCELONA 08193, Spain, ESQ0818002H represented for the purposes of signing the Agreement by M. Pilar DELLUNDE I CLAVÉ — until 31 October 2015

  FUNDACIO PER A LA UNIVERSITAT OBERTA DE CATALUNYA (UOC) ES3, NA, established in AVENIDA TIBIDABO 39, BARCELONA 08035, Spain, ESG60667813 represented for the purposes of signing the amendments to the Agreement by — as from 1 November 2015".

3. Change of bank account for payments

The bank account for payments is changed.

This implies the **following changes** to the Grant Agreement:

- The bank account is replaced in **Article 21.8**:

"Name of bank: CAIXABANK, S.A.
Address of branch: AV. DIAGONAL, 530 PL.1 BARCELONA, Spain
Full name of the account holder: F UNIVERSITAT OBERTA DE CATALUNYA
Full account number (including bank codes):
IBAN code: ES2621005000510200085008"

4. Change of Annex 1 (description of the action)

Annex 1 is changed and replaced by the Annex 1 attached to this Amendment.

5. Changes to Annex 2 (estimated budget of the action)

Annex 2 is changed and replaced by the Annex 2 attached to this Amendment.

All other provisions of the Grant Agreement and its Annexes remain unchanged.

This Amendment **enters into force** on the day of the last signature.

This Amendment **takes effect** on the date on which the amendment enters into force, except where a different date has been agreed by the parties (for one or more changes).

Please inform the other members of the consortium of the Amendment.

SIGNATURES

For the coordinator

M. Pilar DELLUNDE I CLAVÉ with ECAS id nsferran signed in the Participant Portal on 30/11/2015 at 15:00:07 (transaction id SigId-4681-MocNSdMzwHn79ghNa9uwfAnRLDtatyEfwN1kZ8gThZgTZzbo2nyzoqVbTC2M24aU2hS3JGclNzmgB2iXWQzLTy4-Jj71zxYb8yr9TOHuN2x1OS-eipshvQKxNazjmmd30aU5c6aconHSAkvwYeg8O99Ss7). Timestamp by third party at
Mon Nov 30 15:00:34 CET 2015

For the Agency

Signed by Peter VAN DER ZANDT with ECAS id zandtpe as an authorised representative on 11-12-2015 16:11:16 (transaction id SigId-1203-TzRsiWTP59oGimY8x7spZbizkiDRYWzZzeLxv2a1ogg7MXd1PvR0K0k3zOmkEHHKzLoy2NlKSzN92pzkDThqugEd-PHslUMVSXYCswcv4WdCzfp-H7tkwna71MtUTPGzM6NJKX8EN2HzSjFyHWsn6ZSlILbG)
Fri Dec 11 16:11:21 CET 2015

Enclosures:

Annex 1
Annex 2

EUROPEAN COMMISSION

Research Executive Agency (REA)

Spreading Excellence, Widening Participation, Science with and for Society

ANNEX 1 (part A)

Research and Innovation action

NUMBER — 665826 — PERFORM

Table of Contents

1.1. The project summary

Project Number [1]	665826	Project Acronym [2]	PERFORM

One form per project

General information	
Project title [3]	Participatory Engagement with Scientific and Technological Research through Performance
Starting date [4]	The first day of the month after the signature by the Commission
Duration in months [5]	36
Call (part) identifier [6]	H2020-SEAC-2014-1
Topic	SEAC-1-2014 Innovative ways to make science education and scientific careers attractive to young people
Fixed EC Keywords	Responsible Research and Innovation (RRI), Science education, Training, Science Communication
Free keywords	Participatory action-research; Science and arts-based education approach; Secondary schools; Young people's engagement

Abstract [7]

The PERFORM consortium aims to investigate the effects of the use of innovative science education methods based on performing arts in fostering young peoples' motivations and engagement with science, technology, engineering, and mathematics (STEM) in selected secondary schools in France, Spain and the United Kingdom. A considerable percentage of young people in Europe is not interested in STEM careers mainly because they perceive that they lack the skills to deal with such topics. Such negative perceptions discourage adolescents from investing time in learning about science and undervalue the role of science in society. Addressing the challenge of engaging young people in STEM has never been more urgent in Europe in order to avoid loss of scientific talent and to ensure future innovation capability, excellence and competitiveness. PERFORM takes action to overcome the remaining distance between young people and science and to break the unidirectional model of scientific knowledge transfer. PERFORM will explore a creative, participatory educational process on STEM through the use of scenic arts with secondary school students, their teachers and early career researchers, who will get actively involved in experiencing science. They will also reflect on their own role in the interaction between science and society, and the values embedded in Responsible Research and Innovation. PERFORM will analyse how such human-centred, science-arts educational approach contributes to foster girls' and boys' motivations towards science learning and strengthen the transversal competences they will need for STEM careers and jobs. The education and communication skills required for teachers and researchers to further replicate the educational process will be explored and addressed in specific training toolkits. The project dissemination will be fulfilled by ensuring strong science-policy links and by linking PERFORM with Scientix.

1.2. List of Beneficiaries

Project Number [1]	665826	Project Acronym [2]	PERFORM

List of Beneficiaries

No	Name	Short name	Country	Project entry date[8]	Project exit date
1	FUNDACIO PER A LA UNIVERSITAT OBERTA DE CATALUNYA	UOC	Spain	01/11/2015	31/10/2018
2	THE BIG VAN THEORY	TBVT	Spain	01/11/2015	31/10/2018
3	UNIVERSITY OF BRISTOL	UoB	United Kingdom	01/11/2015	31/10/2018
4	SCIENCE MADE SIMPLE LIMITED	SMS	United Kingdom	01/11/2015	31/10/2018
5	THE UNIVERSITY OF WARWICK	UoW	United Kingdom	01/11/2015	31/10/2018
6	L'ATELIER DES JOURS A VENIR	AJA	France	01/11/2015	31/10/2018
7	LES ATOMES CROCHUS	LAC	France	01/11/2015	31/10/2018
8	UNITED NATIONS EDUCATIONAL, SCIENTIFIC AND CULTURAL ORGANIZATION -UNESCO	UNESCO	France	01/11/2015	31/10/2018
9	EUSEA - EUROPAISCHE GESELLSCHAFT FUR WISSENSCHAFTSVERANSTALTUNGEN	EUSEA	Austria	01/11/2015	31/10/2018
10	UNIVERSITAT AUTONOMA DE BARCELONA	UAB	Spain	01/11/2015	31/10/2018

1.3. Workplan Tables - Detailed implementation

1.3.1. WT1 List of work packages

WP Number [9]	WP Title	Lead beneficiary [10]	Person-months [11]	Start month [12]	End month [13]
WP1	Project coordination and management	1 - UOC	24.00	1	36
WP2	Innovative science education methods based on performing arts	2 - TBVT	104.00	1	36
WP3	Building science education and communication capacity for teachers and early career researchers	3 - UoB	53.00	1	36
WP4	Impact assessment of the participatory educational process in students' engagement in and learning about science	10 - UAB	76.00	1	36
WP5	Sustainability and Policy Impact	8 - UNESCO	28.00	1	36
WP6	Dissemination and Outreach	9 - EUSEA	38.00	1	36
		Total	323.00		

1.3.2. WT2 list of deliverables

Deliverable Number [14]	Deliverable Title	WP number [9]	Lead beneficiary	Type [15]	Dissemination level [16]	Due Date (in months) [17]
D1.1	Internal communication strategy and intranet	WP1	1 - UOC	Websites, patents filling, etc.	Confidential, only for members of the consortium (including the Commission Services)	4
D1.2	Risk management plan	WP1	1 - UOC	Report	Public	6
D1.3	Evaluation Report of the Advisory Board	WP1	1 - UOC	Report	Public	24
D1.4	Data Management Plan	WP1	1 - UOC	Report	Public	6
D2.1	Final protocol of tested methods to transform a performance-based activity into a PERSEIA	WP2	2 - TBVT	Report	Public	16
D2.2	Final protocol of tested methods to generate a transformative participatory educational process by using science and arts-based education approaches	WP2	2 - TBVT	Report	Public	30
D2.3	Guidelines for PERSEIA adaptation to science-museums	WP2	2 - TBVT	Report	Public	36
D3.1	Toolkit for researchers wanting to develop PERSEIAs	WP3	3 - UoB	Other	Public	33
D3.2	Toolkit for teachers wanting to develop PERSEIAs	WP3	3 - UoB	Other	Public	36
D4.1	Research report: Methodological aspects of science education assessment	WP4	10 - UAB	Report	Public	7
D4.2	Report on social media responses to science performances	WP4	5 - UoW	Report	Public	35
D4.3	Policy brief: Effective science and arts-based education approach	WP4	10 - UAB	Report	Public	36

Deliverable Number [14]	Deliverable Title	WP number [9]	Lead beneficiary	Type [15]	Dissemination level [16]	Due Date (in months) [17]
D5.1	Sustainability plan	WP5	8 - UNESCO	Report	Public	15
D5.2	Two policy briefs on WP5 related topics	WP5	8 - UNESCO	Report	Public	34
D6.1	Plan for communication, dissemination and exploitation	WP6	9 - EUSEA	Report	Public	4
D6.2	Website and social media launch	WP6	9 - EUSEA	Websites, patents filling, etc.	Public	6
D6.3	Report on outreach activities, including the final conference	WP6	9 - EUSEA	Report	Public	35

1.3.3. WT3 Work package descriptions

Work package number [9]	WP1	**Lead beneficiary** [10]	1 - UOC
Work package title	Project coordination and management		
Start month	1	**End month**	36

Objectives

The WP1 aims to coordinate and manage the PERFORM project's research tasks, partners and resources in a way to bring the successful completions of the general and specific project objectives. Specifically, this WP has the following objectives:
- To achieve an efficient coordination of both research and technical activities and overall progress of the project.
- To perform all legal, financial and administrative obligations and tasks according to the rules stated in the project's contract.
- To provide support on the establishment of technical and scientific discussion
- To design and maintain a sound and effective internal communication strategy.
- To link PERFORM to other European research science education projects.

Description of work and role of partners

WP1 - Project coordination and management [Months: 1-36]
UOC, TBVT, UoB, SMS, UoW, AJA, LAC, UNESCO, EUSEA, UAB
Task 1.1. Project management (led by UOC)
The organizational structure of PERFORM is carefully designed to best fulfill the objectives of the project. This will be achieved via ordering and timing of the different Work Packages (WPs), and their relations with one another.
The Coordination Team (CT) will be in charge to coordinate and supervise a proper legal, technical and financial management, providing support to the consortium members on reporting.
In particular, the UOC will be responsible for coordinating and overseeing:
- Legal issues related with the accomplishment and amendments of the Grant Agreement, the fulfillment and eventual modifications of the Consortium Agreement, and the use of Non Disclosure Agreements if needed.
- Budget expenditure of the project and efforts reporting according to the grant contract conditions and the project work plan. Furthermore, the General Assembly (GA) member of every partner will be responsible for surveying the financial expenses of the respective partner and will enable the generation of certificates on financial statements and audits, when necessary.
The money transfer of the pre-financing to partners will be done by the UAB and the UOC (as the new PERFORM coordinator) will be in charge of the financial administration and money transfer of further payments for the overall project, according to the EC Grant Agreement conditions.
A sound follow-up of project activities will be supported by project meetings. Consortium meetings with all representatives (GA) will be held every 18 months (i.e., kick-off meeting in Barcelona, intermediate meeting in Bristol and final meeting in Paris). The UAB will be responsible for the organization of the kick-off meeting in Barcelona (previous to the amendment for changing the coordinator) whereas the UOC (as the new coordinator) will support in organizing the intermediate and final meetings. Furthermore, every 6 months a project factsheet (including planning, project progress, main results, and estimation of occurred costs) will be sent to the CT. Also, working group meetings between specific partners and additional GA meetings will take place when necessary.
Finally, the CT will be in charge to ensure a sound and effective communication with the EC officers all along the project duration.

Task 1.2. Facilitation of the consortium communication (led by UOC)
The CT and the GA will be responsible of ensuring in-time and adequate data exchange between the different WPs.
An intranet (internal website) will be developed at the beginning of the project in order to allow dynamic follow-up of managerial components of the project by facilitating partners' tasks, exchange of information and communication. The intranet will be linked to the website generated by EUSEA in WP6. In particular, use of e-communication means (mail, web and telephone conferences) will be enhanced between partners, and – when required - videoconferences. The UAB will ask partners for their inputs and archive all management documents in the intranet to allow a dynamic follow-up of managerial components of the project.

Additionally, GA meetings and SC video conferences held during the project timeframe will contribute to strengthening the consortium partners' communication and collaboration.

Task 1.3. Scientific coordination and project monitoring (led by UOC)
The CT, with the support of the GA will perform the monitoring of the general execution of the project through assessing the work progress against the project aims and deliverables to assure and guarantee for the quality of the whole project. In particular, in order to ensure a quality control of project's progress, especially in terms of the deliverables, different monitoring activities will be implemented and internal processes will be established within the consortium with this specific aim. In particular, the quality of the work conducted will be evaluated constantly at different levels.
First, an internal interim report will be developed by each WP leader and submitted to the Steering Committee (SC) each 6 months in order to monitor the partners' performance, follow-up on the effort consumption, track deviations of the work plan, provide assessment and implement solutions if needed. Furthermore, in order to strengthen the quality of PERFORM results, an internal peer-review of the deliverables will be carried out before they are approved by the GA and submitted to the EC. The review will be carried out by a restricted number of project partners not involved in the generation of the deliverable that will provide feedback in terms of completeness and quality.
Also, a mid-term assessment of the project will be performed by all consortium members halfway through the project, evaluating the degree of completion of the project's objectives, the submission of deliverables, the expectations of the stakeholders, etc. through the implementation of specific performance indicators.
Finally, during the second half of the project, the Advisory Board will be in charge to evaluate PERFORM progress on the basis of results of the mid-term assessment and the analysis of the main project outputs. This evaluation will generate an Evaluation Report including comments and recommendations on achieved results and objectives, which will represent a key input to improve and/or adapt PERFORM development.
As an additional tool to ensure a sound project monitoring, a risk management plan will be also generated during the first year of PERFORM and implemented along the project life in order to foresee the main risks related with management issues and identify the corresponding potential responses or mitigation actions.

Task 1.4. Links to STEM education research projects and networks at European level (led by UOC)
The CT will identify and maintain regular communication to STEM education research projects and networks that focus on the PERFORM concept and approach through establishing direct communication with members of the European network Community for Science Education in Europe (Scientix) and participating in Scientix networking events in order to promote scientific collaboration.
In doing that, joining efforts among science education researchers will be created in order to: 1) develop sound research on science education, and 2) generate innovative performance-based science education activities and toolkits for training teachers that contribute to effectively engaging young people with science across Europe.
Such research links will feed the dissemination and outreach activities led by EUSEA in WP6.

Participation per Partner

Partner number and short name	WP1 effort
1 - UOC	12.00
2 - TBVT	1.00
3 - UoB	1.00
4 - SMS	1.00
5 - UoW	1.00
6 - AJA	1.00
7 - LAC	1.00
8 - UNESCO	1.00
9 - EUSEA	1.00
10 - UAB	4.00
Total	24.00

List of deliverables

Deliverable Number [14]	Deliverable Title	Lead beneficiary	Type [15]	Dissemination level [16]	Due Date (in months) [17]
D1.1	Internal communication strategy and intranet	1 - UOC	Websites, patents filling, etc.	Confidential, only for members of the consortium (including the Commission Services)	4
D1.2	Risk management plan	1 - UOC	Report	Public	6
D1.3	Evaluation Report of the Advisory Board	1 - UOC	Report	Public	24
D1.4	Data Management Plan	1 - UOC	Report	Public	6

Description of deliverables

• D.1.1. Internal communication strategy and intranet (M4). An internal communication tool will be developed to regulate the administrative communication as well as an intranet to facilitate the flow of information between all members of the consortium.
• D.1.2. Risk management plan (M6). A risk management plan will be developed to foresee management potential risks and conflicts, estimate impacts, and define responses in order to achieve a resolution.
• D.1.3. Evaluation Report of the Advisory Board (M24). The members of the Advisory Board will elaborate a report whose recommendations, based on achieved results, will provide feedback to improve and eventually adapt PERFORM further actions.
• D.1.4. Data Management Plan (M6). In order to attend the requirements of the pilot action on open access to research data, a Data Management Plan (DMP) in which the consortium will specify what data will be open.

D1.1 : Internal communication strategy and intranet [4]

An internal communication tool will be developed to regulate the administrative communication as well as an intranet to facilitate the flow of information between all members of the consortium

D1.2 : Risk management plan [6]

A risk management plan will be developed to foresee management potential risks and conflicts, estimate impacts, and define responses in order to achieve a resolution.

D1.3 : Evaluation Report of the Advisory Board [24]

The members of the Advisory Board will elaborate a report whose recommendations, based on achieved results, will provide feedback to improve and eventually adapt PERFORM further actions

D1.4 : Data Management Plan [6]

In order to attend the requirements of the pilot action on open access to research data, a Data Management Plan (DMP) in which the consortium will specify what data will be open.

Schedule of relevant Milestones

Milestone number [18]	Milestone title	Lead beneficiary	Due Date (in months)	Means of verification
MS3	Mid-term internal evaluation	1 - UOC	18	Use of a specific set of indicators
MS6	Links to Scientix	1 - UOC	30	Participation in Scientix networking events and

Schedule of relevant Milestones

Milestone number [18]	Milestone title	Lead beneficiary	Due Date (in months)	Means of verification
				presence of Scientix members in PERFORM events

Work package number [9]	WP2	Lead beneficiary [10]	2 - TBVT
Work package title	Innovative science education methods based on performing arts		
Start month	1	End month	36

Objectives

This WP will explore new methodologies to develop PERformance-based Science Education Innovative Activities (PERSEIA) using applied drama and targeting young people. The aim is to engage young people in STEM through direct interaction with early career researchers and teachers in an environment that reinforces the human dimension of science and includes the values embedded in the RRI.
The specific objectives of WP2 are:
- To identify and include key education and communication tools in drama-based activities, that address the human dimension of science, young people's interests in STEM and the RRI values.
- To generate a participatory process based on PERSEIA, involving young people, teachers and early career researchers with the aim of providing young people with transversal competences needed to pursue STEM careers, with a special emphasis on girls.
- To up-scale resulting PERSEIA methodological approach to informal teaching and learning contexts, and specifically to science museums.

Description of work and role of partners

WP2 - Innovative science education methods based on performing arts [Months: 1-36]
TBVT, UOC, UoB, SMS, UoW, AJA, LAC, UAB
Task 2.1. Inclusion of the "human dimension" of science and the values embedded in RRI in performance-based activities (led by TBVT)
In an initial stage of the project, deliberative focus groups with selected secondary school students and teachers will be organised in each of the three case studies in order to collectively reflect about the concerns, needs and expectation of young people in STEM education, as well as their interests on relevant scientific topics related to current EU societal challenges. Specifically, and to allow for comparison, each case study will involve two secondary schools from low socio-economic contexts and two secondary schools from medium socio-economic contexts along the entire project. Schools will give their prior and informed consent and ethical approval of the activities to be performed and students will be asked for returning a signed parental consent form for participating in the project. The involvement of secondary schools and teachers in the project will be encouraged through non-economic and/or economic incentives (education material for schools, punctual payments and/or official recognition for teachers by the corresponding public administration).
Focus groups will be led by case study coordinators (LAC in France, TBVT in Spain and SMS in UK). The topics for discussion in workshops will be related to the RRI values: gender inequality and girl's barriers in STEM (with the support of UNESCO's Women in Science L'Oreal Programme); science-related stereotypes; two-way dialogue between scientists and the society; ethical issues in scientific research; the role of entrepreneurial and multidisciplinary research careers in labour market. TBVT, with the support of LAC and SMS, will lead the qualitative content analysis of the collective discussions generated during the focus groups. The result will be an integrated methodological protocol to develop performance-based activities based on the drama approaches of local partners' expertise: clown by LAC, stand-up comedy by TBVT and street theatre (science busking) by SMS. The protocol will include the topics listed above and provide effective tools to generate a fluid two-way dialogue between students and the researchers during the performance. Such dialogue will provide student reflection about researchers as role models, gender inequalities and ethical issues in STEM careers and scientific research.
LAC, SMS and TBVT will follow the developed methodological protocol to design specific PERSEIA that will be tested with a sample of students from 10 to 16 different secondary schools (from low and medium socio-economic contexts) in each case study, that will also be asked for giving their free, prior and informed consent, as well as student's parental consent. These secondary schools will be selected from the UNESCO's network of associated schools (ASPnet) to ensure their interest in the project.
During one year, the two-way dialogue generated during PERSEIA execution will be encouraged by using social networks (i.e., Twitter) to foster further students' engagement in and learning about scientific topics of their interest. Such interaction will be analysed by WP4.

Task 2.2: Participatory process with young people, teachers and early career researchers (led by TBVT)

In a second stage of the project, LAC, TBVT and SMS will conduct an interactive and self-mobilization participatory process with secondary school students, their teachers and early career researchers in each case study with the aim of assisting students in developing their own PERSEIA, following the methodological protocol generated in Task 2.1. To achieve it, a total of 120 students in each case study (30 students per school) will be actively involved in five participatory workshops to develop their own PERSEIAs and the activities further implementation.
Participatory workshops will address the following topics and their corresponding methodological protocols will be previously developed by the following PERFORM partners:
1. Selection of relevant scientific topics that address societal challenges: TBVT
2. Critical thinking and self-reflection: AJA-TBVT
3. Interaction between arts and the scientific method: UAB-TBVT
4. Gender issues (leadership, entrepreneurship, digital skills): TBVT-UNESCO
5. Performing skills: LAC-SMS-TBVT
TBVT will lead the collection, revision and integration of the individual protocols into a common protocol in order to implement participative workshops with young people, teachers and early career researchers.
As in task 2.1 the two-way dialogue between students and researchers will be encouraged using the social networks. The involvement of researchers in workshops and online dialogue with students will be encouraged through punctual payments.
Students will finally execute the generated PERSEIAs in their own schools, becoming agents to engage and to motivate other youngsters to approach STEM. Results from the qualitative content analysis of the collective discussions generated during the participatory process and from the assessment conducted in WP4 will assist TBVT, with the support of LAC and SMS, to generate an integrated methodological protocol to implement PERSEIA by students, teachers and early career researchers through a participative process.

Task 2.3. Pilot PERSEIA scaled up into informal context: implementation in science museums (led by TBVT)
This task will foster the implementation of PERSEIAs developed in formal contexts to science museums. LAC, SMS and TBVT will identify science educational activities conducted in local science museums and addressed to secondary school students in order to explore the best approach to adapt PERSEIAs to an informal learning and teaching contexts. A knowledge-transfer workshop based on the previous findings, and with the participation of science museum facilitators, will be conducted at a science museum in one of the case studies that will be contacted by TBVT at the beginning of the project (preferably from the ECSITE network). This will allow for designing integrated methodological guidelines to adapt PERSEIAs to science museums activities. These guidelines will be further developed by science museum practitioners once the project is finished.

Participation per Partner

Partner number and short name	WP2 effort
1 - UOC	2.00
2 - TBVT	42.00
3 - UoB	7.00
4 - SMS	30.00
5 - UoW	2.00
6 - AJA	1.00
7 - LAC	18.00
10 - UAB	2.00
Total	104.00

List of deliverables

Deliverable Number [14]	Deliverable Title	Lead beneficiary	Type [15]	Dissemination level [16]	Due Date (in months) [17]
D2.1	Final protocol of tested methods to transform a performance-based activity into a PERSEIA	2 - TBVT	Report	Public	16
D2.2	Final protocol of tested methods to generate a transformative participatory educational process by using science and arts-based education approaches	2 - TBVT	Report	Public	30
D2.3	Guidelines for PERSEIA adaptation to science-museums	2 - TBVT	Report	Public	36

Description of deliverables

• D.2.1. Final protocol of tested methods to transform a performance-based activity into a PERSEIA (M16). With the knowledge attained in the workshops developed in task 2.1 and including all case studies, WP2 will generate a detailed protocol on how to take in the most relevant aspects (the human dimension of science, RRI values) in a performance-based activity to develop a PERSEIA in different UE contexts.
• D.2.2. Final protocol of tested methods to generate a transformative participatory educational process by using science and arts-based education approaches (M30). A methodological protocol to generate participatory educational between students, teachers and early career researchers in formal contexts will be developed with the aim of designing and executing PERSEIAs. The protocol will explain effective approaches to promote a mutual learning scenario between scientific and educational communities that will lead students to the development of PERSEIA.
• D.2.3. Guidelines for PERSEIA adaptation to science-museums (M36). The guidelines will address the key aspects to efficiently develop PERSEIAs in informal education context.

D2.1 : Final protocol of tested methods to transform a performance-based activity into a PERSEIA [16]

With the knowledge attained in the workshops developed in task 2.1 and including all case studies, WP2 will generate a detailed protocol on how to take in the most relevant aspects (the human dimension of science, RRI values) in a performance-based activity to develop a PERSEIA in different UE contexts.

D2.2 : Final protocol of tested methods to generate a transformative participatory educational process by using science and arts-based education approaches [30]

A methodological protocol to generate participatory educational between students, teachers and early career researchers in formal contexts will be developed with the aim of designing and executing PERSEIAs. The protocol will explain effective approaches to promote a mutual learning scenario between scientific and educational communities that will lead students to the development of PERSEIA.

D2.3 : Guidelines for PERSEIA adaptation to science-museums [36]

The guidelines will address the key aspects to efficiently develop PERSEIAs in informal education context

Schedule of relevant Milestones

Milestone number [18]	Milestone title	Lead beneficiary	Due Date (in months)	Means of verification
MS5	Inclusion of the RRI values	2 - TBVT	26	Participatory workshops of the performance-based science education methodologies

Work package number [9]	WP3	Lead beneficiary [10]	3 - UoB
Work package title	Building science education and communication capacity for teachers and early career researchers		
Start month	1	End month	36

Objectives

This WP focuses on the sharing of knowledge and skills relevant to teachers and early career researchers to develop performance-based science education activities; and on the development of training resources in this area. The main objectives are:
- To identify the relevant skills, knowledge and approaches needed to design and implement performance-based activities to engage young people with research and to and facilitate mutual learning amongst partners and external experts.
- To develop training modules and guidelines for researchers and teachers based on the results of the research carried in the first phase of implementation of PERSEIA activities, in order to prepare them to independently carry out the PERSEIA activities and to develop cross disciplinary skills associated with the PESEIAs such as communication and engagement skills, team working, a more holistic and interdisciplinary understanding of research including RRI values and social inclusion, amongst others.

Description of work and role of partners

WP3 - Building science education and communication capacity for teachers and early career researchers
[Months: 1-36]
UoB, UOC, TBVT, SMS, UoW, AJA, LAC, UAB
Task 3.1. Development of knowledge sharing workshop on performance-based activities and RRI values (led by UoB)
In a first phase of the project, the partners will collectively identify the skills and knowledge needed for the production and development of PERSEIAs. Each partner will also reflect on their own range of expertise. Based on this information, a knowledge sharing workshop will be organized where secondary school students, teachers and early career researchers as well as external experts on fields identified previously as relevant to PESEIAs will be brought together to inform and train the partners. The workshop will also offer an opportunity for the different partners to share their relevant knowledge and experience. Some of the skills to be developed may involve, for example, performance skills, working with schools and teenagers, participatory approaches, ethics in participatory research, evaluation, responsible research and innovation.
The information collated during this workshop will inform each partner's development of their PERSEIAs and will be used as a basis – subject to evaluation - for tasks 3.2 and 3.3.

Task 3.2. Development of training and guidelines for researchers (led by UoB)
The research and evaluation carried out during the first phase of developing PERSEIAs will inform the development of training, toolkits and guidelines for researchers interested in using performance based approaches in engaging with young people.
The training courses will be developed as a collaboration between UoB, AJA and UoW in order to benefit from the expertise of these partners in public engagement and training of early career researchers, on reflexivity of the research practice (social dimension of science) and in evaluation.
The specific topics for both trainings will depend on the results of the research done during the implementation of the PESEIAs (Task 2.2), but we envisage training in social aspects of science and reflexivity on the research practice, performance skills, communication skills, working with teenagers, working with schools, gender equality issues, and ethics amongst others. The training on these skills will be organised in the best way for the early career researchers to make the most of it, for example, we envisage having training on reflexivity on research practice before performance skills as that will improve the quality of the performance and avoid perpetuating a deficit-model type of science communication.
The first year, an initial training course (based on results from task 3.1 and 2.1) will be developed and piloted with the University of Bristol's Centres for Doctoral Training offered as weekly sessions over a period of several months. These Centres provide multidisciplinary training and researcher development for PhD students; Bristol has one of the largest concentrations of these Centres in the UK. Prior to this training, participants will take part in a summer school organized by AJA, aimed to enhance reflexivity on their research practice (social dimension of research, issues of integrity, responsibility, social outreach). Regarding participants to PERSEIA activities in France and Spain, a common training will be offered in an intensive format (one week summer school), delivered both by AJA & UoB.

Formative and summative evaluation of the initial training for researchers will be conducted by UoW and UoB, and will inform the development of a second training course to ensure the design and content are appropriate and that the training is effective. The second version of the training course will be delivered during the second year of the project following the same format of a summer school and weekly training in the UK and two intensive trainings in France and Spain. The early career researchers participating in the training will be offered the opportunity to take part in the development and implementation of PESEIAs but for those who decide not to get involved the training will have provided them with valuable personal development skills (such as resilience or confidence) useful in the employability agenda in higher education and in their future careers as engaged researchers. We will strongly encourage researchers to participate in PESEIAs and we expect a take up of about 30% to do so.
A first toolkit for early career researchers/engagement professionals will be developed as the result of the first trainings and on the evaluation carried out on it. This toolkit will be tested and evaluated during the second round of trainings and with the results a final and improved version of the toolkit will be developed. The toolkit will include background information on PERESIAS, guidelines on how to develop the skills identified as essential for PESEIAs and a collection of case studies and best practices resulting from the PERSEIA activities developed in the different participating countries as well as tips on how to implement them. The toolkit will be designed for institutions of Higher Education, , research institutes and any other institutions in charge of the training of researchers.

Task 3.3. Development of training and guidelines for teachers (led by UoB)
In parallel to the development of training and guidelines for early career researchers and using the results from the research done on the first phase of implementation of PESEIAs, UoB and AJA will develop a first version of training and guidelines for teachers (both from science and drama background) interested in using performance based approaches in engaging with students.
A first training will be developed and tested with secondary school teachers in Bristol, with special emphasis on working with schools from socially deprived areas. Following this pilot training, other trainings for teachers will be organised in each of the countries involved in the project in close collaboration with local partners.
In the same way as in the training for early career researchers, formative and summative evaluation of the initial training for teachers will be conducted by UoB, and will inform the development of a second training course to ensure the design and content are appropriate and that the training is effective. The second version of the training will be delivered during the second year of the project by the local partners involved in the project.
The topics for the training will depend on the results of the first implementation of the PESEIAs (Task 2.2), but we envisage training in performance skills, communication, working with researchers, cutting edge research and its related social aspects and ethics including gender equality issues.
A first toolkit for teachers wanting to develop PESEIAs will be developed as the result of the first trainings and on the evaluation carried out on them. This toolkit will be tested and evaluated during the second round of trainings and with the results a final and improved version of the toolkit will be developed. The toolkit will include background information on PERSEIAs, guidelines on how to work with students on the skills identified as essential to develop PERSEIAs and a collection of case studies and best practices resulting from the PERSEIAs developed in the different participating countries as well as tips on how to implement them.

Participation per Partner

Partner number and short name	WP3 effort
1 - UOC	2.00
2 - TBVT	4.00
3 - UoB	31.00
4 - SMS	2.00
5 - UoW	6.00
6 - AJA	6.00
7 - LAC	1.00
10 - UAB	1.00
Total	53.00

List of deliverables

Deliverable Number [14]	Deliverable Title	Lead beneficiary	Type [15]	Dissemination level [16]	Due Date (in months) [17]
D3.1	Toolkit for researchers wanting to develop PERSEIAs	3 - UoB	Other	Public	33
D3.2	Toolkit for teachers wanting to develop PERSEIAs	3 - UoB	Other	Public	36

Description of deliverables

• D.3.1. Toolkit for researchers wanting to develop PERSEIAs (M33). The toolkit will include background information, guidelines on how to develop the skills needed as well as on the practicalities of setting up and resourcing a PESEIAs project and case studies and best practices resulting from PERFORM.
• D.3.2. Toolkit for teachers wanting to develop PERSEIAs (M36). The toolkit will include background information, guidelines on how to develop the skills needed as well as on the practicalities of setting up and resourcing a PESEIAs project and work with the students, and case studies and best practices resulting from PERFORM.

D3.1 : Toolkit for researchers wanting to develop PERSEIAs [33]

The toolkit will include background information, guidelines on how to develop the skills needed as well as on the practicalities of setting up and resourcing a PESEIAs project and case studies and best practices resulting from PERFORM.

D3.2 : Toolkit for teachers wanting to develop PERSEIAs [36]

The toolkit will include background information, guidelines on how to develop the skills needed as well as on the practicalities of setting up and resourcing a PESEIAs project and work with the students, and case studies and best practices resulting from PERFORM.

Schedule of relevant Milestones

Milestone number [18]	Milestone title	Lead beneficiary	Due Date (in months)	Means of verification
MS1	Selection of the specific training skills to be developed	3 - UoB	5	Knowledge sharing workshop

Work package number [9]	WP4	Lead beneficiary [10]	10 - UAB
Work package title	Impact assessment of the participatory educational process in students' engagement in and learning about science		
Start month	1	End month	36

Objectives

The aim of this WP is to monitor and to assess the effectiveness of the participatory educational process, including the performance-based science education activities, in raising the appeal of STEM for girls and boys by fostering their engagement, learning and the acquisition of transversal competences needed for scientific careers. This is directly related to the core of the project, as general goal 1 aims at leading students to explore, understand and learn about the human dimension of STEM through the different activities developed in WP2. Such assessment will combine state-of-the-art methodologies and technologies of social research.
Specific goals are the following:
- To identify and robustly investigate individual, contextual and methodological factors contributing to or detracting from the impacts of the participatory process in girls' and boys' learning and engagement in science.
- To systematically evaluate the quality and quantity of social-media-based impacts stemming from the science education activities based on performing arts on students' feelings, perceptions and attitudes towards science, and their views about the appeal of scientific careers.
- To assess the impact of the participatory process in promoting students' acquisition of transversal competences and skills (digital, civic, and entrepreneurship) that will allow them to engage in scientific ideas and practices.
- To assess the role of the participatory process developed through the project in embedding the values of the RRI approach.
PERFORM will treat any personal information connected to the audience response data with a high level of consideration, courtesy, privacy and ethical practice (as detailed in section 5).

Description of work and role of partners

WP4 - Impact assessment of the participatory educational process in students' engagement in and learning about science [Months: 1-36]
UAB, UOC, TBVT, SMS, UoW, AJA, LAC
Task 4.1. Development of an innovative and participatory impact assessment research methodology (led by UAB)
The methodology design will combine mixed methods and technology in a broad time framework, including assessment prior to, simultaneous and subsequent to the participatory process of creating and implementing the science education activities based on performing arts.
The UAB, with the support of UOC and UoW, will generate a set of expert-based assessment indicators on the grounds of literature review on transdisciplinary assessment frameworks (educational psychology, science communication, sociology, performance-based approaches, among others). This literature review will provide a grounding to define the evaluation criteria and design the data collection instruments to qualitatively and quantitatively analyze in a systematic way the impact of PERFORM activities on students' motivations and appeal for scientific careers.
Furthermore, special attention will be paid to the inclusion of students, and specially girls, in the evaluation process through participatory assessment methods. Each case study coordinator (LAC, TBVT and SMS), supported by UAB and UoW, will develop a workshop in the correspondent country to include the criteria and indicators that students consider important to the assessment of the impact of the project. Such approach will contribute to students' active engagement in the evaluation process, while including their voices and values, and thus, complementing the expert-based indicators.

Task 4.2. Evaluation of the social media-based impacts of the performance events on young people's engagement in science (led by UoW)
UoW will systematically evaluate the quality and quantity of social media-based impacts stemming from the students' participation in the performance events on their feelings, perceptions and attitudes towards science and researchers, and their views about the appeal of scientific careers.
Students' reception of PERFORM engagement activities will be mediated through platforms such as Twitter. The UoW team will develop a social media analysis tool that will initially require the development of a manually annotated corpus tuned and calibrated to discourse about science performances (different research assistants will analyse the same content independently). Iterative testing and improvement of the tool will then ensure its validity and reliability. The tool will pull tweets related to the different PERFORM activities from the social media Application-Programming Interface (API)

for processing. The tool will categorise responses according to specific 'impact' categories derived from the online ethnography results and a communication expert engaged in the project as an Advisory Board member. A small-scale, exploratory, online ethnography case study will be conducted through online interactions/content creation, interviews and content analysis of related material, led by a multi-lingual set of researchers. In addition to paying close attention to social and technological practices visible within youngster's social media discourse about science performances, an analysis of the nature of conversation within this distinctive communication setting will be also conducted.
In parallel, UoW will conduct qualitative interviews with a small sample of young people who have contributed their views on Twitter. Skype and telephone will be used in order to minimize cost.

Task 4.3. Evaluation of the acquisition of transversal competences by students during the educational process (led by UAB)
The UAB team supported by UOC will assess the extent of the students' involvement in the educational process through their active participation in PERSEIAs promotes changes in the way they engage in social and civic competences (e.g., critical and creative thinking), sense of initiative (i.e., entrepreneurship), and learning to learn (i.e., self-reflection, scientific method-approach).
For that purpose, UAB will combine systematic observation, interviews, and deliberative focus groups to analyse their perceptions and skills to study STEM and related careers. During selected WP2 workshops, systematic observation will be conducted and specific moments for collective reflection will be also provided in order to capture and retain students' experiences and appreciations along the process. UAB will also have formal data recorded in video and audio formats in order to compare over time and track processes within (e.g., decision-making or gender-balanced participation). To triangulate data sources while increasing the probability of in-depth understanding of the learning process, teachers and early career researchers involved in the process will be also interviewed about their perceptions on students' attitudinal changes and skill improvement at school.
Specifically, UAB will assess framing effects from different performance content, medium effects from diverse performance approaches and facilitator effects, including their capacity to connect with students, to stimulate the acquisition of such transversal competences. Data on individual and contextual factors such as students' demographics (e.g. gender, age, socio-economic status) will also be gathered and analysed to monitor such factors.

Task 4.4. Assessment of the Responsible Research and Innovation values (led by UAB)
The UAB team will evaluate the capacity of the participatory educational process to transmit the RRI values through the resultant science performances. The parameters analysed will be: a) the inclusiveness of all participants (i.e., students, teachers, and researchers) and its balanced participation in terms of gender equality, b) the ability to booster creative and critical thinking, c) fostering dialogue and learning between students and early career researchers, and d) the inclusion of ethical issues, such as social relevance of topics addressed, respect for cultural diversity, or participants' acceptation of the process and outcomes. WP4 will also measure the impact of the project's RRI approach in students' attitudes and pro-scientific behaviour and learning. Furthermore, performance's capacity to combine rigorous scientific content with aesthetic quality, which is considered as a key feature to achieve effective results, will be also analysed.
This assessment will be conducted in collaboration with UOC and through a triangulation of methods: surveys and informal interviews to key participants and systematic observation (described in Task 4.3). Pre- and post- surveys will be conducted at the beginning and the end of the participatory educational process in each case study whereas interviews and observation will be conducted during WP2 workshops. Framing effects from different performance content, medium effects from different performance approaches and facilitator effects (i.e., facilitators' capacity to stimulate inquiry learning or to mobilise emotions), will be also assessed. Data will be comparatively analysed considering gender and socio-economic factors.
Case study coordinators will support UAB to ensure proper implementation and data collection in each case study.

Participation per Partner

Partner number and short name	WP4 effort
1 - UOC	22.00
2 - TBVT	3.00
4 - SMS	2.00
5 - UoW	14.00
6 - AJA	1.00

Partner number and short name	WP4 effort
7 - LAC	1.00
10 - UAB	33.00
Total	76.00

List of deliverables

Deliverable Number [14]	Deliverable Title	Lead beneficiary	Type [15]	Dissemination level [16]	Due Date (in months) [17]
D4.1	Research report: Methodological aspects of science education assessment	10 - UAB	Report	Public	7
D4.2	Report on social media responses to science performances	5 - UoW	Report	Public	35
D4.3	Policy brief: Effective science and arts-based education approach	10 - UAB	Report	Public	36

Description of deliverables

• D.4.1 Research report: Methodological aspects of science education assessment (M7). UAB will lead a bibliographic review on assessment methods and criteria to evaluate participatory science educational processes and activities, including methodological questions and challenges to be addressed in each specific case study.
• D.4.2 Report on social media responses to science performances. (M35). UoW will lead this dimension of the research. The report will include key findings and insights from both the online ethnography case study and automated Twitter analysis tool.
• D.4.3 Policy brief: Effective science and arts-based education approach. (M36). UAB, in coordination with case study coordinators, will provide policy guiding in addressing the contribution of performance-based approaches in the development of innovative and creative scientific education activities promoting transversal competences, embedding RRI dimensions and raising the attractiveness of STEM careers.

D4.1 : Research report: Methodological aspects of science education assessment [7]

UAB will lead a bibliographic review on assessment methods and criteria to evaluate participatory science educational processes and activities, including methodological questions and challenges to be addressed in each specific case study.

D4.2 : Report on social media responses to science performances [35]

UoW will lead this dimension of the research. The report will include key findings and insights from both the online ethnography case study and automated Twitter analysis tool.

D4.3 : Policy brief: Effective science and arts-based education approach [36]

UAB, in coordination with case study coordinators, will provide policy guiding in addressing the contribution of performance-based approaches in the development of innovative and creative scientific education activities promoting transversal competences, embedding RRI dimensions and raising the attractiveness of STEM careers.

Schedule of relevant Milestones

Milestone number [18]	Milestone title	Lead beneficiary	Due Date (in months)	Means of verification
MS4	ICT development of an automated tool to enable social media data analysis	5 - UoW	24	Running a trial analysis, with a brief pilot automated social media analysis

Work package number [9]	WP5	Lead beneficiary [10]	8 - UNESCO
Work package title	Sustainability and Policy Impact		
Start month	1	End month	36

Objectives

This WP has the twofold objective of promoting the sustainability of the project and embedding policy linkages between PERFORM and EU science education policy and decision-makers from the beginning of the project, in order to ensure a significant medium and long-term impact of the PERFORM resultant methodologies and outcomes across Europe and to return the generated research results to the European society.
Therefore, WP5 specific objectives are the following:
- To promote the sustainability of the project and enhance its impacts on the engagement of young people in STEM in the medium- and long-term across EU Member States.
- To translate the innovative research and practical tools developed by PERFORM into specific policy actions that strengthen and coordinate the institutional ability of EU Member States to encourage scientific vocations among young girls and boys, promoting scientific literacy and awareness about STEM careers

Description of work and role of partners

WP5 - Sustainability and Policy Impact [Months: 1-36]
UNESCO, UOC, TBVT, UoB, SMS, AJA, LAC, EUSEA, UAB
Task 5.1: Generation of a sustainability plan (led by UNESCO)
This task will generate the PERFORM project sustainability plan with the aim of ensuring the successful implementation of resources and methodologies developed by PERFORM to be used by teachers and researchers, improving their capacities as science teachers and communicators, and engaging young people in STEM. Furthermore, the sustainability plan will guarantee the use of the generated resources by professional science education and communication communities interested in science-art projects entities across Europe beyond the end of the project. In doing that, the project will provide them with the skills needed to apply the methodologies and toolkits developed in order to improve their scientific education and communication activities and services.
For that purpose, screening of successful sustainability models of previous EU science education projects or other topic-related projects (including current and past UNESCO initiatives and programmes) will be conducted by UNESCO through the revision of the projects' website and the on-line (email or Skype) interviews of the coordinators about the best practices and opportunities to maximize the impact of a project beyond its end.
The vast know-how of UNESCO, its programmes and expertise will be also leveraged to promote the inclusion of new knowledge derived from the PERFORM results and toolkits into existing UNESCO programmes for their further exploitation and sustainability. During the PERFORM intermediate meeting, UNESCO will be responsible for the structure, arrangements and agenda of a cross-interaction one-day meeting that will provide all PERFORM partners and stakeholders with training and access to the latest UNESCO analytical policy tools and indicators on science literacy, education, gender, research and policy through web-based information systems: the Global Observatory on Science, Technology and Innovation Policy Instruments (GO-SPIN) and the web platform For Women in Science.
UNESCO will also seek frequent advice from the PERFORM Advisory Board to provide input on the project's maintenance and growth.
As part of the sustainability plan, UNESCO will also seek additional financial and intellectual support through strategic partnerships as an early and ongoing project activity to ensure that the outcomes of PERFORM are kept up and running once the grant period is over.

Task 5.2: Maximize the policy impact of PERFORM (led by UNESCO)
This task will contribute to research in the field of science education on how to implement PERSEIA on a larger scale from data collected at meetings with policy-makers and intersection with existing UNESCO successful programmes on science education and capacity-building.
For that purpose, WP5 will design, organize and execute external cross-interaction meetings with key stakeholders (teachers, students, early career researchers, partners) and policy-makers to ensure strong science-policy links with the timely transfer of the newly generated knowledge, results and toolkits to European policy-makers.
Beyond dissemination activities, WP5 will coordinate and lead delegations composed of selected PERFORM stakeholders (i.e., students, teachers, researchers, and partners) to attend the most relevant European science policy forums to present PERFORM in the form of panel discussions and oral presentations. Such participation will also involve

European policy-makers, practitioners, educational institutions at all levels, governments, civil society organisations and industry. During those meetings, UNESCO will conduct interviews and arrange separate roundtables and focus groups with key PERFORM stakeholders and European Ministers of Education, Science, Technology and innovation, accessed through the Scientix network and the UNESCO National Commissions in each European Member State. The preliminary list of events includes: World Science Forum 2015 (Budapest, Hungary), World Science Day 2016; (UNESCO HQ, Paris), UNESCO Youth Forum 2016/2017 (UNESCO HQ, Paris), ESOF 2016 (Manchester, UK), and Scientix General Conference (Brussels, Belgium).
This task will address specific efforts to organise a meeting in the context of a Future Classroom Labs (FCL) workshop held by Scientix in 2017 (dates and location to be defined). UNESCO will coordinate the participation of 10 to 20 selected PERFORM stakeholders. Participation will consist of networking and demonstrations of PERSEIA during a slot in the programme to an audience of policy-makers and the rest of the Scientix community. FCL workshops will provide a unique platform for policy-makers to receive up-to-date information about the state-of-play in STEM education research and practice and to rethink their science education strategies considering the input from teachers and students within flexible learning environments.

Participation per Partner

Partner number and short name	WP5 effort
1 - UOC	2.00
2 - TBVT	2.00
3 - UoB	2.00
4 - SMS	1.00
6 - AJA	1.00
7 - LAC	2.00
8 - UNESCO	15.00
9 - EUSEA	2.00
10 - UAB	1.00
Total	28.00

List of deliverables

Deliverable Number [14]	Deliverable Title	Lead beneficiary	Type [15]	Dissemination level [16]	Due Date (in months) [17]
D5.1	Sustainability plan	8 - UNESCO	Report	Public	15
D5.2	Two policy briefs on WP5 related topics	8 - UNESCO	Report	Public	34

Description of deliverables

• D5.1. Sustainability plan (M15). A sustainability plan will be generated to ensure PERFORM's ability to maintain its impact over the medium and long term. The plan will include concrete actions to incorporate PERFORM's results and outcomes as resources under UNESCO programs and initiatives related to science education, from which they will be readily available to policy-makers at UNESCO National Commissions, and maintaining a repository of all project materials in Scientix.
• D.5.2. Two policy briefs on WP5 related topics (M34). The first policy brief will summarize the best practices and strategies to incorporate the PERSEIAs into the European science policy community of researchers and practitioners. The second policy brief will include an analysis of successful case studies on how the training tools developed by PERFORM can be effectively incorporated into the European science policy community of practitioners and teachers.

D5.1 : Sustainability plan [15]

A sustainability plan will be generated to ensure PERFORM's ability to maintain its impact over the medium and long term. The plan will include concrete actions to incorporate PERFORM's results and outcomes as resources under UNESCO programs and initiatives related to science education, from which they will be readily available to policy-makers at UNESCO National Commissions, and maintaining a repository of all project materials in Scientix.

D5.2 : Two policy briefs on WP5 related topics [34]

The first policy brief will summarize the best practices and strategies to incorporate the PERSEIAs into the European science policy community of researchers and practitioners. The second policy brief will include an analysis of successful case studies on how the training tools developed by PERFORM can be effectively incorporated into the European science policy community of practitioners and teachers.

Schedule of relevant Milestones

Milestone number [18]	**Milestone title**	**Lead beneficiary**	**Due Date (in months)**	**Means of verification**
MS2	Identification of actions for sustainability	8 - UNESCO	8	Screening successful sustainability models of previous EU science education projects or other topic-related projects

Work package number [9]	WP6	Lead beneficiary [10]	9 - EUSEA
Work package title	Dissemination and Outreach		
Start month	1	End month	36

Objectives

The specific objectives of WP6 are the following:
- To create a structure for dissemination and communication that makes the best possible use of the resources available in order to provide relevant, timely and targeted communication opportunities. This will include the online presence, including social media, and other forms of communication with and towards well defined target groups.
- To develop links and collaborations with existing networks and communities, and specifically with Scientix, including mutual visibility through websites, other media and events, to generate the best possible effects of the dissemination efforts.
- To organize and promote a final conference, with the aim to provide stakeholders and others interested with the most updated knowledge and findings/results of the project.

These objectives will be divided into measurable goals, e.g. through the use of web-based tools such as Google Analytics. Social media providers already offer such possibilities, and the possibilities to further refine communication efforts are most likely to increase even more in coming years. Other measurable goals are the number of final conference participants, the number of presentations at Scientix and other conferences, both nationally and internationally.
Part of the structure for communication and dissemination is the network and community of EUSEA, European Science Events Association, with about 100 science events' organizers in more than 30 European countries.

Description of work and role of partners

WP6 - Dissemination and Outreach [Months: 1-36]
EUSEA, UOC, TBVT, UoB, SMS, UoW, AJA, LAC, UNESCO, UAB
Task 6.1 Communication Plan and Tools (led by EUSEA)
A strategic and operational communication plan for dissemination and exploitation will be produced as a first step, identifying target groups, levels of pre-understanding, desired results, proposed actions, time and potential partners for the various activities (such as Scientix). The plan will also cover the data collection output, how the results of the activities will be disseminated and made available (Open Access) to the policy-makers, research and science teachers' communities. Attention will be given to "early adopters" among teachers and how they may be supported. Finally, the plan will also cover the use and importance of local languages for certain activities, such as teacher communication.
With this task, a structure and groups of actors will be created and their needs and expectations regarding communication with the project, for various levels of knowledge, engagement and actual participation will be defined. Electronic means of communication will be primarily considered, for the sake of speed, accuracy, costs and analytics, which will include website(s), social media and digital repositories for references and reports as well as digital tools for collaboration and inclusion. In the case of teachers, although many are fluent in English, translations of key parts will be done, primarily into the project's languages (i.e. Spanish and French). A flexible content system for web publishing will allow further major languages (e.g. German) to be added on a demand basis. Resources for translation will be allocated from the content part of the website and online presence.
A constant "editorship" of website, social media and other communication channels will be arranged. The person(s) in charge will be preparing, promoting and publishing stories, results, references, and other material that support the overall objectives of the project. The task will also include moderating possible discussion fora connected to the social media, events or website.
The online presence, including web and social media, will be designed from a mobile device user's point of view –thus making it easier for teachers and other groups to follow the project through Twitter or other digital media.
The communication structure will use a range of communication channels and tools in order to reach and engage the various target groups. EUSEA experiences from various EU-funded and other projects over the past 10 year period is that the needs and demands for access to information vary considerably between different groups, such as policy-makers and professionals, or members of the public and researchers. However, the following tools will, of course, be used to inform and engage the various groups of people that the project targets: 1) Newsletters, digitally distributed, primarily in English, 3-4 times/year; 2) Factsheets, available both printed and online; 3) Participatory videos, online; 4) Presentations, including slide shows as well as "science café"-like events; 5) Exhibits, e.g. posters, displays and screens to be used at conferences and other opportunities; and 6) Actual PERFORM shows performed inside and outside schools.

Task 6.2: Building the community relations and outreach (led by EUSEA)
This task will exploit existing networks, communities and other collaborations that exist within the project, and closely related to it, such as the Scientix resources as a result of the links created in Task 4.1. The person in charge of the collaboration and exchange with the Scientix community and resources for dissemination purposes will be responsible for the mutual benefits and visibility that can be achieved through this collaboration. In addition to that, the project will also expand its networks to individuals, projects, associations and public agencies that had no previous contact with members of the consortium. This may include (non exhaustive list):
- Cities and regions, depending on responsibilities for science education in different European countries, it is reasonable to build e.g. on the network of cities created through the EU funded PLACES project ("PLACES of Scientific Culture").
- Schools and school authorities connected to EUSEA members and event organizers in European countries –many science festivals have specific "schools programmes" with local communities of schools and teachers.
- Other interested and engaged parties, that may be connected as sponsors, partners, friends or "followers" to individual EUSEA members
- Local groups or individual researchers in the field, also connected to the science events or science centres and museums, for feedback, possible evidence bases, and references.
Furthermore, this task includes the creation and support of a repository of material that may be used for presentations and/or local adaptations to be used during science communication events (such as festivals or science centre days) in European countries. The internal communication structure and channels is a responsibility of WP1.
Finally, this task will involve the organisation of the PERFORM final conference. UNESCO will be responsible for such conference at the UNESCO Headquarters in Paris, in close collaboration with EUSEA. UNESCO will convene representatives of PERFORM stakeholders (students and teachers from the schools who participated in case studies, early career researchers from case studies) as well as European policy-makers, invited speakers including members of the PERFORM advisory board, and other interested practitioners (i.e., entrepreneurs in STEM fields, including industry). This final event will compile the most relevant research results and toolkits of the project, and will show the best ways for PERFORM methodologies implementation in Member States through oral presentations, panel discussions and round tables.
The extent of the responsibility is primarily limited to the actual structure and arrangements; it is expected that all partners will add knowledge and experience to the programme, e.g. by inviting educational, scientific and policy relevant organizations representatives as speakers and moderators. A separate programme committee will be set up, as well as a local organization committee. Contracts with service providers, including venue, local staff, catering, conference administration, etc will be organized by UNESCO.

Participation per Partner

Partner number and short name	WP6 effort
1 - UOC	2.00
2 - TBVT	2.00
3 - UoB	2.00
4 - SMS	2.00
5 - UoW	2.00
6 - AJA	1.00
7 - LAC	1.00
8 - UNESCO	6.00
9 - EUSEA	18.00
10 - UAB	2.00
Total	38.00

List of deliverables

Deliverable Number [14]	Deliverable Title	Lead beneficiary	Type [15]	Dissemination level [16]	Due Date (in months) [17]
D6.1	Plan for communication, dissemination and exploitation	9 - EUSEA	Report	Public	4
D6.2	Website and social media launch	9 - EUSEA	Websites, patents filling, etc.	Public	6
D6.3	Report on outreach activities, including the final conference	9 - EUSEA	Report	Public	35

Description of deliverables

• D6.1 Plan for communication, dissemination and exploitation (M4). The plan outlines the communication and dissemination strategies and activities, focusing on different target groups, their levels of pre-understanding and how they may be reached and encouraged to engage in the project and its content.
• D6.2 Website and social media launch (M6). The project's online presence is a key function for the communication and accessibility of the project for teachers, researchers, school agencies and authorities, and the site and complementing media will be designed with consideration to several groups and several languages.
• D6.3 Report on outreach activities, including the final conference (M35). It will be possible to use the final report also as a guide for future events and projects, as it will be detailed in terms of preparations, outcome and recommendations.

D6.1 : Plan for communication, dissemination and exploitation [4]

The plan outlines the communication and dissemination strategies and activities, focusing on different target groups, their levels of pre-understanding and how they may be reached and encouraged to engage in the project and its content.

D6.2 : Website and social media launch [6]

The project's online presence is a key function for the communication and accessibility of the project for teachers, researchers, school agencies and authorities, and the site and complementing media will be designed with consideration to several groups and several languages.

D6.3 : Report on outreach activities, including the final conference [35]

It will be possible to use the final report also as a guide for future events and projects, as it will be detailed in terms of preparations, outcome and recommendations.

Schedule of relevant Milestones

Milestone number [18]	Milestone title	Lead beneficiary	Due Date (in months)	Means of verification
MS6	Links to Scientix	1 - UOC	30	Participation in Scientix networking events and presence of Scientix members in PERFORM events

1.3.4. WT4 List of milestones

Milestone number [18]	Milestone title	WP number [9]	Lead beneficiary	Due Date (in months) [17]	Means of verification
MS1	Selection of the specific training skills to be developed	WP3	3 - UoB	5	Knowledge sharing workshop
MS2	Identification of actions for sustainability	WP5	8 - UNESCO	8	Screening successful sustainability models of previous EU science education projects or other topic-related projects
MS3	Mid-term internal evaluation	WP1	1 - UOC	18	Use of a specific set of indicators
MS4	ICT development of an automated tool to enable social media data analysis	WP4	5 - UoW	24	Running a trial analysis, with a brief pilot automated social media analysis
MS5	Inclusion of the RRI values	WP2	2 - TBVT	26	Participatory workshops of the performance-based science education methodologies
MS6	Links to Scientix	WP1, WP6	1 - UOC	30	Participation in Scientix networking events and presence of Scientix members in PERFORM events

1.3.5. WT5 Critical Implementation risks and mitigation actions

Risk number	Description of risk	WP Number	Proposed risk-mitigation measures
R1	Low teachers' engagement in performance science education approaches Teachers may not be interested in such innovative approaches since they are not part of the curriculum.	WP2, WP3	The likelihood of this risk is medium. Case study coordinators in France and UK will provide an economic compensation for teachers. In Spain, teachers will have an official recognition by the corresponding regional Department of Education. WP2 and WP3 leaders will also encourage teachers' participation by linking the performance-based science education approaches with the curricula, and specifically with science-related subjects. If a teacher decides to abandon the project, another teacher will be invited.
R2	Low participation of students in social media (Twitter) Students may not participate in Twitter's scientific debates after the PERSEIAs implementation in order to maintain an on-line dialogue with researchers.	WP2, WP4	The likelihood of this risk is medium. Case study coordinators and involved early career researchers will encourage students' participation in Twitter by asking direct questions related to the activities. LAC, TBVT, and SMS have expertise in promoting dialogue and scientific debate using Twitter. If students do not participate in Twitter, UoW will conduct qualitative interviews for assessment purposes by using skype and telephone in order to minimize cost.
R3	Low engagement of students in participatory workshops Selected students may not be motivated to actively participate in workshops for developing their own PERSEIAs.	WP2, WP4	The likelihood of this risk is medium. Case study coordinators will clearly explain the project and invite to participate to a wide range of students in each school. Workshops' schedule will be arranged taking into account the students' academic needs. PERFORM will also motivate students by

Risk number	Description of risk	WP Number	Proposed risk-mitigation measures
			offering visits to labs and encounters with experts. If a student or students are not interested in participating in PERFORM activities, the case study coordinator and the corresponding teacher will consider the possibility to select other required candidates.
R4	Lack of schools' support to students and teachers participating in PERFORM. The school ceases to support the participation of teachers and students in PERFORM. It may happen if there is a change in the school's board during the project.	WP2, WP3, WP4	The likelihood of this risk is low. Case study coordinators will promote schools' engagement through organising promotional meetings with schools in order to explain the benefits of the project. In Spain, schools' participation will be encouraged by providing them with educational material. Case study coordinators will also look for the institutional recognition of the participation of the school in the project by the corresponding public administration. If the school decides to cease its participation, another school will be invited and engaged by using existing contacts of the UNESCO network of Associated Schools (ASPnet)
R5	Low engagement of early career researchers in performance science education approaches Researchers may not be interested in participate in the process due to lack of time.	WP2, WP3	The likelihood of this risk has been rated as low since researchers involved in the project will receive a punctual payment for participating in workshops and online dialogue with students and their involvement will require less time than in the case of teachers. If a researcher decides to abandon the project, the case study coordinator will invite another researcher working in the same topic and who has been already involved

Risk number	Description of risk	WP Number	Proposed risk-mitigation measures
			in science dissemination activities with PERFORM partners to participate in the project.
R6	Low school commitment with the project The schools initially willing to participate in PERFORM may not be further committed due to the participation of the school in other projects.	WP2, WP3	The likelihood of this risk is low. It will be prioritized include schools with previous working-relation with the partners and which have shown a high level of commitment. If local partners perceive that a school's commitment with the project is not enough to accomplish the objectives of the project, the school will be encouraged to increase their commitment. If the situation does not change, another school will be invited and engaged by using existing contacts of the UNESCO network of Associated Schools (ASPnet).

1.3.6. WT6 Summary of project effort in person-months

	WP1	WP2	WP3	WP4	WP5	WP6	Total Person/Months per Participant
1 - UOC	12	2	2	22	2	2	42
2 - TBVT	1	42	4	3	2	2	54
3 - UoB	1	7	31	0	2	2	43
4 - SMS	1	30	2	2	1	2	38
5 - UoW	1	2	6	14	0	2	25
6 - AJA	1	1	6	1	1	1	11
7 - LAC	1	18	1	1	2	1	24
8 - UNESCO	1	0	0	0	15	6	22
9 - EUSEA	1	0	0	0	2	18	21
10 - UAB	4	2	1	33	1	2	43
Total Person/Months	24	104	53	76	28	38	323

1.3.7. WT7 Tentative schedule of project reviews

Review number [19]	**Tentative timing**	**Planned venue of review**	**Comments, if any**
RV1	18	tbc	
RV2	36	tbc	

1.4. Ethics Requirements

Ethics Issue Category	Ethics Requirement Description
PROTECTION OF PERSONAL DATA	- Detailed information must be provided on the informed consent procedures that will be implemented.
PROTECTION OF PERSONAL DATA	- Detailed information must be provided on the procedures that will be implemented for data collection, storage, protection, retention and destruction and confirmation that they comply with national and EU legislation.
PROTECTION OF PERSONAL DATA	- Justification must be given in case of collection and/or processing of personal sensitive data.
PROTECTION OF PERSONAL DATA	- Copies of opinion or confirmation by the competent Institutional Data Protection Officer and/or authorization, or notification by the National Data Protection Authority (whichever applies according to the Data Protection Directive and the national law) must be submitted to the REA before the commencement of the relevant part of the research during the lifetime of the project.
HUMANS	- The applicant must clarify whether vulnerable individuals/groups will be involved. Details must be provided about the measures taken to prevent the risk of enhancing vulnerability/stigmatisation of individuals/groups.
HUMANS	- The applicant must clarify how consent/assent will be ensured in case children and/or adults unable to give informed consent are involved.
HUMANS	- The applicant must clarify whether children and/or adults unable to give informed consent will be involved and, if so, justification for their participation must be provided.
HUMANS	- Detailed information must be provided on the informed consent procedures that will be implemented.
HUMANS	- Details on the procedures and criteria that will be used to identify/ recruit research participants must be provided.

1. Project number

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

2. Project acronym

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

3. Project title

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

4. Starting date

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

5. Duration

Insert the duration of the project in full months.

6. Call (part) identifier

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

7. Abstract

8. Project Entry Month

The month at which the participant joined the consortium, month 1 marking the start date of the project, and all other start dates being relative to this start date.

9. Work Package number

Work package number: WP1, WP2, WP3, ..., WPn

10. Lead beneficiary

This must be one of the beneficiaries in the grant (not a third party) - Number of the beneficiary leading the work in this work package

11. Person-months per work package

The total number of person-months allocated to each work package.

12. Start month

Relative start date for the work in the specific work packages, month 1 marking the start date of the project, and all other start dates being relative to this start date.

13. End month

Relative end date, month 1 marking the start date of the project, and all end dates being relative to this start date.

14. Deliverable number

Deliverable numbers: D1 - Dn

15. Type

Please indicate the type of the deliverable using one of the following codes:

R	Document, report
DEM	Demonstrator, pilot, prototype
DEC	Websites, patent fillings, videos, etc.
OTHER	

16. Dissemination level

Please indicate the dissemination level using one of the following codes:

PU	Public

CO	Confidential, only for members of the consortium (including the Commission Services)
EU-RES	Classified Information: RESTREINT UE (Commission Decision 2005/444/EC)
EU-CON	Classified Information: CONFIDENTIEL UE (Commission Decision 2005/444/EC)
EU-SEC	Classified Information: SECRET UE (Commission Decision 2005/444/EC)

17. Delivery date for Deliverable

Month in which the deliverables will be available, month 1 marking the start date of the project, and all delivery dates being relative to this start date.

18. Milestone number

Milestone number:MS1, MS2, ..., MSn

19. Review number

Review number: RV1, RV2, ..., RVn

20. Installation Number

Number progressively the installations of a same infrastructure. An installation is a part of an infrastructure that could be used independently from the rest.

21. Installation country

Code of the country where the installation is located or IO if the access provider (the beneficiary or linked third party) is an international organization, an ERIC or a similar legal entity.

22. Type of access

VA	if virtual access,
TA-uc	if trans-national access with access costs declared on the basis of unit cost,
TA-ac	if trans-national access with access costs declared as actual costs, and
TA-cb	if trans-national access with access costs declared as a combination of actual costs and costs on the basis of unit cost.

23. Access costs

Cost of the access provided under the project. For virtual access fill only the second column. For trans-national access fill one of the two columns or both according to the way access costs are declared. Trans-national access costs on the basis of unit cost will result from the unit cost by the quantity of access to be provided.

History of changes

Change	Description
Addition of D.1.4.	A new Deliverable (**D.1.4. Data Management Plan** (M6)) has been added in order to attend the requirements of the pilot action on open access to research data.
Improved description of Table 3.4b.	Each partner exceeding 15% of personnel costs has provided more detailed explanations of the correspondent 'Other direct cost' items in Table 3.4b. TBVT has changed the amount to 40500€ (as requested). UoW has allocated translation costs from subcontracting as Other direct costs (3960€). EUSEA has added a table since Other direct costs would increase due to the removal of the website costs from subcontracting (see below).
Revised subcontracting in Section 4.2	TBVT and UoW have improved their corresponding description of activities to be subcontracted. EUSEA has removed the creation of the website from subcontracting activities (39000€). These costs would be allocated as: - Personnel costs: € 24000 (corresponding to 4 person-months added to WP6, the total amount of pm in WP6 is 18) - Travel: € 3700 (the total amount of travel costs is € 11500) - Other goods and services: € 3500 (the total amount of travel costs is € 6500) - Indirect costs: € 7800 (the total amount of indirect costs is € 36000)
Revised Ethics section	The section has been improved according to the EC Screening Report, which ethics requirements have been addressed and included in the text. This new version of the Ethics section has been reviewed and approved by the UAB's Ethics Commission for Human and Animal experimentation (CEEAH).
Changes related to the Amendment	A new beneficiary has been added: UOC (Fundació de la Universitat Oberta de Catalunya). The coordinator has changed from UAB to UOC. UOC is now leading WP1 and responsible for Tasks 1.1 to 1.4, and UAB remains as the responsible for the kick-off meeting in Task 1.1. Sections 3 and 4 have been rewritten accordingly, including Table 3.4.

Table of Contents

1. Excellence

1.1 Objectives

The principal objective of the PERFORM project is **to deeply investigate the effects of the establishment of a direct interaction and communication between young people and researchers in the promotion of young people's motivations and engagement** in science, technology, engineering, and mathematics **(STEM)**. Such direct interaction and communication will be established by using **innovative science education methods based on performing arts approaches**.

There is an education research interest in exploring the effectiveness of a diversity of arts-based education approaches that are currently but not-systematically used in educational contexts, although mainly informal, in motivating young people in STEM. PERFORM will develop **a creative, participatory educational process on STEM** through the use of scenic arts in selected formal education settings in Europe. Secondary school students and their teachers, together with early career researchers, will get **actively involved in experiencing science and reflecting** about their own role in the interface between science and society, the scientific practice and the values embedded in **Responsible Research and Innovation.** By using such a **human-centred approach to science education**, the PERFORM project aims to shed light over the current academic debates on how humanising science contributes to foster **young people's motivations towards science learning, and strengthen the transversal competences** required for science careers and jobs.

The proposal has four specific objectives which will run concurrently:

1) **To explore new science education methods based on scenic arts that lead secondary school students to understand and to learn about STEM.** Through a participatory educational process, PERFORM will design suitable science education methods drawn on performance approaches. Such methods will create direct interaction between secondary school students from low and medium socio-economic environments, their teachers and early career researchers in order to reflect and to learn about scientists' practice and experience, the impacts and applications of science in real life, the transversal competences required to be engaged in science, the challenges of science labour market, and the values embedded in the **Responsible Research and Innovation** (RRI) approach, taking into account the necessary gender issues. The project will further explore how to upscale such education methods to informal educational settings.

2) **To identify and challenge limitations faced by secondary school teachers and early career researchers in teaching and communicating STEM to young people.** PERFORM will analyse the limitations and challenges in education and communication that both secondary school teachers and early career researchers face in order to engage students in science and foster their understanding on STEM issues in formal education settings. Special attention will be paid to potential gender differences through the learning and teaching processes. Such analysis will inform the design of feasible performance-based science education methods. The outcomes will also enable the development of training toolkits

targeted to secondary school teachers and early careers researchers aimed to acquire the communication and education skills needed to motivate students and foster their interest in science and scientific careers.

3) **To assess the impact of the participatory educational process in fostering secondary school students' motivations and engagement in science and with RRI values.** The PERFORM project will explore the effectiveness of the participatory educational process developed in selected formal educational environments. A set of key assessment indicators will be generated to qualitatively and quantitatively measure the impact of the process in raising girls' and boys' awareness of the relevance of science in their societal context and underlining the appeal of science and scientific careers. PERFORM will also assess the process potential impact in the enhancement of young people's acquisition of the transversal competences required to undertake scientific careers and also the RRI values that will enable them to take informed decisions for full civic participation in a knowledge-based European society. The assessment will specifically focus on identifying gender inequalities and the socio-cultural reasons behind them, in order to design appropriate policy recommendations.

4) **To implement a sound communication strategy for the dissemination and explotaition of the research's results for widespread policy adoption and implementation across Europe.** With the aim of spreading out the results of the research project, PERFORM will timely transfer the newly generated knowledge and innovative practical tools to policy-makers and the scientific and education communities across Europe. PERFORM will translate such research results into specific recommendations for policy strategies which will strengthen the institutional capacity of European Member States in encouraging scientific vocations among young people. The project will also establish links to other European research science education and communication projects and networks, specifically with *Scientix* -the Community for Science Education in Europe-, in order to create synergies on science education research, the development of training toolkits, and the maximization of the impact across Europe.

PERFORM will explore, through **participatory action research**, the effects of a human-centred science education approach based on the use of performing arts in increasing the secondary school girls' and boys' learning about and engagement in STEM.

1.2 Relation to the work programme

The PERFORM project relates to the H2020 Science with and for Society work programme topic SEAC.1.2014.2015- *Innovative ways to make science education and scientific careers attractive to young people*.

PERFORM addresses the call's specific challenge of "*raising the attractiveness of science education and scientific careers and boosting the interest of young people in STEM*" through the exploration of the effectiveness of **participatory learning processes supported by innovative performance-based science education methods in creating transformative changes across secondary school students leading to increase their engagement in science**. The project will focus on secondary school students because at these ages they start looking for their professional future (i.e., careers and jobs). They are also in a crucial stage of developing active participation as citizens and will later be making decisions in their cities or villages. **Case studies will be conducted** in secondary schools located socio-economic contexts of low- and middle- income level **in France, Spain and United Kingdom (UK)**, to ensure the wide representation of social groups and those socially disadvantaged.

Specifically, the project will contribute to the call's specific challenge through the development of participatory educational processes in three ways:

- PERFORM will **facilitate direct interaction inside and outside the classroom** (i.e., research centres) between secondary school students, their teachers and early career researchers by using performance-based science education methods, as a mean for **linking young people with real science**. Such interaction will enable students to get a more realistic vision of the scientific practice in different fields of research (i.e., environmental sciences, technology, engineering, physics, biochemistry, mathematics) in order to challenge myths about the complexity and limitations of STEM careers. As it is stated in the call: "*it needs young boys and girls to pursue careers in science, technology, engineering and mathematics, while at the same time adhering to the values embedded in Responsible Research and Innovation*", such interaction will also provide students' with the values embedded in **RRI (i.e., creative thinking, gender equity, inclusiveness, openness, and mutual learning)** since they are key to enhance the current educational process to ensure students' joint engagement in STEM.
- PERFORM will provide the students with the **transversal competences they will need for being successful in science careers and related jobs**. To address the following challenge included in the call, "*The Union needs all its talents to boost creativity and competitiveness*", PERFORM will explore and validate the effectiveness science education methods based on performing arts in fostering students' 1) sense of initiative and **entrepreneurship** (i.e., creativity, critical thinking and innovation), 2) **social and civic** competences (i.e., team work, collaboration, social responsibility) and 3) **learning to learn** (i.e., self-reflection, scientific method-approach). Such competences are significantly linked to the above mentioned RRI values and are also crucial for addressing the current labour

market needs. To ensure that secondary school teachers and early career researchers effectively transmit such transversal competences, PERFORM will identify the limitations and challenges they face when teaching and communicating science, respectively, and will provide them with appropriate education and communication skills.

- The effects of such participatory educational processes on girls' and boys' perception and attitudes towards STEM and related careers, as well as the **effectiveness** of such process in embedding the values of RRI, will be systematically assessed by PERFORM through a **sound evaluation methodology** that will combine quantitative and qualitative traditional evaluation tools with ICT (Information and Communication Technology) tools. In doing so, the project responds to the call's claim of "*a shift to innovative and effective methods is necessary"* by exploring and evaluating such new science education methods based on performing arts in formal contexts.

Moreover, PERFORM will address the ultimate challenge of the call: "*to make informed choices and to engage in a democratic, knowledge-based society*" through the promotion of transdisciplinary knowledge and RRI values via an inclusive participatory approach that will empower secondary school students to discriminate between credible and false information and critically and creatively reflect about nearer societal challenges.

PERFORM fits the purpose and scope of the topic of "*supporting a range of activities, which will raise young boys' and girls' awareness of the different aspects encompassing science and technology in their societal content*" through a participatory action research strategy that will set **secondary school students in the centre of the educational process** aiming to engage them in STEM.

By exploring innovative science education methods drawing on performance-based approaches between students, their teachers and early career researchers, **the project will foster both girls and boys direct contact with researchers and science to learn about and raise their interest in the progresses and challenges of the scientific work when dealing with current and relevant societal challenges** (i.e., climate change, health, food security, secure energy, smart and green transport, inclusive and secure societies). Appropriate interaction will also be fostered between the involved secondary schools and the universities and research centres of those early career researchers involved in the project.

To ensure **gender equality** in the action research process developed in selected settings, gender issues will be specifically addressed and analysed in all the stages of the project (i.e., exploring and assessing the impacts of science methods, building teachers' and researchers' capacity to communicate).

PERFORM will address the call's request of: "*bringing both girls and boys into the scientific world via formal and informal teaching and learning and to orient them towards undertaking scientific careers*" by scaling-up the results obtained in formal settings. In doing that, the project will transfer the knowledge generated to informal education settings (i.e., **science museums**) aiming to guide

further development of performance-based science education activities contextualised in such informal education contexts.

PERFORM will **disseminate and communicate the results and outcomes of the project to a broad audience** including secondary school students and teachers, researchers, and other practitioners interested in science education and performing arts **and, specifically, to policy-makers and scientific and education networks and projects across Europe**. In doing that, and as stated in the call, **PERFORM will establish direct collaboration with *Scientix*** both as user of *Scientix* services (i.e., teachers training workshops, *Scientix* networking events, dissemination to communities website) and as supporter to encourage knowledge exchange and dissemination across Europe (i.e., online resources, final conference).

1.3 Concept and approach

1.3.1. Challenges in boosting young people's interest in science across Europe

In the current European socio-economic and political context, **motivational and structural barriers constrain the interest of the citizens and their active involvement in science and technology**. As earlier as 2007, the European Commissioner Janez Potonick highlighted important challenges in engaging people with science: "*The current limitations in the dialogue between science and civil society have to be overcome*"[1]. Such statement has been recently stated by the 2012 European Commissioner for Research, Innovation and Science, Máire Geoghegan-Quinn, who claimed that "*The dialogue between science and the rest of society has never been more important*"[2].

Addressing the challenge of engaging citizens in science is even more urgent in the case of young people. Their considerable disenchantment with science and technology represents a critical limitation for the European society in order to ensure future innovation capacity, excellence and competitiveness. Results from the Flash Eurobarometer on "*Young People and Science*" (#239) [3] showed that **less than a third of the respondents showed an interest in studying engineering** (28%), natural sciences (25%) or mathematics (24%), versus a 36% and 39% of them who would consider studying economics or social sciences, respectively. In the UK, for instance, only 4% of respondents would definitively study natural sciences. The survey findings also suggested that important gender differences exist regarding their preferences on future careers and jobs. Boys were more interested in engineering or mathematics than **girls, who generally argued that they do not have the skills for studying engineering, biology or medicine**. Although the scientific practice itself involves curiosity, creativity, and practice, European young people, and mostly girls, still

[1] European Commission (EC).2008. Report of the science in society session. Public Engagement in Science. http://ec.europa.eu/research/science-society/document_library/pdf_06/public-engagement-081002_en.pdf
[2] EC. 2012. Responsible Research and Innovation. Europe's ability to respond to societal challenges. http://ec.europa.eu/research/science-society/document_library/pdf_06/responsible-research-and-innovation-leaflet_en.pdf
[3] The Gallup Organisation. 2008. Young people and science. Flash Eurobarometer 239. EC http://ec.europa.eu/public_opinion/flash/fl_239_en.pdf

perceive science complexity as a barrier and scientific careers as useless and unprofitable, which might discourage them from science and studying such careers[4].

Three main reasons behind young people's discouragement with science have been identified by previous research:

- Young people are influenced by a **negative stereotypical and problematic image of scientists that dominates among adults**[5] [6] [7]. Scientific research is often perceived as not related to human and societal needs. Across Europe the efficiency of scientists' work is not clearly understood yet[8]. Moreover, the new role models of young people fed by the media do not include scientists[8] [9]. Media people, such as football players and pop artists, have a more interesting and attractive life for boys and girls and they earn more money than scientists. Young people know that they will not need scientific knowledge to be like their idols[9]. In Spain, for instance, one third of the population perceived science as an unattractive career option for young people and a similar percentage is not interested in science mainly because they do not understand it[10]. Such negative image of science discourages adolescents from investing effort and time in scientific learning. It also leads them to undervalue the scientific concepts, theories and methods they are taught at school for their daily lives and society wellbeing[4] [11]. A change in the perceptions of students towards science and scientists' jobs is then needed to engage them in STEM.
- **The promotion of transversal competences or skills are highly relevant for preparing students for their professional future, but have received less attention** than basic or cognitive skills in European educational programmes, including science education[12]. Specifically, transversal competences related to scientific activities are the following: 1) learning to learn, or the ability to pursue and persist in learning and effectively organise and manage time and information (i.e., self-reflection, scientific method-approach), 2) social and civic competences, or the ability to participate in an effective and constructive way in social life (i.e., team work, collaboration, social responsibility of science), 3) sense of initiative and entrepreneurship, or the ability to turn ideas into action (i.e., creativity, critical thinking and

[4] Littledyke, M. 2008. Science education for environmental awareness: Approaches tointegrating cognitive and affective domains. *Environmental Education Research*,14 (1), 1-17.
[5] Hughes, G. 2001. Exploring the availability of student scientist identities within curriculum discourse: An anti-essentialist approach to gender-inclusive science. *Gender and Education*, 13, 275-290.
[6] Long, M., Boiarsky, G., Thayer, G. 2001. Gender and racial counter-stereotypes in science education television: A content analysis. *Public Understanding of Science*, 10, 255-269.
[7] Steinke, J., Lapinski, M., Crocker, N., Zietsman-Thomas, A., Williams, Y., Higdon, S., Kuchibhotla, S. 2007. Assessing media influences on middle school-aged children's perceptions of women in science and engineering using the Draw-A-Scientist- Test (DAST). *Science Communication*, 29, 35-64
[8] EC 2010. Science and technology (Eurobarometer 73.1, Special Eurobarometer 340). http://ec.europa.eu/health/eurobarometers/index_en.htm
[9] Sjøberg, S. 1998. Naturfag som allmenndannelse: En kritisk Fagdidaktikk. Oslo, Norway: Ad Notam Gyldendal.
[10] FECYT. 2008. IV Survey of Social Perception of Science. Ministry of Science and Innovation. http://www.fecyt.es/
[11] Ruiz-Mallén, I., Escalas, M.T. 2012. Scientists Seen by Children: A Case Study in Catalonia, Spain. *Science Communication* 34(4): 520-545.
[12] EC,EACEA,Eurydice, 2012. Developing Key Competences at School in Europe: Challenges and Opportunities for Policy. http://eacea.ec.europa.eu/education/eurydice/thematic_studies_en.php

innovation)[13]. Beyond cognitive competences on STEM (i.e, communication, mathematical competence, digital competence), transversal competences are also potential tools for personal fulfilment and development, active citizenship, social inclusion or employability across our contemporary and diverse European societies[14]. For example, students need to learn about how to critically select, organise and deal with data if they would study a STEM career. Students' engagement in science needs to start from the acquisition of transversal competences they will use in their professional working life.

- Most of the science education activities addressed to secondary school students in Europe are still related to **unidirectional and vertical transfer of information based on expert knowledge, from the teacher to the students**. Although theoretical debates have replaced the information deficit model by two-way dialogue aiming to increase young people's active involvement in science and public support for research, such change in science education and communication practice is not a reality yet. Educational approaches actively involving the students often lack in the curricula, though they have proved to enhance their engagement[15]. Moreover, the transmission of scientific expert knowledge that is decontextualised from students' reality, although relevant and needed, has been not enough to motivate positive behavioural changes towards science[16]. It can also lead to alienation and irrelevance of contents, when pupils do not have the opportunity to connect the scientific curriculum with their experiences and practice[4].

Science education needs to take action in order to **challenge the remaining distance between young people and science and the mainstream formal education approaches at secondary schools**. **Innovative science education methods** are then crucial to engage young girls and boys in STEM and avoid loss of scientific talent in Europe.

1.3.2 Innovating to engage secondary school students in science education

Within a formal science education context, methodological innovation and integration becomes essential to raise the attractiveness of science education. **Innovation** in such learning contexts highlights the need of conducting 1) **participatory action-research and** 2) **trans-disciplinary scientific education approaches** that are able to integrate, in a creative manner, the different dimensions of knowledge and competences implied in scientific practice and careers.

Action research theory offers a theoretical and methodological framework for approaching innovative science education methodologies since it is based on the assumption that students will

[13] CIDREE. 2008. A toolkit for the European citizen. The implementation of key competences. Challenges and opportunities. Brussels: CIDREE and Department for Educational Development, Flemish Community of Belgium.
[14] EC. 2006. Recommendation 2006/962/EC of the European Parliament and of the Council of 18 December 2006 on key competences for lifelong learning [Official Journal L 394 of 30.12.2006].
[15] NFER. 2011. Exploring young people's views on science education. Report to the Wellcome Trust.
[16] Frisk, E., Larson, K. L. 2011. Educating for sustainability: Competencies & practices for transformative action. *Journal of Sustainability Education*, 2, 1-20.

change their perceptions and attitudes and become engaged in science when they experience and reflect the need to change and will adopt new behaviours based on specific values[17].

Engagement is part of students' learning, understood here as a change in their understanding of the world or its relation to it[18]. When the change affects students' frames of reference (i.e., structural assumptions through which experiences are understood) leading to changes in attitudes, behaviour and social norms, this learning is identified as transformational[19]. Students' **engagement in science** can be defined then as the degree of attention, curiosity, interest, optimism, and passion that students show when they are learning or being taught about science, beyond the transfer and acquisition of information. Engagement extends to the level of motivation they have to learn and progress in their education[20]. Educational psychology research has widely studied levels and types of motivations as well as the underlying attitudes that give rise to action[21]. According to self-determination theory, motivations can be related to the individual's expectation of getting an external outcome or reward (extrinsic motivations) or can exist within the individual as an inherent interest, satisfaction, curiosity or desire to be informed (intrinsic motivations). This theory suggests that intrinsic motivations are led by three psychological needs: competence or being able to do something efficiently, relatedness or connecting with others; and autonomy. Similarly, social cognitive theory suggests that engagement and learning are influenced by students' capacity to mobilize cognitive and behavioural resources needed to successfully execute a specific task within a given context, as well as by students' understanding of the potential outcomes they will get from implementing such task[22]. Value-based judgments and beliefs, as well as structural and situational dimensions are thus powerful drivers for change[16]. Research has also shown, however, that activities must be interesting themselves to satisfy those needs[21].

Engagement in science is needed but insufficient to be intrinsically motivated, **interesting science education activities** are also crucial as an external factor motivating students. New science education methods are thus required to improve the attractiveness of STEM

Participation and contextualisation are key elements in developing innovative science education methods leading to interesting and motivating scientific activities. Previous research has shown that **contextualized and participatory education approaches are more effective in engaging students and promoting learning acquisition** than those that rely on more passive techniques[23] [24].

[17] Webb, G. (1996) 'Becoming critical of action research for development' in O. Zuber-Skerritt (ed.) New Directions in Action Research, London: Falmer Press.
[18] Reed M.S., Evely A.C., Cundill G., Fazey I., Glass J., Laing A., Newig J., Parrish B., Prell C., Raymond C. and Stringer , L.C. 2010. What is social learning? *Ecology and Society* 15(4).
[19] Mezirow, J. (1997). Transformative learning: Theory to practice. In P. Cranton (Ed.), Transformative learning in action: Insights from practice – New directions for adult and continuing education, No. 74 (pp. 5-12). San Francisco: Jossey-Bass.
[20] Great Schools Partnership. 2013. Glossary of Education Reform. http://edglossary.org/student-engagement/
[21] Ryan M. R., Deci, E.L. 2000. Intrinsic and Extrinsic motivations: Classic definitions and new directions. *Contemporary Educational Psychology* 25, 54-67.
[22] Bandura, A. 1997. Self-efficacy: The exercise of control. New York: Freeman.
[23] Minner, D. D., Levy, A. J., Century, J. 2010. Inquiry-based science instruction-what is it and does it matter? Results from a research synthesis years 1984 to 2002. *Journal of Research in Science Teaching*, 47(4), 474–496.

To raise people's motivation and interest, the design of educational activities should be based on participants' opinions. Participation can only be achieved by developing learning methods that allow students to establish connections between their learning at school and their local problems[25]. Participation, however, can be understood and applied in different ways ranging in a continuum from students' involvement within a one-way flow of information by consultation (about the content or activities) to an interactive participation, co-decision and self-mobilization, when students are involved in the development of educational activities and may even take their own actions and decisions concerning the learning process (e.g. develop their own educational activities)[26] [27] [28].

Participatory approaches to education aiming to achieve interactive participation or self-mobilization highlight inquiry and situational dimensions of learning. **Inquiry-based science education approaches involve active inquiry from students through thinking and doing into a phenomenon or problem**, often mirroring the processes used by scientists and including hands-on activities as a way to motivate and engage students while concretizing science concepts[23]. This approach emphasises active thinking and creativity and has proved to increase students' interest and academic achievement[23] [29]. Meaningful connection to "real world" situations and experiences is of particular importance in science education if the learner is to develop an interest in the matter[24] [30].

Learning is situated when scientific knowledge and concepts are connected to specific contexts of action. **Situated learning or contextualized learning is application-related, world- oriented and self-directed and implies the active participation of the students, boosting their engagement in science.**

Participation in and contextualization of learning are essential from the lenses of the **Responsible Research and Innovation**[2], an inclusive approach to research and innovation. The RRI approach that guides the Horizon2020 programme ultimately aims to achieve a social and environmental benefit and highlights the relevance of involving the society from beginning to end of the research process, openness and transparency, and effectively prioritising impacts, risks and opportunities. When applied to science education contexts, the RRI also focus on the importance of enhancing social capacities within scientific practice (cognitive, social, motivational and emotional), training of key competencies within science education that are particularly necessary for personal fulfilment

[24] Ruiz-Mallén, I., Barraza, L., Bodenhorn, B., Ceja-Adame, M.P., Reyes-García, V. 2010. Contextualising learning through the participatory construction of an environmental education programme. *International Journal of Science Education*, 32(13): 1755 - 1770.
[25] Ruiz-Mallén, I., Barraza, L. 2006. Environmental learning in adolescents from a Mexican community involved in forestry. *International Social Science Journal* 189, 513-524.
[26] Arnstein, S. R. 1969.A ladder of citizen participation. *Journal of the American Institute of planners*, *35*(4), 216-224
[27] Blackstock KL, Kelly GJ, Horsey BL. 2006. Developing and applying a framework to evaluate participatory research for sustainability. *Ecological Economics* 60:726–742.
[28] Pretty JN. 1995. Participatory learning for sustainable agriculture. *World Development* 23(8):1247–1263
[29] Education, Audiovisual and Culture Executive Agency (EACEA P9 Eurydice) 2011. Science Education in Europe: National Policies, Practices and Research. Available at: http://eacea.ec.europa.eu/education/eurydice)
[30] de Haan, G. 2006. The BLK '21' programme in Germany: a 'Gestaltungskompetenz' based model for Education for Sustainable Development, *Environmental Education Research* 12:1, 19-32.

and development, social inclusion, active citizenship and employment (Recommendation 2006/962/EC, European Parliament), and assessing the impacts of the learning process. **Gender issues are specifically relevant in scientific practice and science education** since girls' and boys' attitudes and perceptions are differently influenced by negative stereotypes, although some of them prevail across gender, such as the role of women in science, as previous research on the public perception of science across Europe has shown[11].

Trans-disciplinarity, as participatory action research, is also essential to explore innovative science education methods and ground scientific concepts into societal contexts and processes, going beyond the viewpoints offered by a single discipline[31]. Trans-disciplinarity nurtures such science education methods from different disciplines and methodological approaches, such as in the case of **arts and science**.

Arts-based educational approaches have been used in the last decades both in education research (for instance, under the label of "Arts-based Educational Research"[32] as well as more specifically, in science education[33] [34] [35]). These approaches are characterized by the infusion of elements from the arts (performance, literary writing, music, dance, storytelling, visual art and other mediums) in different stages of the research or the educational process in order to capture human experience, explore different ways of representation and convey meaning. Arts-based practices have been identified as particularly useful for projects that aim to describe, explore, or discover[36], all of which are important features of a learning process. Specifically, **applied drama** -referred to dramatic activities that primarily exist outside conventional mainstream theatre institutions, and have objectives that go beyond the artistic, and are also educational, social and political- **has participatory, dialogic and dialectic qualities as effective and democratic ways of learning[37]**. The integration of both rational and emotional dimensions within dramatic activities provides a rich source of individual and collective experimentation and exploration[38]. Furthermore, dramatic activities have been identified as particularly useful teaching and learning strategies for integrating affective and cognitive education to informed action[4]. As a collaborative art form, applied drama embodies a pedagogy designed to encourage interactivity and collaboration, emphasizing the centrality of the student in the pedagogic process. As a practice, knowledge in drama is embodied, culturally located and produced through interactions with others, generating new forms of social and cultural capital[37].

[31] Pohl C.2008 From science to policy through transdisciplinary research, Environmental science & policy, 11(1), 46-53
[32] Barone, T., Eisner, E. 2004. Arts-based educational research In pp. 95–109.
[33] Metcalfe, R.J.A., Abbott, S., Bray, P., Exley, J., Wisnia, D. 1984. Teaching science through drama: an empirical investigation. *Research in Science & Technological Education*, 2, 77- 81.
[34] Ødegaard, M. 2003. Dramatic science. A critical review of drama in science education. *Studies in Science Education,* 39, 75–101
[35] Dorion, K. R. 2009. Science through drama: A multiple case exploration of the characteristics of drama activities used in secondary science lessons. *International Journal of Science Education*, 31(16), 2247-2270.
[36] Leavy, P. 2009. Method meets art: Arts-based research practice, The Guilford Press, New York.
[37] Nicholson H. 2005. Applied drama. Theatre and Performance Practices. Palgrave Macmillan, Basingstoke.
[38] Baraúna Teixeira, T., Motos Teruel, T. 2009. De Freire a Boal. Pedagogía del Oprimido – Teatro del Oprimido. Ñaque Editora, Spain

Dramatic activities have been used in science education within formal and informal settings to address different STEM subjects such as chemistry, biology and physics and transversal topics such as sustainability[33] [34] [35] [39]. Experience suggests that this medium supports learning of affective, cognitive and procedural knowledge, especially higher order thinking skills relating to analysis, synthesis, and evaluation[35]. **The use of drama in science education has been commonly addressed to facilitate students' understanding of STEM concepts**, such as for instance, a dramatization of electricity, representing voltage, current and resistance[40]. Another strategy mainly oriented to engage students in STEM, but less extended among practitioners and researchers, has been the use of drama to relate scientific topics to affective contexts of social, cultural, and intellectual discourse in order to reflect on the role of science in such societal contexts, such as playing stories of scientists to get critical insights of the scientific process[34].

The **potential of applied drama in science education** through these two strategies (i.e., facilitating STEM concepts' understanding and reflecting on the role and use of science in society) lies not only in communicating and bringing to life scientific concepts, but also in addressing the nature of science as a **transformative learning process embedded in a certain societal context**.

Developing such innovative science education activities linked with applied drama requires **accurate and rigorous assessment approaches monitoring and evaluating** the effectiveness of these activities in students' engagement and as a learning process. Assessments of performance-based approaches are generally based on summative evaluations -at the end of the process, although some experiences include experimental designs based on the use of questionnaires and interviews pre and post-performance[41]. Yet, evaluation methods based on integrative and in-depth approaches covering the whole process of creation and representation of such drama activities have not been systematically developed in the field of science education.

1.3.3 PERFORM overall approach and methodology

In order to address the above mentioned European challenges and limitations in science education, and to contribute and innovate in such a research field, the PERFORM project will conduct a **participatory action research to explore and assess the effectiveness of innovative science education methods based on performing arts** in stimulating secondary school students' engagement in STEM.

Such participatory action research will rely in a **holistic and trans-disciplinary methodological framework** integrating elements from arts-based methods, behavioural psychology, science education, science communication, sociology and anthropology.

[39] McNaughton, M. J. 2004. Educational drama in the teaching of education for sustainability. *Environmental Education Research*, 10(2), 139-155.
[40] Tveita J. 1998. Can untraditional learning methods used in physics help girls to be more interested and achieve more in this subject? In E. Torracca (Ed.) Research in Science Education in Europe (pp.1-7). Dordrecht: Kluwer.
[41] Heras, M., Tàbara, J. D. 2014. Let's play transformations! Performative methods for sustainability. *Sustainability Science*, 9(3): 379-398

PERFORM research will be conducted in a total of **twelve secondary schools in France, Spain, and UK** by using a case study approach. A total of approximately 600 students will be constantly involved in the research as stakeholders whereas 6,000 students from other 30 to 48 schools will be punctually engaged (i.e., attending the resultant performances).

The following specific drama-based education approaches will be explored in each setting:

- Clown in France,
- Stand-up comedy in Spain, and
- Street theatre in the UK.

The criterion behind the selection of these performances is twofold:

1) There is an education research interest in exploring the effectiveness of a diversity of arts-based education approaches beyond the most traditional ones (i.e., theatre) in motivating students in STEM when developed through the above described PERFORM conceptual approach.
2) The previous expertise of the consortium partners that will be performing the arts-based education approach has shown that the selected approaches can be potentially effective in motivating young people with STEM.

Through collectively exploring the interface between science and arts with secondary school students, their teachers, and early career researchers PERFORM will create direct interaction between them in order to link researchers' scientific knowledge and science values with students' experience, emotion and meaning within transformative learning processes, with the ultimate aim of humanising science.

Humanising science in such learning context refers to the exploration of educational actions that address the human dimension and values embedded into science and technology with the aim of bringing STEM closer to young people and their reality. Such actions will thus explore women and men scientists' motivations and personal experiences behind scientific practice, unveil and address human values related to science, promote contextualisation of scientific impacts and applications in real life, enhance responsibility of scientific decisions and outcomes and address power relationships and gender and ethical issues.

Through the conceptual approach of humanising science, the scientific concepts and practices worked at classroom will be contextualised into the European current societal challenges[42] to prepare students as tomorrow's European citizens, and engage them in RRI values (e.g., inclusiveness, creative and critical thinking, entrepreneurship, gender equality, openness, mutual learning[2]). Such values and competences will further enable students to contribute to the creation of a knowledge-based society.

[42] H2020 EC Societal challenges http://ec.europa.eu/programmes/horizon2020/en/h2020-section/societal-challenges

As showed in Figure 1.3a, the conceptual approach underpinning the PERFORM project involves the two elements highlighted by previous recommendations from European Commission reports to overcome current limitations in science education:

1) the exploration of science education methods based on performing arts as **innovative ways to engage secondary school students in STEM**; and

2) the promotion of teachers' and researchers' communication and education capacity building to **provide students with valuable learning experiences in formal science education contexts**.

Such approach ultimately aims to address three key priorities of the Horizon2020 strategy to prepare European tomorrow' citizens to deal with current socio-economic and political challenges: smart, sustainable and inclusive societies.

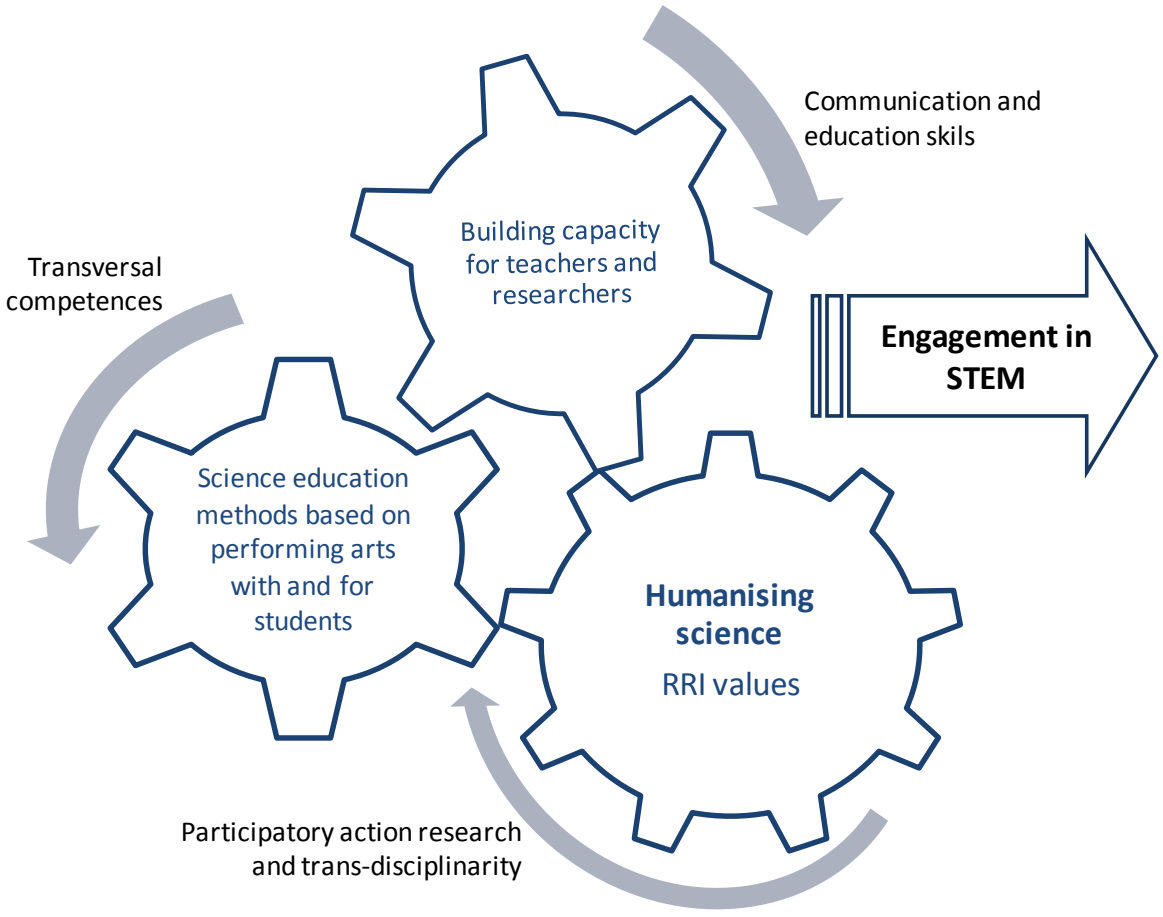


Figure 1.3a. Concept and approach of the PERFORM project

The exploration of science education methodologies and activities based on such performing arts will highlight the human dimension of the scientific research and practice by fostering students'

critical thinking and reflection about the relevance of science in its societal context, and including ethical issues, gender equality, among other values embedded in the **RRI approach**. The inclusion of such RRI values into the performance-based science education methods will be supported by the set of tools for education community generated by the *RRI Tools* FP7 project[43], and specifically those related to public-engagement, formal education to science, gender equality, and ethics.

The use of performing arts will also emphasise **the integration of different disciplines and realms of knowledge to address the scientific topics** selected by the students from the different societal challenges identified in the Horizon 2020 programme during the design of the performance (i.e., health, climate change, smart and green transport, food security, secure energy, inclusive and secure societies). In this way, the aesthetical experience will be also balanced with robust data and focused information. By opening the *black-box of science,* students will be guided through a collaborative creation process addressing these issues, with the aim of creating active learning environments.

PERFORM will focus on developing learning experiences that integrate transversal competences related to learning to learn, civic and entrepreneurship skills into the educational methods based on performing arts. The dramatization process will allow students to think about scientific concepts in ways that are meaningful to them, while the teachers and researchers may gain insight into the students' understanding. The students will be encouraged to use social networks to maintain direct dialogue with researchers to extend the learning process.

The guiding role of teachers and early career researchers during the process will provide a constant conceptual support and assessment of contents. Their involvement with young people in the exploration of the performance-based science education methodologies through the participatory process will be a key element that will face directly the public engagement required for a RRI. Early career researchers will also reduce the generational gap with students.

Secondary school teachers' and researchers' involvement in the project will be encouraged in each case study through non-economic incentives (i.e., official recognition of teachers' participation by the corresponding regional Department of Education in Spain) or/and economic compensations (i.e., punctual payment for researchers –and teachers in the case of France and UK- participating in workshops and online dialogue with students).

The education and communication skills needed by secondary school teachers and early career researchers to be able to further replicate the participatory educational process and implement the methods will be investigated and further addressed in specific toolkits for training teachers and researchers. PERFORM toolkits will provide from rapid tools to use tricks from drama to engage young people in their scientific or educational activities to guidance to long-term participatory process promoting the human dimension of science and the RRI values. Links to *ENGAGE*, *Pathway* and *TEMI* FP7 projects will be established in order to develop PERFORM toolkits, since these projects have created materials for training teachers on RRI and inquiry-based science education; yet none of them involve the use of performance-based approaches. PERFORM will also participate in *Scientix* teachers' training workshops to encourage knowledge exchange between the

[43] http://www.rri-tools.eu/rri-for-education-community

project and such a network that supports and promotes collaboration among STEM teachers, education researchers, and policy-makers in Europe.

PERFORM will **systematically monitor and assess the educational process and activities** in a broad time framework, including assessment pre, during and post performance. Since assessment is still an underexplored research topic in the field of performance-based educational activities, the development of an impact assessment methodology evaluation represents an essential pillar of the research process.

The assessment will provide an analysis of the potential impacts on girls' and boys' cognitive and behavioural changes towards science and related careers, including students' gender as category of the analysis, as well as their socio-economic background. For that purpose, assessment will be divided into:

- An assessment of the punctual interactive events in which performances are played in front of students' audiences.
- An assessment focused on the participatory learning processes among students, researchers and teachers; and

In both cases, a mix of qualitative and quantitative methods will be applied, including the use of social media analyses since such dimension of young people's social world is under-studied, in order to analyse cognitive, emotional, and behavioural changes, as well as attitudes and motivations towards STEM.

The evaluation design will be based on literature review on trans-disciplinary assessment frameworks (educational psychology, science communication, sociology, performance-based approaches, anthropology). This will provide a grounding to define the evaluation criteria and design the data collection instruments to qualitatively and quantitatively analyze the impact of the PERFORM educational process on students' motivations and attractiveness for scientific careers in a systematic way. The design will also take into account the inclusion of all participants (girls and boys, teachers, researchers) in the evaluation process through participatory evaluation methods. In the analysis, we will consider individual and contextual factors that potentially influence students' learning and engagement in STEM, such as **students' gender and schools' socio-economic context**.

Special attention will be placed on addressing gender equality issues across the research project, as one of the RRI values, taking advantage of the UNESCO expertise in gender equality programs as *Women in Science*. Dialogue and reflection on the role of women in science will be encouraged during the design of performance-based science education methods between students, teachers and early career researchers, as well as during training workshops. This will be achieved by ensuring the participants gender balance along the three years of the project. To address challenges related to gender stereotypes, we will first identify our subjects specifically[44], that is, our targeted groups of students will include both girls and boys, and the early career researchers interacting with them will

[44] Following the recommendation for analyzing gender of Gendered Innovations (http://ec.europa.eu/research/science-society/gendered-innovations/index_en.cfm)

include both women and men scientists. For example, during workshops for designing the performance, boys and girls will reflect on their different concerns to pursue STEM careers and how are currently influenced by stereotypes about science jobs. Through the impact assessment we will then understand girls' and boys' perceptions and attitudes towards science, which is crucial to designing successful education methods and training tools that will assist teachers and scientists to overcome these concerns.

The PERFORM project will be positioned in the level 6 of the Technology Readiness Level (TRL) since the project's outputs and products will be demonstrated in selected formal teaching and learning contexts in France, Spain and UK (Figure 1.3b). Further exploitation of the project's results will allow for updating the developed science education methods and training toolkits to other European countries in order to become a science education reference in Europe.

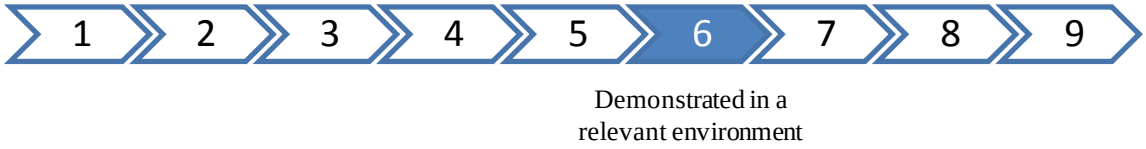


Figure 1.3b. Position of the PERFORM project according to the Technology Readiness Level

In a last step, the **PERFORM activities will be up-scaled to informal contexts**, specifically to science museums, through transfer workshops to provide science museums with methodological guidelines to potentially develop innovative education tools based on performing arts once the project will be finished. PERFORM will use the *ECSITE* European network of science centres and museums, science festivals, and other institutions and companies to scale-up and disseminate the results into information educational settings through EUSEA.

The dissemination and communication of PERFORM findings, products and outcomes will be fulfilled through two main activities:

- The project will generate interaction spaces among the partners and European policy-makers in order to ensure strong science-policy links with the timely transfer of the knowledge, results and practical tools developed by PERFORM into concrete recommendations for policy actions aiming to encourage scientific vocations among young people. Specifically, links to *UNESCO Network of Associated Schools (ASPnet)* will be established to further disseminate the resulting training toolkits and science education methods to other interested European schools.
- The project will design and manage a sound dissemination and communication plan addressed to a broad audience of public education institutions, teachers, and researchers interested in science communication and education, other interested companies and education practitioners. Such a plan will include the development of concrete actions and supporting materials to disseminate the project products and results among the scientific and educational communities and linking PERFORM to other European research science

education projects, as well as science communication platforms and initiatives (i.e., the FP7 *PLACES* project, and the *Famelab contest*). Specifically, **PERFORM will participate in *Scientix* networking events and collaborative dissemination to the *Scientix* network and dissemination of the project results across European countries**.

The dissemination and communication plan will also ensure that specific results from the gender analysis and the resulting science education methods and tools including the gender dimension (as RRI value) reach the scientific educational communities and policy-makers, with the aim of promoting specific action to challenge gender inequalities in STEM education.

1.4. Ambition

The use of performing arts in engaging people about science is part of the burgeoning field of science and art collaborations. **Science and arts projects are becoming increasingly popular** throughout the world; sometimes as a way to reach new audiences who are involved in the arts sector but not necessarily already engaged in science. But, more frequently, projects combining science and performing arts (i.e., stand-up comedy) are aimed to communicate scientific topics and issues to broad or general audiences. A recent research conducted in Portugal showed the effectiveness of using stand-up comedy in increasing the interest of the audience in science[45]. However, **the use of performing arts** to promote innovative science education means of learning in formal learning and teaching contexts **is still an under-explored field of research and practice**.

In general, initiatives and projects aiming to engage students in science do not use dramatized methods, and such initiatives are usually targeted to children. For example, *ScienceLab* is a German initiative to bring science to kids (4-10 years old) using their own motivation and curiosity to act as a steering force. By means of experiments, *ScienceLab* helps to bring the attention of students in science in this early stage including biology, physics, chemistry, medicine, astronomy, and geology. Other initiatives with secondary school students are placed outside the school. In Spain, for instance, the *Escolab* project invites students to discover the latest scientific advances and the leading laboratories of Barcelona guided by researchers.

PERFORM aims to fill this gap and **innovate** in the field of science education action research **by involving secondary school students, teachers and early career researchers in an active inquiry process on relevant scientific topics through the use of performing arts** at schools. This is a ground-breaking approach never used in the past to combine science and arts.

Importantly, science and arts interface provides an opportunity for different disciplines to share ideas and methodologies and learn from each other's practices – from scientists learning new methods to articulate their research, to artists gaining access to scientific concepts that may have an

[45] Pinto, B. et al. 2013. Communicating through humour: A project of stand-up comedy about science. *Public Understanding of Science* http://pus.sagepub.com/content/early/2013/12/05/0963662513511175.full.pdf+html

impact on future society, and for both to gain insights and perspectives that can reach and deepen their respective practice.

For audiences, performing arts, such as theatre, stand-up comedy and clown, have the potential to offer new and unexpected routes into the findings, dilemmas, puzzles and delights of science and scientific research, and can take a number of forms. Amongst recent developments is a trend towards collaborative science theatre, where researchers are actively involved in the development of the performance[46]. This collaboration can take many forms – from the researcher acting as an expert advisor or consultant on the scientific aspects to being an active contributor and even performer. Initiatives such as *Famelab* and *LHComedy* fall in to the latter category. In these, the role of the audience is as a passive receiver of the engagement, education or entertainment. Another variety of collaboration puts an emphasis on audience participation, and this ranges from inviting people to ask questions of the performers to structuring the performance in a flexible way that allows the audience to participate in helping shape its direction. An example of the latter is *Deadinburgh*[47] – an immersive theatrical experience where the participants had to make choices in an epidemic scenario.

However, in each of the examples given, the audience is only involved in the performance itself and not with its development. The emphasis is given to the science itself and misses the opportunity to foreground the creative, performative aspects of collaboration with artists, which has the potential to draw in and engage the existing skills and interests of the participants, working with them to develop those skills and interests as they immerse themselves in the complexities of an issue in science and the means by which it can be communicated. **The aim of PERFORM is to take this interaction to the next level and enable the chosen audience – in this case, young people – and empower them to participate in the design of the programme.** This puts the young people, rather than the research, at the centre of the performance, and creates toolkits for them to construct their own future performances. In addition, it offers the opportunity for the performances to be informed from the start by, and then co-developed with, the students, rather than taking on board audience's feedback at a later stage. Moreover, **such direct interaction and collaboration between the students, teachers and early career researchers is a novel approach in formal education** that will be systematically tested and validated during the project in three European countries.

PERFORM is ambitious not just in the performance methodology but in the way that it is used in an educational setting. Informal science learning is a term that is often applied to activities that take place outside of the formal education system and seek to raise awareness of, interest in and engagement in science[48]. Many of these informal science learning activities are designed to enhance and complement the science curriculum. As described in the section above, initiatives can range from traditional forms of informing and educating about science to more collaborative projects where the young people participate in the development of their own learning. However, very few

[46] Dowell, E. and Weitkamp, E. 2011, An exploration of the collaborative processes of making theatre inspired by science, Public Understanding of Science, 21 (7): 891-901
[47] The Enlightenment Café: Deadinburgh: http://www.lastheatre.com/portfolio/deadinburgh/
[48] Review of informal science learning 2012, Wellcome Trust: http://www.wellcome.ac.uk/About-us/Publications/Reports/Education/WTP040865.htm

focus on performance. **As such this project is novel in that it fuses collaborative educational concepts with the methodology of performance in a highly participatory approach.**

In addition, a strand of this proposal involves the **training of teachers and early career researchers** in performance and participation so that they can create activities with, and for, young people. This training will also be an important facet in teachers' practice and researchers' career development. The unidirectional and vertical transfer of information based from the teacher or expert to the students has been challenged with two-way dialogue models. To be engaged, students need to be active actors of the process instead of receptors. This project would enable the development of training programmes for teachers and researchers on education and communication skills ranging from performance to participation, thus helping to facilitate this shift in institutional culture. Furthermore, **PERFORM training programmes and resultant toolkits will represent unique capacity building process and outcomes** since they will involve effective education and communication skills based on RRI values and performing arts in order to engage students' in STEM. Such toolkits will be key to ensure the further multiplier effect of the project in learning and teaching contexts.

Therefore, monitoring these processes along different time frameworks and case studies across Europe will represent a **pioneering experience and a remarkable added value of the research project**.

2. Impact

2.1 Expected impacts

Today there is an urgent need to boost the interest of children and young people in STEM, so they can become the researchers of tomorrow, and contribute to a science-literate society. Creative thinking calls for science education as a mean to make change happen. In line with this need, the overall **long-term objective of PERFORM is to become the EU-wide reference standard set of tools and methodologies that feeds a specific science education subject in secondary school curricula** showing students the importance of scientific careers for building a sustainable, informed, democratic, and competitive knowledge-based society **through applied, interactive, and creative approaches.**

The process and the different steps to be followed for achieving the above-mentioned overall objective will have a series of impacts in the short, mid and long term that are aligned with those contained in the call:

1) *"Coordination and leverage of Member States activities with respect to innovative approaches in the field of science education and scientific careers."*

Although there is a considerable political and economic effort on developing and implementing the Europe 2020 Strategy in the areas of research and science education, there is still a clear gap to be bridged for the implementation of the flagships directly concerned ('Innovation Union', 'an Agenda for new skills and jobs', and 'Youth on the move') in order to engage young people in Science and technology careers. Europe needs to coordinate to better equip future researchers and other societal actors with the necessary knowledge and skills to fully participate and take responsibility in the research and innovation process.

For that reason, during the project execution **PERFORM will establish a dialogue with relevant regional, national and European stakeholders in the fields of education and research** (e.g. education authorities, scientific and research clusters, policy-makers, associations, media, and science-based entrepreneurs, etc.) in order to identify and analyse the actual gaps between education and scientific careers and map the different best practices developed at the regional level, with special emphasis in areas with strong presence of science and technology clusters, for engaging students, teachers, researchers, and science-based entrepreneurs for the valorisation of scientific careers. This will also allow **PERFORM to update the European science policy community of innovative methods developed by the consortium in science education**. Additionally, the development of the performance-based science education activities through the PERFORM participatory process will foster a mutual learning scenario in which students will acquire from researchers and teachers, basic knowledge about STEM, performing skills and transversal competences needed to pursue STEM careers, while researchers and teachers will realise about young people's interests and concerns towards STEM. **Researchers, students, and teachers will then become engaging actors of new young people in STEM, thus generating a multiplying engaging effect in STEM.**

In parallel, the project will be in direct and permanent interaction with students, teachers, and researchers in order to get a first-hand knowledge of the motivations of secondary-school students for choosing scientific careers, and the actual gaps and actions taken for an effective engagement of all concerned societal actors in the appraisal of science as a career opportunity, in line with the European Union's RRI strategy. The outcome of this process will provide PERFORM with an overall overview, at least in a first stage, of the current situation in France, Spain and UK (the participating Member States in the project). This analysis will allow the identification of commonalities in the different teaching and learning settings as a way of establishing converging strategies for engaging authorities and stakeholders in communicating the value of the scientific careers.

Ultimately, the process will result on a series of **policy recommendations** and a unifying roadmap with a variety of bottom-up, constantly updated methodological approaches for science awareness based on performing arts that becomes in the long term the standard reference across Europe.

The role of partner UNESCO will be key for allowing the direct interaction with policy-makers (national and regional science and education ministries, European parliament, etc.) and associations in order to promote the uptake of the developed standards and promote the implementation of the policy recommendations for bridging the gap between science and education and support building an innovative Europe able to give answers to tomorrow's societal challenges with scientific solutions. Eventually, this should lead to an optimisation of the different regional, national and European efforts for developing scientific career opportunities for young people (through better and attractive measures for increasing mobility, training, knowledge exchange, etc.), and a way for promoting the STEM careers among students.

2) *"Position EU research teams on the map as leaders in innovative science education methods and meeting Europe's targets regarding R&D intensity and competiveness, increasing the number of researchers and innovators, including women, in the public sector and in industry able to better address societal challenge (…) and increase the range of innovative products that reflect societal needs."*

Today, 80% of researchers and 75% of research investment happen outside the EU. Furthermore, researchers are a really small percentage of the European work force (account for only 5.6 in every thousand of the work force in the European Union, against 9.3 in the US and 10.7 in Japan) and Europe still largely suffers from brain drain[49]. PERFORM aims at changing the current perception that research careers are unattractive and not very prestigious from a social point of view will encourage young people to pursue these careers. This should be accompanied with parallel actions and policies that help perceiving by society at large that research and innovation are key priorities to build a competitive ERA that can face tomorrow's society challenges.

According to the project's exploitation strategy (see section 2.2 below), **PERFORM aims at up-scaling from the pilot actions to a broader, Europe-wide level where testing and improving the developed methods and toolkits with more students, teachers and researchers in the post-**

[49] European Research and Innovation - 2020: What can the leading institutions of civil society do for Europe? Atomium Culture, 2009

project phase. The mid-term objective will be creating a sustainable structure that 1) manages the generated results, 2) establishes the necessary mechanisms to periodically engage all key actors in the field, 3) maintains a continuous research process for generating and implementing new tools, approaches and methodologies based on the performing arts, 4) develops an on-line platform for making available the generated resources that allows at the same time the establishment of a community of users and developers that enriches the available material and fosters the dialogue and innovation process with other related projects, networks and initiatives, and 5) creates an official multidisciplinary European training programme addressed to teachers and researchers on awareness and promotion of scientific careers among students, and on providing transversal competences like creativity, entrepreneurship and initiative to help young people to develop their full potential for innovation.

The above-described **sustainability strategy** will be key for reaching the mid-term objective of establishing a permanent and robust programme that makes the difference in young students with regards to their engagement in STEM for developing their professional career. Although the PERFORM project will work directly only with 600 students through the implementation of its pilot actions in France, Spain and UK, it is estimated that almost 6,000 students will benefit from the results as spectators of the activities performed. With this numbers in mind, and considering an escalation of the programme to more Members States in the post-project phase, it is estimated that PERFORM will interact with ca. 3,200 students in the following 5 years after the project ends, reaching the additional amount of 32,000 students that will benefit as spectators of the actions. Furthermore, the application of the programme in this formal setting will be complemented by the implementation of some of the methodologies in e.g. museums, which will imply reaching a broader audience across Europe and impacting in more young people.

If successfully applied, the PERFORM programme should imply an increase of the number of students pursuing scientific studies of 9% by 2020, which will translate afterwards on scientific research careers. This will help support the objective of training and employ at least one million new researchers compared with 2008 levels in order to reach Europe's R&D intensity target of 3% of GDP for 2020[50]. The increase of the scientific taskforce, together with some recent measures already in place such as the increase of the funds devoted to Science and Technology research in Europe and the coordination of the ERA, and the creation of a single European Patent, will position Europe's research production in the top positions at the global level and consolidate it as a single space for research and innovation.

This process should be accompanied by the promotion of Europe as a place of equal access opportunities in research careers, and where research as a whole is driven by the principles and values of RRI. **PERFORM will include as a key aspect of its strategy the implementation of the RRI values**, which entails demolishing the gender barriers of specific scientific careers, the encouragement of the use of open access to make available scientific results, and the application of ethical principles and values across the whole research and innovation chain.

[50] Smarter, greener,more inclusive? Indicators to support the Europe 2020 strategy. European Commission. ISBN 978-92-79-31156-7

The changes in demography that Europe will face in the coming years (Europe will account 30% of the world's people of more than 65 years old) will imply great problems in terms of health services, communication, environment, etc., and pose great challenges that can only be addressed by research, development and innovation[51]. Their strengthening is the only chance to follow being a preeminent actor on the global scene in the close future, which can only occur at an Europe-wide, multidisciplinary, and intersectorial level, reinforcing and involving all agents in the innovation chain, which includes mainly companies and industries as a way of translating research results into tangible solutions for making people's life better.

On this regard, the PERFORM project will also promote the involvement of industry and science-based entrepreneurs in the interactions with the students. **The project will transmit the RRI values and transversal competences linked to entrepreneurial mindset** and will show the value chain of the research process that goes from the lab to the market application, which results into commercial benefits for the society at large. Europe needs for more companies that capitalise the research results and become the drivers for increasing innovation capacity and R&D[52]. PERFORM will convey the relevance of the socio-economic dimension of science for creating sustainable growth and employment, developing career opportunities, and bringing innovative solutions that give answers to societal needs and challenges.

2.1.1. Potential challenges to maximising the impact

There is a global alignment among European experts from all disciplines on the idea that research and innovation are the only way to get out of the serious economic crisis that is affecting Europe, and that affects also its capacity for facing the mid and long-term needs and challenges of its population. Several reports and recommendations coming from policy-makers and stakeholders at large have raised the red flag about the weakness of Europe as a whole for engaging new generations on research careers, for attracting and retaining scientific talent, and for supporting the generation of companies that are able to translate basic research into competitive solutions that make Europe an attractive hub for innovation.

The implementation of the Europe 2020 Strategy by the European Commission, which builds from the fails of the Lisbon Strategy, is the answer at the policy level of the concerns expressed in the recent years. Europe is aware of the critical moment it is going through and the need of building into a new sustainable, social, market, smarter, and greener economy, where prosperity will come from innovation and from using resources better, and where the key input will be knowledge[51]. Creating favourable conditions for innovation, education and research are of paramount importance to move towards higher value added activities. The recently approved flagships 'Youth on the Move' and 'New skills for new jobs' are vital instruments for implementing the policy strategies and will determine the future actions for achieving Europe's objectives. On this regard, it is envisaged that policies become quite stable or are even reinforced in the coming years in order to face Europe's challenges. Education and research are in the center of the knowledge and innovation

[51] Commission working document, Consultation on the future of the "EU 2020", COM (2009) 647
[52] Regional Policy contributing to smart growth in Europe 2020. SEC(2010) 1183

process and will benefit from governmental support and attention as the most important long-term and long-lasting ways of leaving the economic crisis behind. Therefore, it is expected that PERFORM will not encounter any relevant barrier or obstacle for achieving its impacts.

2.2 Measures to maximise impact

PERFORM is an ambitious project which includes activities, research and has an impact in several dimensions. The project will generate and deliver a wide range of qualitative and experimental approaches to science education, with the overall objective of making science education and scientific careers more appealing to young people. This will be done through a series of actions, and will target a range of stakeholders and participants at the local, regional, national and European levels, such as secondary school students and teachers, early career researchers, policy-makers, science teacher trainers, and the science education research community. The **communication plan for the dissemination and exploitation of the PERFORM project's results** will be built accordingly, and will support this structure, with the following two perspectives of goals and aims.

Firstly, PERFORM **dissemination actions** will:

- **make the relevant and evidence-based research-related outcomes of the project available and accessible to the European and global research communities**, thus contributing to make an impact in its scientific meaning, e.g. in terms of citations, and fostering further research;
- reach a significant number of stakeholders in the European science education community, including national and municipal policy-makers, science teachers associations, researchers, and other relevant representatives and practitioners, with the aim of **facilitating its uptake and the application of policy recommendations and measures**; and
- inform the above mentioned potential users about the PERFORM results and outcomes (i.e., training toolkits, science education methodologies) **in order to ensure its further exploitation** through an appropriate IPR strategy, and the sustainability of the project's results.

The fulfilling of these goals will partly be the result of "traditional" dissemination work and skills, i.e. identification of target groups, defining and designing of messages, and selection of the most appropriate channels for maximum reach and impact, including:

- the **publication** of PERFORM research results in top **peer-reviewed journals** on science education, science communication and related topics, and/or other academic formats (i.e., books, books chapters);
- the selection of and participation in scientific **conferences** (e.g., *Scientix* General Conference)**, workshops** (e.g., Future Classroom Labs held by *Scientix* in 2017), **science policy events** and **outreach events** (including slide shows as well as "science café") to

facilitate the uptake of the results by target groups (i.e., researchers, teachers, science communication practitioners); and

- the organisation of the **PERFORM final conference** to maximise the dissemination impact and to promote the further exploitation of the results by informing the European research and science policy communities and entrepreneurs in STEM fields (including the industry) about the innovative science education methodologies based on performing arts explored in order to engage secondary school students in STEM. UNESCO will be responsible for such conference at the UNESCO Headquarters in Paris, in close collaboration with EUSEA. EUSEA has an extensive experience on this field, not least from the arrangements of the Final Conference of the *PLACES* project in March 2014.

In order to ensure strong **science-policy links,** PERFORM will also organise **panel discussions, roundtables and focus groups** with key stakeholders (teachers, students, early career researchers) and policy-makers invited by UNESCO –the leader of the sustainability and policy impact work package– that will contribute to foster wider dissemination of the research and to update the European science policy community of the PERFORM innovative formulas and results in science education through a direct exchange and networking.

Participatory videos about the transformational educational process (i.e., students' carrying out the resultant PERFORM activities) will also be edited and produced by EUSEA, the leader of the dissemination work package, for our target audiences (i.e., researchers, teachers, science communication practitioners).

Finally, **a significant role in the project's dissemination will be played by *Scientix* European network**, an additional and valuable resource which is already hosting important resources in terms of structures as well as national and European networks addressed to targeted audiences –such as Internet portals and social media. The PERFORM communication plan will establish specific collaboration and exchange actions with the *Scientix* network to make use of the community resources (e.g. attending the *Scientix* conference, inviting *Scientix* representatives to the PERFORM events and final conference). By establishing such direct collaboration and using *Scientix* publicly available resources and tools, PERFORM and *Scientix* will enhance the mutual benefits and their visibility. Moreover, the European Schoolnet that is in charge of *Scientix*, is a member of EUSEA, and the two associations have a previous collaboration experience in EU projects. Science teachers and schools will also be reached through EUSEA members, relevant networks and individuals among policy-makers.

Secondly, the PERFORM project will deliver a range of qualitative and experimental approaches to science education and to the overall objective of making science education and scientific careers more attractive to secondary school students, e.g. through the following actions:

- the development of methodological guidelines to provide insights to scientific and educational communities to better address and guide a transformational and participatory educational process based on science and arts activities that can promote and transmit the human dimension of science and the RRI values, while teaching STEM in formal education.

The complete participatory process will generate a mutual learning scenario providing young people with basic knowledge about STEM, performing skills and transversal competences while teachers and early career researchers will realise about young people's interests and concerns towards STEM;

- the generation of toolkits to assist the enormous range of contexts of EU early career researchers and teachers, as well as educators, to implement performance-based science education activities and methodologies to engage students in STEM. PERFORM toolkits will provide rapid tools including the use of tricks employed in drama to engage young people in their scientific or educational activities to effective guidance to the implementation of the above-mentioned science and arts activities.

The presentation and dissemination of such results require a different methodology, and a different approach to communication than the previous goals. Whereas the first part reflects a more formal approach, with target groups that can be defined and approached, **these other actions will benefit most from an "informal" dissemination**. It is about finding the teachers, the "early adopters", supporters and volunteers that will help spreading the word, thus contributing to an increasing interest in the topics, ideas and experiences.

EUSEA members in the European countries will have an important task when it comes to **identify local and national target groups from countries both included and not included in the PERFORM project**; e.g. national teacher conferences and/or unions, as well as the most relevant venues and opportunities to communicate, through conferences, articles, presentations, etc. An important aspect of this, which is sometimes overseen, is that **the three project's languages (e.g., French, Spanish and English) will be used** and presentation material, such as slideshows and participatory videos, will be produced with this in mind, making the material available for translation and adaptation.

Integrating different target groups, with participatory formats, in different European countries, will also contribute to disseminate the project through such "informal dissemination", both inside and outside schools.

Likewise, the *Scientix* network also plays an important role in this work, as not only it reaches the "formal" science education structures, but also individual teachers, e.g. through web, media and annual conferences.

Finally, a purely **communication** strategy addressed to a general audience will be created by means of the definition of messages and the selection of the most appropriate channels for maximum reach and impact. Such strategy will be developed both at the internal and external levels. At the **internal level, as part of the management work package**, a smooth environment will be created to ease the collaboration within the consortium (i.e., intranet, meetings, internal reports). At the **external level**, the leader of the dissemination work package will use **different communication tools** (website, factsheet, mass media, social media, e-Newsletter) to explain the project objectives, activities, partners, and the outcomes. EUSEA will contribute its communication skills but also, and foremost, its local, regional and national presence in virtually all EU Member States.

Specifically, PERFORM will provide a **multifunctional and multi-lingual web portal**, which will act as a virtual campus for lifelong learning, and will be used beyond the project duration. Project websites and communication structures are purely content driven. Their only *raison d'être* is the useful contents for the visitor. The portal will constantly collect and disseminate materials and results generated within the execution of the project: science education methodologies, teaching materials and toolkits, reports and results. PERFORM will also extend the dialogue between young students, their teachers, and early career researchers, thus creating spaces for face-to-face interaction as well as a virtual space to interrelate through **social networks** (e.g. Facebook, Twitter). These social networks will be used to guide young people in the search and use of scientific and educational open access online materials. The use of **traditional communication channels**, such as local newspapers and radio programmes, will be also envisaged.

PERFORM will employ both the dissemination and communication tools for informing the potential users about the expertise, good practice and outcomes obtained in PERFORM and thus **ensure wide exploitation** of such research data and results during the project.

All **data collected** by the PERFORM partners from students, teachers and researchers participating in PERFORM case studies will be **systematically anonymised** in order to prevent possible identification of individuals' opinions or ideas. Such data will be gathered mainly through interviews, workshops and focus groups (audio or/and video recorded), as well as surveys and social media ethnography. Since different types of data will be collected for different analytical purposes in each work package, the partners leading each research task will create the corresponding database and will upload the data obtained during the project. Databases will be shared among partners under request and approval of the correspondent partner in order to promote research collaboration within the consortium. At the end of the project, the Project coordination team will store all the databases in the **Digital Document Repository of the UAB**, under the protection of standard security means. Such database will be available to other researchers under request and with the approval of all consortium members.

Following the terms and conditions of the Horizon 2020 Grant Agreement, and specifically those related to Individual Property Rights and Open Access, the PERFORM project manager will set up a **Consortium Agreement** which will also deal with all the main aspects of the relationships between partners, including legal aspects, ownership of knowledge, protection of knowledge, use and dissemination of knowledge and access rights to knowledge, and further exploitation of the results. The Consortium Agreement will thus regulate partners' confidentiality obligations to protect results and personal data, as well as **intellectual property rights** of the knowledge generated by the PERFORM partners (i.e., copyright and related rights, know how, scientific reports, methods of research and developments and documented data). The Consortium Agreement will include guidelines and regulations related to the ownership and access to the key knowledge and outcomes generated during the project, and thus facilitating further applicability and exploitation of the results.

The obligation of publishing all the resultant scientific publications in open access will also be included in the Consortium Agreement. Moreover, the **resultant outcomes and results** of this

project (i.e., science education methods based on performing arts, teachers' and researchers' training toolkits, participatory videos) will be available at the project website and *Scientix* on-line repository for any interested individual and entity, and protected under the **Creative Commons license**.

Furthermore, PERFORM will **generate a sustainability plan** to ensure the PERFORM project's ability to maintain its impact in the medium and long term once the project is finished. This will be mainly achieved by incorporating the outcomes (e.g., science education methods based on performing arts, training toolkits) as resources under UNESCO programs and initiatives related to science education, from which they will be readily available to policy-makers at UNESCO National Commissions, and, as mentioned above, maintaining a repository of project outcomes in *Scientix*.

A **draft dissemination and exploitation plan** will then include the two perspectives mentioned above, the "formal" and the "informal" communication. Naturally, this plan will have to be developed during the initial phase of the project, in close collaboration with *Scientix* and local EUSEA members and the project network, using existing, traditional, channels for communication as well as new ones (Table 2.2a).

Table 2.2a. Draft plan for the dissemination and exploitation of the PERFORM results –basis for the Communication Plan

Formal communication				
Target group	**Level of pre-understanding**	**Desired result**	**Proposed action**	**Time**
Policy-makers	Basic	Make them feel informed and engaged	Policy briefs, evidence-based stories to be disseminated through relevant channels, e.g. *Scientix* but also through NCPs, national and local Education boards, etc.	Second half of project
Science education research community	Advanced	Create interest in developing further research for evidence	a) making on-going project known through articles (not academic), blogs, at conferences etc. b) report research results as early as possible, through open access, at conferences etc.	Prepared from the start, likely to be more public in second half
Science education public administration and entrepreneurs in STEM fields, including industry	Basic +	Informed and aware, possibly engaged, and preparing for action	Participation in conferences, articles, slide shows, media releases, newsletters, social media	From the start, with a view to frequent updates
Science teachers training	Informed, partly academic, part practical	Informed, prepared to include in training	Training material, including evidence based knowledge and examples	Towards end of project
Science teachers, primarily "early adopters"	Practical	Engaged and prepared for action	Social media, teachers associations, teachers conferences and media,	From the start, with a view to frequent updates.

Informal communication				
Target group	**Level of pre-understanding**	**Desired result**	**Proposed action**	**Time**
Science teachers, primarily "early adopters"	Informed, engaged	Engaged and ready for action, i.e. implementing in class-room	Access to local language material (videos, presentations, etc), PERFORM Toolkits	As soon as possible, probably from second half
Early career Researchers	Informed, curious	Engaged and ready for action, i.e. implementing in their own science communication activities	Access to local language material (videos, presentations, etc), PERFORM Toolkits	As soon as possible, probably from second half
DATA COLLECTION OUTPUT				
Policy-makers	Informed	Decision supporting material	Policy briefs, research reports, incl. summaries	Second half
Research community	Academic interest,	Citations	Academic: peer-reviewed articles, conference presentations, also using web based services like slide-share, academia.edu, etc.	Second half
Science teacher community	Interest, engagement	Implementation in schools	Useful protocols, toolkits, guidelines, including use of web-based tools like YouTube, Facebook, but also through *Scientix* portal	As early as possible, to generate interest and "followers"

3. Implementation

3.1 Work plan — Work packages, deliverables and milestones

The consortium will work with ten entities from four European Member States conducting action-research in selected formal education settings in case studies in France, Spain and UK. PERFORM will achieve its objectives executing six work packages and their corresponding tasks (Figure 3.1a):

- WP1: Project coordination and management, led by UOC
- WP2: Innovative science education methods based on performing arts, led by TBVT
- WP3: Building science education and communication capacity for teachers and early career researchers, led by UoB
- WP4: Impact assessment of the participatory educational process in students' learning about and engagement in science, led by UAB
- WP5: Sustainability and policy impact, led by UNESCO
- WP6: Dissemination and outreach, led by EUSEA

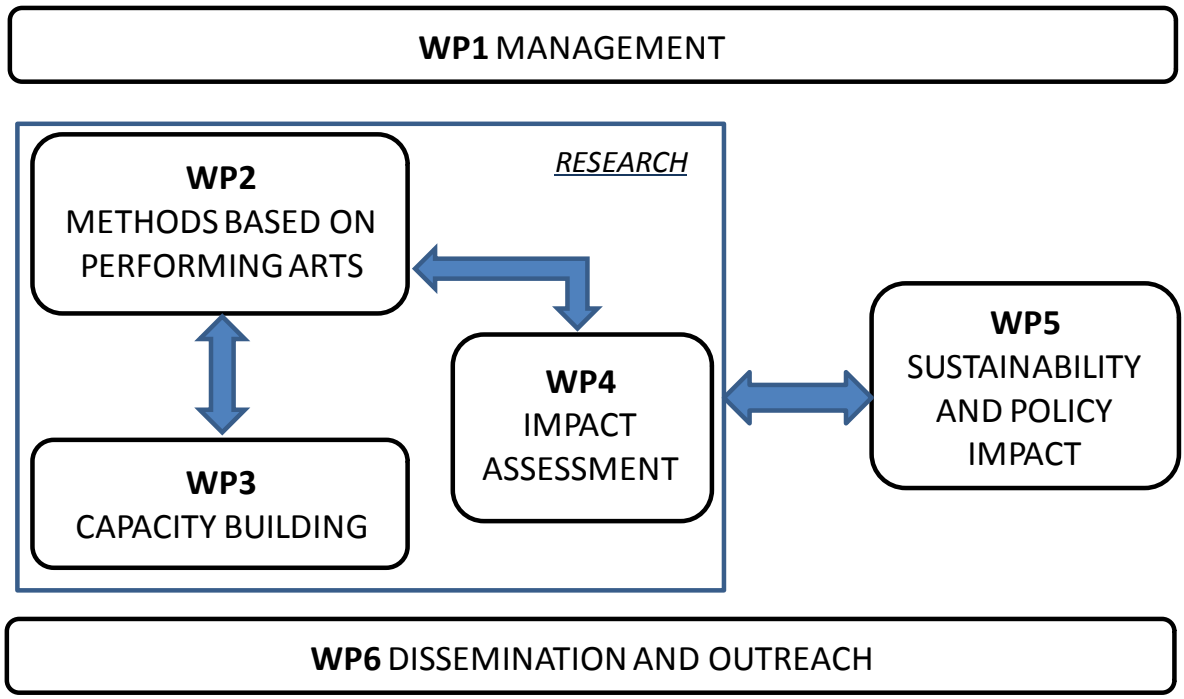


Figure 3.1a: Schematic representation of WPs interrelation in PERFORM.

WP1 will handle the whole legal and financial administration of the project and continuously monitor its technical progress. It will also facilitate the partners' communication and knowledge exchange during the project, and specifically between entities contributing to the same case study.

WP2 will explore innovative science education methods based on performing arts through a participatory educational process with secondary school students, their teachers and early career researchers in selected case studies in order to engage girls and boys in STEM and related careers. By using such approach, the developed methods will also provide students with the transversal competences they will need in a science-related professional future. In a final stage of the project, such science education methods will be scaled-out to informal learning and teaching environments. Through the participatory educational process developed by WP2, WP3 will identify and address the educational and communication skills required by teachers and researchers to develop such performance-based science education methods with students in the resulting training programs. Furthermore, the activities developed in both WPs will address the human dimension of science and the RRI values. The effectiveness in boosting students' engagement in STEM of such participatory educational process generated in WP2 will be systematically assessed by WP4.

As noted in the Gantt chart (Figure 3.1b), WP2, WP3 and WP4 will be highly interrelated along the three years of the project to conduct sound science education research.

	Months																	
Work Packages	2	4	6	8	10	12	14	16	18	20	22	24	26	28	30	32	34	36
WP1: Project coordination and management																		
T1.1. Project management		D																
T1.2. Facilitation of the consortium communication																		
T1.3. Scientific coordination and project monitoring			D						M			D						
T1.4. Links to STEM education research projects and networks															M			
WP2: Innovative methods based on performing arts																		
T2.1. Inclusion of human dimension and RRI in PERSEIA								D										
T2.2. Participatori process with young people													M		D			
T2.3. Pilot PERSEIA scaled up into informal context																		D
WP3: Capacity building																		
T3.1. Development of knowledge sharing workshop			M															
T3.2. Development of training and guidelines for researchers																	D	
T3.3. Development of training and guidelines for teachers																		D
WP4: Impact assessment																		
T4.1. Impact assessment research methodology				D														
T4.2. Evaluation of the social media-based impacts												M						D
T4.3. Assessment of transversal competences																		D
T4.4. Assessment of RRI																		
WP5: Sustainability and Policy Impact																		
T5.1. Generation of a sustainability plan				M				D										
T5.2. Maximize the policy impact of PERFORM																	D	
WP6: Dissemination and Outreach																		
T.6.1. Communication Plan and Tools		D																
T.6.2. Building the community relations and outreach			D												M			D

Figure 3.1b. General Gantt chart of PERFORM work plan and their components (D=Deliverable, M=Milestone)**.**

To ensure the exploitation of PERFORM results beyond the project, WP2, WP3 and WP4 will timely transfer the new knowledge generated to WP5 and WP6. WP5 will generate a sustainability plan and embed policy linkages with European policy and decision-makers designing and coordinating interaction spaces to ensure strong science-policy links with the timely transfer of the newly generated knowledge, results and practical tools generated by PERFORM. Simultaneously, WP6 will develop and execute a dissemination and exploitation plan to make the project's results, toolkits and methodologies available to their final users and to communicate the results and outcomes to wide audiences. WP6 will also build community relations to generate the best possible effects of the project outreach and to engage the general public in PERFORM. WP5 and WP6 will be highly interrelated in order to ensure a coordinated delivery and the exchange of information with all stakeholders (including the promotion and organization of a final conference).

3.2. Management structure and procedures

3.2.1. Organisational structure and decision-making mechanisms

The PERFORM project will be coordinated by the Internet Interdisciplinary Institute (IN3) based at the Universitat Oberta de Catalunya (UOC), and specifically conducted by the research group of the Urban Transformation and Global Change Laboratory. Both IN3 and UOC have a strong background in participating and leading European and international projects in the framework of the main EU funding programmes (i.e., FP7, Horizon2020, among others).

Scientific and operative decision-making will be organised around three main bodies: the General Assembly, the Steering Committee and the Coordination team (Figure 3.2a).

The **General Assembly (GA)** will be composed by one key person from each institution participating in the project and will ensure the sound achievement of the project objectives under the supervision of the CT. The GA will have to provide co-coordination of the research and technical work within the WPs, to ensure that the tasks in the Work Plan are achieved as expected, both in terms of quality and time. The GA will be responsible for all major decisions regarding the PERFORM, modifications and amendments to the work plan, budget allocation in accordance with the original contract, and changes to the consortium composition, if any. The GA will act under the leadership of the CT. Each partner will appoint one key person to attend the meetings that will be held every 18 months, and he/she will be authorized to make decisions and recommendations on behalf of the institution. The CT will inform the GA about time and cost irregularities if they appear.

The **Steering Committee (SC)** will be composed by each work package leader. The SC will be responsible for coordinating and reporting all activities within their designated work packages, ensuring the delivery and the quality of all deliverables, integrating work and deliverables within the work packages and for maintaining a sound communication among its members. The SC will assemble regularly every 6 months either within the scope of the consortium meetings or through video conferences. The SC will be chaired by the CT. Each member of the SC will report on the

activities, progress and, if relevant, problems within the respective work packages. A project factsheet (including planning, project progress, results, estimation of costs made) will be sent every 6 months to the CT.

The SC will also work in coordination with the Case Study Coordinators (CSC, see below) in order to ensure a fluent communication between WPs.

In the event that a conflict will be arising, it will be handled firstly by the CT and with the partner concerned. If no resolution is achieved the GA will be involved in order to resolve the situation. As last option and if the conflict may cause obstacle in achievement of project objectives, the CT shall inform the EC.

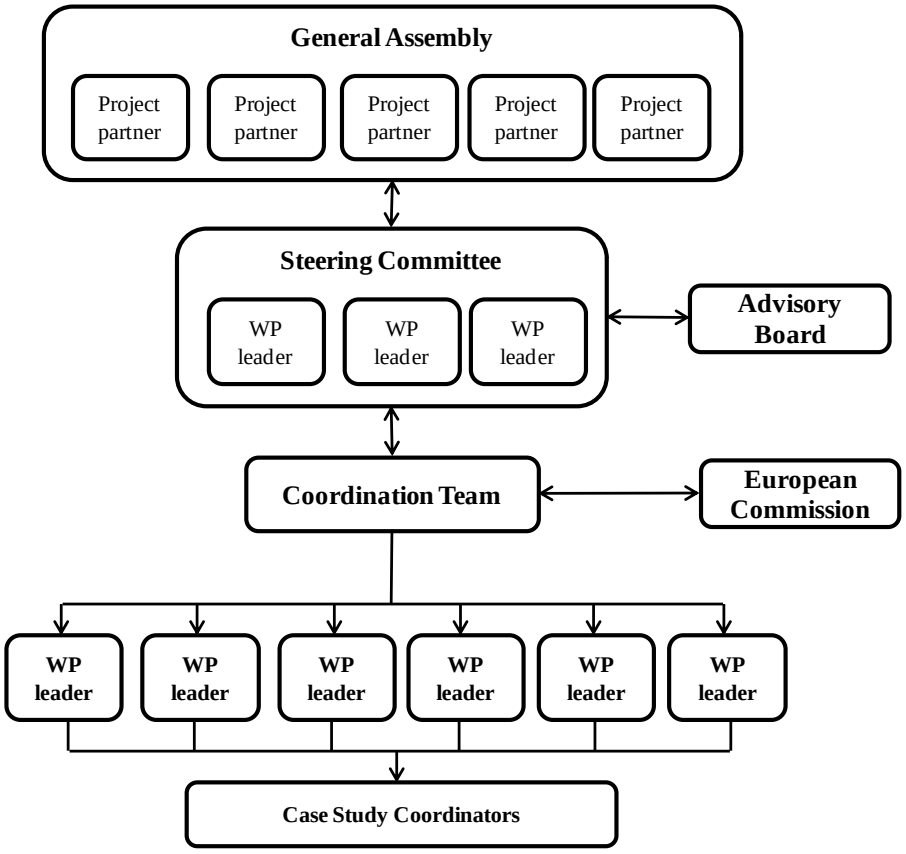


Figure 3.2a. Schematic organization of the project

The **Coordination Team (CT)** will be composed by the Project Coordinator (Dr. Isabel Ruiz-Mallén) and a Project Manager (to be hired) at UOC.

The Project Coordinator will administer the coordination of the project and have overall responsibility for the communication with the EC and timely technical and financial reporting. The Project Coordinator will also supervise and coordinate the project execution. She will be in charge to check and approve all reportings. Both will ensure the efficient execution of the work plan and the efficient use of financial resources in order to ensure the accomplishment of the objectives.

The Project Coordinator will supervise the project's progress monitoring and evaluation of the work packages. The Project Coordinator will integrate the outcomes and develop the scientific progress and annual reports to be submitted to the EC. She will coordinate between work packages and facilitate scientific discussion within the project. This explicit focus on synthesis will ensure that the work conducted in different work packages and in different case studies will get connected and that the separate work package reports are linked in its findings and consequences. Through that an overall common picture of insights and findings can be developed jointly.

Additionally, the Project Coordinator will also be responsible for the communication with the partners and, in interaction with the GA, for the coordination of common outreach activities.

Isabel Ruiz-Mallén has a considerable experience in conducting research on science communication, environmental science education, and public understanding of science in a variety of socio-cultural contexts in international and national projects, as her publications show. She has experience in both formal and informal educational contexts and is well aware of the conditions and problems of the education system and specifically secondary schools.

A Project Manager at UOC will support the Project Coordinator in all legal, financial and administrative tasks and will facilitate and supervise the financial and administrative flow of the project. The Project Manager will also supervise the adherence to the grant agreement, arranged between the consortium and the EC, and to the consortium agreement, arranged between the consortium members, and will support problem solving. Legal, financial and administrative shortcomings will be identified by the Project Manager and reported to the General Assembly (see below).

The CT will be based at UOC to work in close collaboration and to ensure that neither the administration nor the content drift away in different directions but leading to joint insights.

Work package leaders will be responsible for coordinating the implementation of the tasks in each case study, as well as for the timely submission of deliverables and reports of their respective work package. WP leaders will have the competence to delegate work within the work package, to decide on the methods and procedures implemented and to control the quality of the work done.

Case Study Coordinators (CSC) in each case study will be responsible for coordinating the implementation of work packages' tasks in their corresponding case study. CSC will work in coordination with the SC in order to ensure a fluent communication between WPs and case studies. Each CSC will present an update of the activities progress as well as challenges and successes encountered in each case study to the SC every 6 months.

An **Advisory Board (AB)** will act as an external and independent reviewer of the project. The membership and commitment of the AB will be defined and established along the first year of the project. The AB members will be invited by the SC. It will be an interdisciplinary and intersectorial panel composed of a distinguished expert on education and communication research, a representative of entrepreneurs in STEM fields (including industry), a member of decision making and national education agencies, and a member of civil society organisations related to the inclusion of Responsible Research and Innovation values in science education (e.g., Observatory of Gender

Equity). They will peer-review the progress and annual reports and deliverables of the project, advice on the project tasks and specifically on the design of performance-based science education methodologies and training toolkits, provide links to other programs and activities, and make recommendations to the SC for new activities through the elaboration of an Evaluation Report. It is planned that they hold two video conferences over the project, at different times and locations as a result of the SC interests. The AB members will also attend the intermediate project meeting in Bristol. Additional virtual ad hoc meetings will be convened whenever needed.

During these meetings the scientific quality and practical utility and applicability of the research activities results will be discussed and enhanced. The Advisory Board solely acts as a consulting body and does not have any decision-making power.

3.2.2. Strengths of the organisational structure

The consortium's organisational structure will ensure an effective and efficient implementation of the PERFORM project through three main strengths. First, the PERFORM project clearly allocates responsibilities regarding financial, administrative and technical management aspects to the different decision-making bodies (Table 3.2a).

Second, the protocol that will be implemented to prevent financial and technical shortcomings is also an organisation structure's strength in this project. The CT, GA and SC will have different and complementary roles in supervising the work plan. In the case that any partner does not meet a deadline, the CT will send a reminder to the partner and wait for two weeks. If the partner does not react, the research coordinator will convene the GA in a video conference, where the case will be discussed and decided upon. The sanctions may range from giving a last deadline, to financial shortcuts or withdrawal of project responsibilities.

Third, each partner participating in the project has worked beforehand with at least another participating institution in other science education and communication activities or projects. Hence, cooperation between institutions is already established and tested over time at the start of the project. Further collaborations will be developed over the course of the project. The project coordinator and the UAB research team have also worked together over a long period of time leading and participating in science education and communication research projects at the Observatory of Science Dissemination and the Institute of Environmental Science and Technology at the UAB. Even though all partners have not worked in all the countries where the case studies will be developed, the case study coordinator in each country, under the supervision of the CT, will inform and facilitate the implementation of the research to the other partners, acting as communicators between the local teams and the WP leaders.

Table 3.2. Responsibilities and power of decisions within the project (to be developed in the consortium agreement).

Project responsibilities	**Power decisions**					
	General Assembly	Coordination Team	Steering Committee	WP Leaders	Case Study Coordinators	Advisory Board
Work plan overall supervision	X	X				
Supervision of project resources	X	X				
Changes in consortium composition	X					
Time schedule monitoring		X	X			
Financial and technical reporting		X				
Allocation of work within work packages				X		
Methods and tasks implemented within work packages				X		
Methods and tasks implemented within case studies					X	
Sanctions against project partners		X				
Quality management	X	X	X	X	X	X

3.2.3. Critical risks for implementation

PERFORM has conducted a very thorough analysis of the risks connected with the execution of the project activities, and which might affect the eventual achievement of the project objectives (Table 3.2c). Risks related to the overall management and scientific coordination will be specifically addressed by the Risk Management plan as a task of WP1.

The partners are among Europe's leading science communicators, dissemination and networking

specialists with many years' experience in their fields of activity. In addition, several of the partners (UOC, UAB, UoB, UNESCO, EUSEA) led other successful European projects, in which they acquired valuable experience in this type of communications and outreach, targeting young European citizens. Other partners of the consortium have also participated in previous EU proposals and projects (i.e., SMS).

3.3 Consortium as a whole

In order to ensure the successful achievement of the PERFORM objectives, the project requires the involvement and contribution of different types of actors with specific expertise in fields as performing arts, science education and communication, social science (i.e., behavioural psychology, sociology and anthropology), outreach, dissemination and policy impact. To this end, the project will draw together a team of partners with the right mix of skills, knowledge, expertise, and competences (Table 3.3a).

The lead partner is UOC (Spain), and specifically the Internet Interdisciplinary Institute (IN3). The consortium of the project is composed by distinguished universities (UAB, UoB, UoW), successful professional science communication entities involved in science engagement, learning and communication activities (AJA, EUSEA) and specifically in science and arts (LAC, TBVT, SMS), and multilateral organizations working with young people on science education (UNESCO).

The consortium team has been carefully drawn to meet the project objectives, embedding a total of 10 entities that will conduct sound research on this topic, develop effective performance-based science education methodologies and training toolkits that will contribute to increase young people's interest in STEM and related careers and promote dissemination actions during the project.

UOC, as the consortium's leader, will coordinate the whole project (**WP1 leader**). The vast experience of UOC, and specifically of IN3, in leading EU projects ensures the effective management and coordination of the consortium. Moreover, the PERFORM project coordinator has participated in the Observatory of Science Dissemination (ODC) that has been involved in the steering committee of the main Youth and Science European network, called YPSSI (Young People and Science in Society Issue) till recently. It is also important to consider that other partners and/or their current representatives have been also involved in EU projects. Its previous expertise will positively contribute to the project management and development.

To establish timely and sound communication and coordination between the partners of the project, previous collaborations among partners will facilitate and promote an efficient execution of the planned work, as those detailed below.

The **exploration and development of innovative science education methods by using performing arts** (i.e., PERSEIAs) to foster direct interactions between young people and researchers is one of PERFORM specific goals, which will be addressed by **WP2.** TBVT is the most suitable entity to lead this WP since the TBVT team of STEM researchers and communicators has developed science communication activities using drama techniques that consist of short scientific-monologues in a humoristic tone and a final open space for questions. The casual tone of

the conversation created during the monologues promotes public participation and interest. Specifically with secondary school students, these shows have allowed for establishing a direct interaction with the students and breaking some of the stereotypes related to science and the scientists. TBVT will work jointly with LAC from France and SMS from UK in order to implement the project in three case studies. LAC and SMS also have a huge expertise in communicating science through the use of a diversity of performing arts and therefore their common role in using a science and arts-based communication approaches will facilitate teamwork. In order to support and extend the capacity of TBVT, LAC and SMS in conducting sound research to systematically explore performance-based approaches addressed to design science education methods, the consortium will include three universities: UOC, UAB and UoB. The UOC and UAB teams will provide to the consortium previous expertise in conducting research on participatory and trans-disciplinary education methods on social and environmental topics through the involvement of their team members in the Observatory of Science Dissemination's Annual Agenda funded by the Spanish Foundation of Science and Technology since 2008, in which TBVT has also participated. UoB, through its Centre for Public Engagement has wide experience in public engagement projects and events that involve multidisciplinary collaborations including art and science collaborations. Some of those collaborations include for example *danceroom Spectroscopy*, a project bringing together quantum chemists, choreographers, dancers and technologists, and Seeds of Change that brought together researchers from different disciplines, sound artists, storytellers, schools and community groups to discuss and work around issues of heritage, history and diversity in Bristol. For PERFORM, the Centre for Public Engagement will work together with SMS and researchers and bring all its expertise to produce participative performance-based scientific education activities to engage and inspire young people with science.

UoB will also lead WP3 on building science education and communication capacity for teachers and early career researchers. The Centre for Public Engagement, the Graduate School of Education (GSoE) and the Bristol Doctoral College (institutions from UoB) have wide experience in teacher and researchers training, respectively, and will collaborate with the UoW and AJA as well as with external experts to develop, deliver and test a training programme for these two target groups. Such experience on training teachers and researchers on science communication and outreach makes UoB in the most suitable for WP3 leading. For instance, the Bristol Doctoral College has experience in developing training programmes for PhD students to develop their skills in different fields including responsible research, personal development, professional and career development and research tools and teaching amongst many others. The GSoE is also actively involved in the Teach First programme that aims to train and support people with leadership potential to become inspirational teachers in schools in low income communities. AJA will be key partner in complementing UoB expertise and enhance the WP3 capacity building process due to its previous expertise in organising summer schools and other courses in order to train researchers on reflexivity in the research practice (i.e., integrity, responsibility, outreach, social dimension of science).

The impact assessment of the resultant participatory education will be led by UAB (WP4). The UAB research team has considerable expertise in developing evaluation tools to assess the effectiveness of science education and communication activities in shaping young people's

perceptions and attitudes towards science and technology, mainly in formal learning and education settings. Furthermore, the Observatory of Science Dissemination is currently coordinating, among other projects, a pilot national project to evaluate the inclusion of RRI values in science communication and dissemination activities in Spain (*EXODI*, funded by the Spanish Foundation of Science and Technology) and, since five years ago, a regional project that promotes and evaluates secondary school students and young researchers dialogues on scientific issues in Catalunya (funded by the Barcelona's Institute of Culture). UAB will closely collaborate with the UOC research team to develop and analyse the evaluation methods because of the Project Coordinator expertise on impact assessments of education and communication projects. UoW will complement such impact assessment by delivering a groundbreaking analysis of responses to performance-based science engagement on the social media platform Twitter. UoW will bring extensive expertise in this field of research, with a string of proceeding research grants in the domain of social media-based public engagement, including projects funded by the Arts & Humanities Research Council, the National Endowment for Science, Technology and the Arts and other UK government funders. UAB is also currently collaborating with AJA in monitoring an inquiry-based science education project where the secondary school students are stimulated to engage in dialogue with researchers, and to co-create open questions (*Nouveaux Commanditaires Sciences* funded by Foundation de France).

The combined expertise of **UNESCO, leading the sustainability and policy impact (WP5), and EUSEA, leading PERFORM dissemination and outreach (WP6)**, will be crucial to ensure a sound communication strategy that enhances the dissemination and exploitation of the PERFORM research project**.** UNESCO will provide access to European science policy-makers through its Member States delegations in Paris and offer its resources and more than 50 years of expertise in science education, science policy and gender studies. EUSEA will contribute communication and outreach skills, experience and expertise as well as an extensive and diverse network of science events and science communication experts all over Europe. In particular, members of EUSEA have extensive experience in adding informal learning processes, programmes and activities, such as specific school programmes in festivals, and thus also considerable knowledge about the evaluation and assessment of such events. Furthermore, the members of EUSEA are most often well positioned in between the local or regional general public and other stakeholders and policy-makers, including school authorities, in municipalities and local industry – both of which very important partners in the development of attractive science careers and education. Also, *Scientix* is run by the European Schoolnet, which is a EUSEA member. Individual EUSEA members and the European Schoolnet have collaborated on a number of projects, and the two entities together on one of the *WONDERS* projects, in 2007.

The combined expertise of UNESCO and EUSEA will be crucial to organise a successful final conference of the project. UNESCO will contribute the European and international dimension through its global outreach to states and ministries and EUSEA will contribute the expertise of event experts and project managers within the science communication field. UNESCO and EUSEA have collaborated before with TBVT and AJA in science outreach events (e.g. Science Slam Mallorca 2014, Isola di Einstein 2014) which will facilitate and promote an efficient

communication strategy. LAC also has a good national and international network of organisations mixing arts and science that can help disseminate the outcomes of the project (e.g. *ECSITE*).

Table 3.3a. Schematic representation of partners' expertise in relevant fields for PERFORM.

Expertise	**UOC**	**UAB**	**TBVT**	**UoB**	**SMS**	**UoW**	**AJA**	**LAC**	**UNESCO**	**EUSEA**
Science education and communication research	X	X		X		X		X		
Performed-based activities boosting young people's engagement in science			X		X		X	X		
Participatory and trans-disciplinary approaches in science education	X	X	X	X	X		X	X		
Training in reflexivity, critical thinking and RRI		X		X			X	X	X	X
Training on scenic arts and science communication		X	X	X	X		X			
Impact assessment of science education activities		X				X				
Linkages with policy-makers									X	X
Communication, dissemination and exploitation	X	X		X					X	X

3.4 Resources to be committed

PERFORM involves 10 institutions from different EU countries, including academia representatives (UOC, UAB, UoB, UoW), SMEs (EUSEA, LAC, AJA), civil society organizations (TBVT, SMS) and one international organization (UNESCO).

The overall PERFORM budget (and requested contribution) amounts to 1,997,252.50€, considered to be adequate for the successful implementation of the envisaged project activities.

The total effort for the project is 323 p-m including permanent personnel and specifically hired experts for the implementation of the project.

Each partner of the Consortium has actively contributed to the definition of the budget providing accurate estimation of costs in consistency with its specific national law and institutional usual practice. Also, the adequacy of the overall financial plan has been verified by the financial departments/experts of all participating institutions. Costs have been allocated to optimise the scientific and technical quality of the project, to reach the best value for money and to maximize the cost-effective use of resources. Financial resources have been distributed and balanced between partners in relation to their specific role and contribution within the PERFORM work plan. In particular, no single country receives more than 35% of the overall project budget.

Major efforts (233 p-m) and related costs (63% of budget allocation) are allocated to RTD activities to be carried out within WP2, WP3 and WP4 which represent the core actions of this RIA. Such actions are fundamental to develop the innovative PERFORM participatory action research approach in three ways. First, these actions are needed to explore innovative science education methods based on performing arts to boost young people's interest and motivations in STEM and related career. Second, these research actions are also addressed to build teachers' and researchers' capacity and skills to teach science by using such innovative methods and thus contributing to the participatory educational process. Finally, research is needed to conduct the impact assessment of this educational process in order to assess the effectiveness of the innovative methods in promoting young people's engagement in STEM.

Management activities consist of 24 p-m. They are mainly attributed to the Coordinator and include primarily the Project manager and Research Coordinator effort, but also foresee the contribution from all consortium partners to project management and scientific coordination. The total budget for management activities accounts for the 7% of the overall requested contribution, which has been considered necessary to a 3-year project involving 10 partners.

A relevant share is also dedicated to other key activities such as project dissemination (38 p-m and 19% of the total requested contribution) and exploitation (28 p-m and 11% of the total requested contribution), considering them crucial for an effective uptake of project outcomes as remarked in the description of the methodological approach. Since the research results and outcomes will be generated in selected case studies from three European countries, an effective dissemination and communication strategy will ensure the exploitation and potential replication of such methods and tools across Europe. At this aim, personnel efforts have been allocated not only to the WP leaders (UNESCO and EUSEA) but also to the other partners of the consortium. Costs allocated to WP6

also include the organization of the final international conference addressed to scientists, practitioners, entrepreneurs and policy-makers in the fields of science education and communication. A budget portion has been also allocated to the subcontracting of minor tasks. Considering the different budget items, the highest share is allocated to Personnel costs, which represents 61% of the overall PERFORM financial resources. The personnel costs consists of highly qualified researchers and technical experts who will lead the development of the research actions described above and also be directly involved in the dissemination, communication and management of their corresponding institutions. Such personnel costs also include professional communication and policy experts who will lead the dissemination and exploitation of the PERFORM project.

Travel & Subsistence costs for all partners to allow them to take part to technical meetings and to the governance bodies (i.e., General Assembly) to ensure the best coordination, including travels for the attendance of project meeting by the AB members. A share of the T&S costs is allocated to dissemination activities and policy events to participate and / or to present contents and results of the PERFORM. Where relevant also T&S for research activities and joint actions among partners have been considered, in particular for attending the training organized within WP3 and visiting the case studies in France, Spain and UK.

A minor allocation of resources will be dedicated to the purchase of equipment and durable goods (in accordance with the usual amortization practices of each institution) such as audio visual equipment to be used during the PERSEIA events and specific recording and data collection equipment for social media analysis

Other goods and services include economic compensation for teachers and researchers attending project workshops in WP2 and WP3, materials and services for the organization of project meetings, events and training workshops, audiovisual materials for dissemination, and fees of conferences to disseminate the results to scientific and non-scientific audiences.

Indirect costs (corresponding to 25% of direct costs excluding subcontracting) have been calculated considering the indirect cost models chosen by each participant, according to the provisions of EC financial rules, and each specific accounting principle.

The table below shows details for each participant where its sum of the costs for' travel', 'equipment', and 'goods and services' exceeds 15% of the personnel costs (according to the budget table in section 3 of the proposal administrative forms).

Table 3.4b. 'Other direct cost' items (travel, equipment, other goods and services, large research infrastructure)

UOC	Cost (€)	Justification
Travel	18100	Intermediate meeting (UK, 5 days, 2 people): €3150 Final meeting and conference: (France, 5 days, 2 people): €2500 Knowledge exchange meeting (UK, 5 days, 1 people): €1575 Research trips/meetings to case studies (Spain, France and UK, 5

		days, 1-2 people): €8875 National and international trips for dissemination, communication and policy impact (i.e., Future Classroom Lab meeting, 3 days, 1-2 people; ESOF 2018, 2-3 days, 1 people): €2000
Equipment	-	
Other goods and services	6100	Audio-visual material for dissemination: €1100 Fee of scientific conferences to disseminate the project: €1300 Publication costs (open access): €1400 Translation or language revision of the project outcomes (policy briefs and other publications): €2300
Total	24200	

UAB	**Cost (€)**	**Justification**
Travel	18900	Intermediate meeting (UK, 5 days, 1 people): €1575 Final meeting and conference: (France, 5 days, 1 people): €1250 Knowledge exchange meeting (UK, 5 days, 1 people): €1575 Research trips/meetings to case studies (Spain, France and UK, 5 days, 1-2 people): €12500 National and international trips for dissemination, communication and policy impact (i.e., Future Classroom Lab meeting, 3 days, 1-2 people; ESOF 2018, 2-3 days, 1-2 people): €2000
Equipment	1000	Video camera for impact assessment data recording
Other goods and services	18177.50	Hosting the kick-off meeting consortium meeting (Spain): €15000 Fee of scientific conferences to disseminate the project: €800 Publication costs (open access): €1300 Translation or language revision of the project outcomes (policy briefs and other publications): €1077.50
Total	38077.50	

TBVT	**Cost (€)**	**Justification**
Travel	25000	• **National Trips (7000€):** National trips to develop and deliver PERSEIA and workshops at 10 to 16 high schools to be chosen in Spain. For each school, from 3 to 4 members of TBVT will travel to execute PERSEIA and workshops. Average cost per trip including accommodation for two days: 200 euros / person • **International trips to conferences (8000 €):** ESOF 2016 (Manchester) or PCST 2016 (Istambul) and ESOF 2018 or PCST 2018; Final dissemination conference; Two meetings with Policy-Makers (WP5). For each trip, from 1 to 2 members of TBVT will travel. Average cost per trip including accommodation for three days: 1000 euros /person /conference • **Management and research meetings (10000 €):** Two members will attend kick-off and intermediate meeting.

		From one to two members of TBVT (as WP2 leader) will visit, at least once per year, SMS-UoB (UK) and LAC (France) in order to ensure an optimal development and delivery of PERSEIA and workshops. Average cost per trip including accommodation for 1 week/ person: 800 euros
Equipment	6000	Audio-visual equipment for PERSEIA: Projector: 2000€ Microphones: 1500€ Camera: 500€ Props and perishable materials for PERSEIA: 2000€
Other goods and services	9500	• **Materials and food for workshops/shows (1500€):** Refreshing, snacks and meals for participants of PERSEIA workshops in Task 2.1: up to 10, in Task 2.2: up to 30, in Task 2.3: up to 5. • **Audio-visual material (4000 €)** Generation of flyers, posters, trailers, web content etc. for the PERSEIA will be necessary to ensure the impact objectives and to reach the possible beneficiary local audiences as young people, secondary school teachers and young researchers. • **Registration fees to conferences (4000 €)** Cost of registration for one to two members of TBVT in conferences for disseminating the project as ESOF 2016 (Manchester) or PCST 2016 (Istambul), ESOF 2018 or PCST 2018, final dissemination conference and two meetings with Policy-Makers (WP5). Average cost per person / conference: 800€.
Total	40500	

UoB	**Cost (€)**	**Justification**
Travel	14340	Travel for workshops, events, meetings and activities: Workshops – 4 training workshops in Bristol plus Summer Schools externally Events- presentation of the projects in conferences and other national and/or international dissemination and policy impact events Meetings – Consortium meetings and other meetings with partners in the UK and abroad. 2/3 people to travel from UoB. Activities – associated to PERSEIA performances (details below)
Equipment	0	
Other goods and services	31500	Coordinating training workshops – there will be in Bristol at least 4 training workshops, 2 for researchers and 2 for teachers. Summer schools in France and Spain. (7164.86€) Hosting knowledge exchange workshop - 4 days (5728.65€) Conducting PERSEIA activities – number of performances to be determined in collaboration with Science Made Simple, but at least one project per year will be developed. This cost include materials, transport of materials, venue, etc. (10026.49€)

		Hosting the consortium intermediate meeting - 5 days (2867.02€) Toolkit development – costs could include graphic designer, illustrator, film maker, narrator, etc. but the type of costs will depend on the final format which will be determined by the needs of the partners (5712.98€)
Total	45840	

UoW	Cost (€)	Justification
Travel	10400	Kick off Meeting Barcelona - Travel €300, 2 nights accommodation and subsistence €320, 1 person Intermediate meeting Bristol - Travel €135, 1 night accommodation and subsistence €160, , 1 person Final Meeting Paris - Travel €300, 2 nights accommodation and subsistence €320, , 1 person KE Meeting Bristol - Travel €135, 1 night accommodation and subsistence €160, 1 person Future classroom lab in Brussels - Travel €300, 3 nights accommodation and subsistence €480, 1 person 2 x 3-day trips to Bristol @ €455 each (Travel €135, 2 nights accom €320 , 1 person 2 x 3-day trips to Paris @ €620 each (Travel €300, 2 nights accom €320), 1 person 2 x 3-day trips to Barcelona @ €620 each (Travel €300, 2 nights accom €320), 1 person Dissemination at EU and UK conferences – registration fees, travel and accommodation (€4400), 1 person
Equipment	9000	Project laptops and accessories €4750 Specialist software €500 Recording equipment for data collection €1000 Tablets and accessories €2750
Other goods and services	9160	Casual research assistance to contribute to detailed data analysis, literature searches and other tasks as needed, including annotating tweets for the automated analysis tool – 194 hours @ €21.15 per hour = €4103.10 Compensation for approximately 45 student participants @approximately €24 per person in the online ethnographic research who agree to be interviewed at length €1096.90 Translation (total €3.960) will be allocated across multiple smaller subcontracts as follows: 1. Social researchers (expected to be postgraduate students) from Spain and France commissioned to conduct set number of interviews, which they translate to English, as well as translating tweets and related materials from those individuals into English for the research assistants to analyse (15 foreign language interviews plus full sample of tweets per country (€960 per country) x 2 countries = total of € 1.920). 2. Translation of social media report deliverable 4.2 into Spanish

		and French (€240 per language = € 480.00). 3. Translation of project research into Spanish and French for publication in Spanish and French language journals (€240 per language = € 480.00). 4. Helping with the translation aspect of adaptation of the automatic social media analysis tool to Spanish, French language data (€ 1,080.00).
Total	**28560**	

Travel costs are consistent with the University of Warwick policies, and all travel costs are directly linked to the conduct of the action. Appropriate financial records relating to all travel and other costs will be kept by the University.

UNESCO	**Cost (€)**	**Justification**
Travel	24000	International trips to conferences (coordination, dissemination and policy impact of the project) and meetings (management of the project): • **Big Events (10 000€)** 2015 World Science Forum, Budapest 2016 EUROSCIENCE OPEN FORUM (ESOF), Manchester 2016 EMBO Meeting, Birmingham 2017 EMBO Meeting, Mannheim 2015/2016/2017 World Science Day, Paris (travel for invited participants 3-5 people) For each Big Events, at least 2 UNESCO staff will travel. • **Workshops (3 000 €)** Kick-off meeting and intermediate meeting and workshops (2) will be organized in each country (France, Spain, and UK) in which the twelve pilot secondary schools identified are located. For each workshop to be organized, 1 to 2 UNESCO staff will travel. • **Meetings (11 000 €)** UNESCO plans to organize several meetings for policy makers. Some of them will be organized at UNESCO HQ. The others around Europe. At least 3 to 5 meetings in HQ. At least 3 to 4 capacity building meetings all around Europe. For each meeting to be organized: - 1 to 2 UNESCO staff will travel - 6 to 11 Participants will be invited
Equipment	0	--
Other goods and services	90000	Organization of meetings and events with partners and policy makers (including final event), materials & food for the meetings with policy makers: 50000€ - At least 9 conferences will be organized for policy makers around Europe. - At least 6 to 11 meetings will be organized in HQ including the

		3 PERFORM consortium meeting Fee of conferences to disseminate the project: 22000€ Audio-visual material for dissemination: 18000€
Total	114000	

EUSEA	**Cost (€)**	**Justification**
Travel	11500	Kick-off, intermediate and final project meetings (4-5 days each): 3000 International trips for dissemination, communication and policy impact (i.e., Future Classroom Lab meeting, 3 days, 1-2 people; Three Scientix conferences (Brussels): 2-3 days, 1-2 people, additional travels for policy or dissemination meetings): €8500
Equipment	0	--
Other goods and services	6500	Provisions for a sustainable access to the site for a period of 5-10 years after the project, i.e. web hosting at € 3,000 Displays for conferences, € 1500 Roll-ups for conferences and meetings, € 1000 Printed material € 1000
Total	**18000**	

4. Members of the consortium

4.1. Participants (applicants)

4.1.1. UOC

Since its creation in 1994 as a state-of-the art technological university with a highly innovative learning model, the **Universitat Oberta de Catalunya** (UOC, Open University of Catalonia) is one of the world's premier online Higher Education universities, now engaging more than 50,000 students.

The UOC's core goal is to be the university of the knowledge society, promoting innovative education, personalized learning, technological leadership, R&D work on the information society and eLearning and the dissemination of knowledge. The UOC promotes R&D activities via 45 groups linked to a study or to one of the university's two centers: the eLearn Center, which studies eLearning, and the Internet Interdisciplinary Institute (IN3), specialized in the study of the networked society and the knowledge economy, network technologies and specific software areas. In total, more than 400 people work in R&D at the UOC.

Over the last five years, the UOC has participated in more than 260 R&D projects, either national, European or international, including those in 7th Framework Programme, Horizon 2020, COST, ICT-PSP, Lifelong Learning Programme and the actual Eramus+ Programme. The UOC is currently acting as the coordinator of 1 FP7 project and 2 Horizon 2020 projects. What is more, the UOC works to promote knowledge transfer and has, over the last four years, signed more than 1,000 agreements to this end, including the creation of its first spin-off, Open Evidence (www.open-evidence.com), specialized in consulting on health, welfare, consumption, innovation and public policy. The UOC forms part of more than 35 international networks, including the European University Association (EUA), the International Council for Open and Distance Education (ICDE) and the IMS Global Learning Consortium. Currently, UNESCO Chair in both a) *Education and Technology for Social Change;* and, b) *Food, Culture and Development*, it activates over 170 international agreements for joint research, mobility initiatives and training, including an ever growing number of qualified EHEA Master Degree Programmes.

Underpinning the management of all this is UOC's Research and Knowledge Transfer Support Office. More than 25 specialists cover all project management support areas, including Grant Agreements, Ethics, Gender, fellowship hosting, IPR and legal counsel, reporting and logistics, plus community outreach and support for innovation via its widely consulted Social Media 2.0 communication channels, Virtual Platform and Open Repository.

Curriculum Vitae

Isabel Ruiz-Mallen holds a PhD in Environmental Sciences at the UAB (2009). She is a senior researcher at the Internet Interdisciplinary Institute (IN3), Universitat Oberta de Catalunya (UOC) and an associated researcher at the ICTA-UAB and is collaborating with the Observatory on Science Dissemination at the UAB (ODC). Her postdoctoral research has contributed to the understanding of cultural, socio-economic and institutional factors affecting biological and cultural diversity conservation in rural and indigenous communities –mainly in Latin America- through the lens of ethnoecology. She has co-authored more than thirty scientific publications on these topics,

and mostly in peer-reviewed journals of high impact, and participated in FP7 and other European research projects. Her current research interests lie in environmental education, public understanding of science, and science communication.

Fulvia Ferri obtained a MSc in Social Anthropology (2012) in Utrecht, the Netherlands. She is currently organizing the kick-off meeting of the project at the UAB and she will work as the project manager of the PERFORM at the UOC. She has experience in organizing the Summer Schools on Degrowth and Environmental Justice. Her main interest lies in exploring alternative ways of living toward environmental and social sustainability, different approaches that bridge activism and research, and social conceptions about mental health.

List of publications:

- **Ruiz-Mallén, I.**, Escalas, M.T. (2012). Scientists seen by children. A case study in Catalonia, Spain. *Science Communication* 34(4): 520-545.
- Reyes-García, V., Kightley, E., **Ruiz-Mallén, I.**, Fuentes-Pelaez, N., Demps, K., Huanca, T., Martinez-Rodríguez, M.R. (2010) Schooling and local environmental knowledge: Do they complement or substitute each other? *International Journal of Educational Development* 30, 305-313.
- **Ruiz-Mallén, I.**, Barraza, L., Bodenhorn, B., Ceja-Adame, M.P., Reyes-García, V. (2010). Contextualising learning through the participatory construction of an environmental education programme. *International Journal of Science Education,* 32(13): 1755 - 1770.
- **Ruiz-Mallén, I.**, Barraza, L., Bodenhorn, B., Reyes-García, V. 2009. Evaluating the impact of an environmental education programme. An empirical study in Mexico. *Environmental Education Researc*h, 15(3), 371-387.

List of projects:

- Isabel Ruiz-Mallén (PI). *El factor humano en la comunicacion de la ciencia: Métodos interactivos para atraer a los adolescentes al mundo cientifico*. Ministerio de Economía y Competitividad, 18.600€. 2013-2014.
- Isabel Ruiz-Mallén (PI). *Fortalecimiento de las capacidades locales para la adaptación al cambio ambiental global en comunidades rurales e indígenas mexicanas*. XXX Convocatòria del Fons de Solidaritat de la Universitat Autònoma de Barcelona. 9.405€. 2013-2014.
- Teresa Escalas and Isabel Ruiz-Mallén (PI), *Science dissemination course "Opening science: building bridges between research and society*. Collaboration Agreement with "La Caixa". € 9.000, 2013.

Infrastructure

None specific infrastructure is needed to develop this Project.

4.1.2. UAB

The **Universitat Autònoma de Barcelona** (UAB) is one of the major public universities in Spain, with over 41000 students and almost 3000 researchers and teaching staff.

Currently, it offers 84 undergraduate courses, 30 official Master's degrees, 6 Erasmus Mundus and one doctorate Erasmus Mundus. The UAB is a pioneering institution in terms of fostering research. In 2009, UAB achieved the institutional recognition as a Campus of International Excellence by the Ministries for Science and Innovation of Spain. Regarding the UAB's research activity the following data stands out: 3,496 articles published in indexed journals (2012 Thompson Reuters WOK); 347 research agreements; 231 research national projects; 51 patents claimed (2012) and 53 spin-off companies (2012). Furthermore, The UAB has so far been a partner in 168 projects of the 7FP, acting as the coordinator for 16 of them and received more than 44 million Euros of funding. UAB is currently hosting 9 excellent projects funded by the European Research Council (ERC Starting and Advance Grants). Regarding the Marie Curie Action, UAB is the first Spanish university in number of projects and has already hosted 33 Marie Curie fellows. Finally, the UAB also participates in more than 114 European research projects outside the 7FP (DG EAC projects, LIFE, CORES, ESF, NATO etc). The Institute of Environmental Science and Technology (ICTA) of UAB was established in 2003 with the objective of promoting interdisciplinary research and training in the area of environmental science and technology. At present, ICTA is made up of a research staff of more than 60 internationally known specialists and has an active publication role with an average of ca. 120 SCI/SSCI articles per year. In the period 2006-13 ICTA was awarded more than 16 million€ in direct funding for research projects and agreements, a large part coming from the European programs. In particular, at present 23 European and International collaborative projects are ongoing, funded in the framework of the main EU programmes (FP7, Interreg, LIFE+, etc), of which 4 under ICTA's coordination.

Curriculum Vitae

Louis Lemkov is Professor at ICTA and the Department of Sociology at the Universitat Autònoma de Barcelona (UAB) and the former International Relations vice-rector of the UAB. He had held teaching and research positions at the UAB since in 1975 in Sociology and Environmental Science, and also held positions at the University of East London (UK), Cornell University (USA) and the Escuela Andaluza de Salud Pública (Granada, Spain). Principal investigator as partner in 10 EU funded research projects in Framework Programmes. Current research on perception of environmental and technological risk; social inequalities, exclusion, environment and health; labour market changes and social exclusion. Has been adviser/consultant for WHO (Europe) and for the European Commission: DG Environment, DG Research and the Consumer Policy Service. Has lectured in over 30 countries.

Teresa Escalas holds a PhD in Chemical Sciences and she is the director of the UAB Observatory of Science Dissemination (ODC), involving civil society in research decision-making through mutual learning and reflection on their interests and needs in science and technology. Her main interest deals with science communication with general public and school context through coordinating participatory activities, designing and evaluating projects, studying social perception

of science and technology, often in collaboration with municipalities authorities. She is member of the Catalan Council on Scientific Communication and of the European Network on Training in Scientific Communication (ESCW – ESConet). She is Advisor for the web page "Recerca en Acció" and Spanish coordinator of the European project "Young people within the building of a European knowledge-based society". She is also a member of the research group TIRE (Quality Research Group denomination from the Catalan Government) and the research group in computer technology and educative research.

Maria Heras holds a MSc in Interdisciplinary Studies in Environmental, Economic and Social Sustainability (2008). She is currently working at ICTA-UAB in her PhD research, through which she explores the interplay between arts, science and participatory methods in social learning processes. Her main research experience and interests are connected to the design and facilitation of participatory processes within action-research and participatory knowledge integration in Sustainability Science.

List of publications:

- **Heras, M.,** Tàbara, J.D (2014) Let's play transformations! Performative methods for sustainability. Sustainability Science 9(3): 379-398
- **Lemkow L**. "Intergenerational Solidarity, Sustainability and Climate Change". (2012). Queries.
- Kieselbach T., Bagnara S., De Witte H., **Lemkow L**., Schaufeli W. (2009) Coping with Occupational Transitions: An Empirical Study with Employees Facing Job Loss in Five European Countries. 354. ISBN: 9783531152370
- Espluga J., **Lemkow L.**, Baltiérrez J., Kieselbach T. (2004). Desempleo juvenil, exclusión social y salud. 197. ISBN: 8474267374

List of projects:

- Louis Lemkov. *EPINET. Integrated assessment of societal impacts of emerging science and technology from within epistemic networks*. FP7-288971. €118.245, 2010-2015.
- Teresa Escalas (PI) *TANDEM-Schools Project*, Autonomous University of Barcelona, Rovira i Forns Highschool. Fundación Catalunya-La Pedrera. € 60.000, 2013-2016.
- Teresa Escalas (PI), *Anual Agenda of Activities from the UCC+i*, Observatory of Science Dissemination, Autonomous University of Barcelona. Spanish Foundation of Science and Technology (FECYT), Ministry of Science and Technology. € 11.000. 2013-2014.
- Teresa Escalas (PI), *Shall we explain or dialogue? Assessment on RRI features in activities of science dissemination*. Observatory of Science Dissemination and Universitat Autònoma de Barcelona. Spanish Foundation of Science and Technology (FECYT), Ministry of Science and Technology. € 26.000€. 2013-2014.
- Teresa Escalas (PI) *Talk, Experiment and Chat with a scientist in Barcelona*. Institute of Culture, Barcelona City Council. € 3000, 2014.

Infrastructure

None specific infrastructure is needed to develop this Project.

4.1.3. TBVT

Founded in 2013, and with an outstanding exponential growth, **The Big Van Theory** (TBVT) is a Civil Non-profit Organization, composed by 12 scientist, 11 of them PhD holders, created to perform science educational and outreach activities around Spain and internationally. TBVT aims to share the enthusiasm about science by offering humorous performances and stand-up comedy shows that are tailor-made for schools, festivals, museums, adult audiences at pubs, discos, etc. TBVT's mission is to engage people with STEM topics as part of their general culture, inspire the next generation of scientists and engineers, and to strengthen the connection between researchers and the public. We do this in two ways:

- By performing Stand-Up comedy shows, designed and executed by scientists, not only in places thought to hold scientific events (schools, museums, festivals) but also at places that are normally out of the scientific circuit, like theaters, pubs, discos. In every show, we leave a space for dialogue with the public, both in person and via social media, in which scientists can learn about societalconcerns about science, and the public can talk and explore how the real life of a scientist is.
    - Since June 2013, we have performed in more than 250 shows, reaching around 20.000 people.
- By training professional science communicators for high quality science shows, through a variety of formats. These include live presentations, demonstrations, workshops on theatre techniques and other artistic means. We have trained more than 250 science professionals in communication skills to date

The impact of TBVT shows have been assessed by external auditors in two different national projects where TBVT is involved:

- Ciudad Ciencia (CC) is a spanish scientific program organized by CSIC (Spanish National Research Superior Council) whose aim is to bring scientific educational activities to cities below 30.000 inhabitants. TBVT has had great success in contributing to this initiative, especially among young people. More than 1700 highschool students have taken part in the TBVT show in 2014 with more than 64% showing an improvement in their regards towards the scientific labour and more than 50% stating that the contents exposed during the show were excellent[53].
- TBVT has also taken part in private initiatives to bring science closer to people. The most important of which has been an extensive collaboration (7 shows) with the "La Caixa" Foundation. An external assessment undertook by "La Caixa" Foundation during first trimester of 2014 showed that more than 80% of the attendants enjoyed being talked about

[53] Official poll undertook by the CC Program, sample of 365 students between 14 and 18 years old, manuscript in preparation.

science in the show, and more than 77% preferred TBVT format to the standard scientific talk format. Notably, 65% of attendants stated that they would talk about science with friends or relatives due to they learned new scientific concepts during the show.

Curriculum Vitae

Oriol Marimon Garrido, PhD, will be the coordinator of PERSEIA development. He is co-founder and active science communicator in TBVT, specialized in clown and storytelling techniques. He has been working as a non-formal educator instructor with children and teenagers for more than 10 years, being actively involved in international cooperation projects related to scenic arts and science. As a science communicator trainer, he has developed a solid experience in mediation with young people and has organized numerous science activities with various audiences to publicize scientific knowledge. He has coordinated as well the design and execution of the TBVT communication training courses since the beginning of the company. He holds a PhD in biophysics.

Helena González Burón, PhD will be the coordinator of PERSEIA participatory processes. She is co-founder and active science communicator in TBVT, specialized in drama techniques. He has been working as as an explainer in the Scientific Park of Barcelona for more than 6 years. She has coordinated and executing international cooperation projects related to gender equality, becoming an expert in participatory processes developed in conflict zones. She has participated as a trainer in TBVT training courses since the beginning of the company. She holds a PhD in biomedine and a diploma in drama studies.

List of publications

- Bringing Science to Stage. *Science Careers.* By Michele Catanzaro. July 23, 2014
- 13th International Public Communication of Science and Technology Conference (PCST). Salvador, Bahia, Brazil. The Big Van Theory, scientists on the road. Performance 20745. 5-8 May, 2014.
- The Big Van Theory: Los otros nerds que tienen fans. SciDev.Net Latin America. By Aleida Rueda. May 8, 2014
- *2014.* Science communication book "Si tu me dices GEN, lo dejo todo". Publisher: La Esfera de Los Libros.
- 2014 (manuscript in preparation). Science Communication through humour, a new way of bringing science to the general public.

List of Projects

- More than 20 shows within Ciudad Ciencia. (Science City), CSIC.
- Stand-up comedy shows at science Festivals: CERN (Comedy collider: LHCollider 2014), Cheltenham Festivals (FameLab final show 2014), La Isola di Einstein (Italy, 2014).
- Training courses for Science Slam participants in Spain and México.
- Training courses for students and educators in Parque Explora (Colombia).

Infrastructure

None specific infrastructure is needed to develop this Project.

4.1.4. UoB

The **University of Bristol** is one of the most prestigious universities in the UK. It is a thriving international community combining excellence in research and innovation with a vibrant entrepreneurial culture. Research is at the heart of the University's mission and accounts for its international reputation. The University organizes its academic affairs in 25 Schools and 15 research centers arranged in six faculties: Engineering, Science, Medicine and Dentistry, Medical and Veterinary Sciences, Social Sciences and Law, and Arts. In the 2008 UK Research Assessment Exercise (RAE2008), nearly 93% of research at the University was deemed to be of an international standard. Over 60% of the research assessed was awarded either the top 4* rating, defined as 'world leading', or the 3* rating, 'internationally excellent'. As a result, in 2009-10 the University was allocated the 8th highest share of government research funding in the UK. The University participates in hundreds of international collaborations both within and outside of Europe and attracts research funding from organisations around the world.

Centre for Public Engagement

Within the Communications Division, the **Centre for Public Engagement** (CPE) works across the University of Bristol to support and promote public engagement with research and teaching. This involves running a programme of public engagement activities including discussion events, exhibitions and festivals, and helping academics to engage with the public by working with them to attract funding, providing appropriate training and facilitating collaboration with partners outside the University. The CPE works closely with the National Coordinating Centre for Public Engagement which shares best practice in engagement across the UK universities.

Graduate School of Education

The mission of the Graduate School of Education (GSoE) is to develop learning and leadership for a changing world through research and teaching that promotes achievement, opportunity and social justice.

Since its founding in 1913, the GSoE has achieved international prominence and distinction in developing the professional and academic skills of educationists in the United Kingdom and around the world. Nowadays, more than 60 academic colleagues teach and guide over 600 students in doctoral, masters' and initial teacher education programmes each year. These programmes lead to careers in research, teaching, school leadership, educational and social policy, educational psychology, teaching English as an additional language and many other fields."

Bristol Doctoral Centre

Bristol's outstanding research profile is underpinned by the contribution of our postgraduate researchers. The Bristol Doctoral College (BDC) provides a focal point for doctoral training activity and researcher development across the University and in collaboration with our partner institutions.

With over 250 PhD scholarships available across our six faculties, Bristol has one of the largest concentrations of funding for collaborative research training in the UK. This includes doctoral training grants from all UK Research Councils alongside EU funding and charitable organisations.

The BDC offers integrated support for staff setting up and running doctoral training partnerships and centres.

Curriculum Vitae

Centre for Public Engagement

Dr Kate Miller is the Academic Liaison Officer at the Centre for Public Engagement, where she works with staff and students wishing to engage audiences beyond academia. This includes brokering partnerships, helping researchers develop and evaluate their own engagement activities, providing training and development opportunities, and organising engagement activities. Current projects include SYNENERGENE (funded by the EU), which is exploring responsible research and innovation in synthetic biology, and Know your Bristol (funded by the Arts and Humanities Research Council). She has worked as a public engagement practitioner for over 7 years and holds a PhD in bioscience engineering.

Dr Fiona Hyland, Centre for Public Engagement, has 14 years of experience working in higher education; 7 years as a researcher, with a PhD in health psychology, and an additional 7 years working in Professional Services supporting the teaching and research activities of staff and students. Fiona has a wide range of project management skills gained through the supervision of a number of research and public engagement projects including in 2013 *Seeds of Change: Growing a Living History of Bristol*, a Heritage Lottery Funded community engagement project.

Mireia Bes is Public Engagement Officer at the CPE where her role is to look after the organisation of CPE's large-scale public events such as Bristol Bright Night (part of EU Researchers' Night) or the University's contribution to the Bristol Festival of Nature. Before joining the CPE in October 2012, she worked at the Barcelona Science Park coordinating the public engagement activities and developing content for several FP7 European Projects such as Nanoyou, Xplorehealth and Nanopinion, that aimed to engage young people with research in biomedicine and nanotechnologies. She also has an MSc in science communication from Imperial College London where she did her final project on Theatre as a tool in Science Education.

Graduate School of Education

Jon James holds a M.Sc in Science Education from the University of Bristol and is currently working on a Ph.D in the area of science teachers' development of their subject knowledge. He has been engaged with research projects examining teaching approaches that integrate literacy and science in primary schools, and the development of behaviour management skills in trainee teachers. He has also carried out work for the National Network of Science Learning Centres on the importance of subject knowledge in science teaching and the needs of early career teachers in this area. He leads and teaches on several Science teacher training programmes at the University of Bristol, including the PGCE and Teach First programmes. Prior to working at the University he spent over 20 years working in a variety of roles in UK schools and as a local government adviser for education. He is a member of the strategic research group for Natural England, a body which promotes the engagement of communities with the environment.

List of publications

- James, J. (2014), Not using scientific terminology? A study that investigates language and concept development in the primary science classroom . In Constantinou, C.P., Papadouris, N. & Hadjigeorgiou, A. (Eds.), E-Book Proceedings of the ESERA 2013 Conference, Part 16, 71-81, Nicosia, Cyprus: European Science Education Research Association
- Berry,B. , James, J., Rivett, A. & Wharf, M. (2013) Identifying subject-knowledge gaps and CPD needs of early career teachers. A report by the Science Learning Centre South West for the Research, Impact & Accreditation Group of the Science Learning Centre Network
- Pabuccu, A., Erduran, S & James, J.P. (2012). Heating up the discussion: promoting and investigating argumentation in the context of chemistry stories. International Dynamic, Exploratory and Active Learning Conference, Bayburt, Turkey

Sarah Eagle holds a PhD in Education at the University of Bristol. Her main interests are in learning in informal contexts (the home, museum, public space) and other contexts that are not explicitly framed by educators and institutions, and in designed artefacts (especially new technologies) in such settings. Over the last three years she has worked as evaluator of an informal science engagement programme delivered by one of the city's museums (2010-present), carried out an Arts Council UK funded research study of the work of a group of Creative Technologists, and run a UoB funded interdisciplinary workshop series for academics on Creativity, Learning and the Internet of Things. She was a team member of the EU FP7 projects *STELLAR* (the European Network of Excellence in Technology Enhanced Learning and *CoCreat* (Enabling Creative Collaboration through Supportive Technologies). Currently she holds an ERCIM postdoctoral fellowship and is working with colleagues at the Norwegian University of Science and Technologies (NTNU) on a study of learning and creativity involving physical computing across a variety of educational and informal settings.

Infrastructure

None specific infrastructure is needed to develop this Project.

4.1.5. Science Made Simple (SMS)

Founded in 2002, '**science made simple**' is an award-winning social enterprise organisation based at Cardiff University, but working across the UK and internationally to achieve a three-part mission:

- to inspire the next generation of scientists and engineers
- to engage a wider public with STEM as part of popular culture
- to be a STEM translation service between researchers and the public

The enterprise was founded and is led by Wendy Sadler (FRSA) who was awarded the EU Descartes Laureate award in 2006 for Innovative action in science communication using performance. SMS reaches around 70,000 people a year with a range of inspirational STEM presentations for a wide range of age groups and audiences and have reached over half a million

people since they began. They currently employ 13 staff and are have regional offices in three areas of the UK. The company specialise in developing and delivering interactive and engaging shows that connect audiences with research and give context for science and engineering topics. They have worked in over 26 countries to date including an extensive tour of South-East Europe with an innovative, non-verbal science theatre performance called 'visualise - the beauty of science'. They work with a number of academic and industrial partners and have built up a specialism for engaging audience with engineering and physical sciences in particular.

In addition to their performance work, they have built up a substantial range of training experiences for academics and science communicators ranging from one-day presenting courses to specialist master-classes and week long summer schools. They are currently jointly responsible for the Outreach and Public Engagement training for organisations such as The Institute of Physics, The Royal Academy of Engineering and the Engineering and Physical Sciences Research Council (EPSRC) Doctoral Training Centre at Bath University. They reach around 150 adults each year with training experiences in science communication or outreach and have delivered professional training programmes in Sweden, Malta, Greece, Canada and South Africa amongst others.

Curriculum Vitae

Wendy Sadler has been working professionally as a science communicator and public engagement specialist since 1994. Her scientific background is in Physics and Music (BSc – Cardiff University) and she has since completed an MSc in Science with the Open University with a dissertation on the impact of science shows as a form of engagement. She is a fellow of the ERA foundation and the RSA (Royal Society of Arts) and is the author of 19 published books on science for children. She has been a judge for FameLab International and has been involved in training researchers in communication and presentation skills since 2001. She is a member of the EPSRC Peer Review College on issues of Public Engagement and Science in Society and holds a Gold Medal (Grade 8) distinction qualification for public speaking (LAMDA).

James Piercy has a degree in chemistry and MSc in science communication. He has been involved in writing, producing and delivering; science performances, workshops and dialogue events for wide ranging audiences since 1995. He has been awarded the LAMDA gold medal in public speaking and is Chair of the British Interactive Group (BIG) – the UK network for science communicators.

Before joining science made simple James was Director of Inspire Discovery Centre, a small hands-on science centre in Norwich, where he developed the outreach and educational programmes.

James is a senior trainer for science made simple and has extensive experience delivering training on behalf of Edinburgh Science Festival, FameLab, Abu Dhabi science festival, Research Councils UK (RCUK) and the Royal Society.

David Price is a science communicator with a specialism in Science Busking (Street performance using science and maths demonstrations) He has been an invited judge in Malaysia for the international science busking competition, and in 2013 he was awarded the ‘Learning outside the Classroom’ award for innovation for training school students to use busking techniques in the

classroom. In 2010 David was awarded the Manchester Science Festival Josh award for outstanding innovation in science communication, for his work in developing and popularizing science busking techniques.

David is a LAMDA trained public speaker to gold level with distinction. He regularly trains diverse groups in both science communication and science busking techniques. Recently he undertook a month long tour of Norway on behalf of the Association of Norwegian Science Centre's in order to foster science busking there.

List of publications

- Piercy, J and Roberts, E. (2013) – "How not to present science" – published in proceedings of British Science Association Science Communication Conference e-book. http://www.britishscienceassociation.org/science-communication-conference/reporting-2013-conference
- Sadler, W.J. (2012) – "Why do golf balls have dimples?" (Accent Press) and 19 other published science titles for primary school children
- Physics Education (2008) – 'Physics and Performance'
- ASTC Dimensions (2007) – "Evaluating the short and long-term impact of an interactive science show"
- Sadler, W.J. ((2004) – "Evaluating the short and long-term impact of an interactive science show" (unpublished MSc dissertation, Open University – received a distinction)

List of projects

- Co-Investigator/Partner for EPSRC Engineering Stage Award scheme (2007) – "Engineering for Life: From Cradle to Grave" with Cardiff University. Taking Medical engineering shows to schools across the UK and working with researchers to develop engaging content. (£212,500 awarded)
- Co-applicant STFC Science and Society Awards (2007) – "Gravity: Beyond the Apple" Working with researchers on gravitational waves to develop school shows (£13,245 awarded)
- Principal applicant STFC (2008) – "Herschel and the mysteries of the cold universe" Working with research astronomers on the Herschel telescope project for a performance in schools across the UK (£14,658 awarded)
- Delivery partner – Engineering UK (2011 – present) – "Tomorrow's Engineers". Working in partnership with various companies (Rolls Royce, Airbus, Jaguar Land Rover etc) to develop and deliver a touring show about engineering. The show has been taken to over 200 schools and we continue to deliver the show across the UK. (£150,000 awarded so far)
- Lead delivery partner with EPSRC and Welsh Government National Science Academy Grant – "Whose maths is it anyway?" – Developing two new Maths performances

highlighting the context of Maths in a range of career and everyday life settings and touring the performances to schools around Wales. (£124,000 awarded so far)

Infrastructure

None specific infrastructure is needed to develop this Project.

4.1.6. UoW

The **University of Warwick** ranks 7th overall in the UK according to the latest Research Assessment Exercise, and 3rd within the 'Top 50 under 50' QS world rankings. Warwick has an annual income of over €500m with approximately 22,000 students (over 8,000 from overseas) and 5000 staff. The University is internationally acclaimed and has also been singled out, time and again, by academics, politicians, and industrialists as a model both of academic excellence and of entrepreneurial ethos. In 2012/13 Warwick's annual research income exceeded €150 m of which 15% was derived from EU awards. The University of Warwick is currently co-ordinating 47 FP7 projects and is a partner in a further 34 FP7 projects, and its total income from FP7 is in excess of €60m. Warwick also successfully led numerous projects under FP5 and FP6 and has significant experience of managing a wide variety of international awards, from individual fellowships to large multi-partner projects.. The University of Warwick therefore has a very successful track record of managing and participating in large international projects.

Curriculum Vitae

Dr Eric Jensen, Associate Professor, Department of Sociology will lead on employing ICT tools to evaluate the impacts of performance-based science engagement events. Jensen is a widely published researcher in the field of public engagement, and is an expert in public engagement (including mediated public engagement), media sociology and impact evaluation methodology. His main research interest is the interface between forms of expert knowledge and broader publics. He is founder and director of the Master of Science programme in Science, Media & Public Policy at the University of Warwick. His research in this domain has included studies of the impacts of science events, museums, galleries, universities, zoos, research groups and festivals at engaging publics with particular ideas. He has also researched the production and delivery of activities designed to engage publics with expert knowledge and ideas, as well as the role of online resources in enhancing public engagement practice. Recent projects include 'Public Engagement with Research Online' (funded by JISC), the Qualia project developing an evaluation and feedback app for the arts and culture sector (funded by the Digital R & D Fund for the Arts: Nesta, Arts & Humanities Research Council and the Arts Council), a 'rapid evidence assessment' funded by Defra, an upcoming project on 'The role of technology in evaluating the non-economic impacts of arts and culture' (funded by the Arts & Humanities Research Council) and Wellcome Trust-funded seminar series on impact evaluation in public engagement. In terms of theory, Eric has linked these research interests to a new model of social change, developed in his recently published book: *Culture & Social Change: Transforming Society through the Power of Ideas* (Information Age). Eric has a forthcoming research book on science in the public sphere (2014, Ashgate), two books under

contract with Cambridge University Press set for publication in 2014 (*From Conservation Education to Public Engagement* and *Making the Most of Public Engagement Events and Festivals*) and a forthcoming research methods textbook for SAGE entitled *Doing Real Research*. Eric has a PhD in Sociology from the University of Cambridge.

Dr Mireille Mazard is a postdoctoral research fellow in the Department of Sociology, University of Warwick. Mazard has a PhD from the University of Cambridge. She has over five years of experience designing, planning and executing social research projects, leading to research publications and conference presentations. She will be taking the lead in delivering the empirical research to be conducted in WP4. She has extensive experience in survey design, academic report writing and dissemination.

To supplement the existing expertise within the University of Warwick, there will be relatively small contributions from other academic experts acting as consultants employed by Warwick.

Prof. Mike Phillips and Christopher Hunt (i-DAT, University of Plymouth) will bring their expertise and technical experience to bear on developing the technology to be used for WP4, including an automated social media analysis tool (using a combination of machine learning and rules), smartphone app and user interface for science engagement practitioners.

Professor Mike Phillips' (i-DAT, University of Plymouth**)** experience includes ICT projects for Arts Council England, NESTA, EPSRC, AHRC/B, ESF, EU Marie Curie ITN, EU Culture Programme and commercial partners ranging from Architects (Woods Bagot, Feilden Clegg Bradley Studios) to publishers (AA, Dorling Kindersley. Phillips is the Director of i-DAT, an Arts Council National Portfolio Organisation with a specific remit for digital support for the cultural sector. i-DAT is sponsored by IBM Smarter Planet and collaborates on beta testing and software development with digital companies. Phillips is a member of the TSB Internet of Things SIG and the AHRC Internet of Things Advisory Board. He brings a wealth of experience and expertise at the intersection of art and digital technology.

Christopher Hunt is a research assistant and developer at i-DAT and is currently studying for a Masters of Research (MRes) in Digital Art and Technology at Plymouth University. His research is currently focused on the use of machine learning, big data and the internet of things in technology and exploring potential applications for public engagement organisations. Chris graduated with a BSc (Hons) in Digital Art and Technology in 2012, and was also awarded the IBM Smarter Planet award for his work on i-DAT and Beaford Art's Confluence Project, which connected schools and artists with wireless environmental sensors. Currently acting as a lead software developer for the Qualia project, he has also worked on a variety of i-DAT's projects and collaborations.

List of publications

- Jensen, E. & Buckley, N. (2014). 'Why people attend science festivals: Interests, motivations and self-reported benefits of public engagement with research'. *Public Understanding of Science*. (Journal ranked 2nd in History & Philosophy of Science, 5th in Communication; Impact factor: 1.838)

- Dawson, E. and **Jensen, E.** (2011). Towards a 'contextual turn' in visitor research: Evaluating visitor segmentation and identity-related motivations. *Visitor Studies, 14*(2): 127-140.
- B. Wagoner**, E. Jensen** and J. Oldmeadow (Eds.), *Culture and Social Change: Transforming society through the power of ideas*. (2012, Information Age Publishers).
- Jensen, E. & Buckley, N. (*under contract*, for delivery in June 2014). *Making the Most of Public Engagement Events and Festivals: Research, Principles and Practice* (Cambridge University Press)
- Jensen, E. and Phillips, M. (invited by book series editors; planned for delivery in September 2015). *Mediating Creativity: Technology in Public Engagement with Art and Culture* (Palgrave, book series on 'Creativity and Culture').

List of projects

- Principal Investigator (Aug. 2014 - Aug. 2015), 'Using Social Media to Identify and Leverage Engagement (SMILE) with Arts and Culture'. *Arts and Humanities Research Council: Digital Amplification fund*. (£79,971 awarded).
- Principal Investigator (2014), 'The Role of Technology in Evaluating Cultural Value'. *Arts and Humanities Research Council: Cultural Value Fund*. (£39,968 awarded).
- Principal Investigator (2013), 'Qualia: Automated impact evaluation', funded by *Digital R & D Fund for the Arts*, National Endowment for Science, Technology and the Arts / Arts and Humanities Research Council / Arts Council (£125,000 awarded). Qualia.org.uk.
- Co-Principal Investigator (2013), 'Household food security: A review of Food Aid', funded by UK Government Department for Environment, Food and Rural Affairs (Defra). (£43,140 awarded)
- Principal Investigator (2012), 'Public Engagement with Research Online: Embedding impact analysis good practice through integrated web-based linguistic and quantitative analysis solutions'. Part of theme on 'Embedding impact analysis in research using BCE practitioners – 2nd Round', funded by the Joint Information and Skills Committee, UK. (£29,978 awarded)

Infrastructure

None specific infrastructure is needed to develop this Project.

4.1.7. AJA

The **Atelier des Jours à Venir** is a French non profit cooperative company, composed of young researchers and teachers who conceive their role as scientists, educators, and citizens as a coherent whole. It develops and performs teaching for university students in university research curricula, aiming at fostering sound responsible practices within the research community. By addressing the

implicit usages and values that coexist with rational investigation, it aims at empowering university students to become active, creative and responsible members of the research community, contributing to a fruitful dialogue with society.

More specifically, the Atelier des Jours à Venir currently delivers trainings on integrity & responsibility, scientific literacy, and strengthening societal outreach of research for PhD students in Paris universities (Paris Descartes & Diderot) and Zürich university & ETH. The Atelier des Jours à Venir also delivers this trainings in the form of summer schools open to students from all places in Europe.

In addition, the Atelier des Jours à Venir creates and supports projects of scientific culture with a strong social commitment : conveying the research and the values of scientific communities, can empower citizens, in particular in socially deprived contexts, such as French suburbs, Egypt, ex-Yougoslavia where AJA members have been taking action. AJA also takes action to spread tools for citizen participation in research, from creating questions to gathering & analyzing data.

Curriculum Vitae

As a researcher, **Livio Riboli-Sasco** holds a PhD at the crossroads between philosophy and biology, theoretical biology and ecology-evolution. He continues to explore different approaches of the concepts of biological information and biological individuals, within the theoretical context of extended heredity. He also teaches "scientific humanities" at Sciences Po Paris and Reims : an introduction to the norms, values, practices of the research community for students who will not become researchers yet may have important political responsibilies. After having founded Paris-Montagne association, which uses scientific culture as a tool for social inclusion and empowerment, he became a social entrepreneur. He is now co-director of Atelier des Jours à Venir and works as a trainer, facilitator and designer of new activities.

Claire Ribrault holds a PhD in neurosciences (Paris 6 university, 2010), and an interdisciplinary master degree with a major in chemistry. In parallel of her research work, she was involved in the development of innovative teaching approaches (such as project-based learning, critical reading methods…). Together with a few colleagues, she also developed initiatives aiming to promote scientific integrity and responsible research practices. She also participated to Paris-Montagne association, which aims to share the research practice with youth from deprived suburbs of Paris. In 2012, with a few colleagues, she co-founds the cooperative company Atelier des Jours à Venir in order to pursue these diverse actions of education and share the research practice with citizens.

List of projects

- Trainings for PhD students in Paris Descartes university, AgroParisTech, Paris Diderot university and Zürich ETH & university since 2012, specifically on integrity & responsibilty and scientific literacy.
- Nouveaux Commanditaires sciences : 4 ongoing participatory research projects, in France, Spain and Portugal, funded by Fondation de France, 50 000€, 2012 – 2014

List of publications

- L Riboli-Sasco & L Perié, Science festival open doors, Science, 332 (6037), 1503-1503, 2011
- T Flutre, T Julou, L Riboli-Sasco, C Ribrault, Pilot scheme for misconduct database, 478 (7367), 37-37, Nature 2011
- L Perié, L Riboli-Sasco, C Ribrault, E Zlotek-Zlotkiewicz, Kid's questions transcend conflicts, Science, 345 (6198), 740-740, 2014
- L Perie, L Riboli-Sasco, C Ribrault, Straight into conflict zones, scientific research empowers the minds, Journal of Science Communicatin 13 (2), 2014

4.1.8. LAC

Les Atomes Crochus is an interdisciplinary association created in 2002 at the prestigious École normale supérieure in Paris. Ever since its very creation, more than ten years ago, Les Atomes Crochus' identity is closely linked to the development of both the practice of science clowns and the theory behind.

Combining arts, science and pedagogy, the association has rapidly grown into a real laboratory for innovations in scientific culture and science communication.

Science clowns, scientific tales, experimental conferences, debate workshops, photography exhibitions, creative writing contests… Its activities in the fields of experimental sciences and sustainable development are for all ages and all levels of knowledge. *Les Atomes Crochus* are active in France and abroad, in schools, universities, multimedia libraries, cultural and scientific centers, science events…

The association aims high: it wishes to share and pass on its passion for knowledge, to place science back into culture, to develop young people's appetite for learning, to participate in the clarification of values, to keep alive the pleasure of discovery and the will to understand the world… In order to achieve these goals, it draws on the research and reflections of his members and of the Traces group (www.groupe-traces.eu), also active at EU level, in experimental as well as human sciences (cognitive sciences, education sciences, history, sociology and philosophy of sciences…).

Curriculum Vitae

Dr. Richard-Emmanuel Eastes (M) is the President of Les Atomes Crochus. Former director of Paris science center Espace des sciences Pierre-Gilles de Gennes, he is now the rector of teacher training institution *Haute Ecole Pédagogique* of the Berne, Jura and Neuchâtel regions of Switzerland. Learning processes, the notion/concept of understanding in science are parts of his research subjects. "Agregé" professor in chemistry, he is a corresponding member for the national board of the Commission Chimie et Société (Fondation de la Maison de la Chimie - Paris). He also founded several innovative and well established science communication associations. (www.richard-emmanuel.eastes.eu)

Malo de la Tullaye (M) is a comedian and a stage director who has been working with Les Atomes Crochus for several years. In particular, he co-created its science clown show Wanda Wonderfull, which toured in France and all over the world. He initially trained as an actor at the Patrick Baty workshop and the Ecole Claude Mathieu and has since developed his skills through various workshops in specific techniques such as clown (notably with Hervé Langlois and Marcella Obregon), baroque theatre View Point (with Ann Bogart) and Suzuki. In parallel to his activity as a comedian on stage & for television, he stages plays and facilitates theatre and clown workshops.

Céline Martineau (F) is a project manager at Les Atomes Crochus. She develops, follows and implements science communication projects, with a special focus on how they can contribute to build or tighten social interactions. The « Tell me about your technologies » intergenerational project is one of them. It aims at fostering exchanges between generations through the transmission of knowledge around everyday objects. After her diploma as an engineer at Agro Sup Dijon, she volunteered in a Slovenia culture center and created Mapamundi, an association that directs documentaries on solidarity initiatives. She then became a project coordinator at Les Petits Débrouillards Normandie before heading to Unis-Cité Ile de France, where she was in charge of the training of volunteers.

Fabien Descamps (M) is a science explainer at Les Atomes Crochus. Owner of a licence degree in chemistry as well as science communication and environmental education, he first started off at the French association of astronomy before joining Les Atomes Crochus's permanent team in 2009, where he designs and facilitates playful pedagogical activities of all sorts. Running short or all year long workshops with groups of all ages is part of his daily work and he regularly collaborates with Les Atomes Crochus's team of stage artists. A master of experiments, is is also trained to the techniques of discussion games used as a tool to tackle societal aspects of science, that are especially powerful for groups of teenagers and adults. His activities involve training adults and young people alike to the art of science communication.

List of projects

- Les Atomes Crochus initiated two festivals coupled with training sessions and reflection symposiums on science clowns (2012) www.science-clowns.fr and spectacular science ({Electrons libres} 2014 http://www.espgg.org/Electrons-Libres-Festival-de).
- The association has conducted for several years workshops linking science and regular theatre over the course of a school year with groups of selected primary school children with special needs. They resulted in a performance by the young people at the end of the school year, in front of other students and of their family.
- Last summer, in the framework of an "open school" project, fifteen students from secondary schools participated to a workshop lasting a whole week with the aim of providing a basic training of children to science communication so that they could present some experiments in front of a wider audience during the public event "Fontenay-sous-Soleil". Similar workshops have been conducted by our explainer in other cities.

- 3 shows for young people were created by young people with the help of Les Atomes Crochus: *La lumière enchantée* (2005), *La pollution c'est pas du bidon (2006), La Bouffe, c'est ouf (2007)*
- In partnership with association Paris Montagne, Les Atomes Crochus, implemented in the framework of the FP7 "2 WAYS" project the "Recreating life?" workshops, looking through popular culture at the technical and ethical aspects linked to the last developments of synthetic biology.

List of publications

- Richard-Emmanuel Eastes and Francine Pellaud, "The Child, the Clown and the Scientist", in *Current Challenges in Basic Science Education*, Unesco, Paris, 2011.
- Collectif, *La Science en culture, le détour par l'art, Pratiques de médiation scientifique*, Les Atomes Crochus, Paris, 2011.
- Bérénice Collet, Richard-Emmanuel Eastes et Mélodie Faury, « La mise en scène du "Système périodique" de Primo Levi », XXXth International science education meetings (JIES) proceedings, Chamonix, 2009.
- Mélodie Faury, Hélène Monfeuillard, Claire Truffinet, « Scènes de la vie scientifique… les pratiques de recherche vues par le théâtre », XXXth International science education meetings (JIES) proceedings, Chamonix, 2009.
- André Giordan and Francine Pellaud, *Redefining science teaching with a view to citizenship education*, Council of Europe, 1999.

Infrastructure

Since 2011, Les Atomes Crochus has a special agreement with science center Espace des sciences Pierre-Gilles de Gennes of the Ecole supérieure de physique et de chimie industrielles of the City of Paris (www.espgg.org). Its facilities can be used to present the shows and welcome the groups for the workshops, naturally embedding the project into informal science. Situated within a higher education school, this science center frequently interacts with its PhD students and researchers, who can constitute both participants and an audience for the PERFORM! workshops.

4.1.9. UNESCO

In 1945, **UNESCO** was created in order to respond to the firm belief of nations, forged by two world wars in less than a generation, that political and economic agreements are not enough to build a lasting peace. Peace must be established on the basis of humanity's moral and intellectual solidarity.

UNESCO strives to build networks among nations that enable this kind of solidarity, by: 1) Mobilizing for education: so that every child, boy or girl, has access to quality education as a fundamental human right and as a prerequisite for human development. 2) Building intercultural understanding: through protection of heritage and support for cultural diversity. UNESCO created

the idea of World Heritage to protect sites of outstanding universal value. 3) Pursuing scientific cooperation: such as early warning systems for tsunamis or trans-boundary water management agreements, to strengthen ties between nations and societies. 4) Protecting freedom of expression: an essential condition for democracy, development and human dignity.

Today, UNESCO's message has never been more important. We must create holistic policies that are capable of addressing the social, environmental and economic dimensions of sustainable development. This new thinking on sustainable development reaffirms the founding principles of the Organization and enhances its role:

In a globalized world with interconnected societies, intercultural dialogue is vital if we are to live together while acknowledging our diversity. In an uncertain world, the future of nations depends not only on their economic capital or natural resources, but on their collective ability to understand and anticipate changes in the environment - through education, scientific research and the sharing of knowledge. In an unstable world - marked by fledgling democratic movements, the emergence of new economic powers and societies weakened by multiple stress factors – the educational, scientific and cultural fabric of societies – along with respect for fundamental rights - guarantees their resilience and stability. In a connected world - with the emergence of the creative economy and knowledge societies, along with the dominance of the Internet, the full participation of everyone in the new global public space is a prerequisite for peace and development.

UNESCO is known as the "intellectual" agency of the United Nations. At a time when the world is looking for new ways to build peace and sustainable development, people must rely on the power of intelligence to innovate, expand their horizons and sustain the hope of a new humanism. UNESCO exists to bring this creative intelligence to life; for it is in the minds of men and women that the defences of peace and the conditions for sustainable development must be built.

Curriculum Vitae

Casimiri Vizzini. Graduated in Medicine and Surgery at the University of Palermo, he also attended a master in International Cooperation at the "Institut de Relations Internationales et Stratégiques" (IRIS) in Paris. He currently works as Expert, responsible for the Human Variome Project (HVP), in the division of Science Policy and Capacity-Building at the United Nations Educational, Scientific and Cultural Organization (UNESCO) Headquarters in Paris.

Marga Gual Soler, Ph.D will be the Coordinator of Policy Relations. Marga has 7 years of experience in academic research, science communication and education, international development, international science cooperation and science policy. Bilingual in English and Spanish, her professional, study and travel experiences span 25+ countries in 4 continents. Dr. Gual Soler holds a Bachelor’s and Master’s degree in Biology at the University of Barcelona in Spain (2008) and a PhD in Molecular Cell Biology from the University of Queensland in Australia (2013). After her PhD, Dr. Gual Soler went on to pursue a training fellowship in science and technology for development at the United Nations Headquarters in New York City, where she also volunteered as Global Community Coordinator of Science House Foundation, a non-profit international science education organization. Stemming from her work at the United Nations, she founded the Latin American Network of Young Scientists (WAYS LAC), in partnership with UNESCO, and was

selected to represent Spain at the 2014 Global Competitiveness Leadership Program of Georgetown University in Washington DC. Most recently, Dr. Gual Soler obtained a highly competitive Research Fellowship in Science Diplomacy at the American Association for the Advancement of Science (AAAS) to study science cooperation between Spain, the European Union and Latin America. In addition, Dr. Gual Soler is an entrepreneur and has founded a number of initiatives in science communication, policy and diplomacy, listed below.

List of publications

- Active Learning in Optics and Photonics (ALOP): ALOP trains educators with hopes that it will enable them to develop professionally and pass on their skills to their students. Since 2004, ALOP workshops have included over 600 teachers from 45 developing countries in Africa, Asia and Latin America (with the most being from 15 countries in Africa). There have also been several follow-up workshops to train trainers, by giving them the opportunity to work as assistant facilitators
- Microsciences: Early a decade after the Global Microscience Programme was launched by UNESCO and the International Union for Pure and Applied Chemistry (IUPAC) in 1996, the microscience approach has been introduced into 72 countries, many of them in Africa.
- World Library of Sciences: A joint initiative of Nature Education and UNESCO, the World Library of Science will be a comprehensive free library of science education resources in the life and physical sciences. Scheduled to launch in early 2014, the World Library will ensure that all science students with access to computers or mobile phones have a universally high quality of educational information to draw on in their coursework.
- UNESCO and the Sony Ericsson WTA Tour Partnership: In November 2006, UNESCO and the Sony Ericsson WTA Tour, the world's leading global sport for women, established a landmark global partnership, in order to further gender equality and promote women's leadership in all spheres of society.
- Better Life, Better Future: UNESCO launched the Global Partnership for Girls' and Women's Education, known as 'Better Life, Better Future', in 2011 guided by the conviction that educating girls and women can break the cycle of poverty and foster greater social justice. The Partnership seeks to increase learning opportunities for adolescent girls and women and to find solutions to some of the biggest challenges and obstacles to their education.

List of projects

- The future of mobile learning: implications for policy makers and planners. Publ: 2013; 44p.
- Gender equality, heritage and creativity. Published in 2014 by the United Nations Educational, Scientific and Cultural Organization 7, place de Fontenoy, 75352 Paris 07 SP, France. ISBN 978-92-3-100050-8.

- Gender equality, HIV and Education. Published in 2012 by the United Nations Educational, Scientific and Cultural Organization 7, place de Fontenoy, 75352 Paris 07 SP, France, 2012. ISBN 978_92_3_001119_2
- World Atlas of gender equality in education: Published in 2012 by the United Nations Educational, Scientific and Cultural Organization 7, place de Fontenoy, 75352 Paris 07 SP, France, Maps © Collins Bartholomew Ltd 2012. ISBN 978-92-3-104232-4.

Infrastructure

None specific infrastructure is needed to develop this Project.

4.1.10. EUSEA

The **European Science Events Association** (EUSEA), established in 2001, gathers about 100 science events organizers from more than 30 European countries. Members include science festivals, science centres and museums, universities, research funding organizations, and NGO's – all with an expressed interest in the development of two-ways communication, informal learning opportunities, public engagement, and formats for an enhanced understanding and dialogue.

In one way or another, virtually all members and their science communication events encompass and emphasize the objective of reaching out to young people, and promoting science education and science careers.

The association's tasks include – as a membership based organization – to arrange annual conferences, initiate projects and other forums for exchange of experience, best practice and knowledge in the field of science communication events. This would also include the proactive development of new formats, dissemination of experience and data through articles and conference participation, and presenting evidence based material to policy-makers. The recently finished *PLACES* project (2010-2014) with 65 participating "Cities of Scientific Culture" is one such example.

This gives EUSEA and its members an excellent position and structure for this particular call about "Making Science Education and Careers Attractive for Young People" in two ways:

First: the members of EUSEA together have access to a large repository of events, experiences, projects, activities and other sources of knowledge and information on the subject. This ranges from ambitious, long-term projects over several years, such as the "Science Municipalities" for teachers and pupils in Denmark, to individual activities and events for teachers or students as parts of school programmes in festivals, science days or science centres.

Second: the association provides as such an already existing infrastructure for dissemination and organization for both material and immaterial resources. This structure includes 100 members' networks all over Europe, many of which are closely related to and connected to different levels of the education systems, research institutions, industry, NGO's and policy-makers. In this capacity, EUSEA members are excellent forums for discussions as well as experiments and projects for cross-cutting interaction.

Primarily, the PERFORM project participation will be handled by the EUSEA board of directors and, on a more daily basis, the director Jan Riise.

Curriculum Vitae

Jan Riise is a senior science communication advisor, with almost 30 years in the interface between schools, research, industry, public and policy-makers. In 1997, Jan Riise was one of the co-founders of the International Science Festival in Gothenburg, Sweden, now one of Europe's leading science communication events. He was the president of EUSEA in 2008-2010, and assumed the position as director in 2013. Jan Riise's background includes a BA in Urban and Regional Planning from the University of Gothenburg. He has been working with three interdisciplinary research centres: Gothenburg Center for Public Learning and Understanding of Science, GC-PLUS, with prof Ilan Chabay; the Centre for Culture and Health, with prof Gunnar Bjursell; and most recently with Mistra Urban Futures, with prof David Simon, at Chalmers University of Technology. Jan Riise is a member of the scientific committees of the global PCST Network for Public Communication of Science and Technology, and of "Science & You" at Université de Lorraine, France. Jan Riise is a frequent speaker at international conferences such as AAAS Annual Meetings in the US, at Beijing Science Festival in China, and at the ESOF conferences held in Europe every 2 years. In addition to this, Jan Riise is an experienced project manager for science communication events, including conferences and other activities. He has organised EUSEA annual meetings and the 2008 international conference for the PCST Network in Sweden and Denmark. Furthermore, in EUSEA there are several experts on science communication within the education system, and it would be reasonable to involve and engage one or two of them in a project like PERFORM.

EUSEA is represented in the project proposal by Leonardo Alfonsi, president of EUSEA, and CEO of Psiquadro scarl in Perugia, Italy, and by Jan Riise, executive director of EUSEA. Jan Riise, as executive director, will be the senior representative of EUSEA in the project and responsible for the work package. Other persons may be contracted for parts of the work package, as employees or contracted project officers for EUSEA.

List of projects

- 2WAYS (2008-2010) EUSEA and some 30 members exploring how to develop presentations (including games, theatre, multi-media, etc) regarding "new" science, i.e. ongoing research, in collaboration with the research teams. Within the same projects, 30 science parliaments for young people were organized. The parliament project was repeated in similar, but not identical, ways in 2014, with a final parliament at ESOF2014 in Copenhagen
- PLACES (2010-2014, coordinated by Ecsite). The PLACES project was basically about improving the communication between policy-makers, public, and science in cities and regions, thus strengthening the capacities for development and collaboration. More than 150 cities and regions took part in the final conference, organized by EUSEA, and some 60 Third parties developed and carried out local "Pilot Activities" for the development of "Cities of Scientific Culture".

Infrastructure

None specific infrastructure is needed to develop this Project.

4.2. Third parties involved in the project (including use of third party resources)

Does the participant plan to subcontract certain tasks (please note that core tasks of the project should not be sub-contracted)	**Y**/N
TBVT Audio-visual material post production and web content assessment to generate attractive PERSEIA (Task 2.1 and Task 2.2) and for dissemination of the project in the local language (Tasks 2.1, 2.2 and 2.3) will be subcontracted to multiplatform content developer expert studios (like Reina Mono) (4000€). In task 2.1, the involvement of experts in dramatized content generation to implement PERSEIA in chosen schools will be subcontracted, as well as the involvement of teachers and researchers to develop performance-based science education methods with students, in specific occasions (5000€). In Task 2.3, science education methods will be scaled-out to informal learning and teaching environments, meanly science museums. The participation of science museum facilitators in the workshops will be economically incentivized by punctual payments (1000€). **UoW** An external supplier will be selected to provide the technology and related expertise to effectively conduct social media analysis in Task 4.2. This *Technology Subcontracting* (total €24,995) includes: Set up Indico developer API (€150), Server and PHP Licensing (€500), Developer Time (€8.550), Web services subscription (€400), Project management, requirements gathering and solution definition (€3.600), Travel for consultation with researchers (€950), Meetings and consultations (€2.500), Equipment (€500), User Testing (2.000), Natural Language Processing Expert Consultancy (€2.345), Advanced Statistical Analysis Expert Consultancy, including preparing syntax for automated analysis (€3.500). It is anticipated that the Technology Subcontracting will be allocated through multiple smaller subcontracts to gain the highest quality input for the lowest price.	
Does the participant envisage that part of its work is performed by linked third parties[54]	Y/**N**
If yes, please describe the third party, the link of the participant to the third party, and describe and justify the foreseen tasks to be performed by the third party	
Does the participant envisage the use of contributions in kind provided by third parties (Articles 11 and 12 of the General Model Grant Agreement)	Y/**N**
If yes, please describe the third party and their contributions	

[54] A third party that is an affiliated entity or has a legal link to a participant implying a collaboration not limited to the action. (Article 14 of the Model Grant Agreement).

5. Ethics and Security

5.1 Ethics

According to the ethical issue Table included in the administrative proposal form, the PERFORM project involves ethical issues relating to the involvement of human participants and the collection of personal data during the research. Specific ethical issues will also arise from the automated analysis of social media and from the dissemination (on-line and off-line) of underage students' images participating in PERFORM activities as detailed below.

Participation will be strictly voluntary, and subjects will have the right to choose not to participate or to withdraw at any point. The research will be developed under the supervision of the UAB's Ethics Commission for Human and Animal experimentation (CEEAH) and comply with relevant EU legislations (i.e., the European Charter of Fundamentals Rights). The CEEAH is an independent organism appointed by the Council of the UAB and its members do not have any conflict of interests when making their deliberations. UAB is the WP4 leader of the project and will collect data to assess the impact of the performing activities, reason why such institution will be in charged of supervising ethical issues.

1) Informed consent procedures

PERFORM will work directly with secondary school students who are underage and thus considered persons will be unable to give informed consent to participate in the research as well as vulnerable individuals. In order to meet the EU and national legal and ethical requirements (i.e., EU Charter of Fundamental Rights) of involving underage students in education research and dissemination we will follow several steps to obtain informed consent:

- First, each case study coordinator will send an invitation letter to the selected secondary school principals. This letter will include an **information sheet** and the **consent form**. The information sheet will include information on PERFORM project's objective, main activities, benefits and risks, and the PERFORM team commitment of ensuring data confidentiality according to the national legislation of personal data protection. The consent form will include authorisation for the school participation in PERFORM activities as well as for unrestricted permission for images, videos, and recordings of the school and participating underage students to be used in print, video, digital and internet media for PERFORM dissemination purposes. The principal will sign the consent form giving his or her free, prior and informed consent and ethical approval of the activities to be performed at the school and will send the form to case study coordinators. Secondary schools should be able to confine their participation to those activities which they deem to be responsible for the students in their care.

- Second, each case study coordinator, in the presence of the teacher, will then provide an **information sheet** explaining the project and the **consent form** to each student in order to obtain their parental consent for their participation in PERFORM activities. The consent form will include authorisation for the child/ren participation in PERFORM activities and unrestricted permission for images, videos, and recordings of the participating underage

students to be used in print, video, digital and internet media for PERFORM dissemination purposes. Students will be required to return a signed parental consent form, based on an approved template modified according to the corresponding national legal and ethical requirements of each case study country. In addition, students will be informed that they can decline to participate in the project or withdraw from it at any moment without need of further explanations event if their parents signed the consent form.

- Third, each case study coordinator will provide selected teachers and early career researchers with an information sheet and the consent form in order to obtain their consent to participate in PERFORM activities. Teachers and researchers will be asked for returning the signed consent form to participate in the project.

The signed consent forms obtained from the participants will be kept by case-study coordinators till three years after the end of the project.

No data, other than a count for an anonymous person unwilling to participate, will be kept from people who do not want to take part of the study. We will keep record of the number of people deciding not to participate to assess whether this type of attrition bias research results.

We are attaching a draft of the written consent form that will be used. The form will be adapted and translated to each study site.

2) Data collection, storage, protection, retention and destruction

At the beginning of the project, the PERFROM project manager will be responsible for elaborating a Data Management Plan (Deliverable, Month 6) and sharing these guidelines with all partners to accomplish the legal and ethical requirements regarding data collection, storage, protection and publication.

Data will be collected by researchers during project activities on paper and video, and then storage in electronic databases only accessible to team members. PERFORM partners will provide the PERFORM project manager with resultant databases that will be stored in the Digital Document Repository of the UAB, protected with standard security means. To protect the confidentiality of subjects, we will keep the raw data (in papers and videos) in a locked file cabinet at UAB, accessible only to the PI and team members. We will not share the critical data related to confidentiality with anybody outside of the research team. Research data will be retained for a period of 5 years after the project ends, but the consortium will take measures to enable for third parties to access and disseminate research data at the end of the project according to the Data Management Plan.

The partners in this project will be aware of the need to **protect** the **personal data** collected during the project, to **guarantee the ethics in publishing** results and in general the **rights of individuals**. All the aspects set out below are included in the guidelines published on the website http://cordis.europa.eu/fp7/ethics_en.html. The research complies with the **Directive 95/46/EC of the European Parliament and of the Council of 24 October 1995** on the protection of individuals with regard to the processing of personal data and on the free movement of such data. All data collected by the PERFORM consortium from students, teachers and researchers will be systematically anonymised (i.e., removing the names of participants and schools and any other

identifier that would allow a user to identify a subject by the data) in order to prevent possible identification of individuals' opinions or ideas.

There is a unique range of issues associated with **social media data**. While conventional ethical practices cannot easily be applied to Twitter and other social media sites, PERFORM will not be gathering private personal information, including personal sensitive data, or using secretive methods to gain access to social media data. PERFORM will be accessing content that audience members choose to make public, either on the performance groups' webpages or on Twitter. In sum, PERFORM is not trying to get information that people are keeping, or trying to keep, private. The consortium will treat any personal information connected to the audience response data with a high level of consideration, courtesy, privacy and ethical practice. For example, PERFORM will anonymise social media quotations included in the research.

Any publication resulting from participation in the study will not identify subjects by name.

If any unforeseen ethical issues arise during the project, the coordinator will consult with the ethics specialists at the UAB Ethics Commission.

3) Collection and/or processing of personal sensitive data.

PERFORM will not collect and/or process personal sensitive data (i.e., ethnicity, political opinions, religion, health, finances, etc) since obtaining such type of data will not contribute to achieve PERFORM aims and objectives. In the specific case of social media analysis, as we explained before, PERFORM will not gather private personal information, including personal sensitive data, or using secretive methods to gain access to social media data.

4) Copies of opinion or confirmation by the competent Institutional Data Protection Officer

We will submit the notification by the Catalan Data Protection Agency to the REA by the start date of the project and before starting the relevant research activities of the PERFORM project (November 2015). This agency is the correspondent competent authority of the institution in charge of supervising ethical issues (UAB) that will centralize data collection and storage.

5) Involvement of vulnerable groups

PERFORM will work directly with secondary school students who are underage and thus considered vulnerable individuals. The three PERFORM partners coordinating case-studies in Spain, France and UK (TVBT, LAC and SMS, respectively) will use purposive sampling to select four secondary schools as participants along the entire project from a list of schools with which they have previously collaborated or can potentially collaborate based on their previous expertise. The selection criteria will be only based on ensuring socio-economic variability for comparison purposes (i.e., two secondary schools from low socio-economic contexts and two secondary schools from medium socio-economic contexts). Additionally, the three case-study coordinators will invite another 10 to 16 different secondary schools (from low and medium socio-economic contexts) in each case study to participate in part of the project activities. These secondary schools will be randomly selected from the UNESCO's network of associated schools (ASPnet) in each country to ensure their interest in the project. We will have the desired number of schools plus replacements.

In each school, the participation of groups of students will be collectively agreed by the school principal, teachers and the correspondent PERFORM case-study coordinator according to the research purposes. PERFORM will also work with teachers from selected schools and early career researchers from PERFORM universities and organizations and associated research centres whose participation will be voluntary. Case-study coordinators will invite selected schools' teachers to participate and their involvement will be agreed by the school. Case-study coordinators will invite 2-4 early career researchers whose research is related to the topics selected by the students in each school to participate in the project. In both cases, we will use informed consent. The involvement of secondary schools and teachers in the project will be encouraged through non-economic and/or economic incentives (education material for schools, punctual payments and/or official recognition for teachers by the corresponding public administration). In the case of UK and France, teachers participating in the project will receive a small economic compensation that has been established by local partners according to their previous experience and projects. In the case of Spain, teachers will receive a symbolic compensation, such as an official recognition of the time they invest in these activities since teachers' economic compensations are not as usual in Spain as in the other countries. Researchers in the three countries where the case studies will be implemented will also receive a minor monetary compensation for the time they spend participating in the project activities.

6) Informed consent of children/adults unable to give informed consent

Please see details on how PERFORM will obtain children's informed consent in "1) Informed consent".

7) Participation of children/adults unable to give informed consent

As explained above, PERFORM will work directly with secondary school students who are underage and thus considered people unable to give informed consent to participate in the research as well as vulnerable individuals. We will not work with adults unable to give informed consent.

PERFORM: Participatory Engagement with Scientific and Technological Research through Performance

Information for participants

[name of the person collecting information] is working at *[name of the institution]*. S/he is about to conduct a new research project with the help of some other researchers from the PERFORM consortium.

Through the PERFORM project we want to explore and assess the effectiveness of innovative science education methods based on performing arts in stimulating secondary school students' engagement in Science, Technology, Environment and Mathematics subjects (STEM). For that purpose, we will conduct a participatory action research involving secondary school students, teachers and early career researchers in an active inquiry process on relevant scientific topics through the use of performing arts at schools. The PERFORM project will systematically monitor and assess the educational process and activities in a broad time framework, including assessment pre, during and post performance. The assessment will provide an analysis of the potential impacts on girls' and boys' cognitive and behavioural changes towards science and related careers.

This research is funded by the European Commission through a Grant to Isabel Ruiz-Mallén (UOC). *[name of the person collecting information]* is working at *[name of the institution]*, an organization that is part of the consortium for this project. This study is being conducted in a total of twelve secondary schools in France, Spain, and UK by using a case study approach. A total of approximately 600 students will be constantly involved in the research as stakeholders whereas 6,000 students from other 30 to 48 schools will be punctually engaged (i.e., attending the resultant performances).

To collect the information we need, participants will be actively involved in a set of participatory workshops in which students will engage in collectively reflection and dialogue about STEM and relevant scientific topics with early career researchers, systematically assessed by researchers. The participatory workshops will be recorded in video and audio formats so that researchers can compare interventions over time and track processes within. Besides, students will follow a written survey and, eventually, they will be interviewed on their perceptions, attitudes and interest in STEM, as well as teachers and early career scientists involved. The assessment will also include a social media analysis of participants' interventions related to the study in social platforms. The study will not be gathering private personal information or using secretive methods to gain access to social media data. PERFORM will be accessing content that audience members choose to make public, either on the performance groups' webpages or on Twitter. The data generated in this study will be used for basic science research; it will not be used with any commercial purpose.

All the procedures chosen for this study are widely used by social researchers and entail no risks to the participants. The Principal Investigator and other participants in the team have considerable experience with these methods, having used them successfully in numerous social science research projects over the last 10 years. The PERFORM consortium will treat any personal information and data with the highest level of consideration, courtesy, privacy and ethical practice according to the corresponding national legal and ethical requirements.

The benefits of participating in the project include getting involved in a unique learning experience in which students will have the opportunity to approach scientific issues with artists and scientific researchers, get training in an artistic discipline and strengthen transversal competences and values that they will need for STEM careers and jobs. There are no individual payments for

participating in the study, other than punctual compensations for teachers and early career scientists who will actively participate in the project. Additionally we plan to make donations to the schools (i.e., school materials).

Informed consent

We are asking for your participation, because *[a) for school principals: your school has been selected to participate; b) for parents: your daughter/son studies in one of the participating secondary schools]* in the PERFORM project. *[For school principals: Your school; b) for parents: Your daughter/son]* does not have to participate if you do not wish so, and you are welcome to decline to proceed at any time. Participation in this study is strictly voluntary. There are no penalties to people who decide not to participate, or who started to participate and later decided to withdraw.

Data from this project will only available to the project's key personnel. Data are completely confidential. All names will be replaced by coded numbers. Any publications, videos and reports to the funding agency will not identify participants by name. Data will not be used for any purpose other than scientific publications. Data will not be sold, given, or pass in any other way to third parties that might use it with any other purpose than research. Even in this case, we will ensure that third parties cannot identify the person who provided data.

Information will be used to inform scientists and the public in general about the effects of the use of innovative science education methods based on performing arts in fostering young peoples' motivations and engagement with STEM. At the end of the research, we will carry out a workshop at each school to inform about our preliminary research results and ask for feedback. We will invite participants, parents, members of local institutions, and research institutions. A group of students who will be actively engaged in the participatory research will also execute the generated performance-based science education activities in their own school, becoming agents to engage and to motivate other youngsters to approach STEM. We will prepare publications in local languages to disseminate the lessons learned.

Isabel Ruiz-Mallén is the responsible for the project, and you might ask her any questions about the project or the procedures. She will be visiting the schools at least once a year. You can also write to her at the Internet Interdisciplinary Institute, Universitat Oberta de Catalunya, 08860 Castelldefels, Spain. You may also call at 00 34 93 2535743 or send an e-mail to iruiz_mallen@uoc.edu. If you have questions about your legal rights as a research subject, you may contact: ceeah@uab.cat. To contact her, you can ask one of the project members at the school who will have complete instructions and will do it on your behalf at no cost to you.

You will be given a copy of this form to keep. By agreeing to participate and giving consent, you are not waiving any of your legal rights, claims, or remedies. You will keep the right to withdraw from the project at any moment, without explanations or further consequences. You may sign the form yourself or ask for someone else to sign on your behalf. If you prefer we can record your consent to participate by tape recording it.

I have read (or someone has read to me) the information in the consent form. I have had an opportunity to ask questions and all my questions have been answered to my satisfaction. By signing this consent form, I willingly agree to participate in this study.

Name of participant (type or print):_____.

. _____ . . _____ .

Signature of subject or legal representative Date (must be signed prior to entry)

I have explained the research to the participant and answered all of his/her questions. I believe that he/she understands the information described in this consent form and freely consents to participate.

Name of Investigator/research team member (type or print):_____

. _____ . . _____ .

Signature of investigator/research team member Date

5.2 Security[55]

Please indicate if your project will involve:

- activities or results raising security issues: NO.
- 'EU-classified information' as background or results: NO.

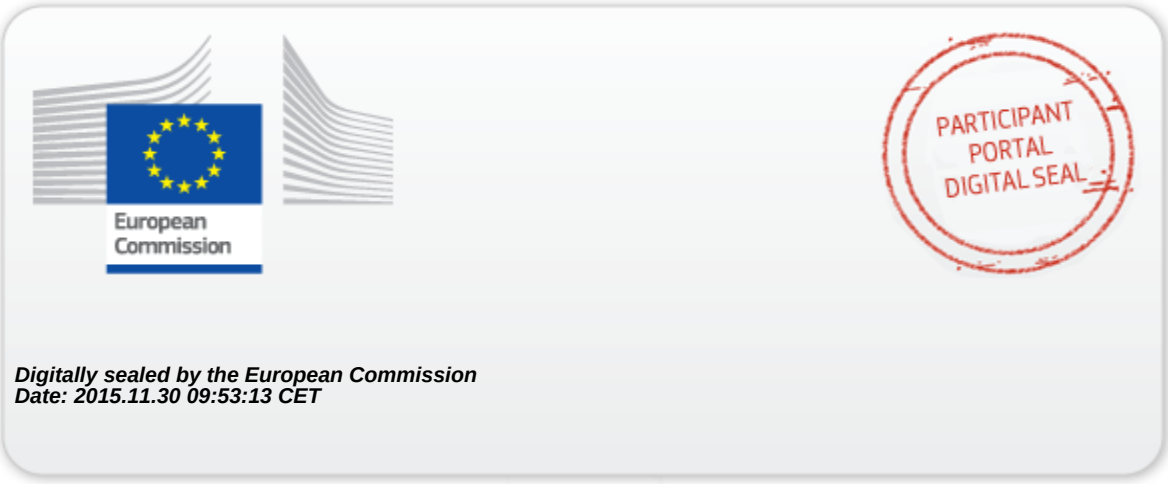
[55] Article 37.1 of Model Grant Agreement. *Before disclosing results of activities raising security issues to a third party (including affiliated entities), a beneficiary must inform the coordinator — which must request written approval from the Commission/Agency;* Article 37. *Activities related to 'classified deliverables' must comply with the 'security requirements' until they are declassified; Action tasks related to classified deliverables may not be subcontracted without prior explicit written approval from the Commission/Agency.; The beneficiaries must inform the coordinator — which must immediately inform the Commission/Agency — of any changes in the security context and — if necessary —request for Annex 1 to be amended (see Article 55)*

ESTIMATED BUDGET FOR THE ACTION (page 1 of 2)

	Estimated eligible[1] costs (per budget category)									EU contribution			Additional information		
	A. Direct personnel costs				B. Direct costs of subcontracting	[C. Direct costs of fin. support]	D. Other direct costs	E. Indirect costs[2]	Total costs	Reimbursement rate %	Maximum EU contribution[3]	Maximum grant amount[4]	Information for indirect costs	Information for auditors	Other information:
	A.1 Employees (or equivalent) A.2 Natural persons under direct contract A.3 Seconded persons [A.6 Personnel for providing access to research infrastructure]		A.4 SME owners without salary A.5 Beneficiaries that are natural persons without salary				D.1 Travel D.2 Equipment D.3 Other goods and services D.4 Costs of large research infrastructure						Estimated costs of in-kind contributions not used on premises	Declaration of costs under Point D.4	Estimated costs of beneficiaries/ linked third parties not receiving EU funding
Form of costs[6]	Actual	Unit[7]	Unit[8]		Actual	Actual	Actual	Flat-rate[9] 25%							
	(a)	Total (b)	No hours	Total (c)	(d)	(e)	(f)	(g)=0,25x ((a)+(b)+ (c)+(f) +[(h1)+(h2)]- (m))	(i)= (a)+(b)+(c)+ (d)+(e)+(f)+ (g)+(h1)+(h2)+(h3)	(j)	(k)	(l)	(m)	Yes/No	
1. UOC	136028.76	0.00	0	0.00	0.00	0.00	24200.00	40057.19	200285.95	100.00	200285.95	200285.95	0.00	No	
2. TBVT	189000.00	0.00	0	0.00	10000.00	0.00	40500.00	57375.00	296875.00	100.00	296875.00	296875.00	0.00	No	
3. UoB	192468.00	0.00	0	0.00	0.00	0.00	45840.00	59577.00	297885.00	100.00	297885.00	297885.00	0.00	No	
4. SMS	72200.00	0.00	0	0.00	0.00	0.00	9800.00	20500.00	102500.00	100.00	102500.00	102500.00	0.00	No	
5. UoW	152950.00	0.00	0	0.00	24995.00	0.00	28560.00	45377.50	251882.50	100.00	251882.50	251882.50	0.00	No	
6. AJA	40700.00	0.00	0	0.00	0.00	0.00	3700.00	11100.00	55500.00	100.00	55500.00	55500.00	0.00	No	
7. LAC	96000.00	0.00	0	0.00	0.00	0.00	8100.00	26025.00	130125.00	100.00	130125.00	130125.00	0.00	No	
8. UNESCO	110000.00	0.00	0	0.00	0.00	0.00	114000.00	56000.00	280000.00	100.00	280000.00	280000.00	0.00	No	
9. EUSEA	126000.00	0.00	0	0.00	0.00	0.00	18000.00	36000.00	180000.00	100.00	180000.00	180000.00	0.00	No	
10. UAB	123681.74	0.00	0	0.00	0.00	0.00	38077.50	40439.81	202199.05	100.00	202199.05	202199.05	0.00	No	
Total consortium	1239028.50	0.00		0.00	34995.00	0.00	330777.50	392451.50	1997252.50		1997252.50	1997252.50	0.00		0.00

ESTIMATED BUDGET FOR THE ACTION (page 2 of 2)

(1) See Article 6 for the eligibility conditions
(2) The indirect costs covered by the operating grant (received under any EU or Euratom funding programme; see Article 6.5.(b)) are ineligible under the GA. Therefore, a beneficiary that receives an operating grant during the action's duration cannot declare indirect costs for the year(s)/reporting period(s) covered by the operating grant (see Article 6.2.E).
(3) This is the theoretical amount of EU contribution that the system calculates automatically (by multiplying all the budgeted costs by the reimbursement rate). This theoretical amount is capped by the 'maximum grant amount' (that the Commission/Agency decided to grant for the action) (see Article 5.1).
(4) The 'maximum grant amount' is the maximum grant amount decided by the Commission/Agency. It normally corresponds to the requested grant, but may be lower.
(5) Depending on its type, this specific cost category will or will not cover indirect costs. Specific unit costs that include indirect costs are: costs for energy efficiency measures in buildings, access costs for providing trans-national access to research infrastructure and costs for clinical studies.
(6) See Article 5 for the forms of costs
(7) Unit : hours worked on the action; costs per unit (hourly rate) : calculated according to beneficiary's usual accounting practice
(8) See Annex 2a 'Additional information on the estimated budget' for the details (costs per hour (hourly rate)).
(9) Flat rate : 25% of eligible direct costs, from which are excluded: direct costs of subcontracting, costs of in-kind contributions not used on premises, direct costs of financial support, and unit costs declared under budget category F if they include indirect costs
(10) See Annex 2a 'Additional information on the estimated budget' for the details (units, costs per unit).
(11) See Annex 2a 'Additional information on the estimated budget' for the details (units, costs per unit, estimated number of units, etc)
(12) Only specific unit costs that do not include indirect costs
(13) See Article 9 for beneficiaries not receiving EU funding
(14) Only for linked third parties that receive EU funding



Digitally sealed by the European Commission
Date: 2015.11.30 09:53:13 CET

This document is digitally sealed. The digital sealing mechanism uniquely binds the document to the modules of the Participant Portal of the European Commission, to the transaction for which it was generated and ensures its integrity and authenticity.

Any attempt to modify the content will lead to a breach of the electronic seal, which can be verified at any time by clicking on the digital seal validation symbol.