Project Number: 665826

Project Acronym: PERFORM

Project title:

Participatory Engagement with Scientific and Technological Research through Performance

Periodic Technical Report

Part B

Reporting period 2: *RP2*

Period covered by the report: from 01/02/2017 to 31/10/2018 [Months 16-36]

Contents

List of acronyms

AB:	Advisory Board
AJA:	L'Atelier des Jours À venir
CT:	Coordination Team
DoA:	Document of Action
EC:	European Commission
ECR:	Early Career Researchers
EUSEA:	European Science Events Association
GA:	Grant Agreement
GenA:	General Assembly
ICT:	Information and Communication Technology
MoE:	Ministries of Education
PERSEIAs:	Performance-based Science Education and Innovation Activities
PEST:	Performers - ECRs - Students - Teachers
PO:	Project Officer
PW:	Participatory Workshops
RRI:	Responsible Research and Innovation
SC:	Steering Committee
SMS:	Science Made Simple
STEM:	Science, Technology, Engineering, Mathematics
STEAM:	Science, Technology, Engineering, Arts, Mathematics
TBVT:	The Big Van Theory
TRACES:	Théories et Réflexions sur l'Apprendre, la Communication et l'Éducation Scientifiques
UAB:	Universitat Autònoma de Barcelona
UNESCO:	United Nations Educational, Scientific and Cultural Organization
UoB:	University of Bristol
UOC:	Universitat Oberta de Catalunya
UoW:	University of Warwick
WP:	Work Package

1. Explanation of the work carried out by the beneficiaries and overview of the progress

During the reported period, February 2017 to October 2018 (Month 16 to Month 36), the PERFORM consortium **kept generating results and outcomes** towards the **PERFORM overall objective** of investigating how the establishment of a direct interaction between students and researchers by using performing arts methods for science education can have an impact on students' motivation and interest towards science, technology, engineering, and mathematics (STEM). The positive progress of the project in this direction was confirmed by the highly positive mid-term assessment produced by the Advisory Board (AB) and effective and on-time delivering of expected outcomes.

The PERFORM project completed the **two phases of a participatory educational process with secondary school students, teachers and early career researchers (ECR)** that guided students to generate scientific monologues, busks and theatrical pieces. This process consisted of a series of participatory workshops that were evaluated according to **a set of indicators assessing the inclusion of the values of the Responsible and Research and Innovation (RRI) approach**, as well as potential changes in students' attitudes, knowledge and perceptions towards science, and the acquisition of the transversal competences needed to pursue STEM careers, with a special emphasis on gender issues. Students and researchers also had the opportunity to interact beyond face-to-face encounters by using social media tools, which led to the development of an Information and Communication Technology (ICT) automated tool to enable social media data analysis. The PERFORM project also experimented the **science education drama-based approach in informal learning contexts** through a pilot initiative in a science museum in Barcelona.

Also, the PERFORM consortium developed **training toolkits addressed to ECR** to develop reflexivity, understanding of RRI values and creative approaches to public engagement, which were informed by pilot trainings conducted in UK, France and Spain. Similarly, pilot trainings addressed to secondary school teachers also conducted in the three case studies informed the development of **training toolkits to equip science teachers** with the tools to improve their skills on science communication, performance and reflexivity.

By conducting these participatory action research activities, around **250 students, 80 teachers, 100 ECRs and 18 science museum communicators** have been directly and actively engaged in the project research activities during this reporting period. Exploitable results related to these activities included the development of **a set of toolkits** addressed to different audiences: secondary school teachers and students, ECR, science museums and science communicators. These are: i) a **user-friendly toolkit** to transform learning activities combining arts and science into **performance-based science education and innovation activities (henceforth PERSEIAs)** addressing the human dimension of science and the Responsible Research and Innovation (RRI) values; ii) **a user-friendly toolkit of tested performance-based science education methods generating a transformative participatory educational process** amongst secondary school students, iii) a set of **methodological guidelines to implement these PERSEIAs in the context of science museums**, iv) a **toolkit to support ECRs in reflective thinking around RRI values** and **introduce them to creative performance methods** for public engagement, and v) a **toolkit for providing secondary school teachers with a series of creative activities and resources** to help stimulate discussion on science and society in the classroom, and develop a more reflective understanding of science and careers in science.

Our consortium generated other key results related to the PERFORM impact assessment consisting of **three academic publications** and a **policy brief focused on the analysis of the impacts of PERFORM's educational approach** in fostering secondary school students motivations and attitudes towards science learning and STEM careers, as well as a **research report about the nature of sharing (through social media and other pathways)** that occurred

for young people engaged through PERFORM. In particular, academic publications include **two scientific papers published in open access in high impact, international peer-reviewed journals** (*International Journal of Science Education*, IF:1.85 JCR Q2, and *Science Communication*, IF:2.03 JCR Q1), one of them presents a RRI-based conceptual framework and indicators for assessing science education activities while the other shows evidence on the positive impact of researchers' interaction and drama-based techniques when learning science on students' views of scientists and motivations for studying science. The third academic publication is a **book chapter published by one of the fastest growing publishers of books in Educational Research and related fields at international level** (*Blind Publishers*) that sheds lights on how the novelty of student participation in formative assessment in an art-science programme support learning and inform and adapt teaching practices that fulfil learners' basic needs.

The consortium ensured the timely transference of the newly generated knowledge to the scientific and education communities across Europe through **online and offline communication tools and platforms**, including **Scientix,** and national and international scientific and policy events.

Partners were involved in 64 outreach events, and organised the final PERFORM conference at UNESCO Headquarters. Considerable effort was put into maximising the policy impact of the project and promoting its sustainability in the long term. Two key exploitable results were produced in this regard consisting of a **UNESCO position paper addressed to policy-makers and based on two policy briefs produced by UNESCO** that summarises their recommendations generated for the project, and a **graphic document of the PERFORM outcomes and tools** that will be distributed in online and printed formats to promote their uptake and use beyond the project's timeline.

In sum, **10 deliverables** and **3 milestones** were successfully achieved (Table 1) during this second reporting period, and **12 exploitable results were generated** (Table 2) in line with the Annex 1 of the Grant Agreement (GA).

Table 1. Deliverables and milestones achieved in reporting period M16-M36, by WP.

WP no.	Del./ Mil.	Deliverable/Milestone name	Lead beneficiary	Peer-reviewed by	Delivery Month
WP1	D1.3	Evaluation Report of the Advisory Board	**UOC**	**UNESCO, LAC**	24
WP1	Mil.3	Mid-term internal evaluation	**UOC**	**--**	18
WP1	Mil.6	Links to Scientix	**UOC**	--	30
WP2	D2.1	Final protocol of tested methods to transform a performance-based activity into a PERSEIA	**TBVT**	**UoB, UoW, UOC**	16
WP2	D2.2	Final protocol of tested methods to generate a transformative participatory educational process by using science and arts-based education approaches	**TBVT**	**UAB, AJA, UOC**	30

WP2	D2.3	Guidelines for PERSEIA adaptation to science museums	**TBVT**	**EUSEA, UOC**	36
WP3	D3.1	Toolkit for researchers wanting to develop PERSEIAs	**UoB**	**TBVT, AJA, UOC**	33
WP3	D3.2	Toolkit for teachers wanting to develop PERSEIAs	**UoB**	**SMS, UOC**	36
WP4	D4.2	Report on social media responses to science performances	**UoW**	**SMS, UAB, UOC**	35
WP4	D4.3	Policy brief: Effective science and arts-based education approach	**UAB**	**AJA, UNESCO, UOC**	36
WP4	Mil.4	ICT development of an automated tool to enable social media data analysis	**UoW**	**UOC**	24
WP5	D5.2	Two policy briefs on WP5 related topics	**UNESCO**	**UoW, UAB, UOC**	34
WP6	D6.3	Report on outreach activities, including the final conference	**EUSEA**	**UNESCO, AJA, UOC**	36 (1 month delay accepted by the EC PO)

Table 2. Summary of the exploitable results generated in reporting period M16-M30.

WP no.	**Exploitable result**	**Involved beneficiaries**	**Means for current and further exploitation**
WP2	User-friendly toolkit "From drama-activities to raising scientific aspirations in secondary school students"	**TBVT, SMS, TRACES**	Publication at PERFORM website, TBVT website and the project and partners' social media (including videos). Also published in Scientix and RRI-Tools webpages
WP2	User-friendly toolkit "Secondary school students as science communicators. PERFORM: scenic arts for humanising science"	**TBVT, SMS, TRACES**	Publication at PERFORM website, TBVT website and the project and partners' social media (including videos). To be published in Scientix and RRI-Tools webpages
WP2	Guidelines for PERSEIA adaptation to science museums	**TBVT**	Publication at PERFORM website, social media and TBVT website.
WP3	PERFORM toolkit for researchers to develop reflexivity, understanding of	**UoB, AJA**	Publication at PERFORM website and social media.

	RRI values and creative approaches to public engagement		
WP3	PERFORM toolkit for teachers wanting to develop PERSEIAs	**UoB, AJA**	Publication at PERFORM website and social media. To be published at Scientix website.
WP4	Policy Brief: "Encouraging students' engagement in science education through arts-based approaches"	**UAB, UOC**	Publication at PERFORM website and social media. To be published at Scientix website.
WP4	Scientific article "Responsible Research and Innovation Indicators for Science Education Assessment: How to Measure the Impact?" *International Journal of Science Education.* 2017	**UAB, UOC**	Gold open access publication. Publication at PERFORM and involved partners' websites and social media. Published at the RRI-Tools repository.
WP4	Scientific article "From White Lab Coats and Crazy Hair to Actual Scientists: Exploring the Impact of Researcher Interaction and Performing Arts on Students' Perceptions and Motivation for Science" *Science Communication.* 2018	**UAB, UOC**	Gold open access publication. Publication at PERFORM and involved partners' websites and social media.
WP4	Book chapter "'What Do I Like about Science-Related Activities?' Participatory Indicators Addressing Students' Motivations and Needs When Learning Science". 2018	**UAB, UOC**	Advertisement through the PERFORM and involved partners' websites and social media.
WP4	Research report on the nature of sharing through social media and other pathways that occurs for young people engaged through PERFORM	**UoW**	Publication at PERFORM and involved partners' websites and social media.
WP5	UNESCO position paper addressed to policy makers and based on two policy briefs produced by UNESCO	**UNESCO**	Publication at PERFORM and involved partners' websites and social media.
WP6	Graphic visualisation of the project's results: whiteboard animation and project poster	**EUSEA**	Publication at PERFORM and involved partners' websites and social media. Distribution of printed copies in events.

1.1 Objectives

In this reporting period, our consortium conducted work towards the achievement of the four specific objectives listed in the PERFORM Document of Action (DoA), as follows:

Objective 1. ***To explore new science education methods based on scenic arts that lead secondary school students to understand and to learn about STEM***

PERFORM contributed to this objective through three actions conducting during this second reporting period. First, the delivery of a user-friendly toolkit summarizing the document "Final protocol of tested methods to transform a performance-based activity into a PERSEIA" (Deliverable 2.1, Task 2.1). This toolkit named 'From drama-activities to raising scientific aspirations in secondary school students' shows, step by step, how to use drama-based activities to introduce the human dimension of science in learning processes and to embed the RRI values. It is a key instrument for both science communicators and teachers that turns into practice a wide set of observations and reflections on students' views about science and technology, their expectations and concerns, gathered in selected schools in France, Spain and the UK during the first reporting period. This toolkit includes 11 short videos and links to 7 documents, and it is available on the PERFORM website.

Second, PERFORM implemented the first and second rounds of participatory workshops (PW) corresponding to Task 2.2 by conducting activities in 12 schools from low-to-medium socio-economic backgrounds in the three case studies (4 in France, 4 in Spain, 4 in the UK). Participant students were guided by the PERFORM science communicators/performers to generate their own PERSEIAs by means of an interactive participatory educational process with their teachers and ECRs. Based on the feedback and recommendations received by PERFORM researchers after the implementation of the first round of PWs at 5 participant schools (Month 15-20), the PW were redesigned by adapting them to the local context and needs of the stakeholders involved in each case study and implemented in another 7 schools. In total, **253 students, 31 teachers and 44 ECR** were involved in the PW across the three countries. Schools, teachers and parents of involved students, gave their free and informed consent to participate in the project, as well as the involved ECR did. The description of the redesigned PW was included in the toolkit "Final protocol of tested methods to generate a transformative participatory educational process by using science and arts-based educational approaches" (Deliverable 2.2, Task 2.2). As previously done for the Deliverable 2.1, a user-friendly version of the protocol was produced in order to facilitate dissemination and use to targeted audiences that include secondary school students and teachers. This toolkit named "Secondary school students as science communicators. PERFORM: scenic arts for humanising science", contains 10 short videos and links to the description of the PW conducted in the three case studies, and are available on its YouTube channel and the website of the project and disseminated through social media.

Third, PERFORM scaled-up the results of PERFORM project to informal-learning environments, and particularly science museums, through a pilot experience conducted at CosmoCaixa Science Museum in Barcelona, Spain. A series of science education activities addressed to secondary school students and conducted in this museum were reviewed in order to explore the best way to adapt PERSEIAs to the context of science museums and based on this evidence a knowledge-sharing workshop was conducted with **18 science museum facilitators**. Additionally, a specific training addressed to non-expert science museum facilitators was conducted in order to support drama-based scientific guided tours at CosmoCaixa. These activities led to the generation of a set of methodological guidelines for conducting PERSEIAs in science museums that are included in Deliverable 2.3 (Task 2.3) "Guidelines for PERSEIA adaptation to science-museums". This resource is available on the website of the project, its YouTube channel and disseminated through social media.

<u>Objective 2.</u> To identify and challenge limitations faced by secondary school teachers and early career researchers in teaching and communicating STEM to young people

Within this objective two main actions were conducted in this second reporting period. On the one hand, the PERFORM consortium produced **training toolkits for ECR** to bring them together with performers, teachers and secondary school students to develop performance-based activities that explored RRI values and the human dimension of science (Deliverable 3.1, Task 3.2). On the other hand, PERFORM produced training toolkits addressed to teachers to support them in setting up and resourcing PERSEIAs (Deliverable 3.2, Task 3.3). Both toolkits and the corresponding videos are available at the website of the project, Youtube channel and disseminated through social media.

To do that, **the first pilot ECR training** delivered in the three case studies and attended by **66 ECR** was assessed and reviewed in this second period, in order to address both the needs of ECRs and the project in the training in the second stage. **The second phase of ECR trainings then took place in each of the three countries**. A total of **35 ECR** were voluntarily involved in this second round of trainings across the three countries. An evaluation report was produced, which highlighted areas of significance some which were able to ensure the development of the toolkits related to the end user.

In turn, a **first teacher training took place in Barcelona** and the evaluation undertaken on it informed the teacher training design being further developed in France and the UK. The outcomes of this training were written up in an internal evaluation report and discussed by PERFORM members and led on **to inform subsequent teacher trainings in the three case studies.** It was agreed that training sessions for teachers should endeavour to encourage more two-way, participative communication between teachers and students and amongst students. **The subsequent first round of training for teachers in Bristol** was designed accordingly and was based on developing and sharing techniques and ideas for reflective dialogues about science. Teacher feedback offered during these sessions was subsequently used to help shape and inform the next developmental stages of the toolkit. The evaluation was shared with the case study coordinators the three case studies to influence the **design of the teacher training in Paris** and a **second upcoming round of training in Barcelona and Bristol**. Based on this evaluation and the trainers' experiences, the training was also adapted for a second phase of Bristol teacher training. **A total of 79 teachers** participated in these trainings.

The feedback gathered from the AB was helpful for PERFORM thinking about the toolkit resources for both trainings (i.e., ECR and teachers) that were produced, and influenced the design and targeting of those resources to ensure effectiveness and correct implementation by our peers in the researcher development and teacher training sectors, as well as by interested individuals. Also, advice relating to appropriate content, effective format and dissemination networks for both of the toolkits have been gathered consistently throughout the development process of both of the toolkits.

In the case of the ECR toolkit, specialists in RRI and public engagement/performance from the UK, Spain and France were consulted to ensure the toolkit was designed with the ECR end-user experience in mind. A particular judgment was made about the value of producing a toolkit that could be used independently by ECRs, without the need of professional facilitators. As a result, the toolkit provides less emphasis on advising ECRs on how to develop performance techniques: instead there is a general introduction to the concept of creative approaches to public engagement and the idea of collaborating with performance partners.

In the case of the toolkit for teachers, regular consultation with teachers and education experts throughout the development of the toolkit resulted in recommendations from teachers that meant the toolkit structure, content and design was based heavily on teacher experience. A cohort of 5 teachers' from across Europe belonging to the Scientix Ambassadors European teacher's network reviewed the penultimate draft of the teacher toolkit and fed back on usability. A key section of the toolkit for teachers directly addresses key barriers and challenges faced by

secondary teachers (the **Guidance Notes for integrating these approaches into your lessons).** These were framed through the testimonies of teachers participating in the training in Bristol, who were encouraged to discuss potential barriers to being able to use performance exercises and philosophical discussions in lessons. Theatre practitioners and Philosophy of Science experts were invited to work with the PERFORM team to outline this list of suggestions for how the issues could be overcome.

<u>Objective 3.</u> To assess the impact of the participatory educational process in fostering secondary school students' motivations and engagement in science and with RRI values

PERFORM contributed to this objective by implementing the assessment instruments designed during the first reporting period in the 12 secondary schools participating in the PW during the first and second implementation phases of the participatory educational process. The analysis of data collected during the first phase of PW implementation generated **four internal reports for each case study**, each report corresponding to one of the four implementation goals of the PERSEIAs (i.e., transversal competences, RRI values, perceptions and attitudes towards science, creation of the PERSEIA) and including specific recommendations for the redesign of the workshops for the second round. Based on these reports, the results were returned to the 5 participant schools in the first round of PWs.

Based on the insights and reflections generated during the first round of PW, as well as on the feedback received from the AB, the **assessment strategy and tools for the second round of workshops were refined** and then implemented in the three case studies. Results were analysed, and **three internal reports of results** were generated and shared with case study coordinators in each country, together with **a summarised version** that was also shared with participating schools and ECRs.

Based on this evidence, PERFORM generated a **policy brief that highlights the potential of performing arts to address the human dimension of scientific inquiry and to emphasise positive experiential aspects of learning** that can create new rapports of students with science and enhance their motivations and interests to learn about it. This policy brief also introduces the main RRI-related methodological elements of PERFORM's educational approach and examines their impact on promoting secondary school students transversal competences, embedding RRI values in their perceptions of science and fostering their scientific vocations. The policy brief is available at the PERFORM website. Furthermore, PERFORM partners have produced **two scientific papers and a book chapter of international distribution** focused on different conceptual and methodological aspects of the assessment that contribute to the understanding of the potential and challenges of the PERFORM drama-based approach in science education.

Finally, within this objective PERFORM conducted research on participating students' engagement activities on Twitter and Instagram, by developing a social media analysis tool and analysing the feelings, perceptions and attitudes towards science and scientific careers of participant students. Results from this tool were included in an **empirical research report on the social media responses and impacts from the project engagement with young people.**

<u>Objective 4.</u> To implement a sound communication strategy for the dissemination and exploitation of the research results for widespread policy adoption and implementation across Europe

Over this period the PERFORM consortium collectively contributed to extensive online and offline dissemination and communication activities, based on the project's dissemination and communication plan. The communication activities reached out nationally and internationally, addressing relevant stakeholders in all involved member states.

In total, **PERFORM participated and/or organised 64 national, European and international conferences, meetings and activities on STEM education, RRI and/or science communication** (45 international and 19 national). This involvement ensured a widespread communication of the project results in different communities of practice and among relevant stakeholders and policy makers across Europe.

The consortium also organized and attended a series of policy meetings with high-level or senior policy/decision makers. The list of policymakers met by the consortium includes ministers, director of governmental agencies and diplomats. All in all, the advocacy actions of the consortium throughout the three years of implementation of PERFORM contributed to promoting to policymakers the benefits of rethinking the traditional way of teaching and learning science.

Furthermore to the promotion of PERFORM during high-level events in science communication, the consortium also produced **two policy briefs** offering policies to include early career researchers and teachers in new educational processes to motivate, inspire, and encourage reflection from young people, based on the findings and values of the PERFORM project. Based on these policy briefs **UNESCO generated a position paper** to maximize the policy impact of the project and thus ensuring its sustainability and legacy beyond the project time frame.

The final PERFORM Conference was organised at UNESCO Headquarters, inviting **400 participants**, among them 150 students and 50 UNESCO delegates.

Also, the consortium produced **36 thematic videos** and shared them via PERFORM social media, the website and the project's Youtube Channel to reflect the project's findings and results. Three of these **videos** were produced to reflect the overall project results, based on 22 interviews conducted with project partners, stakeholders, external experts and students who participated in the activities.

Indeed, social media was actively used to promote the project results: the numbers of Twitter followers and Facebook likes increased considerably over the project's timeline.

A printed and online documentation with a **graphic visualisation of the project's outcomes** was produced to allow the uptake of PERFORM recommendations and tools beyond the project's timeline.

1.2 Explanation of the work carried per WP

1.2.1 Work Package 1 (WP1): Project coordination and management

As WP1 leader, **UOC** coordinated both research and financial activities of the project according to the rules stated in the GA, providing support to other partners when needed. **UOC** also facilitated communication among consortium members through promoting the use of the intranet and organizing face-to-face and on-line meetings for coordination purposes.

In this reporting period, two consortium meetings took place in Bristol and Paris, organised by **UoB** and **UNESCO**, respectively, in closer collaboration with **UOC**. Also, four Steering Committee (SC) meetings took place in this second reporting period.

In April 2017 (Month 18) **UOC** organised the external review meeting with the EC PO and an external reviewer, led the AB evaluation process and coordinated the actions to complete Deliverable 1.3 that was timely submitted. **UOC** is also organising the external review meeting that will take place in Barcelona in November 2018, once the project will be finished.

Finally, links between the consortium and the **European network Community for Science Education in Europe (Scientix)** were strengthened through **organizing and participating in six events within the Scientix network** and sharing PERFORM outcomes through the Scientix

webpage. In doing this, **UOC** achieved two milestones in this period: Mil.3 related to the mid-term internal evaluation and Mil.6 on the links to Scientix.

Task 1.1 Project management

As planned in the DoA, the **PERFORM intermediate meeting** in Bristol (UK) took place in April 10th-12th, 2017 (Month 18), organised by **UOC** and the local partner **UoB**. Twenty members of the 10 partnering institutions participated in this 3-day meeting, in which WP leaders updated the consortium on their progress, future tasks were discussed and scheduled in each case study, financial issues were clarified and agreements to improve the use of resources were achieved. The **second General Assembly (GenA) meeting,** attended by all partners, and the **fourth SC meeting,** attended by WP leaders, were held the third day of the intermediate meeting.

In the same month, April 24th, 2017 (Month 18), **UOC** coordinated the external review meeting in Barcelona with the attendance of the EC PO and an external reviewer from Odessa National I.I. Mechnikov University (Ukraine). The **UOC** Coordination Team (CT), all WP leaders and science communicators' partners presented the progress of WPs during the first 15 months of the project and responded to the questions. The **evaluation was highly positive and resulted in a set of comments and recommendations that UOC circulated** encouraging partners and particularly WP leaders to follow them. The day after this meeting, **UOC** and **UAB** organised a visit with the EC PO at two participant schools in the PWs in 2017 (INS Santa Eulàlia and IES Castellbisbal), in which the EC PO had the opportunity to meet and talk with participant teachers and students.

Two other SC meetings were organised by **UOC** and conducted on-line in this period: the **fifth SC** on November 30th, 2017 (Month 25), and the **sixth SC** on April 19th, 2018 (Month 30), both of them attended by all WP leaders. The agendas were mainly set up on the basis of (i) the mid-term review recommendations by the EC and AB members and (ii) the planning of needs for the remaining of the project, e.g., the final conference.

The **final consortium meeting took place in Paris** in October 4th, 2018 (Month 36). It was organised by **UNESCO** and **UOC** and 19 representatives of all partnering institutions attended it. Morning presentations and discussions were mainly concerned with both technical and financial reporting issues. The **third GenA** took place in the afternoon with a representative of each partner who validated the agreements discussed in the morning. Also in the afternoon, the CT and WP leaders held the **seventh SC meeting** to discuss final details of WP implementation and outcomes.

PERFORM team at the final consortium meeting in UNESCO headquarters, Paris, October 2018

In the last months of the project, **UOC** was in communication with the EC PO to organise the **external review meeting that was held in Barcelona** in **November 6th and 7th, 2018** with representatives of WP leaders and the external reviewer from the Department of Archaeology and Ethnology of Ukraine.

PERFORM team and EC representatives at the final review meeting in UOC, Barcelona, November 2018

During these months, **UOC coordinated and supervised a proper technical and financial management** through regular email correspondence, online and face-to-face meetings and phone conversations with other partners, providing support to the consortium members on reporting when needed. **UOC** provided advice to partners for management issues (e.g. related to budget and p-m reallocations, to extension of deadline requirements, to technical and financial reporting issues), for dissemination issues (collecting inputs periodically from partners) and for ethical issues (e.g. procedure to collect consent forms in schools).

Task 1.2 Facilitation of the consortium communication

UOC ensured that all project-related files (research- and management-related) were managed and stored in the **intranet** created during the first reported period and hosted in the PERFORM webpage.

UOC also provided support to **EUSEA** for website-related actions (e.g., update of consortium activities, update of new members' profiles and their inclusion in the internal email lists).

As a result of a collective decision made during the intermediate meeting in Bristol (April 2017, Month 18) **UOC** together with **EUSEA** created an internal email list for research purposes including WP2, WP3 and WP4 partners.

Task 1.3 Scientific coordination and project monitoring

As part of this task, in this period **UOC** achieved Milestone 3 (Mil.3) on the mid-term evaluation and led the elaboration of **Deliverable 1.3 (D1.3) "Evaluation report of the Advisory Board"**, both timely submitted to the EC in April 2017 (Month 18) and October 2017 (Month 24).

Mil.3 provided an **internal mid-term assessment** of the progress of the PERFORM project (from Month 1 to 18) through the use of a specific set of indicators as means of verification consisting of (i) conventional indicators to monitor the progress of the project and (ii) RRI-related indicators developed through an internal participatory reflective process. To do that, **UAB** and **UOC** designed a **shared protocol of RRI implementation and reflection guidelines** to provide the PERFORM consortium with procedures to meet a set of RRI process requirements. A battery of 10 self-reflective questions were generated and answered by all PERFORM partners. **UOC** and **UAB** organized partners' answers and presented them in the intermediate meeting of the consortium

in April 2017 (Month 18) to foster continuous self-reflection on the inclusion of RRI in the different stages of the project until the end of the project. This mid-term assessment showed that the PERFORM consortium was satisfactorily progressing towards the full achievement of its four objectives and was overall progressing to meet RRI requirements. It also showed, however, that partners needed to continue addressing efforts to enhance four particular aspects: i) inclusion of students with special needs in the participatory educational process, ii) early engagement of both teachers and researchers in the workshops, iii) collective reflection with participants about the process, and iv) critically approach gender issues in the design of the activities beyond ensuring both female and male participation. During the consortium meeting WP leaders committed to keep working in addressing these aspects and, one year later during the 6th SC meeting, in April 2018 (Month 30), **UOC** asked WP leaders for reporting on their improvements through a set of self-evaluation questions from the AB report (D1.3). Their responses on this progress were discussed with each WP leader separately by the end of the project.

D1.3 was the outcome of the PERFORM project mid-term assessment as well as the **report conducted by the AB** based on the achieved results and objectives of the project during its first period, from November 2015 to January 2017 (Month 1-15). It represented a key input to improve and adapt PERFORM further development. The members of the AB who conducted the report were Roger Strand (University of Bergen, Norway), Daniel Erice (Alioth Arte y Ciencia, Spain), Emily Dawson (University College London, UK), Àgueda Gras (European Schoolnet, Belgium), and Frank Burnet (University of West England, UK). During the **fourth SC** meeting in April 2017 (Month 18) it was agreed that WP leaders would suggest two AB members to evaluate their work. **TBVT, UoB, UAB, UNESCO and EUSEA** suggested two or three members and **UOC** elaborated the final list. As for the specific outputs to review, **UOC** asked each AB member to assess the progress of his/her assigned WPs based on the interim technical report (first period: Months 1 to 15), as well as other specific documents (e.g., deliverables, internal reports). Within each WP, WP leaders and the CT suggested specific issues to AB members to focus on. Also, in parallel to such evaluation process, some WP leaders contacted members of the AB with specific expertise on the actions they were developing to ask for advice and guidance: **UoB** contacted Àgueda Gras and Emily Dawson, **UAB** contacted Daniel Erice, **EUSEA** contacted Frank Burnet, and **UOC** contacted Roger Strand. Sometimes it was possible that AB members also attended the activities (e.g., Daniel Erice attended one of the PW in Spain with **TBVT, UOC** and **UAB** and one in the UK with **UoB** and **SMS** and held a meeting in Paris with **TRACES**).

The AB members provided their feedback according to a planned timing strategy. Documents and specific questions were provided to each AB member in June 2017 (Month 20), asking for them to send their feedback in mid July 2017 (Month 21). On the basis of this feedback and the WP leaders' reactions to it **UOC** sent back the report to the AB in early September 2017 (Month 23). Two weeks later a Skype meeting was held between **UOC** and the AB for the final check of the report. The final version of the report was peer-reviewed by **TRACES** and **UNESCO** in October 2017 (Month 24) and delivered in due time: October 31st, 2017 (Month 24).

Moreover, **UOC** asked **AB members** for attending the PERFORM final conference in Paris in June 2018 (Month 32, see Task 6.2) and to hold a previous **meeting with WP leaders** in order to be informed about the progress and challenges faced by the project and provide feedback. Three AB members were able to participate: Àgueda Gras, Daniel Erice and Roger Strand. **UNESCO** hosted this meeting. AB members congratulated the consortium for their work so far done and gave feedback on how to overcome the challenges highlighted. A fruitful and reflective discussion around RRI values was opened on this occasion. The inputs and reflections they provided during the meeting on how to leverage PERFORM outcomes and value were warmly welcomed by WP leaders.

In parallel, during the reported period **UOC** held several meetings with the UOC library services in order to implement the Data Management Plan (DMP). In this regard, **UOC** created a Zenodo account for PERFORM and with the help of **UAB** produced two databases (Literature review

analysis matrix and Survey variables matrix) that will be uploaded according to the DMP timing strategy.

Task 1.4 Links to STEM education research projects and networks at European level

During this period, **UOC, EUSEA** and **SMS** participated in **6 events within the Scientix network**, in which **UOC and other partners** established contact with other EC projects for exploring opportunities for further collaboration (e.g., NUCLEUS, CREATIONS):

- ECSITE Annual conference 2017 (June 15th-17th, Porto-Portugal)
- Science is Wonder-ful! (September 25th-27th 2017, Brussels-Belgium)
- 12th Scientix Projects Networking Event 'Gender and innovation in STE(A)M education' Scientix Future Classroom Lab (December 5th, 2017, Brussels-Belgium)
- Get Inspired by STEAM education! Webinar organised by the European Schoolnet (April 25th 2018, Online)
- ECSITE Annual conference 2018 (June 7th-9th, Geneva-Switzerland)
- PERFORM final conference (June 14th-15th, Paris-France)

As a result of the efforts, actions and activities through which links between the PERFORM project and Scientix were established, **UOC** achieved **Milestone 6 (Mil.6) on Links to Scientix** in April 2018 (Month 30). Direct communication and interaction with STEM education research projects and networks such as Scientix represented a joint effort among science education researchers and practitioners feeding PERFORM dissemination and outreach activities.

Specifically, the **12th Scientix Projects Networking Event in December 2017** (Month 25) was **co-organized by Scientix, UNESCO** and **UOC** together with the H2020 GEDII project. To strengthen the links with other research projects, **UNESCO** invited other H2020 projects to participate in the event, such as the HYPATIA

. As an outcome of this meeting, a collaborative paper launched by the Scientix Observatory paper was published and advertise in one of the newsletters in July 2018 (Month 33; see Task 5.2. for further details).

Also in this period, the **PERFORM final conference** (see Task 6.2) included a session particularly addressed to networking in which a representative from Scientix presented the Scientix project, and other projects from the network participated such as Xplore Heath, Hypatia, Edu-Artic and Compass. Scientix network advertised the PERFORM conference in the Events section of its webpage.

UOC asked Scientix for uploading PERFORM deliverables produced in this reporting period and related to Scientix targeted audience (e.g., teachers) at the Scientix webpage (still in progress).

1.2.2 Work Package 2 (WP2): Innovative science education methods based on performing arts

During this second reporting period, **TBVT**, as WP2 leader, produced the three outcomes envisioned in this WP.

First, and related to Task 2.1., **TBVT** generated a user-friendly version of D2.1 (Protocol of tested methods to transform a performance-based activity into a PERSEIA) that includes a toolkit with 11 videos and 9 short documents. This user-friendly toolkit is addressed to teachers and science communicators and was uploaded to RRI-Tools and Scientix webpages.

As for Task 2.2, produced a user-friendly toolkit of tested performance-based science education methods generating a transformative participatory educational process amongst secondary

school students (D2.2), which is mainly addressed to teachers and students. This was based on the work done by **TBVT, TRACES** and **SMS** with the support of **UAB, UOC, AJA** and **UoB** who implement a first round of PW in 5 schools in Paris, Barcelona and Bristol, re-designed this participatory educational process according to the feedback received from the assessment of activities conducted by **UAB** and **UOC** (see Tasks 4.3 and 4.4 for more details) making the corresponding changes to adapt it to local contexts, personal experience, and conducted the second round of PW in another 7 schools participating in the three case studies.

Finally, and related to Task 2.3, **TBVT** produced a set of methodological guidelines to adapt PERSEIAs to the informal learning context of science museums (D2.3). To do that, **TBVT** conducted a pilot experience in Spain, in collaboration with CosmoCaixa Science Museum in Barcelona. Based on a review of the guided tours offered in CosmoCaixa, **TBVT** delivered a knowledge-transfer workshop to 18 science museum facilitators in order to analyse how to adapt PERFORM methods and activities to the context of science museums. Also, **TBVT** provided support to a group of 15 non-expert science museum facilitators in producing and performing drama-based scientific guided tours through a short training at CosmoCaixa.

Task 2.1 Inclusion of the "human dimension" of science and the values embedded in RRI in performance-based activities

In February 2017 (Month 16), **TBVT** fine-tuned the analysis of the evaluation performed in this task and, with this result, completed the **Deliverable 2.1 Final Protocol of tested methods to transform a performance-based activity into a PERSEIA**. D2.1 was sent for internal review to **UOC, UoB** and **UoW**, and submitted to the EC on time by the end of Month 16.

In Months 19 and 20 **TBVT** collected feedback from some of the teachers in Barcelona who had participating in this task during the first reporting period through short structured interviews in order to refine some aspects of their role in the process of PERSEIA construction. In addition, **TBVT** received feedback from AB members, which was taken into account to improve the outputs. With the feedback collected, from June to December 2017 (Months 20 to 25), **TBVT** produced the **user-friendly version of the D2.1** ("From drama-activities to raising scientific aspirations in secondary school students"), which includes 11 short videos and links to 7 documents that aim at disseminating the process to transform drama-based activities into drama-based activities addressing scientific issues and based on RRI values, with the final aim of raising scientific aspirations among secondary school students. This **user-friendly version** was produced to facilitate and replicate the methodology, activities and results obtained in Task 2.1 by other stakeholders. The videos are available at the YouTube channel of the PERFORM project (see also Task 6.1) and TBVT, and at PERFORM and Scientix webpages.

Task 2.2 Participatory process with young people, teachers and early career researchers

TBVT developed this task by three different phases. The first phase included the first round of workshops that were conducted in 5 participant schools (from low-to-medium socio-economic level) from January 2017 (Month 15, as reported in the first periodic report) until May 2017 (Month 19). **132 students, 11 teachers, and 15 ECRs** were involved in these workshops. **TBVT**, **TRACES** and **SMS** were the partners responsible for the implementation of the PW while encouraging the collaboration of involved teachers and ECRs. **TBVT,** as WP2 leader, coordinated the three case studies and met with **TRACES** and **SMS** twice during March 2017 (Month 17) to supervise the final implementation schedules and review the overall strategy. In-between PW sessions, **UAB** researchers shared with **TRACES** and **TBVT** impressions related to the observations, and **UoB** did the same with **SMS,** providing informal feedback around punctual aspects. From February to May 2017 (Months 16 to 19) **TBVT** collected the parental consents of the participant students, teachers and ECRs in the Spanish case study. **SMS** in UK and **TRACES** in France also collected the informed consents in their case studies.

The second phase of this task (March 2017 to January 2018; Months 17 to 27) included the redesign of the PWs based on the results of the assessment conducted in WP4 by **UAB** and **UOC**.

TBVT drafted a strategy to redesign the PW in collaboration with the rest of the partners, which was discussed during the Consortium Meeting in Bristol in April 2017 (Month 18). This included the development of the **Performers-ECR-Students-Teachers (PEST) alliance** in each case study, an idea suggested by **AJA,** to implicate more in-depth both ECRs and teachers during the PWs. **TBVT** together with **SMS** and **TRACES** coordinated the redesign of the PW tasks and timeline. In France **TRACES** worked together with **AJA** in the redesign of the workshops, while in UK and Spain **SMS** and **UoB** and **TBVT, UAB** and **UOC** respectively did the same. Online and offline meetings were held between partners to finishing and reviewing the plans for the second round of workshops. **TBVT** ensured that the modifications agreed were implemented and that all the information on the redesign was reported to **TBVT** in order to prepare the Deliverable 2.2. As a result of the redesign of the PWs, **TBVT** designed 8 PW, **SMS** 4 PW, and **TRACES** 8 PW, including the delivery of the final PERSEIAs. **TBVT,** as WP2 leader, coordinated the designed across the three case studies, supervised the final elaboration of the protocols and reviewed the overall strategy.

Finally, the third phase, consisting of the preparation and implementation of the second round of PW in 7 schools in the three case studies took place from November 2017 to May 2018 (Months 25 to 31). **TBVT**, **SMS** and **TRACES** were responsible for delivering the PW and organizing the collaboration with teachers and ECRs following the PEST alliance strategy. **UOC, UAB, UoB** and **AJA** provided support in this regard.

In Barcelona, during November and December 2017 (Months 25-26), **TBVT**, with the help of **UOC** and **UAB**, organised three meetings to present and discuss the project activities with the teachers of the two secondary schools involved in this second round (IES Consell de Cent and IES Moises Broggi). The first one gathered all teachers of both schools to explain the overall aims of the project while the second one was addressed to the teachers directly involved in the workshops to discuss the activities and present the evaluation strategy, so as to include teachers' views. The third meeting involved teachers and participant ECRs to put in common the main values to be transmitted to the students throughout the workshops. Before the workshops **TBVT** shared with involved teachers and ECRs in both schools a detailed description of activities through an on-line platform.

Similarly, in Bristol, from November 2017 to January 2018 (Months 25-27), **SMS** implemented coordination meetings (by phone) with teachers from the three participating schools (Castle school, Bristol Free, Bridge Learning Campus) to set out aims and objectives of the project, timetables, commitments and facilities required, as well as to take into account the vision and opinion of the teachers. **SMS** and **UoB** shared the detailed description of all the participatory activities included in the UK process by direct email with teachers and ECRs in order to ensure that all of them had access to all the information needed for correct implementation of the workshops. **SMS** also supported ECRs either by email or Skype in the development of their busking presentations to students (also as part of Task 3.2).

In Paris, **TRACES** started the preparation meetings with teachers and ECR earlier than in the other case studies. In September 2017 (Month 23) **TRACES** organized meetings with the teachers of the two participant schools (Cesaria Evora School – Montreuil, and Mendès France School – Villiers-le-Bel). In November 2017 (Month 25), teachers, ECRs, science facilitators and actresses met during the training organized by **AJA** to share and prepare the PW (see also Task 3.2). In this training ECRs practiced how to explain and share their research topics by using gamification and concrete objects, photos and videos. Then in January and March 2018 (Month 27 and 29) **TRACES** organized two other meetings with ECRs, performers, teachers and science facilitators at each participant school.

From January 2018 to June 2018 (Months 27 to 32) **TBVT, SMS** and **TRACES** conducted the second round of PWs in the **7 schools** (2 schools in Paris, 2 in Barcelona, and 3 in Bristol) with the participation of **121 students, 20 teachers, and 29 ECRs**. Particularly in the UK, **UoB** coordinated the participation of 11 ECRs, facilitated some aspects including reflection sessions,

research exercises and introductions to RRI, and arranged and facilitated the final PW workshop at Castle school, which was postponed due to snow, and **SMS** were unable to attend. In Spain and France, **UAB** and **AJA** also coordinated the involvement of ECRs in the PWs. In turn, in Spain and UK, and in order to ensure the correct implementation of each PW, **TBVT** and **SMS,** together with **UoB,** conducted coordination contacts with teachers and ECRs via email some days before the PW, reminding them their associated tasks in that specific PW. Also, coordination meetings with ECRs before and after each PW took place to ensure their correct participation in the PERFORM activities. Further, in the UK where the ECR training overlapped with the PW, **UoB** led regular email reflections with ECRs following the workshops. This enhanced the ECR experience and helped to strengthen relationships and collaborative work amongst the cohort. **TBVT** also arranged an informal social reflection evening with the ECRs following the final workshop in March 19th, 2018 (Month 29). In France, **TRACES** organized meetings between PWs with the ECR and teachers involved to adjust and improve the subsequent PWs. In Spain, and to follow the suggestions of the external review meeting with the EC, **TBVT** promoted the use of WhatsApp tool in Barcelona to create group of students and ECR discussing common issues related to the experience they have had together during PW.

In sum, **participants of the first and second rounds conducted in the three case studies included a total of 253 students, 31 teachers and 44 ECR** (Table 3).

Busking at Fairfield High School, Bristol, by Science Made Simple

Students, teachers and ECRs from IES Moises Broggi, Barcelona, just before their PERSEIA performance

Participatory Workshop at Collège-Lycée Pierre-Mendès France, Villiers-le-Bel, Paris, TRACES

Table 3. Total number of students, teachers and ECRs involved in the execution of the participatory process in each school per case study. LSL-Low Socioeconomic Level. MSM-Medium Socioeconomic Level.

Case Study	School name and location	Students	Teachers	ECRs
Spain	IES Santa Eulàlia, Terrassa (LSL)	29	3	3
	IES Castellbisbal, Castellbisbal (MSL)	30	2	3
	IES Consell de Cent, Barcelona (LSL)	19	3	5
	IES Moisès Broggi, Barcelona (MSL)	20	2	6
UK	Fairfield High, Bristol (LSL)	29	2	7
	Bridge Learning Campus, Bristol (LSL)	18	3	3
	Bristol Free School, Bristol (MSL)	9	2	4
	The Castle School, Thornbury (MSL)	16	4	4
France	Collège Marie Curie, Paris (LSL)	24	2	1
	Collège Les Toupets, Vauréal (MSL)	20	2	1
	Collège Césaria Évora, Montreuil (MSL)	21	2	2
	Collège-Lycée Pierre-Mendès France, Villiers-le-Bel (LSL)	18	4	5
TOTAL		**253**	**31**	**44**

As a result of this work, **TBVT** produced the **Deliverable 2.2** "**Final protocol of tested methods to generate a transformative participatory educational process by using science and arts-based educational approaches**". D2.2 includes the detailed description of all the drama-based science education activities implemented in the participatory educational process conducted in the three case studies of the PERFORM project. D2.2 was sent for internal review to **UOC**, **UAB** and **AJA**, and submitted on time by April 2018 (Month 30).

Simultaneously, since January 2018 (Month 27), **TBVT** produced, in collaboration with **SMS**, a **user-friendly version** of D2.2, in order to facilitate its use and replication by stakeholders. This user-friendly version contains 10 videos produced by **TBVT,** 3 of them include interviews to participant ECRs, students and teachers in which they explained their feelings and opinions about their participation in the project. Postproduction and English subtitles were subcontracted, as specified in the DoA. The toolkit also includes links to 6 documents including practical information about the participatory educational process and the description of the PWs conducted in the three case studies. The toolkit and videos were uploaded in the YouTube channel and are also available at the website of the PERFORM project. In October 2018 (Month 36), **TBVT** disseminated this outcome through its social networks and webpage. **UOC** will also uploaded it at Scientix and RRI-Tools repositories.

Task 2.3 Pilot PERSEIA scaled up into informal context: implementation in science museums

TBVT initiated this task in October 2017 (Month 24) as a pilot experience to be conducted in the Spanish case study. To do that, **TBVT** established a collaboration with the CosmoCaixa Science Museum of Barcelona, which belongs to the ECSITE network.

The first action was to review the dissemination activities addressed to secondary school students in CosmoCaixa by the science museum facilitators. As Task 2.3 was designed to be implemented only in the Spanish Case Study, TBVT, SMS and TRACES decided to focus in CosmoCaixa Science Museum and review science museum activities only in Spain. In December 2017 and January 2018 (Months 26 and 27) **TBVT** reviewed 6 guided dissemination activities consisting of a 45 minutes talk inside the CosmoCaixa facilities focused on a specific exhibition: Forest Sustainability; Life & Evolution; Antarctic Base; Brains; Trix, the best conserved T-Rex in Europe & Fossils. These activities were reviewed in order to explore the best approach to adapt PERSEIAs to an informal learning setting for secondary school students.

As a result of this review, in April 2018 (Month 30) **TBVT** prepared an internal report of good practices and tips to adapt the main results and conclusions of PERFORM project into a "Science Museums Guided Dissemination Activities", i.e. as a way to include the human dimension of science and the values embedded in the RRI.

In the same month, April 2018, **TBVT** initiated the implementation of a **Knowledge-transfer Workshop** on this review and report with CosmoCaixa facilitators, by organising a coordination meeting with CosmoCaixa Science Museum representatives. The Knowledge-transfer Workshop was carried out in June 2018 (Month 32) with **18 science museum facilitators**. In this workshop, **TBVT** exposed the PERFORM methodologies and activities to the museum facilitators and guided a participatory discussion to analyse the possibility of including these methodologies in the different activities they deliver at the museum.

Out of the analysis and discussions generated during this workshop, **TBVT** designed and implemented **a four-days training with 15 non-expert science museum facilitators** from CosmoCaixa, with the aim of providing them with skills to prepare their own guided science dissemination activities including the human dimension of science and the values embedded in the RRI. This training was implemented in July 2018 (Month 33). See Table 4 for details.

Knowledge-transfer Workshop held at CosmoCaixa, Barcelona, April 2018

Table 4. Description of the science museum facilitators' training at CosmoCaixa:

Session	**Topic**	**Objective**
3rd July 2018	*How Science is related to EU - Societal Challenges*	To relate real Societal Challenges with Science Museums exhibitions
5th July 2018	*Critical Thinking in STEM*	To define the content to include in science museums activities
9th July 2018	*Ethical issues and gender barriers in STEM*	To include an ethical vision in science museum activities
12th July 2018	*Performing skills in oral science-communication*	To rehearse the science museum activities focusing on storytelling and body language

On 13th July 2018, the novel facilitators that attended the PERFORM workshop, delivered their PERSEIAs, adapted to Science Museums, in front of the general public visiting the museum (CosmoCaixa, Barcelona).

PERSEIA delivered at CosmoCaixa by non-expert science museum communicators, July 2018

Based on the results of these activities, **TBVT** produced the **Deliverable 2.3 - Guidelines for PERSEIA adaptation to science-museums.** This Deliverable includes a series of practical tips to implement the activities and methodologies described in Deliverables 2.1 and 2.2 in science museums. D2.3 was sent for internal review to **EUSEA**, **UoW** and **UOC**, and submitted to the EC on time by October 2018 (Month 36). These guidelines are also uploaded at the PERFORM webpage.

1.2.3 Work Package 3 (WP3): Building science education and communication capacity for teachers and early career researchers [Months 1-36]

During the reported period **UoB**, as WP3 leader, coordinated and completed the first and second phases of the ECR training in the three case studies in April 2017 (Month 18) and June 2018 (Month 32), respectively. To do that, **UoB** had the support of **UOC, UAB, TBVT, TRACES, SMS** and **AJA. UoB** carried out an evaluation of the first round of ECR training programmes, which were mostly implemented during the first reporting period, in order to inform the second phase of the trainings. Overall, **the first round of ECR training programmes reached 66 researchers and the second round involved 35 ECRs**. An evaluation report of these ECR training was produced by **UoB** in June 2018 (Month 32) in order to inform the toolkit development. AB feedback also contributed to the development of the trainings, and the toolkits design.

In this second reporting period, **UoB** also coordinated the design and implementation of the trainings addressed to secondary school teachers in the three case studies and the corresponding toolkit design. The first teacher training was delivered by **TBVT** in Barcelona, and evaluated by **UoB,** in order to inform the development of future training for teachers in all countries. Then **UoB** delivered two rounds of teacher training in Bristol, **TRACES** conducted one full day of teacher training in Paris, and the second round of teacher training was delivered by **TBVT** in Barcelona. **54 teachers participated in trainings in Bristol, 20 teachers in Barcelona and 5 in Paris. UoB** used AB feedback for improving the development of the trainings and toolkit design for teachers.

Based on these actions, **UoB designed the toolkits for ECRs and teachers** (D3.1 and D3.2, respectively) that share learning and best practice from the training programmes in PERFORM. **UoB** worked closely with **AJA** to develop the form and content of the **toolkit for researchers (D3.1)** which was was uploaded on time to the EC portal in July 2018 (Month 33) and subsequently made available online at the PERFORM webpage. This toolkit aims to support ECRs in reflective thinking around RRI values and processes and introduce them to creative performance methods for public engagement. It consists of written resources in PDF format and a series of four videos. **The toolkit for teachers (D3.2)** was produced by **UoB** in conversation with partners, teachers and education experts, timely submitted in October 2018 (Month 36) and is also available at PERFORM webpage. The toolkit provides secondary science teachers with a series of creative activities and resources to help stimulate discussion on science and society in the classroom, to help students develop a more reflective understanding of science and careers in science. It consists of written resources in PDF format and a series of five videos.

Task 3.1 Development of knowledge sharing workshop on performance-based activities and RRI values

This task was fully completed and reported in the first periodical report (M1-M15).

Task 3.2 Development of training and guidelines for researchers

In April 2017 (Month 18), the first training for ECRs in the UK, the last of the three countries' training programmes, was completed. The **first round of ECR training programmes** in the three countries were broadly successful and reached **54 researchers in Spain, 8 ECR in the UK and 4 researchers in France**.

Reflective sessions with participant ECR were conducted in the three countries. In the final session of the UK training in April 2017 (Month 18), the cohort of ECR came together and reflected on their experience in the project and what they felt could be usefully learned and applied for future participants in the project. In France, in February 2017 (Month 16), **AJA** met the ECRs involved in the workshops in Paris to reflect on their experience in the project. Similarly, in Spain, in March 2017 (Month 17), **TBVT** met the ECRs involved in the workshops in IES Castellbisbal, Barcelona, for a reflection session that was recorded (short videos were sent to **EUSEA** (WP6 leader) for further dissemination purposes). Also in Barcelona, in May 2017 (Month 19), an evaluation expert from **UoB** visited ECRs to gain their feedback via a group interview held together with **UAB** and **UOC** (see also Tasks 4.3 and 4.4). The outputs of these sessions in the three case studies, plus observations from the training sessions fed in to an **internal evaluation report**, which provided formative and summative evaluation of the first round of training for researchers and outlined key findings and recommendations for the development of the next phase. This report was shared with all partners and gave them the opportunity to learn from the successes of the different formats and approaches to ECR training in the different countries. The report also formed the basis of WP3 report to the AB.

From May 2017 (Month 19), work began in the three countries to **redevelop the training for the second phase of the project**. In France, **AJA** presented their redesigned plan and call documentation in July 2017 (Month 21). The new design reduced the time requirement to 2 days, in order to increase ECR applications, included more practical application of the theoretical material covered and introduced fun games to encourage greater engagement. Beyond ECR, teachers, performers and science communicators from **TRACES** were involved in this training with two objectives: (i) to build, with the ECRs, their speeches and gamification of their research and their daily work; and (ii) to build a common culture between the teachers, the ECRs, the science facilitators and the performers.

In the UK and Spain, in response to feedback regarding a perceived disconnect between the experience of the training and that of the PW, while keeping the same theoretical themes, the practical aspects of the sessions were more grounded in preparing ECR for their increased role in the workshops in schools. In this regard, in the UK in August 2017 (Month 22) **UoB** and **SMS** met to discuss how to improve the alignment of the training and participation of ECR and teachers in the PW schools. This led to the addition of more substantial science busking training for ECR and teachers, and practical workshops tailored to the more substantial role for ECRs in the second phase of PW. The timing of the training programme was also changed to run prior to the PW, rather than alongside, as it did in the first phase of the participatory educational process.

In the case of Spain, in July 2017 (Month 21), **UAB** and **UOC** met to redesign the training. Also, **UAB** and **UOC** met **UoB** that same month to discuss the proposal and to coordinate with the rest of trainers the specific design of the sessions. In September 2017 (Month 23), another meeting between **UoB**, **UAB** and **UOC** took place to make a follow-up of the design of the different sessions and agree on the final programme. As a result, two further sessions were introduced: one focused on Science in Society presented by **UOC** in collaboration with **UoB,** and a session prior to the PW to prepare the researchers for their roles in schools' workshops, delivered by **TBVT**. To make the correspondent arrangements, **UAB** met the UAB postdoctoral school in July 2017 (Month 21) and October 2017 (Month 24) to tailor the training offer and advertising to encourage strong cohort development. Besides **UAB** and **UOC, TBVT** disseminated information about the ECR training through their webmail list and social networks in March 2017 (Month 17) and in a symposium in Parc Científic de Barcelona in September 2017 (Month 23). In October 2017 (Month 24), **UAB** made all the logistical arrangements for the training programme and coordinated and managed the contact with interested ECRs.

The second round of ECR training started in October 2017 (Month 24). **A total of 35 ECR participated across the three case studies.**

In the UK, **UoB** coordinated and carried out the ECR training in Bristol. A series of 10 workshops were all delivered at the **UoB** campus between October 2017 - June 2018 (Months 24 – 32) with seminar contributions from **SMS, AJA** and academic staff from **UoB** for a consistent cohort of **11 ECRs,** 5 male and 6 female (7 PHDs, 2 Post-docs, 1 Research project manager, 1 Research associate from various fields of research). Initially 16 ECRs signed up but 5 had to leave due to clashes with research timings (Table 5).

Table 5. Sessions from the second round ECR training course in Bristol.

Session	**Topic**	**Partner**
25 October 2017	*Science Busking*	**SMS**
1 November 2017	*Philosophy in Science*	**UoB**
8 November 2017	*Ethics*	**UoB**
15 November 2017	*Reproducibility and Trust in Science*	**UoB**
22 November 2017	*Communicating Your Topic to young people*	**UoB**
29 November 2017	*Science Busking*	**SMS**
6 December	*Responsible Research and Innovation*	**UoB**
24 January 2018	*Schools workshop preparation*	**UoB**
3 May 2018	*Reflection session*	**UoB**
6 June 2018 (re-scheduled from 18 April due to French transport Strike).	*Standpoint Theory & Fem epistemologies*	**AJA**

One key objective of the ECR training course in Bristol was to prepare the cohort of ECRs for their experience in schools as part of the PW delivered in WP2 (see also Task 2.2). The training course was also designed by **UoB** to help build good working relationships within the cohort of ECRs, to support their collective experience in the schools and also to enable constructive networking. Therefore, **UoB** held regular de-briefs with ECR both informally in conversation and formally via email to reflect on experiences and concerns. As well as this, after the final PW, **UoB** held a social event to de-brief informally on the ECR experience of PW in schools with an overwhelmingly positive response. One key change implemented for the second round of PW in Bristol related to the role of the ECR: the school students were asked to develop their performances based around the specialism of the ECR. This had a positive impact on the input the ECR was able to make, as well as the relationship they were able to develop with the students. Evaluation of the impact of the ECR training was further explored in a reflection session in May 2018 (Month 31) led by **UoB** with support from **UAB** and **UOC** evaluators (see also Tasks 4.3 and 4.4).

ECR Science Busking Training, University of Bristol, November 2017

In Barcelona, the second ECR training was implemented at the UAB campus in November and December 2017 (Month 25-26). The course consisted of 6 seminars delivered by different PERFORM partners including **UAB, UOC, UoB, TBVT** and **AJA** and were delivered in English, although Catalan and Spanish were used as support in small group activities and discussions (Table 6). In addition, an extra optional session was organized by **TBVT** in which ECRs and teachers worked together in the PW protocols in order to facilitate the PEST alliance (see also Task 2.2). In a change from the first round, a call was made for a maximum of 20 ECR who were willing to participate in the school workshops (with participation being confirmed during the training course). Workshops were delivered for a consistent cohort of **15 ECRs** (13 female and 2 male; 13 PhDs and 2 Post-docs) from various fields of research (11 of these went on to participate in PW in schools).

Table 6. Sessions from the second round ECR training course in Barcelona.

Session	**Topic**	**Partner**
2 November 2017	*RRI Introduction*	**UAB, UOC, TBVT**
9 November 2017	*Responsible Communication Responsible scientific communication*	**AJA**
16 November 2017	*Critical Engagement & Participation*	**UoB**
25 November 2017	*Ethics of Science*	**UoB**
30 November 2017	*Science in society*	**UOC, UoB**
1 December 2017	*Performative session Monologue creation!*	**TBVT**
14 and 20 December 2017	*P/FEST meetings at schools: informative session with teachers and researchers*	**TBVT**

Feedback from the ECR participants in Barcelona was collected through an online form after the workshops (7 ECRs answered the survey) by **UAB** and **UoB**. ECRs rated their degree of satisfaction with the training with scores between 8 and 10 out of 10. ECRs especially appreciated the opportunity to: i) reflect about aspects of research commonly taken for granted (or ignored in their academic training, such as ethics or philosophy), ii) interact and discuss with researchers from very diverse disciplines and iii) approach a different communication format (i.e. scientific monologues) and learn how to communicate their research in a simpler way and more linked to society. Some ECR also proposed having longer sessions to delve deeper in the topics.

Second round ECR training in Barcelona, UAB campus, November 2017

Additionally, from October 2017 to April 2018 (Month 24 to Month 30), **UoB, UAB** and **UOC** also collectively worked on adapting PERFORM ECR training sessions to an online format for a **UOC** training course to introduce Spanish researchers to the RRI approach, which was also inspired by the materials produced by other H2020 projects on RRI such as HEIRRI and RRI-Tools. The online course was launched by **UOC** in February 2018 (Month 28) under the supervision of the PERFORM project coordinator, with **13 participants** who actively discussed and reflected on RRI issues within their own research practices for two months.

In November 2017 (Month 25) the second phase of ECR training was delivered in Paris, across two days by **AJA** with participation from **TRACES.** In Paris **9 ECRs** took part in the training: 6 women and 3 men, post docs, from various fields of research. A total of 6 training topics were covered (including two additional follow up sessions in Month 27, Table 7). **TRACES** delivered these two further sessions, one at a mid-point in the PW for the ECRs and the six teachers involved in the PW to reflect together about the work they were doing, and one following the PW to reflect on their experience in the process. **TRACES** also attended a training session explicitly focused on developing the PEST alliance –working together to build common values. All took place at TRACES premises: Espace Pierre Gilles de Gennes, Ecole Supérieure de Physique Chimie Industrielles de la Ville de Paris, Paris.

Table 7. Sessions from the second round ECR training course in Paris.

Session	**Topic**	**Partner**
28 & 29 November 2017	*Individual reflexivity about one's own research* *Values in Science* *Gamification of research* *Standpoint Theory*	**AJA, TRACES**

Feedback was collected from the French ECR cohort by **AJA.** The ECRs were happy to be introduced to literature about values and feminist epistemology. Most participants were already aware of these issues and perspectives but lacked references to literature to support their perspectives. They were highly satisfied by the perspective of collaborating with the teachers from one of the schools, while for the other there was slightly less enthusiasm but still a very positive feedback. The connection with the artists from **TRACES** was excellent, as they took part in the whole training. The ECRs were looking forward to going into schools for the PW. After the PW in the schools finished, in May 2018 (Month 31), two 2-hour sessions were delivered in order to debrief with the ECRs. **AJA** also worked with the ECRs on adapting the communication skills they used in the school settings, for other professional purposes for example to create a poster session for a conference.

Following the ECR training and reflection sessions, further information and observations relating to the second round of ECR trainings in each country were gathered by a specialist evaluator at **UoB** for an **internal evaluation report on the second round**. This report was produced in June 2018 (Month 32) and was written to follow up the earlier internal report to show how the second training course was designed in the light of the observations provided in the first report, and to provide some reflection and evaluation on the outcome. This report also aim to present some observations from the second iteration of training that was used for the development of the ECR Toolkit (D3.1). For instance, the importance of relationship building between ECR and students, as well as reflexivity, was pulled out, and as showed in the following recommendations:

"The practice of scientists can be made visible to school students and members of the public: Informal conversations between school students and scientists are valuable for students' interest in and

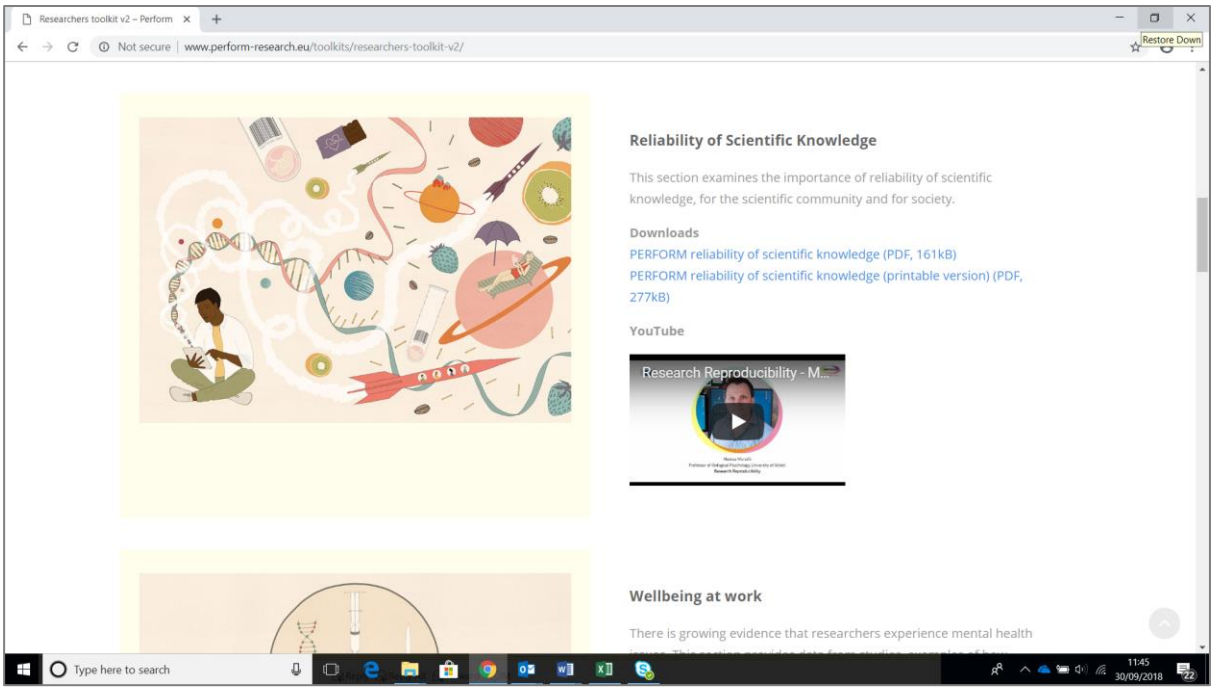
learning about scientific practice, and sharing and discussing their own lives and those of the school students they meet can increase and enrich RRI understandings amongst ECRs and scientist. Toolkits may be developed to suit this end."

"Reflexivity should extend to considerations of 'community knowledge' and discourses and the notion of 'co-construction'. There is potential for toolkit training to engage ECRs and others actively with ideas concerning knowledge, hierarchies of knowledge and the co-creation of knowledge. Valuing of the experiences and appreciating conceptions of the world by people from 'other' groups such as those of low socioeconomic status will contribute to the richness of engagement in thinking about public discourse and public engagement in science. Toolkits may be developed to suit this end."

UoB began the process of designing the toolkit for researchers (D3.1) in August 2017 (Month 22) by identifying opportunities within the ECR training programmes to gather material and engaging trainers to provide input towards the materials to be produced. In response to the way that the wider project developed and learning that happened along the way, it was decided that the toolkits should be produced concurrently with the second phase of training, rather than in advance of. **UoB** made relationships with individuals in institutions that provide training to researchers who would be willing to provide feedback and potentially test the resources produced. To initiate this, in December 2017 (Month 26) presented PERFORM's ECR training at the Engage conference in Bristol in December 2017 (Month 26, see also Task 6.2) and by that time **UoB** began working closely with **AJA** to design the form and content. **UoB, UOC, UAB, TBVT, TRACES, SMS** and **AJA** made the most of the networks of researchers they have recruited in the three case studies to feed in to and feedback on and test the toolkit resources. Also, a schedule of consultations and review was put in place by **UoB** to ensure the toolkit development made the most of input and advice from partners, relevant specialists and potential end-users. **UoB** were in communication with an external focus group made up of specialists in RRI and public engagement/performance from the UK, Spain and France. As such the development of this set of resources was informed by collaboration and reviewed with PERFORM partners and external partners as well as the evaluation reports produced by **UoB** after first and second rounds of ECR training. In March 2018 (Month 29) first drafts were sent to the PERFORM consortium for review. In May 2018 (Month 31) **UoB** and **AJA** drafted the toolkit contents and refined the structure of the toolkit. This proposed structure was shared with the PERFORM consortium to allow opportunity for feedback. At the beginning of June 2018 (Month 32) the first full draft of the toolkits was sent to an external focus group, comprised of 14 experts in the fields covered by the toolkits. This focus group included experts from departments of Public Engagement, Biological Sciences, Biological Psychology, Economics, Management, and Research & Enterprise Development at **UoB**, as well as experts from the **UOC, AJA,** and King's College London. The focus group was asked to comment on the format and structure of the toolkit as well as provide more content specific feedback where appropriate. Feedback from the focus group was received and from this feedback the second draft of the toolkits was developed. A number of the experts from the focus group were consulted on specific elements of the toolkit throughout the development process. Throughout June and July (Months 32 & 33), **UoB** and **AJA** worked to further refine the toolkit. **UoB** submitted the **Deliverable 3.1 "Toolkit for researchers wanting to develop PERSEIAs"** on time to the EC portal in July 2018 (Month 33), which was previously peer-reviewed by **AJA, TBVT** and **UOC**. In August (Month 34) the toolkit was made publicly available on the PERFORM website, and the **UoB** website with videos hosted on the PERFORM You Tube channel with help from **EUSEA.**

The aim of this resource (D3.1) that for dissemination purpose was titled "**PERFORM toolkit for researchers to develop reflexivity, understanding of RRI values and creative approaches to public engagement"** is to support ECRs in their reflective thinking around RRI values and processes and introduce them to some creative performance methods for public engagement, inspired by the PERFORM project. This toolkit has been designed as a user-friendly starting point for professional development on these topics, for higher education institutions responsible for training ECRs, or for ECRs to use independently as a framework for informal professional development training.

The toolkit is comprised of four ten-minute videos and seven short written sections. The videos, which are hosted on the PERFORM You Tube channel and include subtitles in English for clarity, share the expertise of speakers who contributed to the ECR training programmes including academics from **UoB** and **AJA**. Inviting different speakers to contribute to the ECR training workshops was a successful aspect of the training, so this same approach was used for the toolkit. The videos each feature one speaker presenting on a key topic: *Research Reproducibility*, *Reflexivity in Research*, *Responsible Research and Innovation*, and *Creative Approaches to Public Engagement.* The videos end with reflective questions, which serve as a starting point for discussion. They can be used alongside the written guides, or as a standalone resource. The four video presentations were filmed at the end of April and June (Month 30 and 32) and post production was finalised in May and June (Months 31 and 32) by independent media company.



View of D3.1 Toolkit for Researchers on PERFORM website

The seven written sections each focus on a key topic from the ECR training and serve as a framework for training. These topics include *Research Ethics and Integrity; Reliability of Scientific Knowledge; Wellbeing at Work; Values in Science; Reflexivity in Research; Responsible Research and Innovation;* and *Performance Approaches for Exploring Responsible Research and Innovation*, and were chosen following the two rounds of ECR training as the most beneficial for developing reflexivity, understanding of RRI values, cross-disciplinary skills such as effective communication, and an introduction to public engagement and creative approaches to engaging with publics. Users can either implement a standalone training session with one section or use multiple sections to form a training course, with each section forming one session. The format of the written sections was decided in collaboration between **UoB** and **AJA** in May (Month 31), to include guides for discussion- based activities, short excerpts of reading to introduce key ideas, reflections from ECRs who took part in the PERFORM training on that topic, and a list of further reading and resources.

UoB and **AJA** created the toolkit with usability as a high priority. A judgement was made about the value of producing a toolkit that could be used independently, without the need for professional facilitators. As a result, the toolkit provides less emphasis on advising ECRs on how to develop performance techniques: instead there is a general introduction to the concept of

creative approaches to public engagement and the idea of collaborating with performance partners. It was apparent during the training that for ECRs to develop performance approaches to public engagement it was vital to have professional performance practitioners introducing and supporting the process. 'Performing' their science for audiences was a new concept for the majority of ECR participants. Also, performing for audiences and engaging with schools were areas of expertise that required skill and experience that cannot be developed effectively by ECRs independently, through the use of a toolkit. As such the toolkit advises on partnership working as the best approach for developing creative approaches to public and schools engagement.

An evaluation guide has been designed by **UoW** in September and October 2018 (Months 35 and 36) to be distributed alongside the toolkit for researchers (D.3.1). These guidelines are designed to help those using the toolkit to evaluate quality of experience and impact. This guide starts with general advice about why evaluation of such training matters, before providing specific survey questions trainers can use to evaluate participants' responses. Because aspects of each toolkit's content are distinctive, this guide includes examples of specific survey questions that can be selected or adapted for evaluations with ECRs using the toolkits. This additional evaluation guide was finalised

RRI training workshop using PERFORM toolkit for researchers and teachers at University of Bristol September 2018 (left) and at University of Bath October 2018 (right).

The toolkits produced as part of WP3 are already being used for training purposes. In September (25th) the PERFORM toolkit for ECRs was trialled by group of post-doc students from Synthetic Biology at the UoB faculty of Life Sciences, who led an RRI training session for 30 first year PhD students. In October (19th) the PERFORM toolkit for ECRs and the toolkit for teachers were used within a UoB 'Thinking Science' training session for the Young Researchers outreach programme at Bath University. The training was attended by a total of 8 PhD students.

Task 3.3. Development of training and guidelines for teachers

Training sessions for teachers were devised by **UoB** in collaboration with project partners **TBVT** and **TRACES** in the three case studies in accordance with the PERFORM goals: 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.

A **first round of training for teachers** took place in Barcelona and Bristol with **37 teachers involved**, while **42 teachers were engaged in the second round** of trainings in the three case studies.

In Barcelona, in July 2017 (Month 21), **the first teacher training session was delivered** by **TBVT** and hosted by the summer school of the Institute for Education at UAB **(ICE-UAB). UAB** and **TBVT** advertised the course through their networks, as well as with the schools involved in the first stage of the PW, and **four teachers** attended a training on '**Developing a PERSEIA for your science teaching'.** The course was filmed and evaluated by **UoB**, giving input to inform the development of the next phase of teacher training in Spain, as well as the teacher training development in the UK and France. The programme was positively evaluated by the teachers involved, and **TBVT** had some clear feedback as well as their own perspective on what might be usefully changed in future as well as what would be worth sharing in toolkit resources.

In the UK, planning for the teacher training began in May 2017 (Month 19). Following on from conversations with teachers in schools involved in the project **UoB** decided that **a first training should focus on philosophical techniques for discussing complex topics in science**, and performance techniques for science teaching. **UoB** worked with the Centre for Science and Philosophy (**UoB**) to develop a training entitled Philosophy in the Science Classroom. This training took place in October 10th, 2017 (Month 24) at We The Curious, a science museum in Bristol, and it was **attended by 14 teachers** (21 teachers registered for the session). **A further training, Performance in the Science Classroom**, was developed by **UoB** in collaboration with theatre company Kilter. This workshop took place in November 8th, 2017 (Month 25) at the Watershed Arts Centre in Bristol: **19 teachers attended the session** (35 teachers registered). Topics covered by the two workshops are summarised in Table 8.

Table 8. First round teacher training workshops in Bristol

Topics	**Description**
Philosophical dialogue in the science classroom	The aim of this first workshop was to give teachers techniques to encourage a more participatory dialogue in the classroom, to use philosophical dialogue to support curriculum understanding, foster a deeper understanding of science and enhance pupil engagement.
Discover performance techniques to enhance student engagement in science	The second workshop, led by immersive theatre company Kilter, introduced teachers to a range of innovative performance approaches to explore scientific concepts with young people. This workshop gave teachers the opportunity to experience these techniques first hand and collectively reflect on ways to integrate these into science lessons to support the curriculum. The techniques are particularly designed to encourage students who typically do not engage with science lessons.

Teacher training in Bristol, November 2017

Both in Bristol and Barcelona feedback from participants was collected and an evaluation report of round one of teacher training was produced by a specialist evaluator at **UoB** in January 2018 (Month 27). Collaborative discussions with all partners as well as the recommendations from this report (which was shared with partners) helped to shape the second phase of teacher training. A key recommendation from the evaluation report was that training sessions for teachers must be specifically tailored for them and must endeavour to work to encourage two-way, participative communication between teachers and students and amongst students. Teacher feedback indicated that both of the workshops trialled in Bristol (on philosophical dialogue and performance techniques) included useful techniques with potential to be applied in the classroom.

Based on this evaluation and the trainers' experiences, in Bristol, these same two workshops were adapted for a second phase of Bristol teacher training in May 2018 (Month 31). ***Philosophical dialogue in a Science classroom*** – led by a Philosophical practitioner, UoB and a Public Engagement Associate, UoB. This training took part in the Graduate School of Education, University of Bristol on the 2nd May 2018 (Month 31) and **was attended by 4 teachers**. ***Performance in a Science Classroom*** – led by Kilter Theatre, a theatre company with strong experience of working with scientists and RRI issues. This training took part at We the Curious Science Centre on the 15th May 2018 and **was attended by 17 teachers**. Both workshops during the second round were also used as a platform to promote and develop the PERFORM teacher toolkit. Teacher feedback offered during these sessions was subsequently used to help shape and inform the next developmental stages of the toolkit.

In Paris, development and planning for the teacher training was led by **TRACES**. **TRACES** took the learning and feedback from the ECR training (see Task 3.2) to build a training for the teachers involved in the PWs and a wider audience of invited teachers from their network, developing the ideas around working with ECRs, tools for talking with young people about science and grand challenges, and using performance techniques for science teaching. Advertising for this second training began in October 2017 (Month 24), with invitations being sent out to teachers in the **TRACES** network of over 950 individuals and schools, and the closing date for applications was end of February 2018 (Month 28). **The training took** place in a 1-day session in April 2018 (Month 30) at **TRACES** offices within the ESPCI. 10 teachers signed up but the final number of participants was **5 teachers** due to the social movement and strike. The content of the session included cooperation games, theatre games, mind-maps to collect and gather ideas and stereotypes about science and research, case studies for questioning the production of scientific knowledge, examples of life experiences and careers of different researchers, and games about science controversy.

Teacher training in France, April 2018

A second round of Barcelona teacher training was planned by **TBVT,** in discussion with **UAB** - and in response to feedback received from **UoB** - and took place in July 2018 (Month 33) again as part of the summer school that **ICE-UAB** offers to teachers in Catalonia. Several months before, in February 2018 (Month 28), **TBVT** marketed the training by leading a PERSEIAs show for secondary school teachers to ensure an optimal number of participants - ideally, between 12 and 20. **TBVT** also used its social media networks, webpage and teachers' mailing for marketing purposes. So, **16 teachers participated in this second round of the training** that consisted of 20 hours over the course of 5 days and covered four topics (Table 9):

Table 9. Second round teacher training sessions in Barcelona

Topics	**Description**
Talk about societal challenges	Techniques for; encouraging more participatory dialogue in the classroom, using examples of different EU societal challenges, supporting STEM understanding and relation to real life, fostering a deeper understanding of science and enhancing pupil engagement.
Critical thinking to find reliable science information	Opportunity to experience the issues associated with identifying reliable scientific information, using sources commonly used by students (i.e. Google, Youtube) and reflecting on how overcome these problems.
Scripts about science and performing skills	Story -telling techniques and performance approaches to explore scientific concepts with young people.
Gender issues in STEM	Techniques and skills to conduct honest dialogues in the classroom about gender barriers and stereotypes in STEM. The last workshop also led a reflection on ways to integrate these techniques into science lessons to support the curriculum.

TBVT, together with the ICE-UAB, evaluated this second round of teacher training by looking whether the course responded to their expectations or incorporated new ways of doing practice or not, among other aspects, which resulted in an overall satisfaction with the training of 3,86 out of 4 points.

Teacher training in Barcelona, ICE-UAB, July 2018

Based on learnings from these trainings, in January 2018 (Month 27) **UoB** began to progress the design of the toolkit for teachers (D3.2). This toolkit was produced in conversation with teachers and education experts in the three countries and informed by the evaluation from the first round of teacher training, as above. The timeline of consultation and input with the toolkit development was as follows: In March 2018 (Month 29) the first draft outline was reviewed by staff within **UoB** networks and **UOC.** Also in March (Month 29) key review questions relating to toolkits were put to participant teachers during informal conversation during the PERFORM PWs in Bristol (Task 2.2). In April 2018 (Month 30) the revised first draft of the document was sent for review to the PERFORM consortium. Also in April (Month 30) as part of a WP4 reflection session (see Tasks 4.3 and 4.4), **UOC** assisted the toolkit consultation process with teachers in both Bristol and Barcelona who had participated in PW. Teachers were shown elements of the toolkit and asked if they would use them, how they would use them and what they would improve about them to make them more usable. In May 2018 (Month 31) participants at the PERFORM teacher training workshops in Bristol were asked for their views on toolkits. In June (Month 32) at the PERFORM final conference participants at the **UoB** workshop '**Perform: bringing philosophy and performance into your science classroom'** were presented with the draft version of the toolkit resources and offered feedback**.** In July (Month 33) a developed draft – including written resources and two videos - was sent to education experts at **UoB** and **AJA** for suggestions on content. A decision was then taken to wait until a clearer and more developed version of the toolkit was ready before contacting an external focus group of teachers and education experts - in order to optimise the value of the feedback.

For the videos of the toolkit, **UoB** received advice from a teaching expert at **AJA** on the format of the videos. **UoB** coordinated the filming and production of the videos showing ECRs. **UoB** liaised with **TRACES, AJA** and **TBVT** and **UOC** in order to select suitable ECR participants from PERFORM to feature in the videos. During May 2018 (Month 31) **UoB** visited 2 ECRs in their research institution at **UAB** in Barcelona and 2 ECRs at the Institute Marie Curie Paris to carry out the interviewing and filming for the videos. The same month 2 ECRs were filmed in Bristol at **UoB**. **UoB** worked with **AJA** to produce the most appropriate interview questions that would form the content for these videos. Post production on the videos took place during months May – August (Months 31 – 34). Unfortunately, one of the interviews with a **UAB** ECR was lost due to corrupted audio files, resulting in five usable films rather than six. Subtitles were produced in French and Spanish in response to requests from teachers. Also, **UoB** worked closely with education experts

from **AJA** and **UoB** to compile a list of suggested ways of using the videos in a classroom. These ideas were included in an accompanying guide to the videos which also provides further information on each featured researcher.

In September 2018 (Month 35) the following consultation group was contacted with a reduced version of the toolkit and asked for providing feedback: i) attendees from the **UoB-**led PERFORM teacher training workshops, ii) participant teachers from the PWs in three Bristol schools, iii) participant teachers from PERFORM workshop at ASE conference in January 2018, iv) Education partners in France and Spain. Also, in September (Month 35) a proposal was submitted and accepted for the **Scientix Ambassadors European teacher's network** to review the penultimate draft of the teacher toolkit. During September an international cohort of 5 teachers' from across Europe spent a day each reviewing the toolkit and feeding back on usability. **UoB** worked with a graphic designer to make final amendments during October 2018 (Month 36).

This regular consultation with education experts throughout the development of the toolkit as outlined above resulted in feedback which heavily contributed to shaping the design, structure and content of the teacher toolkits. Examples of some key feedback were:

- It should contain resources that are easily digestible and clear. It needs to introduce something new and novel.
- Explanations should be concise. Information should be set out in an uncluttered and easy-to-navigate format.
- Proposed activities must be quick and easy to integrate into science lessons. It needs to be clear how it enhances learning rather than distracts from curriculum. Important to have examples of curriculum links and examples of how the activities could be used alongside curriculum topics.
- Activities need to be easy to facilitate for teachers new to performance or philosophical dialogue.
- It needs to be usable with different forms of ICT.
- Plain English for use across Europe. Subtitles for video content ideally for France and Spain. Ideally resources will be translated into French, Spanish and Catalan.

UoB submitted **Deliverable 3.2 "Toolkit for teachers wanting to develop PERSEIAs"** on time in October 31st, 2018, which was previously peer-reviewed by **SMS** and **UOC**. This toolkit provides secondary science teachers with a series of creative activities and resources to help stimulate discussion on science and society in the classroom to help students develop a more reflective understanding of science and careers in science.

Illustration from D.3.2. PERFORM Toolkit for teachers: **Should we believe everything we read about science?**

The final toolkit consists of **three main teaching resources, Performing Science cards, Meet the Scientist videos, and Guidance Notes for integrating these approaches into your lessons**, each of which can be used as a standalone resource or in conjunction with other components of the toolkit:

- **Performing Science & Science and Society resource cards includes 6 artworks** that illustrate an ethical question relating to science and society. The ethical questions were chosen to reflect RRI values that had been in focus during PERFORM. Alongside each artwork and corresponding question is a short performance-based or discussion-based activity. **TBVT, SMS**, Kilter and **TRACES** contributed performance activities they had used with students during PERFORM. The most appropriate performance activities were selected and used on the Performing Science Cards. The Science and Society cards also provide further suggestions to help deepen understanding and explore the ethical dilemma further.

- **Meet the Scientist videos** include 5 x 4 minutes videos each featuring an ECR from across the PERFORM project. The videos provide personal and relatable insights into careers in science and stimulate conversation about current scientific research and its potential implications for society. Each video is divided into two sections: in the *Meet the Scientist* section the researcher speaks about their own identity and career and in *The Bigger Picture* they reflect on ethical and philosophical issues related to their own practice and field of research.

D.3.2. PERFORM Toolkit for teachers, ECRs from the series of Meet the Scientist videos

- **Guidance Notes for integrating these approaches into your lessons** is a pdf document that outlines suggestions for how teachers' identified potential barriers to being able to use performance exercises and philosophical discussions in lessons could be overcome. This includes feedback from theatre practitioners and Philosophy of Science experts.

1.2.4 <u>Work Package 4 (WP4):</u> Impact assessment of the participatory educational process in students' engagement in and learning about science

During this second reported period, **UAB**, as WP4 leader, supported by **UOC,** coordinated and implemented **the assessment instruments in the 12 secondary schools** participating in the PWs of Task 2.2 since January 2017 (Month 15). This included observations of all PW and a formative evaluation tool during the development of the participatory educational process, as well as the implementation of assessment instruments before and after the workshops (i.e. students' surveys and focus groups, and interviews to teachers and ECRs). From March to July 2017 (Months 17 to 21), **UAB** and **UOC** analysed data generated from the first round of PWs. As a result of such

analysis, **four internal reports** were generated in each case study, each corresponding to one of the four implementation goals of the PERSEIAs: 1) Interaction between students and ECR, 2) Quality of the resultant performances, 3) Transversal competences, 4) RRI values. These reports were discussed with **TBVT, TRACES** and **SMS** and informed the redesign of the PW for the second round.

Between September and December 2017 (Months 23 to 26), **UAB** supported by **UOC** worked on the redesign and refinement of the assessment strategy and tools to be implemented during the second round of PW. Such redesign was based on the insights and reflections generated during the analysis of the first implementation, the new design of the PW in schools shared by **TBVT, TRACES** and **SMS** and the feedback provided by the AB in August 2017 (Month 22). Between January and July 2018 (Months 27 and 33), **UAB** and **UOC** implemented the new assessment strategy, before, during and after the participatory workshops in the three case studies, with the support of **SMS, TRACES, TBVT** and **UoB**. Such implementation was adapted to fit the PW implementation calendar in each case study. Analysis of the data collected started in February 2018 (in order to inform the design of the assessment tools post-implementation) and lasted until August 2018 (Month 34). **Three internal reports were elaborated** from June to August 2018 (Months 32 to 34) from the quantitative and qualitative data analysis. These reports were the basis for the elaboration of **three summary reports** led by **UAB that returned the results to case study coordinators and the participating schools** in September and October 2018 (Months 35 and 36).

As a result of such assessment, the **UAB**, with the support of **UOC,** elaborated a **policy brief focused on the analysis of the impacts of PERFORM's educational approach** in fostering secondary school students motivations and attitudes towards science learning and STEM, which was handled as **Deliverable 4.3** in October 2018 (Month 36).

In parallel, **UoW** prepared analytic tools to analyse social media data (Milestone, Month 24), conducted qualitative research with young people and prepared a research report on the role of social media in young people's responses to PERSEIAs (**Deliverable 4.2** in September 2018, Month 35).

Task 4.1 Development of an innovative and participatory impact assessment research methodology

This task concluded in the first reporting period (Month 10). During the second reporting period **UAB** and **UOC** continued working on the **two research articles and a book chapter** generated with results from the task.

The scientific article entitled **"Responsible Research and Innovation Indicators for Science Education Assessment: How to Measure the Impact?"** (Heras, M., Ruiz-Mallén, I.) was published online at the *International Journal of Science Education* (Q2, IF:1,85) in October 2017 (Month 24). It is currently available at the following permanent link of the journal (gold open access), the PERFORM website and **EUSEA** shared it through PERFORM social channels (Facebook and Twitter). The article was also shared on RRI-tools resources repository.

The book chapter "**'What Do I Like about Science-Related Activities?' Participatory Indicators Addressing Students' Motivations and Needs When Learning Science"** (Heras, M., Ruiz-Mallén, I.) published in 2018 as Chapter 12 (pp. 201-228) in P. Katz and L. Avraamidou (Eds) Stability and Change in Science Education – Meeting Basic Learning Needs. Homeostasis and Novelty in Teaching and Learning. (New Directions in Mathematics and Science Education; vol. 033). Bill Publishers. ISBN 978-90-04-39161-1. It is advertised at the PERFORM website and a pre-print copy has been uploaded at UOC's repository.

The other article entitled "Responsible Research and Innovation in science education: Insights from assessing activities using digital media and arts-based methods" is still under review at *Research in Science Education*.

Task 4.2 Evaluation of the social media-based impacts of the performance events on young people's engagement in science

UoW completed **Milestone 4 "ICT development of an automated tool to enable social media data analysis"** in October 2017 (Month 24). To do that, **UoW** conducted research on students' PERFORM engagement activities on Twitter and Instagram, which were connected to activities in Task 2.1 during the first reporting period. **UoW** developed a social media analysis tool which was calibrated to automatically gather and analyse discourse about PERFORM-related science performances. Iterative testing and improvement of the tool was implemented to enhance its validity and reliability. The tool analysed social media data as they come in, producing analytics in real time. The tool gathered tweets and Instagram posts related to the different PERFORM activities by scraping from the social media Twitter and Instagram project feeds for processing. During the period from June 2017 (Month 20), **UoW** ran the tool on the collection side to harvest data, and the analysis was implemented in the following months (to run to the end of the project in Month 36).

UoW faced key challenges in accessing social media data, especially in the UK and France cases due to challenges reported by project partners **SMS** and **TRACES** with schools' regulations on the use of social media by students. Therefore, this tool focused on the overall project level in terms of data collection. The tool handled data in Spanish, English and other languages, with the help of a Google Translate filter that operated automatically.

Indeed, a full empirical research based on social media and interview data, as well as the results from the tool, wers incorporated into the final deliverable of this task by **UoW**: **Deliverable 4.2 "Report on social media responses to science performances".** D4.2 was peer-reviewed by **UAB, SMS** and **UOC** and the report was updated accordingly by **UoW** for final approval and uploading. **UoW** timely submitted D4.2 to the EC in September 2018 (Month 35), which is available at the PERFORM webpage.

D4.2 includes a research report about the nature of sharing (through social media and other pathways) that occurs for young people engaged through PERFORM in which the **UoW** team worked since June 2016 (Month 8). Among other things, the results showed that even when young people engaged by the project were positively disposed to all aspects of the project, they were reluctant to reveal this positivity in their social media personas for fear of being perceived as 'too keen'. The research is underpinning two blog posts being produced for the *Public Understanding of Science* journal blog. An up-to-date literature review on social media audiences was developed and added to the empirical findings to create a full picture and a research deliverable suitable for submission to a peer-reviewed journal. The research report that was prepared for D4.2 revealed important patterns around the following themes (among other topics):

- Why students value social media and their general patterns of use of this digital dimension of their social lives.
- How social media modulates students' reception of science communication.
- How and why PERFORM activities were shared through social media (or not).
- Implications of social media dimension for science communication practice.

In addition, the research results presented at different forums by **UoW** (see also Task 6.2) and related discussions helped to clarify how best to frame the research outputs from this aspect of the project to be most appealing and helpful to practitioner and academic audiences. All these topics were taken into account in D4.2.

Task 4.3 Evaluation of the acquisition of transversal competences by students during the educational process

UAB and **UOC** explored students' acquisition of transversal competences as a result of their engagement in the participatory educational process in each case study during the two stages of

PW implementation in 2017 and 2018. This was done through **assessing students' inputs provided in the surveys** (as a first quantitative approach) and **observations of the PW complemented by students, teachers and ECRs inputs through focus groups and interviews** (as a qualitative in-depth approach). Such assessment was conducted before, during and after the PW.

In the first round of PWs, between February and June 2017 (Months 16 and 20), **UAB** with the support of **UOC** continued with the **implementation of the assessment tool**s foreseen in the assessment strategy and reported in the first report period **in the 5 participant schools**. First, systematic observations from all the PW were gathered. Observations were then triangulated with the development of a focus group with selected students, a group interview with involved teachers and a group interview with ECRs. The questionnaire implemented before the PW was delivered again to students after the PW to track the changes in their answers and to provide feedback about the process (see also Task 4.4). Furthermore, during the PW, **UOC** and **UAB** with the support of **TBVT, SMS** and **TRACES** provided a learning chart devised to foster students' reflective thinking and learning to learn skills, by **inviting students to reflect about: i) their motivation to learn, ii) their learning outcomes, and iii) the way they had learnt it.**

The three case studies followed the same implementation strategy, although the specific tools were adapted to each local context and PW implementation approach. While the observation guide and pre- and post-surveys were already designed in the first reporting period, **UAB** and **UOC** worked on the design of the focus group and group interviews between March and June 2017 (Months 17 and 20). A general design was made taking into account the assessment criteria and indicators identified in Task 4.1, which was then adapted to each case study taking into account preliminary results from the observations and the pre- and post-surveys.

In the case of Paris, **UAB** conducted structured observation of the PW and students' performances in the two participant schools during the first round of PW, which were video-recorded by **TRACES**, following the audio-visual recording guidelines prepared by **UAB**. Between May and June 2017 (Months 19 and 20) **UAB** and **UOC** conducted a 1.30-hour focus group with 10 students in Collège Les Toupets and 9 students in Marie Curie. Pre- and post-surveys were also implemented with 19 and 22 students participating in the PWs in each school, and 31 and 17 students who did not participate. A 1-hour group interview with involved teachers in each school (2 teachers in Marie Curie and 4 in Les Toupets) was also conducted to collect their impressions about the PW. **TRACES** supported **UAB** and **UOC** in the communication and logistics with the schools to conduct the assessment.

In Bristol, during the first round of PW, observations were conducted both by **UOC** and **UoB** in the participant school (Fairfield High School) in February 2017 (Month 16). Following advice from **UoB** and **SMS**, only one PW was recorded. **SMS** conducted the observations of students' performances in March 2017 (Month 17) and sent the notes to **UAB** in June 2017 (Month 20). In May 2017 (Month 19) **UOC**, supported by **SMS** and **UoB,** conducted a 1-hour focus group with 8 students. 19 participant students and 13 who were not involved in PW answered to pre- and post-surveys. An online survey was also sent by email to the 2 participating teachers. The online format was considered more appropriate to provide critical feedback than a face-to-face interview, due to the cultural setting. For the ECRs interview, **UOC** and **UAB** used the transcripts from the reflection session conducted by **UoB** with 7 ECRs (see also Task 3.2), as the data collected already addressed students' acquisition of transversal competences.

In Barcelona, **UAB** and **UOC** continued with the observations at the two participant schools, which began in January 2017 (Month 15), by following the structured observation guide and the audio-visual recording guidelines. **UAB** and **UOC** researchers also observed students' final performance in both schools and recorded their notes according to the observation guide. Between April and May 2017 (Months 18 and 19) **UAB** and **UOC** conducted a 1.30-hour focus group with 10 students in INS Santa Eulàlia and 7 students in IES Castellbisbal. Further, at the INS Santa Eulàlia **UAB** and **UOC** also designed and implemented a 1-hour pilot reflective session with all the participating

students, which was oriented towards enhancing learning to learn skills, such as fostering reflective thinking about their learning process. Pre- and post-surveys were answered by 37 and 22 participant students in INS Santa Eulàlia and IES Castellbisbal, respectively, and 16 and 18 students from control groups. **UAB** and **UOC** also conducted a 1-hour group interview with involved teachers to collect their impressions about the project and the impact on the school students (10 teachers in INS Santa Eulàlia and 3 teachers in IES Castellbisbal). In the case of INS Santa Eulàlia one of the two teachers directly participating in the workshops also answered to some questions via online to add more information to the group interview. **UAB** and **UOC** also conducted a group interview with 3 ECRs in May 2017 (Month 19), which was jointly prepared and implemented with **UoB** (see also Task 3.2). 4 ECR answered an on-line survey.

Starting in January 2017 (Month 15) **UAB** and **UOC** organised weekly on-line meetings to ensure coherence in data collection and analysis across case studies. From March to July 2017 (Months 17 to 21), **UAB** and **UOC** analysed all the data collected. In all cases, **UAB** and **UOC** collected observations using a Word file for the complete set of notes (narrative) and systematised them in an Excel template. Observations were qualitatively analysed to explore in-depth the pedagogical context and learning approach and to which extent and how it fostered the *mise-en-place* of skills and competences implied in the creation of the students' performances. Surveys were systematised in Excel templates and quantitatively analysed through a statistical software. Students' answers for the pre- and post-surveys were analysed by looking at the percentage of answers reported by students. Answers were then compared with those from the control group, and differences between boys and girls were statistically analysed. The variation of every individual answer for each question was also calculated to see whether students' answers changed their answers between pre- and post-surveys. All these results were complemented with students' inputs further collected through the focus group transcripts and learning charts. Finally, to complete the analysis, **UAB** and **UOC** qualitatively analysed teachers' and ECR's perceptions about the fostering of students' transversal skills through the process gathered through the oral and written interviews. All data were anonymised following PERFORM ethical standards set in Deliverable 7.1.

As a result, **four internal reports were generated in each case study**. Each of the documents extensively reported the data collected through all the assessment tools and provided an analysis focused on the goals identified for the development of the participatory educational process. Those results of the analysis corresponding to transversal competences were compiled in one internal research report, i.e., promoting the acquisition of transversal skills amongst students. As a way to explore how the participatory educational process approached this goal, the focus was set on **three different types of transversal competences**: **i) learning to learn skills, ii) civic and social skills, iii) sense of initiative and entrepreneurship.** More specifically, the analysis was oriented towards exploring to which extent PW facilitated learning spaces to train and put in practice students' transversal competences, and what aspects facilitated or hindered such practice. **UAB** shared analysis reports with case study coordinators in June and July 2017 (Months 20 and 21) and feedback meetings were held between **UAB, UOC** and **TBVT, SMS** and **TRACES** between this month and September 2017 (Month 23) to discuss the results and their main implications for PW redesign. The analysis was presented emphasising **strengths of the process and aspects to improve**, according to the different data inputs. Highlights from the analysis and related recommendations were also identified in the three case studies and shared with case study coordinators, in order to contribute to the redesign process in the second implementation round. Between September and October 2017 (Months 23 and 24), these results were processed by **UAB** and **UOC** to **be returned to participant schools in a summarised and accessible way**. One short report containing main messages addressed to different stakeholders (students, teachers, researchers) were generated in the **local language** of each case study as an output for this return of results and are available at the PERFORM webpage.

Also in September 2017, **UAB** supported by **UOC** started to work on the **redesign and refinement of the assessment strategy and tools to be implemented during the second round of PW.**

Such redesign incorporated the learning and insights gathered during the first implementation round and the feedback provided by the AB in August 2017 (Month 22). For that purpose, **UAB** and **UOC** focused on the redesign of the survey, the systematic observation guide and the formative evaluation, by working around two main aspects. First, a better grounding of assessment indicators related to transversal competences in the specific design of the PW, e.g. by tailoring the three categories of skills identified in the assessment framework to the pedagogical approach of PERFORM and the skills put in practice by students during PW. Second, an increase of the presence of the formative evaluation to enhance students' self-reflection about their learning process (e.g. learning to learn skills, RRI values). A detailed protocol with these changes was shared with **SMS** in Bristol, **TRACES** in Paris and **TBVT** in Barcelona in November 2017 (Month 25) and a Skype or face-to-face meeting was held with them between Month 25 and 27 to discuss its implementation. This way, **SMS, TRACES** and **TBVT** provided feedback about any potential local adaptations and suggestions in the design. In particular, it was agreed to integrate the **formative evaluation** in the design of the PWs, as part of students' learning and creation process. In doing this, new activities were integrated within the PW, which were focused on: i) **students' perceptions of science and researchers** (including researchers' skills), and ii) **students' awareness of the learning environment created through PERFORM and their emotions** within this learning environment. For that purpose, the formative assessment combined two kinds of activities to be implemented by the science communicators in each case study: one individual written activity and one group activity applying body movement. The new formative evaluation design also included a final reflective session with the students once the PWs were over, in order to reflect with them about their answers to the formative evaluation activities (see below). In turn, the **revised version of the pre- and post-survey** included new items on transversal skills, such as items on reflective and critical thinking, learning autonomy and communication skills. The **observation guide was reorganized,** and some indicators were merged to facilitate its implementation, while some others related to transversal competences were emphasized (i.e., students' learning autonomy). These three tools (students' surveys, observation guide and formative evaluation) were ready and tested (in case of students' surveys) by **UAB** and **UOC** in December 2017 and January 2018 (Months 26-27), before the beginning of the second round of PW.

UAB and **UOC** coordinated the **implementation of the assessment methods in the 7 schools participating in the second round of workshops**. In January 2018 (Month 27) **UAB** and **UOC** researchers held a two-day meeting in Barcelona to discuss in-depth the assessment implementation and approach specific implementation needs in each case study. Later on, Skype weekly meetings took place to facilitate communication, share insights and face specific implementation issues, ensuring coherence across the implementation in the different case studies as well as responsiveness to each local context. These meetings were held until August 2018 (Month 34).

The implementation of the assessment tools during the second round was adapted to the implementation calendar in each country: it started in January 2018 and lasted until May 2018 (Months 27 to 31) in Bristol and Barcelona and July 2018 in Paris (Month 33), as the workshops in Montreuil school started in March 2018 (Month 29).

From January until March 2018, **UAB** and **UOC** implemented the surveys and observation guide in the 5 participant schools in Bristol and Barcelona (to 18 participant students in INS Consell de Cent, 19 in IES Moisès Broggi, 18 in Bridge Learning Campus, 15 in Castle School and 8 in Bristol Free School, and similar numbers in the control groups). In the case of France, these were implemented in the two participant schools between January and May 2018 (to 18 participant students in Villiers and 19 in Montreuil, and similar numbers in the control groups). Likewise, **SMS, TRACES** and **TBVT** implemented in each corresponding case study the formative evaluation activities during the PWs, supported by **UAB** and **UOC**.

Formative evaluation exercise at Montreuil School, Paris, February 2018

In February 2018 (Month 28) in Barcelona, March in Bristol and June in Paris, **UAB** and **UOC** implemented the **reflective session** with all students involved in the PW in order to explore with them and consciously ground their learning through the project. Most specifically, students discussed about: i) their awareness of the learning environment created through PERFORM, by reflecting about the perceived differences with their traditional learning environment at science class, the skills trained and their reactions to the methodological approach, ii) the different goals of the PERFORM project (including training transversal competences and skills) and to what extent they considered they had been achieved and why.

Reflective session at INS Consell de Cent, Barcelona, February 2018

Based on the data from this session, the surveys and observations, **a new design of focus groups with selected students** was tailored for each specific case study, to further explore relevant aspects of students' perceptions of the participatory educational process and its impact in students' transversal competences, among others. For that purpose, **UAB** and **UOC** implemented one focus group with 6-8 students in each school in May 2018 (Month 29) in Barcelona, April 2018 (Month 30) in Bristol and June 2018 (Month 32) in Paris.

Finally, the **group interview guides for teachers and ECRs** were reviewed during April 2018 (Month 30). The teachers' interview was implemented during the same month in Bristol and Barcelona and in July in Paris, with 1 to 2 teachers in each school. It included questions about the impact of the project in students' training of transversal competences, according to their

impressions and their knowledge of the students. A group interview with 7 ECR was implemented in Barcelona also in April 2018 (in Month 30), which included inputs from **UoB**. An online survey was also answered by those ECRs which could not attend the face-to-face interview (n=4). In the case of Bristol, **UAB** used **UoB** reflection session with 11 participating ECRs (Month 31, see also Task 3.2), providing inputs where needed. In Paris, similarly to Barcelona, one group interview was conducted in June 2018 (Month 32) with 4 ECRs, while 2 ECRs answered an online survey.

From February to August 2018 (Months 29 to 34), **UAB** and **UOC** focused on the analysis of collected data. Similarly to the first round (see detailed description above), in all cases, **UAB** and **UOC** collected observations that were systematised in an Excel template and qualitatively analysed to explore in-depth to which extent and how the pedagogical context and learning approach fostered the *mise-en-place* of specific skills. Likert-scale items in the surveys were systematised in Excel templates and quantitatively analysed to explore students' self-perceptions of different transversal competences related to science learning before and after the intervention and also the extent to which they put them in practice during the workshops. All these results were complemented with students' qualitative inputs further collected through the open-ended questions in the survey, the focus group transcripts and through the different formative evaluation exercises and session. Finally, teachers' and ECR's oral and written interviews were qualitatively analysed to explore their perceptions about the fostering of students' transversal skills through the process. All data were anonymised following PERFORM ethical standards set in Deliverable 7.1.

As a result of the quantitative and qualitative analysis, **three internal documents with research results** were elaborated from June to August 2018 (Months 32-34). The documents contain the main insights of the analysis related to: i) the design of PERFORM methodological approaches and the inclusion of RRI elements, ii) the contribution of such approaches to fostering transversal competences, and iii) the contribution of such approaches to enrich students' perceptions of science and enhance scientific vocations. In terms of transversal competences, we focused on the three types defined above: i) learning to learn skills (mostly reflected through autonomous learning and reflective thinking), ii) civic and social skills (divided in communication skills, collaborative skills and performing skills), and iii) sense of initiative and entrepreneurship. The results were shared and discussed via online and face-to-face meetings with case study coordinators in each country – **TBVT, SMS** and **TRACES** in September 2018 (Month 35) to contrast and further enrich the analysis.

Furthermore, the analysis documents, together with the reports from the first round, constituted the basis to elaborate **Deliverable 4.3: Policy Brief "Effective science and arts-based education approaches"**. This policy brief was elaborated by **UAB** and **UOC** between Months 33 and 36. The deliverable was reviewed by **UNESCO, AJA** and **UOC** and timely submitted by **UAB** in October 2018 (Month 36). The policy brief, which is available at the PERFORM webpage, focused on the **analysis of the impacts of PERFORM's educational approach in fostering secondary school students' motivations and interest towards STEM and science learning and motivation**. Most specifically, the document presents evidence and analysis introducing the main methodological elements of the RRI-inspired design of the workshops and reviewing the contributions of such educational approach to promote students' transversal competences, enrich their science perceptions and raise their scientific vocations. Based on such evidence, the document extracts **policy implications and recommendations** oriented towards schools and research centres. In terms of transversal competences, the analysis presented highlights the following core contributions:

- Communication skills: providing new expressive resources and tools to students.
- Collaborative and social skills: facilitating spaces for cooperation and dialogue.
- Sense of initiative & entrepreneurship: fostering self-confidence through performance
- Learning to learn skills: from fostering inquiry skills to critical thinking.

Finally, between September and October 2018 (Months 35 and 36), assessment results have been summarised by **UAB** with the support of **UOC** to be returned to and discussed with PERFORM case study coordinators and participants (schools and ECRs). **One short report containing main messages of the evaluation has been generated in the local language** of each case study as an output for this return of results and is now available at the PERFORM webpage.

Task 4.4 Assessment of the Responsible Research and Innovation values

RRI values within the participatory educational approach were mainly explored by **UAB** supported by **UOC** through students' inputs provided in the **surveys** (as a first quantitative approach) and **observations** of the PW complemented by students, teachers and ECRs inputs through **focus groups and interviews** (as a qualitative in-depth approach) during the first and second round of PW in 2017 and 2018.

For that purpose, during the first round of PW in 5 participant schools, and complementing the assessment described in Task 4.3., between January and May 2017 (Months 15 and 19) **UAB** supported by **UOC** implemented the pre- and post-survey with participant students in PW activities and those from the control group (as reported in the first reporting period). The objective was twofold: i) to compare students' attitudes and perceptions towards science and STEM careers, with an emphasis on RRI-related dimensions (gender stereotypes, ethical issues, inclusiveness, engagement and critical/creative thinking), before and after the implementation of PWs, and ii) to examine students' perceptions towards the participatory educational process, also as an input to inform the design of the focus groups. In order to evaluate whether students' answers were specific to the PERFORM group, **UAB** and **UOC** also conducted these questionnaires (pre- and post-surveys) among a group of students who did not attend to the workshops: the control group. The post-surveys were delivered once the PW were finished, in specific time-slots scheduled for the occasion: during March 2017 (Month 17) in Barcelona, April 2017 (Month 18) in Bristol, and May and June 2017 (Months 19 and 20) in Paris; with one exception: for IES Castellbisbal (Barcelona), it was delivered just after the performance of the scientific monologues, due to difficulties in finding an extra time slot with students. Surveys were answered by participant students and by the control group in each school, from which parental informed consent was obtained. In Bristol, **SMS** arranged the implementation dates of the survey in Fairfield High School and managed the informed consent for the control group. In Barcelona, **TBVT** collected the informed consents of the control group in Castellbisbal secondary school and supported the **UAB** team in the collection of informed consents in Terrassa. In Paris, **UOC** supported by **TRACES** conducted these surveys.

From March to July 2017 (Months 17 to 21), **UAB** and **UOC** analysed all the data related to RRI values and collected through observations, written surveys and learning charts, focus groups and group interviews. As in the case of Task 4.3., such analysis was reported in **one internal research report** for each case study, which **focused on including RRI values in the participatory learning process and boosting motivations towards science**. As a way to explore how the workshops approached this goal, the report focused on **three different aspects of RRI values**: i) inclusiveness, ii) engagement, and iii) ethics integration. In another internal research report, **UAB** and **UOC** also analysed students' general perceptions and attitudes towards science before and after the PW in order to contextualize the analysis and identify potential changes resulting from students' participation. Gender was included as a variable of analysis along all these aspects. In particular, pre- and post- surveys explored students' perceptions and attitudes towards science around several RRI-related dimensions, such as: students' feelings on science learning at school, motivations towards studying a scientific career, personal value of science learning, perceptions of gender-related roles in science or understanding of the nature of science. Students' answers to the survey were further explored through the learning charts and the focus groups conducted. Furthermore, in order to explore if and how the pedagogical context and related factors of the PW had integrated RRI process requirements and fostered learning outcomes, **UAB** analysed the transcription of the observations during the whole process. For the analysis of inclusiveness,

observations mostly focused on the implementation of the designed activities and their facilitation (to identify process requirements) and on students' performance and participation throughout the PW. Students' cognitive engagement in the PW was approached mainly through observations focused on the capacity of the learning process to foster students' questioning and reframing, systems thinking, the connection of topics with experience, and the consideration of different perspectives and points of view in their discourse. Data on emotional aspects of learning was also collected and analysed by **UAB** and **UOC**, such as students' enjoyment and affective reactions towards the topics approached and methods proposed. Finally, ethics integration was analysed through the observation of different process requirements during the implementation and facilitation of the PW. To complete such analysis, both involved teachers' and ECRs' perceptions of the educational process implemented were explored. As with Task 4.3, the analysis reports corresponding to RRI values were shared by **UAB** and **UOC** with **TBVT, SMS** and **TRACES** in June and July 2017 (Months 20 and 21) and feedback meetings were held between July and September 2017 (Month 23) to discuss the results and their main implications for the redesign of the PW (see also Task 2.2).

Based on this analysis, **UOC** and **UAB** produced a **scientific publication** entitled **"From White Lab Coats and Crazy Hair to Actual Scientists: Exploring the Impact of Researcher Interaction and Performing Arts on Students' Perceptions and Motivation for Science"** that is currently published in *Science Communication* (Q1, IF:2,03). It is available at the link of the journal (gold open access), the PERFORM website and social channels (Facebook and Twitter). The evidence analysed in this article shows that students changed their perception of scientists toward a less stereotyped image after participating in the PWs and particularly where their interaction with researchers was higher (at schools in Bristol and Barcelona). It also shows that pupils' interest for scientific careers significantly increased where drama-based techniques were more inserted into the pedagogical approach (in Parisian schools).

During September and October 2017 (Months 23 and 24), the **UAB** supported by **UOC**, started to work on the **redesign and refinement of the RRI values assessment strategy and tools** to be implemented during the second round of PW. Such redesign paid attention to the exploration of the RRI values embedded within PW scientific content shared with students, which is a core and challenging aspect of the project. Furthermore, **UAB** and **UOC** worked to enrich and further expand the analysis framework in relation to gender, through the adoption of an intersectional approach in the assessment strategy. As a result of this process, the assessment tools (i.e. observation guide and students' surveys) were refined, adapted to each case study and implemented by **UAB** and **UOC** before, during and after **the second round of PW** since January (Month 27) until July 2018 (Month 33). The improved version of the **pre- and post- surveys included new items on students' educational aspirations** (including their parents' expectations), science identity, critical thinking and changes in science perceptions. Items on students' educational aspirations and science identity also contributed to approach gender from an intersectional perspective. The **observation guide emphasized as well some indicators related to RRI, such as facilitators' discourse of science** (i.e. how science is presented to students through the project), beyond indicators on process requirements. The **new formative evaluation strategy** (see above, Task 4.3) **focused as well on students' processes of meaning making** (i.e., how students make sense of the contents approached), in order to reflect with them about RRI dimensions introduced through the participatory educational process. For that purpose, students were invited to reflect, both at the beginning and at the end of the workshops about relevant aspects of science (i.e. what is needed to conduct scientific research) and about any new insights or learning about science and research through the project (e.g., the different creative and RRI elements of the approach related to the human dimension of science, exploring scientific topics through a creative process). **Focus groups** (see also Task 4.3), in turn, **helped to explore the impact of PERFORM RRI approach in students' attitudes towards science and pro-scientific behaviours**. These included the exploration of: i) specific changes in students' perceptions, according to their answers to specific items in the pre- and post- surveys and their open answers to the post-surveys; ii) students' scientific career choice (e.g. how and when they

make that choice, elements influencing such choice, potential impact of projects like PERFORM); iii) students' identification with science and scientific careers. Finally, **teachers' interviews** (see also Task 4.3) **included questions on students' engagement through the process**, **teachers' perceptions about the added value of PERFORM's RRI perspective**, about the creative approach in students' attitudes towards science, and about their consideration regarding their role as teachers through the process. Teachers' opinions and attitudes related to learning resources fed in to Task 3.3. **ECRs group interviews** (both face-to-face and online) **included questions about ECRs role through the project,** their interactions with students and their approach to RRI elements through such interactions.

As with Task 4.3, between February and August 2018 (Months 28 to 33), the **UAB** and **UOC** conducted the analysis of all data collected through observations, written surveys and formative evaluation exercises, focus groups and group interviews. **The analysis on RRI values focused on three dimensions**: i) methodological elements of the design integrating RRI values, that is, fostering students' inclusiveness, engagement and the integration of ethical and social dimensions of research; ii) students' general perceptions and attitudes towards science before and after the PW and changes resulting from students' participation in the project; and iii) impacts of the project in students' scientific vocations, in terms of motivations to study science and STEM-related careers. Gender was included as a variable of analysis along all these aspects. This analysis had the same focus as in the first implementation round (see above for a detailed description): the analysis of students' answers to pre- and post- surveys explored students' perceptions and attitudes towards science around several RRI-related dimensions, which were expanded by the formative evaluation exercises and the focus groups conducted with students; the transcripts of researchers observations analysed if and how the pedagogical context and related factors of the PW had integrated RRI process requirements and fostered learning outcomes; and the transcripts of the interviews to involved teachers' and ECRs' "were analysed to explore their perceptions of PERFORM methodological approach and its impact in students".

Results of the quantitative and qualitative analysis related to RRI values were included in the **three internal documents** (see also Task 4.3) were produced by **UAB** and **UOC** between June and August 2018 (Months 32-34), which were shared with case study coordinators (**TBTV, TRACES, SMS**) in September 2018. These documents, together with the reports from the first round, constituted the basis to elaborate **Deliverable 4.3,** introduced above in Task 4.3.

In terms of RRI values, the policy brief first identifies methodological elements of the design implemented integrating RRI values within the educational approach, identifying both successful and challenging aspects, and then reviews their contribution to enrich students' perceptions of science and eventually raise scientific vocations. In this regard, the analysis emphasises the following core aspects:

- Experiencing science learning as something fun: increasing motivations to learn.
- Understanding the nature of science: diversity, critical thinking and social implications of research.
- Breaking students' stereotypes about scientists and research: differentiated impacts.

As mentioned above, between September and October 2018, all the results of this assessment related to RRI values were summarised by **UAB** with the support of **UOC** to be returned to case study coordinators and participating schools and ECRs.

1.2.5 Work Package 5 (WP5): Sustainability and Policy Impact

During the reported period, **UNESCO**, as the WP5 leader, led work to promote and advocate for PERFORM to make it more visible and known by both policy-makers and science education and communication practitioners. This was done by **UNESCO** and other partners attending and

organizing dedicated PERFORM sessions during high-level events in the field of science communication and science education including, for instance, World Science Forum 2018 and the Public Communication of Science and Technology Conference 2018 (PCST).

The last **UNESCO** General Conference gathering Ministers of science technology and education from all the 195 **UNESCO** member states was also an excellent opportunity to connect with science education policy-makers and advocate for PERFORM and the importance of developing and investing in non-conventional means to learn and teach science to engage young girls and boys in the STEM.

In line with the external review recommendations, a second relevant goal of this period was to pursue the resource mobilization efforts at national and regional levels this, to ensure the project sustainability beyond the current funding. To achieve this aim, **UNESCO** organized a series of separate meetings with representatives of its Member states divided into six different regional groups. The goal of the above-mentioned meetings was to promote and advocate for the concept of "myPERFORM" as expansion and adaptation of PERFORM outside the three current pilot countries. Also, **UNESCO** and **TBVT** made several contacts with various types of stakeholders including governments, foundations, and the private sector in countries such as Belgium, Egypt and Brazil.

Last but not least, the focus of **UNESCO** relating to the policy impact of the PERFORM project was mainly in the development of **two policy briefs as the Deliverable D5.2** informed by research results provided by **UAB**, **UoB** and **UOC**, as well as the writing of a **UNESCO position paper** summarising PERFORM key findings and policy recommendations.

Task 5.1 Generation of a sustainability plan

This task ended up in January 2017 (Month 15) with the submission of the Deliverable D5.1 Sustainability plan. Nevertheless, **UNESCO and the PERFORM consortium as a whole** kept on working toward the sustainability of PERFORM. This to, either ensure a strong link between the project and new final users and stakeholders or to establish small scale PERFORM project at national or regional levels.

In April 24th, 2017 (Month 18), **UNESCO** led a presentation of the PERFORM sustainability plan that was made during the EC external review meeting hosted by **UOC** in Barcelona. On this occasion, the concept of "myPERFORM" was shared and discussed with the whole consortium and with the EC PO and the external reviewer, who made suggestions to rethink the concept to ensure its sustainability in the long term. As a follow-up of the review meeting with the EC PO and the external reviewer, and the PERFORM AB recommendations from Deliverable 1.3 (see Task 1.3), **UNESCO** kept on working on **the promotion of "myPERFORM" concept** during this reporting period. myPERFORM was created as a legacy and continuation of the original PERFORM project, which uses tools of the performing arts to inspire and motivate young people to pursue science careers. myPERFORM also aims to change young people's stereotypes about scientists, to encourage them to reflect on wider questions relating to science and society, and to teach them crosscutting competences and skills. myPERFORM will follow a similar structural model to PERFORM and a consortium of partners will be sourced according to the requirements of funders as well as those of the particular geographical and social context. In this regard, smaller-scale and specific myPERFORM projects were designed for various countries interested in implementing and adapting PERFORM. **UNESCO** also worked on a synthesis communication material about "myPERFORM". As of this reporting period, the list of dedicated "myPERFORM" project at national or regional level includes seven African selected countries, China, Jordan, Kazakhstan, and Yemen. Moreover, as far as fundraising and sustainability of PERFORM is concerned, by the end of 2017 **TBVT** was in contact with Chinese representatives to discuss the possibility of developing a PERFORM pilot project in China.

In January 2018 (Month 27), in this vein, a teleconference was held with the National Director for the El Hassan Youth Award to discuss possible ways to implement "myPERFORM" in Jordan. **UNESCO** was also in touch by that time with representatives of Ukraine, Kazakhstan and Egypt.

In April 2018 (Month 30), **UNESCO** run two presentation meetings about PERFORM with **Ambassadors and Permanent delegates of the African and Asian group** of **UNESCO**. The objectives of these two meetings were to present the advancements of the PERFORM project and to show to these Member State representatives how PERFORM is a great tool to share the human side of research and therefore to engage young girls and boys in future scientific careers.

In May 2018 (Month 31), **UNESCO** led the its first meeting with the responsible of the Change Management and Communication Director Corporate Research & Innovation of Solvay, a Belgian leading company in the field of chemistry, Solvay. Solvay is a multi-specialty chemical company, committed to developing chemistry that addresses critical societal challenges. In line with Solvay's corporate social responsibilities, **UNESCO** and Solvay agreed to cooperate in advancing and developing new science education and communication approaches to teaching and learning science. The concept of "myPERFORM" was appealing to the Solvay group, and they requested a second meeting with the responsible of Solvay's Corporate laboratories around the world. In September 2018 (Month 35), during a presentation meeting of the two innovative concepts, PERFORM and myPERFORM, both parties agreed to set up two different myPERFORM projects: one in Brazil and the other one in India. **UNESCO** is currently working on a feasibility study for each of the both countries mentioned above.

Also in September 2018 (Month 35), **UNESCO** held a teleconference with The Italian Association for Cancer Research (AICR) to discuss the possibility of developing together a science education project based on "myPERFORM" tailored to AIRC's needs in line with AIRC's activities in science education and the popularization of science among young girls and boys in the North of Italy. To this end, both parties agreed to meet in Milan on 30th October (Month 36) to make progress in the discussion and look for potential agreements.

As a follow-up of a meeting in July 2018 (Month 33) between **UNESCO** and a representative of the non-for-profit Organization 1001 Inventions specialized in the popularization of science among young public, connection was made with the Egyptian Foundation Al Alfi Foundation. Al Alfi Foundation is dedicated to investing in developing human capital through education and capacity building, particularly among Egyptian scientists, educators and gifted students in STEM. The "myPERFORM" concept appeals to the foundation and they expressed the need to set up a project in Egypt. In this framework, **UNESCO** is currently (Month 36) in negotiations with the CEO of Al Alfi Foundation. The myPERFORM Concept Note for Egypt and its budget is under review.

UNESCO also looked for ways on keeping alive PERFORM in the project pilot countries, and other European countries. In October 2018, **UNESCO** presented PERFORM and its global expansion myPERFORM to the **Group I, including the EU member states and a representative of the European Union at UNESCO**. The presentation included an overview of the PERFORM project, highlighting the benefits of science communication through performance-based activities, in encouraging young people to engage in STEM careers. This was followed by an introduction of the replica project myPERFORM. Overall, the presentation was extremely well received, with positive and engaging questions asked by numerous Member States such as Canada, France, Norway and Spain. Canada, France, Spain and the UK all expressed their interested in following-up with the project in the future.

Particularly in Spain, in October 2018 (Month 36), **UNESCO** had a teleconference with the responsible for education and science programs and conferences at the Caixa Foundation to discuss on future possibility of cooperation with the Caixa Foundation to develop a dedicated myPERFORM project in Catalonia. Moreover, the purpose of the meeting was to include PERFORM in the agenda of the first Open International STEAM Summit to be held on April 3-4th, 2019 in Barcelona. The idea is to present PERFORM as an excellent example of a successful science

education and communication project to motivate young girls and boys to undertake careers in science.

Beyond the **UNESCO** efforts to ensure the sustainability of PERFORM and as an essential element for the success of the PERFORM project after the end of the EU funding is the firm links and interactions between **PERFORM and the academia and educational sector**, other member of the consortium worked toward the same goal.

In this regard, **UAB** supported by **UOC**, collaborated in a pilot educational programme funded by the Autonomous Solidarity Foundation (FAS-UAB) at the Environmental Sciences degree at UAB. Most specifically, the project PERFORM was introduced to first-year university students as an example of pedagogical innovation and facilitated a practical session in which they applied theatrical exercises to reflect about scientific content. This pilot programme is generating a set of pedagogical guidelines to inspire teachers and educators at UAB and beyond and contribute to pedagogical innovations within the university. All in all, the programme represented a way of sharing PERFORM project and establishing links with teachers and students at the UAB, in the search for working and educational synergies in the future.

TBVT in turn incorporated the PERSEIA show developed in Task 2.1 as part of the educational activities that **TBVT** regularly deliver at Spanish schools. This is the case of the National Project Ciencia Show, in which **TBVT** delivers the PERSEIA show to more than 5000 secondary school students each year. This project is founded by national institutions as public entities (e.g., Cátedra de Cultura Científica de la Universidad del País Vasco) and private foundations (e.g., Fundación ANTAMA). In parallel **TBVT** implemented the PW generated in Task 2.2 in the Universidad Nacional de Costa Rica reaching more than 30 ECRs and more than 200 secondary school students, in a project that is going to be re-implemented in 2019. Also in Latin America, **TBVT** worked with El Salvador Science Ministry in order to implement the new science policy programme including outreach activities involving ECRs and secondary school students. **TBVT** trained 15 ECR from El Salvador and implemented 3 workshops with a total of 90 secondary school students.

To conclude, an important element for the success and sustainability of the PERFORM project consists of the strong links and interactions between PERFORM and all the relevant stakeholders or networks that could help to maintain or expand the outputs of the project after the end of the current EU funding. The PERFORM consortium needs to work closely with the academic sphere to integrate PERFORM's findings in their pedagogic materials and curricula. To this end, the consortium can rely on **UNESCO**'s expertise in the education field in order to reinforce and build up effective relationship with schools, teachers and higher education actors. For instance, the UNESCO's network of schools (ASPnet) could further contribute to the success of PERFORM by encouraging more European schools to be part of the project or benefiting from the project findings. In the same vein, **UNESCO** will work in close collaboration with the Teacher Task Force and the Higher Education departments of UNESCO to advocate and promote the PERFORM related toolkits for teachers and ECR.

Task 5.2 Maximize the policy impact of PERFORM

As part of its duty in maximizing the policy impact of PERFORM, **UNESCO** coordinated two types of actions within this task: i) the presence of PERFORM project and consortium in relevant events for the policy impact and ii) the elaboration of two policy briefs as Deliverable 5.2 to ensuring strong science-policy links with EU policy and decision makers.

During this period, and particularly in October 2017 (Month 24), **UNESCO** took advantage of internal major events including the 202nd UNESCO Executive Board (58 countries) and the 39th UNESCO General Conference (195 countries) to advocate and communicate on the benefits of the PERFORM project in engaging young schoolchildren in STEAM. **UNESCO**'s lobbying actions targeted the UNESCO's Member states and especially the representatives of their Ministries of Education (MoE) who attended the above-mentioned major internal events.

In addition to the above, **UNESCO, UOC, SMS, UAB, UoB, UoW, TBVT and the other partners of PERFORM consortium** advocated for PERFORM in other significant events at international level in the field of science education and communication:

- November 7th-11th, 2017 (Month 25): On the occasion of the **UNESCO 39th General Conference**, PERFORM was presented to the Minister of Education of Uruguay. A similar discussion about the project was also made with representatives of Cuba, Gabon, Ukraine, and Russia. In parallel to the UNESCO General Conference, PERFORM was also presented to policymakers and science education specialists during the **World Science Forum** that was held in Jordan. The PERFORM session at World Science Forum was run in cooperation with **UOC** and **SMS**.

- December 5th, 2017 (Month 26): **UNESCO** together with **UOC**, **Scientix,** and GEDII a sister H2020 project, organized the **12th Scientix Projects' Networking Event on 'Gender and innovation in STE(A)M education'** in Brussels, which was focused on gender issues in STEM education. This was a Future Classroom Lab workshop attended by **35 participants** including PERFORM EC PO, other Horizon 2020 sister projects, academia and teachers from all around Europe. **UAB** and **UoB** also took part in the one-day workshop. The goal of the workshop was to share experiences and initiatives addressing gender aspects in science education in innovative ways. Therefore, it was an excellent opportunity to reflect upon the role of arts-based approaches for combating gender stereotypes and bias within science and beyond. Two **UNESCO** Experts from Gender Equality department presented the critical challenges on gender issues in the STEM. While the first expert provided the **UNESCO** response to tackles these issues using art and Performance art, the second one invited the audience - divided into small working groups, to reflect and identify best practices to overcome the current gender gap in STEM education. Three set of questions were proposed to the public to this end: 1) Identify the three greatest challenges you have faced in introducing arts into science education; 2) What kind of support would be helpful in overcoming such obstacles?; 3) How can arts help dealing with stereotypes in STEM education? What is the added value of arts in this regard, if it has some? The conclusions of the workshop mentioned above informed the policy briefs in Deliverable 5.2.

  As a follow-up of the 12th Scientix Projects' Networking Event, **UOC, UAB, UoB** and **UNESCO** contributed to a publication led by Scientix and titled "Gender and innovation in STE(A)M education" that was issued in June 2018 (Month 32) and can be found on Scientix Portal and PERFORM website.

12th Scientix Projects' Networking Event, Brussels, December 2017

- April 4th-7th, 2018 (Month 30): The **Public Communication of Science and Technology Conference 2018 (PCST)** was held in Dunedin, New Zealand. PERFORM was there represented by **UNESCO**, **UOC**, **TBVT** and **UoW**. Highlighting **UNESCO** and **UOC** presentation of PERFORM as a perfect example of "New approach to science communication". The goal of this session was to share the progress of the PERFORM project and its impact on policy-making in science education. The session was a success and raised the interest of several participants in the project. Moreover, a number of networking opportunities originated at the conference. Attendees heard from the Chief Science Advisor to the Prime Minister of New Zealand, a NASA representative, and a number of distinguished scientists and science communicators. On behalf of the consortium, **UNESCO** agreed to explore new ways of collaboration with SCICO, a non-profit organisation for science communication, and CEGA, the Andean Geothermal centre of Excellence. In this conference, **TBVT** lead a performance session to deliver a PERSEIA and present the user-friendly toolkits of D2.1 in front of PCST attendees. **TBVT** also lead a workshop to present the participatory workshops conducted during the Task 2.2
- May 5th, 2018 (Month 31): **European Commission Open Day 2018, Brussels.** In PERFORM was for the second time in a row selected by the EC as one of the 15 participating projects to attend the European Commission Open Day 2018. The event took place on May 5, 2018. **SMS** and **UNESCO** presented to the 15000 visitors that came to the EC building, showing the busking activities and the tools for innovation in STEM education developed by the PERFORM project. The Open Day was an auspicious opportunity to meet and discuss with representatives' of the EC research and innovation directorate.
- June 14-15th, 2018 (Month 32): **PERFORM Final conference** at UNESCO Headquarters, Paris, organised by **UNESCO** and **EUSEA** in cooperation with the coordination team (**UOC**). The two-day conference provided the opportunity for the PERFORM project to showcase how unconventional means of teaching and learning science, using the dramatic arts, constitute powerful tools to motivate and engage young girls and boys into pursuing science. All partners were involved in the programme, and **UAB, UoB, TRACES, SMS** and **TBVT** had an active role in contributing to sessions or conducting specific workshops. About 400 people attended the event including scientists, students, researchers, and policymakers (find out more details about the conference in Task 6.2).
- July 9-14th, 2018 (Month 33): **ESOF – Euroscience Open Forum 2018**, Toulouse. **UNESCO** chaired the session 'PERFORM: a case study of public engagement' in which **UoB** presented the results of the project related to the teachers training toolkits and **UAB** presented results of the evaluation related to the interaction of ECRs in the project through the presentation "What is left of the PERFORM experience?"
- October 22-24th, 2018 (Month 36): **Open Science Forum for Latin America and the Caribbean (CILAC)**, Panamá**.** Together with **TBVT**, **UNESCO** organized a thematic session dedicated to PERFORM during the last edition of the CILAC. In its 75 minutes, the focus of the session was to outline the effects of the use of the PERFORM methodology in engaging students in STEM. In this framework, **TBVT** performed a live performance on stage. **TBVT** also conducted a workshop titled "Workshop for raising scientific aspirations in youth through the values embedded in the Responsible Research and Innovation and the Societal Challenges" based on the protocols developed in Task 2.2. Education policy makers from several countries of Latin America were invited to take part in the session.

Besides these conferences, and in order to maximize the policy impact of the PERFORM project in the challenging times of transition between the funding frameworks HORIZON 2020 and HORIZON Europe, **EUSEA** offered to conceptualize and organize a **PERFORM policy workshop** in Brussels, in September 24th, 2018 (Month 33). This one-day workshop brought together 13

experts from the PERFORM Consortium (**TBVT, SMS, TRACES, UNESCO**) and the European Science Engagement Association, **EUSEA**, as well as **Scientix** representatives. During the workshop the participants: i) reflected the project outcomes of the PERFORM project in the context of recent developments in the fields of Public Engagement, Open Science, Science Education and Science Communication; ii) developed contents for a PERFORM Policy Brief addressing political stakeholders on EU and national levels; iii) gave recommendations based on the project results concerning the upcoming funding framework HORIZON Europe, iv) discussed the taking-up and distribution of results beyond the project's timeline. The day after the workshop **EUSEA** offered all participants an opportunity to join the "Science is wonder-ful"-event at Brussels Parliamentarium, showcasing the European Researchers Night 2018 – a good opportunity to get in touch with stakeholders from the EC. As a result of this workshop, **UNESCO** with the support of **EUSEA** agreed to work on a position paper directed to policy makers, including those at the EC, as described below.

Also, during September and October 2018 (Month 35 and 36) **UNESCO** continued to present and promote PERFORM among its network of member states, in the same vein as the series of meetings already undertaken with the African, Asian and Pacific groups as well as the Latin America and the Caribbean group. PERFORM was presented to Electoral Groups I and II, which include all the European countries and North America. The presentation was warmly welcome. The member states enthusiast about the PERFORM concept. Furthermore, some of them requested a bilateral meeting to know more about PERFORM and myPERFORM.

To set-up the preparation of the policy briefs for D5.2, in April 2017 (Month 18) **UNESCO** shared with the consortium the latest UNESCO analytical policy tools and indicators. The information shared with the consortium aimed at providing **the necessary tools and literature in order to conceive the most effective toolkits for students and teachers**. The folder shared was divided in 4 subfolders.

1. STEM Education in UNESCO, presents UNESCO vision and strategies to engage young people into STEM.
2. Series of Books & Publications, focusing on the latest research findings studies in the field of Science Education.
3. Statistics & Policy, gathering figures and numbers on the status of science and Science Technology and Innovation (STI) in the world including Europe.
4. Gender, Girls & Women in Sciences, focusing on gender issues and ongoing initiatives to engage girls and women in science.

During July and August 2018 (Month 33 and 34) **UNESCO** wrote two policy briefs, offering recommendations on how to include ECRs and teachers in new, PERFORM-inspired educational processes to motivate and reflectively engage young people in science. These policy briefs were included in **Deliverable 5.2 "Two policy briefs on WP5 related topics"**, a document peer-reviewed by **UOC**, **UAB**, and **UoW**, and timely submitted by **UNESCO** in August 2018 (Month 34).

These policy briefs were informed by WP3 and WP4 internal evaluation reports provided by **UoB** and **UAB** to support policy development. PERFORM found that both ECRs and teachers played crucial roles in the framework of the project. When interacting with young people in performance-based science education workshops, PERFORM found that ECRs helped to challenge young people's stereotypes about scientists, showing that people of all genders and ages are and can be scientists. They were also able to bring some key RRI values into young people's frameworks, raising the wider questions relating to science and research. The role of teachers, on the other hand, was found to be crucial to help facilitate PERFORM processes, and to tailor workshops to specific schools and their science curricula. **UNESCO** thus recommended that European policymakers should encourage higher education institutions to provide programmes of professional development for ECRs, which include training on communication, performance,

reflexivity and RRI, and to include these elements in teacher-training curricula. Additionally, UNESCO recommended that European policymakers should establish networks and official channels of communication to facilitate and encourage interactions between teachers in secondary schools, ECRs at higher education institutions, and science communicators, and to more generally encourage and promote the use of performance-based teaching methods in school science curricula.

In October 2018 (Month 36) **UNESCO** prepared a **position paper** based on these policy briefs and other PERFORM findings to disseminate these recommendations across all 195 UNESCO Member States, and share it with its Education Sector to ensure, in line with the strategy adopted in the PERFORM sustainability plan, that all ministries of Education and their related senior officials receive the policy recommendations developed by the PERFORM project.

After the end of the project and beyond October 2018, **UNESCO** will keep on advocating and promoting the benefits and findings of the PERFORM project amongst its network of Member States and during high level policy makers gathering in the field of science education and communication.

1.2.6 Work Package 6 (WP6): Dissemination and Outreach

As leader of WP6, **EUSEA** coordinated a co-creative process to disseminate and communicate the project's finding and results. A range of online and offline communication activities was developed, aiming to enhance the impact of the messages, recommendations and tools generated by the PERFORM project.

The dissemination and communication of the project progressed during this reporting period together with the relevant goals of the first period (i.e. broaden the consortium connections with other networks such as ECSITE, European Researchers' Night, and EC Open Day organizers as well as the Beijing Association for Science and Technology at continental and global level).

As stated in Task 5.2, the initial actions to organize and document the **final conference of the project** were taken by **EUSEA** and **UNESCO.** The consortium strengthened this action to consolidate and broaden the international network of relations with different stakeholders.

In sum, during the reported period efforts and actions were developed to enhance the dissemination and outreach impact along three lines:

- Online actions shared via social media and publication of articles in project newsletters directed to different communities of interest.
- Participation in national and international meetings in order to broaden the community of stakeholders interested and connected with the project.
- Development of the PERFORM Final Conference structure, content and the dissemination of information about this conference both offline and online.
- Production of marketing material: Toolkits' dissemination poster and white board animation.

Task 6.1 Communication Plan and Tools

Based on the target audiences identified in the communication plan developed by **EUSEA** (D6.1 Plan for communication, dissemination and exploitation) in Month 6, a set of actions were developed during this second reporting period.

The production of specific communication materials was promoted together with a collaborative use of PERFORM social media (namely Twitter and Facebook) that led to the following results:

- **Production of 36 videos** (of a total of 42 throughout the 3 years of the project) available on the PERFORM YouTube channel describing some of the main features of the project and some

of its preliminary results. Videos were produced by **SMS**, **UOC** and **TBVT** based on the suggested editorial guidelines and objectives identified and discussed jointly with **EUSEA**:

- 1 video developed by **SMS** and **UOC** in February 2017 (Month 16) shows an example of trainings with students (available at https://www.youtube.com/watch?v=jHwmufejufs&t=15s).
- 1 video developed by **UOC** in April 2017 (Month 19) present the talk delivered by UOC colleague Karla Berrens on May 31st, 2017 in Barcelona and awarded with the title of the best presentation in the event organized by **UOC** (available at: https://www.youtube.com/watch?v=6mIyJ5HoMV4).
- 1 video developed by **UOC** describing the data management in the open source library approach (edited in April and May 2017, Months 18 and 19) (available at: https://www.youtube.com/watch?v=gQgSqAdNjS8).
- 11 videos produced by **TBVT** between May and September 2017 (Months 19 - 23) to explain the main features of the exploratory workshops conducted with the students to generate the expert PERSEIAs. These videos are part of the **user-friendly version of the Deliverable 2.1**, for which **TBVT** designed a strategy for the promotion and dissemination of these through the TBVT social networks and it is also available at the PERFORM website (see Task 2.1). The videos introduce the workshops structure and guidelines and are linked to a complete document in the PERFORM website. One blog entry was published in the **TBVT** blog and one MailChimp e-mail entry was sent to the **TBVT** e-mail base data contacts (more than 5000 contacts).
    - https://www.youtube.com/watch?v=XR5unZi0Dv8
    - https://www.youtube.com/watch?v=9A85sou733g
    - https://www.youtube.com/watch?v=FXInWciggfI
    - https://www.youtube.com/watch?v=_e1_s__cEiw
    - https://www.youtube.com/watch?v=O4XIvOuo0DI
    - https://www.youtube.com/watch?v=JEPFo0N0lug
    - https://www.youtube.com/watch?v=TDzhU_3xaVA
    - https://www.youtube.com/watch?v=OD-KhY4qL3g
    - https://www.youtube.com/watch?v=SLN4YAfbH_s
    - https://www.youtube.com/watch?v=mOCwC4828TY
    - https://www.youtube.com/watch?v=aSWVVrleSmo
- 10 videos produced by **TBVT** between January and September 2018 (Months 27 to 35) for the **user-friendly version** of D2.2, in order to facilitate its use and replication by other stakeholders (see Task 2.2). The videos were uploaded in the YouTube channel and website of the PERFORM project. **TBVT** also disseminated these videos through its social networks webpage, including blog and MailChimp e-mail entries sent to the **TBVT** e-mail base data contacts (more than 5000 contacts).
    - https://www.youtube.com/watch?v=3FbHyiuyIlc
    - https://www.youtube.com/watch?v=UOSh6Q9Iw78
    - https://www.youtube.com/watch?v=zrkt7r6dQ9s
    - https://www.youtube.com/watch?v=LD-yTjDaKbM
    - https://www.youtube.com/watch?v=NHjvcgqUf48
    - https://www.youtube.com/watch?v=sDSC8OBRiA8
    - https://www.youtube.com/watch?v=ozJyaKlb_Y8
    - https://www.youtube.com/watch?v=xj6Pavs8uCs
    - https://www.youtube.com/watch?v=-6nY70A04Y0
    - https://www.youtube.com/watch?v=be6eK3xVUb0
- 5 videos "Meet the scientist" for the PERFORM toolkit for teachers. These videos introduce students to scientists from across Europe who are in the early stages of their careers.

- https://www.youtube.com/watch?v=Wzr_W8-1OPg
- https://www.youtube.com/watch?v=7Vi_7fxhSHM
- https://www.youtube.com/watch?v=clJRU6l-iRU
- https://www.youtube.com/watch?v=nYbxTSyZMRQ
- https://www.youtube.com/watch?v=5q2Zs9PR5xA

- 4 videos for the PERFORM toolkit for Early Career Researchers (ECRs).
  - https://www.youtube.com/watch?v=xIk5tLTZdKE
  - https://www.youtube.com/watch?v=mVNm8dzi4Ic
  - https://www.youtube.com/watch?v=juaeuPFZUzo
  - https://www.youtube.com/watch?v=hXPnRAendRA&t=10s

- 3 videos produced by **EUSEA** in August 2018 (Month 34) summarising and presenting the project's approach and success, including individual feedback from students, performers, teachers and ECRs. For these videos, **EUSEA** prepared and conducted **22 structured interviews** with teachers, students, performers, policy makers and early career researchers that were involved in the PERFORM project and with external professionals in the field of science communication and performances **during the final PERFORM Conference in Paris.** These interviews collected a wide set of comments on the relevance of performing arts for STEM education and for science communication. Then, **EUSEA** generated **scripts for the production of these videos** addressed to teachers and ECRs and to secondary school students to provide an overview on the PERFORM results. Based on these storyboards, the **three introductory videos were produced by EUSEA:**
  - "Playing like a Scientist";
  - "Creative Teachers and Researchers Part 1";
  - "Creative Teachers and Researchers Part 2".

Additionally, during the reported period, some of the videos produced in the previous period (M1-M15) were edited following the recommendation of the AB:

- 4 videos produced by **TRACES** and **LAC** which show excerpts of the clownery approach to the PERSEIAs development (edited in February 2017, Month 16): These videos are now available with PERFORM Youtube subtitles in English.
  - https://www.youtube.com/watch?v=G-enLa6cYYM
  - https://www.youtube.com/watch?v=R9a8oWA6vFc
  - https://www.youtube.com/watch?v=-3ERyZ2-R6A
  - https://www.youtube.com/watch?v=T9QJnlVbzcI

- The **PERFORM Twitter and Facebook** accounts were directly curated by **EUSEA**, who also promoted a collective use by the consortium members developing and distributing **guidelines for social media use**. Followers and activities considerably increased around the period of the final conference in May and June 2018 (Months 31 and 32 In October 2018, the number of **followers on Twitter was 551** (as at 22 October). PERFORM has **706 likes on Facebook** (as at 22 October) Particularly, PERFORM social media were greatly used to promote the PERFORM conference contents together with other contents related to: RRI, STEM (among the other the STEM Discovery Week held in April 2018 was promoted through the Online PERFOMR media) and Science Communication at large. **UoW** and **UOC** produced and communicated Twitter content about the project, including during the PCST 2018 conference, and re-tweeted content from the project feed. Also, **TBVT** promoted the use of PERFORM-Instagram during the first reporting period. In October 2018 (Month 36) the Instagram channel counted 30 published posts and 104 followers (as at 22nd October 2018).

- The **PERFORM website** will be fully accessible but frozen for further updates on December 2018. All Social Media accounts will be updated until this date as well. The hosting of the website will be in **EUSEA** hands for 2019 and after this year **UOC** or **UNESCO** will host it. The project exploitable resources will be shared via embedding the website link in the consortium

partners own website and by using the hashtags #performingartsandsciences and #performstem.

- **Launch of four PERFORM newsletters** available at the PERFORM webpage:
  - First PERFORM newsletter, March 2017 (Month 17). **EUSEA** developed editorial actions defining the structure and topics of the newsletter jointly with **UOC**, assigning the articles to **TBVT, SMS, Traces, AJA, UAB, UoB, UOC, UoW** and **UNESCO** who wrote them, editing the articles and disseminating the newsletter through the web-platform. All the partners took part in the writing process of the newsletter focusing on specific topics related to their role and tasks within the project.
  - Second PERFORM newsletter, January 2018 (Month 27). **EUSEA** developed editorial actions and prepared the 6 articles taking into account the information collected by all the partners and the data presented both in the internal report and in the deliverables. The newsletter was disseminated through the standard PERFORM project mailing list and with the support of the **EUSEA** network mailing list.
  - Third PERFORM newsletter, August 2018 (Month 34). **EUSEA** developed editorial actions and prepared the 4 articles during the month of June and July. The third perform newsletter included reflections on the teachers training methods developed by the **UoB**, the summary of the results of the PERFORM final conference and the reflection on the use of creativity to innovate STEM education. Moreover, the publication about gender issues and STEM education produced by the project and published on **Scientix** were featured.
  - Fourth PERFORM newsletter, October 2018 (Month 36). **EUSEA** developed editorial actions to prepare this last newsletter during the last month of the project to summarise and disseminate the main outcomes and results of PERFORM. It was delivered during November 2018, and it includes the main outcomes of the Final Review Meeting, and news regarding PERFORM legacy: toolkits, policy briefs and dissemination materials.
- PERFORM featured in the **Scientix Newsletter** – February 2018 (Month 28) Issues dedicated to "Girls in STEM". The article was connected to the contents discussed by the PERFORM team (**UNESCO** and **UOC**) during a networking event organised by Scientix in December 2017 about gender and innovation in STE(A)M education, in collaboration with the EU funded GEDII projects.
- PERFORM featured in the **EUSEA** periodical newsletter trough two articles: one in December 2017 (Month 26) and the other one in March 2018 (Month 29). The two articles focused on the main results of the project and on the announcement of the PERFORM Conference respectively.
- **UOC** released a communication campaign by means of videos with the PERFORM coordinator interviewed in Barcelona (Spain) in February 2018 (Month 28).
- **UNESCO** in cooperation with **EUSEA** and **UOC** developed a two-page flyer and an electronic banner of PERFORM that was uploaded at the PERFORM website to support common efforts in advertising the PERFORM final conference.

Task 6.2 Building the community relations and outreach

During this reporting period **64 main outreach events** (45 international and 19 national) were attended by **UOC, UAB, UoB, UoW, TBVT, TRACES, SMS, UNESCO**, 3 of which led by **EUSEA**, who worked on submitting proposal, organizing and convening sessions on some of the main European science engagement conferences in Brussels, Leuven and Porto in May/June 2017 (Months 19 and 20). These outreach events where selected and attended to reach the target audiences previously identified by **EUSEA** in D6.1 both at national level (countries where the consortium partners are based) and at European level.

Moreover, networking activities were developed during the last months of this period by **UNESCO, UOC, TBVT, UoW** and **EUSEA** that led respectively to the presence of the PERFORM project into several international relevant contexts on science education and communication (see also Task 5.2).

Listed from the oldest one, the **outreach events** attended by PERFORM partners during this period are briefly described below (a full list of the event is published on the PERFORM website events section):

- 2017, April 23rd, II Neuroeducation International Seminar, Girona (Spain). **TBVT** presented PERFORM preliminary results and gave a short talk about the relationship of education and emotions in the context of PERFORM project.
- 2017, May 3rd, European Researchers' Night Coordinators' Day, Brussels (Belgium). **EUSEA** presented the training opportunities for early career researchers under development in the PERFORM project during the session at Directorate-General for Education, Youth, Sport and Culture.
- 2017, May 6th, European Commission Open Day, Brussels (Belgium). PERFORM was selected by the EC as one of the 15 participating projects. **SMS** and **UOC** presented the busking activities and the format for innovation in STEM education developed by the PERFORM project.
- 2017, May 16th, 2nd Homo scientificus europaeus Meeting, Barcelona (Spain). During the session on RRI and participative science **TBVT** presented the PERFORM project achievements.
- 2017, May 29th-30th, EUSEA Annual Conference, Leuven (Belgium). **EUSEA** and **SMS** developed a workshop to present the PERFORM project and experience the meaning of participation in the development of STEM-based performances. The workshop included stakeholders from the science communication field from all over Europe.
- 2017, May 31st, UOC Reseach Schowcase, Barcelona (Spain). A presentation in a TED talk style of the PERFORM contents and structure to the **UOC** Research Showcase was delivered by **UOC.** The presentation was awarded the first prize. Participation of **UOC** as speaker in a panel session on Open Data.
- 2017, June 27th, PESO (Public Engagement with Science Online)-A Research Workshop of the Israel Science Foundation, Haifa (Israel). **UoW** presented the preliminary results of the evaluation of the social media-based impacts of the performance events on young people's engagement in science.
- 2017, June 16th, ECSITE Annual Conference, Porto (Portugal). A session with the title RRI: new collaborations for science communicators and researchers was developed and held by **EUSEA, SMS** and **UOC.**
- 2017, July 8th, V International meeting SRUK (Society of Spanish Researchers in the United Kingdom), London (UK). **TBVT** took part into a roundtable on science engagement and presented a monologue titled Brain and epigenetics.
- 2017, July 11th, International University Menéndez Pelayo, 'The challenge of science: a look at international assessments', La Coruña (Spain). **TBVT** presented the PERFORM Project D2.1 related outcomes.
- 2017, July 19th-21st, The Big Event, Newcastle-Upon-Tyne (UK). **SMS** presented excerpts from busking sets developed during the PERFORM project to professionals in science communication. The goal was to enhance the participatory approach of new science busking activities under development in the PERFORM project.

- 2017, August 25th-28th, 4th Shanghai International Popular Science Products Expo 2017, Shanghai (China). **SMS** presented the PERFORM project preliminary results and outcomes during the event jointly organized with **EUSEA**.
- 2017, September 22nd, Barcelona Peptide Therapeutics Symposium 2017. International symposium where **TBVT** presented the PERFORM Project to the audience, with a high proportion of ECRs, with the possibility of joining PERFORM Task 2.2.
- 2017, September 26th-27th, Science is Wonder-ful, Brussels (Belgium) and 29th September, Paris (France), Valladolid and Madrid (Spain) European Researchers' Night. **SMS, TBVT** and **TRACES** were all involved in the development of shows and activities in different locations where the European Researchers' Night was held.
- 2017, October 2nd-4th, LabSchoolNetwork, Paris (France). **UAB** and **UOC** participated in the conference titled "Colloque Le Bien-être dans l'éducation to introduce a reflection on the potential of arts-based methods for inclusive science education.
- 2017, November 2nd-3rd, RNK (Training of Science Communicators), Belgrade (Serbia). The **AJA** team delivered a training for science communicators also based on the participatory methods developed and studied in the PERFORM project. The event had a national dimension. The main stakeholders involved were young researchers and communicators.
- 2017, November 7th-11th, World Science Forum, Dead Sea (Jordan). UNESCO, SMS and UOC took part into the event presenting a session on the innovation in education through the performing art as experienced in the PERFORM project. The context allowed to present the PERFORM results to policy makers and scientists from all over the world and to start promoting the PERFORM Conference. The event is relevant to enhance the visibility of the project among policy makers, scientists and communicators.
- 2017, November 8th-10th, Foz doIguacu (Brazil). **UoW** delivered a plenary presentation and workshop at the 1º Simpósio Internacional de Conservação Integrada that included methodological know-how and example findings from the impact assessment work package of PERFORM. The audience for these activities included approximately 350 practitioners and policymakers, primarily from Brazil.
- 2017, November 15th-17th, Beyond the Obvious Conference, Rome (Italy). **EUSEA** and **SMS** took part into this international event dedicated to cultural strategies in Europe which is organised every year by the Culture Action Europe Association, a network of artists and professionals in the field of culture. **SMS** presented example of innovation in science education among which the PERFORM project features and outcomes. European cultural stakeholders were the majority of the participants involved in the conference. The event was relevant to increase the interdisciplinary connection of the project with performers and other artists or cultural stakeholders that are interested in the results of the PERFORM project.
- 2017, November 18th-19th, Educere Network Meeting, Oxford (UK). **UOC** and **UAB** took part into the Inaugural event of this network, an international event gathering scholars, practitioners and policy-makers working in the fields of education, wellbeing and environmental sustainability from the Educere and Educare Network (Oxford Department of International Development, University of Oxford). The PERFORM approach was presented in the event through the implementation of a workshop.
- 2017, November 23rd-24th, Congreso de Comunicación Social de la Ciencia, Cordoba (Spain). **UOC, UoB, AJA** and **UAB** took part into the VI Congress of Social Communication of Science delivering a presentation focused on the key aspects of the PERFORM training to early career researchers and the particular experience in Barcelona.

- 2017, November 29th-30th, II Jornadas #RSU: Un diseño universitario para la responsabilidad social¨, Castelló (Spain). **UOC** presented an oral talk entitled ¨Bridging the gap between RRI theory and practice" at this event in which the online training course for ECR resulting from PERFORM project was advertised.
- 2017, December 5th, 12th Scientix Projects' Networking Event (SPNE12), Brussels (Belgium). **UNESCO** and **UOC** together with Scientix coordinated the organisation of this event with Scientix, a one-day meeting with projects members involved in innovation in education processes and EU funded projects. The workshop was focused on Gender and Innovation in STE(A)M Education. **UAB** and **UoB** participated as well in the workshop.
- 2017, December 6th-7th, Engage Conference, Bristol (UK). **UoB** took part in a panel discussion on innovation in STEM sharing the PERFORM approaches. The conference session was entitled: 'tackling engagement challenges'.
- 2017, December 7th, SCI:COM conference, Dublin (Ireland) **EUSEA** participated in this conference about science communication in Ireland taking part into a panel discussion were examples of EU funded projects on innovation in science communication were presented among which the PERFORM project.
- 2017, December 13th, European Researchers' Night info day 2017, Brussels (Belgium). **EUSEA** took part during which networking activities aimed at inviting science communicators and other stakeholders to the PERFORM Conference were implemented and the possible link between the PERFORM project and results and the Marie Curie Actions were investigated to be further developed.
- 2018, January 4th, Accessible Learning and Evaluation at the Exploratorium workshop, San Francisco (California). **UoW** contributed with an invited presentation was on designing impact evaluation of informal learning experiences in a way that accounts for diversity and accessibility, including examples from PERFORM impact assessment methodology.
- 2018, January 4th-5th, Association of Science Education (ASE) National Conference, Liverpool (UK). **UoB** representatives presented and delivered an interactive session on PERFORM at the. The **UoB** representatives gave the context for and presented some key objectives of the project and ran short workshop with activities from the teacher trainings including: RRI activities from Kilter and Big Van and requested feedback on teacher toolkit ideas.
- 2018, January 22nd-24th, Feria de proyectos de extensión y taller de evaluación de impacto at the Sede San Carlos at the Costa Rica Institute of Technology (Costa Rica). **UoW** participated in the with an invited keynote presentation on impact evaluation of public engagement with research and workshop on impact evaluation (both in Spanish), including findings and know-how developed through PERFORM.
- 2018, February 2nd, Parque Explora science centre, Medellin (Colombia). **UoW** delivered an invited presentation about impact evaluation of informal science learning, including know-how and example findings from PERFORM impact assessment.
- 2018, February 12th, Programa Argó Presentation Conference, Barcelona (Spain). **TBVT** made a live dissemination Performance at the Programa Argó, based on the PERSEIA developed in Task 2.1 and presented the Toolkit 2.1 in order to assist the students to prepare their reports, assisted by **UAB**.
- 2018, February 19th, Institut de Ciencies de l'Educació de la Universitat Autònoma de Barcelona, Barcelona (Spain). **TBVT** made a Dissemination performance to enrol teachers in the 2nd Teachers' Training to be held in July 2018.
- 2018, April 4th-6th, Public Communication of Science and Technology Conference 2018 (PCST), Dunedin (New Zealand). **UNESCO, UOC, UoW** and **TBVT** took part into the event that brings together academics and practitioners in science communication around the

world so PERFORM took this opportunity to present preliminary results through oral communications, round tables with reflections on practice, and practical workshops and demonstrations.

- 2018, April 10th, RRI practice Consortium meeting at the University of Bristol, Bristol (UK). **UoB** presented Perform as a case study. The event reached 20 international attendees from different countries eg. Brazil, Sweden, Netherlands, Bulgaria, etc.
- 2018, April 12th, La Caixa d'Eines de l'Educació Ambiental al CCCB, Barcelona (Spain). **TBVT** showed PERFORM results through a performance, a talk and a round table with representatives of Educational Section of Diputació de Barcelona, Generalitat de Catalunya Government.
- 2018, April 17th, Swedish Research Council, (Sweden). **UoW** delivered a workshop on impact evaluation of science communication, including methodological know-how and examples from PERFORM impact assessment.
- 2018, April 18th, Forum for science communication, Gothenburg (Sweden). **UoW** delivered a workshop on impact evaluation of science communication, including methodological know-how and examples from PERFORM impact assessment.
- 2018, April 20th, the European Researchers Night Swedish Organisers Meeting, Gothenburg (Sweden). **UoW** delivered an invited presentation on impact evaluation of public engagement events, including methodological know-how and examples from PERFORM impact assessment.
- 2018, April 25th, Bristol Doctoral College and Centres for Doctoral training meeting, Bristol (UK). **UoB** presented PERFORM in a talk titled Experiments in RRI training at this event that reached 20 people responsible for ECR training (and interested in introducing RRI training) at EPSRC CDTs.
- 2018, April 25th, Get Inspired by STEAM education! Webinar organised by the European Schoolnet, Online. **UOC** was invited to make a live and online conference entitled "Lessons from the PERFORM project as a practical example of STEAM" at this Webinar.
- 2018, April 26th. Freudenthal Institute, University of Utrecht, Utrecht, Netherlands. **UoW** delivered an Invited research seminar focused on research methods and findings from the assessment.
- 2018, April 27th. Higher Education Institutions and Responsible Research and Innovation (HEIRRI) second conference, Wien (Austria). **EUSEA** took part into this event on implementing new methods for training in Higher Education incorporating RRI Values. EUSEA presented the most updated results of the PERFORM project and the main topics of the PERFORM Conference planned for June 14th and 15th in Paris.
- 2018, May 3rd-5th. Eu-SPRI Early Career Research Conference (ECC) "Science, Technology and Innovation: New challenges and practices, Valencia (Spain). **UOC** conducted a "workshop on Responsible Research and Innovation" based on the online training on RRI for researchers inspired by the PERFORM training.
- 2018, May 5th. European Commission Open Day, Brussels (Belgium). PERFORM was selected by the EC as a best practice and invited to attend the event (Month 31). **SMS** and **UNESCO** presented the busking activities and on-going results of the PERFORM project.
- 2018, May 16th -17th. ICTA-UAB Spring Symposium, Barcelona (Spain). The **UAB** presented PERFORM's approach merging arts, education and science during an oral presentation entitled '*Science meets Art: an introduction*.
- 2018, May 17th -18th. EUSEA – European Science Engagement Association Annual Conference, Madrid (Spain). A pre-conference session jointly organized by **TBVT** and **EUSEA** was held in Madrid with the participation of 30 participants from China and

Europe to experience some of the methods used during the project workshop sessions with secondary school students. During the conference a session was held to present the PERFORM results and the PERFORM conference in June. At the same event, **UoW** led a pre-conference session delivering training on science communication evaluation including detailed examples from the PERFORM project, as well as delivering a keynote presentation at the conference featuring the PERFORM project methods and results.

- 2018, May 29th. Postgraduate in Biological Sciences, University of Tlaxcala (Mexico). **UOC** conducted a workshop entitled "PERFORM: The potential of arts for science communication and education" to postgraduate students.
- 2018, June 1st. Netherlands Science Communication Student Conference, Nijmegan (Netherlands). **UoW** delivered a keynote presentation featuring the PERFORM project methods and results.
- 2018, June 6th-9th. ECSITE – European Network of Science Centres and Museums Annual Conference, Geneva (Switzerland). **EUSEA** hosted a reverse session to develop dialogue among European projects on Responsible Research and Innovation.
- 2018. June 9th. Barcelona Science Festival, Barcelona (Spain). **UOC** received an invitation of the Barcelona Municipality to present the PERFORM project at the Barcelona Science Festival, and **UOC** together with **TBVT** coordinated the participation of 17 secondary school students from IES Moises Broggi, IES Castellbisbal and IES Consell de Cent in the event, who performed their own shows created within PERFORM activities.

Performances of secondary school students at the Barcelona Science Festival, June 2018

- 2018, June 14th-15th. **PERFORM final conference** tooked place at **UNESCO** Headquarters in Paris (France). The PERFORM consortium developed a two-day conference organised by **EUSEA** and **UNESCO** with the support of **UOC** to present the results of the project (see description below).

Banner advertising the PERFORM final conference

- 2018, June 26th. Unicamp delegation of Brazilian researchers to Cardiff University, Cardiff, (UK). **SMS** presented PERFORM outcomes in this event.
- 2018, July 9th-14th. ESOF – Euroscience Open Forum 2018, Toulouse (France). PERFORM hosted a session where **UNESCO**, **UoB** and **UAB** presented the results of the project related to the teachers training toolkits and the general results of the project.
- 2018, July 14th. Final Conference of European project STAEM, Valetta (Malta). **TBVT** delivered a 1-hour talk about the main results of PERFORM project.
- 2018, July 18th-20th. The BIG Event – BIG STEM Communicators Network, Winchester (UK). **SMS** participated in a skill sharing workshop and disseminated PERFORM science busking experience.
- 2018, August 14th. Physics Institute - Instituto de Física, Universidade de Sao Paulo, Sao Paulo (Brazil). **UoW** delivered an invited lecture on 'Why impact evaluation matters in science and environmental education'. Talk content included a focus on arts-based approaches to science education, specifically presenting methods and results from the PERFORM project.
- 2018, August 14th. 'Inclusive Innovation in Tourism' symposium, Phuket (Thailand). **UoW** delivered invited research presentation including methods and results from the PERFORM project at this event funded by the British Council and co-hosted by the Thailand Chamber of Commerce University and Birmingham University.
- 2018, September 12th. UK Reproducibility Network, Bristol (UK). **UoB** presented PERFORM toolkit at an initial meeting for this new organisation: UK Reproducibility Network, an academic-led initiative to coordinate efforts to improve the quality and robustness of research, and agree the terms of reference of the Network with key stakeholders.

- 2018, September 18th. Campus Gutenberg International Congress, Barcelona (Spain). **TBVT** delivered a 1-hour workshop to an audience of 20 attendants in Cosmo Caixa Science Museum. The workshop focused on how to include the human dimension of science in scientific oral communications.
- 2018, September 19th. Evaluation and impact assessment of dissemination activities Course, delivered at Pompeu Fabra University, Barcelona (Spain). **UoW** delivered one-day workshop on impact evaluation, featuring PERFORM project methodology and research findings.
- 2018, September 21st-22nd. II Congreso International de Innovación Educativa, Zaragoza (Spain). **TBVT** presented PERFORM methodologies through a workshop in this conference.
- 2018, October 19th. Young Researchers Programme, Bath University, Bath (UK). **UoB** led a Thinking Science Training session using PERFORM toolkits.
- 2018, October 11th-12th. NUCLEUS final conference, Valletta (Malta). **UoB** presented a poster with the PERFORM toolkit resources.
- 2018, October 22nd-24th. Foro CILAC, Panama City (Panama). **TBVT** implemented a three-day workshop and delivered a Plenary Session of 1 hour on the main results of Perform project with the Sustainable Development Objectives of the United Nations. Together with TBVT, UNESCO organized a thematic session dedicated to PERFORM during the last edition of the CILAC. In its 75 minutes, the focus of the session was to outline the effects of the use of the PERFORM methodology in engaging students in STEM.

Furthermore, **UOC** led two **TV appearances** of PERFORM. In March 2017 an overview of the PERFORM project was released on Terrassa Television (a Spanish TV channel) on the news (from min 9:45): https://www.youtube.com/watch?v=1z9xKpEkcpY. In April 2018, Isabel Ruiz-Mallén presented the PERFORM project and its main results at the Catalan public TV, TV3, Science Capsules program: https://www.youtube.com/watch?v=7onxSACxMY8

The organisation of the PERFORM final conference was a key dissemination action conducted during this period. In November 2017 (Month 25) **EUSEA** and **UNESCO** started with the preparation actions. First, the conference webpage was launched on the PERFORM website. Next, a series of actions were implemented to start promoting the conference in the context of the national and international meetings listed above and thorough the online media considered in the communication plan. In parallel, starting from December 2017 (Month 26) a series of meetings both, in person and via Skype were constantly held with the CT (**UOC**) and WP leaders (**TBVT, UAB, UoB, UNESCO, EUSEA**) to define the contents of the sessions and the role of the PERFORM stakeholders participating. Further meetings were also organised by **EUSEA** and **UNESCO** with **UOC** to follow up the process. In February 2018 (Month 28) the registration process to the conference begun. From February to May 2018 (Months 28 to 31) the actions to involve different stakeholders' communities were developed by identifying and inviting other European-funded projects to join the PERFORM conference and developing specific actions to maximize the effectiveness of contents' presentations during the conference.

The final PERFORM project conference was held on the 14th-15th of June 2018 in Paris at the UNESCO Headquarters. It was attended by 400 participants from 24 countries, among them 150 students from secondary schools and 50 UNESCO delegates (see **final programme**).

The first day started with three performers with a very diverse background who engaged more than 400 people in the audience with their speeches about the curiosity and openness as key tools to interpret the world, the power of stories to learn science and technology and the need for recognizing and dismantling gender stereotypes in science and technology: the comedian and radio speaker Robin Ince, the youtuber Léo Grasset and the medical doctor and communicator Ana Peiró One special. **UAB** displayed short presentations on the key results from the project evaluation in-between the presentations of the invited performers. A couple of students, teachers

and ECRs from the different case studies who had participated in PW shared their experience and learning with the audience. This morning session was hosted by the science journalist and communicator Quentin Cooper. In the afternoon, **TBVT, TRACES** and **SMS** ran a workshop on successful examples to implement Stand Up Comedy, Busking and Impro theater with young people to talk and reflect about STEM and the values embedded in RRI. **UoB** also contributed a panel discussion with 3 ECRs, one from each participating country, and 3 representatives from **AJA** and **UOC**, which highlighted key points of learning from the unique training programs that were developed for ECRs, introduced to creative approaches to public engagement and explored RRI values and how they relate to the various individual professional practices that were represented on the panel. Finally, and to promote networking among European projects, **EUSEA** hosted a panorama talk "Innovating STEM Education in Europe" with representative of Scientix and other European projects such as Xplore Heath, Hypatia, Edu-Artic and Compass.

The second day of the conference started with a live poster session aimed to showcase 10 innovative projects on science education. Afterwards, four special training sessions were delivered for students and teachers. **TBVT**, **SMS** and **TRACES** ran three workshops addressed to students and teachers to create their performance-based science education activities at their schools. **UoB** ran an interactive workshop for an international cohort of 12 teachers that introduced key concepts explored during PERFORM training for teachers. **UNESCO** and **EUSEA** closed the conference, and gathered feedback from participants through an online survey.

PERFORM final conference at UNESCO Headquarters, Paris, June 2018

EUSEA prepared a complete description of the PERFORM final conference preparation process and implementation that is included, together with a report of the other dissemination activities, in **Deliverable 6.3 "Report on outreach activities, including the final conference".** This deliverable was initially scheduled in September 2018 (Month 35), which made not possible to include all the outreach activities conducted within the three years of the project, so **EUSEA** with the support of **UOC** asked for one-month extension of the deadline and the EC PO approved it. After being peer-reviewed by **UNESCO**, **TBVT** and **UOC, EUSEA** submitted D6.3 to the participant portal in October 2018 (Month 36).

1.2.7 Work Package 7 (WP7): Ethics requirements [Months: 1-36]

No further activities have been developed during the reported period.

1.3 Impact

Over the reported period (Month 16 to 36) an increase was observed in all the PERFORM online communication channels.

Twitter, as anticipated, highlighted a constant trend to increase the number of followers reaching **the number of 551 followers** (22nd October 2018), as showed in Figure 1.

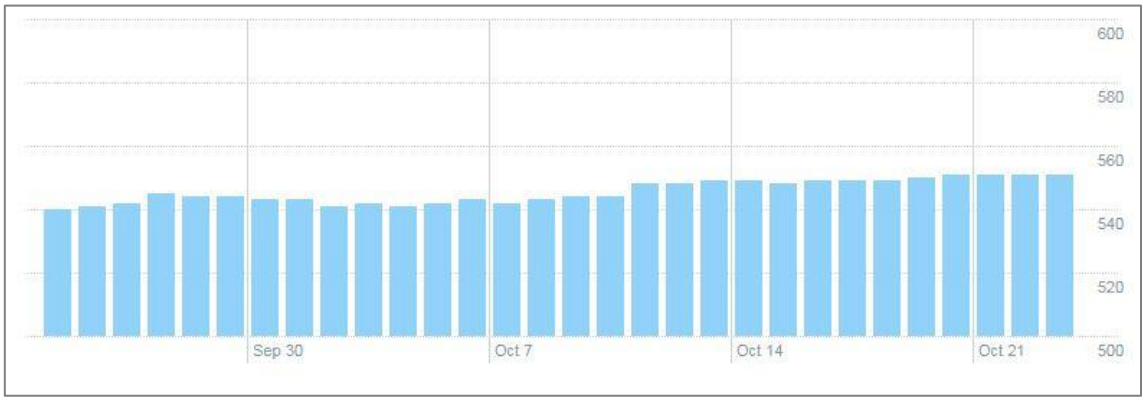
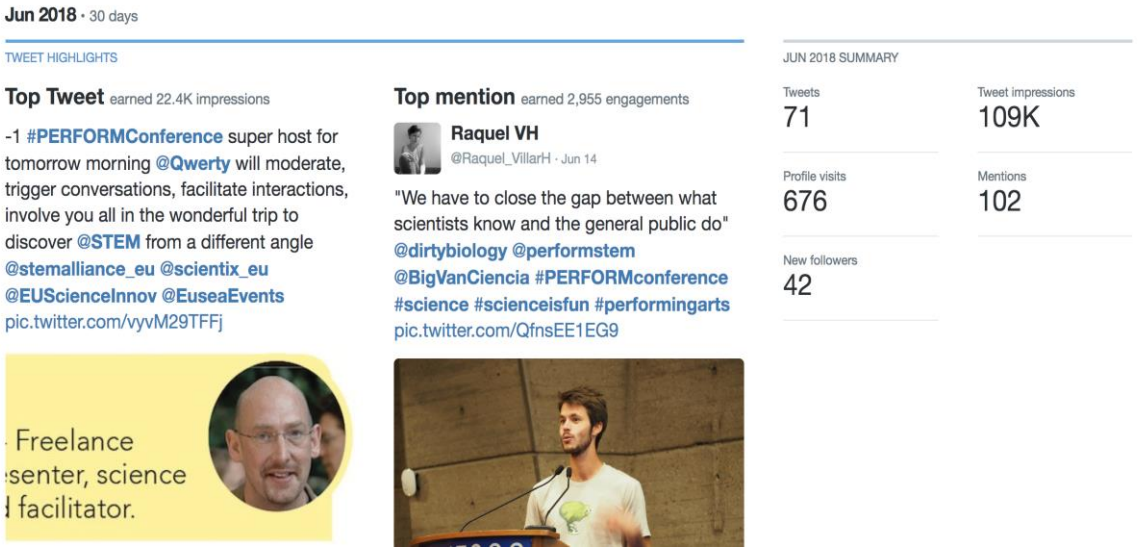
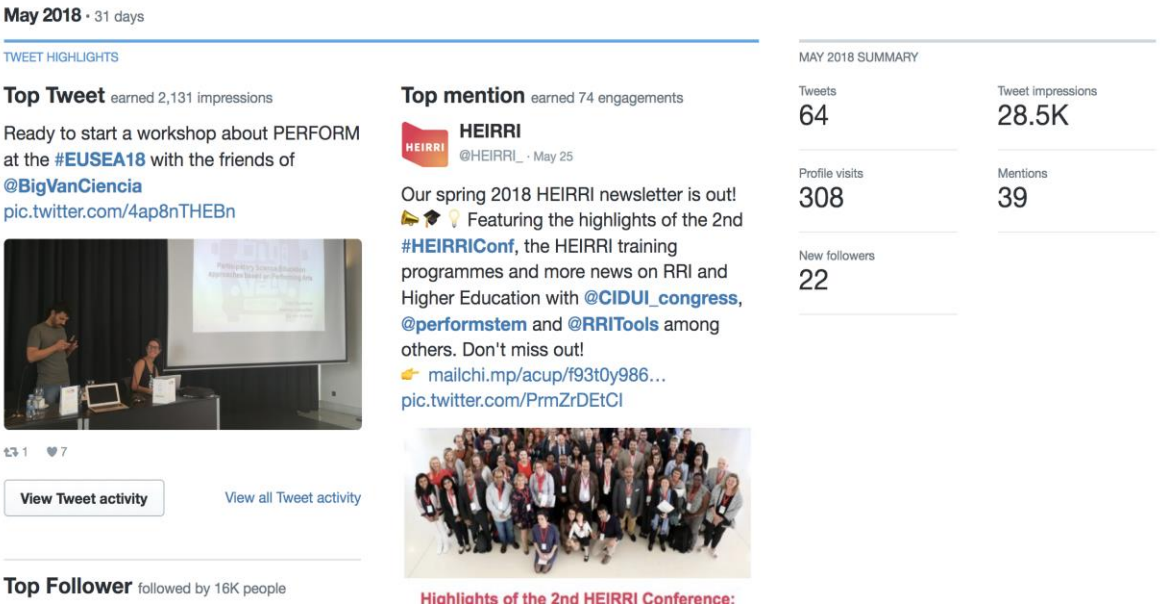


Figure 1. Number of Followers at the end of PERFORM Twitter (month 36).

From May to July 2018 (Months 31 to 33) an increase was observed in all the online communication channels, most probable due to the PERFORM final conference. The Twitter account figures before and during the conferences showed a positive trend. The images below report some data related to this traffic in May and June 2018.





In turn, the PERFORM **Facebook** likes also reflected an increase in followers of the Facebook page of the project that reached **706 *likes*** in 22nd October 2018 (Figure 2).

More in detail, there was a relevant increase in May 2017 (Month 19) during the period around the European Researchers' Night Coordinators day and the EC Open Day as well as in October 2017 (Month 24) after the publication of the videos on the toolkits for the teachers and ECR (Figure 3).

Also, in January 2018 (Month 27) there was a relevant increase that might be due to the launch of the second PERFORM newsletter, as seen on Figure 4.

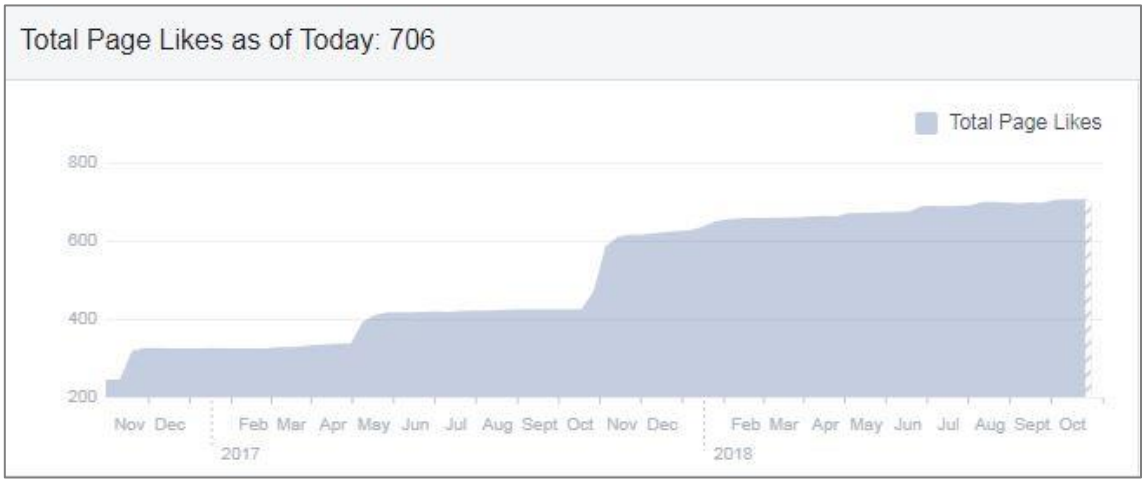


Figure 2. General trend of "*likes*"-number on the PERFORM Facebook page M16-36.

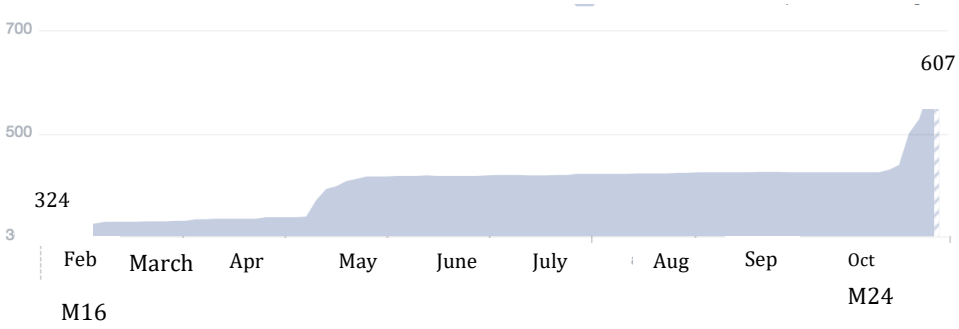


Figure 3. General trend of ¨*likes*¨number on the PERFORM Facebook page M16-24.

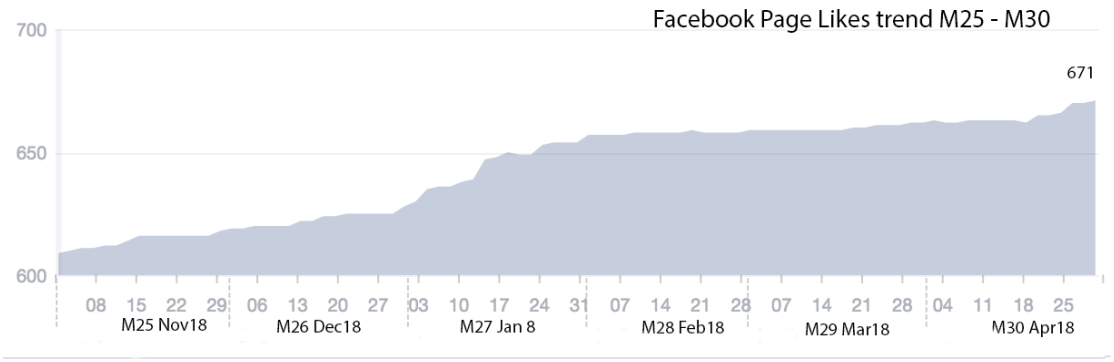


Figure 4. General trend of "*likes"* numbers on the PERFORM Facebook page M25-30.

Website data showed that between February 2017 and October 2018 (Months 16 to 36) **8.287 users** were actively consulting the information published, corresponding to **13.219 sessions**.

The number of users showed its peak during the PERFORM final conference with **1.051 users** accessing the website during the month of June 2018 (Figure 5). Among the visitors accessing the website over **two third were new visitors** (Figure 6). The average duration per session was **2:26 minutes** (Data as at October 24th, 2018).

Figure 5. Trend of the users of the website from February 2017 – October 2018 (M16-36).

Figure 6. New visitors and returning visitors on the PERFORM website.

The average duration per session is lower than expected (less than 3 minutes) because most of the visitors only got into the webpage to download the programme of the conference and many of the videos and resources generated by the project were uploaded by the end of October and advertised beyond the life of the project (November 2018).

2. Update of the plan for exploitation and dissemination of results (if applicable)

The plan for the exploitation and dissemination of the project results led by EUSEA as Deliverable 6.1 in February 2016 (Month 4) was not updated during this reporting period.

Nevertheless, the PERFORM consortium put more effort than the originally envisioned in the plan to promote and disseminate the project results through producing a set of videos based on the direct testimonies of participant students, teachers and ECR, and a whiteboard animation and a project poster that introduce the project to external stakeholders by illustrating main results and outcomes.

3. Update of the data management plan (if applicable)

The Data Management Plan (D1.4) was updated in p.18 to clarify the type of intellectual property licence of the deposited data, as follows: "More specifically, deposited data will be attached to a **CC-BY PERFORM licence**, which allows re-distribution and re- use of the licenced work on the condition that the creator is appropriately credited (https://creativecommons.org/licenses/by/4.0/)".

Moreover, the Data Management Plan (D1.4) was updated in p.19 to clarify the preferred open access scheme for publication, as follows: "Articles will be published in open access according to a **green open access scheme**, as defined in the Guidelines on Open Access to Scientific Publications and Research Data in H2020".

4. Follow-up of recommendations and comments from previous review(s) (if applicable)

During this period WP leaders worked on addressing each of the main recommendations from the previous review as follows:

#1. The project website should be more developed, and it should be more attractive for final users. Videos on the website should give more time for the students' feedbacks on the events they have participated and impacts they have received

In a coordinated effort, **EUSEA** and **UOC** further developed the project website to address this recommendation. The homepage was redesigned to make it more accessible to audiences with no relation or knowledge of the project. New videos, an animation and toolkits were produced by **EUSEA, UoB** and **TBVT** and included.

In particular, the videos focused on showing the students' active involvement and PERFORM experiences at schools by including individual feedback from participant students, performers, teachers and researchers who were interviewed while addressing teachers, researchers and stakeholders from science education and communication as the main target groups to take up the project's results. Examples of such videos are the following:

- The video "Playing like a Scientist" was developed for the project's homepage to give students a voice at the entry of the project. **Video: *Playing like a Scientist*** https://www.youtube.com/watch?v=VdVycen9qPw
- Two videos on "Creative Teachers and Researchers" focused on these two main target groups. **Video: *Creative Teachers and Researchers Part 1*** https://www.youtube.com/watch?v=V6fU9kgwgXA; **Video: *Creative Teachers and Researchers Part 2*** https://www.youtube.com/watch?v=YDGT6-LFj0s&t=6s

#2. The project should enhance application of social networks to reach the pupils and promote STEM education among youngster

Partners involved in the development of the activities with students (mainly **TBVT, SMS and TRACES**) intensively encouraged the use of social media among pupils during the development of the activities. Although the preliminary impact assessment showed relevant enthusiasm of the students while doing the activities, they did not to consider these activities to be "sharable"

through social media among their communities mainly because they were school-related activities, which in general are never shared.

However, an effort was put by **TBVT** to create WhatsApp group with early career researchers and students to collect dialogues that might be of interest and fragments of those conversations might be published on the PERFORM website as traces of the conversation developed during the project highlighting some aspects of the experience done by the students. **TRACES** and **SMS** could not use any social media at school because of regulations on the use of cell phones and social media at schools in UK and France.

In order to reach out young audiences and teachers **EUSEA** started a process to verify whether it was possible to produce short videos with popular Youtubers (namely one Youtuber in Spain and one Youtuber in France). The aim of these short videos should have been to enhance the visibility of the project contents through their contacts. The youtubers that were approached by **EUSEA** were hesitant to include project-related content into their specific videos, since these were only related to their specific scientific approach. Video-productions only for the project would have started at 10000 €. A mere "shoutout" to refer to the project after one of such videos was offered for a sum of 5000 €. In agreement with the project management these costs were considered too high related to the expected output. Instead, it was agreed to focus more on teachers, researchers and stakeholders as multipliers who will work with students in the future. The budget allocated to the Youtubers was directed to produce the 3 videos described above, showcasing the student interviews and experiences plus the involvement of teachers in the PERFORM project.

#3. The final user for the project activities should be more involved (i.e. to address larger number of school teachers)

A series of actions have been implemented to increase teachers' involvement in PERFORM PW, trainings, and the final conference, while improving the quality and relevance of the PERFORM experience for them.

In the three case studies, the teacher's role in the second round of PW in Task 2.2 was given more consideration, resulting in more active involvement: participating within group work rather than just observing and organising details of the final performances. This enhanced collaboration with teachers during these workshops led to a positive relationship with the teachers and their increased engagement.

Regarding the trainings, in Bristol, **UoB** worked with theatre company Kilter to create a second round of teacher training that responded directly to some teacher's concerns (disruptive behaviour, lack of time for these type of activities). For example, the training for teachers was held in a 'science classroom' (instead of a theatre space) ensuring that the techniques we incorporated into the session were short and required no movement around the classroom. Both alterations aimed to build confidence and receptiveness in the teachers and led to a marked difference in attitudes to the potential for integrating these performance techniques into a science class.

In Barcelona, to increase teachers' interest in the training that was implemented in July 2018 (Month 33), **TBVT** advertised it to the secondary schools included in its database (>3000) and to the ones included UNESCO's database. **TBVT** also send invitations to the teachers who had participated in previous PERFORM activities, asking them to act as ambassadors to disseminate the course to their mates. As a result, teachers' attendance increased from 4 of them participating in the first teacher training to 16 teachers in this second training.

In Paris, **TRACES** conducted several actions for increasing teachers' involvement in the second round of PW, both into the process and methodology: the six participant teachers in the PW were invited to participate in regular meetings for the preparation of the PW with the **TRACES** science communicators and performers and the ECRs, including the training for ECR, in order for them to understand better the whole dynamic of the project, to introduce their students and the way they

work with them to **TRACES** team and to better prepare the workshops. Another five teaches participated in the training for teachers organised by **TRACES** in April 2018 (Month 30).

The consortium invited two Spanish teachers and two UK teachers to travel to Paris and represent PERFORM at the final conference in June 2018 (Month 32). 5 French teachers who had been involved in PERFORM activities were also invited to the conference with an active role. **UNESCO**, in turn, invited other teachers and students of two international schools to participate in this conference. The **UoB** workshop 'Perform: bringing philosophy and performance into your science classroom' was attended by 14 participants, mostly teachers, who offered feedback to the training toolkit (D3.2).

Beyond this workshop, and to test out the different elements of the toolkit for teachers (D3.2) and ensure that they appeal to as many teachers across Europe as possible, **UoB** carried out a schedule of consultation with teachers in all three countries. **UoB** attended the Association of Science Education conference in January 2018 (Month 27) and held a PERFORM workshop for science teachers, the final section of the workshop brainstormed 'what teachers look for in a toolkit'. Topics included: where teachers looked for toolkits, what content was particularly valued and what puts them off certain resources. Also, teachers involved in the PWs in both Bristol and Barcelona were asked about the toolkits in March and April (Months 29 and 30). Teachers were shown elements of the toolkit and asked if they would use them, how they would use them and what they would improve about them to make them more usable. In May (Month 31) participants at the PERFORM teacher training workshops in Bristol were asked by UoB for their views on toolkits. In September 2018 (Month 33) a consultation group of teachers from across the project was contacted with a reduced version of the toolkit and specific consultation questions. Also, in September a proposal was submitted by **UoB** and accepted for the Scientix Ambassadors European teacher's network to review the penultimate draft of the D3.2 toolkit for teachers. A cohort of 5 teachers from across Europe each spent one full day reviewing the toolkit and feeding back on usability: specifically on how the resources are framed/explained within the toolkit i.e. is there enough information for teachers to be able to use them in their lessons, do the resources as they stand make sense, would they want to use these resources in their lessons and additional suggestions on how teachers could use the resources in the lessons. Feedback was overwhelmingly positive, and the design and content were deemed usable and effective for use in each of the countries represented by the ambassadors: Greece, Portugal, Spain, Italy and Estonia. No major changes were suggested. But some common feedback points were taken in to account in the final design of the toolkit. Thus, the end user of the toolkit for teachers (D.3.2) has been heavily involved in shaping the design and content of the teacher toolkit, ensuring that it is in a format that teachers are happy to use in their classroom.

Finally, to increase the visibility of the participants' views about PERFORM and to capture attention to the project outcomes, **TBVT** designed user-friendly versions of D2.1 and D2.2 , based on videos with an intuitive and easy-going format (including a video with interviews with the Spanish secondary school teachers participating in the participatory workshops). **TBVT** distributed these tools by e-mail to its database of stakeholders (5000), published it through its social media, **EUSEA** published it in the PERFORM web page and **UOC** uploaded the documents to Scientix and RRI-Tools webpages.

#4. The consortium should develop the contacts with new stakeholders and new final user of the project

The consortium has built up ties with academia and other related teaching institutions or unions, such as:

- Universities: Universitat de Barcelona (Spain), Universitat Pompeu Fabra (Spain), University of Madison (USA), University of Bordeaux (France);

- Research Center: WISERD Education (Wales institute of Education Research at Cardiff University), Centre de Recherche Interdisciplinaire (France), Barcelona Education Consortium (Spain);
- European Network of Teachers: Scientix, European SchoolNet.

UNESCO with its long experience in education and basic science is further disseminating and linking PERFORM within its network of Chairs in Education, Science Education, and within its institutes dedicated to education and science education, such as: Technical and Vocational Education and Training (TVET); The World Academy of Sciences for the advancement of science in developing countries (TWAS); International Centre for Theoretical Physics (ICTP); The European Organization for Nuclear Research (CERN).

UNESCO is disseminating the newly developed policy briefs across all 195 UNESCO Member States through its Education sector. Therefore, these policy briefs will become a leverage tool to involve new stakeholders and increase the number of new final user of the PERFORM project.

#5. The logo of the EU should appear in every publication

The CT at **UOC** ensured strict compliance with this obligation by including the EU logo in each communication led by **UOC**, periodically reminding PERFORM partners about the obligation of including the logo in the communications led by them, and (when possible) supervising that the logo of the EU was included in partners' communications.

For the face-to-face events performed in Barcelona, **UOC** produced a roll-up with the logos of PERFORM and EU flag.

#6. The consortium should think about the sustainability of the project after the EU funding (i.e. to plan the set of smaller-scale project with financial support on the local or national level, in peculiar educational environments)

After completion of the PERFORM project, 'myPERFORM' will be implemented in two different phases. The first phase of the project will consist in training and capacity building activities with and for students, teachers and young researchers in selected countries. In the second phase, myPERFORM Ambassador Program (MAP) will be developed. This program will mainly consist on the fact that trainees will train their communities at national and regional level

The goals of 'myPERFORM' are as follow:

- Expand and adapt the original PERFORM concept worldwide with a particular focus on developing countries;
- Ensure project adaptability in providing tailored project agenda conducive to daily realities and environment of final beneficiaries;
- Foster early scientific engagement by extending the scope of the project towards youth in primary and secondary school education;
- Empower local stakeholders via the myPERFORM Ambassador Programme (MAP) initiative.

UNESCO is actively seeking new donors and partners to allow for the implementation of myPERFORM after the end of current EU funding. Some promising discussion are ongoing and well advance to this end. Furthermore, the sustainability of the project will be ensured beyond myPERFORM given that **UNESCO** representatives will work in close collaboration with the Teacher Task Force and the Higher Education departments of UNESCO to advocate and promote the PERFORM related toolkits for teachers and ECRs; and also, by including some East European countries and by contacting Ministries of Education of different countries as far as possible.

EUSEA will also encourage the consortium to present the outcomes of the project in 2019 EUSEA annual conference, so PERFORM can continue showing its legacy to wider audiences. **EUSEA** and **UNESCO** will also use the contacts' database generated after the PERFORM Final Conference to address the participants individually and invite them to visit the resources generated as an effective way to get users directly to the tools.

5. Deviations from Annex 1 and Annex 2 (if applicable)

During this second and final reporting period, deviations from the DoA were only concerned with the use of resources and consisted on minor adjustments for ensuring an effective management and development of project activities (see section 5.2).

5.1 Tasks

Not applicable in this reporting period.

5.2 Use of resources

The following deviations occurred within this final reporting period to deal with unexpected needs in order to achieve a more effective use of resources. In any case, these deviations endangered other activities:

Transfer of personnel costs between partners:

- In the project intermediate meeting in Bristol in April 2017 (Month 18) the PERFORM GenA agreed in a p-m redistribution in order to address **TRACES** underestimated budget to conduct Task 2.2 and Task 3.3 in the French case study and the corresponding reallocation of responsibility, as follows:
    - **TBVT** transferred 2p-m to **TRACES** (budget transfer: 10.000€ (Personnel cots: 8.000€; Overheads: 2.000€))
    - **UOC** transferred 1 p-m to **TRACES** (budget transfer: 5.000€ (Personnel cots: 4.000€; Overheads: 1.000€))
    - **AJA** transferred 1 p-m to **TRACES** (budget transfer: 5.000€ (Personnel cots: 4.000€; Overheads: 1.000€))
    - **UoB** transferred 0.7p-m to **TRACES** (budget transfer: 3.500€ (Personnel cots: 2.800€; Overheads: 700€))

Transfer of subcontracting to personnel costs:

- In June 2018 (Month 32) **UoW** informed the CT about the need of transferring 12.000€ from subcontracting to personnel costs. The original plan for **UoW** was for appointment of an experienced postdoctoral researcher to work on Task 4.2 (Dr Mireille Mazard). However, Dr. Mazard became unavailable and was not able to contribute as planned. Instead, **UoW** needed to rely on a variety of less qualified staff (research assistants) to achieve the same outcomes. The rate of pay was lower for these less qualified staff, so the budget was still the same. The lower level of productive output per hour means that the number of p-m was inflated beyond the initial plan. This additional time allowed for greater depth, for example, in developing the literature review, translations, analysis and reporting for D4.2. This part of the subcontracting budget was therefore transferred to casual research assistance. Thus, technically skilled research assistants were employed on a temporary basis to address the same scope as the initially planned subcontract (but in a more in-depth manner than would have been feasible for the same cost with the technical subcontract). This raise of effort represents almost 14 p-m more for WP4.

Transfer of other direct costs to personnel costs:

- **TBVT** transferred around 15.000€ (4 p-m) from other direct costs to personnel costs. **TBVT** personnel costs increased due to the implementation of activities that were not foreseen in the DoA and were aimed to foster the quality, visibility and sustainability of PERFORM: i) creating user-friendly guidelines for the protocols produced in Tasks 2.1 and 2.2; ii) developing a training for novel science museum educators in Task 2.3, iii) fully design of the teacher's training in Barcelona and its implementation in the second year in this case study in Task 3.3, iv) contacting organizations potentially interested in implementing myPERFORM as part of Task 5.1, v) participation in dissemination and policy making events to foster PERFORM visibility.

Transfer of personnel costs to other direct costs:

- **UoB** transferred around 15.000€ from personnel costs to other direct costs. On the one hand, UoB spent less p-m than originally anticipated on WP2. Although as a team **UoB** made a significant contribution to WP2 regarding the revision of the structure and content of the school workshops between round 1 and round 2 in Task 2.2, this was not time consuming. Staff from **UoB** participated in all the Task 2.2 school workshops in the first and second round but **UoB** were not required to spend much additional time working with **SMS** outside of the actual workshops.

- **EUSEA** transferred 12.000€ from personnel costs to other direct costs due to cover a) the production of 3 additional videos, including interviews with students about their experiences within the project; b) an infographic-poster for post-project dissemination purposes, as well as c) the organisation of a PERFORM Policy Workshop in Brussels in September 2018 to discuss how to promote PERFORM dissemination, exploitation and sustainability beyond the life of the project, especially among policy makers and stakeholders; d) technical services to support the redesign of the PERFORM website, making it more user-friendly for external visitors of the site.

Unforeseen expenses in other direct costs:

- In July 2017 (Month 21) **UoB** engaged a videographer in Barcelona to capture video footage of the teacher training delivered by **TBVT** in Task 3.3 (expenditure of 751.31€), which was not anticipated in the DoA. This video footage served two purposes. Firstly, to give an insight to the **UoB** team about how the training was received in the room and how the activities worked, in order to inform the development of the further teacher training in Barcelona as well as the trainings in Bristol and Paris. Furthermore, as the training was delivered entirely in the Spanish language, and the **UoB** team is not Spanish speaking, it would have been difficult for them to do that in person.

- In September and October 2017 (Months 23 and 24) participant schools in Bristol within Task 2.2 highlighted that a financial support was required to provide teacher cover because the student participant numbers required in each school were half the size of a full class. A sum of 600€ was agreed to be provided by **TBVT** as WP2 leader.

- In April 2018 (Month 30) **UoW** participated in the Public Communication of Science and Technology (PCST) conference in New Zealand by leading a workshop on "How to evaluate science communication impact using survey methods" and presenting a paper and participating in roundtable discussion entitled "The art and science of engagement: a global perspective on science communication through the arts", which drew on Task 4.2 research results.

- In August 2018 (Month 34) **UoW** travelled to Brazil to present Task 4.2 findings at a Science Communication Symposium and a Science Communication Evaluation Workshop at the Oswaldo Cruz Foundation. These communications addressed the role of social media in young people's reception of science communication interventions and the

methodological implications of the PERFORM project for evaluation of science communication.

- In October 2018 (Month 36), **TBVT** participated in the Latin America and the Caribbean Open Science Forum (CILAC) in Panama, in which **TBVT** conducted a workshop titled "Humanising Science – EU – H2020- PERFORM: Workshop for raising scientific aspirations in youth through the values embedded in the Responsible Research and Innovation and the Societal Challenges". This workshop was based on the results of Tasks 2.1 and 2.2.

5.2.1 Unforeseen subcontracting (if applicable)

Not applicable.

5.2.2 Unforeseen use of in kind contribution from third party against payment or free of charges (if applicable)

Not applicable.