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Science Education

Achievements in Horizon 2020 and recommendations on the way forward

Research and Innovation

Science Education - Achievements in Horizon 2020 and recommendations on the way forward

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Science Education

Achievements in Horizon 2020 and recommendations on the way forward

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Directorate-General for Research and Innovation
Science with and for society

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ACKNOWLEDGEMENTS

This document reports on the Horizon 2020 Science with and for Society (SwafS), science education project portfolio results. Thus, the first to acknowledge are all the scientists and researchers involved, ensuring excellent research.

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EXECUTIVE SUMMARY

Research and innovation are essential to finding solutions to the pressing challenges we face. It requires opening up the research and innovation system to the participation and collective intelligence of society, embedding high integrity and ethics standards, raising interest in science, and supporting Europe's brightest minds engage in scientific careers. Put simply, Europe cannot thrive without ensuring the best possible match between the immense potential achievements science has to offer and the needs, values and aspirations of citizens.

The objective of this report is to convey the achievements of the science education projects funded under the Science with and for Society (hereinafter referred to as SwafS) part of Horizon 2020. Its purpose is to serve as input for the preparation of the Horizon Europe programme implementation.

Overview of SwafS Implementation in Horizon 2020

A budget of EUR 462 million was earmarked for SwafS in Horizon 2020. Close to 2,000 proposals submitted in response to the annual calls for proposals, conveys strong interest in SwafS matters.

The annual evaluations are deemed to be highly robust. So far, they resulted in 150 funded projects and close to 50 more projects are expected to stem from the final calls under Horizon 2020. Since the start of this Framework Programme, REA Unit B.5 manages the projects. SwafS projects are typically composed of large consortia with an average of 11 partners and tend to run for around 3 years.

Science education

Creative and innovative science teaching and learning help young people make the best use of their capacities to become a force of innovation. The main goals of science education include boosting the participation rates of young people in STEM[1] with a view to encouraging long-term careers in these fields. More broadly speaking, science education seeks to equip citizens with the skills required to partake actively in science.

Science education projects produced a range of ready-to-use material for students (online lessons, an online encyclopaedia and a range of apps) and teachers (repositories and tool-kits encompassing practical tips to support their teaching). With schools at the heart of science education, a number of projects are developing an open schooling model to facilitate outreach to the local community.

The European Union Contest for Young Scientists (EUCYS) is the flagship competition for science education and has proven to be an excellent way to engage and showcase the work of students and young scientists.

Scientix, the community for science education in Europe, promotes and supports a European-wide collaboration among STEM education professionals. Looking to the future, Scientix is well placed to facilitate exploitation of the vast array of material produced and ensure project outcomes are fully harvested.

[1] Science, Technology, Engineering and Mathematics

INTRODUCTION

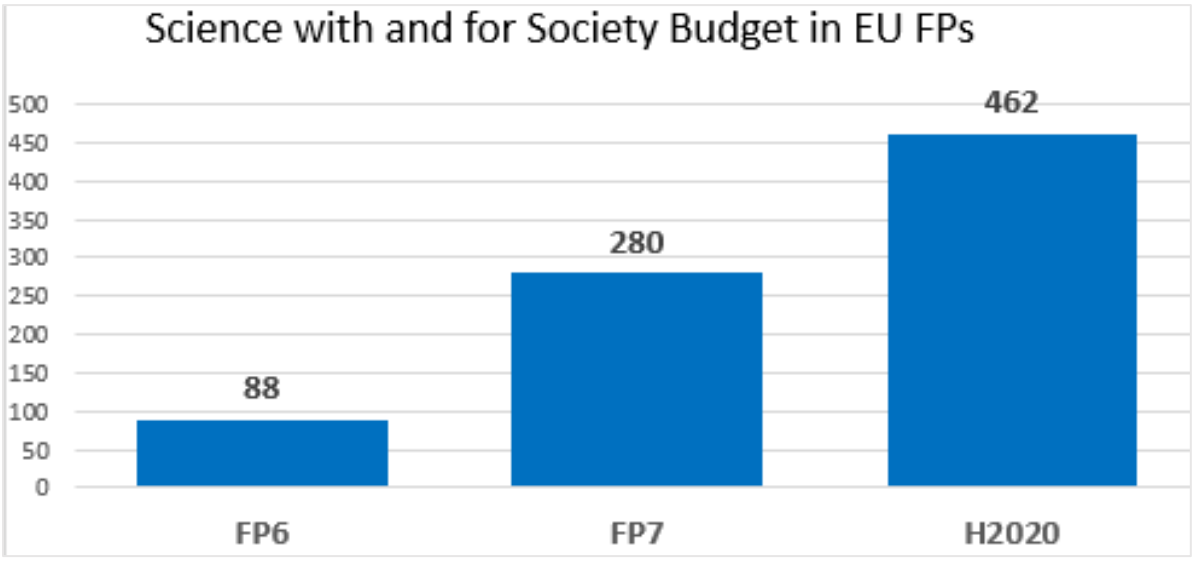
The Commission working paper in November 2000 'Science, Society and the Citizen in Europe' established the basis for the debate on the relationship of science and technology with society. On 26 June 2001, European research ministers adopted a resolution on 'science and society and on women in science' inviting both EU Member States and the European Commission to become more active in bringing science and society closer. As a response to the June 2001 invitation, in December 2001 the 'Science and Society' Action Plan was launched to set out a common strategy to make a better connection between science and European citizens.

The 'Science and Society' theme under 'Structuring the ERA' in the Sixth Framework Programme (FP6) became the first ever initiative of its kind on a European scale. With a budget of EUR 88 million, its goal was to increase society's acceptance of and engagement with science and to rectify gender imbalances in research. The Science and Society projects supported a wide range of studies and participatory events in areas including gender, ethics, young people and scientific participation.[2]

In 2007, under the 7th Framework Programme for Research and Technological Development (FP7), 'Science and Society' became 'Science in Society (SiS)' with the main objective to foster public engagement and a sustained two-way dialogue between science and civil society. Its budget almost tripled to 280 million euros. 183 projects were funded with an average EC contribution of 1.6 million euros. SiS demonstrated a clear European added value addressing science and society-relevant issues such as governance, ethics, public participation, awareness raising, gender equality, science education, open access to data, as well as dissemination of research and innovation.[3]

In 2012, the Communication on a reinforced ERA, included gender equality and gender mainstreaming in R&I as one of its five core priorities.[4]

Fig. 1: Evolution of budget allocated to 'Science with and for Society' in EU FPs



[2] Report of the Expert Group: Evaluation of the Sixth Framework Programmes for research and technological development 2002-2006
[3] Study 'Commitment and coherence: Ex-post-evaluation of the 7th EU Framework Programme (2007-2013)'
[4] COM(2012) 392 final 'A Reinforced European Research Area Partnership for Excellence and Growth'

In parallel, SiS led to the development of a concept reconciling the aspirations and ambitions of European citizens and other Research and Innovation actors and towards the end of FP7, lessons learnt gave birth to an approach known as Responsible Research and Innovation (RRI), which was, on 21 November 2014, enshrined in the Rome Declaration.

Under such a framework, all societal actors (researchers, citizens, policy makers, businesses, civil society organisations, etc.) work together during the whole Research and Innovation process in order to better align both the process and its outcomes, with the values, needs and expectations of European society.[5] In practice, RRI[6] is implemented as a package, aiming to better engage society in Research and Innovation activities, enabling easier access to scientific results, favouring a better uptake of the gender and ethics dimensions in Research and Innovation content, and spreading good practices in formal and informal education in science.

This concept of Responsible Research and Innovation (RRI) was tested and promoted during the last years of FP7. While RRI activities are concentrated in the 'Science and/in Society' parts, the intention was for the principles of RRI to be integrated into the overall research strategy across the Framework Programme.

The ex-post evaluation of FP7 found that future Framework Programmes should involve citizens and civil society organisations more substantially. They should engage citizens and stakeholders in a dialogue about the purpose and benefits of research and the way it is conducted, create incentives for science communication and support more strategic measures of communication addressing different audiences, foster the linkages between researchers, citizens and policy makers.

It recognised that citizen involvement in European research projects aims at increasing trust, acceptance, and ownership of research, a positive perception of science, better adoption of new knowledge and innovations, and improving relevance and creativity of research outcomes.[7]

Following on from this, Horizon 2020 includes a dedicated part on 'Science with and for Society'. Its overall aim is to build effective cooperation between science and society, to recruit new talent for science and to pair scientific excellence with social awareness and responsibility.[8] SwafS has grown substantially to reach EUR 462 million (see Fig. 1: Evolution of budget allocated to 'Science with and for Society' in EU FPs), giving leverage to put RRI and all its dimensions into practice in Europe, notably through 'institutional changes' (a concept which was first piloted with Gender Equality Plans under FP7) in research and innovation organisations. In parallel, gender, RRI, and social sciences and humanities became cross-cutting issues promoted throughout the Horizon 2020 programme.[9]

New innovations are essential to Europe's international competitiveness. Europe cannot thrive without including citizens in the process of ensuring the best match possible between the immense potential achievements of science, and the needs and aspirations of society.

It is essential to realise societally robust science and innovation policy in the context of the European Research Area (ERA) and Innovation Union. The interim evaluation of Horizon 2020 conveys that 'Science with and for Society' is highly relevant to the

[5] Brochure 'Responsible Research and Innovation: Europe's ability to respond to societal challenges'
[6] The five dimensions of Responsible Research and Innovation are gender equality, science education, open access/open data, public engagement, and ethics.
[7] Study 'Commitment and coherence: Ex-post-evaluation of the 7th EU Framework Programme (2007-2013)'
[8] Regulation (EU) No 1291/2013 of the European Parliament and of the Council establishing Horizon 2020
[9] European Commission website for SwafS

overarching challenges facing Europe and calls for greater support for citizen science and user-led innovation.[10]

In response to this, Horizon Europe places citizens at its core. Like for FP6, where the programme was embedded in 'Structuring the ERA', 'Science with and for Society' will be embedded in the 'Strengthening the European Research Area - Reforming and Enhancing the European R&I system'. According to the legal basis establishing the framework for Horizon Europe, *'this part will also include activities on: […] modernising European universities; supporting enhanced international cooperation; and science, society and citizens'*.[11]

The Horizon Europe Impact Assessment report states that the SwafS part on 'Accelerating and catalysing processes of institutional change' contributes to implementing the RRI keys (public engagement, science education, ethics including research integrity, gender equality, and open access) through institutional governance changes in Research Funding and Performing Organisations (RFPOs) in an integrated way.

Results contribute to the implementation of ERA priorities, a greater involvement of all stakeholders in R&I, and a better and more sustainable engagement with society. Under Horizon 2020, the key performance indicator for SwafS is the number of institutional change actions which are analysed notably under the RRI chapter. This will be a key bridge for SwafS as it moves into Horizon Europe.

The Horizon Europe legal basis sets out the aim of deepening the relationship between science and society, maximising benefits of their interactions through gender equality plans, diversity and inclusion strategies, and comprehensive approaches to institutional changes. It calls on the future Framework Programme to engage and involve citizens and civil society organisations in co-designing and co-creating responsible research and innovation agendas and content, promoting science education, making scientific knowledge publicly accessible, facilitating participation by citizens and civil society organisations in its activities and promoting gender equality and strengthening the gender dimension. It should do so both across the programme and through dedicated activities under the 'Strengthening the European Research Area' part.

The engagement of citizens and civil society in research and innovation should be coupled with public outreach activities to generate and sustain public support for Horizon Europe. The programme should also seek to remove barriers and boost synergies between science, technology, culture and the arts to obtain a new quality of sustainable innovation, as well as support an inclusive approach to gender equality in research and innovation.[12]

Further enriching the debate in the run-up to the start of Horizon Europe are two reports on mission-oriented R&I, authored by Mariana Mazzucato, which provide directions for how co-design, co-creation, and citizen involvement in implementation can play key roles in responding to the challenges of our times.[13,14]

The ERA cannot grow in a sound manner without citizens at its core embracing science education for all, promoting gender equality in our organisations, integrating ethical aspects in the research design phase and further developing a coherent EU ethics and integrity framework, opening up research and innovation to collective intelligence and

[10] Interim evaluation of H2020
[11] COM/2018/435 final 'Proposal for a regulation of the European Parliament and of the Council establishing Horizon Europe'
[12] See supra note 11
[13] 'Mission-oriented Research & Innovation in the European Union', by Mariana Mazzucato
[14] Governing Missions in the European Union, by Mariana Mazzucato

capabilities, building trust in science through targeted communication and ultimately ensuring citizens are an integral part of the process to ensure better R&I.

The objective of this report is to convey the achievements of science education projects funded under SwafS in Horizon 2020 to serve as input for DG Research and Innovation for Horizon Europe, both across the future Framework Programme and in the first work programmes falling under the 'Strengthening the European Research Area' part.

The report commences with an outline of the methodological aspects of the analysis (the frame for the analysis, data sources, the analytical approach and its limitations). The first chapter presents an overview of SwafS implementation in Horizon 2020 in terms of both the evaluation process and project implementation. The core of the report presents the science education policy objectives, analyses the projects' achievements and puts forward recommendations for the future Framework Programme. The final chapter presents concluding remarks as a complement to the highlights outlined in the executive summary.

At the time of writing this report, the COVID-19 pandemic, came to the fore with Member States going into lockdown, resulting in citizens across the EU being obliged to stay at home. There was an imminent need for effective online tools and many SwafS projects adopted contingency measures notably moving from physical to an online format for project activities in order to sustain the bridge between science and society.

0. METHODOLOGICAL NOTE

Data sources

Calls for proposal: From the start of Horizon 2020 in 2014 until 2019, projects funded under the calls foreseen in the respective SwafS work programmes are included in the analysis (note that the calls dedicated to National Contact Points and those managed by DG R&I, featuring under the 'other actions' section of the work programmes are excluded):

Year	Call
2014	SEAC (2 topics) : SEAC-1-2014, SEAC-2-2014
2015	SEAC (1 topic) : SEAC-1-2015
2016	Single call (1 topic): SwafS-15-2016
2017	Single call (1 topic): SwafS-11-2017
2018	Two-stage call (1 topic): SwafS-01-2018-2019-2020
2019	Two-stage call (1 topic)[15]: SwafS-01-2018-2019-2020
2020	Two-stage call (2 topics): SwafS-01-2018-2019-2020, SwafS-24-2020

Projects: The projects included are those funded under the calls listed in Table 1: Number of Science Education projects in Horizon 2020, as of 15/07/2020. In terms of data sources, the Grant Agreement notably the Description of Action, project deliverables, review reports, project web sites, project policy briefs as well as input from REA Project Officers over-seeing the implementation of the projects have been the basis of the analysis.

Cluster events: REA-led events organised in collaboration with DG R&I, bringing together projects funded under the same theme, pointed to some recommendations which are taken up in this report. In 2019, such an event was held for science education projects.

Reports: Horizon 2020 legal basis, annual work programmes, Interim evaluation of Horizon 2020, Impact Assessment for Horizon Europe are the primary references. Other relevant documents are referenced directly in the report.

Feedback from the evaluation: Some recommendations made by experts during the panel meetings and the independent observers in their reports are also included.

DG R&I Policy Officers provided input in terms of key reference documents as well as the objectives of the respective themes and gave feedback on the draft chapters.

[15] Grant Agreement Preparation on-going at the time of writing this report so these projects have not been included in the report.

Table 1: Number of Science Education projects in Horizon 2020, as of 15/07/2020

# of projects \ SwafS theme	Science education
Finished	13
Running (at least 1 review held)	2
Running (1st review to be completed)	4
TOTAL GAs signed, as of 15/05/2020	19
Forecast of 2019 stage-2[16] & 2020 call	9
TOTAL H2020	**28**

Analytical approach

The approach to the analysis is qualitative. Whenever possible, quantitative data has been included.

The analysis is primarily based on first-hand data on the currently running or completed projects under the Horizon 2020 Framework Programme. Each project was systematically assessed including the website, review reports and key deliverables. Deliverables singled out in the report are those deemed to be particularly pertinent by the project consortia (highlighted in project website) and/or by the independent expert involved in the project review and responsible REA Project Officer (highlighted in the review report). Policy and other pertinent reports have been consulted in order to integrate this analysis in a broader perspective.

In the project portfolio table and maps, a distinction is made between the coordinator (i.e. the entity coordinating the project consortium) and other partners. Note that 'other partners' includes project beneficiaries that are signatory to the grant agreement and does not include other entities e.g. third parties, that may be involved in project activities.

Finally, note that the project budget corresponds to the requested EU contribution.

Limits of the analysis

The main limitation of this study lies in the lack of complete data as many projects have not yet concluded. The analysis was carried out prior to the 2020 evaluation, projects resulting from the 2019 call are in the process of grant agreement preparation and those funded following the 2018 call had not yet been subject to their first review.

[16] Grant agreement preparation is on-going for four projects selected for funding for the SwafS-2019 stage-2 topic which are not included in this report.

1. OVERVIEW OF SWAFS IMPLEMENTATION IN HORIZON 2020

1.1. Evaluation process

Since the start of Horizon 2020, SwafS has organised calls for proposal on an annual basis.

As indicated in the introduction, the underlying objective of all these calls is to build effective co-operation between science and society; Foster the recruitment of new talent for science; Pair scientific excellence with social awareness and responsibility.[17]

The Horizon 2020 specific programme[18] outlines eight activity lines for SwafS:

- Attractiveness of scientific careers;
- Gender equality;
- Integration of citizens' interests and values in research and innovation (R&I);
- Formal and informal science education;
- Accessibility and use of research results;
- Governance for the advancement of responsible research and innovation and promotion of an ethics framework for research and innovation;
- Anticipation of potential environmental, health and safety impacts;
- Improved knowledge on science communication

For the SwafS WP 2014-2015, four separate calls for proposal were organised each year, with a common call deadline, and focused on:

- Making science education and careers attractive for young people (SEAC);
- Promoting gender equality in research and innovation (GERI);
- Integrating society in science and innovation (ISSI);
- Developing governance for the advancement of responsible research and innovation (GARRI)

As of 2016, the structure of the SwafS work programme moved from four distinct calls to individual topics under a single call. Under this new approach, the SwafS WP 2016-2017, focused on the following main orientations:

- Institutional Change to Support Responsible Research and Innovation in Research Performing and Funding Organisations
- Embedding Responsible Research and Innovation in Horizon 2020 Research & Innovation
- Strengthening the Science with and for Society Knowledge-Base
- Developing Inclusive, Anticipatory Governance for Research & Innovation

The SwafS WP 2018-2020 focused on the following five strategic orientations: Accelerating and catalysing processes of institutional change;

- Accelerating and catalysing processes of institutional change;
- Stepping up the support to Gender Equality in Research & Innovation policy;
- Building the territorial dimension of SwafS partnerships;

[17] Regulation (EU) No 1291/2013 of the European Parliament and of the Council establishing Horizon 2020
[18] See supra note 17

- Exploring and supporting citizen science, and
- Building the knowledge base for SwafS.

Table 2: SwafS proposals data in Horizon 2020shows the number of proposals submitted, evaluated and funded as well as the corresponding EC grant amount and the volume of evaluation review requests. From the outset, it is clear that there is a strong interest in the SwafS fields peaking in the final year of Horizon 2020 with 407 proposals submitted.

Over the course of Horizon 2020, the pattern tends to be lower submission rates in the first year of the work programme compared to the following year. Furthermore, submission rates were lower overall for the 2016-2017 work programme topics

Table 2: SwafS proposals data in Horizon 2020

Year	Title of Call	Number of proposals			EC grant amount for retained proposals	Success rate	Evaluation review	
		Submitted	Evaluated	Retained for funding			Requests	Upheld but not re-evaluated
2014	SEAC-2014-1	140	140	8	14.719.360 €	5,7%	1	0
	GERI-2014-1	47	44	5	10.275.490 €	11,4%	1	0
	GARRI-2014-1	28	28	5	8.710.636 €	17,9%	0	0
	ISSI-2014-1	35	33	3	10.792.173 €	9,1%	0	0
2014 TOTAL		250	245	21	44.497.659 €	8,6%	2	0
2015	SEAC-2015-1	207	204	6	11.934.183 €	2,9%	1	0
	GERI-2015-1	46	46	4	8.359.319 €	8,7%	1	0
	GARRI-2015-1	31	31	6	9.174.322 €	19,4%	0	0
	ISSI-2015-1	109	99	7	23.315.000 €	7,1%	2	1
2015 TOTAL		393	380	23	52.782.823 €	6,1%	4	1
2016	SwafS-25-2016	9	8	1	497.626 €	12,5%	0	0
	SwafS-2016-1	132	129	22	44.285.828 €	17,1%	1	0
2016 TOTAL		141	137	23	44.783.454 €	16,8%	1	0
2017 TOTAL	SwafS-2017-1	221	216	24	61.167.321 €	11,1%	2	0
2018	SwafS-2018-1	121	114	26	55.674.892 €	22,8%	2	1
	SwafS-2018-2-stage-1	76	76	*16*	-	21,1%	0	0
	SwafS-2018-2-stage-2	16	16	5	7.049.141 €	31,3%	0	0
2018 TOTAL		197	190	31	62.724.033 €	16,3%	2	1
2019	SwafS-2019-1	194	193	27	52.272.299 €	14,0%	0	0
	SwafS-2019-2-stage-1	114	113	*22*	-	19,5%	1	0
	SwafS-2019-2-stage-2	22	21	8	10.804.446 €	38,1%	0	0
2019 TOTAL		308	306	35	63.076.746 €	11,4%	1	*0*
2020	SwafS-2020-1	262	-	-	-	-	-	-
	SwafS-2020-2-stage-1	145	-	-	-	-	-	-
2020 TOTAL		407						
GRAND TOTAL		**1917**	**1474**	**157**	**329.032.036 €**	**10,7%**	12	2

compared to the first (2014-2015) and final (2018-2020) work programmes in Horizon 2020. In 2020, the number of proposals submitted peaked with over 400 consortia putting forward proposals and bringing the total number of proposals submitted under Horizon 2020 up to almost 2,000.

Looking more closely at the 2019 call, for which the evaluation is completed, compared to the previous year, the number of proposals increased by 56%. This call includes 13 topics, two of which are subject to a two-stage evaluation (see 1.1.1).

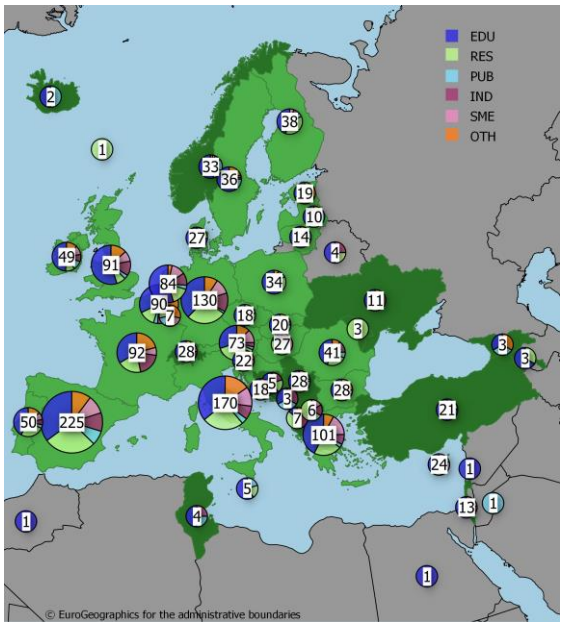
Science Education remains the most popular topic with the highest number of proposals (93). Meanwhile, Citizen Science is the topic with the biggest growth in terms of proposals (78), which more than doubled compared to 2018 (33).

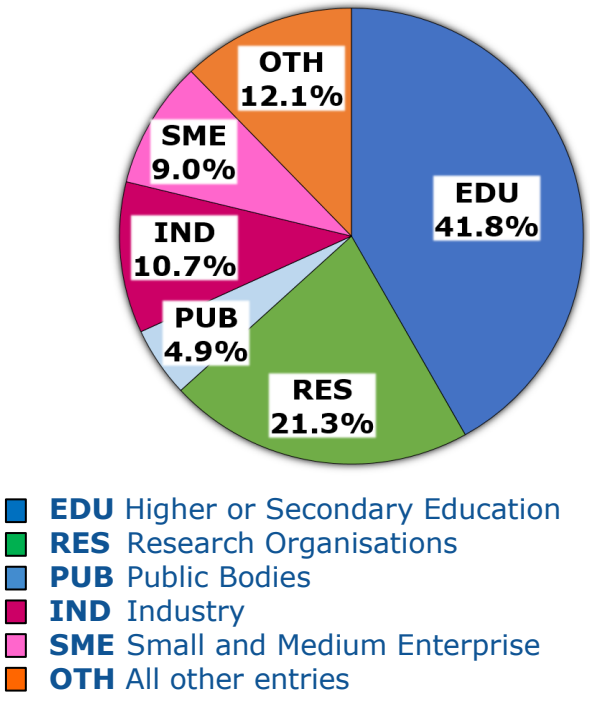
In the 2019 call, approximately one third of the topics identified international cooperation as particularly pertinent including one of the gender topics, dedicated to

dialogue with third countries. With applicants from 85 different countries from continents across the globe including Asia, Australia, Africa, South and North America, Science with and for Society follows the spirit of 'open to the world'. Looking at Europe in particular, the map below shows, applicants come from right across the continent.

Applicants represent stakeholders from all parts of the quadruple helix model[19], including Civil Society Organisations (falling under the 'other' category in pie chart above) with the relative majority being educational institutes.

Fig. 2: Applicants for SwafS-2019 single call for proposals





EDU Higher or Secondary Education
RES Research Organisations
PUB Public Bodies
IND Industry
SME Small and Medium Enterprise
OTH All other entries

[19] The quadruple helix model considers particular services, products and solutions as being co-identified, co-developed and co-created through co-operation between industry, government (e.g. policy makers and institutions), universities and society (e.g. citizens and Civil Society Organisations (CSOs).

After the 2014 evaluation, DG R&I delegated the management of SwafS to REA Unit B5. Since 2015, REA Unit B5 manages the evaluation and implementation of SwafS projects and to this end, continues to work in close cooperation with DG R&I responsible for the policy-making and drafting of the work programmes.

In line with Horizon 2020 practices, three independent evaluators evaluate each proposal, selected for their expertise while the overall panel is well-balanced in terms of gender (i.e. at least 40% of males and females), geography and sector of activity.

With regard to the quality of the evaluation process, independent observers examine the fairness of the evaluation procedure. In the 2019 SwafS evaluation, the observer reported, 'that the design, planning and execution of the evaluation process was very robust and entirely consistent with peer review principles of transparency, equality of treatment and absence of conflicts of interest.' The evaluators themselves echoed this observation in the panel meetings in their invitation to EC services to better publicise the robustness of the evaluation procedure.

A quantitative indicator of the quality of the evaluation is the number of evaluation review requests filed. Applicants may file a complaint on the evaluation of their proposal from a procedural point-of-view. Over the course of the last 5 years, 0.8% of applicants (12) filed such a complaint.

An independent Evaluation Review Committee, consisting of REA staff (not involved in the evaluation) and DG R&I staff, assesses each evaluation review request.

The outcome shows that for 10 out of the 12 evaluation review requests, the respective Evaluation Review Committees found no grounds for the complaint. For the remaining two (0.1%), the Committees found some grounds for the complaint. However, this did not have an impact in terms of the proposal's possibility for funding and hence a re-evaluation of the proposal was not required.

1.1.1. Two-stage evaluation process

The aim of the two-stage process is to ease the burden for applicants in the initial stage of the proposal preparation although the overall period for the evaluation extends by approximately eight months. In stage 1 of the two-stage procedure, applicants submit a short proposal (maximum 10 pages) and, like the evaluation criteria, focuses only on 'excellence' and part of 'impact', notably in relation to the expected impact statement in the work programme.

Successful stage-1 proposals passing the thresholds (see Annex H of the General Annexes to the work programme), receive general common feedback and are invited to stage-2, which is the same as the single proposal procedure albeit that the full proposal must be consistent with the short proposal submitted in stage-1.

2018 saw the introduction of the two-stage evaluation process for SwafS in view of the traditionally over-subscribed topic, science education (3% success rate in 2015).

For science education, 67 applicants submitted a proposal to stage-1 (call deadline April 2018) of which 15 were invited to submit a full proposal in stage-2 (call deadline November 2018), 4 proposals were finally selected for funding (informed March 2019) and projects commenced in summer 2019.

1.2. Project implementation

SwafS counts a total budget of EUR 462 million in Horizon 2020. Since the start of Horizon 2020, 150 projects have been funded amounting to a total budget of EUR 319 million, all are managed by REA Unit B.5 except for three which are managed by DG R&I.

SwafS projects are typically composed of large consortia with an average of approximately 11 partners per project. The duration tends to vary with the shortest project duration being 2 years and the longest project extending to 5 years while the average project duration is 3 years.

In terms of their nature, 30% are Research and Innovation Actions (RIA) focused on generating new knowledge while approximately 70% of funded projects are Coordination and Support Actions (CSA) tending to focus on 'accompanying measures' including for example networking, mutual learning exercises and awareness-raising type activities. The exception is GENDER-NET Plus, an ERA-NET COFUND action, managed by DG Research and Innovation which aims at funding research projects promoting the integration of sex and gender analysis into research at an international level.

The REA Unit B.5 signs grants with consortia within the legal deadline of 8 months from the call deadline. Project Officers partake in kick-off meetings and closely follow the project during the lifetime. Each project has defined reporting periods that conclude with a review meeting, the formal approval of the deliverables and the payment for the activities carried out. The REA calls upon the support of an independent expert to review the deliverables and reports. The quality of deliverables is closely monitored notably those that are public and are automatically published once approved.

The REA works closely with DG Research and Innovation to ensure policy makers are kept abreast of any feedback from the project relevant for their policy monitoring or future policy-making activities.

DG Research and Innovation and the REA promote networking between projects to encourage sharing of best practices and to encourage projects to build on the available know-how. The REA and DG R&I have developed this practice by organising thematic one-day cluster events in Brussels. These cluster events are organised in co-creation mode with the projects and since 2018 five such events were organised including for ethics, gender, science education and citizen science projects.

Liaising with other SwafS projects was formally encouraged in the 2018-2020 work programme which foresees the inclusion of 'additional dissemination obligations' in Article 29.1 of the grant agreement for certain topics. This provision requires consortia to share their strategies and methodologies from the outset with a view to reaping the full benefits of synergies. Project co-ordinators have demonstrated strong willingness to work together in organising joint communication channels, events, meetings, and co-ordinating content-related activities. This grant condition was a key element in terms of aiming to build a knowledge and collaboration ecosystem. The results have been positive in the territorial and citizen portfolios for example where projects are pro-actively liaising with each other. The Super_MoRRI project gathered 14 other SwafS projects together at its annual event in Leiden in January 2020.[20] This 'additional dissemination obligation' condition should be used more extensively in the future.

[20] Super MoRRI annual event, January 2020

2. SCIENCE EDUCATION

Science Education forms the basis for the full achievement of the Innovation Union and the European Research Area. Creative and innovative formal, non-formal and informal[21] science teaching and learning help young people make the best use of their capacities to become a force of innovation.

Encouraging formal, non-formal and informal science education is one of the dimensions of Responsible Research and Innovation that cuts across Horizon 2020.

In this respect, institutional changes were promoted concerning the introduction of new methods of teaching the curricula and new means of systematically fostering informal learning in non-educational settings.

In addition, science education topics show a close link to the science communication aspects of the programme, contributing to an informed and scientifically literate society.

2.1. Policy objectives

According to Annex I – Part V of the Specific Programme Council Decision of 3/12/2013, the policy objective for Science Education in Horizon 2020 is to:

'*Encourage citizens to engage in science through formal and informal science education, and promote the diffusion of science-based activities, namely in science centres and through other appropriate channels.*'

More specifically, the main goals of Science Education actions are:

- Greater participation of young people (up to age 20) in STEM;
- Encourage long-term careers in STEM;
- Equip citizens with the skills they need for active participation in science;
- Increase the number of countries participating at EUCYS;
- Increase the uptake of Scientix.

2.2. Project portfolio

Science Education was the focus of four particular domains (see Table 3) throughout Horizon 2020's work programmes, resulting in 19 funded projects (2019 and 2020 calls not included) with a combined budget of EUR 37.4[22] million.

[21] 'European Guidelines for Validating non-Formal and Informal Learning'
Formal learning: occurs in an organised and structured environment (e.g. in an education or training institution or on-the-job) and is explicitly designated as learning (i.e. in terms of objectives, time or resources). Formal learning is intentional from the learner's point of view. It typically leads to validation and certification.
Non-formal learning: embedded in planned activities which are not always explicitly designated as learning (in terms of learning objectives, learning time or learning support), but which do contain an important learning element. Non-formal learning is intentional from the learner's point of view. It can take place in museums, science camps, clubs, etc.
Informal learning: results from daily activities related to work, family or leisure. It is not organised or structured in terms of objectives, time or learning support. Informal learning is mostly unintentional from the learner's perspective.
[22] The slight difference in the total figure calculated on basis of budget allocated to each project in table 4 is due to rounding.

Fig. 3: Number of coordinators in Member States (MS) and Associated Countries (AC)

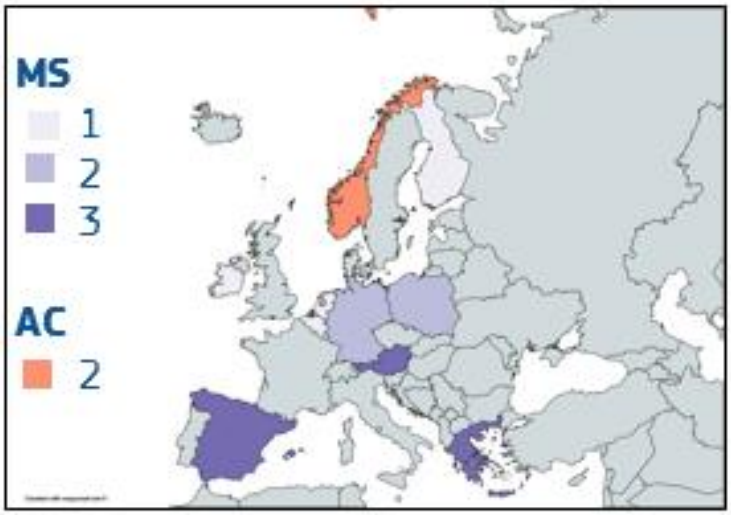


Fig. 4: Number of other partners in Member States (MS) and Associated Countries (AC)

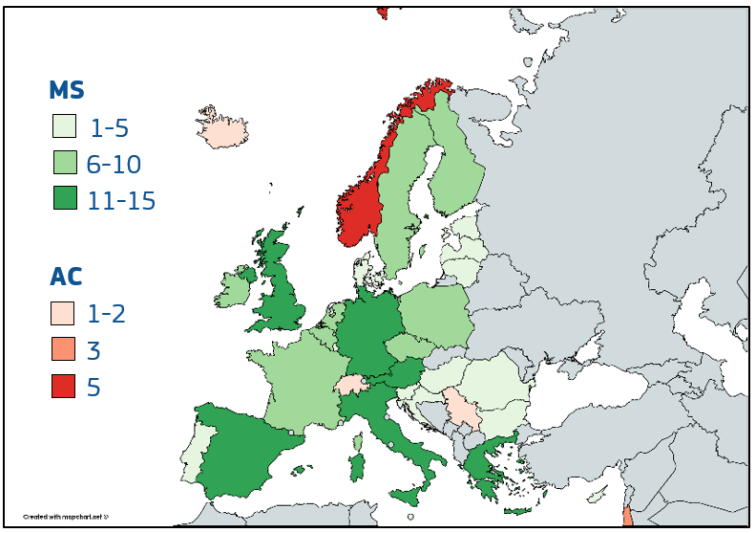


Fig. 5: Number of partners in Third Countries (TC)

A total of four third countries are involved: Australia, Belarus, Colombia and the United States of America.

Table 3: Science Education project portfolio

Project	Budget €	Dates	Coordinator	Country Coord.	Countries Other partners	Website
SEAC-1-2014-2015 Innovative ways to make science education and scientific careers attractive to young people (RIA, CSA)						
MultiCO	1.4 M	01-08-2015 30-11-2018	ITA-SUOMEN YLIOPISTO	FI	**EU:** EE, DE, UK, CY	multico-project.eu
PERFORM	2.0 M	01-11-2015 31-10-2018	FUNDACIÓ PER A LA UNIVERSITAT OBERTA DE CATALUNYA	ES	**EU:** ES(2), UK(3), FR(3), AT	perform-research.eu
SciChallenge	1.3 M	01-09-2015 31-08-2017	SYNYO GmbH	AT	**EU:** CZ, SE, CY, SI, HU, AT, BE, UK	scichallenge.eu/
CREATIONS	1.8 M	01-10-2015 30-11-2018	UNIVERSITAET BAYREUTH	DE	**EU:** UK(3), EL(3), FI, DE, MT, ES, SE, FR **AC:** CH, NO, RS	creations-project.eu
ER4STEM	1.6 M	01-10-2015 30-09-2018	TECHNISCHE UNIVERSITAET WIEN	AT	**EU:** BG, AT, EL, MT, UK, CZ	er4stem.eu/
STIMEY	4.0 M	01-09-2016 30-11-2019	UNIVERSIDAD DE CADIZ	ES	**EU:** DE(2), EL(2), FI, ES **TC:** BY	stimey.eu/home
EDU-ARCTIC	1.8 M	01-05-2016 31-07-2019	INSTYTUT GEOFIZYKI POLSKIEJ AKADEMII NAUK	PL	**EU:** PL, FR **AC**: IS, NO, FO	edu-arctic.eu
STEM4youth	1.8 M	01-05-2016 31-10-2018	POLITECHNIKA WARSZAWSKA	PL	**EU:** EL(2), SI(2), IT, CZ, ES(3)	stem4youth.eu
UMI-Sci-Ed	1.8 M	01-06-2016 31-05-2019	INSTITOUTO TECHNOLOGIAS YPOLOGISTONK AI EKDOSEON DIOFANTOS	EL	**EU:** IE, IT(2), FI, BE **AC:** NO	umi-sci-ed.eu
Marine Mammals	1.8 M	01-09-2016 31-08-2019	CHRISTIAN-ALBRECHTS-UNIVERSITAET ZU KIEL	DE	**EU:** BE, PL(2), DK, DE(3), SE	marine-mammals.com
SEAC-2-2014 Responsible Research and Innovation in Higher Education Curricula (CSA)						
EnRRICH	1.5 M	01-07-2015 31-03-2018	VRIJE UNIVERSITEIT BRUSSEL	BE	**EU:** UK(2), IE(2), IT, DE(2), HU, NL, ES, FR, LT	livingknowledge.org/projects/enrrich/
HEIRRI	1.5 M	01-09-2015 31-08-2018	UNIVERSIDAD POMPEU FABRA	ES	**EU:** ES(3), DK, AT, HR, BE **AC:** NO	heirri.eu
SwafS-15-2016, SwafS-01-2018-2019-2020 Open Schooling and collaboration on science education (CSA)						
OSOS	3.0 M	01-04-2017 31-03-2020	ELLINOGERMANIKI AGOGI SCHOLI PANAGEA SAVVA AE	EL	**EU:** NL(2), ES, IE, DE, FI, EL(2), FR(2), IT, PT(2), LU, BG, **AC**: IL(2) **TC**: AU, USA (special agreement[23])	openschools.eu
SEAS	1.6 M	01-09-2019 31-08-2022	UNIVERSITETET I OSLO	NO	**EU:** AT(2), SE(2), BE(2), IT(2), EE, UK	seas.uio.no
PULCHRA	1.5 M	01-09-2019 31-08-2022	ETHNIKO KAI KAPODISTRIAKO PANEPISTIMIO ATHINON	EL	**EU:** DE, PL, CZ(2), RO, IT, LV, EL, SE, CY, IE	pulchra-schools.eu/
OSHub	1.5 M	01-10-2019 30-09-2022	UNIVERSITEIT LEIDEN	NL	**EU:** IE, IT, AT, FR, CZ, PT, EL **AC**: CH	oshub.network/

[23] European Commission website for the EU-US Cooperation in Research and Innovation

PHEREC LOS	1.5 M	01-10-2019 30-09-2022	KINDERBURO UNIVERSITAT WIEN GMBH	AT	**EU:** AT(3), PL(2), NL(2), DK, FI, PT, IT, RO, UK **TC:** CO	phereclos.eu
SwafS-11-2017 Science education outside the classroom (RIA)						
SySTEM 2020	3.0 M	01-05-2018 30-04-2021	TRINITY COLLEGE DUBLIN	IE	**EU:** NL, BE, FI, AT(2), SI, IT, EL, DK **AC:** IL, RS	system2020.education
CoM_n_Play-Science	3.1 M	01-06-2018 31-05-2021	NORGES TEKNISK-NATURVITENS KAPELIGE UNIVERSITET	NO	**EU:** FI, EL, NL, SE, DE, MT, ES, AT, UK (2) **TC**: USA (special agreement)	comnplayscience.eu

2.3. Achievements

The Science Education topics tend to attract the highest number of proposal submissions in SwafS, showing a great interest and need for dedicated funding in this area. The high number of applications led to a low success rate however ensured excellent projects were selected for funding.

The European Commission flagged many Science Education projects as success stories in relation to the quantity and quality of exploitable learning material, the engagement of students and the project's impact on teaching: PERFORM, SciChallenge, EDU-ARCTIC, STEM4Youth and Marine Mammals.

ER4STEM was selected to participate in the Science is Wonderful exhibition at the European R&I Days in Brussels in September 2019, and was a finalist at the European Digital Skills Awards.

In addition to specific projects managed by the REA, the Science Education policy area in Horizon 2020 included other actions. In particular, it is worth mentioning the EUCYS contest and the Scientix portal.

The annual European Union Contest for Young Scientists (EUCYS) is one of Europe's premier events for showcasing young scientific talent. It brings together winners of national science competitions (young people between 14 and 20 years of age) to compete with their European counterparts. The host country receives a grant to an identified beneficiary for EUR 800,000. In 2019, Commissioner Mariya Gabriel attended the Opening Ceremony and Deputy DG Signe Ratso attended the award ceremony in Sofia. The contest in 2021 will be in Salamanca.

Scientix, the community for science education in Europe, was developed to ensure a wide uptake and dissemination of STEM education practices. Scientix promotes and supports a European-wide collaboration among STEM teachers, education researchers, policy makers and other STEM education professionals.

This activity is funded by Horizon 2020 under SwafS 'other actions'. This European Commission initiative, since its inception in 2009, has been coordinated by European Schoolnet. Scientix has been selected as one of the world's top 100 innovations in education.[24]

[24] Article 'Scientix is one of the world's top 100 innovations!', January 2017

2.3.1. Ready-to-use content for students

Projects produced a high number of quality, ready-to-use material for students. Even after its official ending, the EDU Arctic project continues to provide the public with online lessons given by Arctic researchers.

The Arctic Explorer Game App is an example of an innovative educational tool targeting school pupils. It is based on the idea of 13-year-old EDU-ARCTIC Competition finalist from the Faroe Islands (2nd edition) Yngva Sigursdottir Lamhauge. She had the idea of creating a virtual journey through the Arctic, which, thanks to the form of a quiz, allows participants to broaden their knowledge of this region. The idea was then further developed by the project team and subsequently launched in the Google app store.

Finally, EDU Arctic developed Polarpedia, a free online encyclopaedia on polar research and established an extensive knowledge base on the Arctic, with more than 500 terms translated into 16 national European languages. 'Polarpedia' promotes the idea of co-creation and contains photos, graphics and animations, videos as well as games and quizzes.

STEM4youth produced freely available educational content for high school students aimed at encouraging them to study STEM and to pursue STEM-careers (not only academic). To this end, the project aimed at presenting students with tangible arguments on why it is worthwhile studying STEM subjects and the career perspectives in store for STEM graduates.

COM n PLAY Science developed the COMnPLAYer app to encourage children to discover and learn about science, and have their say on what it means to them.

2.3.2. Toolkits for teachers

Educators are essential in delivering any knowledge and results coming from the projects to students. Several projects included teacher training, and some produced deliverables designed specifically for teachers.

ER4STEM, a project that explored robotics education, developed a generic curriculum linking subject domains, technologies, use cases and powerful ideas. An educational robotics repository was created for use and improvement by teachers, academics, researchers and practitioners in the field of educational robotics.

Stem4youth researched citizen science at schools and provided a toolkit for teachers on how to design and carry out such experiments.

SySTEM 2020 created a toolkit of design principles and methods to help educators and pedagogical coordinators facilitate and reflect on the science learning activities offered in non-formal learning environments. The toolkit also includes examples of best practices and practical tips to support educators adapt the design principles to their particular context.

In terms of capacity building, EnRRICH produced good practices and case studies that demonstrate the embedding of RRI in modules and courses at 11 higher education institutions. Similarly, the EnRRICH tool for educators in higher education provides valuable insights in developing teaching modules and assisting in the design of teaching and learning methods.

HEIRRI created formative training materials designed for different educational levels and produced a booklet teaching and learning RRI presenting teaching resources in an endeavour to teach RRI in universities and higher education institutions.

2.3.3. Open schooling

Schools are of course the nexus where Science Education mostly takes place. The OSOS project promotes the open school model and supports adhering schools to hub together.

The OSOS Portal brings together 1000 schools from different European countries. These schools have been introduced to the open schooling culture and are already involved in numerous related activities promoting the use of open content and open pedagogies, while establishing open cooperation schemes with local stakeholders, industries and research organisations.

In order to continue promoting the open schooling approach, a new batch of projects started at the end of 2019: SEAS, PULCHRA, OSHub and PHERECLOS.

2.3.4. Competitions

Competitions are a great way to engage and showcase the work of students and young scientists. The aforementioned European Union Contest for Young Scientists (EUCYS) is a prime example of a successful event of this type promoted by the European Commission through SwafS. Individual projects also set up smaller-scale competitions.

Stem4Youth organised an open international student competition, along with a report including conclusions and suggestions on how to organise similar events.

As mentioned above, EDU Arctic developed and maintains the Arctic competition for teams of one or two pupils aged 13 to 20 and their teacher. In addition they created the engaging EDU-Arctic App, to collect meteorological data and through which students can collect points as part of the competition.

ER4STEM organised the annual European Conference on Educational Robotics (ECER) which centred on the 'botball' competition. High-school students submitted papers and if successful presented these at the conference and showcased their robotic developments.

2.3.5. Knowledge base

SySTEM 2020 started in 2018 and has already produced a mapping of over 1000 European STEAM (Science, Technology, Engineering, Art and Mathematics) organisations, programmes, events, online projects and bottom-up initiatives across a number of parameters. This has generated valuable insights and comparable data. The collected data from these STEAM organisations contains vast information on different targets groups, scientific topics, the methods used, outreach and communication strategies, activities, collaboration, governance and more.

2.3.6. Dissemination

Most projects engaged with many students, teachers, the general public, schools, civil society organisations and policy makers.

To give a sense of the amplitude of the outreach of the Science Education projects, we have outlined the number of stakeholders reached from a few projects.

ER4STEM (a completed 3-year project) reported to have used a total of 571 robots to engage with 4,459 students, well above the original target. An additional 510 people

were addressed in conferences, and more than 50 teachers were trained through workshops. More than 80 teachers and Scientix ambassadors were present at the repository webinars organised by the partners.

While initially aiming at reaching 10 EU countries, EDU-ARCTIC (also a completed 3-year project) reached pupils in 60 countries across five continents and established a network of over 1200 educators from over 800 schools. They estimate that the programme reached at least 30,000 students, who participated in more than 500 online lessons dedicated to the Arctic and polar research.

SySTEM 2020 (an on-going 3-year project) claim that their communication and dissemination activities reached about 500,000 people in the following categories:

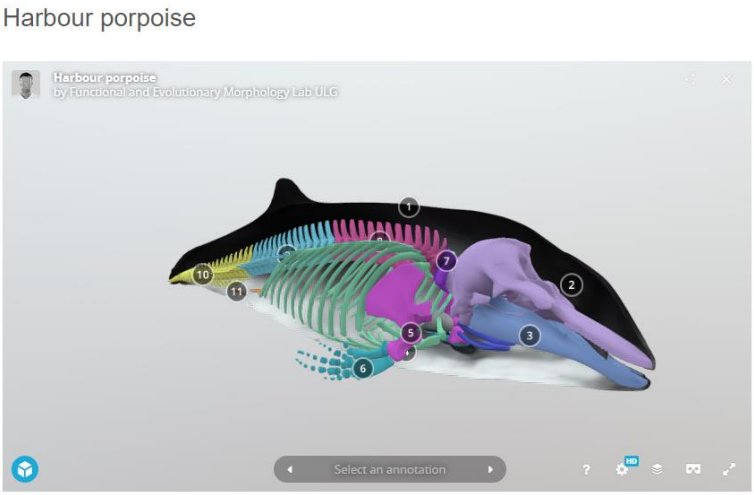
Table 4: SYSTEM 2020 dissemination

Category	People reached by SySTEM 2020 dissemination
Scientific Community	2,137
Industry	759
Civil Society	5,428
General Public	195,922
Policy Makers	118
Media	1,937
Investors	25
Customers	2,240
Other	271,132
TOTAL	**479,698**

EU success story example: Marine Mammals

The project is exemplar in utilising a specific topic like marine mammals to engage citizens with science, technology and environmental awareness.

Significant exploitable results include novel educational resources relevant to school curricula and attractive to students, teachers and the general public: 3D models, "expedition boxes", interactive digital posters, a book, practical activities and display materials. These are available through the project website, project partner events and exhibitions at consortium venues and other marine science centres.



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These tangible outputs contribute considerably to ensuring a lasting legacy of the project. They also make an excellent contribution to the current state-of-the-art in marine science education and outreach.

Considerable impact has been achieved by directly involving over 400 teachers and almost 1,500 students from 14 different countries in more than 50 events between training sessions, summer schools and symposia. The public outreach activities have reached an estimated 50,000 people in the partner countries.

© Marine Mammals, 2020.

Sustainability of the project has been ensured through the production of physical and digital resources which project partners will continue to utilise in various ways in the future.
The additional, unforeseen, opportunity to publish a book with a well-respected academic publisher is an added positive.

This project contributes towards EU policy and strategy in the areas of environment and education. In particular it demonstrates the successful approach of using hands-on learning inside and outside of the school curriculum and direct contact with scientists to raise interest in and understanding of science careers and environmental issues.

2.4. Recommendations

2.4.1. Policy recommendations

In line with the von der Leyen Commission's priorities, the Science Education community recommends the systematic integration of climate change and energy issues into schools' curricula.

More than 50 educational systems exist across the EU Member States, sharing common challenges and offering many different solutions. This variety of experiences could be better exploited with a view to identifying best practices for promoting Science Education.

Science Education policy is closely connected with the first article[25] of the European Pillar of Social Rights. The implementation of the life-long learning principle, involving people outside of the formal education sphere, would benefit from better integration with citizen science, citizen engagement and science communication policy areas.

A possible vehicle to this interconnection could be the extension of the open schooling approach to open universities, whereby universities become community spaces, hosting events and co-creation activities open to the public at large.

Other public spaces like museums or local municipalities could also be exploited. Science communication professionals may use issues of particular public interest to help people connect to science through everyday experiences. Such activities can help combat anti-scientific attitudes.

Furthermore, a clear Science Education component could be integrated and supported in each Citizen Science project.

Adults could also be more involved in their children's educational activities and promoting inter-generational learning. Accompanying carers should be kept in mind when organising activities primarily targeting children.

2.4.2. Recommendations for Horizon Europe

Horizon Europe should foresee standalone Science Education topics.

In terms of possible topics, one area of exploration could be calls dedicated to facilitating interactions between secondary and tertiary education.

The full potential of the business world is yet to be explored and Science Education topics could for example aim to identify mutual benefits and create the means for such interactions.

Reinforced collaboration with Scientix would increase projects' impact. This should be added as a specific requirement in the work programme topic descriptions.

Furthermore, Scientix should assess the extensive material produced by Horizon 2020 Science Education projects and consider a 'one-stop-shop' solution for teaching practitioners who do not have the time to look into individual projects.

[25] 'Everyone has the right to quality and inclusive education, training and life-long learning in order to maintain and acquire skills that enable them to participate fully in society and manage successfully transitions in the labour market.'

Scientix could ensure teaching material is readily identifiable and accessible. Scientix is well placed to facilitate the exploitation of the material produced and ensure the outcomes of projects are fully harvested.

The article on 'additional dissemination obligations', which applies for a number of SwafS topics since 2018, should also be foreseen for Science Education projects in order to share best practices, identify synergies and ensure sustainability.

It is advisable that project duration in relation to the budget foreseen is indicated in the work programme topics. In terms of implementation, this would facilitate clustering activities with the timing of periodic reviews for similar projects coinciding.

Aside from the standalone topics on Science Education, Horizon Europe could also foresee mainstreaming of Science Education in other parts of the programme. Coordination and support actions for science education, citizen science and science communication could be aimed at facilitating these specific SwafS-related elements in projects across the future framework programme.

Science Education policies should seek links beyond Horizon Europe, for example by engaging with publicly recognised European scientific programmes like European Space Agency (ESA)'s Copernicus.

Synergies should be explored between funding schemes with similar goals in Europe. Notably, DG EAC has initiatives tying in directly with the goals of Science Education, for example the European Key Competences Framework.

An example of successful synergies with other funding programmes is the Horizon 2020 project EDU Arctic, which secured additional European Economic Area (EEA) funding for its Arctic exploration programme.

CONCLUDING REMARKS

Since 2014, the projects funded under 'Science *with and for* Society' contributed to its primary aims set out in the EU Regulation establishing Horizon 2020, notably to effectively build cooperation between science and society, recruit new talent for science and pair scientific excellence with social awareness and responsibility.[26]

One of the key ways of working towards these three SwafS objectives, and ensuring impact, is the implementation of **institutional changes** in beneficiaries. This is demonstrated by the Key Performance Indicator for Swafs being '*Percentage of research organisations funded implementing actions to promote Responsible Research and Innovation, and number of institutional change measures adopted as a result'*.[27]

The results of a sample of twelve RRI projects revealed that almost 250 individual institutional change actions are implemented or in the process of being implemented by this part of the SwafS portfolio.[28]

The pioneers of institutional changes are Gender Equality projects dedicated to the implementation of Gender Equality Plans (GEPs). Out of 168 institutions involved in GEP projects, 130 institutions (78%) implemented or are in the process of implementing a GEP.

SwafS will well and truly surpass its target of 100 institutional changes in beneficiaries by the end of Horizon 2020.

SwafS stakeholders are in an excellent position to take a leading role in supporting other entities, for example universities envisaging institutional transformation. As Commissioner Gabriel's portfolio encompasses innovation, research, culture, education and youth, exploiting synergies between research and innovation and education is particularly pertinent.

Science Education is the basis for recruiting new talent for science. It is crucial to continue to invest in science education to nourish young curious minds and invest in Europe's future researchers. The high submission rate of proposals throughout Horizon 2020 convey the research community's strong interest in this domain.

Integration services offered by the pan-European network of EURAXESS support centres for researchers' careers and their families is an investment in the R&I system and a key enabler of brain and knowledge circulation and should be considered part of the much-needed transformations and scale-up mechanisms to ensure an inclusive, healthy and attractive work environment for excellent research in the renewed ERA.

Networking is key to ensure that projects learn from each other and build on existing know-how. DG Research and Innovation and the REA organise thematic cluster events to promote networking between projects and encourage sharing of best practices. Project co-ordinators demonstrated strong willingness to work together.

International cooperation is one of the priorities of Commissioner Gabriel. SwafS projects have embraced international cooperation and involve partners from around the world.

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[26] Regulation (EU) No 1291/2013 of the European Parliament and of the Council establishing Horizon 2020
[27] Horizon 2020 indicators

[28] This data collection exercise did not cover projects dedicated to gender equality, ethics, or open access/open data, which, to various degrees, focus also on institutional changes.

Inclusiveness on all levels underpins SwafS. We need science education for all, gender equality in our organisations, ethics and integrity embedded in research, communication we can trust, open science and ultimately place citizens at the core to ensure excellent Research and Innovation to tackle the challenges of today for a better future.

GLOSSARY

CSA: Coordination and Support Action

CSO: Civil Society Organisation

DG: Directorate-General

DG R&I: DG Research and Innovation

EEA: European Economic Area

ERA: European Research Area

ESA: European Space Agency

FP: Framework Programme

GA: Grant Agreement

H2020: Horizon 2020

HEI: Higher Education Institutes

ICT: Information and Communication Technology

R&I: Research and Innovation

REA: Research Executive Agency

RFO: Research Funding Organisation

RFPO: Research Funding and Performing Organisation

RIA: Research and Innovation Action

RPO: Research Performing Organisation

RRI: Responsible Research and Innovation

SiS: Science in Society

STEAM: Science, Technology, Engineering, Art and Mathematics

STEM: Science, Technology, Engineering and Mathematics

SwafS: Science with and for Society

WP: Work Programme

LIST OF COUNTRY CODES

AT	Austria	**HU**	Hungary
AU	Australia	**IE**	Ireland
BE	Belgium	**IL**	Israel
BG	Bulgaria	**IS**	Iceland
BY	Belarus	**IT**	Italy
CH	Switzerland	**LT**	Lithuania
CO	Colombia	**LU**	Luxembourg
CY	Cyprus	**LV**	Latvia
CZ	Czechia	**MT**	Malta
DE	Germany	**NL**	Netherlands
DK	Denmark	**NO**	Norway
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Inclusiveness on all levels underpins SwafS. We need science education for all, gender equality in our organisations, ethics and integrity embedded in research, communication we can trust, open science and ultimately place citizens at the core to ensure excellent Research and Innovation to tackle the challenges of today for a better future.

Europe can only thrive by matching the immense potential of science with the values, needs, and aspirations of society.

Horizon Europe must strengthen efforts to tap into the vast potential citizens have to offer and ensure effective cooperation between science and society.

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