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Author(s): Leonhard Hennen and Linda Nierling (KIT), with the support of the Engage2020-
Consortium

Organisation name of lead beneficiary for this deliverable: Karlsruhe Institut für Technologie
(KIT)

Engage2020 Partners

Teknologirådet – Danish Board of Technology (DBT)

Toldbodgade 12, DK-1253 Copenhagen, Denmark

Contact: Marie Louise Jørgensen

mlj@tekno.dk

www.tekno.dk



FONDEN TEKNOLOGI RÅDET

DANISH BOARD OF
TECHNOLOGY FOUNDATION

Karlsruhe Institut für Technologie (KIT)

Kaiserstr. 12, 76131 Karlsruhe, Germany

Contact: Leonhard Hennen

leonhard.hennen@kit.edu

www.kit.edu



The Involve Foundation

33 Corsham Street, London, N1 6DR, United Kingdom

Contact: Edward Andersson

edward@involve.org.uk

www.involve.org.uk



Rijksuniversiteit Groningen (RUG)

Nijenborgh 4, 9747 AG Groningen, The Netherlands

Contact: Dr. Henk A.J. Mulder

h.a.j.mulder@rug.nl

www.rug.nl/wewi



university of
 groningen

Applied Research and Communications Fund (ARC Fund)

5 Alexander Zhendov str., 1113 Sofia, Bulgaria

Contact: Zoya Damianova

zoya.damianova@online.bg

www.arcfund.net



Dialogik Gemeinuetzige Gesellschaft fuer Kommunikations- und Kooperationsforschung mbH

Lerchenstrasse 22, 70176 Stuttgart, Germany

Contact: Rainer Kuhn

Kuhn@dialogik-expert.de

www.dialogik-expert.de



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Content

- 1. Introduction - Engaging the public: Perspectives within Engage 2020 5**
- 2. Policy options for public engagement within Horizon2020 7**
 - 2.1. Rules and regulations 8
 - 2.2. Infrastructures/institutions/networks 11
 - 2.3. Funding & Incentives 13
 - 2.4. Training/ Capacity building 16
 - 2.5. Promotion 17
 - 2.6. Research activities 18
- 3. Conclusions 20**
 - 3.1. Actors and PE Policies 20
 - 3.2. The European Research Area and Public Engagement 23
- Literature 25**

1. Introduction - Engaging the public: Perspectives within Engage 2020

The objective of the project Engage2020 (www.engage2020.eu) is to highlight policies and methods, which are suited for stimulating the engagement of members of society in the EU Research and Innovation Programme Horizon2020.

Scientific scholars, policy-makers and Civil Society Organisations (CSOs) expect multiple advantages from including societal actors in research and innovation policy formulation. The motivation for this inclusive approach is reasoned differently: (a) If citizens had the possibility to contribute to political decision making, science and innovation policy would improve its responsiveness and legitimation. The background of this reasoning is a perceived disenchantment of parts of the public with politics and a decline of public trust in policy makers and political institutions. Involving the public is expected to make R&I policy more democratic and accountable. (b) By including lay people – citizens, stakeholders, CSOs – in research activities and policy formulation the reflexivity of science as well as the societal utility, adaptability and “robustness” of scientific knowledge could be improved. (c) Participatory approaches are increasingly gaining importance not only on the level of R&D policy making but also on the level of innovation and research processes itself. On the one hand, it is expected that debates and conflicts about innovation can be avoided if the interests and wishes of consumers and interest groups are taken into consideration early in the innovation process. On the other hand, the inclusion would also facilitate that – when entering the market – innovative products, technologies and services will meet the needs of their users. The participatory integration of employees in innovation processes at the workplace in a similar vein is expected to benefit from the implicit knowledge of the workforce as well as to foster practicability and acceptability of innovations.

Our literature review shows that there is currently a vivid landscape of approaches to Public Engagement in R&I (Hennen/Pfersdorf 2014). The way how the public can be involved in R&I and the roles representatives of the public can take are manifold. Despite a growing interest in PE and a growing number of experiments the broad scope of ways to include citizens in R&I is not fully developed yet and there is a lot to do in terms of opening up R&I to the public in more than symbolic but practically meaningful ways (Hennen/Pfersdorf 2014, 58 f.).

1) Setting the R&I agenda – It is possible for civil society organisations (CSOs) or lay people to be involved in the process of setting the research agenda of (national) R&I programmes – e.g. through the mediation of a Technology Assessment (TA) institution – thus providing a knowledge base for decision makers in parliaments and governmental bodies. However, although CSOs have asked for involvement in order to orientate the research towards societal needs, advisory boards still comprise mostly representatives of the scientific community and experts from related industries

2) Supervising and assessing R&I – The public can participate in the supervision and assessment of R&I programmes and projects in various ways. Societal groups can contribute to R&I policy making by discussing ethical aspects, possible risks and benefits and thus contribute the socially sound decision making with regard to research programmes or regulatory approaches to R&I. Advisory boards including CSOs can observe the ethical or e.g. environmental principles in research processes. With

regard to workplace innovation, employees can oversee the effects of the innovation processes on workforce's needs and interests.

3) **Actively initiating and funding research** – In recent years, a growing number of cases of research initiatives coming from CSOs and lay citizens have been observed. Especially in the sector of medical research patient organisations take an active role in defining research which should help to explore possible treatments for rare diseases. Another way for initiating research is the science shop model, where researchers offer support to communities, CSOs or groups of citizens to define and set up research that serves their own needs

4) **Shaping the R&I process** – There are public engagement activities which are designed in a way to give opportunities for lay people to put their specific knowledge into a research process. Researchers and citizens can cooperate in order to define a specific research question, or to discuss research results, the validity with regard to the problems-perceived by communities and the solutions needed and risks involved. It is also possible for users to be involved in shaping the R&I process. In the field of software design, for example, they can contribute with their practical knowledge to inspire improvement of technologies or new R&I innovation processes.

5) **Gather data** –Lay people can play the role of co-researchers (and not only observers) by making observations and interpretations in research fields like meteorology, astronomy, environmental monitoring, biodiversity research, brain research and many others. In most cases scientists are the ones to define the research process and the role of lay people is to contribute to the research with everyday life skills or common sense knowledge. Lay people can also be trained to become involved in more specific research tasks.

In the empirical work of Engage 2020, we have mapped 110+ policy practices covering EU countries, the EU, selected other countries and international organizations (Kuhn et al. 2014). By far, we cannot claim to have a list of all activities but we are able to identify trends and gaps related to the fields of our literature review. With this in mind, we aim to identify policy and activity innovations, which support engagement and which can be applied also outside of the original setting. The scanning of policies and activities includes a list of descriptors as the reciprocity in the engagement process, reasons for setting up the policy or activity, evaluations or comments on the policies and activities, funding mechanisms and other instruments, geographical scope and disciplinary areas of use, societal challenge addressed, stakeholders involved or number of citizens, and known success and fail factors. The literature review as well as the empirical study are the basis for us to identify policy options which will have the potential to fruitfully support future engagement processes within Horizon 2020 and beyond.

2. Policy options for public engagement within Horizon2020

In principle there are four different levels which are crucial to identify policy options in the field of public engagement in science and science policy: The levels of (1) policy formation and (2) program development as well as (3) program definition and (4) research and innovation activities.

- **Policy formation** is the praxis of defining the frame conditions for R&I activities. This includes making policies for distribution of funds between programs, rules and instruments on responsible R&I, legal regulation on applying technologies as well as any process of opinion forming on the general paths of R&D politics, such as discussions on how to define and steer towards sustainable and socially acceptable R&D policies. Public engagement on this level comprises involvement of CSOs in political debates or hearings in parliaments or advisory panels of governmental agencies as well as the organization of citizen dialogues. Engagement is mainly about participation on the level of opinion forming in a non-binding manner. Engagement exercises can be supported by or be part of TA activities.
- **Program development** as the process of defining the content of R&I research programs is typically a process involving representatives of the research community and stakeholder groups. Technology Assessment processes are often carried out in the context of discussions about goals and focus of governmental R&I programs. Involvement of CSOs (public interest groups) is not standard but can be organized by public consultations on setting R&I funding agendas on the national level. In the case of workplace innovation, it is also possible that employees or their representatives are involved in setting the agenda for and defining strategies of innovation on the level of the company. Involvement of patient organisations in the development of public research agendas in the health sector is a case in point as well.
- Involvement of NGO's in research and innovation processes can also encompass the **definition of a R&I project**. Researchers and interest groups cooperate in setting up R&D projects that fit the needs and demands of societal groups. A case in point again is medical research that is initiated and driven by patient groups. Another example are Science Shops which carry out or mediate research on request of civil society organisations or citizens, with various degrees of participation. The engagement is 'upstream' (starting from setting the research agenda). Formats such as stakeholder workshops as well as citizen panels are applied to inform the so called "scoping process" of TA projects. Here, it is about exploring the scope of aspects to be covered as well as the fine tuning of the problem definition that needs the input from different societal perspectives. This is regarded to be an indispensable condition for providing for a proper analysis as well as for legitimate results of the assessment process.
- Engaging society directly in the **research and innovation activities** is a field of PE that normally is not covered by discussion on public participation in science and technology. It is about direct support of and involvement in research itself and can - as projects of citizen science show - support science in managing research for which great amounts of empirical data are needed. Engagement on this level moreover can allow for clarification of normative issues in the scientific process (e.g. processes to ensure responsible research and innovation on the project level), may improve the relevance and thereby the implementation of research and innovation results (involvement of users), or may support the functionality of science and research for societal groups by organizing research on behalf of and with

communities, CSOs or patient organisations (for example through Science Shop related activities).

In the following, possible policy options to support public engagement in all fields named above are presented alongside six types or dimensions of policy interventions clustering possible policy measures:

- Rules and Regulation;
- Infrastructure/Institutions/Networks;
- Funding and Incentives;
- Training;
- Promotion;
- Research activities.

The dimensions are, of course, overlapping in many respects. A sound policy strategy has to be derived from all fields described below.

2.1. Rules and regulations

The implementation of rules or the development of certain regulations is the most formal effort to integrate public engagement in R&I policy making and practice. Rules and regulations mainly are appropriate and needed to integrate PE on the level of policy making (in our scheme: policy formation and program development). With regard to R&I policy on the EU level this would comprise policy making processes of regulation of risks and benefits of new technology options (such as the debate on nano-materials), priority setting in EU R&I funding and development of particular funding schemes and programs (such as the development and design of Horizon 2020). On this level processes of public consultations are increasingly integrated in policy making (be it by single consultation processes on directives, as practiced by the EC, or by institutionalized bodies of TA and technology dialogues on the national level). However policy formation and program development is still mainly dominated by boards of experts with representatives mainly from research, academia and strong economic interest groups. To allow for a strong representation of public perspectives and civil society needs in R&I priority setting and program development is a task that affords strong political commitment. Existing PE practices on this level mainly suffer from an unclear function and role with regard to decision making, and it often remains unclear how and whether at all results of PE processes are taken account of in decision making. Making PE (public consultation) a standard procedure in policy formation, would give public engagement a formal role in decision making in S&I and definitely strengthen the relevance of PE within policy making. Initiatives in this direction would be supported by principles of good governance as laid down in the Lisbon strategy and more explicitly defined in the White Paper on Governance (EC 2001) and similar activities on democratic EU governance and “Science and/in Society” in the following years (up to the MASIS Report, 2009).

Such rules could encompass on the level of **policy formation**:

- A declaration on **mandatory PE** in specific STI fields on the EU and the national level inspired by the Aarhus Declaration, which made it mandatory on certain environmental areas. Engage 2020 found a few examples of national governments opening up policy making processes (as

in Greece (3)¹ for online participation or a bill in Bulgaria (8) requesting online publication of a bill before it is adopted. These initiatives mainly provide for a more transparent decision making process, but do not make PE a must in processes. Most decisive is that there is no provision for monitoring of the uptake and use of PE in the policy making process. The latter also applies for the many online PE exercises applied in the last decade on the national and EU level and the public consultations of the EC (37). Whereas such more informal PE experiments are suffering from a lack of political commitment and a defined role in the policy making process, more “constitutionally” fostered forms of PE such as referenda in Switzerland or the European Citizen Initiatives include high barriers by formal rules and requested quota that hinder deliberation and direct communication among civil society and policy making. What is asked for are flexible and open processes of public consultation on emerging issues of the R&I policy making agenda that are nevertheless strongly embedded in the policy making process itself, as e.g. the NHS Act in the U.K. which requires engagement in the health sector, including research.

- Declaration on a **national establishment of institutions** or infrastructures (see below) dealing with public engagement, e.g. TA institutions. This is inspired by comparable rules in the area of human rights, where national institutions are mandatory. Many policy expressions for participatory TA or participatory Foresight have been made, but have not yet crystalized into a common set of rules.
- Implementation of **codes of conduct** to support PE in policy making processes, as e.g. set up by the Stakeholder Dialogue of DG Health (51) is helpful to make actors sensitive to PE. This should however be fostered by **Rules of Procedure** regarding PE activities within policy making organisations on national and European level (e.g. parliaments, governments, agencies, EU institutions) in order to set standards for not only implementing PE as a procedure but also for taking account of results in factual decision making, such as agenda points in committees or special meetings on PE project outcomes which would ensure continuous follow ups on the results of PE initiatives.

Currently, typical barriers of involving the public in **program development** are a lack of transparency of policy processes and stakeholder involvement to the wider public. The process of program development is opaque with regard to actors having a say, and to the input, selection and definition of R&I objectives and priorities. Moreover, stakeholder involvement appears to be restricted to strong pressure groups whereas public interest groups (environment, consumers, patients etc.) as well as local or regional perspectives play a minor role. To overcome these shortages, on the level of programme definition, the development of standard procedures of how to involve the public would support the systematic integration of PE in the identification of the future research agenda of the EU. It is crucial to reflect on all three phases which are relevant for the program definition on EU-level: design, decision-making and implementation. With the definition of the grand challenges as a means to orient R&I towards societal needs the EU has done a major step to demand driven R&I. This would however remain incomplete and flawed without taking account of societal needs in the operationalization of programs and calls by providing for PE also on this level. The inclusion of societal needs in research programmes could also be supported by including “societal impact” as a

¹ Numbers in brackets refer to the fact sheets produced as an outcome of Engage2020’s exploration on “Policies and Activities of Societal Engagement in Research” (Kuhn et al. 2014, deliverable 3.1).

criteria in evaluation of research programmes as e.g. in the Dutch ERiC programme (Evaluating Research in Context) (26).

Design phase:

- Involvement of public actors by inviting them to workshops and to open-days, where the first ideas of the research programme are discussed and the wishes and expectations of the public are recorded. There should be **direct invitations to various actors** for making contributions.
- Set up **standard procedures** of involving public actors through consultations, hearings but as well through a call for public experts who should evaluate proposed research programs
- Accordingly, the agency responsible for the programme development should enable public actors to participate in **social media activities** to connect to their constituencies and the wider public to receive feedback on ongoing discussion.
- In the different **committees**, which discuss the draft research programme and make recommendations, all interest groups need to be balanced.

Decision-making:

- **Transparent development of the research programme:** responsible policy-makers should be obliged to argue why the programme took its shape and why e.g. public expectations could not be considered.

Implementation:

- It is often difficult for CSOs to relate to the academically defined research problems as addressed in funding calls. Each research programme should contain **open calls**, i.e. not dedicated to a predefined research question, in order to allow for civil society organizations, user groups etc. to apply with a project of their interest.
- In order to increase the societal relevance of the research programme, **horizontal linkages** between its different branches should be facilitated or even enforced.

EU wide agreements on standards could also support PE initiatives on the **project definition** level and on the level of **R&I activities**. Community based research activities or science shops at universities or run by other actors could be supported in this way. But also the in the Horizon2020 calls it could be provided for more openness towards public demands and interests (for further options in this respect see below: "Funding"):

- PE could be set as a **definite standard** for certain types of projects (applied research, problem oriented research) within the calls of the Horizon2020 program. Appropriate criteria should be developed together with actors relevant for the fields of the grand challenges. First steps in this direction are marked by the inclusion of criteria related to societal relevance of research in the Research Excellence Framework in the U.K. and in institutional auditing (115). (see also the "Grand Challenges Workshop" to be carried out in Engage2020 on 26-27 January 2015, Brussels).
- Part of these standards could be rules for "**open access**" to data and results of publicly funded research. "Open access" thus should go beyond the open access strategies targeted towards the research community as involved in the development of the European Research Area. Standards would include requirements for presenting data in a way that they are as far as possible understandable and accessible also for interested lay people.

- **A European Code of Conduct** on governance of STI which would involve Public engagement. This CoC could be ratified by universities, agencies, EU-institutions, industry organisations, and CSOs (and could also be combined with support for appropriate training and university curricula, see below). Examples are the EC's Code of Conduct for Responsible Nanoscience and Nanotechnologies (129) or the Concordat for Engaging the Public with Research in the U.K. (125)
- Higher education institutions are often required by law to serve societal needs. It is only recently that this is translated into rules of involving civil society groups in project definition as e.g. in the Irish National Strategy for higher education (28).

It is a challenging task to integrate PE in policy formation and program development in a functional, democratic and robust way, especially on the level of EU (R&I) policy making. Any initiative in this respect should draw on the experience with participatory processes attached to policy making and policy advice at hand e.g. at institutions of Technology Assessment in many European countries and as discussed in scientific literature. Critical points to take care of are representativeness or inclusiveness of the set of participants; sound translation of outcomes of PE processes into policy making; serious commitment of political institutions to PE; political (in)dependence of organisers of engagement processes. Furthermore, PE policies should be connected with other existing policies, such as "social inclusion" policies.

2.2. Infrastructures/institutions/networks

Setting up institutions or enlarging the scope of existing EU-institutions for PE would be a powerful measure towards public engagement within the EC. Such institutions dedicated to PE could not only form an important knowledge and cooperation base which could be used to connect questions and demands from EC-staff, researchers and citizens likewise. It could furthermore fulfil an important networking function between the national PE landscape and the EC. The following variants at the level of **policy formation** are conceivable:

- **Enlarging the scope of existing organizations:**
 - National EU contact points could focus on PE ("NCPE") in all member states. They could be connected to a competence center. National contact points could advertise research programs and projects towards the public. Furthermore, national contact points could serve as mediator between the funding organisations, CSOs and scientists.
- **Strengthen intermediary organizations:**
 - "Participation offices" (independent competence centers for public engagement in R&I) could be set up on the European and national level as well as on the institutional level (universities).
 - New bodies involving only civic actors can be set up to consult the responsible administration as being done e.g. by the Consumer Consultative Group at DG Health (49). Provisions have to be made to monitor the "impact" of these bodies in R&I policy making.
 - Science Shops could, with appropriate financial support, enlarge their competence to European R&I questions

Stakeholder Committees including CSOs involved in research programme development are established especially in the field of health care and medical research also at the EU level (for Pediatrics, 40, Advanced Therapies,38, Orphan medical products). These can on the one hand serve as a model for other fields of research. On the other hand, it has to be provided for that recommendations of CSOs are taken account of in the policy process.

- **Setting up new institutions:**
 - A European PE Competence Center organized as an agency on a permanent level. It should be designed in such a way that it not only functions within the EC, but should be also open for the interests of the member states. Furthermore it could be the linking organization for the national contact points focusing on PE (see above). In terms of organization, there could be a split ownership, e.g. partly EU/ member state or membership financed.
 - Another option would be a research and innovation council on PE that takes care of public expectations and public research interests within the EU-commission.

In general, institutions should be designed in such a way that they can support all crucial groups of PE (EU-staff, researchers, CSOs, citizens). On the level of **program development** they should support EU-staff in the definition and choice of relevant experts taking PE into account and for the sound integration of citizens (“watchdog function”). Furthermore, the institutions should serve as a competence and contact point for scientists and citizens planning (project definition), and conducting research activities (“People and knowledge brokerage function”).

A weaker, but nevertheless effective path to embed PE within EU-research could be to strengthen existing networks of participation as well as independent institutions outside the administrative body of the EC. This would be especially relevant for the levels of “**project definition**” and “**research activities**”, as here most of the networking activities outside the EC are taking place.

- Infrastructures and institutions supporting the engagement of citizens in R&I are not sufficiently developed. Helpful **infrastructures that provide for connecting researchers with citizens and CSOs** such as science shops or platforms for citizen science could be supported. Examples are the Citizen Science Initiative in Germany (107), the School University Partnership Initiative of the UK Research Council (116) or the REPERE program of the French Ministry for Ecology and Energy supporting cooperation between innovation management and civil society (17).
- **Continuation of support of strong networks** of engagement, e.g. by supporting conferences or training programs.
- **Widen scope of existing networks:** Support of multi actor/disciplinary associations for PE as a platform for exchange on and promotion of PE in R&I across Europe, e.g. for pairing schemes for established PE/TA institutions and institutions in the making. **Examples** for already existing networks and platforms which could be supported or serve as models for additional activities:
 - Cross-EU network on policy-oriented TA (www.eptanetwork.org), with a special emphasis on PE-based TA. TA includes a mission for PE (20) and TA institutions could function as contact point for PE in R&I.

- Living Knowledge Network: Cooperation could be advanced through, e.g., the GACER (Global Alliance for Community research, 82) network, The British experience with the National Contact Center for Public Engagement (NCCPE) experience could be shared and adapted to continental Europe through this network.
- Networks of CSOs (Agora) to encompass a broad range of different interests shaping R&I.

2.3. Funding & Incentives

Funding constitutes a very effective lever to direct research activities. Thus, conditions for funding can be elaborated to strengthen and broaden PE activities in EU-funded research. However, currently, there is a weak connection between funding agencies and CSOs, although already first funding schemes exist, like e.g. the Europe for Citizens Programme (2007-2013, Nr. 46) which provides funds for cooperation activities and operating costs for NGOs. Still, there seems to be a general lack of knowledge among civil society on how they can participate in informing EU research policy. On top, sufficient funding possibilities for community based research are currently not foreseen by the EC.

On the level of **policy formation** it would thus be important to identify efficient funding measures which allow using knowledge from PE processes within policies of the EC to further support policy decisions. On the macro level, the following funding options are at hand:

- Support for the development of a **“code of PE conduct”** for the EC, universities and other research actors as well as CSOs as an orientation of further PE activities within the EC.
- Funding for the development of **an index on national + EU STI governance including performance in PE.**
- **Fast funding route** for EU-wide PE on policy-relevant issues, in order to be able to match the policy-making cycle and pace.

At the level of **program development**, funding is an important measure to shape research projects towards public engagement. Hereby it seems especially important to make the demand and need for PE explicit in the calls (as is already started by the Science with and for Society Program at DG Research, e.g. the VOICES project, 90). A clear signal to researchers should be given that PE is a criterion for evaluation panels to score proposals.

We see the following options for **integrating PE in future EU-calls**:

- Include public engagement as **mandatory** in R&I calls
 - A certain **% of program budget** set aside for PE activities, this counts especially for flagship projects, very large consortia (such as fusion research) and large research infrastructure investments
 - Include **“enforcement clauses”** in calls for project proposals: PE as a success criterion for proposals, request a plan for PE as part of proposals, PE practice as part of project evaluation. Give concrete standards for time and resources to be invested in PE and provide for possibilities of project evaluation by public participants: are they satisfied with the type of involvement/their role in the project (information on volume, scope, and budget)?

- Offer **different call formats**
 - Currently, open calls are missing which could enable the public to bring in topics of self-defined relevance. Thus, **make Open Calls** in each of the Grand Challenges with the only requirement to do 'research with or for civil society'. In this way, one can benefit from topics and knowledge from grass roots level and include these in EU research directly. As long as many small projects are possible there is no problem with representativeness; calls are open to issues of any scientific institutions and CSO across the Union. Also, a Cross-EU example project could be funded with an open call where topics are not predefined.
 - **Provide extra funds (rewards) for "risk taking"** in the field of PE, as PE in research projects implies openness for methodological experiments (see also Felt 2014).
 - Funding to develop **"disruptive citizen visions"** in different fields, in order to break the closed thinking in research communities (see also Felt 2014).

Furthermore, a quality management for PE, including the development of an adequate evaluation strategy and a detailed description of the aim and scope of the PE activities in the single projects should be included in the calls.

- Varied **evaluation criteria** for public engagement in proposals might be developed. Additionally the introduction of two evaluator types would support the quality management of PE proposals: one for scientific quality, one for engagement quality. The latter can be a number of people representing CSOs.
- Generally it should be provided for that a request for PE in Horizon 2020 asks for an **explicit statement** (plan) how, why and for what purpose PE is included in the project work. It is especially important to request reasoning on how the outcome of PE will be used in the project, in order to avoid that PE is just an idle add-on activity.

Furthermore, there should be a reflection process on the need and relevance of PE in all topics, the EC raises. This would be important for a broad and targeted inclusion of PE in EU-research.

- All topics/calls should be **revisited before launch with regard to the need for a PE dimension** in the projects.
- **Specific subprograms** could be relevant in controversial research areas, so that PE can go at arm's length from the research consortia, but still in dialogue with them.

Whereas the above mentioned measures are pointing to scientific organisations and CSOs alike, a crucial aspect which should be explicitly addressed in **"program development"** is the increase and also variation of CSO-participation. To achieve this, the following specific measures are proposed.

- In general, a **two stage funding** would be seen as beneficial by CSOs. To set up new partnerships, a small grant would help, before applying for a larger one, in order to build a consortium with enough trust among partners and make a decent plan to submit. This would also allow involving various public actors (like grassroots or local initiatives) and not again the same (established) organizations. Here, the long experience of the Canadian Social Sciences and Research Council (114) could be used.
- In order to make the involvement of the public in research programmes easier, **the amount of possible grants could be reduced**. Public actors do usually have problems that don't need the same amount of research funding as researchers do. By making the grants smaller, the

projects become more manageable for public actors, e.g. 250,000 € for a single project with required partnership in 2 member states at minimum. It is expected that the smallness of the projects prevents the usual suspects from going for these funds. This way of bottom up programming seems quite cheap as well, since the Commission itself does not need to prepare specific calls based on citizen's inputs first.

Besides, the following administrative prerequisites to integrate CSOs in EU-research activities should be considered:²

- Use the current definition of CSOs as previously in FP7. Possible mis-use of the definition of CSO might be investigated. It might be not sufficient to define the purpose of a CSO to be "not for profit", as there are organizations enjoying a "not for profit" status but nevertheless clearly representing commercial interests (Consider 2013).
- CSO could be allowed to take a specific role in a project, e.g. be 'principal & user', if they for administrative reasons cannot or do not want to be a formal partner in a R&I project.
- Co-working with other research funders (e.g. connection of European and national agencies) should be established.

For the phase of "**project definition**" as well as "**research activities**" it would be also important to introduce a mandatory action as an orientation for researchers to integrate PE in their proposals, thus

- There could be financial incentives for public engagement in research projects. A **fixed percentage of each project budget (5-15%)** should be invested in PE activities.

Furthermore, with respect to a long-term perspective of PE in science, there should be funding targeted especially at the research work at universities:

- Incentives for **universities** to set up infrastructures different from disciplinary organization, e.g. institutes/offices for "problem oriented research" which work in a trans-disciplinary mode, take up community issues (similar to science shops) and involve citizens in project work. Hereby Horizon 2020 could support **projects to explore PE options** for universities or provide financial support for science and society activities of universities; a national example would be the UK program "Beacons for Public Engagement" (123).
- Incentives to combine science shop activities with "crowd science": i.e. do projects on behalf of communities, groups of citizens and at the same time recruit citizens for project work.

A common problem is that CSOs are under-equipped with resources to join project work. This can be a barrier for CSOs to engage themselves in projects or in the proposal phase of projects

- **Financial support of CSOs** is needed (per day, travelling) for preparing projects (proposals).
- Incentives for **CSOs to involve their members into citizen science**. Projects could be set up in which CSOs motivate their members to contribute as citizen scientist. The time they invest could be rewarded to the CSO in terms of financial support.

² This type of funding is based on the highly successful pilot call for any research brokered through science shops, at the end of FP6, which led to the funding scheme of research for the benefit of specific groups/CSOs in FP7. In that Science Shop Call, there were approx. 26 projects above the threshold; of which 4 could be funded (call was 1M).

2.4. Training/ Capacity building

To conduct a PE process and to get relevant results out of it is a demanding process for all actors involved. Even if a participative process has been conducted in the best methodical manner, it is not for sure that the results of the process are used and kept up in the political institutions that started the participation process. In order to implement the PE processes in R&I actions of the EC and to use the results in the administrative bodies involved, it is especially important to directly address and educate the various groups of people which are involved in the PE-process (EC-staff, scientists, public actors). The successful integration of PE requires not only theoretical and methodical knowledge about the various forms and methods of participation. It furthermore requires certain “participative” competences, e.g. discursive, analytical, or moderation skills etc. which should be trained. Policy measures in the field of capacity building/training in PE should again address all four levels as identified above.

On the level of **policy formation**, training measures could be implemented by setting up rules to formally integrate training measures within EU-regulation:

- Expected competence and rights for training of all actors involved in the PE process could be included in the *Code of Conduct* mentioned above.
- Inclusion of mandatory training in programmes and actions on inducing and funding of PE initiatives and institutions.

In the field of **program development** training options could be integrated

- By offering voluntary training options within supportive actions.
- By the development of training measures for the staff of the relevant administrative bodies and experts involved in the commission, e.g. training on the added value of PE-processes for policy making as well as limits of their contribution (a national example would be the training measures of the UK Sciencewise program (108)).

As at the level of **project definition** as well as of **R&I activities** participation is conducted in the most practical sense, it is especially here that needs for training evolve in the “process of doing”. Thus, it would be very helpful to set up and develop tailor-made and adequate training models for the scientists as well as the public actors involved which accompany both phases of research: project definition and R&I activities:

- There should be trainings for **scientists** applying for projects within the research programmes, e.g. on methods how to integrate the public into their research already at the level of project definition. Up to now, the training available for researchers on public engagement is limited. However the Living Knowledge Network (33) offers training opportunities tailored also for researchers like summer schools and a web-based toolbox.
- Vice versa, there should be trainings for **public actors** who want to get involved, so that they increase their understanding of the academic sector and the related policy-fields and are empowered to take part in informed discussions. Thus the knowledge of the relevant public to give feedback could be increased. One example would be the training for patients to take part in informed discussions conducted by the European Medical Agency (28).

- The reluctance of researchers to adopt citizen science is often substantiated by the argument of allegedly “lower” standards of **data quality**. Training on ways to provide for good quality of “lay data” could help.

In order to arrange the trainings it would be recommendable to make use of existing infrastructures and organisations. On the one hand universities/ research institutions are an important actor to provide training for scientists (and citizens):

- Inclusion of PE (e.g. user involvement) in academic curricula.
- Support universities in setting up “service learning” as part of curricula (students have to connect to communities/civil society organisations to do research on behalf of them). This would support building up openness with regard to Public Engagement among (young) scientists. In “community-based research” the students are even more engaged with civil society and its organisations; the usual time spent on a research project with civil society is much longer than the typical service learning project (see e.g. the Dublin Institute of Technology’s Students Learning With Communities: <http://www.dit.ie/ace/>).
- “Massively open online courses (Moogs)” as set up by some universities could be an example and door towards citizen science, include funding for such activities in programs.

On the other hand existing networks and initiatives which already deal with educating the public should be engaged:

- “Citizen Science” could be integrated in the education system from public schools (participating in CS projects), to general higher education, to PhD’s (part of curriculum, maybe with specialized courses for different disciplines)
- Summer Schools and Training & Mentoring of Science Shops and the Living Knowledge network could be continued for research institutes and higher education institutes that want to start this. This requires either additional EC funding in a project or delivering it as paid service.
- TED-talks or online videos could serve as educational measurements, where academia and responsible administrations could be informed about the concepts and advantages of PE.

2.5. Promotion

Next to the strong “formal” incentives, outlined above in the previous chapters, in the following “soft” promotion activities are proposed which have the potential to raise interest for PE on a broad and continuous basis. Traditionally, conferences are tools to foster exchange about latest developments in a certain field. For public engagement, the conferences on Science and Society organized as part of the European Presidency, e.g. in Rome 2014 or the bi-annual Living Knowledge conferences are important in this respect (36). However, it is especially important to address scientists and CSOs alike. The establishment of new formats on specific questions of PE like journals, conferences, etc. would even more contribute to promote PE within the scientific system as such, as currently the scientific career planning and reward system is not conducive to doing community related research (see also Kuhn et al. 2014: 40).

- Establish **journals/ conferences** on the topic, e.g.:
 - Policy-journal “STI and EU Public”

- Annual conference on STI governance
- EU “STI and EU Public Week”
- Develop peer-reviewed repositories for other output than scientific papers (similar to e.g. <http://ces4health.info/>)

To reach the broader public as well as CSOs, the following advertising measures are proposed:

- Annual EU prize/**award** on PE and/or good STI governance
 - E.g. best practice projects should be highlighted and promoted by extra rewards, e.g. like the “bi-annual Dutch-Belgium Science Shop award” (36), or the Dutch “Academic year award” giving the winning researchers 100.000€ to work with citizens on their projects (41).
- Use of **media channels** and **targeted communication**
 - When the design process of a programme is launched, the administration could advertise this on websites, radio broadcasts, social media etc. in order to encourage public actors to contribute.
 - Provide for media coverage on salient citizen science activities as the number of volunteers for projects can be raised considerably by media news: Set up media events to promote projects, support networking activities of CSOs.
 - Support internet platforms where scientists and citizens can meet.
 - Targeted communication programs to spread the idea of and opportunities for involvement of CSOs or citizens among “intermediates” (e.g. school teachers).

2.6. Research activities

With respect to research topics which should be raised in the future, PE should not only take a side function, by accompanying research topics with a PE perspective. Rather there should be funding and calls for research on PE itself. We propose the following future research streams on PE as most important:

- Research on **methods**:
 - Experimentation and experience-building on new strands of methods,
 - Method development with regard to scanning and foresight activities
 - Alignment of normative lay people perspectives with scientific standards of “objectivity”,
 - Structuring of participation processes, esp. tailor-made participatory formats depending on the issue (e.g. when to choose citizen dialogs with 100 people vs. expert groups)
- Support research on **motivation of citizens/users** to contribute to R&I (citizen science) in order to develop ideas for raising participation in resp. projects
- **Long-term permanent evaluation/monitoring**. This proposal is based upon the experience from TA that impacts may only be seen long time after the projects end. Also for PE, such a long time horizon is important to evaluate the outcomes of the initiatives.

Scientific knowledge production has usually a very long time horizon. What would be important however would be a direct access to the research results, even to interim results.

- **Open access to intermediate results** (as is often the case in citizen science projects) should be made obligatory for certain types of projects in Horizon 2020. Furthermore, there should be an obligation to provide open access to data, also by presenting data in a way accessible for lay people.

3. Conclusions

The above given considerations provide a broad scope of possible activities that can be taken up in order to support public engagement in research and innovation. The wealth of options at hand makes it difficult to select more or less important, or more or less effective ways to support the further integration of public engagement in R&I policy making and in research. What is needed is targeted integration of measures of all types and in all fields of practice of PE, which again can be best developed by involving actors from science as well as from civil society. In a nutshell the central challenges and actions to be taken up are the following:

- **Rules & Regulations:** Provide formal rules for PE to make it obligatory on EU-level
- **Infrastructures:** Strengthen infrastructures for the implementation of PE activities on all levels of the R&I process
- **Funding & Incentives:** Give time and resources for all actors included and open up the academic system (reward structures, remove organisational barriers)
- **Training and Capacity:** Provide training measures for all actors
- **Communication & Promotion:** Change the culture of engagement
- **Research:** Support research on (long-term) evaluation of PE

In the following two sub-chapters we will (3.1) briefly sum up on the options at hand by reflecting on the different roles of actors in setting up policies for supporting PE in R&I. Finally we reflect on the relevance of public engagement for the success of the ongoing process of developing the European Research Area (ERA).

3.1. Actors and PE Policies

In the process of R&I different actors take different roles and responsibilities; accordingly their competences and capacities to set up activities/policies to support and foster PE processes in R&I differ significantly. Table 1 clusters the relevant actors in the R&I process – from R&I policy formation to concrete R&I projects – in four categories: Governmental agencies on the European and national or regional level setting frameworks and legal regulations for R&I, organisations setting up or administering research programmes and funding, public and private R&I institutions carrying out research and innovation activities and civil society organisations monitoring and accompanying R&I and articulating social demands and concerns relevant for R&I.

The obvious fact that the four categories of actors are focused towards particular roles and competences in the societal R&I process does not imply that they are restricted to certain types of PE policies – although the policies at hand to different actors differ with regard to their “political reach” (from national to inner-organisational).

Table 1: Actors and PE policies

	Government - National and EU	Research Fund. Org./Research Councils	Universities, public and private R&I institutions	CSOs
Rules and Regulations	<ul style="list-style-type: none"> • Legislation: Mandatory PE in S&T policy making • Rules for using PE in R&I policy making • Open Access policy for research data 	<ul style="list-style-type: none"> • Codes of Conduct • PE as part of best practice standards. • Include civil society in programme committees and boards • Open Access policy for research data 	<ul style="list-style-type: none"> • Codes of Conduct 	<ul style="list-style-type: none"> • Establish a policy for PE within organisation
Infrastructures/ Institutions/ Networks	<ul style="list-style-type: none"> • Platforms and National Centers for PE in R&I • Include PE in TA, Foresight ... • Civil Society Councils for R&I, R&I council for PE 	<ul style="list-style-type: none"> • Platforms for PE • Support for PE in R&I projects • Competence centers for PE in R&I 	<ul style="list-style-type: none"> • Setting up centers for PE (Science shops) • Centers for problem oriented research • Contact points for citizen science 	<ul style="list-style-type: none"> • CSO networks and platforms for PE • Join networks with focus on PE
Funding/ Incentives	<ul style="list-style-type: none"> • X% of research budgets for PE • Financial support for PE institutions • Fast funding route for PE issues • Open calls for R&I 	<ul style="list-style-type: none"> • PE as criteria for funding decisions • Support for Researcher doing PE • PE mandatory in R&I calls 	<ul style="list-style-type: none"> • Financial support for students and researchers active in PE • PE competences as evaluation criteria in recruitment of staff 	<ul style="list-style-type: none"> • Provide funding for PE • Use position in advisory boards
Training	<ul style="list-style-type: none"> • PE Training for R&I administrative staff • Support training for civil society actors to get involved in PE • Include PE in science curricula at secondary schools 	<ul style="list-style-type: none"> • PE training programmes for researchers 	<ul style="list-style-type: none"> • Including PE in curricula • Service learning for students in community based research 	<ul style="list-style-type: none"> • Training for CSO staff in PE
Promotion	<ul style="list-style-type: none"> • PE campaigning and national events • Use mass media to promote PE 	<ul style="list-style-type: none"> • PE awards for researchers 	<ul style="list-style-type: none"> • PE awards for researchers 	<ul style="list-style-type: none"> • Public campaigning and lobbying for PE in R&I
Research/ PE Studies	<ul style="list-style-type: none"> • Programmes for PE research 	<ul style="list-style-type: none"> • Programmes for PE research and evaluation of PE practice • Journals, conferences on PE 	<ul style="list-style-type: none"> • PE research as part of portfolio of departments 	<ul style="list-style-type: none"> • Initiate studies on PE, Evaluation of PE practice

As regards “rules and regulations” national and EU governmental bodies could take a fundamental decision on setting a framework conducive with regard to PE by making PE a mandatory part of R&I policy making and providing for public access to research data thus alleviating the involvement of representatives of the public in R&I. Other actors would induce rules that help to motivate researchers to regard PE as a mandatory part of their professional activity, e.g. by including PE in codes of conduct for good scientific practice and by including civil society representatives in boards and programme committees. Also CSOs - despite the fact that they understand themselves as representatives of “the public” - could implement a PE policy as part of their portfolio.

Setting up PE “**infrastructures and institutions**” is relevant on the EU and national level as well as on the organisational level. To counterbalance the existing structures of expert and stakeholder councils and boards in R&I policy making by establishing civil society councils with a say on research agendas would be a task on the European as well as on the national level. Platforms and competence centers for supporting existing networks on PE, for connecting researchers and citizens and for supporting PE activities with practical expertise would be a task for governmental agencies, research funding organisations as well as for CSOs and single R&I institutions. For the latter it would be decisive to open up (or at least complement) the existing disciplinary structures for research by establishing structures enabling interdisciplinary, problem oriented and community related research. Contact points for citizens with an interest of taking actively part in research or with a need for scientific advice or support could be attached to these structures.

Setting aside a certain percentage of available budgets for “**funding**” PE activities would be a task for all actors within their respective field of competence - research programmes in the case of national and EU governmental agencies and funding organisations, project funding and financial support for researchers and students active in PE in the case of universities and research institutes. For CSOs there is the problem of scarce budget to reimburse the engagement of members in PE activities that could be mitigated by the availability of public money for this purpose. CSOs might use their position in R&I advisory boards to support the setting aside of budgets for PE activities in public institutions. Besides the increase in budgets for PE it might even be more effective to provide for funding structures and “incentives” that are supportive for PE activities. On the national and EU level open calls are helpful to motivate actors such as CSOs to articulate their specific problems and perspectives – which not always can easy be related to research issues as addressed in academic call – in a project proposal. A fast funding route for PE related activities would also help to accommodate funding structures with the needs of non-academic actors lacking the institutional backup for long term application procedures. Making PE a mandatory part of calls for problem oriented research and making PE skills and achievement a criteria for evaluation of projects resp. research staff would be a policy to be taken up by research organisations and institutions.

Actors on all levels are in need of “**training**” in PE related skills and methods as they are so far not part of the curricula and practice neither at universities nor in vocational training courses. For all actors in order to increase their capacities for including PE in their working structures training for administrative and research staff in PE would be recommendable. For governmental bodies (besides raising their in house knowledge on PE and its possible roles in R&I policy making and research) it would be a task to foster the enrichment of curricula with PE. This would also apply for curricula for teachers and secondary schools as a means to support e.g. citizen science activities as well as making PE in R&I a salient issue in political education. Particular options are at hand for universities to open up towards community based research and include students in community based research activities as part of their education.

Besides material and educational support PE in R&I needs to be fostered by awareness building on all levels and thus needs “**promotion**”. Public campaigning would be an option at hand for all actors. In general PE processes need public awareness in order to increase the potential of PE to foster the relations of science and society and in the long term establish a culture of PE in the R&I system. Single PE activities - be it on the policy making level or be it a citizen science platform - should be

supported by mass media coverage in order to get their intentions and achievements known beyond those groups and organisations involved in the process.

PE is relevant as cross-cutting activity in all fields of R&I and at all levels of the R&I process. This however does not imply that there is no need for specialised **"research"** on the roles, functions, the opportunities and achievements and the barriers and pitfalls of the implementation and practice of PE procedures. PE has become a subject in the field of science and technology studies. This needs to be supported by dedicated programmes in order to better understand and design the role of PE in policy making and research. The exchange of researchers, practitioners as well as policy makers needs to be supported by PE journals and conferences not only attractive to an academic public. And PE research could be included in a broad scope of research departments at universities - beyond the social sciences. One of the most salient things lacking so far is continuous evaluation of PE practice. This could be supported by setting up respective funding programmes and platforms for exchange on evaluation standards and procedures.

3.2. The European Research Area and Public Engagement

As has been declared in the 2020 Vision on the European Research Area (ERA) by the Council of the EU it is a central feature and a precondition for success that the ERA is responsive to the needs and ambitions of citizen and that the vision of the ERA includes the need to "democratise decision making, for a science operating as a service to society" (Council of the European Union 2009). The orientation of the European research funding towards the seven societal challenges in Horizon2020 is a decisive step to provide for the responsiveness of ERA; as well as the cross cutting Horizon2020 principles of Responsible Research and Innovation (RRI), focussing on reflexivity and responsiveness of researchers towards public views and expectations as a part of science's social accountability (e.g.: EC Expert Group 2013).

As a part of these strategic objectives the European Commission has induced a lot of activities to strengthen the ties between science and society by e.g. funding "cooperative research", including CSOs in the research process of FP6 and FP7 projects, and by supporting Mutual Mobilisation and Learning Action Plans pillared by research and civil society organisations alike. These activities will be continued in Horizon2020 and formats of aligning societal and research perspectives have a role to play in completing the ERA process.

The many formats and approaches to public engagement with and in R&I currently applied all over Europe to foster the link between science and society (Engage2020: Deliverable 2.1), thus have to be regarded as an indispensable part of the further development of ERA. They are meant to facilitate the sharing and co-construction of knowledge by European researchers, citizens, and their respective organizations and thus can build a cornerstone of ERA's ambition to encompass the needs, knowledge and opinions of European citizens in its research and innovation processes.

Striving for "renewed growth" and "raising the quality of public spending on research and innovation" being the main targets of the ERA process - as has been stressed in the recent communication of the European Commission on the ERA process (COM 2014 575 final, 39) – necessarily implies a better alignment of R&I with societal expectations. This can be supported by opening up the R&I systems of member states with regard to the public by means of involving representatives in priority and agenda setting. On a general level it appears to be obvious that

targeting research towards societal needs asks for a dialogue with a broad scope of societal groups in order to learn about their needs and to integrate their perspectives with the innovation strategies of ERA. “Knowledge transfer and open innovation” as part of the ERA priorities would benefit from openness towards and involvement of society. It is nowadays widely accepted that the involvement of potential users (also for consumer products) increases the market success of R&I processes.

The further development of the ERA stakeholder platforms has been addressed as being one of the means to help completing the ERA in the EC communication. It is stated that the involvement of new stakeholders is a challenge for the future development of the ERA, and thus the participation in the ERA stakeholder platform should be expanded: “The future success of ERA will depend on the buy-in and active mobilization of researchers and stakeholders, so that research reflects society’s needs and challenges” (COM 2014 5757 final, 10). In this respect the ERA goals of aligning the programming of R&I among the member states together with the objective to meet the grand challenges are anchor points for Public Engagement. E.g.: to tackle the challenge of fostering safe energy supply for Europa including measures necessary to reduce CO₂ emissions is impossible without taking civil society and the general public on board. Public engagement is needed to ensure public support for measures to be taken, for identifying options for action and their possible pitfalls as well as for helping to induce the behavioural change necessary for a sustainable energy economy.

The pan-European exchange and coordination needed and instigated by the ERA initiative would thus be incomplete without including and intensifying the exchange on public needs and expectations as well as on means at hand to align the further development of ERA with societal needs. Public consultations on R&I visions for Europe and for designing research clusters and programmes therefore should be part of the process. It would most probably be supportive in this respect to instigate the social responsiveness of the ERA by including civil society organisations in the ERA stakeholder platform and in the European Technology Platforms in order to enable civil society to share the open access policy and its benefits. In its report on the EC’s Green Paper on European Research and Innovation Funding, the European Parliament’s Industry, Research and Energy committee (ITRE) argues for a “creation of a specific platform for dialogue between CSOs and researchers for discussing research priorities areas in specific sectors” (ITRE 2011, 9). To include civil society representatives in the ERA platform and invite them to contribute their perspectives on challenges and need for research and innovation appears to be a natural conclusion when the needs of society are meant to make up the guideline for European R&I.

Setting up a European platform for Public Engagement in R&I in order to induce exchange on the role of the European citizenry in the ERA process would be another option. Such a platform - distributed among the member states and with co-ownership of EU, member states and civil society organisations as a principle - could help to prepare the concrete steps needed for opening the European Research Area to the European public.

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