RESPONSIBLE PUBLIC ENGAGEMENT AT TERRITORIAL LEVEL: CORE DIMENSIONS AND MEANS FOR IMPLEMENTATION

Maria Michali, Thalia Kallia, Daniele Mezzana, George Eleftherakis

South-East European Research Centre (Greece), South-East European Research Centre (Greece), Knowledge & Innovation (Italy), CITY College, University of York Europe Campus (Greece)

mmichali@seerc.org; efkallia@seerc.org; mezzana@knowledge-innovation.org; eleftherakis@york.citycollege.eu

ABSTRACT

Responsible Research and Innovation (RRI) appeared as a policy concept acknowledged by the European Commission (EC). Over the last decade, RRI and its six keys form the basis for transformational initiatives at national, institutional and territorial levels. Particularly the Public Engagement (PE) key seeks to democratize Science, Technology and Innovation (STI); a key aspect in this democratic restructuring is the meaningful engagement of civil society and interested stakeholders in STI and research processes, and the consideration of their values and concerns. The present paper places the focus on RRI and PE application at territorial level (Territorial RRI framework). Territorial PE initiatives address a common STI-related territorial stake and engage the public through various methods –thus abiding by the public's local ethical codes and standards. By critically examining five PE-related territorial applications in five different territories, this paper aims to draw the attention to the conceptual underpinnings of territorial PE and to its practical application –as indicated by the experiences examined. The concluding arguments indicate some core conceptual traits of territorial RRI and PE. Then, they spell out specific elements contributing to the effective application of territorial PE for integrating public ethics concerns in STI processes and transformational agendas. Similarly, a few limitations, which should not be overlooked during territorial PE implementation, are outlined. The paper's evidence-based and concluding observations can finally provide valuable input for creating a new social (and ethical) contract between science and society, and for mitigating the exclusive dominance of the technocratic elite at territorial agendas.

INTRODUCTION

Responsible Research and Innovation (RRI) is a multi-dimensional concept gaining advancing prominence within the final decade in the ERA (European Research Area) and beyond. The EC (European Commission) characterizes RRI as "a transparent, interactive process by which societal actors and innovators become mutually responsive to each other with a view to the (ethical) acceptability, sustainability and societal desirability of the innovation process and its marketable products" (Von Schomberg, 2011 as cited in Owen, Macnaghten, & Stilgoe, 2012, p. 753). Drawing on this EC-acknowledged definition of RRI, one explicitly comprehends that RRI principles and tenets (RRI keys) can highly contribute to aligning the agendas of STI (Science, Technology, Innovation) to society's needs and ethical concerns or values. A strong emphasis can be particularly placed on how the RRI key of Public Engagement (PE) contributes to achieving the aforementioned objectives. PE advocates, among others, towards: a) involving stakeholders so that innovations address societal needs, societal complexities and ethical problems (Taebi et al., 2014), b) engaging the public "before an issue or technology becomes controversial, when opinions become polarised and hardened and polices are

predetermined" (Cobb & Gano, 2012, p. 97) –thus making ethical questions acquire genuine meaning within the context of research, technology and development.

The six RRI keys, RRI principles, dimensions and related initiatives can be applied at a national, institutional and/or territorial level. With reference to the Territorial RRI framework, it can be described as shaping research and innovation (R&I) to support territory-making processes and new governance-making agendas (Caiati & Mezzana, 2019). It concurrently advocates that R&I and STI processes need to be responsive and 'response-able' to regional and societal needs, as well as to grand societal challenges (Fitjar, Benneworth, & Asheim, 2019). Consequently, territorial PE acquires new similar dimensions. It focuses on territory-based co-creation, and affects territory-making R&I agendas by combining scientific knowledge with the intimate knowledge of the territory's local actors (Caiati & Mezzana, 2019). Scientific knowledge is socially and ethically enhanced, since regions –owing to their scale– exhibit a better proximity towards social values and ethical concerns. Overall, experts can collaborate with citizens and practitioners, with the latter ones acquiring the license to express their ethical concerns towards new developments in the region, and subsequently infuse their own (otherwise tacit) ideas and moral standards to core regional transformational agendas.

The present paper discusses the application of Public Engagement (within the RRI umbrella) at the territorial level. It places an emphasis on the critical interpretation (dimensions, principles) of territorial PE, shifting the focus to engaging communities at various territorial scales (e.g. at a region, city, municipality). PE approaches, which can be applied at a territorial scale and within an upstream, midstream or downstream vantage point, are afterwards described in an evidence-based way. Territorial PE-related applications that are responsive to ethical and societal concerns relate to the following initiatives and specific PE methods (indicated in the parenthesis): BlueAp - Bologna Local Urban Environment Adaptation Plan for a Resilient City (Participatory design); Citizen science Lab of Leiden University (Science Shops); Sustainable Urban Mobility Plan Bremen 2025 (Scenario planning); Brainport Smart District (Living Labs), Energy vision Murau (Guiding Visions technique for Agenda Setting). The rationale of the above processes has after all been to critically describe the content of the aforementioned PE activities applied territorially, and subsequently stress some concluding elements that enhance the conceptual underpinnings and applications of territorial PE.

This holistic approach has the potential to lead to the successful 'operationalisation' of territorial PE for meeting society's ethical concerns towards R&I and technology. Valuable arguments are provided in this way towards enhancing: a) the concept of shared responsibility in innovation, and b) the opportunities for constructing new territorial and PE-driven R&I and technological agendas. These agendas ultimately promote a socially and ethically robust science by combining expert/scientific knowledge with local and practical experiential knowledge –the so-called building of a truly knowledge-based society (Steinhaus, 2013).

The present paper is structured as follows; firstly, the state-of-the art of RRI and PE is set, followed by their framing at the territorial context (Territorial RRI and PE). The focus then shifts exclusively on territorial PE. Its conceptual underpinnings, which among others entail addressing public ethical concerns towards STI, are primarily described. Immediately after, the five territorial PE applications are examined and valuable insights gained are spelled out. The paper's concluding remarks allude to experience-based arguments towards realistically and efficiently capitalizing on territorial PE for developing STI processes and agendas that are ethically responsive and democratic.

RRI, PE AND THEIR TERRITORIAL APPLICATION

The inability to harmonise scientific and technological knowledge with social and ethical responsibility is a challenge put forward several years ago (Mitcham, 2003; Stilgoe, Owen, & Macnaghten, 2013); as Innerarity (2013) argued, knowledge does not seize to be perceived as a product of experts, so as to then be 'open' to social guidance and turn into a social construct. At the same time, apart from the inability for 'openness' towards society, science seems to urge new manifestations of public hesitation and ethical concerns due to its increasing 'emancipation' (Mejlgaard et al., 2018). RRI came to manifest itself as the European Commission's response towards the aforementioned challenges. RRI emerged as a policy concept aiming to initiate transparent dialogues with society (de Saille, 2015) and achieve socio-technical collaboration in STI processes. This exact socio-technical integration in STI was further promoted by the EC by acknowledging the 'pillars' approach of RRI (Pellé & Reber 2015), and by promoting its application within various national, institutional and/or territorial initiatives. Based on the EC policy framework and the pillars approach, responsible and ethically accountable STI activities and outcomes should consider six key policy agendas, the so-called RRI keys: *Public Engagement*, *Open Access*, *Science Education*, *Gender*, *Ethics* and *Governance*. For ensuring the optimum outcomes, these RRI 'ingredients' can also be circumscribed by four core conditions: *anticipation*, *reflexivity*, *inclusion* and *responsiveness* (the so-called procedural approach). It can therefore be noticed that RRI has been attributed the ability to challenge the traditional social contract between science and society, and enhance new reconfigurations of actors and shared responsibilities in STI processes (Rip & Shelley-Egan, 2010).

As for the RRI key of Public Engagement (PE), the EC (2020) defines PE processes as "co-creating the future with the public and civil society organisations, and also bringing on board the widest possible diversity of people that would not normally interact on matters of science and technology". In other words, PE implies the establishment of participatory multi-actor interactions and exchanges, which can provide input to STI processes and policy agendas. Through such interactions, particularly the public can express ethics concerns towards emerging advancements and also create the space for the different values at stake to be expressed. As for the operationalisation of such expert-public interactions, these can broadly take place within three vantage points: *upstream*, *midstream* and *downstream* (Marschalek, 2017). The upstream perspective signifies that the public should be engaged at the early stage of research and technological development; it should contribute to answering *what* research questions or challenges the project/initiative should address. Midstream PE then signifies the stage of actual research and development, where the public can participate in the research process or provide input as to *how* the research could evolve. Finally, during downstream PE the public is usually asked about *whether* the outcomes and products of the STI processes should be adopted (and how). It should overall be highlighted that since such exchanges take place between both experts and public and the decisions are shaped collaboratively, PE exhibits an additional, beneficial effect. It manages to address a long-standing dilemma in R&I (Bucchi & Neresini, 2008, p.466) referring to the "technocratic option" (expert-driven decisions) or the "ethical option" (decisions driven by the individual users).

When applied at territorial level, RRI and PE acquire some new features. This application however is not automatic, in the sense that one must understand how RRI can be integrated into the territorial dynamics and with particular attention to the local actors and their concerns. This is an important question, since the original definition of RRI does not in itself have a spatial dimension (Fitjar, Benneworth, & Asheim, 2019). The territory is a human/social construction, which takes place by giving names and meanings to certain extensions of space, carrying out transformative material activities, elaborating and applying rules, transmitting all this over time, building a community. Concerning this, there are dynamics of de-territorialization (Paasi, 1998; Elden, 2005), that is, the loss

of social ties and control of the territory by the actors who live there (due to globalization, de-localization, unemployment, impacts of the environmental crisis, etc.) (Sassen, 2013). But reverse processes can also occur, of re-territorialization, to recover social bonds and identities. This can be done through territory-making practices (Dorstewitz, 2016) in different areas (energy, mobility, urban/rural development, services), implemented through forms of cooperation among local actors.

Based on a mapping of experiences that one can define as re-territorialization, it is possible to hypothesize that territory-making has at least three characteristics (Caiati & Mezzana, 2019): the development of a "territorial awareness", the activation of a "territorial mobilisation", the production of a "territorial change for governance". It is also possible to identify two components of territory-making *policies*: (a) the *"territorial orientation"*, which refers to what is intended to be done for and to be changed in the territory (e.g. re-rooting social and economic activities, empowering local actors, etc.); (b) the *"governance frameworks"*, which refer to the structured and recurring operating methods through which the territory-making process takes place (e.g. fostering a participative agenda setting system, launching knowledge co-creation platforms, etc.).

In this context, territorial RRI can be understood as the ability of R&I to respond to de-territorialization and contribute to re-territorialization, in terms of response-ability (Caiati & Mezzana, 2019). Various territorial RRI processes, while having a focus on re-territorialization, can shape the direction of R&I towards ethically desirable targets (at the European scale). Having said this, Territorial RRI can play a pivotal role, considering: (a) the RRI keys (how to use the RRI keys to open research and innovation to public concerns, to territory-making process and enhance the "territorial orientation"); (b) the RRI dimensions (how the four dimensions of anticipation, inclusiveness, responsiveness and reflexivity can be taken into account while using R&I for strengthening the territorial "governance frameworks", always in accordance to ethical accountability). With particular reference to the Public Engagement key and its territorial application, the focus is on a common territorial and R&I-related (or STI-related) stake, turned into reality through the cooperation among R&I actors and other key players, including individual citizens (Caiati & Mezzana, 2019).

TERRITORIAL PE: CONCEPTUAL BACKGROUND AND PRACTICAL APPLICATIONS

After setting the scene around RRI, PE and the new features they acquire when applied territorially, this section focuses explicitly on territorial PE. Its benefits in relation to including the public perspective in STI are firstly described based on previous literature. Section 3.2 afterwards describes five specific PE applications, which have taken place in five different territories and have employed five different PE methods.

Responsible PE: expression of ethics concerns towards sti

Shifting the focus on Territorial PE, it may be interpreted in terms of *territory-based co-creation*. Examples of territorial PE application can be, among others, the living labs, science-shops, and all forms of participatory design and citizen science. In more details, for achieving the objectives of a given territorial R&I policy, scientific knowledge should be combined with the knowledge of the territory. This knowledge, after all, stems out of its people and organisations that act in the territorial milieu, are bearers of the knowledge itself, and take into account the views and needs of the local community. In addition, territorial PE, due to its intrinsically participatory character, contributes to the identification, expression and sharing of ethical issues and concerns related to STI, and can foster a dialogue between different actors to better address these issues and concerns, and possibly identify ethical principles and codes tailored to the local context. As evident, the effects of territorial PE are enhanced by the

fact that the regional context around STI processes can be beneficial for effective knowledge acquisition and spillover (Laursen, Masciarelli, & Prencipe, 2012). The potential contribution of territorial PE is finally aligned to the EU and EC concerns. Various research programmes explicitly seek solutions to contemporary societal challenges (European Union, European Commission, & Directorate-General for Research and Innovation, 2013) and highlight necessity to address societal needs and ethical questions in research, development and technology.

PE practical examples at territorial level

As a follow-up to the description of the main conceptual features of Territorial PE, this section focuses on its practical application. Five PE-related applications have been selected to be critically described, so as to discuss a considerable range of PE methods contributing to the integration of public ethics concerns into STI processes, and promoting a responsible governance of science and technology. Based on a mapping of territorial RRI experiences (Caiati & Mezzana, 2019), the five PE methods listed in Table 1 are among the most frequent ones. Under this rationale, we have tried to detect through desk research concrete territorial initiatives employing these methods; by capitalising on the criterion of transparency and adequate public documentation, the target five initiatives that deal with a considerable challenge in the target territory have been sorted out. Prior to critically describing the application of PE in each of the five different initiatives, Table 1 outlines all five PE applications, in terms of territorial initiative, PE method and target territory.

Table 1. The five territorial PE applications.

Territorial initiative	PE method	Target territory
BlueAp - Bologna Local Urban Environment Adaptation Plan for a Resilient City	Participatory design	Bologna (Italy)
Citizen science Lab of Leiden University	Science Shops	Leiden (The Netherlands)
Sustainable Urban Mobility Plan Bremen 2025	Scenario planning	Bremen (Germany)
Brainport Smart District (BSD)	Living Labs	Helmond (The Netherlands)
Energy vision Murau	Guiding Visions technique for Agenda Setting	Murau region (Upper Austria)

PE application 1: Participatory design in Bologna

The BlueAp initiative (Bologna Local Urban Environment Adaptation Plan for a Resilient City) took place in Bologna (Italy) from 2012 to 2015, and aimed to address the challenges faced by the city in relation to climate change. The participatory design (co-design) of the responsible and adaptive strategy towards climate change entailed cooperation with both public and private stakeholders (Bono et al., 2015): public bodies, public and private companies, trade and consumer associations, university and schools, consortia, non-profit organizations, land reclamation authorities. The target stakeholders were engaged in the participatory development of the adaptation plan both upstream and midstream. The upstream engagement took place through various workshops, thematic sessions, round tables and surveys. During all these, the stakeholders and citizens of Bologna had the opportunity to express their own ethics concerns towards facing climate change and to actively participate in drafting the plan – thus providing input on what issues and territorial needs the BlueAp project should address. As for

midstream public engagement, particularly the citizens were engaged through the online app *PlayBlueAp*. This app —in the form of a social game— allowed citizens to share their own environmentally friendly activities under six main environmental themes and gain online ranking points. In this way, the public was able to collect and report data related to damage in the city due to specific climate phenomena, and provide input as to how the government could address future climate challenges. With reference to the results of the participatory design, citizens had the opportunity to acquire new knowledge about this specific scientific field, be inspired and take responsibility for the environmental activities in their city. The city of Bologna was likewise benefited, by being able to integrate citizens' concerns, ethics values and public input into the new local adaptation plan —thus providing an output genuinely considering the vulnerabilities and needs of the territory.

PE application 2: Science Shop in Leiden

The science shop of the University of Leiden is typically known as the Citizen Science Lab (CSLab), and brings together different stakeholder groups for co-creating new research (citizen science) projects. The specific territorial initiative of CSLab described in the present paper refers to addressing the territorial (and international) challenge of air pollution. The Leiden Science shop organised as its first activity in 2018 an international workshop engaging stakeholders from all over Europe: air pollution researchers, NGOs, citizen science experts, creative research experts, app developers and representatives from local/national/EU governments, among others. The aim of the science shop's activity was to initiate a co-creation process by combining the 'top-down' approach of projects initiated by scientists, and the 'bottom-up' activities initiated by society (Lorenz Center, 2018). Participants were engaged in an upstream way, since they participated in brainstorming discussions on the value of citizen science (e.g. through 'World Cafés') and in co-working sessions for developing project proposals (The Citizen Science Cost Action, 2018). These proposals aimed at indicating what kind of research and pilot projects could be initiated in the future for addressing air pollution. Therefore, non-experts in particular had the opportunity to: (a) provide their input on what kind of research directions and citizen science initiatives could be applied for enhancing air quality; (b) be enabled to take responsibility and control over their own environment. Regarding the outcomes of the CSLab's territorial initiative, these refer to co-creating promising plans for incubation and pilot projects at both territorial and international level, in order for them to afterwards turn into citizen science initiatives (that can be seen as midstream PE).

PE application 3: Scenario planning in Bremen

The Sustainable Urban Mobility Plan (SUMP) is a project implemented in the city of Bremen, Germany that encouraged the participation of regional actors and citizens, in order to form a new mobility plan for the city by 2025. The goal has been to develop a transportation system that will ameliorate the quality of the lives of Bremen's residents and tourists, and will further support sustainable mobility (e.g. cycling). The project engaged regional actors in several phases of the program through a variety of engagement methods. In terms of upstream engagement, SUMP Bremen 2025 organised citizen forums and public interest groups in order to define the goals of the project. Afterwards, additional participants were engaged for expressing their opinion on Bremen's opportunities and weaknesses – as displayed through a status analysis (SUMP Bremen 2025, 2021). The new participants were comprised of citizens who took part in regional committees or gave their input through an online portal. Then, the engaged actors were provided with 5 different "Test Scenarios'' (future scenarios). Each scenario presented an extreme case of a transport problem, accompanied by corresponding measures/possible solutions –these had been collected during the upstream engagement. In terms of

applying midstream engagement procedures, the participants evaluated all measures based on their potential effectiveness and in accordance to the goals of SUMP Bremen 2025. The engaged actors thus had the opportunity to indicate how (and through which specific directions) the target problem could be addressed After this step, a final "Target scenario" was developed and presented to the audience, who could now choose which measures should be featured in the final scenario. All actors were finally engaged in a downstream way, since they expressed their opinion towards the adoption of the final implementation plan and were further informed on three possible funding routes. They were asked to prioritize measures and decide which of them would be primarily or secondarily implemented. Overall, and through the scenario planning, SUMP Bremen 2025 was able to gain great input from its citizens who live and operate in the city; the engagement procedures did not focus on publicly presenting an almost-finished plan, but they provided to the public the opportunity to express their visions and integrate their concerns into every phase of the planning process. In other words, the plan ensured that transport solutions would continue to be formed according to the needs of Bremen.

PE application 4: Living Lab in Helmond

The Brainport Smart District (BSD) is a living lab in the city of Helmond in Eindhoven, the Netherlands, aiming to enhance smart development within the context of a community-building project. Its aims refer to forming an ameliorated living environment that enhances technological and sustainable innovation, and concurrently corresponds to the needs of its residents (Brainport Smart District, 2021a). At the same time, its ultimate goal can be described as co-creating a functional environment of an actual neighbourhood, developed as a safe and smart living space for its residents through eco-friendly strategies. The public engagement initiatives of BSD began in 2017, set to include different stakeholders within a span of 10 years (2018-2028) (Gebhardt, 2019). The project capitalised on a 'bottom-up' and 'top-down' approach, while the target stakeholders have so far been included in all stages of the project, particularly during the co-design and co-decision processes. Regarding the upstream engagement procedures applied, an initial workshop took place in 2017 (Syntegration), with the participation of different actors –regional and governmental actors, technology experts, STEM scientists, educational institutes, companies and inhabitants. The engaged actors produced twelve themes and provided their input toward the future directions of the living lab –since the final themes served as a baseline for the BSD program lines (Circular district, Participation, Social and Safe district, Healthy district, Digital district, Mobile district, District with Energy and District with water) (Brainport Smart District, 2021b). In the later phases of the BSD initiative, the aim is to engage different inhabitants from younger/older ages, with diverse backgrounds (e.g. lifestyle, income), but also businesses and employees who are going to provide feedback on how the conditions of their everyday life have been affected during the BSD program. The target stakeholders' engagement finally indicated that the upstream engagement was the most systematised, while there are also a few indications that downstream engagement will be applied in the remaining lifespan of the initiative. As for the overall outcomes of the engagement practices, the inhabitants have had the opportunity to influence and contribute to the design and development of the district, which will include approximately 1500 houses and a large-scale business park. Public participation has already assisted and will further assist BSD to create a smart neighbourhood exhibiting a high quality of living, potentially serving as an example for many areas internationally.

PE application 5: Guiding Visions technique for Agenda Setting in Murau

The Energy Vision Murau (EVM) is a project aiming to transform the area of Murau, upper Austria, into a self-sufficient region concerning energy use. The project started in 2002-2003 and formed an agenda ("Energievision Murau" 2015) with the input and contribution of different actors. A 'bottom-up' approach was adopted for both upstream and midstream engagement procedures, including interviews, workshops and events with a variety of actors –such as regional professionals related to renewable energies, installation, suppliers of energy, agricultural actors, different schools, politicians, people of administration and residents. In detail, the target actors were primarily engaged in an upstream way and worked together in order to define the objectives of Murau 2015. During this initial stage, the means for practically realising these objectives were also discussed. Proceeding a step further to the midstream engagement, a bigger group of actors (additional people joined) worked collaboratively in groups, in order to form strategies on how the project will proceed. Many of the actors were professionals related to energy and installation, and provided valuable input owing to their expertise. The participation of regional actors was also significant in the practical implementation stage of the Murau vision. Throughout the project, different actors formed additional networks and worked together towards common goals; for instance, political representatives collaborated with different energy companies. An example of such a cooperation refers to a company (member of Natur-Installateure), which started installing sustainable heating systems in new houses after working with a mayor and the project of Murau (Späth & Rohracher, 2010). Other project outcomes refer to the community strongly enhancing the EVM vision and processes; relevant achievements from regional stakeholders refer to one municipality being fuel-oil free and the overall region being self-sufficient in energy by 80%. Another example refers to the largest consumer of energy in the region (Stolzalpe Hospital) having increased the use of biomass for heating (it replaced over 1 million litres of oil). What should be overall noted is that the EVM engagement procedures enhanced the concept of 'energy systems of tomorrow', which is a tangible example of a simultaneous technical and social contribution –the so-called socio-technical integration in STI (de Saille, 2015).

DISCUSSION - CONCLUSIONS

Overall, territorial PE and related initiatives contribute to creating a new social contract between science, technology, innovation and society. Particularly due to the spatial/territorial context surrounding the initiatives, common territorial stakes can be addressed; in this way, the territorial STI processes become beneficial for the territory itself by being aligned to public concerns and ethics values. Likewise, the actors engaged (particularly the citizens) gain new knowledge and take responsibility for the development of their own territory. The present section reports some concluding observations on territorial PE –referring, among others, to most common engagement vantage points, to interlinkages with principles of equality and with the smart directionality approach – and on how it can be effectively applied for including ethical concerns to the transformational STI-related agendas of territories. These observations and concluding remarks can function as a basis or as an inspiration point for designing and implementing similar initiatives. More specifically, the PE initiatives examined cannot be entirely replicable, but the concluding arguments form a continuum; nothing is entirely replicable, but several aspects can be inspiring for PE potential implementers and for achieving the target transformation of their territory.

First of all, it has been noticed that the upstream engagement procedures are the most systematised ones for engaging the public and interested stakeholders at the territorial level. All territorial PE initiatives engaged the target stakeholders early in the process, so that experts and the public would co-define and co-design the goals of the initiative and its territorial orientation. In this way, public

Jorge Pelegrín-Borondo, Mario Arias-Oliva, Kiyoshi Murata, Ana María Lara Palma (Eds.)

concerns and ethical values would be considered prior to the actual implementation of STI territorial initiatives. This further comes in correspondence to general PE aspirations about early engagement before the target topics and final opinions become controversial, hardened, or polarised (Cobb & Gano, 2012). Subsequently, territorial PE initiatives that involve the target stakeholders in an upstream way can prove to be considerably beneficial, since the activities that will transform the territory will have considered in advance public ethics concerns. At the same time, this early engagement can create a sense of ownership to the engaged stakeholders, making them feel 'problem-owners' and genuinely mobilised in relation to the challenge addressed and initiating a series of territorial PE activities that will bring genuine impact.

Proceeding a step further, it is evident that fairness and equality principles play a pivotal role in the engagement procedures. All interested stakeholders would be engaged in the territorial PE initiatives, irrespective of their social status, cultural background, race, gender or even age at some instances. This indeed contributes to including an even wider range of perspectives and concerns, and to delivering outcomes that are ethically acceptable by a majority of people. Therefore, by enhancing fairness principles, the unfolding of the PE initiatives is context-dependent, in alignment to the regional context and characteristics (Wittrock & Forsberg, 2019), as well as in alignment to suggestions made towards a more effective implementation of RRI and its keys at various environments in the future (Gerber et al., 2020). It should be finally underlined that this emphasis on fairness, equality and on the inclusion of diverse individuals aids in creating new and powerful networks in the territory. Particularly due to the territorial scale, these networks of various actors and individuals have stronger ties, and contribute to a successful diffusion of knowledge about an ethically accountable science, technology and innovation.

As for the territorial challenges that PE initiatives tend to address, they can be listed among the Sustainable Development Goals (SDGs), often to the ones related to climate, environment and energy areas. As a follow-up to this observation, one can notice that territorial PE can successfully address the territory's' concerns and perspectives when combined to the smart directionality approach (Mazzucato, 2016). This approach suggests that knowledge production and exploitation should address societal goals and challenges. It further enhances the responsible and ethical use of research results for societal purposes. Consequently, the inclusion of public values and concerns into the STI processes can be the first step towards achieving the aforementioned responsible and ethical use – that can ultimately lead to sustainable R&I and STI investments in the target territories.

Along with these evidence-based remarks towards an effective territorial PE application, emphasis should also be placed on accompanying implications and limitations. Considerable obstacles might firstly be encountered when trying to engage the target audiences. Some stakeholders may be reluctant, sceptical or occasionally lack trust towards the local authorities. Particularly this lack of trust (or even mistrust) may very well stem from a rather old but long-standing perspective; this refers to the public participation being used as an additional argument for the legitimacy of pre-defined decisions by experts (Callon, Lascoumes, & Barthe, 2001). Concurrently, experts involved in the engagement procedures may unintentionally (or intentionally) reinforce the representation of the lay public as "ignorant" (Bucchi & Neressini, 2008). This scenario is even more prominent at territorial levels, where due to the smaller regional scale a few emblematic and leading figures do not allow space for counter-arguing their ideas. Such situations can particularly cause de-motivation and reluctance towards the active participation of the lay public and of their expressing of genuine concerns. A few final implications to be noted refer to the application of RRI as a whole at territorial levels. Each territory is different and any initiatives should be context-dependent, but as approaching to larger territorial scales (up to European ones), cultural differences add to problems of communication and

coordinated action (Fitjar, Benneworth, & Asheim, 2019). Then, referring to any territory and irrespective of its size, similar initiatives entailing expert-public participation cannot but fall under other ordinary political and democratic processes, which entail additional concerns and interests on behalf of actors involved –as similarly argued by Fitjar, Benneworth, & Asheim (2019).

Public engagement in R&I and STI processes can overall bring multiple benefits contributing to the accreditation of scientific and technological knowledge. In terms of application at territorial levels, this accreditation further adds to an ameliorated realisation of a common territorial stake, tailored to local ethical codes and values. Irrespective of the PE method(s) potentially selected for realisation of specific initiatives, PE implementers should bear in mind that expert and lay knowledge encounter each other and are not independent from each other. They are in need of hybrid forums –as Callon, Lascoumes, & Barthe (2001) call these places of interaction– so as to evolve, and it is highly possible that territories owing to their scale will be able to provide such forums in an effective way.

ACKNOWLEDGEMENTS

KEYWORDS: Public Engagement (PE), Responsible Research and Innovation (RRI), Territorial, Regional, Ethics, Society

REFERENCES

Bono, L., Caranti, C., Fini, G., & Gueze, R. (2015). *Stakeholders Engagement Outcomes (Summary)*. Deliverable 1 - BlueAp - Bologna Local Urban Environment Adaptation Plan for a Resilient City. Retrieved from http://www.blueap.eu/site/wp-content/uploads/2013/09/B.1.1-SE-Outcomes-Summary.pdf

Brainport Smart District. (2021a, March 29). *Documents. Plan of Action*. Brainport Smart District. Retrieved from: https://brainportsmartdistrict.nl/en/organisation-business/documents/

Brainport Smart District. (2021b, March 29). *Programs*. Brainport Smart District. Retrieved from: https://brainportsmartdistrict.nl/en/organisation-business/programs/

Bucchi, M., & Neresini, F. (2008). Science and Public Participation. In E. J. Hackett, O. Amsterdamska, M. Lynch & J. Wajcman (Eds.). *The Handbook of Science and Technology Studies* (pp. 449-472). Cambridge, UK: MIT Press.

Caiati, G., & Mezzana, D. (2019). *Map of approaches, policies and tools for Territorial RRI*. Deliverable 3.3.- TeRRItoria project. Retrieved from http://territoriaproject.eu/wp-content/uploads/2021/04/TeRRItoria_D33_Map_of_approaches__policies_and_tools_for_Territorial_RRI.pdf

Callon, M., Lascoumes, P., & Barthe, Y. (2001). *Agir dans un Monde incertain: Essai sur la démocratie Technique*. Paris, France: Editions de Seuil.

Cobb, M. D., & Gano, G. (2012). Evaluating Structured Deliberations about Emerging Technologies: Post-Process Participant Evaluation. *International Journal of Emerging Technologies and Society*, 10, 96–110.

De Saille, S. (2015). Innovating innovation policy: the emergence of Responsible Research and Innovation. *Journal of Responsible Innovation,* 2(2), 152-168.

Dorstewitz, P. (2016). Imagining Social Transformations: Territory-making and the Project of Radical Pragmatism: Response to Review. *Contemporary Pragmatism*, 13(4), 361-381.

Elden, S. (2005). Missing the point: globalisation, deterritorialisation and the space of the world. *Transactions of the Institute of British Geographers*, 30(1), 8-19.

European Commission. (2020, February 10). *Public Engagement in Responsible Research and Innovation*. Horizon 2020. Retrieved from https://ec.europa.eu/programmes/horizon2020/en/h2020-section/public-engagement-responsible-research-and-innovation

European Commission. (2020, November 30). *Public Engagement*. Policy. Retrieved from: https://ec.europa.eu/research/swafs/index.cfm?pg=policy&lib=engagement

European Union, European Commission, & Directorate-General for Research and Innovation. (2013). *Options for strengthening responsible research and innovation*. Luxembourg: Publications Office of the European Union.

Fitjar, RD., Benneworth, P., & Asheim, BT. (2019). Towards regional responsible research and innovation? Integrating RRI and RIS3 in European innovation policy. *Science and Public Policy*, 46(5), 772-283.

Gebhardt, C. (2019). The Impact of Participatory Governance on Regional Development Pathways: Citizen-driven Smart, Green and Inclusive Urbanism in the Brainport Metropolitan Region. *Triple Helix Journal,* 6, 69-110.

Gerber, A., Forsberg, E.M., Shelley-Egan, C., Arias, R., Daimer, S., Dalton, G., Belén Cristóbal, A., Dreyer, M., Griessler, E., Lindner, R., Revuelta, G., Riccio, A. & Steinhaus, N. (2020). Joint declaration on mainstreaming RRI across Horizon Europe. *Journal of Responsible Innovation*, 7(3), 708-711.

Innerarity, D. (2013). Power and knowledge: The politics of the knowledge society. *European Journal of social theory,* 16(1), 3-16.

Laursen, K., Masciarelli, F., & Prencipe, A. (2012). Regions Matter: How Localized Social Capital Affects Innovation and External Knowledge Acquisition. *Organization Science*, 23(1), 177–193.

Lorentz Center. (2018). *Citizen Science Lab: Air Pollution*. Retrieved from: https://www.lorentzcenter.nl/citizen-science-lab-air-pollution.html

Marschalek, I. (2017). *Public engagement in responsible research and innovation*. [PhD dissertation, University of Vienna].

Mazzucato, M. (2016). From market fixing to market-creating: a new framework for innovation policy. *Industry and Innovation*, 23(2), 140-156.

Mejlgaard, N., Woolley, R., Carter, B., Bührer, S., Griessler, E., Jäger, A., Lindner, R., Bargmann Madsen, E., Maier, F., Meijer, I., Peter, V., Stilgoe, J., & Wuketich, M. (2018). Europe's plans for responsible science. *Science,* 361(6404), 761-762.

Mitcham, C. (2003). Co-responsibility for research integrity. *Science and engineering Ethics,* 9(2), 273-290.

MountEE. (2021, March 30). *Energy Vision Murau*. MountEE Sustainable Public Building. Retrieved from http://www.mountee.eu/good-practice/strategies/3-at/.

Mourey, T. (2015). *Bremen: SUMP monitoring and evaluation champion (Germany)*. Eltis. Retrieved from https://www.eltis.org/discover/case-studies/bremen-sump-monitoring-and-evaluation-champion-germany.

Owen, R., Macnaghten, P., & Stilgoe, J. (2012). Responsible research and innovation: From science in society to science for society, with society. *Science and public policy*, 39(6), 751-760.

Paasi, A. (1998). Boundaries as social processes: Territoriality in the world of flows. *Geopolitics*, 3(1), 69-88.

Pellé, S., & Reber, B. (2015). Responsible innovation in the light of moral responsibility. *Journal on Chain and Net-work Science,* 15(2), 107-117.

Rip, A., & Shelley-Egan, C. (2010). Positions and Responsibilities in the 'Real' World of Nanotechnology. In R. Von Schomberg & S. Davies (Eds.). *Understanding public debate on nanotechnologies: options for framing public policies. A Report from the European Commission Services* (pp. 31-38). Brussels, Belgium: European Commission Services.

Sassen, S. (2013). When territory deborders territoriality. *Territory, politics, governance*, 1(1), 21-45.

Späth, P., & Rohracher, H. (2010). 'Energy regions': The transformative power of regional discourses on socio-technical futures. *Research Policy*, 39, 449–458.

Steinhaus, N. (Ed.). (2013). *Living Knowledge – Journal of Community-based research: Future Options for Responsible Research and Innovation*. Bonn, Germany: International Science Shop Contact Point.

Stilgoe, J., Owen, R., & Macnaghten, P. (2013). Developing a framework for responsible innovation. *Research Policy*, 42(9), 1568-1580.

SUMP Bremen 2025. (2021, May 7). *English version: Verkehrsentwicklungsplan Bremen 2025 / SUMP Bremen 2025*. Bauumwelt Bremen. Retrieved from https://www.bauumwelt.bremen.de/mobilitaet/verkehrsentwicklungsplan-5586

Taebi, B., Correljé, A., Cuppen, E., Dignum, M., & Pesch, U. (2014). Responsible innovation as an endorsement of public values: the need for interdisciplinary research. *Journal of Responsible Innovation*, 1(1), 118–124.

The Citizen Science Cost Action. (2018). *Citizen Science Lab: Air Pollution - Meeting in Leiden*. Retrieved from: https://cs-eu.net/blog/citizen-science-lab-air-pollution-meeting-leiden

Wittrock, C., & Forsberg, E.M. (2019). *Handbook for Organisations Aimed at Strengthening Responsible Research and Innovation*. Deliverable 17.6 - RRI-Practice project. Retrieved from https://www.rri-practice.eu/wp-content/uploads/2019/06/RRI-Practice-Handbook-for-Organisations.pdf