



Innovative Public Engagement

A Conceptual Model of Public Engagement in Dynamic and Responsible Governance of Research and Innovation*

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The PE2020 Project

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Executive Summary

By setting public engagement (PE) as a key thematic element of responsible research and innovation (RRI), the European Commission promotes fundamental changes in the way in which civil society and other stakeholders outside the scientific community influence – and is expected to influence – research activities. Promoting PE means giving more weight to citizens and stakeholders in the definition of research needs, in the critical reflection of current and future research priorities, and in the implementation of R&I activities. Yet there is limited understanding of the transformations that widespread use of PE will involve in R&I activities. Can PE remain an add-on to academic research, or does it involve some new functions, or even structural changes in the ways that research will be designed, funded, implemented and evaluated? How can PE contribute to better governance of science-in-society interaction, and what makes PE successful in it? Without clear answers to these issues, there is a risk that PE does not serve RRI, but on the contrary, becomes a burden for R&I activities, and an obstacle for bridging of research and society.

The objective of the ‘Public Engagement Innovations for Horizon 2020’ (PE2020) project is to identify, analyse and refine innovative PE tools and instruments for dynamic and responsible governance of R&I. **This study elaborates a conceptual framework of PE, where innovativeness, participatory performance and dynamic governance remain the key concerns.**

Our data are based on descriptions of 38 innovative PE cases, selected from a global sample of 256 cases that were identified in the data basis of the MASIS and Engage2020 projects, a systematic literature review, and our own qualitative survey. Data were analysed from two perspectives. Qualitative analysis included a content analysis of each PE case description. The findings were reported through cognitive maps that imprint the input and output ‘footprints’ of each PE case. Quantitative analysis included statis-

tics of the communication patterns, participant selection methods, PE approaches and mechanisms, impact areas, learning and continuity, and features of innovativeness. Qualitative and quantitative results were compared and used as a means to validate the findings.

We found that **innovative PE processes are mostly initiated by non-profit organisations** such as non-government organisations (NGOs), unofficial networks and associations. Research institutions were the next most frequent promoters of PE, followed far behind by national governments and other institutions.

A characteristic of innovative PE is that it involves a high number and variety of actors. We found that the **trend of increasing representation of the third sector** is continuing strongly through the participation of organised stakeholder groups, such as environmental and industrial organisations. More strikingly, we found that **three-quarters of the innovative PE cases involved the ‘fourth sector’**, which is an emerging field composed of actors or groups of actors whose foundational logic is not in the representation of established interests, but rather in the idea of social cooperation through hybrid networking. Examples of fourth sector actors included hybrid experts, randomly selected participants, ‘life world experts’ and ‘field experts’. Realising that the fourth sector is becoming more prominent in many areas of R&I activity, we call for further reflection of its impacts on the responsible governance of R&I.

In methodological terms we found that **‘public deliberation’ was the most frequently used approach.** Compared with more traditional models of public communication and public consultation, where dialogue between decision makers and the public is narrow and restricted, public deliberation represents a more active model of Science in Society (SiS) activity. We consider the prevalence of deliberative processes to be an indicator of the

increasing methodological maturity of the PE field, as in many cases there was a strong continuum of theory and praxis, which in turn can increase the robustness, credibility and relevance of method development, and help to consolidate the whole field of PE by providing scientific evidence for governance innovation.

In the section on the innovativeness of PE, we further analyse the PE cases in terms of their focus on societal challenges, bearing on political impacts, as well as some other tendencies including methodological transferability, use of multiple media, and orientation to learning. Except in one case, all the **innovative PE cases were oriented towards addressing societal challenges**. *Europe in a changing world – inclusive, innovative and reflective societies* was the most frequently addressed challenge of the EU's seven societal challenges, whereas *Secure societies – protecting freedom and security of Europe and its citizens*, and *Smart, green and integrated transport* attracted less attention.

Most important results in the section on innovativeness pertain to the impacts of innovative PE. Contrary to some earlier studies, which paid attention to the limited impacts of PE, and criticised PE from the tendency of it remaining an 'intra-mural' exercise (e.g. Grönlund et al., 2014; Kies and Nanz, 2013; Rask, 2013; Goodin and Dryzek, 2006; Rip, 2003), **we found innovative PE to have truly versatile impacts**, not only on R&I but also on the environment, society, politics – and individuals. We distinguished between three impact areas – substantive, practical and normative – and we found that close to **three-quarters of the reported impacts could be described as practical**. This is an interesting finding, since there is much talk about the rationales of PE: should it be driven by democratic, epistemic or pragmatic motivations? Our empirical finding is that innovative PE largely produces practical goods, such as cognitive and attitudinal changes (e.g., better awareness of environmental and scientific issues), development of new capacities (e.g. new professional skills, methods and platforms of collaboration), and mobilisation of resources for addressing scientific and societal challenges (e.g. research funding, political commitment, public awareness, and social acceptance). A sub-category of practical impacts includes impacts on policy making (e.g., development of policy recommendations,

informing R&I policy making with citizens' viewpoints, and joint definition of research agendas).

Other types of impacts included normative impacts, such as democratisation and increasing responsibility of research. Instances of normative impacts included consensus building, community building, political empowerment, increased gender equality in science, and introduction of the principles of deliberative democracy to R&I governance. Quite surprisingly, **we observed that innovative PE was quite limited in its contribution to new scientific knowledge**. Considering that our primary focus has been on PE projects related to R&I, this can be seen as a disappointing result. However, there were important deviations to this pattern. Citizen science and science shop, in particular, emerged as new concepts that do not only involve co-design but also co-implementation of R&I.

An important result of this study is the discussion and analysis of 'participatory performance'. We introduce this concept to refer to the functions of PE, and to the scope and intensity of PE activities. We analysed participatory performance by tracking such activities that contributed to the capacities of dynamic governance, including anticipation, reflection, transdisciplinarity and continuity. **Public reflection on R&I is by far the most general function of innovative PE**, followed by anticipation and development of transdisciplinary approaches.

Creation of continuity is becoming a more important capacity that is needed both to balance dynamic governance and sustain dynamism in the long run. Continuity was created through institutional boundary work, for example, multi-level policy communication (local-national-international), multi-actor collaboration (public-private-people) and types of political embedding.

Summarising our findings, **we suggest a 'composite model of participatory performance' that explains how functions and capacities of PE contribute to dynamic and responsible governance of R&I**.

One section of this publication focuses on the evaluation of successful PE. Defining success and success criteria serves a dual purpose. First, it clarifies what can be realistically expected from PE activity, and second, articulating potentially relevant success criteria can support development

of indicators that help to measure whether the intended goals of PE have been met.

Building on evaluation literature and criteria emerging from empirical data, **we elaborate a synthetic evaluation framework.** We propose a set of procedural and impact based criteria that could be used in defining and evaluating the success of any PE process.

In the final substantial section of this study we look at the obstacles to organising PE activities. Contrasting the high number of challenges related to the implementation of PE, we argue that PE is currently too weak to redeem its promises of increased societal relevance and high impact of R&I. We found that the **inadequate capacity of the organisers of PE to manage complexities involved is the main obstacle of successful PE.** Other major challenges included low motivation of the participants, technical problems, low political impact, inadequate funding, and cultural conflicts.

We conclude the study with a discussion in which we synthesise the main findings by building a ‘vision of PE benefitting European R&I activities’. **The vision is built around the notion that better involvement of actors occurs when the ‘right people’ are gathered together to address the ‘right issues’ through the ‘right PE tools and methods’, which can contribute to a better quality of research and R&I governance.** Reflecting the obstacles challenges of PE activity, we argue that implementing dynamic and responsible research and innovation through PE is far from a finished project. We conclude the discussion by suggesting a list of research questions, both academic and practical, that in our view would deserve further attention by policy makers, researchers and practitioners of PE.

PE2020 project

PE2020 will identify, analyse and refine innovative public engagement (PE) tools and instruments for dynamic governance in the field of Science in Society (SiS). PE2020 analyses the PE tools and instruments through a systemic and contextual perspective, and contributes to the potential and transferability of new governance innovations. PE2020 will create new knowledge of the status quo and trends in the field of PE in science, refine innovative PE tools and instruments and propose new ones.

The project will do this by (1) further developing a conceptual model that provides a systemic perspective of the dynamics of public and stakeholder engagement; (2) creating an updated inventory of current and prospective European PE innovations; (3) context-tailoring and piloting best practice PE processes related to the grand challenges of the Horizon 2020 programme and (4) developing an accessible net-based PE design toolkit that helps identify, evaluate and successfully transfer innovative PE practices among European countries.

New tools and instruments for public and societal engagement are necessary to boost the quality, capacity and legitimacy of European STI governance and to solve the looming problems related to the grand societal challenges of the Horizon 2020. In order to ensure practical relevance, the project will work through intensive co-operation between researchers and science policy actors. PE2020 will expand the capacity of European and national science policy actors to integrate better societal engagement by providing an easy access to new PE tools and instruments, to be included in the requirements and implementation of research in Horizon 2020 and beyond.

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A photograph of a sandy beach with waves crashing onto the shore. The sand is golden-brown and has several sets of footprints leading from the foreground towards the water. The water is a vibrant blue, and the white foam of the waves is visible. A white, rounded rectangular banner is overlaid on the image, containing the text 'Part I APPROACH AND FRAMEWORK' in orange, bold, sans-serif font.

Part I APPROACH AND FRAMEWORK

1 Introduction

Box 1 Definition of Public Engagement (PE)

PE involves different types of processes, where there is a distinct role for citizens and stakeholder groups to contribute to research and innovation activities.

Public engagement (PE), the focus of the PE2020 project, is at the heart of Responsible Research and Innovation (RRI). PE involves processes, where there is a distinct role for citizens and stakeholder groups to contribute to research and innovation activities. PE is intentional activity that aims to create opportunities for mutual learning between scientists, stakeholders and members of the public.¹

PE has many faces at different stages of the research and innovation (R&I) process. In a study underlying the PE2020 project, we analysed PE at the level of national policy debates on R&I issues (Rask et al., 2012a). We found that PE in such a context can contribute to a more active culture of debate and deliberation on research and innovation themes in a country, and that big differences prevail between the ‘participatory performance’ rates of the countries.

The original idea of the PE2020 project was to explore how the notion of ‘participatory performance’ changes when we shift the focus from nation-wide debates to PE activities at the level of research programmes and projects. Do PE processes in such contexts imply functions other than debating and deliberating? What are the specific benefits and challenges

that are related to PE at this level? What kinds of innovative practices are currently being introduced in Europe and globally? How could we characterise the innovativeness and success of PE at the level of research programmes and projects?

In order to study these questions, in this study we have closely analysed cases of innovative PE processes that were identified in the first step of the PE2020 project. Our data include a sample of 38 innovative PE processes, systematically selected from a larger sample of more than 250 initiatives. These cases are real-life initiatives that were realised (some of which are still on-going) between 1992-2016 in Europe and the United States and are based on engaging the public in research and innovation activities.

In order to explore these cases fully, we have studied them through two methodologies. First, a qualitative content analysis was conducted of each individual case by applying the method of cognitive mapping. This includes an analysis of input factors such as participants, methods, resources and objectives, as well as output factors such as learning, media and policy impacts and new forms of networking and interacting with society. The concept maps have also been used to illustrate the **footprint of innovative PE processes**, namely the cluster of relevant issues related to them on the basis of project managers’ accounts. The maps are included in Appendix 1 of this study. Second, we conducted a quantitative analysis of the same data. Acknowledging that the N of our sample was small, we understand that the possibility for statistical reasoning is limited. However, we found such an analysis to be informative of the tendencies found in the PE processes studied.

In the following sections we describe the empirical data and methods of this study, introduce our conceptual framework, and define our research questions. In the latter part of the study we report the key findings and discuss implications for future research of innovative PE.

We argue that **a better understanding of innovative PE processes contributes to a better capacity to renew R&I governance**. The commitment of the European Commission to promoting RRI will lead to increas-

ing pressure on national research agencies to place PE at the core, not on the periphery, of their research strategies. Learning from pioneering PE practices can help avoid some of the evident pitfalls, such as downplaying the capacity of a deliberative public to tackle complex decisions, and navigate towards more promising horizons. Such horizons include, for instance, gradually opening the R&I agenda setting processes through 'upstream' PE practices.

2 Methodological approach

In this methodological section we explain the data available. We also provide an account of the qualitative and quantitative research strategies used in the analysis.

2.1 Data

Our data are based on descriptions of 38 innovative PE cases, selected from a broader sample of 256 cases that were identified in the data bases of the MASIS and Engage2020 projects, a literature review and personal information provided by the research consortium members. The broader sample was published in Deliverable 1.1 of the PE2020 project, and it included short descriptions of 256 international PE initiatives classified in 76 PE mechanisms under five main categories of PE: public communication, public activism², public consultation, public deliberation and public participation (see Box 2).

Box 2 Categories of PE

(Source: Deliverable 1.2 of the PE2020 project)

Public communication – *the aim is to inform and/or educate citizens.*

The flow of information constitutes one-way communication from sponsors to public representatives, and no specific mechanisms exist to handle public feedback (examples include public hearings, public meetings and awareness raising activities).

Public consultation – *the aim is to inform decision-makers of public opinions on certain topics.* These opinions are sought from the sponsors of the PE initiative and no prescribed dialogue is implemented. Thus, in this case, the one-way communication is conveyed from citizens to sponsors (examples include citizens' panels, planning for real and focus groups).

Public deliberation – *the aim is to facilitate group deliberation on policy issues of where the outcome may have an impact on decision-making.*

Information is exchanged between sponsors and public representatives and a certain degree of dialogue is facilitated. The flow of information constitutes two-way communication (examples include 'mini publics' such as consensus conferences, citizen juries, deliberative opinion polling).

Public participation – *the aim is to assign part or full decision-making power to citizens on policy issues.*

Information is exchanged between sponsors and public representatives and a certain degree of dialogue is facilitated. The flow of information constitutes two-way communication (examples include co-governance and direct democracy mechanisms such as participatory budgeting, youth councils and binding referendums).

Public activism – *the aim is to inform decision-makers and create awareness in order to influence decision-making processes.*

The information flow is conveyed in one-way communication from citizens to sponsors but not on the initiative of the sponsors as characterises the 'public consultation' category. (Examples include demonstrations and protests).

The selection process was as follows. Using innovativeness as the preliminary criterion, the members of the PE2020 identified a sample of 64 of (out of the 256 cases) for closer study. The managers of these projects were sent qualitative surveys, through which they were invited to respond to a series of questions about the nature of these processes (see Deliverable 1.2). Responses were received from 38 PE managers. The non-response was due to conventional reasons, the most significant being that some of the projects had ended, and the responsible persons were no longer undertaking duties specific to their case.

The case reports are narratives of five to ten pages. The narrations have been systematically structured under the following categories: project title, context, aims and mechanisms, most important results, advantages, obstacles, innovative dimensions and orientation towards societal challenges. A more detailed description of the survey process, and descriptions of the cases themselves, can be found in Deliverable 1.2.

2.2 Analysis

Data were analysed from two perspectives. One working group of the PE2020 research consortium carried out a qualitative content analysis³, while another group conducted a quantitative analysis⁴. The results were compared and used as a means to validate the findings.

Qualitative analysis included a content analysis of each public engagement (PE) case description. The findings were reported through cognitive maps (Appendix 1). The content analysis applied both bottom-up and top-down approaches. The bottom-up approach involved a close reading of the issues emerging with the particular cases in particular contexts. Such issues were coded and clustered around relevant clusters (Figure 1). To make such analyses useful and comparable, several rounds of analysis, clustering, harmonisation and validation of the codes were carried out. The bottom-up approach resulted in a series of cognitive maps, providing a highly unique 'footprint' for each PE case.

Figure 1 illustrates the key elements of the PE cases studied. The exemplary map is of *PRIMAS*,⁵ a project supporting inquiry-based learning at European primary and secondary schools. The cognitive map reflects the key concepts or a cluster of issues related to this particular PE process. The structure of mapping (name and category; characterisation; aim; focus and approach; challenges; main impacts; media coverage) was applied equally to all PE cases to ensure homogeneity of analysis.

The left-hand side of the map illustrates the 'input side' of the PE process: resources, structures, strategies and contextual factors that were involved in the design and implementation of the case. The right-hand side of the map illustrates the 'output side'. This includes learning ef-

fects, policy and media impacts, networking and various spin off effects (Figure 1).

Instructions on how to read Figure 1 are indicated by the numbered red circles on the exemplary map. Following instructions apply:

1. **The title and category of the PE case** is indicated in the middle of the map. The title, usually an abbreviation, is the same as that used in Deliverable 1.2. The capital letters following the title (in parentheses) refer to the main methodological category under which the case was classified. The following categories have been included:
 - COM – public communication (under which PRIMAS was classified),
 - ACT – public activism,
 - CONS – public consultation,
 - DEL – public deliberation and
 - PAR – public participation.
2. Each PE case was given a **short characterisation**, including a couple of definitional lines including descriptions of their main function(s) and political contexts.
3. **The main aims** of the PE cases have been described in a box at the top of the map. The main aims were not necessarily those that were described in the original plan of the PE process, as in some cases the aims were supplemented as a response to emerging issues while implementing the PE case.
4. **Focus and approach** refer broadly to the methodological features, organisational and institutional strategies and other factors related to the design and implementation of the projects.
5. **Challenges** have been described in the bottom left-hand corner of the map.
6. The **main impacts** of the PE projects are described in a cluster that is indicated by the arrow head that starts from the aim box. The arrow between aims and outputs is to draw readers' attention to the congruence or discrepancy between the aims and outputs. Other outputs are listed in other areas of the right-hand side.
7. In cases that **media impacts** have been reported, they have been described in the top right corner of the map.

Map 1: PRIMAS



Figure 1. An exemplary cognitive map (for the full list of maps, see Appendix 1)

Quantitative analysis, on the other hand, is more characterised by a top-down approach, for which we took some of the theoretically loaded analytical concepts of the PE2020 project as the starting point (e.g. innovativeness, success, supply and demand factors of PE processes), and applied them in the design of the statistical analysis.

The quantitative analysis explored the cases from many angles through statistical means. Such variables were derived from a literature review

(Deliverable 2.1) as well as discussion between consortium members and WP2 team. The data for analysis were categorised with regard to geographical and time scope, type of sources and communication, aims, results and societal challenges (see Table 1). The following variables were studied and reported on in separate Excel spreadsheets (see Appendixes 2-6).

Communication patterns and participant selection (Appendix 2). The following variables were studied: participant selection methods, type of com-

munication, type of media, number of media, level of communication, direction of communication, evidence of formalisation, and transdisciplinarity.

Public engagement (PE) approaches (Appendix 3). We undertook statistical analysis of the appearance of the following PE categories (as defined in Deliverable 1.2): public communication, public activism, public consultation, public deliberation and public participation).

PE mechanisms (Appendix 4). We analysed which PE instruments and tools specifically had been applied in the PE processes studied, and how many, as defined in Deliverable 1.2 and elaborated in Deliverable 2.3. They were also identified by analysing PE cases.

Impact areas, learning and continuity (Appendix 5) were measured by documenting available information on the repetition of the PE processes, subsequent reflection processes and an indication of other impacts and changes caused by the PE process.

Finally, **Features of innovativeness (Appendix 6)**, were studied by analysing the frequencies of identified ‘innovative characteristics’ of each of the cases studied (17 characteristics were found in this analysis).

Societal challenges were not documented in the quantitative analysis due to the limited amount of data provided by survey. The overall logic of the survey analysis is illustrated in Table 1.

Table 1. Logic of the survey analysis.

Communication patterns and participant selection	PE categories and mechanisms	Impact areas, learning and continuity	Features of innovativeness
<ul style="list-style-type: none"> ● What methods were used for participant selection? (<i>controlled, uncontrolled, self-selection</i>) ● What types of communication were used? (<i>face-to-face, media, mixed</i>) ● What types of media were used? (<i>printed, translated, internet-based, other</i>) ● How many different media were used? ● What was the level of communication? (<i>one way, two way</i>) ● How was communication directed? (<i>sponsor to public, public to sponsor, public to public</i>) ● What formal evidence was introduced? ● Was the PE initiative transdisciplinary? 	<ul style="list-style-type: none"> ● What was the main category of PE? (<i>public communication, activism, consultation, deliberation and participation</i>) ● What were the PE mechanisms? (<i>out of 76 mechanisms identified in Deliverable 1.1</i>) 	<ul style="list-style-type: none"> ● In which area were the aims of PE initiatives fulfilled in (culture, government, society, science and technology)? (<i>impact areas</i>) ● Was the PE initiative repeated? (<i>continuity</i>) ● Were there signs of methodological reflection after the end of PE initiative? (<i>lessons learnt</i>) ● Did the organizer of PE have determination or intention to elaborate the PE concept? (<i>liability for changes, adaptability</i>) 	<ul style="list-style-type: none"> ● What are the features of innovativeness of PE per cases? (<i>hits in a list of 17 innovative characteristics</i>)

2.3 Limitations and validity

The data were provided by the coordinators of recently finished or on-going PE processes. Since it is in the interest of the project managers to promote their own activities, we expected there to be a positive bias in these reports. However, we found that these reports also include critical reflections on the challenges and obstacles met during different stages of the PE processes, which we consider reflect the honesty and learning orientation of these reports. In any case, we have found the reports to be highly useful for building a better understanding of the dynamics of PE innovation and the oppor-

tunities and challenges with current PE activities in Europe and beyond. Further, and to justify our data collection strategy, it should be noted that for many recent PE projects, published reports were not available, and that the PE managers' reports therefore include inside knowledge that would not have been available through alternative research approaches.

The validity of the analysis was supported by iterating the analysis, seeking feedback from colleagues, and comparing the qualitative content analysis with the quantitative analysis, and making any necessary adjustments. At the same time, it is worth recognising that some degree of subjectivity is unavoidable in this kind of analysis.

3 Conceptual framework

‘Participatory performance’ was the starting point of the PE2020 project, as was discussed in the introductory section. Participatory performance refers to the functions of public engagement (PE), and to the scope and intensity of such activities. A high number of PE processes related to R&I issues, for example, can contribute to an active culture of debating and negotiating, which in turn can help in the development and introduction of new technologies in a more democratic and acceptable manner, as social concerns are publicly reflected in the media and various decision arenas. The domain of PE, however, is broad and complex, for which reason we required a conceptual framework to orient our analysis.

In this section we elaborate a conceptual framework of PE and then apply it in the formulation of our research questions and subsequent analysis of the PE cases. By building the framework, we aim both to support the analysis of innovative PE processes, and also to contribute to an approach that helps research and innovation actors to identify relevant issues and to ask the right type of question while designing new governance practices based on PE.

3.1 Four levels of R&I policy

In the PE2020 project we distinguish between **four levels of research and innovation policy activity**, where PE can be relevant.⁶ The most general level can be called **policy formation**, which includes the design and creation of large R&I policy issues, including research infrastructures and organisational settings that provide the frame conditions of conducting research and innovation activities. Another level is **programme development**, which includes funding schemes, thematic prioritisation and other general rules and guidelines for researchers and research funders. The third level is **project**

definition, which refers to the delineation of the research topics, methods applied and resources included in specific research projects. The fourth level includes **research and innovation activities**, which are the actual activities carried out by research actors in order to accomplish the objectives of R&I projects. PE may or may not be relevant in any of these four levels. In this study we are mainly interested in PE activities at the level of research projects and programmes.

3.2 Innovativeness

Box 3 Innovative PE

Innovative PE can be defined as new participatory tools and methods that have the potential to contribute to a more dynamic and responsible governance of R&I.

Innovativeness is among the key concerns of the PE2020 project. We are interested in studying innovative PE practices, since there is a high potential in them in solving some of the stubborn problems of R&I governance, including societal acceptance of technological solutions, limited democracy of R&I decision making, ineffective mobilisation of resources, limited awareness of technoscientific development and, at worse, irresponsible use of public resources. Following these considerations, innovative PE can be defined as new participatory tools and methods that have the potential to contribute to a more dynamic and responsible governance of R&I.

In order to identify innovative PE tools, the PE2020 research consortium had a ‘preliminary definition of innovativeness’ as a starting point of

data collection (see Deliverable 2.1). The following characteristics were included in this preliminary definition:

- new ways of representation
- methodological and institutional hybridity
- bearing to political impacts
- focus on societal challenges

These characteristics were used as a means to select interesting cases for a closer study. After analysing the 38 PE cases, we are now in a position to provide some additional observations about the innovativeness of current PE activity, as we will do in the subsequent sections of this study.

3.3 Participatory performance

Box 4 Participatory performance

Participatory performance refers to the different functions of public engagement (PE), and to the scope and intensity of such activities.

Participatory performance is among the key concepts of the PE2020 project (Box 4). In the paper in which we introduced this concept (Rask et al., 2012a), we applied it to study the scope and intensity of R&I policy debates in European countries. In that paper, we also claimed that the factors contributing to higher or lower levels of participatory performance can be divided into **supply and demand factors** as well as **government policies** and **supportive factors**.

In sociological and political analyses of science in society activities, the level and intensity of public R&I debates have been frequently analysed and discussed (e.g., Gaskell and Bauer, 2001). In the PE2020 project, however, we took on the challenge of analysing participatory performance in a completely different context, namely, in the **context of research projects and programmes**. In our view, the shifted focus involves a more ‘instrumental’ and variegated perspective on PE. This is for the simple reason that unlike in SiS debates at a national level, where an active culture of public debate

can be considered to be an important goal in itself, this hardly is the case in the project and programme context. Instead, PE tools in these contexts usually serve both instrumental and specific purposes. Therefore, we have not aimed to build one ‘block indicator’ of participatory performance in a research project and programme context, but rather, we have chosen to explore and characterise the main performative functions of PE in such contexts.

3.4 Successfulness

Box 5 Successful PE

Successful PE involves right people with right methods and goals, while leaving a big ‘footprint’ on research, innovation and society.

Success is yet another key concept of high interest to the PE2020 project. In a paper on participatory performance in national contexts (Rask et al., 2012a), we implicitly equated high levels of participatory performance (or broad scope and high intensity of public debate on science) with a successful culture of science in society. In the project and programme contexts, however, where the goals of PE are both more heterogeneous and specific, this assumption is difficult to justify. Since success (and failure) of PE is still in the interests of funders, policy makers and researchers, and since most PE managers reported about the success aspects of their PE activities, we decided to elaborate our own definition of the success of PE. In doing so, we adopted a ‘hermeneutical’ approach, in which we included multiple criteria and iterative perspectives in the study of success factors. More precisely, to study the success of PE activities in research project and programme contexts, first we crafted a preliminary definition of success based on consortium members’ own experience and insights. We enriched this conception with the ideas of the studied PE project coordinators, as well as with ideas presented in evaluation literature. On the basis of these various components, in Section 8, we elaborate a synthetic evaluation model to study the success of PE. Based on this model, we can define successful PE as participatory processes that in-

volve the right people with the right methods and goals, while leaving a big 'footprint' on research, innovation and society (Box 5).

3.5 Dynamic governance

Box 6 Dynamic governance

Dynamic governance refers to the ability of policy making to handle issues in a rapidly changing environment requiring continuous adjustment of policies and programmes. In this framework, dynamic governance involves dynamic interactions between scholars, citizens, industry and government as an exploratory, inductive approach in setting performance standards for responsible research and innovation.

Dynamic governance refers to the ability of policy making to handle issues in a rapidly changing environment requiring continuous adjustment of policies and programmes. In this framework, dynamic governance involves dynamic interactions between scholars, citizens, industry and government as an exploratory, inductive approach in setting performance standards for responsible research and innovation. In particular, the dynamic governance framework conceptualises interactions between scholars, policy makers and relevant stakeholders in the context of multidimensional governance and actors influence on the performance of these programs. According to Gulbrandsen (2014), the critical point is a presence or absence of dynamics, tension of changes and co-operation. To explain this, the PE2020 identifies dimensions of dynamic governance based on the concepts of anticipation, reflexivity and transdisciplinarity.

Following Neo and Chen (2007), we include **anticipation, reflexivity** and **transdisciplinary mobilisation of resources** among the key capacities that help policy makers to manage complex issues dynamically in modern research and innovation policy systems. As public engagement may have many roles there, ranging from democratisation to educational functions, the focus on dynamic governance capacities pays special attention to the 'instrumental' role of PE. To reiterate the point, from the perspective of dynamic governance, PE should not only be perceived as a tool for making sci-

ence more democratic or ethical. It should also be seen as an important tool for making decisions that are context wise, proactive, effective and efficient. In addition to these core capacities of dynamic governance, we decided to include **continuation** as an additional key capacity in our analytical framework (Figure 2). Continuity is needed to balance accelerated change caused by increasingly dynamic governance actions.

3.6 Responsible research and innovation

Responsible research and innovation (RRI), finally, is the current 'umbrella term' used to refer to the ideal type of research and innovation activity in the European research area. The European Commission has defined it as follows (Box 7):⁷

Box 7 Responsible Research and Innovation (RRI)

"Responsible research and innovation is an approach that anticipates and assesses potential implications and societal expectations with regard to research and innovation, with the aim to foster the design of inclusive and sustainable research and innovation."

Comparing the dynamic governance and RRI approaches, we make the following observations:

- Dynamic governance is instrumental to responsible research and innovation. Anticipation, reflexivity and transdisciplinarity are acknowledged among the key capacities contributing to both dynamic governance and RRI (Neo & Chen, 2007).
- Dynamic governance, however, is not only for ensuring RRI, but is also essential for sustained economic and social development and other long-term interests of the nations and the EU.
- To ensure responsibility of dynamic governance, which emphasises continuous adjustment of policies and programmes, an additional capacity may be required: the capacity to provide organisational and institutional continuity. Certainly, things change, and more rapidly all the time. But as has been recognised e.g. in the literature on PE and deliberative sys-

tems, without an adequate level of institutional embedding and continuity, isolated PE projects are not in themselves conducive to better governance (e.g., Parkinson and Mansbridge, 2012; Dryzek, 2010).

- To ensure the continuity of dynamic governance, RRI is interlinked with the organisational creativity, innovation, entrepreneurial spirit⁸, experience (knowledge, practice), reputation equity (Marland Sykes policy Cycle⁹), which must be embedded into all aspects of the policy cycle – especially policy choice, execution and evaluation.¹⁰
- To ensure politically feasible actions, dynamic governance combines the bottom-up approaches with top-down governmental visions.¹¹

Connecting the dynamic governance to PE, some other observations can be made:

- The key capacities in the model adopted here, that are conducive to dynamic governance (anticipation, reflexivity and transdisciplinarity), are strongly connected with PE. As a matter of fact, anticipation is a capacity that largely relies upon an early analysis and interpretation of the emerging orientations and practices of the key stakeholders, and this can mainly occur in a context of dialogue and consultation. The same can be said for reflexivity, which is not a personal capacity but is chiefly a collective product resulting from dialogue and exchange. Transdisciplinarity can evidently be practised only through a dense interaction between the various disciplinary communities.
- PE also plays a pivotal role in contextualising dynamic governance. It is in fact quite evident that dynamic governance can be developed only through negotiations and consensus-building processes involving both internal and external stakeholders allowing new practices to be fully embedded in a given institution or cluster of institutions. It is hard to imagine a contextualisation process without extended and continuous practices of PE and participatory mechanisms.

- If PE provides indispensable support for shifting to dynamic governance, the latter offers in turn new room for developing PE practices. In particular, being dynamic governance aimed at facing an environment characterised by wide and rapid changes, it needs to be structurally effective for information about the changing environment. Such information is mainly gained through the interactions between the different internal and external players, who actually function as the main ‘sensors’ of the organisation. This goes in the direction of institutionalising and ensuring continuity to PE. Conversely, a non-dynamic organisation will likely frame PE merely as an ethical question or an optional practice to be occasionally carried out and not as an essential part of its own governance strategies.

3.7 Analytical framework

To summarise, the theoretical perspectives or ‘analytical lenses’ outlined earlier contribute to an analytical framework that have been applied in the analysis of the 38 case studies (Figure 2). We are interested in exploring what the trends and innovative aspects of current PE practices are. We expect that PE will have different performative functions in the contexts of research programme development and project definition, and that the success of PE in those contexts depends both on demand- and supply-based factors. At best, PE can contribute to a more dynamic governance of research and innovation by contributing to new governance capacities such as anticipation and public reflexivity. These concepts have been applied to define the research questions of this study.

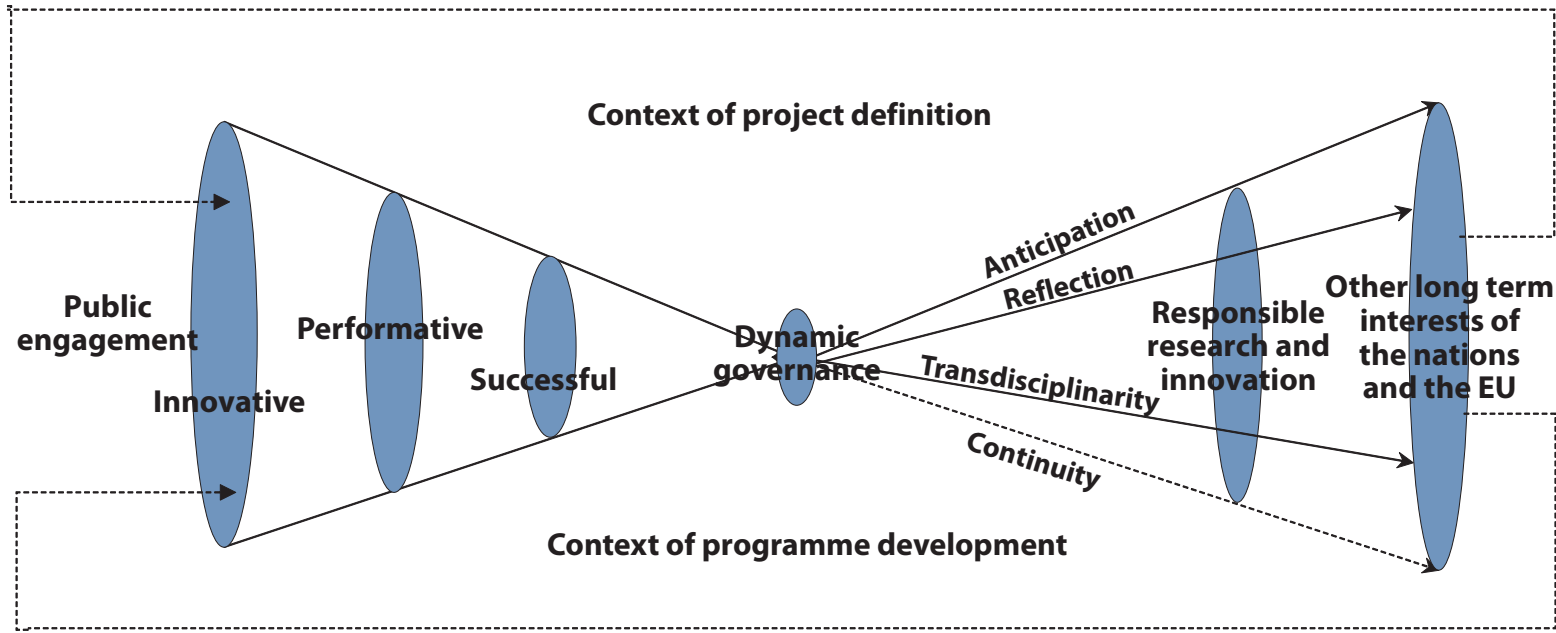


Figure 2. Analytical framework.

4 Research questions

Building on the above discussion in following sections, we have defined our research questions as follows:

Innovativeness

1. What are the characteristics of innovative PE processes in our sample?

Participatory performance

2. What are the performative functions of PE in our sample?
 - How could we measure 'participatory performance' in the context of project definition and programme development?
 - What factors could contribute to higher or lower levels of participatory performance in these contexts?

Successfulness

3. How can we define and characterise the success of PE?

Obstacles

4. What are the obstacles for successful PE?

In Part I we have presented our approach and the underlying data. In the following Part II of this publication, we report our findings of the 38 cases of innovative PE processes in terms of the above described research questions.



Part II ANALYSIS OF PUBLIC ENGAGEMENT CASES

5 Identities of the PE cases studied

The identities of the PE cases studied are described in Table 2. The numbers refer to the Catalogue of PE initiatives (Deliverable 1.2), in which the cases are fully described. In addition to the coordinators of each initiative, we have indicated the years during which the projects were running. The oldest example ran from 1992-1994 (*Imagine Chicago*, U.S.) while most of the cases are more recent, having been implemented during the past five to ten years, or they are on-going. An example of an on-going project is the *Flemish science shop* programme or *Soapbox science* initiative, which started as an experimental project but has now turned into an international programme. Most of the examples are either PE projects or programmes, but also included are other initiatives, including a social movement, a legal framework and other organisational entities.

Additional information on the identities of the PE processes studied has been published in PE2020 report Deliverable 4.1 (“Toolkit design document”). In that report, we have provided information about the following basic aspects of the cases:

- **Types of promoter.** We found that 14 initiatives were promoted by non-profit organisations, ten by academic institutions, five by national governments, five by networks, three by local governments and one by another type of institution.

- **Types of target group.** Lay people were targeted in 34 initiatives, and respectively public officers in 18, stakeholders (i.e., individuals or groups involved with or having an interest in the issues dealt with in the PE initiative) in 15, experts in nine, researchers and academic bodies in eight, NGOs in two and other entities in four initiatives.
- **Scope.** We found that 16 PE initiatives operated at a national level, while the corresponding number of Europe-level initiatives was 16, local 13, regional three, and global two. None of the PE processes were devoted to a single organisation or institution.

In the following sections we report on our findings about innovativeness, participatory performance and successfulness.

Table 2. Identities of the 38 innovative PE cases: title, coordinator, year, and type (project, programme, other).

N	Title	Coordinator	Year	Type
1	PRIMAS	University of Education Freiburg, Germany	2010-13	Project
2	Science Municipalities	Danish Science Factory	2008-11	Programme
3	Nanodialogue	Fondazione IDIS – Città della Scienza	2005-07	Project
4	Breaking & Entering	University of Copenhagen	2013-14	Project
5	EARTHWAKE	EUROSCIENCE	2007	Project
6	Let's do it - movement and world clean up	Let's Do It Foundation	2012-18	Social movement
7	DEEPEN	Durham University	2006-09	Project
8	Flemish Science Shops	Vrije Universiteit Brussel and Universiteit Antwerpen	2003-ongoing	Programme
9	RESEARCH2015	Ministry for Science, Technology and Innovation	2007-08	Project
10	iSPEX	iSPEX consortium	2013-ongoing	Project
11	PERARES	Living Knowledge Network	2010-14	Project
12	SplICES	Atomium Culture	2012-13	Project
13	The Autumn Experiment	Vetenskap & Allmänhet	2013-14	Project
14	VOICES	Ecsite (European network of science centres and museums)	2013-14	Project
15	Societal Advisory Board	Joint Programming Initiative „More Years Better Lives“	2012 – Ongoing	Organizational entity
16	Imagine Chicago	Imagine Chicago	1992-94	Project
17	Bonus Advocates Network	BONUS programme	2010-11	Programme
18	Owela Open Web Lab	VTT, Technical Research Centre of Finland	Ongoing	Service
19	Citizens' Dialogue on Future Technologies	German Ministry of Research and Education	2011-13	Project
20	GenSET	Portia Ltd	2009-12	Programme
21	Law no. 69/07 of the Tuscany Region	Tuscany Region	2008-13	Legal framework
22	Act Create Experience	WWF-UK	1996-ongoing	Programme
23	The National DNA Database on Trial	University of South Wales	2008-09	Project
24	2WAYS	European Science Events Association, Eusea	2009-10	Project
25	NanoDialogue	German Federal Ministry of Environment, Nature Conservation and Nuclear Safety	2006-ongoing	Programme
26	World Wide Views on Global Warming	The Danish Board of Technology	2007-09	Project
27	Bioenergy Dialogue	Biotechnology and Biological Sciences Research Council	2012-14	Project
28	Soapbox Science	Dr Seirian Sumner & Dr Nathalie Pettoelli	2011-ongoing	Programme
29	Futurescape City Tours	Consortium for Science, Policy & Outcomes	2012-14	Project
30	CIVISTI	Danish Board of Technology	2008-2011	Project
31	Empowering Citizen Voices in.. New Orleans	AmericaSpeaks	2006-07	Project
32	Consensus Conference on future energy	Wissenschaft im Dialog gGmbH	2010	Project
33	Peloton	Demos Helsinki	2009-ongoing	Programme
34	PARTERRE	Tuscany Region	2010-12	Project
35	Imagine Jersey 2035	States of Jersey and Involve	2007-08	Project
36	G1000	G1000	2011-12	Project
37	Youth Council Espoo	City of Espoo	1997-ongoing	Organizational entity
38	We the Citizens	University College Dublin	2011	Project

6 Innovativeness

We selected our sample of innovative cases by using the preliminary criteria of innovativeness that are discussed in the following subsections (indicated in parentheses):

- new ways of representation (6.1)
- methodological and institutional hybridity (6.2)
- focus on societal challenges (6.3)
- bearing on political impacts (6.4)
- other innovative tendencies in PE (6.5)

6.1 New ways of representation

In considering the key actors in research and innovation activities, academia and public authorities have traditionally had a strong role in the planning, implementation and evaluation of such processes. Public authorities represent the public sector, whereas researchers and research institutions have traditionally come from both the public and private sectors. In addition to these two sectors, the social sector – sometimes referred to as the ‘third sector’ – has in recent decades been increasingly involved in research activities by providing access to the interests and viewpoints of organised stakeholder groups, such as environmental and industrial organisations. **The trend of increasing representation of the third sector is continuing strongly** in many areas of R&I decision making, such as university boards and national research and innovation policy councils that involve members from such organisations (Rask et al., 2012a). This is also reflected in our case studies, where the third sector is strongly represented.

Box 8 ‘Fourth sector’

‘Fourth sector’ is as an emerging field, composed of actors or actor groups whose foundational logic is not in the representation of established interests, but rather, in the idea of social cooperation through hybrid networking.

More recently we have witnessed **the emergence of the ‘fourth sector’** which is becoming more prominent in many areas of public activity, not least in the context of R&I policy. There are several definitions of the fourth sector in the research literature. Sabeti (2009) refers to hybrid organisations, such as chaordic organisations,¹² social enterprises, cross-sectoral partnerships and community interest corporations. Williams (2002) refers to the world of volunteering and ‘one-to-one’ helping amongst affluent and deprived people. Mäenpää and Faehnle (2015) refer to public activism outside organised interest groups, such as neighbour self-help groups, local movements, pop up restaurants and exhibitions, and small sized cooperatives. Common to all these notions is that the fourth sector is seen as an emerging field, composed of actors or groups of actors whose foundational logic is not in the representation of established interests, but rather, in the idea of social cooperation through hybrid networking. The four sectors are illustrated in Figure 3.

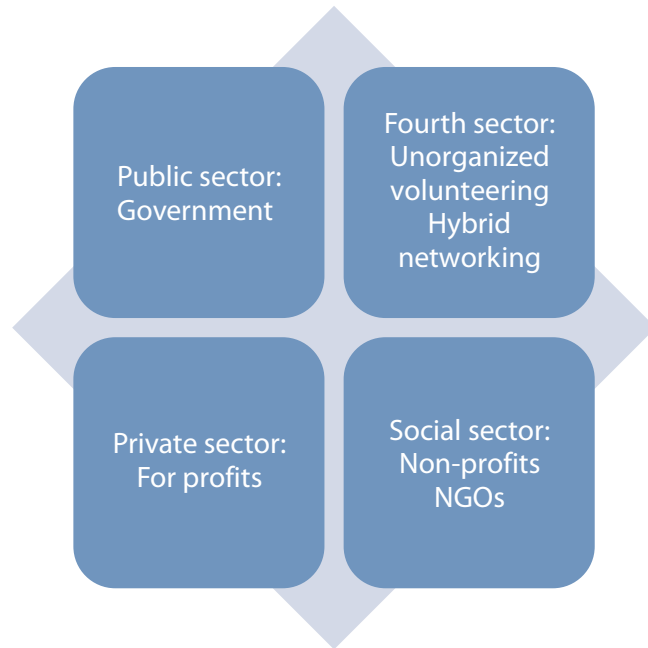


Figure 3. Four sectors of the economy and society.

Our first observation about the sample of innovative PE processes is that **the number and variety of actors is high**. This is illustrated in Figure 4, in which we clustered actors around the four sectors just described. As the free-format shape of the figure suggests, allocation of the actors under the four sectors can only be made roughly. This is particularly the case with the fourth sector, within which we included the following sub-groups: hybrid experts, randomly selected people, field experts and life world experts. It should also be noted that the border between the ‘unorganised’ fourth sector and the more organised groups representing the social sector is often blurred.

Second, **innovative PE is eager to have the involvement of the fourth sector**. In the literature on PE the involvement of the fourth sector is often labelled as ‘direct involvement of citizens’, which is separated from ‘stakeholder involvement’ referring to the participation of the third sector organisations (Elson, 2014). We found that three-quarters (29/38)¹³ of the innovative PE cases directly involved citizens, either as the sole mechanisms, as for example in the *World Wide Views on Global Warming*, or more likely, as one of various involvement mechanisms. In any case, such active involvement of the fourth sector is in striking contrast to the ‘state-of-the-art’ in R&I policy making, where more traditional models of participation prevail.

Third, **in most cases, the purpose of involving the fourth sector was to provide a broad representation of socio-demographic diversity**. This can be contrasted with the intention to empower particular socio-demographic segments by targeting such groups or over-representing them in the samples. Highly different actor groups and societal segments were involved in the PE processes studied, as communicated in Figure 4. Youth was over-represented or targeted in one-third of the cases. Other systematically empowered groups included women (*GenSET*) and consumers (*Owela Open Web Lab*).

Fourth, **random or stratified random sampling strategies were used in several cases (12/29)¹⁴ to control the selection of the participating citizens**. Most of such cases belong to the category of ‘public deliberation’, which reflects the prevailing wisdom in the context of deliberative democratic theory and praxis to rely on ‘micro-publics’ as a means to provide access to unbiased arguments (Bächtiger et al., 2014). **One-quarter (7/29)¹⁵ of the cases applied uncontrolled selection strategies**, in which there was no intention to compose participating groups in any systematic manner. In some cases, this was understandable through the effort to maximise participation, as for example in *Imagine New Jersey 2035*. Most instances of uncontrolled selection, e.g. *Soapbox science* where passers-by can enter in a dialogue with senior scientists, belong to the category of ‘public deliberation’. Other types included ‘public activism’ (*Let’s do it!*) and ‘public consultation’ (*Owela Open Web Lab*). Additional approaches to participant selection in-

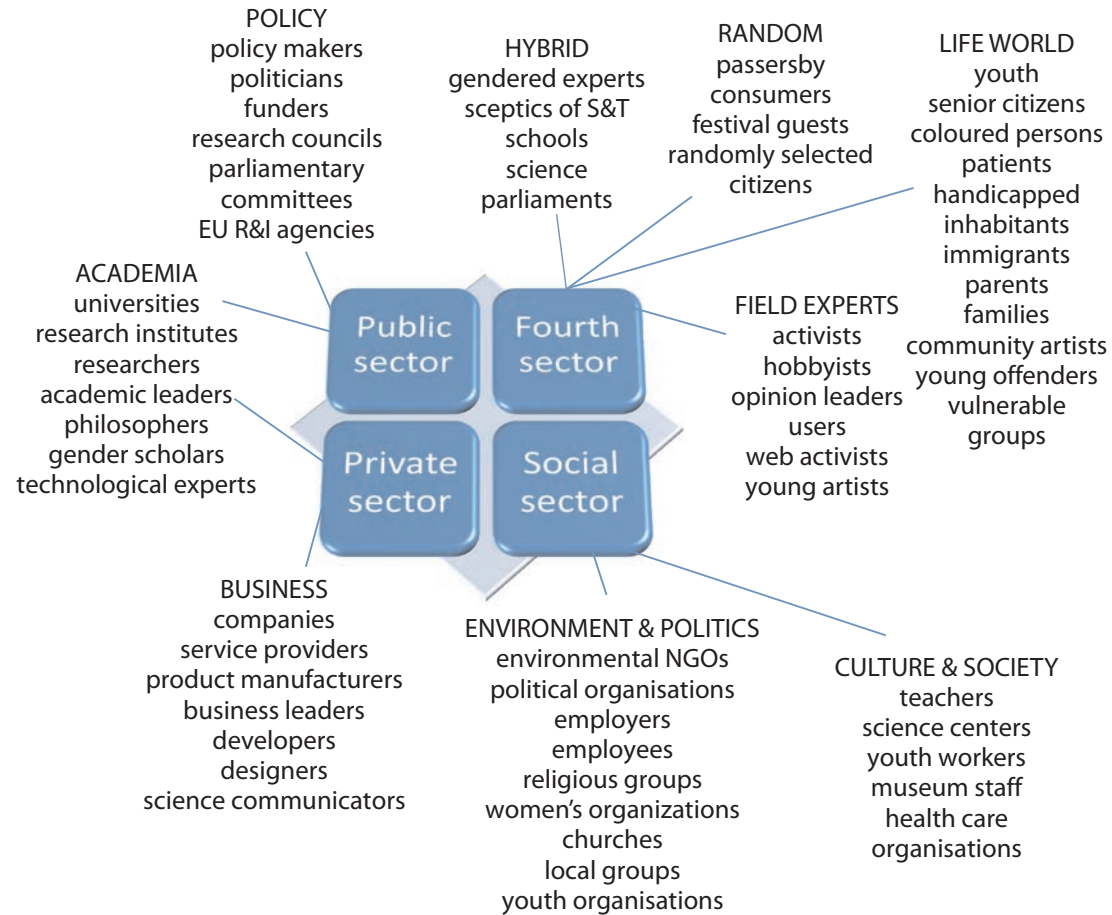


Figure 4. Different actors participating in innovative PE processes.

cluded self-selection methods (where a snow-ball type of processes is used) and mixed methods (see Appendix 2).

Fifth, the third sector (or stakeholder groups) was involved in most cases, including cases that were primarily oriented at citizen involvement.

None of the cases were based only on expert representation, by involving only scientists or policy makers. One-fifth of the cases involved only stakeholders.¹⁶ Therefore, it is fair to say that an increasing involvement of the third sector is a long and still continuing PE trend in Western R&I policy.

Finally, **innovativeness of participant representation reflects an increasingly systemic approach to the design of the deliberative processes.** We found that in many cases, the strategies of participant engagement and representation were highly sophisticated. An example is the *Let's do it!* campaign, for which separate involvement strategies were prepared for communication, political engagement, global activities and provision of know-how and support for the activists. The systemic approach involves several targeted approaches:

- Recognition and reconciliation of the rationales of participation. Examples of highly different rationales include experimentation (*Breaking and entering*), co-production of knowledge, and comprehensiveness in representation of societal interests (*Social advisory board*). Different rationales imply different requests to participant selection and representation.
- The formal vs. informal structure of the PE process implies different approaches to building and maintaining representation of politics and expertise. In more structured processes (e.g. *Flemish science shops*) there is the need to maintain clear division of tasks and responsibilities between different partners (e.g. professors ensuring scientific quality, CSOs identifying socially relevant problems), compared to some less formal processes (e.g. *Soapbox science*), where the creation of random encounters between researchers and the publics is the key aspiration.
- One dividing line is whether stakeholders are being mapped systematically as in *Bonus advocates network* and in the *Peloton* process – or not so. Using such mapping methods steers PE processes toward models that are more systemic.
- Iterative vs. event based engagement processes. Cases in which the engagement process was based on iteration (e.g. the *Deepen* project, for which focus groups were re-convened and represented in a final deliberation event) require a good understanding of the motivations and measures to attract reconvening participants in the PE process.
- On-line (e.g. *Citizens' dialogue on future technologies*, *GenSET* and *Parterre*) vs. face-to-face processes open up a whole set of issues on how, and how controllably, representation can be built into PE processes.

More extensive reliance on web based methods increases the number of challenges on how to keep track of the virtually ramifying deliberation.

Overall, we found that innovative PE cases involve highly sophisticated tools and approaches to ways in which actors are motivated to participate, how deliberations are structured, how networks are created and maintained, and how productive interactions are generated. The complexities of such efforts are reflected in the 'focus and approach' cluster of the cognitive maps (see Appendix 1).

6.2 Methodological and institutional hybridity

In the catalogue of innovative PE processes (Deliverable 1.2) we divided the 38 cases into five methodological clusters: public communication, public consultation, public deliberation, public participation and public activism (Box 2). This categorisation is based on a fusion of two classic models, Arnstein's (1969) 'ladder of participation', which pays attention to the levels that political power assigned to the participants, and Rowe and Frewer's (2005) model, which pays attention to the directions of information flows between sponsors and participants. Both formal (e.g. organised deliberation process) and non-formal (e.g. public activism) PE processes can be included in these categories. The allocation of the 38 PE cases across the main methodological categories is illustrated in Figure 5.

Our first observation is that **nearly half (18/38) of the cases are 'public deliberation' processes.** By definition, these are processes that aim to have an impact on decision making, not by assigning political power directly to the participants but by communicating sooner the results of deliberations to policy makers, who in turn, are expected to react and 'give an account' of the implications of deliberations for decision making. The second largest group (12/39) are public consultation processes, the primary purpose of which is to inform decision-makers about public opinions and viewpoints on certain topics. The third largest group is public communication processes, which aim to inform or educate citizens (five cases). In addition, two cases rep-

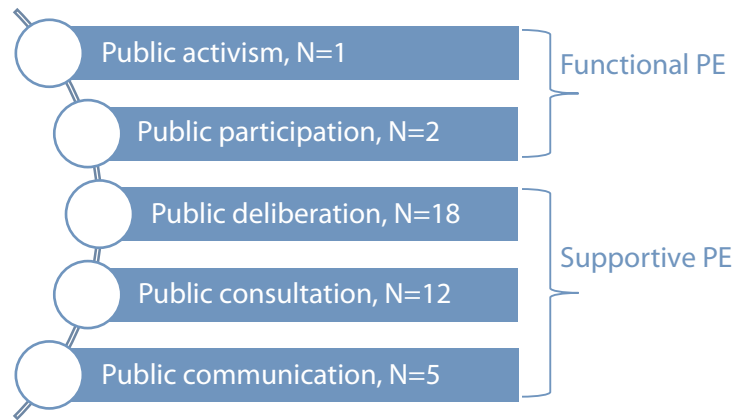


Figure 5. PE cases by main methodological category.

resent public participation, where decision-making power is partly or fully assigned to the citizens, and one case represents public activism (*Let's do it!*).

Considering the role of the five methodological clusters in R&I decision making, we propose to use the term 'supportive PE' to cover public deliberation, public consultation and public communication, since such processes include different facilitative roles, such as providing input, advice, feedback and evaluative insights from an expanded group of experts and stakeholders to decision makers. Following this logic, we propose to refer to public activism and public participation as 'functional PE', since they are oriented towards either making decisions or implementing them. Functional PE, in other words, is oriented towards doing things – making decisions or implementing them – rather than merely debating about them.

Our second observation is that **an overwhelming number of innovative PE processes (35/38) represent supportive PE**. Only three cases belong to the category of functional PE (see Figure 5).

Third, **we consider the prevalence of deliberative processes to be an indicator of the increasing methodological maturity of the PE field**. Compared with traditional models of public communication and consultation, where dialogue between decision makers and the public is narrow and

restricted, public deliberation represents a more active model of SiS activity. This model is backed by recent ideas and theories of deliberative democracy that emphasise the importance of identifying relevant discourses and stakeholders and organising equal and inclusive discursive processes in order to reach agreements on complex policy problems (Gastil and Levine, 2005). The continuum of theory and praxis, embedded in the deliberative model, can increase the robustness, credibility and relevance of method development, which in the long run can help to consolidate the whole field of PE by providing scientific evidence for governance innovation.

Fourth, we found **indications of institutional ambivalence – simultaneous support and resistance – toward more innovative PE processes**. In other words, along with increasing methodological maturity, many of the PE processes were perceived as being risky interventions, and in many cases policy makers made qualified statements about them, which indicates that even advisory PE can be perceived as a threat to existing practices of policy making (e.g. *Law No. 69/07 of the Tuscany Region, Act Create Experience, BBSRC Bioenergy debate*). This reservation, combined with the fact that many of the PE processes studied were public consultation and public communication exercises in which the role of the public is even more limited, suggests that systemic scepticism toward innovative PE processes can easily cause them to slip back to more traditional SiS models.

Fifth, we found **a comprehensive turn from one-way communication processes towards multiple-way communications**. Rowe and Frewer (2005) characterised public communication and public consultation as 'one-way' communication processes, since in the former, information is expected to flow from the sponsors of PE toward the public, and in the latter the expectation is the opposite. In our sample we preliminarily included 18 PE processes in the category of one-way communication. Contrary to our expectation, however, we found that **practically all (36/38) PE cases were based on two or multiple-way communication**. Only *G1000* and *We the citizens* (see Appendix 2), were classified as 'one-way' processes, since they both emphasise and try to protect the political autonomy of the deliberative panels, for which reason they to pursue limited interactions with such actors who might compromise their autonomy. Even in those two cases, how-

ever, we can still recognize a tendency toward multiple rather than one-way flow of communications¹⁷.

An illustrative example of the shift towards multiple-way communication is the *Nanodialogue* project. Its main aim (typically to a traditional science communication project) is to increase public awareness of nanotechnologies by raising curiosity and stimulating public debates on topical scientific issues. In reality, in contrast, the *Nanodialogue* project was a multidimensional communication exercise, through which a transdisciplinary group of philosophers, designers, politicians, social scientists, nanoscientists and members of the museum staff first co-designed the PE process. They then organised dialogues with families, schools, nanoindustries and science centres, which finally led not only to increased public awareness of nanotechnology, but also to a transformation of science centres' conception of their own roles in the business of science communication (from a spectator of scientific development to its active supporter). It would be a violation of the reality to label such activity as one-way science communication, since both the public and the organising bodies whose identities were under revision were targeted through educational efforts.

Sixth, **bold institutional hybridity is a clear sign of innovative PE**. Institutional hybridity in our context refers to the mixing of traditional R&I policy institutions. In general, we found that such mixing was high in terms of creating highly diversified networks of collaboration. We also found that usually highly diversified networks contributed to highly diversified outcomes in the PE projects. An example is *the Autumn experiment* that involved schools, cities and researchers in a Swedish citizen science project: the results not only included registration and measurement of more than 2000 trees and other scientific results but it also led to new teaching materials and methods for teachers, as well as to intensive public debates about the role of scientific research in Swedish municipalities. In particular, we found that the role of the following institutions is in a state of transformation through innovative PE processes:

- **Cities and municipalities** – these are among the main platforms of innovative PE processes. Even though smart city development is a well-known phenomenon that combines technoscientific development with

city development, systematic strategies and infrastructures for science interaction at this level are still quite limited even though there is much potential to benefit from them (see case 2, *Science Municipalities*)¹⁸.

- **Science centres and museums** – in many cases these adopted a stronger role in exerting political influence than is commonly considered appropriate for such 'neutral' players in the science policy arena. Examples include the *Nanodialogue project* focusing on understanding the transformative role of science museums, the VOICES project that involved a highly political process of defining strategic research priorities with regard to urban waste research in Europe, and *World Wide Views on Global warming*, where U.S., Japanese and German science museums facilitated dialogues about international politics of climate change (see Rask et al., 2012b).
- **Schools** – these were especially active in experimenting with citizen science processes that activate the whole network of actors related to primary and secondary education: pupils, teachers, parents, cities, service providers, scientists and regulators.
- Some of the institutions are more difficult to reach than others. These included **international policy institutions**¹⁹ (e.g. UN COP negotiations in the World Wide Views process, case 26) and **criminal agencies**, as in the case of *the National DNA database on trial*, in which young offenders were involved in a mock trial process in order to empower youth and local communities to deal with complex bioscience issues.
- **Business companies** – these are somewhat hidden in our sample of PE processes, but in a few cases there have been promising results about the potential of PE in providing access to new product concepts and business ideas. An inspiring example is the Peloton process by Demos Helsinki, in which a peer-incubator platform was created for 'smart-up' companies to co-create new services and products with lead users and cities.

Overall, institutional hybridisation generated win-win situations, by creating concrete platforms for co-design activities (cities and municipalities), transforming identities and core missions of R&I actors (science centres

and museums), broadly mobilising communal resources (schools), mainstreaming policies (international negotiation), empowering marginalised actors (criminal political agencies) and stimulating creativity in product development (business companies).

Seventh, **innovative PE uses multiple tools and instruments**. We found that more than twenty mechanisms (out of the 76 identified in Deliverable 1.1) had been used in our sample. Some of those mechanisms were used for the first time and they were unique, as for example ‘Mock trials,’ ‘Gatekeeper analysis,’ ‘Co-creation spaces’ and ‘IMAGINE appreciate inquiry’. Four projects used the ‘21st Century Town Meeting’ method (one of them was an ‘electronic town meeting’); this was the most often used single mechanism in our sample.

Eighth, **innovative PE processes combined face-to-face communication with electronic media**. Almost all cases relied on face-to-face deliberation processes in establishing dialogues between the actors. One-fifth of the cases relied only on face-to-face communication, while the majority of the cases completed their communication with additional media, be they television, radio, phone, printed media, internet or other electronic applications (see Appendix 2). Electronic media were used in 70% of the PE cases including email, Internet, websites, blogs, podcasts, webinars, videoconferences, Twitter, Facebook, YouTube, SurveyMonkey, GoPetition, GoMeeting, or other similar web based applications. One third of the PE cases used at least two different media and every fourth of the PE cases used three or more media to reach their target audiences²⁰. In addition to the Internet, printed media were popular. Almost one-third of the instigators of PE projects and initiatives reported that they used newspapers, magazines or posters.

We also explored the methodologies at a more general level, identifying most commonly used methods (see Appendix 4), and simply cross-examining how the use of such methods coincided with various features of innovativeness (see Appendix 6). The main finding is simple: **the higher the number of methods used, the higher the number of innovative features and impact on societal challenges** (see Figure 6).

As Figure 6 indicates, the lowest number of reported methods was one while the maximum was eight. The average number of methods used per PE case was 3.5. All in all, the number of methods used correlates highly with the innovativeness of the PE processes, which is understandable, since methodological mixing was one of our preliminary criteria of innovativeness. The numbers can be misleading however, as we could expect that one type of tool or instrument can actually contain several methods that were not just explicated in the case description. ‘Media’ for example, can include different types of traditional media (TV, radio, newspapers, magazines etc.) even though this was reported as a single category. The simple statistic is still an indicator of the general trend that seems quite obvious: methodological mixing contributes to more innovative PE practices.

Ninth, as a corollary of the previous point, **online tools and instruments were most often used as complementary methodologies**. We found 16 cases in which online tools such as social media, websites, consultations, voting, e-mails, internet hearings, and on-line debate portals were used in parallel with other methods.

Tenth, **rather than being ‘one-off’ events, many innovative PE processes are essentially systemic innovations**. Some of the cases may first appear to be single events, as for example the Breaking and entering project that basically organised a physical installation on emerging applications of synthetic biology. On closer inspection, however, such processes reflect boundary work across domains, many times challenging existing norms and conceptions of the role of citizens, research, innovation and appropriate ways to communicate science in society. The following types of **institutional boundary work** could be found among the first ten PE cases:

- multi-level policy communication – local, national, international (case 1)
- multi-actor collaboration – public, private (cases 2 and 3)
- multi-functional communication – science communication, scientific exploration (case 4)
- trans-disciplinary design – various sciences and practical expertise (case 4)

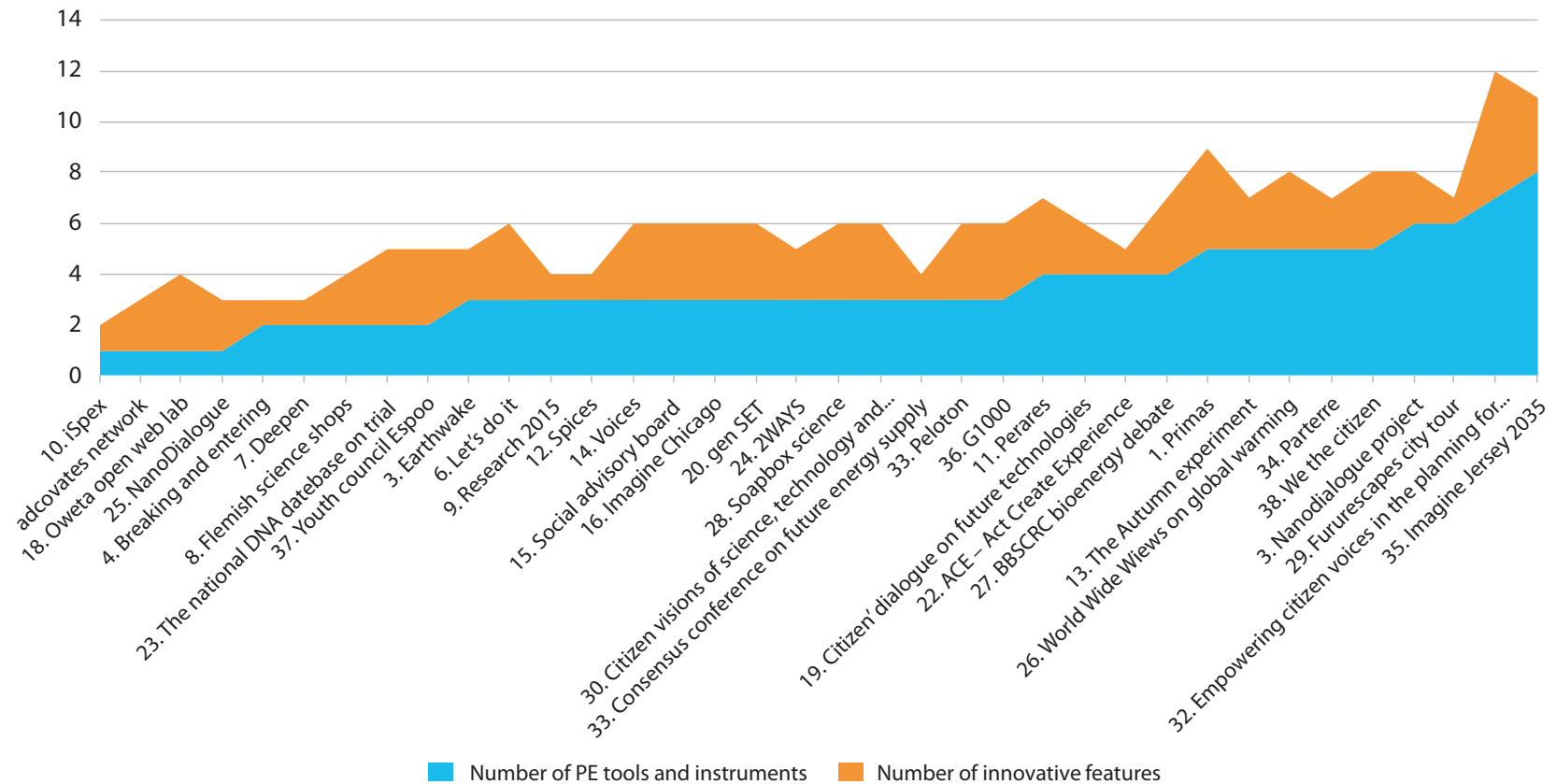


Figure 6. Coincidence of the number of PE tools and instruments with innovativeness (see Appendixes 4 and 6).

- cross-sectoral dissemination – motivation of participants, global communication, provision of expertise etc. (case 5)
- increasing organisational complexity, globalisation – strategic specialisation, spreading to more than 100 countries (case 6)
- methodological iteration – local deliberative events, reconvened groups, final event (case 7)
- historical continuity – 20 years of elaboration of the science shop approach (case 8)
- political embedding – integration of the process in policy design (case 9)
- expansion and programmatisation – widening and deepening use of the citizen science approach (case 10)

The list could be continued, but the point is evident: as recent scholars of deliberative democracy have emphasised, it is becoming more and more important **to start considering the systemic aspects of deliberative processes**. This is becoming reality with the more innovative PE processes that we studied.

6.3 Focus on societal challenges

European research programmes reflect the policy priorities of the Europe 2020 strategies and address major concerns shared by citizens in Europe and elsewhere. In order to approach such concerns, the European Commission has defined seven societal challenges that orient research programmes and projects funded under the Horizon2020 programme (Box 8).²¹

Box 8 Seven societal challenges of the European Commission

- A. Health, demographic change and wellbeing;
- B. Food security, sustainable agriculture and forestry, marine and maritime and inland water research, and the bioeconomy;
- C. Secure, clean and efficient energy;
- D. Smart, green and integrated transport;
- E. Climate action, environment, resource efficiency and raw materials;
- F. Europe in a changing world - inclusive, innovative and reflective societies;
- G. Secure societies - protecting freedom and security of Europe and its citizens.

Orienting publicly funded research activities in addressing societal challenges – or grand challenges, as they are also called – is well justified due to their pervasive and compelling nature.²² Demonstrating that research and innovation activities are necessary to address societal challenges is also among the more powerful ways to legitimise public spending on European and national research programmes.

While the challenge-driven approach has obvious virtues, as acknowledged by high level European strategies, there are also “challenges in addressing grand challenges”, as professors Stefan Kuhlman and Arie Rip (2014) claim in their ‘think piece’. The main challenge according to those authors is that **addressing societal challenges involves an open ended mission and requires systemic transformations**. This is in contrast with more traditional R&I policies that focus on stimulating innovation in particular technological domains through dedicated funding programmes. To address societal challenges better, Kuhlmann and Rip (2014) have called for a **tentative governance approach**, which includes ideas that governments should adopt a facilitative role in a) orchestrating activities by a high variety of actors by creating new spaces for interaction – and actively involving new actors such as charitable foundations, which can operate with fewer bureaucratic and democratic constraints, b) supporting experimentation through dynamic, provisional and revisable interventions, and c) facilitating systemic change through tentative policy mixes. These three points (a-c) have been referred to here as ‘criteria of tentative governance’.

Against this briefly sketched background to societal challenges in European R&I policy thinking, what could be said about the potential of PE in addressing them better?

Our first observation is that **innovative PE processes are widely oriented towards addressing societal challenges**. Only one case, *We the citizens*, was not classified as directly addressing societal challenges; even in that case, however, where the initiative aimed at “showing the merits of random selection and deliberation in processes of discussing constitutional reform”, we can see links to societal challenges, in particular Challenge F (*Europe in a changing world*). In all other cases, PE processes were directly focused on addressing one or more societal challenges (Figure 6).

Second, **innovative PE processes are specifically oriented towards addressing societal challenges**. In other words, their level of ambition in addressing the challenges is high. On average, each PE project contributed to three societal challenges. All seven challenges were addressed in seven cases, whereas only one challenge was addressed in eight cases. But the figures are perhaps less telling about the ambition levels. A better indicator

Table 3. Orientation of the PE initiatives toward societal challenges (white colour= primarily R&I focussed; blue colour= other focus).

Public communication	Public consultation	Public deliberation	Public participation	Public activism
1. PRIMAS (F)	7. DEEPEN (E, F)	19. Citizens' Dialogue on Future Technologies (A, C)	37. Youth Council Espoo (A, F, G)	6. Let's do it! (A, B, E, F)
2. Science Municipalities (B, F)	8. Flemish Science Shops (A, F, G)	20. GenSET (E, F)	38. We the Citizens (none)	
3. Nanodialogue Project (B, E, G)	9. RESEARCH 2015 (A-G)	21. Law No. 69/07 of the Tuscany Region (F)		
4. Breaking and Entering (A, B, C, E)	10. iSPEX (A, D, E, F)	22. ACE (A-G)		
5. EARTHWAKE (A-G)	11. PERARES (A-G)	23. The National DNA Database on Trial (A, G)		
	12. SplICES (F)	24. 2WAYS (F)		
	13. The Autumn Experiment (B, E, F)	25. NanoDialogue (A, E)		
	14. VOICES (E, F)	26. World Wide Views on Global Warming (C, E)		
	15. Social Advisory Board (A, F)	27. BBSRC Bioenergy Dialogue (C)		
	16. Imagine Chicago (F)	28. Soapbox Science (F)		
	17. Bonus Advocates Network (A, B, E, F)	29. Futurescape City Tours (A, F)		
	18. Owela Open Web Lab (A-G)	30. Citizen Visions of Science, Technology and Innovation (A-G)		
		31. Empowering Citizen Voices in the Planning for Rebuilding New Orleans (A, E, F)		
		32. Consensus Conference on Future Energy (C, E)		
		33. Peloton (B, C, D, E)		
		34. PARTERRE (A-G)		
		35. Imagine Jersey 2035 (A, B, D, E, F)		
		36. G1000 (F)		

can be discerned in the goal descriptions of the PE initiatives. *Let's do it!*, for example, had the goal of “cleaning up the whole world from illegally dumped solid waste” (relevance to challenges A, B, E, F); *Imagine Chicago* aimed at “cultivating hope and developing visions for a city and its citizens” (challenge F)²³; *Law No. 69/07* aimed at “developing Tuscany as a laboratory of deliberative democracy” (challenge F); and *G1000* had the goal of “innovating democracy and letting citizens experience democracy” (challenge F). Needless to say, such goals are not intended to address trivialities of societal change, but rather, find new tools and remedies in addressing wicked problems of our societies, such as polluted environment and endangered democracy and social cohesion.

Third, in order to study the approach of the PE initiatives to the societal challenges, we divided the cases studied into two types: initiatives primarily focusing on R&I themes; and initiatives primarily focusing on other themes (Table 3)²⁴. Examples of R&I-focussed initiatives include *PRIMAS* that aimed to promote inquiry in mathematics and science across Europe and *Flemish Science Shops* that supported dialogue between researchers and civil society. Examples of PE initiatives focusing on other themes include *G1000* exploring the future of the Belgian political system, and *World Wide Views on Global Warming* contributing to the international politics

of climate change. While two-thirds of PE cases primarily focused on R&I themes, an interesting observation is that **political framing dominated the two ‘highest rungs on a ladder of PE’, public activism and public participation**, whereas public deliberation is a mixed category in which both R&I and other framings are present. Perhaps this reflects the fact that the closer one comes to decision making and action, the more political things get.²⁵

Fourth, we studied which of the seven societal challenges were approached most often in the PE processes that we studied (Table 4). We found that (F) ***Europe in a changing world – inclusive, innovative and reflective societies was the most frequently addressed societal challenge*** (28 cases), which is no wonder, since by definition, PE is about inclusivity. (E) *Climate action, environment...* (22 cases), and (A) *Health, demographic change and wellbeing* (20 cases) were the two next frequently addressed challenges. Less attention was paid to challenges (B) *Food security, sustainable agriculture and forestry...* (15 cases), (C) *Secure, clean and efficient energy* (13 cases), (G) *Secure societies...* (11 cases), and (D) *Smart, green and integrated transport* (10 cases). We have not made broad generalisations on the basis of our limited data, but we anticipated the low number of interventions targeted at challenge G, *Secure societies...*, reflecting the fact that only belatedly had this

Table 4. Distribution of PE cases and categories per societal challenges.

Societal challenge	Number of PE cases	Number of PE categories				
		Public communication	Public consultation	Public deliberation	Public participation	Public activism
A	20	2	7	9	1	1
B	15	4	5	5	-	1
C	13	2	3	8	-	-
D	10	1	4	5	-	-
E	22	3	8	10	-	1
F	28	3	12	11	1	1
G	11	2	4	4	1	-

challenge been included in the list of seven. We found surprising the limited attention paid to challenge D, *Smart, green and integrated transport*, as sustainable transportation has been acknowledged as one of the more salient challenges in research by European citizens in past participatory processes.²⁶

Fifth, we analysed the extent to which categories of PE were applied to different societal challenges (Table 4). We observe that **public consultation and public deliberation were the two main approaches applied with the most frequently addressed challenge, (F) Europe in a changing world**. From the opposite perspective, public participation and public activism were rarely used approaches. Public communication and public consultation were used frequently, with the exception that challenge (D) *Smart, green and integrated transport* was addressed as a public communication exercise only in one case (*EARTHWAKE*).

Sixth, and returning to the discussion of Kuhlman and Rip (2014), we found that **innovative PE processes largely represent the ‘tentative governance approach’ in addressing societal challenges**. They easily meet all the three criteria defined above: (a) orchestration, (b) experimentation and (c) systemic change, as we will explain in later discussion.

Seventh, looking at these criteria individually, criterion (a) – orchestration – is met in all cases, because, by definition, PE initiatives can be seen as complex orchestration processes. It should be noted that **non-profit organisations are the main promoters of innovative PE processes** (see Table 5). As indicated in Table 5, there are also other organisations, which have promoted and orchestrated PE processes, including (in decreasing order of frequency) academic institutions, national governments, networks and local governments. Compared with the other types, non-profits are therefore most inclined to see PE as a relevant way to address societal challenges. It should also be noted that some of the PE processes studied included a high number of actors. The highest number and variety of actors were included in the *Let’s do it!* campaign, which has operated in 112 countries and has included over 12 million participants. This example is a unique exercise, but it is worth remarking that there were many other initiatives that attracted thousands of participants. Examples include many of the citizen science processes studied as well as the international citizen consultation

and deliberation processes, often subsidised by the EU. Overall, we want to underline the point that innovative PE processes are always challenging and multidimensional orchestration exercises.

Table 5. Types of promoters of innovative PE processes.

Type	No.
Non-profit organisations	14
Academic institutions	10
National governments	5
Networks	5
Local governments	3
Other	1
Total	38

Eight, criterion (b) – experimentation – is also frequently met, since **many of the innovative PE cases were either methodological or socio-technical experimentations**. *Breaking and entering*, for instance, was a truly experimental science communication exercise. *The autumn experiment* was a large-scale experiment in citizen science, while *The national DNA database* tested the mock trial method in helping young offenders to handle complex bioscience issues. The majority, but not all of the PE processes studied included aspects of experimentation (or demonstration), in which sense they very much represent the idea of ‘tentative governance’.

Ninth, **innovative PE contributed to systemic change in multiple ways** (criterion (c)). Such ways included **conceptualisation**. *Science municipalities*, for example, contributed to the notion of ‘science municipality’, while also developed related infrastructure. Other examples of new concepts that were developed include ‘science parliament (2WAYS)’ and ‘long-term participatory foresight’ (CIVISTI). Another way to facilitate systemic change was by building **new competencies**. *PRIMAS*, for example, focused on the promotion of inquiry based learning at both primary and secondary schools in Europe. **New socio-technical solutions** were developed under several

initiatives. Examples are *DEEPEN*, that developed solutions on how to govern a new domain of science (nanotechnology) under conditions of uncertainty, while enhancing innovation and remaining sensitive to public concerns. Resulting from this process was a new ‘upstream’ methodology that helped to inform the EU’s RRI policy about issues of nanotechnology. *Peloton* is another interesting case that developed an innovative way for citizens to participate in the co-creation of new products and services – and also contributed to the notion of ‘smart-up’. **Demonstration**, finally, is a paradigmatic example on how systemic change can be promoted under the notion of ‘tentative governance’. *VOICES* aimed at demonstrating that citizens’ ideas, preferences and values can be taken into account in defining agendas for European research and innovation activities (in the area of urban waste). *World Wide Views on Global Warming* demonstrated that global citizen deliberation is feasible. *PARTERRE* focused on demonstrating the business potential of two new e-participatory tools. Figure 7 illustrates the four aspects on how innovative PE can contribute to systemic change.

Tenth, and finally, **while innovative PE addresses societal challenges, we found that it is in no way immune to the impacts of the very same challenges**. In particular, when PE processes are becoming more international and extensive in scope, they face the problems of managing cultural, linguistic and other discursive variety (cf. Rask, 2013). How successfully they have managed to harness such challenges is discussed in section 4.

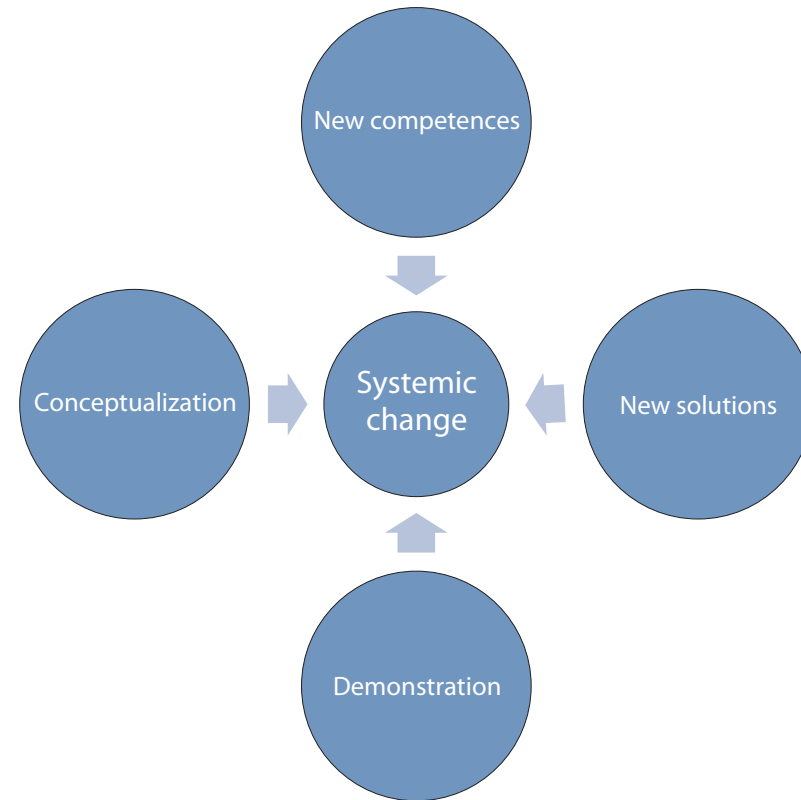


Figure 7. PE contributing to systemic change.

6.4 Bearing to policy impacts

Bearing to policy impacts were considered a preliminary criterion of innovative PE, as **the problem of limited policy impact of PE**, especially deliberative mini-publics²⁷, has been largely recognised by political scientists (see e.g. Grönlund et al., 2014; Kies and Nanz, 2013; Rask, 2013; Goodin and Dryzek, 2006), and corresponding remedies have recently been developed by the community of PE practitioners and scholars. One expression of this tendency is the current discussion on ‘deliberative systems’, which has shifted the focus from individual PE events to a consideration of the role of PE in a broader political setting (Rask and Worthington, 2015; Stevenson and Dryzek, 2014; Parkinson and Mansbridge, 2012; Dryzek, 2010).

The study of policy impacts of PE processes has often proved challenging for many reasons, including e.g. over- and under-determination of the impacts, long time spans between PE processes and related (or belated) policy processes, and the difficulty of defining, quantifying and measuring such impacts, for instance, changes in policy cultures, and empowerment of actors. While these are serious limitations for the study of policy impacts, we do not think that they should prevent us from entering in such a study, in particular, because the more public money is spent on PE activities, the more important it becomes to understand what the actual or potential payoff from them is. In addition, our data are highly expressive about the various outputs of PE, some of which we might appropriately call ‘policy impacts’.

As we next continue reporting our findings about the policy impacts of innovative PE, we have emphasised that we are not establishing causalities, but instead, are reporting how managers of innovative PE processes perceived the outputs and outcomes of their activities. For example, *the Let’s do it!* world clean-up movement was claimed to have led to a rapid reduction of illegal dumping, and to an adoption of improved waste management practices in several countries. The PE2020 research consortium did not inspect the truth value of these claims against different data sets, but rather, it took these claims as the data, and analysed them to explore the ‘big picture’ of policy impacts, by identifying emerging impact categories and trends, and reflecting on whether they can be linked to the characteristics of innovative PE processes.²⁸

Further, in order to analyse and describe the policy impacts of the PE processes studied, the following conditions apply. First, we applied a broad definition of policy impacts. We started by analysing all of the types of impacts reported, and then proceeded to a discussion on different impact categories. Second, in order to organise the analysis of the impacts, we applied the so called ‘TAMI’ model (Decker and Ladikas, 2010). This model was originally designed for the impact evaluation of participatory technology assessment processes, and it proved to be highly applicable, with minor modifications, to the study of the PE processes.²⁹ Third, to sustain our discussion on innovative PE, we compared our policy impact findings with some of the issues discussed before, including e.g. the role of the fourth sector, and focus on societal challenges. Finally, we remind readers that an overview of the various outputs and policy impacts of innovative PE can be found on the right hand side of the conceptual maps (Appendix 1).

Our first observation is that **the impacts of innovative PE processes are truly versatile**. Scanning through Table 6 provides a summary of the broad variety of impacts, which could be pleasant surprise for a reader expecting PE to be a mere add-on to real R&I activities. Overall, we identified 55 types of impacts that were derived from the 162 case examples.

Our second observation is that **most of the impacts of innovative PE can be described as practical**. Following the TAMI model (that distinguishes between three impact areas – substantive, practical and normative) we found that 71% of the reported impacts could be allocated under the ‘practical’ category (Table 7).³⁰ This is an interesting finding, since there is much talk about the rationales of PE: should it be driven by democratic, epistemic or pragmatic motivations? Our empirical finding is that innovative PE largely produces practical goods, such as increased publicity (18 cases), methodological development and demonstration (12 cases), and professional skills and networks (12 cases). The two main issue areas where practical impacts were realised included social issues (29%) and science and technology (S&T) issues (27%), followed by political issues (15%).

Table 6. Summary of the impacts of the studied PE processes (numbers refer to the 38 PE cases reported in Appendix 1).

	substantive (e.g. new knowledge and ideas)	practical (e.g. new products, practices, skills, social acceptance)	normative (e.g. democratization and empowerment)
science & technology	scientific measurement and data (13)	new products and services (1, 18, 33)	expression of citizens' opinions of R&I (11)
	new scientific knowledge (13)	methodological development and demonstration (7, 11, 14, 20, 23, 24, 26, 27, 29, 30, 34, 38)	building consensus of R&I (9, 25, 32, 34, 35)
	problem solving knowledge (8)	new educational contents and practices (1, 13, 22)	confirmation of existing R&I policies (27)
	research and publications (33)	professional skills and networks (1, 5, 6, 8, 16, 19, 20, 26, 27, 28, 30, 33)	more responsible R&I (11, 25)
	university theses (8)	new solutions to societal challenges (6, 31, 33)	
	academic debates (26)	large-scale experimentation (21)	
	knowledge transfer (8)	fund raising for R&I (17, 31)	
	new research areas (14)	conceptualisation (2, 3, 5, 11, 30, 33, 34)	
societal issues	crowdsourcing of new ideas (34)	increased publicity (1, 4, 6, 8, 10, 12, 13, 17, 18, 20, 22, 26, 28, 31, 33, 36, 37, 38)	empowerment of youth (16, 23, 37)
	consumers' preferences and experiences (18)	public awareness of environment (10)	community building and ownership (16, 29, 31, 35)
		public awareness and debates of S&T (3, 4, 9, 12)	increased local activism (31)
		better understanding of scientific practices (13, 22)	increased empathy and interpersonal skills (29, 31)
		better image of science (10, 13, 24, 28)	more active civil society (6, 23)
		new models and platforms of collaboration (17, 18, 24, 33, 34)	
		new organisational functions (8)	
		expansion and institutionalisation of PE (6, 8, 10, 11, 15, 27, 28)	
		participant learning and behavioural changes (24, 32, 38)	
		social innovations (14)	
social change (6)			
political issues	better understanding of public opinion (14, 26, 35)	linking science and evidence to policy making (10, 20)	policies driven by societal needs (11, 19)
	identification of regulatory implications (25)	informing policy making (7, 20, 22, 24, 27, 30, 35)	principles of deliberation introduced to legislation (21, 38)
		policy recommendations (3, 5, 15, 19, 20, 26, 32)	increased accountability of decision making (31)
		parliamentary debates (10)	democratisation of decision making (9, 37)
		new policies and regulations (20, 31, 37)	renewal of democratic institutions (21, 36)
		research agenda setting (14, 15, 17)	new governance skills and practices (6, 7)
		allocation of research funding (9)	trust and confidence in institutions (34)
		promotion of challenge driven research (9)	

Table 7. Share of different impact types in the studied PE processes.

	Substantive	Practical	Normative
S&T issues	5 %	27 %	6 %
Societal issues	1 %	29 %	7 %
Political issues	2 %	15 %	7 %

Third, **normative impacts including democratisation and responsibility of R&I are still important aspects of innovative PE**, as almost half of the cases (18/38) reported such impacts. ‘Building consensus of R&I’ (five cases), ‘community building and ownership’ (four cases) and ‘empowerment of youth’ (three cases) were the most frequently expressed impacts that we identified under the normative impact category. Although democratisation of research and innovation was a reported impact in only two cases, most of the normative impacts were related to it in one way or other, as is illustrated in Figure 8.

Fourth, **creation of new substantive knowledge is not among the core outputs of innovative PE processes**. We found only eight cases in which new substantive knowledge was mentioned among the outputs. The biggest category was new knowledge on S&T issues, which included five cases. In our view, only two cases contributed directly to new scientific knowledge. Typical of a citizen science project, *The autumn experience* contributed to new measurement, data, and finally new scientific knowledge published in academic papers. The *Flemish citizen science* project contributed to new ‘problem solving knowledge and academic theses’, and it facilitated knowledge transfer between academic and non-academic partners. The Europe-wide citizen consultation *VOICES* project contributed to the identification of new research areas. *World Wide Views on Global Warming* and *Peloton* – as two interesting and innovative PE processes – were targets of academic research and publishing, which was an indirect impact of these initiatives. Other epistemic impacts in the societal area included crowd-sourcing of new ideas and revelations about consumers’ preferences, and in the political area, the surveying of public opinion and the identification of regulatory implications.



Figure 8. Normative impacts of innovative PE.

Fifth, **challenge oriented PE processes can stimulate impressive, socially and politically significant impacts**. We didn’t possess a ‘PE Richter scale’ or other means to assign magnitude numbers to quantify the political impetus generated by innovative PE processes. Instead, we observed that some of the PE processes had impressive impacts; or at least impacts that seemed to make a big difference in the existing political or societal order within the domains of environment (*Let’s do it!*), research (*GenSET*) and municipal planning (*Empowering citizen voices in the planning and rebuilding of New Orleans*). The *Let’s do it!* initiative searched for and found new solutions to illegal dumping in 112 countries by mobilising over 12 million participants, including governments, CSOs and individual volunteers. *GenSET*, a multi-stakeholder dialogue project promoting gender equality in

science contributed to the mainstreaming of gender issues in research activities, and to the introduction of related gender policies and regulations that are widely applied. *Empowering citizen voices in the planning and rebuilding of New Orleans* contributed to comprehensive rebuilding plans of the city, and rebuilt a sense of community for this hard hit city. Considering that one of these cases represents public activism (*Let's do it!*) and the other two represent public deliberation, and that they all operate in different domains and political contexts, it seems that they may have limited commonalities. What we found combining these processes was a forceful focus on societal challenges: dealing with local environmental problems, reducing gender inequality in science, and rebuilding a devastated city.

Sixth, **close to half of innovative PE processes enjoyed high media publicity.** Media coverage can be considered to be an important element of PE, as for example in deliberative democratic theory, publicity is considered a necessary requirement for well-functioning democracy (e.g. Dryzek, 2000). In cases in which the role of media publicity was discussed, it was considered to be an important element in advancing public debates about R&I (e.g. *SpiCES*), raising environmental awareness (e.g. *iSPEX*) and stimulating debate about new ways of exercising democracy (e.g. *G1000*). We found that all the few cases of public activism and public participation stimulated high levels of media publicity. Half of the public consultation cases reported high media publicity, whereas only two-fifths of public communication and public deliberation stirred high media coverage. Despite online tools and social media having been used in 16 cases, their impacts were discussed in only one case, *Soapbox science*, in which both traditional and new media were activated, and a large community of Twitter followers was formed, which contributed to the success of this programme.

Seventh, it should be noted that many of the innovative PE processes were oriented to exploring new methodological tools and approaches for PE in S&T, not exploiting existing ones. *Breaking and Entering*, for example, was a thoroughly experimental science communication exercise, and for this reason, it didn't have ambitious goals to influence formal policy processes, but rather it aimed to generate interaction and dialogue about the social role of science among festival visitors and contributing to public sense

making of synthetic biology. Overall, we found that **the more the PE process was oriented to methodological exploration, the less evidence there was of direct policy impacts.** However, the border between explorative and demonstrative cases was occasionally difficult to draw, and if we look at the 12 PE cases that included "methodological development and demonstration" (see Table 6), we observe that most of them contributed to some policy process by informing or making recommendations, and close to half of such initiatives were reported to be successful in this business. Among such projects is *GenSET*, the impacts of which have already been discussed. Other influential demonstration projects include *VOICES* that developed a new transnational participatory process (and influenced strategic research priorities of urban waste research in the EU), and *We the Citizens* that piloted citizens' assembly in Ireland. These projects integrated citizens' views at the heart of constitutional reform.³¹ So, we have enough cases to draw the conclusion that with proper project design an explorative orientation does not necessarily compromise the policy relevance of PE processes, which should be an interesting finding for the proponents of 'tentative governance'.

Eighth, we found that **half of innovative PE processes had an impact on governmental processes.**³² Several types of impact were identified. The least intensive way was *informing policy makers* and organising policy dialogues (cases 23, 30, 35). Occasionally this took place through *recommendations* (cases 5, 7, 19, 26). In two cases, the PE process led to *parliamentary debates*, including discussions on air quality in the Netherlands, following the *iSPEX* project, and summits hosted by the European parliament on the theme of gender equality in science, stirred by the *GenSET* project. Three cases (25, 32, 34) contributed to *consensus building* and creation of agreement among policy makers and stakeholders. Four cases had a functional role in *allocating resources* to research activities (9, 14, 15, 27), as well as identifying lacunae in research priorities. Three cases (31, 37, 38) contributed to *changes in regulation* by directly influencing policy making. Overall, the listed categories of impacts can be seen as representing continuity in the 'ladder of participation' where informing is the lowest step, and participation in regulatory decision is the highest one (Figure 9). An interesting observation is that some of the PE processes that were tightly coupled to policy processes resulted in

a small-sized ‘output footprint’. Examples of this sort include the *Social Advisory Board* of the *JPI More Years, Better Life*, the main aim and only outcome of which was provision of policy advice, and the German *NanoDialogue* process that focused on and resulted in an effective process of consensus building in the area of responsible use of nanomaterials.

Ninth, an interesting observation is about the different tendencies between European and U.S. impact orientations. **While much of European PE is directed at influencing policy, the U.S. examples emphasise civic capacity and community building.**³³ This is of course a strong claim considering that we only have three examples from the U.S., but since we found this tendency in all those cases, in our view, this suggests an interesting hypothesis for further study.



Figure 9. Different types and levels of policy impacts.

Tenth, **there was a tendency for a gradual institutionalisation of PE.** This can be seen as processes, where less formal and shorter term activities transform into more formal and longer term activities. Important in this context is to distinguish between different types of activities that the studied PE processes represent. Two-thirds of them can be characterised as **projects** with a clear temporal limit, typically one to five years (see Appendix 7). One-fifth are **programmes** that usually involve a longer time span of five to 20 years. One-eighth are **other types** of activities, including, a societal movement (*Let’s Do It!*), legal structure (*Law No. 69/07 of the Tuscany region*), ICT-based service (*Owela Open Web Lab*), and two organisational entities (*Social Advisory Board*, and *Bonus Advocates Network and Youth Council Espoo*). We found that 27 PE cases had gradually developed towards more continuous activity schemes or programmes, or had become institutionalised in some other ways, such as establishing new concepts, methods, organisational structures, regulations, and infrastructures. The gradual institutionalisation of PE can be represented as a structuration process, where ideas are first manifested as projects, which can then be transformed into programmes and structures (see Figure 10).

As Figure 10 suggests, social movements can also play an interesting role in the structuration process. Social movements can be effective in challenging existing structures and introducing new ideas. This was the situation with *Let’s do it!* campaign that started with some bold ideas on how to clean up a country in one day. As we found, the idea of *Let’s do it!* was first implemented as a national project in Estonia, but it then soon spread to other Eastern European countries, and finally to more than 110 countries globally. Parallel to its geographical extension, *Let’s do it!* has been transformed into a continuous programme and it has developed a sophisticated organisational structure. It was even granted the status of United Nations Environment Programme (UNEP) membership. Such a structuration process will inevitably change the identity of a spontaneous social movement. This can even be labelled as being a **PE governance dilemma**: while social movements are probably the most powerful way to exercise PE, they can hardly be managed through government actions without losing their identity. For other categories of PE activity this dilemma seems less pronounced.³⁴

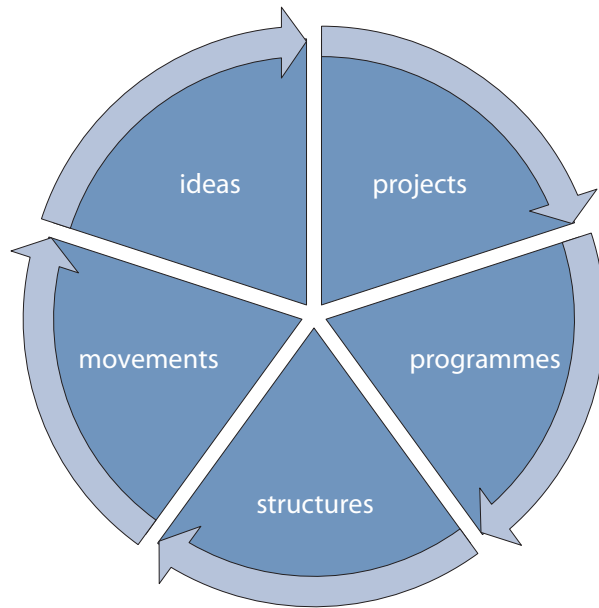


Figure 10. Structuration of the studied PE processes.

6.5 Other innovative tendencies

So far we have analysed the characteristics and trends of innovative PE based on the preliminary criteria of innovativeness listed in section 5.1 of this study. During the analysis we observed some other tendencies that might become stronger in the future. These include the following trends:

Transferability means the ability to transfer particular PE processes to other contexts and topics. This is interlinked to the trend of the institutionalisation of PE, but also reflects the growing professionalisation and business orientation in PE activities. There are more and more consultancies and professional organisers of PE practices, who try to commodify their PE tools and instruments. Sometimes it can be merely about the fact that

good ideas can spread fast and virally. In many cases, however, the logic of commodification and expansion is strategic, and this had led to regional, international or institutional transfer of PE practices. Among such PE cases we list *Science Municipalities* and *ACE* that were transferred to other cities or regions within a country; *VOICES* and *SpICES* that were transferred to the European Commission's calls for proposals; and *iSPEX*, *GenSET*, *Imagine Chicago* and *Let's Do It!* that travelled internationally. The *Danish Board of Technology foundation's* two innovations, *CIVISTI* and *World Wide Views* processes have also been designed to be transferable. A 'fast track' version of *CIVISTI* was designed and later used in other EU projects (*CASI*, *SIMULACT*), and the global *World Wide Views* process has been applied both with new topics and new political scales, including regional, national and local processes (see Rask and Worthington, 2015).

We already discussed **use of multiple media** in the section on policy impacts, but a point should be made about the growing tendency to combine on-line tools and social media with face-to-face processes. The respondents to our survey asserted that the use of multiple media contributed to better involvement by the public, induced wider discussion and increased awareness of the PE case.

An orientation to learning was clearly detectable in most cases, and it took several forms. In some cases, learning was an in-built feature of activities, as one-third of the cases were methodological development projects. Other learning functions included participant feedback, external evaluations, and scientific studies and evaluations. Award and prizes represent even broader societal scrutiny and recognition of PE activities. Such a strong learning orientation is not a self-evident fact, in particular since there are pressures to make PE an everyday activity for R&I actors. However, as we are talking here about innovative PE, there are several factors that contribute to an intense orientation to learning. Reflexivity and research orientation is in-built in the process of developing new methods and renewing related policy institutions. Programmatisation and institutionalisation also increase requests for financial and political accountability. Learning processes were seen as opportunities to move forward, improve activities through self-evaluation, observation and revision of PE practices.

7 Participatory performance

7.1 Participatory performance in context

Participatory performance refers to the different functions of PE, and to the scope and intensity of such activities. For example, in the UK there are many groups of professionals and intermediary organisations providing PE services, as well as regulations and mechanisms contributing to a vital culture of science in society activities. Compared with some other countries where such institutions do not exist or are less developed, the participatory performance of British R&I institutions can be claimed to be at a higher level (Rask et al., 2012a).

In the context of research projects and programmes, the focus of the PE2020 project, PE includes a high spectrum of activities and functions. Earlier we identified five categories of PE: including public communication, consultation, deliberation, participation and activism. All these categories point roughly to the different functions of PE: informing the public, asking them for feedback, organising equal deliberations between experts, stakeholders and members of the public, delivering decision making power to the publics, or mobilising activities through social movements. We have also identified issue areas in which PE can be relevant (issues such as S&T, social and political issues), and political impacts (substantive, practical and normative). While these categories are still useful in classifying PE processes and analysing their impacts, they are too broad to explain exactly what kinds of PE activity were introduced in such processes.

7.2 Focus on dynamic governance and RRI

Next we have analysed the participatory performance of innovative PE processes by identifying the activities that were introduced in them. This analysis relies on the functional (left-hand side) dimension of the cognitive maps (Appendix 1). In particular, we have tracked activities that contributed to the four capacities of dynamic governance:³⁵ anticipation, reflection, transdisciplinarity and continuity. We have also tracked other activities and capacities, and analysed whether they were substantively, practically or normatively oriented (see Table 8).

It is important to study participatory performance in order to understand the ways in which PE processes can potentially contribute to better science, better policy, and better SiS activities. In particular, **our aim was to understand how PE activities can support dynamic governance and responsible research and innovation.**³⁶ In order to support reflection on timely matters of European R&I policy, we have also made a few observations on how PE processes might contribute to open innovation, open science, and the openness of European R&I institutions. These are the three strategic priority areas, proposed recently by Carlos Moedas, the Commissioner for Research, Science and Innovation.³⁷

Table 8. Participatory performance functions of innovative PE (numbers refer to the PE cases; blue colour indicates the most densely populated cells).

	anticipation	reflection	transdisciplinarity	continuity	awareness raising	competence building	action initiation
substantive	exploring impacts of societal change (35)	identifying sustainable consumption choices (33)	conducting transdisciplinary research projects (8,10,13)		understanding public opinion (3,12,14,18,27,38)	educating democracy (37)	piloting (2,34)
practical	co-designing new products and services (18,33,36)	publicly debating R&I issues (4,12,16,17,19, 20,23,25, 28)	designing trans-disciplinarily educational programmes (1)	expanding PE processes internationally (10,11,14)	increasing public awareness of science (3,4,5,10,24)	developing new competences for students (1,8)	mobilising citizens to clean their living environments (6)
		increasing visibility of science in media (5,12)	mobilising societal and financial resources (2,5,31)	creating enduring professional networks (1,26)	increasing public awareness of environmental problems (6)	developing new competences for researchers (13,28)	introducing new 'science municipal' activities (2,34)
		articulating public concerns on S&T (7,29)	testing new models of public-private partnerships (33,34)		increasing awareness of gender issues in science (20)	developing civic capacities (4,29)	building consensus and managing conflicts (25,32,35)
		developing new methods for public reflection (24,26,27,30,34)				expanding possibilities for science education in municipalities (2) empowering youth (16,22,23)	
normative	developing future visions and plans (16,31)	publicly debating regulatory issues (21,26,30,32,37,38)	aligning research activities with stakeholders (15,17,20,23)	institutionalising deliberative democracy (19,21,24)		improving visibility and perception of women in science (28)	
	identifying future research needs (8,9,11,15,30)	developing government accountability (31)		establishing the use of PE processes in R&I governance (3,6,13,15,17,18)		embedding citizens' values in local systems of innovation (29)	
	upstream engagement (7,8,11,14,21)					revitalising democracy (36) influencing political processes (37,38)	

7.3 Anticipation

Box 9 Anticipation

Anticipation refers to the capacity for prospective thinking and acting.

“The faster the car, the further the headlights must go.”

– Gaston Berger (1959)

Anticipation refers to the capacity for prospective thinking and acting. An anti-fatalistic, pre-active (anticipating changes) and proactive (provoking changes) attitude is essential, as futurists Godet and Roubelat (1996, p. 164) have claimed, in the face of the accelerating pace of change, the uncertainties of the future, and the increasing complexity of phenomena and interactions.

Considering the performative functions of PE, **anticipation of the future is among the core functions of innovative PE**. This took place through participatory foresight activities and various collaborative processes identifying future research needs. Included in this group can also be so called ‘upstream engagement’ processes (e.g. *Deepen*, *Flemish science shops*, *PERARES*, *VOICES* and *the Tuscan Law No. 69/07*) that involve two-way communication at an early stage of the research or policy cycle, in contrast to downstream, in which selection instead of design is the key (cf. Joly and Kaufmann, 2008). Opening up the agenda setting stage to a public or stakeholder based scrutiny can help in anticipating and addressing such societal concerns that may become activated at a later stage of the R&I cycle.

7.4 Reflection

Box 10 Reflection

Reflection refers to the capacity to publicly accomplish critical reflective dialogues with relevant stakeholders, who can take the role of the other, develop shared values, and subject their reasoning to public scrutiny.

Reflection, in the context of our discussion, refers to the capacity to accomplish critical reflective dialogues with relevant stakeholders in public. Each can take the role of the other, develop shared values, and subject their reasoning to public scrutiny (cf. Raelin, 2001). Public reflection supports learning from past successes and mistakes, and it also helps building collective identities around focal themes and practices. Public reflection is also among the key concepts in the theory of deliberative democracy that promotes organising of public dialogues and deliberations around politically meaningful matters (e.g. Dryzek, 2010).

Public reflection on research and innovation is by far the most general function of innovative PE. While issues of R&I were the main subject of such debates, regulatory and policy issues were also frequently discussed. Face-to-face discussions, events and workshop were the main participatory mechanisms used, while on-line tools were frequently used as supportive tools in close to half of the cases (17/38, see appendix 4). Participants of the discussions involved experts and stakeholders, but increasingly also the ‘fourth sector’ as we reported in Section 6.1.

7.5 Transdisciplinarity

Box 11 Transdisciplinarity

Transdisciplinarity refers to the capacity of holistic thinking and acting by mobilising knowledge, expertise and other resources across and beyond scientific disciplines.

Transdisciplinary studies is a flourishing field of research, with its own university programmes and training schemes. Engaging in a full discussion on this concept is beyond the scope of this study, but we refer to Nicolescu’s (2002) classic definition of transdisciplinarity, which refers to research activities that go between, across and beyond disciplines. Ideas of holistically understanding the world and an underlying idea of the ‘unity of knowledge’ can also be found in literature (e.g., Klein, 2004).

Considering our data, **transdisciplinarity is a widespread feature of innovative PE**. Some two-thirds of the PE cases studied included at least some aspects of transdisciplinarity (Appendix 2), such as the involvement of multiple disciplines in research efforts and a challenge-oriented definition of research priorities. As far as public engagement refers to the involvement of lay people or non-experts in R&I activities, transdisciplinarity is even a tautological characteristic of PE. Yet we can observe differences between the ways in which innovative PE expresses transdisciplinarity. We found that transdisciplinarity is more tightly linked to the realm of policy rather than to research; to the transgression of established actor groups rather than to the spanning of scientific disciplines. One obvious reason is that our sample represents primarily innovative R&I governance practices, not innovative research practices. In line with this, most of the reported transdisciplinary activities included practically or normatively oriented functions, such as design of transdisciplinary research programmes, broad mobilisation of societal and financial resources for R&I activities and introduction of new public-private partnerships. In only in few cases did we find instances of transdisciplinary research, for example in the citizen science project *iSpex* as well as in the two cases of science shop initiatives (*Flemish Science Shops*, *PERARES*).

7.6 Continuity

Box 12 Continuity

Continuity refers to the capacity to embed new activities in existing institutions or otherwise building bridges between separate interventions.

Continuity refers to the capacity to embed new activities in existing institutions or otherwise to build bridges between separate interventions. Continuity is needed to balance accelerated change caused by increasingly dynamic governance actions. Conversely, if discontinuity prevails between activities, this hinders organisational and institutional learning and limits

the effectiveness of interventions as there is no accumulation of the effects. The need for continuity has been recognised in several streams of the scholarly literature. Systemic approaches both in innovation studies (e.g. Smits and Kuhlman, 2004) and studies of deliberative democracy (e.g., Parkinson and Mansbridge, 2012; Dryzek, 2010) both emphasise the importance of managing institutional interdependences and path dependences that can either support or hinder effective action.

Quite interestingly, PE is in a dynamic, not arbitrary relationship with institutional continuity. On one hand, PE is often the change maker, by introducing new approaches to old governance dilemmas – in Figure 7 we illustrated the role of PE in stimulating systemic change by introducing new conceptualisations, new types of competences, new solutions and demonstrations. In particular, **introducing participatory mechanisms into the policy cycle may contribute to ensuring the continuity of dynamic governance**. In fact, thanks to such mechanisms, the pace and scope of the policy cycle is no longer dependant only on the leaders of the organisations or from dynamics fully internal to the organisation. Indeed, PE may create a social pressure to the organisation, forcing it to go on with the policy cycle and may make the process more transparent and accountable, so that it cannot be arbitrarily stopped or changed without any consequences (in terms of reputation, credibility, trust, etc.). On the other hand, externally developed tools and methods of PE threaten to remain disjointed from the actual practice of policy making, for which reason particular efforts are needed to ensure their relevance in the long term.

Continuity was an important aspect of the PE processes studied. Continuity was related to the aims to institutionalise the use of PE tools in R&I governance, and in some cases, to the institutionalisation of the principles of deliberative democracy in R&I governance, which is actually a highly ideological project. Along with these tendencies, a major proportion of innovative PE processes have moved beyond a narrowly instrumental, methodological or event based approach. Instead, we have identified various types of ‘boundary work’ (Gieryn, 1983), including activities that aim to stimulate and manage interactions between institutions, such as science centres, ministries and research institutes. As a consequence,

innovative PE is not so much about providing researchers with new tools for effective science communication, but rather by contributing to new skills and capacities to collaborate across institutional borders. Examples include enduring professional networks and internationally distributed methodologies and guidelines that help to expand and consolidate PE practices.

7.7 Other capacities

While we analysed participatory performance functions of innovative PE processes, we encountered activities that contributed to the four capacities of dynamic governance. However, **we also found functions that contributed to more ‘able people’ and more ‘agile governance processes’**. These are the two levers of dynamic governance in Neo and Chen’s study (2007) that we used as our theoretical orientation tool. Awareness raising and competence building are two functions of innovative PE that clearly contribute to more ‘able people’, while action initiation clearly contributes to more agile governance processes.

There is nothing surprising in the fact that **awareness raising is an important function of PE**, except that we are talking about a sample of the more innovative PE processes, which could be expected to move beyond the traditional awareness raising paradigm. This function is likely to stay there, however, as public awareness of R&I issues is a precondition of any contributory function that members of the public may have (be it epistemic, practical or normative), such as contributing to new scientific knowledge or taking part in making decisions concerning research funding. The interest in measuring public opinion and interest in increasing public awareness of science are the two complementary functions of awareness raising activities.

Perhaps it is more interesting to note that **innovative PE processes contributed to new competencies, especially civic and democracy education and empowerment of youth**. As the primary focus of our examples is research and innovation, this is a good reminder that such processes can be as

important processes of democracy and youth education as more traditional educational institutions or political arenas. Getting involved in PE activities also developed new competences for researchers, which is pronounced in *Soapbox science*. Researchers who participated in this process reported real career changing experiences.

We previously established in this study that public deliberation is the predominant category of innovative PE processes. As deliberation has often been described as a ‘talk-centric’ model of democracy (Chambers, 2003), it can be a surprise that **innovative PE has a major role in initiating action**. Piloting is among such functions, and we are talking about both the piloting of PE processes, but also what was piloted was a whole new infrastructure science education and science deployment at the municipal level, as in the case of *Science municipalities*. Most of the action initiating functions were related to the practical aspects R&I activities. Such examples included consensus building and conflict management manoeuvres related to the themes of nanotechnology, energy policy and municipal planning, and mobilisation of citizens to clean their living environments (*Let’s do it!*). We also found cases in which PE processes directly influenced or even initiated political processes, as for example *Youth council Espoo* that had the role of taking formal initiatives to city boards.

7.8 Open innovation, open science, open to the world

Open innovation, open science, and openness of European R&I institutions are cultural factors that Commissioner for Research, Science and Innovation, Carlos Moedas, outlined in his vision for a common EU approach to Open Science in Europe (EU Conference on 22 June 2015). In what follows, we have tried to estimate how innovative PE processes included such functions that can contribute to the three strategic priorities of European R&I activities (Box 13):³⁸

Box 13 EU's strategic priorities for open R&I

Open innovation is about involving far more actors in the innovation process. This can be stimulated by including an innovation-friendly regulatory environment, venture capital and by supporting excellence and promising companies.

Open science is about making scientific research, data and dissemination accessible to all levels of an inquiring society. This process can be fostered by opening access to research results and the underlying data – as well as by supporting research integrity that shows to the public that European science is above reproach.

Open to the World is about better science diplomacy and global scientific collaboration. This can be supported through collaborative projects, partnerships between regions and countries and taking leadership in addressing global challenges.

Table 9. Innovative PE processes contributing to opening of European R&I culture (numbers refer to the PE cases).

Open innovation	Open science	Open to the world
developing more favourable regulatory environment for nanotech (7)	opening debate about risks and opportunities of nanosciences (3)	mobilizing research resources to support inquiry based learning in European schools (1)
innovating means to cultivate hope and civic engagement in Chicago (16)	opening the secrets of synthetic biology to the public (4)	providing access to regional resources to increase the quality of science education in municipalities (2)
providing an on-line platform for open innovation (18)	opening science through media (5)	mobilising society and innovations to solve global environmental problems (6)
assessing risks and opportunities of future technologies (19)	opening research agenda setting (9)	supporting collaboration between civil society and academia (8)
innovating democracy (21, 35-38)	involving the public in research making (10)	supporting regional and transnational collaboration in research agenda setting (11)
evaluating the risks and opportunities of nanotechnologies (25)	involving the public in research activities (13)	mobilising media to enhance Europe wide dialogue on science policy (12)
engaging publics in strategy and policy development on bioenergy (27)	formulating research agendas based on, societal pull' (15)	developing methods for research agenda setting at the EU level (14)
engaging community members in local systems of innovation (29)	raising awareness of gender issues in science (20)	supporting macro-regional collaboration between national stakeholders (17)
innovating means to rebuild a city (31)	engaging youngsters in complex bioscience issues (23)	providing youth responses to Earth Summit's global plan for environment (22)
involving citizens in dialogue on future energy supply (32)	supporting gender equal science (28)	involving European citizens in two-way dialogue on life sciences (24)
co-creating new products and services with start-ups and citizens (33)		engaging citizens globally in climate policy debate (26)
developing new eParticipatory tools supporting spatial and strategic planning (34)		involving citizens in European R&I policy agenda setting (30)

Table 9 was prepared by analysing the main aims of the 38 PE cases and expressing the main ‘opening functions’ of each particular case in one clause. As PE is fundamentally about opening R&I by involving new actors and perspectives, it was a simple matter to draw up such a list of actions. The only problem was that the list could have been much longer. In a few cases, the link to R&I was not pronounced, which is especially the case with the five cases that primarily contributed to ‘innovating democracy’. The borderlines between actions that were related to innovation, science or international activities were also blurry, but we prepared this table more or less intuitively to provide an impression of the contributions of PE to the process of opening European R&I.

Many observations could be made about how PE contributes to the project of opening European R&I, but we have limited our discussion to a few observations related to the three dimensions described:

- With respect to **open innovation**, we found several activities that involved far more actors in the innovation process, for example new platforms for open innovation, and engagement of members of the public in the evaluation of risks and opportunities of emerging technologies. In some cases, there were efforts to develop new regulatory frameworks to support responsible development of nanotechnology and new energy technologies. We did not find venture capital and measures to support excellence, nor promising companies.
- As regards **open science**, we found honest efforts to open up access to the public of complex scientific processes, which is not an easy task. This was done, for example, by organising experimental debates, participatory agenda setting exercises, and direct involvement in research activities through citizen science processes. Media and stakeholders were used to mobilise two-way dialogue and the ‘societal pull’ perspective in science policy processes. Public evaluation or risks and threats of science as well as gender equality processes contributed to an enhancement of research integrity. We did not consider projects that took open data as their primary focus, even though this had a role in several PE cases (*PRIMAS*, *SpICES*).

- With respect to ‘**open to the world**’, we found that an impressive number of the PE processes enhanced Europe-wide collaboration. In some cases even global collaboration and in many cases, regional level collaboration. Innovative PE, therefore, is very much about international science diplomacy, creating collaborative efforts and enduring networks that can foster and spread new SiS practices in EU partner countries and beyond.

7.9 Measurement of participatory performance

Our research questions pertaining to participatory performance included a study of performative functions, but we were also interested in the problems of measurement and dynamics of PE processes through the following questions:

- How could we measure ‘participatory performance’ in the context of project definition and programme development?
- What factors could contribute to higher or lower levels of participatory performance in these contexts?

As we found that in this context, **participatory performance is a diversified phenomenon, for which reason there is no way to measure it directly at an aggregate level**. Instead, it is possible to construct a composite model of several performance functions (see the next subsection), which could help orienting such a measurement. As a corollary of this view, we expect that the only feasible way to analyse factors that contribute to higher or lower levels of participatory performance, requires focusing on the specific functions, such the role of PE in increasing capacities to anticipate or publicly reflect R&I policy issues.

7.10 A composite model of participatory performance

Summarising the above discussion on participatory performance, we have constructed a composite model (Figure 11) that integrates the various elements and aspects just discussed: capacities, linkages between capacities,

able people, agile processes and dynamic and responsible R&I policy, as well as policy culture (including not only the EU's strategic priorities related to openness, but also the five thematic pillars underlying the EU's RRI policy – PE, open access, gender, ethics, science education). Underlying this model is Neo and Chen's (2007) framework of dynamic governance that has guided the PE2020 since its origin (PE2020 Annex I).

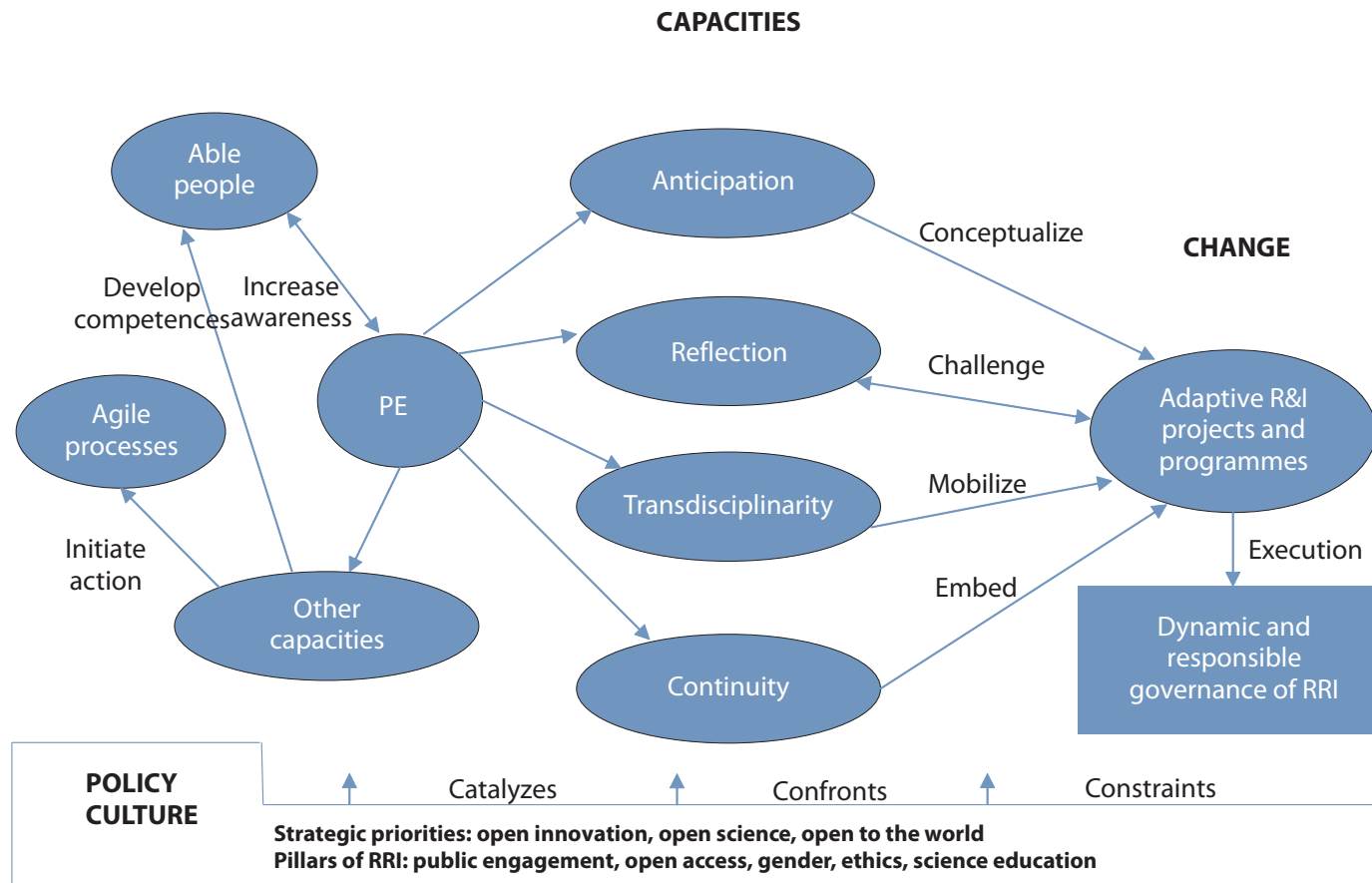


Figure 11. A composite model of participatory performance.

8 Successfulness

As PE activities increase in number and volume, it has become more and more important to evaluate the successfulness of such processes. Actually, many evaluations have observed, analysed and evaluated PE processes from different angles. The academic evaluation literature includes meta-evaluations (e.g. Beirle and Cayford, 2008; Dietz and Stern, 2008), reviews of deliberative mini-publics (Grönlund et al., 2014), evaluations of European-level PE processes (Kies and Nanz, 2013), academic handbooks (Gastil and Levine, 2005), theoretical discussions on relevant evaluation dimensions (e.g. Blackstock et al., 2007; Burgess and Chilvers, 2006; Burton, 2009; Chilvers, 2008; Delli Carpini et al., 2004; Dryzek 2009, 2010; Goodin and Dryzek, 2006; Fiorino, 1990). In addition, there are evaluations intended for practitioners rather than academics supporting organisational learning (e.g. Boussaguet and Dehousse, 2008; Goldschmidt et al., 2008; OCED, 2001; Warburton, 2011). Further, there are many toolkits and handbooks focusing on public participation on the Internet, providing insights about success factors of PE. We identified 18 such toolkits in Deliverable 4.1.

Informed by this literature, but not limited by it, we have proposed criteria that could be used in defining and evaluating the success of PE. Defining success is definitely a normative task. In doing so, we relied on the following process:

- Building on the PE2020 consortium's own experience and insights, we first brainstormed a list of factors that in our view characterise successful PE (section 8.1).
- Second, a broader list of success factors was created by analysing how success was reflected by the managers of the 38 PE case studies (Section 8.2).

- Third, we introduced some classic project evaluation criteria (appropriateness, efficiency, effectiveness) that we used to review and complete our previous criteria.
- Fourth and finally, we developed a synthetic evaluation framework, also taking into account the rationales behind dynamic and responsible governance of R&I (Section 8.4).

Defining success and success criteria serves a dual purpose. First, it **clarifies what can be realistically expected from (innovative) PE activity**, or to put it in the language of evaluation theory (Knowlton and Phillips, 2013), what kind of 'theories of change' are appropriate in the evaluation of PE. For example, our data suggest that spin-off effects are widespread results of innovative PE processes, for which reason they should somehow be taken into account in the planning and evaluation of PE activities. Second, articulating potentially relevant success criteria can support development of indicators that help to measure whether the intended goals of PE have been met. The following questions summarise the two evaluation perspectives: First, "is PE doing the right things?" and second, "is PE doing things right?"

Readers who are more interested in seeing the final synthetic evaluation framework are advised to jump directly to Section 8.4. In Sections 8.1-8.3 we discuss alternative criteria and evaluation perspectives that can be used to complement the synthetic model, and we discuss the process how we arrived at our proposal of the synthetic evaluation model.

8.1 A preliminary list of success criteria

In order to start gauging factors that contribute to the successfulness of PE, we organised a brainstorming session among the partners of the PE2020 consortium.³⁹ After brainstorming, clustering and ranking ideas, we arrived at the following preliminary list of success criteria (Table 10).

Table 10. List of ten preliminary criteria of successful PE (numbers refer to the votes given by PE2020 consortium members to each criterion).

Preconditions	Outcomes
balanced inclusion (6)	improvement of policies, incl. effectiveness and responsiveness (4)
transparency (4)	enlarged capacities (2)
motivation and reward (3)	continuity (2)
clear understanding of the objectives (3)	efficacy (1)
early intervention (1)	acceptability (1)

About half of the suggested criteria referred to the impacts of PE, while the other half pointed to procedural aspects. We nominated the two types of factors as ‘preconditions’ and ‘outcomes’.

‘Balanced inclusion’ was considered to be the single most important criterion. The idea was that what matters most are the people involved. In other words, who will be selected to participate in a PE process largely defines its outputs and outcomes, as well as its democratic qualities. ‘Transparency’ and ‘improvement of policies’ were considered to be the next two more important of the criteria. Transparency contributes to greater legitimacy of PE (while secrecy compromises it); transparency can also result from PE processes that publicly scrutinise decision making. Improvement of policies, increasing the effectiveness of PE and responsiveness in particular, are two instances of the positive outcomes of PE.

Other criteria in the preliminary list include ‘motivation and reward’ and ‘clear understanding of the objectives of PE’ – factors that help moti-

vating people to participate and ensuring that they know what they are doing (informed consent). ‘Early intervention’ reflects the current ‘upstream thinking’ and related interest in opening up decision process at an early stage of planning and decision making. ‘Enlarged capacities’, ‘efficacy’ and ‘acceptability’ cover both individualistic and institutional outcomes. ‘Continuity’, in turn, reflects the current ‘deliberative systems thinking’ and interest in embedding separate PE processes into the broader polity in a lasting way.

The preliminary list helped to consolidate the dual view of success factors, which also resonates largely with the PE evaluation literature. It also helped in articulating some initial ideas about successfulness that reflect current discussions about PE, including the high levels of interest in advancing upstream engagement and developing deliberative systems. As such, however, the preliminary list proved to be inadequate in covering all relevant evaluation perspectives.

8.2 An extended list of success criteria

A broader list of potential success factors was generated by exploring the 38 PE cases: how PE managers described success in their own terms. As success was occasionally obvious but implicitly described, we also used our own wordings (e.g. PE processes had often travelled to dozens of new places, which was often reported merely as a matter of fact, even though it could be fairly described as a highly successful achievement).

An extended list of success criteria is presented in Table 11. Following the dual logic of the preliminary list, **we distinguished between two categories of success criteria: ‘procedural virtues’ and ‘utilitarian goods’.** We identified three sub-categories of procedural virtues: representative, value based and methodological; and in parallel, four sub-categories of utilitarian goods: political, practical, institutional and substantive. Finally, we bolded two criteria under each sub-category that in our view seemed most pronounced in the cases, and we also included the preliminary criteria (in *italics*) in Table 11.

Table 11. An extended list of success factors divided to 'procedural virtues' and 'utilitarian goods' (bolded= most pronounced criteria among the 38 cases; italics = criteria emerging from the preliminary list; italics with \angle symbol= links preliminary criteria under case based criteria).

Procedural virtues

Utilitarian goods

Procedural virtues		Utilitarian goods	
<p>Representative virtues</p> <ul style="list-style-type: none"> European wide exemplary gender wise objective politically relevant transnational unique widely representative \angle <i>balanced inclusion</i> 	<p>Methodological virtues</p> <ul style="list-style-type: none"> attractive concrete content producing <i>clearly defined</i> easily adaptable explorative feasible flexible functional innovative interactive <i>motivation and reward</i> multi-disciplinary nuanced practical replicable robust timely \angle <i>early intervention</i> 	<p>Political goods</p> <ul style="list-style-type: none"> consensus creation of hope empowerment \angle <i>efficacy</i> global influence increased responsibility \angle <i>responsiveness</i> high profile inspiration political influence \angle <i>improvement of policies</i> \angle <i>effectiveness</i> 	<p>Institutional goods</p> <ul style="list-style-type: none"> creation of continuity cross-pollination of institutions embedded processes institutional transformation institutionalized practices
<p>Value based virtues</p> <ul style="list-style-type: none"> agenda setting business friendly challenge driven deliberative democratizing grass roots innovation supportive pioneering scientifically relevant <i>transparency</i> 		<p>Practical goods</p> <ul style="list-style-type: none"> <i>acceptability</i> enlarged capacities increased awareness increased sustainability new competences media publicity mobilization of resources mutual benefits satisfaction spin-offs useful products and services 	<p>Substantial goods</p> <ul style="list-style-type: none"> conceptual creativity education enlightenment new ideas relevant information new knowledge surprises

The extended list of success factors covers 74 criteria. While they all characterise what successful PE could look like, not all of them can be relevant in all cases. For example, access to Europe-wide public views can be highly relevant in some projects operating at the European level, but not in local level PE processes. While the extended list of criteria can serve as an inspiration for developing relevant evaluation criteria for the needs of the particular PE cases, we created a shortlist of 35 criteria with more universal applicability (Table 12).

We offer the following observations about the **procedural success criteria**:

- The list is based on a number of highly varied empirical cases, for which reason it provides a rich spectrum of potential criteria, not limited to one particular aspect of PE, such as democratic quality.
- The three **representational criteria** (balanced composition, gender balance, and wide representation of societal perspectives) are rather unconventional, and refer to qualities that are expected from most PE processes. There can be instances where gender balance is not feasible,

Table 12. Shortlisted set of success criteria or the REM-IPPS criteria of PE evaluation.

<p>R Representativeness</p> <ul style="list-style-type: none"> ● balanced in composition (no particular interests dominate) ● gender balanced ● widely representative of societal perspectives 	<p>E Ethical quality</p> <ul style="list-style-type: none"> ● deliberately high quality ● democratically legitimate ● open (involves co-design practices) ● scientifically informed ● transparent 	<p>M Methodological quality</p> <ul style="list-style-type: none"> ● functional ● interactive ● motivating and rewarding ● practical ● robust (applies knowledge based practices) ● timely 	
<p>I Institutional impacts</p> <ul style="list-style-type: none"> ● cross-pollinating ● embedded ● transformative 	<p>P Political relevance</p> <ul style="list-style-type: none"> ● efficacy increasing ● empowering ● politically influential (e.g. improves policies, increases effectiveness of decision making) ● responsive 	<p>P Practical impacts</p> <ul style="list-style-type: none"> ● awareness increasing ● capacities developing ● mutually beneficial ● publicity increasing ● resources mobilizing ● satisfactory ● social acceptability increasing ● spin-offs creating ● sustainability increasing ● useful 	<p>S Substantial impacts</p> <ul style="list-style-type: none"> ● conceptually creative ● educative ● ideas generating ● informative

but at least the design of PE should be gender aware. Balanced composition is a kind of meta-criterion that needs specification, yet we argue that balance should be articulated in some way or other, and that the minimum requirement is that no particular interest should dominate deliberations (cf. Renn, 2008). Wide representation of societal perspectives is a practical request for most PE processes, and as our cases have indicated, statistical or demographic representation is rarely necessary.

- **Ethical quality** refers to the ‘value based virtues’, in other words, the value basis of the PE process. As a plurality of values is a fact of modern society, we find it unfeasible that PE processes are anchored to some particular world view, such as grass roots or business oriented philosophy (see Table 11). Rather, we find it justified that PE processes, at least to some extent, should reflect the values that are generally considered to lift the deliberative quality of communications. Such values include democratic legitimacy,⁴⁰ openness, transparency, and access to scientific information.
- **Methodological quality** is composed of many aspects related to the (professional) design of PE. In our view, the list of six criteria that we propose covers some of the most fundamental methodological aspects of designing successful PE processes. Longer lists could be generated, based on the years of experimentation with PE activities.

We make the following observations about **outcome- or impact- bound criteria**:

- The list of impact-bound criteria is highly selective. A more extensive list was presented in Table 6, which can be used as an inspiration for developing indicators for the more general criteria proposed in Table 12.
- **Institutional impacts** are evaluated only rarely, as they are considered to take place over a longer time span than other impacts, such as participant learning. While this is true, we observed that many innovative PE processes were targeted at changing institutional practices, and quite often they managed to do this well (for example, *Bonus Advocates Network* created new structures for research collaboration on Baltic Sea issues). Evaluation of PE processes, in our view, should take into account

the strong institutional orientation of PE. For example, ‘institutional cross-pollination’ could be measured as the number of new networks and collaborative programmes ensuing PE activities.⁴¹ Embedding refers to the linking of the PE process to existing policy structures and processes. In our view, this is an often neglected consideration in the design and implementation of PE processes, and should be better taken into account in evaluations. Institutional transformation refers to how PE has an impact on organisational and societal practices. Many of our cases suggest that such impacts can be detected even in the short run (e.g. *GenSET* inspired gender summits supporting the preparation of research programmes, and downright societal and environmental change stirred by *Let’s do it!*).

- **Political relevance includes three types of criteria.** First, empowerment and efficacy refers to the increased agency of individuals to take part in political and social activities. The concept of ‘political efficacy’ is a highly relevant concept here, referring both to beliefs about one’s own competence to understand and to participate effectively in politics (internal efficacy), and to beliefs about the responsiveness of governmental authorities and institutions to citizen demands (external efficacy) (see e.g. Craig et al., 1990). Many of our cases were targeted at youngsters, and positive empowerment impacts were frequently reported in such contexts. Second, **political influence is a composite criterion**, including e.g. changes in policies and regulations, parliamentary debates, changed research agendas, impacts on the allocation of research funding, promotion of challenge driven research, informing policy making, linking evidence to decision making, policies driven by societal needs. Third, **impact on decision procedures** includes effects such as increased responsiveness of decision making,⁴² in particular increased accountability of decision making, which is an often neglected but important aspect of responsible PE activity (e.g. Stevenson and Dryzek, 2014). Responsivity, in this sense, should feature high in the definition of successful PE.
- **Practical impacts is another broad category of criteria**, reflecting our previous observation that practical impacts dominate innovative PE

processes (Table 7). Each of the ten criteria included can be divided into (a) cognitive-attitudinal, (b) competence based and (c) resource related criteria. (a) Increased publicity and acceptability⁴³ of R&I as well as participant satisfaction⁴⁴ toward PE processes are examples of cognitive-attitudinal criteria. Quite interestingly, increased public awareness was not among the more pronounced success features, perhaps reflecting the fact that innovative PE is more orientated to other virtues, such as capacity building, networking and development of innovative SiS communication.⁴⁵ (b) Development of new capacities, spin-offs and practices supporting sustainable development (e.g. effective waste management practices based on smart technologies in *Let's do it!*) are examples of the competence based criteria. (c) Mutual benefits, mobilisation of resources, and usefulness, finally, are examples of resource based criteria (Table 7 provides examples of each criteria; usefulness, for instance includes new products and services, methodological development, demonstration, and new solutions to societal challenges).

- **Substantial impacts**, finally, includes a shorter list of success criteria. This reflects our previous finding that substantial impacts belong to the least salient impact category of innovative PE (see Table 7). It is obvious that one cannot coherently move from descriptive statements to prescriptive ones (so called Hume's law), and actually, we encourage funders and organisers of PE to pay attention to the limited contribution of PE to new scientific knowledge – perhaps something could be done to change this unfortunate situation.⁴⁶ As most of our cases suggest that knowledge creation is not the main point of PE – or at least creation of scientific knowledge –, we are not proposing to include it among the key criteria of success. We justify this by pointing to several examples of highly successful PE in which knowledge production was not the main point. Considering processes such as *Soapbox science*, *Tuscan law*, *Let's do it! GenSET* or *World Wider Views on Global Warming*, all of them were impressive exercises in their own particular ways – in terms of conceptual creativity, educational impacts and creation of information about public views – but none of them was impressive in creating new scientific knowledge.

In summary, both the extended and shortlisted sets of evaluation criteria complement the preliminary view of success through a procedural and impact oriented evaluation perspectives. In the following sub-section, we elaborate on a synthetic evaluation framework that takes into account some classic project evaluation criteria, including consideration of the appropriateness of PE.

8.3 Classic evaluation criteria

Classic criteria of evaluation, according to Georghiou and Keenan (2006, p. 769) include:

- **Appropriateness** – which refers to the question about the rationale of the activity, including consideration of the worth of public intervention and its alternatives. The latter includes reflection of the additionality, which refers to the extent to which the activity would have taken place without a public intervention.
- **Efficiency of implementation** – which refers to process evaluation focusing on managerial, organisational, logistical, methodological and other practical concerns.
- **Impact and effectiveness** – which refers to core issues of policy makers' concerns, namely to the outputs (measure of activity without measurement of its significance) and outcomes (activity including its significance) of PE activities.

Building on these classic evaluation criteria we start elaborating a synthetic PE evaluation framework (see Figure 14 in Section 8.4), in which previously discussed categories of evaluation criteria are reviewed, and completed with additional consideration of the rationales of PE.

8.3.1 Appropriateness

Considering that we are evaluating publicly funded PE processes,⁴⁷ appropriateness can be evaluated from three perspectives.

First, appropriate goals (A)⁴⁸ is an important evaluation criterion of successful PE. In the context of the EU's Horizon programmes, PE can be expected to contribute to more dynamic and responsible governance of RRI, as well as the EU's other strategic priorities. In the context of specific research programmes, more special goals need to be attained.

Second, **additionality** is a key question in the evaluation of any public policy intervention. Such an evaluation is a counterfactual thinking exercise asking whether similar activities would, or would have taken,⁴⁹ place without a particular PE process (Georghiou and Keenan, 2006, p. 769). We have placed additionality under the category of 'appropriate goals' even though it can be seen as a more general evaluation perspective covering both procedural and utilitarian perspectives.

Third, publicly funded projects need to meet high ethical standards (E). Such projects cannot discriminate but rather, they must be based on openness, transparency, democratic legitimacy, and other similar values that reflect good governance principles.

As our 38 PE case studies have all been realised, we can assume that their funders have already carried out some kind of evaluation of the appropriateness of these processes. For this reason, it is of interest to review the goal setting of these processes. As an empirical finding, we have observed that **funders have preferred PE projects with highly ambitious and highly general goals over projects with more modest and specific goals** (Figure 12). *Let's do it!*, for example, aimed "to clean up the whole world from illegally dumped solid waste, and to support the most intelligent and sustainable waste management principles in order to ensure a future clean world"; *G1000* aimed "to be a citizen initiative that is capable of innovating democracy..."; *World Wide Views on Global Warming* aimed "to give citizens an opportunity to express their views on some of the key issues negotiated at COP15 and engage policy makers in a dialogue about citizens' views." Yet we found some instances where goal setting was more modest and techni-

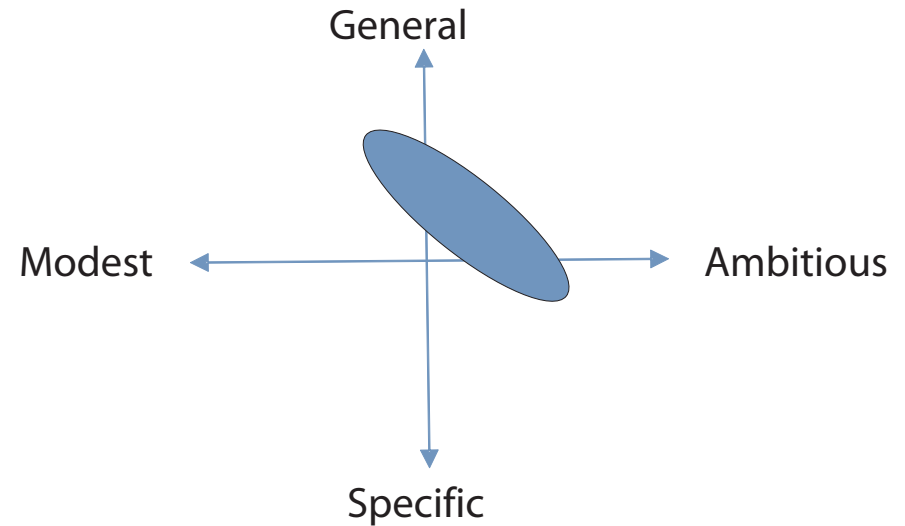


Figure 12. Main tendency of goal setting in innovative PE.

cally oriented, e.g. *PARTERRE* that aimed "to demonstrate and validate the business potential of two novel eParticipatory tools for spatial and strategic planning in territorial development at the European level."

Ambitious goal setting can result from the current tendency of policy makers to address societal challenges and support experimental policies.⁵⁰ While ambitious solutions can be required to address societal challenges, also characterised as 'wicked problems' (see e.g. Roberts, 2000; Australian Public Service Commission, 2007), the down side is that this approach can lead to an abstraction from reality,⁵¹ where solutions need to be practicable and connectable to existing frameworks of action; another difficulty is that too abstract goal setting can hinder effective evaluation of PE processes. For these reasons, even the most ambitious PE projects should contain some firm and locally-set targets that support practical orientation, learning from mistakes and renewal of existing practices.

8.3.2 Efficiency of implementation

Efficiency means the ability to do things well, successfully, and without wasting energy, effort, money and time. Many of the PE cases studied have been large and expensive processes, for which reason it is important to ask whether resources have been spent both effectively and efficiently.

Involving the right people, or the question of representativeness (R) is perhaps the single most important issue contributing to the efficiency of PE.⁵² While it is important to judge the composition of participants in PE processes, it is also to note that PE often is the challenger of existing structures of participation. ‘Crowdsourcing,’ for example, has proved an effective way of redistributing work previously carried out by public sector experts, as indicated by the successful opening of the U.S. patent review system to the public in 2007, (Howe, 2008). The point we want to make is that PE has much potential to save energy, effort, money and time previously consumed by publicly funded agencies. An evaluation of the efficiency of PE should therefore be accompanied by an evaluation of the potential inefficiency of existing ways of addressing the same problems.⁵³

Methodological quality (M) is another relevant factor contributing to the efficiency of PE. There is much practical and theoretical knowledge of the feasibility and functioning of PE methods, and our criteria are purported to reflect such insights. Functional, interactive, motivating, practical, robust and timely are some key methodological aspects that should be in-built in any PE process, and other similar methodological ‘rules of thumb’ and design principles could be added on the list. Another important methodological insight is that ‘one size doesn’t fit all’, but rather, PE has to be tailored to the needs of particular socio-political contexts.

The capacity to sensitise contextual requirements is to a large extent a matter of organisational competence (O). The probability of successful PE can be increased by having competent and well-resourced agencies organising the events. There are also other supportive factors that contribute to a flourishing culture of PE practices, such as networking between professionals, existence of brokerage institutions, interchange between universities and practitioners, existence of pioneers and ‘champions’ etc. These factors were discussed in a

previous publication (Rask et al., 2012a). As the data for this report were not particularly focussed on this aspect, we acknowledge that organisational competence is an important precondition of successful PE and it has to be studied further in another research context.

8.3.3 Impact and effectiveness

For funders especially, it is important that PE projects meet their intended goals. Therefore, **goal attainment should be among the main criteria of successful PE.**

Most, if not all, of the 38 cases studied could be classified as successful according to this criterion.⁵⁴ This is no wonder, as we chose the 38 cases to represent most innovative among interesting PE processes, and we did not actively seek examples of failure. Perhaps reflecting the tendency of broad and general goal setting, we also found that the impacts of innovative PE were quite broad, although with much variation.

We maintain that evaluation of the impacts should acknowledge types of impacts: substantive (S), practical (Pr) and normative impacts, the latter being further divided (in Table 12) into institutional impacts (I) and political relevance (Po). Impacts can be related to three issue areas: science and technology, societal issues and political issues (Table 6). Thus, considering that there can be highly different impact profiles, it is relevant to ask whether it is possible to evaluate and compare levels of effectiveness of PE processes.

To address the difficulty of evaluating the impacts of PE, we propose **PE footprinting** to be applied as a tool for estimating and illustrating them (see Appendix 1). This technique has been used as the analytical backbone of this study, and it has the following benefits:

- It is an easy, semi-structured approach to model and analyse categories of socio-policy impacts, for example, media coverage, impacts on policy making, participant learning, institutionalisation, enhanced civic capacities, new knowledge, new products, empowerment, mutual benefits, cultural change, community building, democratization, societal change, and creation of professional networks.

- Being a semi-structured method means that while some of the most obvious impacts types can be pre-defined, footprinting leaves room for the recognition of additional impact.
- Thus, including both pre-defined and emerging impacts, PE footprinting can reveal unique impact profiles for each PE case.

As most of our cases represent successful PE processes, at least in the sense of goal attainment, it is interesting to see that success have been achieved through highly different impact profiles. Many cases (e.g. *Primas*, *The National DNA Database on Trial*) are characterised by a broad impact profile, while in other cases, the impact profile is quite narrow (e.g. *G1000*, *Societal Advisory Board*) (Figure 13). Intuitively one could equate having broad impact profiles with being successful, and in parallel, having narrow impact profiles with being unsuccessful. What limits us to do so, however, is the observation that even limited impacts can stir deep changes in organisational practices and institutional structures. For example, the *Societal Advisory Board* of JPI More Year, Better Life, is doing pioneering work by introducing a mechanisms of societal peer review and practices of PE in the context of European Joint Programming Initiatives. Another example is *G1000* that introduced and helped to institutionalise practices of deliberative democracy in Belgium and other countries.

In summary, considering what might count as successful in terms of socio-political impacts, we propose that **the bigger the footprint of PE, the bigger its additional value to the society.**⁵⁵ Reflecting on the above discussion, however, we acknowledge that a big footprint can be either broad or deep, or at best, both broad and deep.

In Figure 13 we also introduce another impact variable, publicity, which is relevant in the definition of the impact profiles. Less than half of the cases (17/38) reported high media publicity, whereas the others (21) reported low or moderate publicity, or didn't report such impacts at all. We did not find strong correlations between levels of publicity and different impact profiles.⁵⁶ Instead, we can hypothesise that different orientations of the PE either support or hinder publicity. We assume that technically (e.g. *Social Advisory Board*)⁵⁷ and organisationally oriented (e.g. *The National DNA Database on Trial*) PE is less attractive to the media than politically (*G1000*) and societally oriented PE (*Primas*).

Publicity is an interesting issue for the business of PE. As the name 'public' indicates, the issue is very much about submitting issues of technical expertise to public reflection, be it through representatives of the populace or through public media. Whatever the means, it is impossible to advance PE through closed circles with limited access to publicity. Considering that the 'intra-murality trap' is a well-known difficulty with many PE processes (Rip, 2003), it is important to include considered and effective strategies of public communication in any PE process.

Different impact and publicity profiles are illustrated in Figure 13.

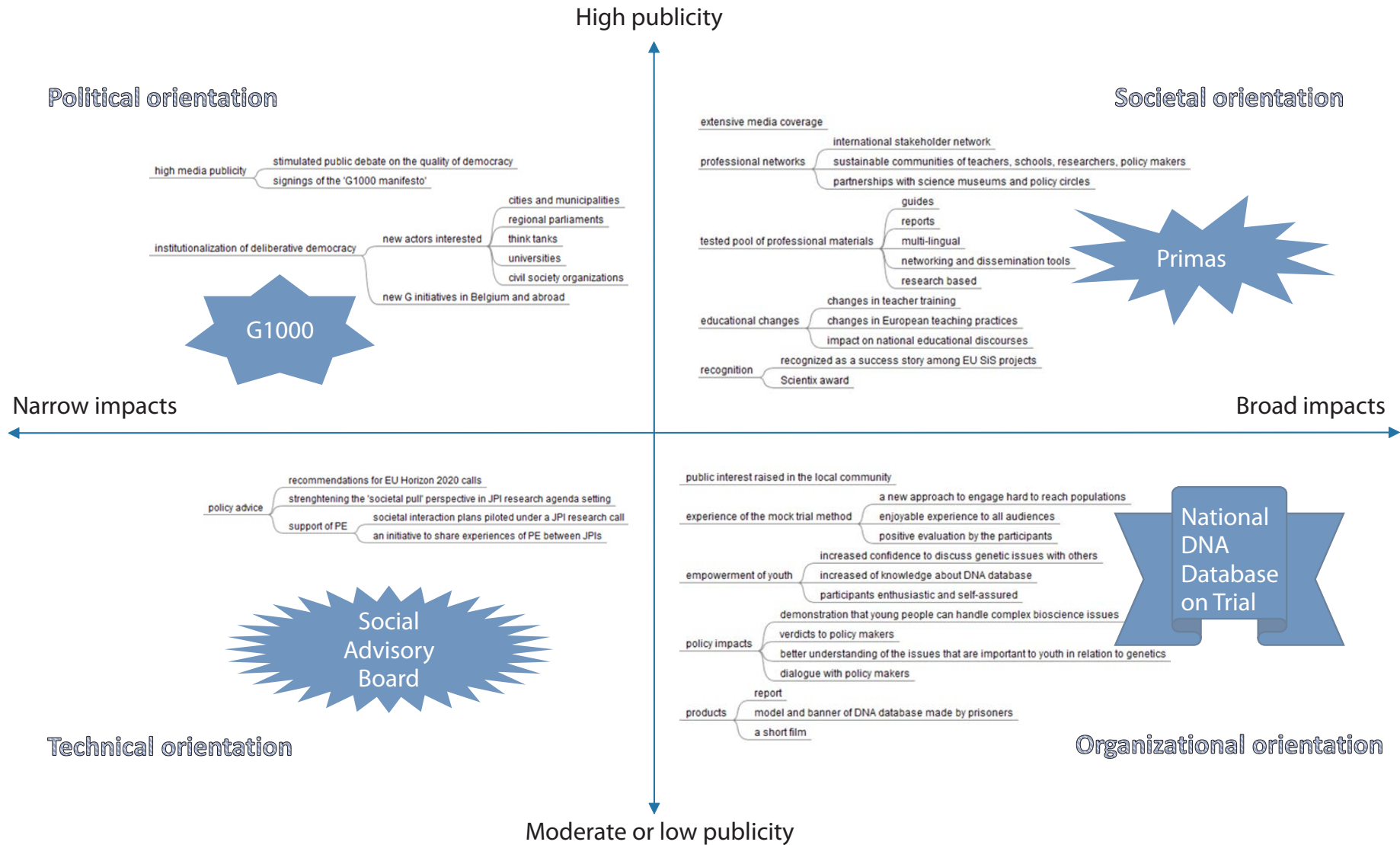


Figure 13. Different impact and publicity footprints of innovative PE.

8.4 Synthetic evaluation model

Building on the previous discussion, in this sub-section we propose a synthetic evaluation model that can be used in the evaluation of PE activities. As we previously argued, such a model could help to improve the understanding of what can be expected from successful PE processes (appropriate orientation and high influence), and how it could successfully be organised (efficient implementation).

Figure 14 summarises the various evaluation perspectives thus far and contains **a synthetic model of PE evaluation**. We propose that this model could be used as a starting point for any evaluation of PE processes. To finish the discussion on the success of PE, we would like to raise the following points.

First, PE includes a diverse set of activities, and any single model can prove to be too restrictive. For example, some of the culturally oriented PE processes are not necessarily aimed at broad or deep policy impacts; however, even such processes will probably be aimed at some practical or institutional impacts, for which reason it is important to acknowledge and accept a broad range of goal orientations. This has also been recognized among deliberation scholars, who have recently introduced the notion of ‘Type II’ deliberation (Bächtiger et al., 2010),⁵⁸ which welcomes all forms of communications (instead of highly rational and consensus seeking ‘Type I’ deliberations) and relaxes some established procedural quality criteria such as the request for sincerity. An up-to-date the evaluation framework of PE, in our view, should also become more relaxed and context wise.

Second, the proposed synthetic model of evaluation results from an empirical study of a sample of innovative PE processes and reflection on the recent literature on PE. In order to increase the validity and relevance of the model, it has to be scrutinised (and publicly deliberated) with actors and stakeholders who are in a position to evaluate or appraise the potential value of PE activities. This is what we intend to do in the latter stages of the PE2020 project.

Third, even if this model manages to capture some essential insights of the dimensions of successful PE, it opens up a whole new body of work, along with the consideration of relevant indicators for each success criteria. Fortunately, much of this work has already been done, and indicators for deliberative quality, in the form of discourse quality index (for example), can be found in the academic literature as well as in practical applications (e.g., Lord and Tamvaki, 2013; Steenbergen et al., 2003). Some other criteria need additional reflection, however. For instance, the possibility of acknowledging the high potential of PE to result in indirect impacts and spin-off effects: how could this be taken into account in the design and evaluation of PE? In WP4 of this project, we will continue to reflect on the available indicators, and the work will have become available through the PE2020 web tool by the end of the project.

Finally, we acknowledge that defining what success is, and how it can be measured, are completely separate tasks from explaining what leads to success or limits its achievement. The latter question is of great interest to anyone who plans to organise PE activities, and it is also a salient issue for the PE2020 project, which has adopted a view that recognition of contextual demands can be as important as choosing the right methods and approaches for particular problems. In the next section of this study, we report on some observations of the challenges that need to be addressed in order to develop more prosperous cultures of PE. We do not engage in a systematic discussion of factors contributing to successful PE, because our data are not particularly well suited for this.

Appropriateness

Efficiency of implementation

Impact and effectiveness

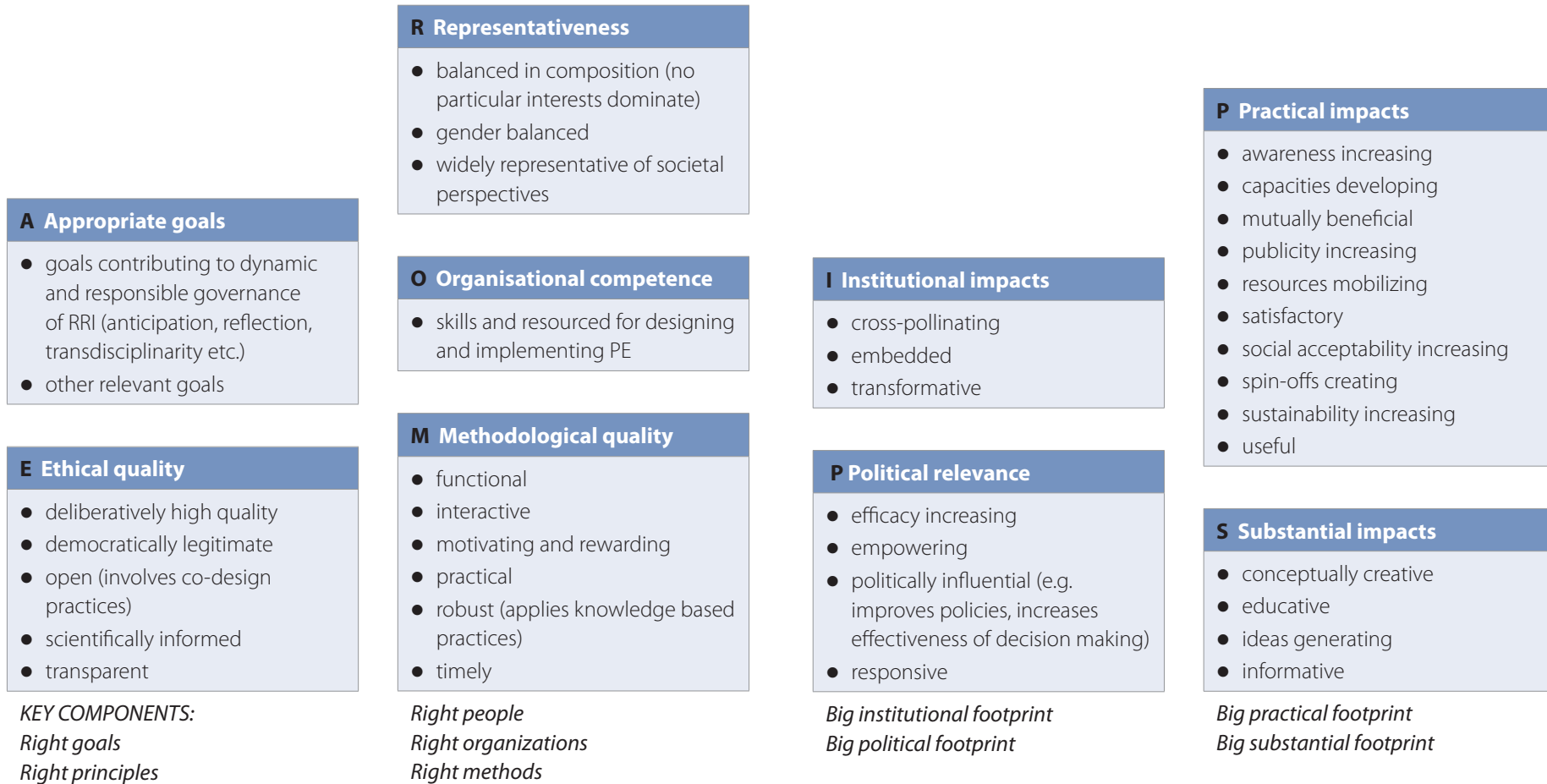


Figure 14. A Synthetic model of PE evaluation.

9 Obstacles for PE

Learning from difficulties, mistakes, obstacles or challenges is something different, and more modest, than proposing a full scientific theory of designing or managing successful PE activities. American political scientist Charles Lindblom called the more modest approach “the science of muddling through” (Lindblom, 1959), and he argued that it is fundamental to any organisation to learn from even the smallest mistakes to improve the situation. This is what we will next do: look at the obstacles of organising PE activities.

Overall, on the basis of the cognitive maps of 38 PE initiatives (Appendix 1), 118 challenges were identified. Challenges were reported of each case, and on average there were three challenges per case. In order to understand the nature of these difficulties, we clustered them in eight thematic groups of obstacles.⁵⁹ These clusters are presented next, and we have reflected on how they are related to the criteria of success that we just defined. – If our model is relevant in the evaluation of PE activities, we should expect that the challenges and obstacles could also be allocated under relevant evaluation perspectives.

The biggest group of challenges were capacity-based obstacles (28/38). Managerial difficulties (13/38) were frequently reported. Examples of managerial challenges include managing conflicts and strategising between participating actors and stakeholders, getting companies to understand their strategic role in PE processes, selecting the right types of stakeholder and maintaining fruitful communications with and between them, managing the framing of problems, creating shared visions of expected outcomes, ensuring productive interdisciplinarity, balancing power differences, and balancing between project obligations vs. partners’ autonomy. **Right timing and scheduling of PE processes** was mentioned as a challenge in several cases (9/38). For example, links to on-going policy processes were

missing, time pressure was chronic, and scenarios were outdated due to economic recession even before the project had ended. **Inadequate capacity to evaluate PE processes** was also recognised as a problem (6/38). Such challenges included limited follow-up, lack of relevant indicators for the measurement of capacity building, inadequate feedback forms etc.

The second biggest category of challenges were motivational obstacles (22/38). It was reported that it is difficult to motivate the following groups to participate: youth, industry, teachers, business, and academia. Different reasons were expected, including scepticism toward PE activities or organising institutions, underlying agendas etc. Yet other difficulties included avoiding high dropout rates and transforming short-term participation to long-term commitment. **Mobilisation of researchers was difficult in many cases (7/38).** There were several reasons for this, including e.g. the challenge of orienting researchers to thinking about societal challenges and contributing to the co-creation of knowledge, scientists’ time pressure as well as their own ways of understanding what constitutes high quality science. (For example, for many scientists, science is primarily gender neutral, for which reason there is no perceived need for gender balanced production of scientific knowledge).

Technical obstacles were frequently mentioned (20/38). Here we are referring to available PE methods and their efficient use. Problems included e.g. effective use of social media (poor awareness of ICT tools, public limitedly engaged in Facebook debates), ensuring adequate number of participants, covering multiple topics in one day, limited thematic coverage of the panel, self-selection, organising tours, exclusion of people needing assistance, inadequate facilitation skills, logistics, representation, on-line debating, combining F2F with on-line, organising simultaneous debates, dependency on cloud free days, dependency on certain phone models. This

is what it looks like in the engine room: there are many small things to take care of before any PE process can run smoothly.

Low impact was a recognised as an obstacle in fewer than half the cases (18/38). There were two sides to this problem. First, **low awareness or absorptive capacity of decision makers** towards the PE process was a regular issue (10/38). Sometimes this was caused by inadequate ties to decision making institutions, in other cases it was caused by the scepticism of administrators, which in one case (*Tuscan Law No. 69/07*) led to a situation that the new law supporting PE was mostly ignored by decision makers, even though some other actors used it proactively. Second, **low impacts were linked to fuzzy or trivial results.** In some cases, citizens' recommendations were just too general to attract policy makers' attention, while in other cases results were too concrete leading to having an impact only on little issues.

That funding is challenging is no surprise to anyone. **Financial and resource based obstacles** were mentioned in fewer than one-third of the cases (10/38), even though we might expect that they are always a challenge. In particular, longer term funding for PE is missing. Volunteering can help in expanding activities, but it can be unpredictable, and therefore requires monitoring and management of relevant performance quality standards.

Cultural obstacles were often faced (10/38). This was particularly the case with several transnational PE processes, in which different languages, cultural habits, and professional norms prevail. A particular aspect of cultural challenge in the area of PE includes the hostility of NGOs towards deliberative processes and bodies, as they see PE as a threat to their own role

as representing the voice of civil society.⁶⁰ Sometimes hidden motivations of PE processes were suspected, and some of their ideologies, such as the orientation to co-creation of knowledge with citizens, seemed to be distant. More typical cultural obstacles were related to challenges of intercultural communication.

External or environmental obstacles caused surprises in about one-sixth of the cases (6/38). Examples of such challenges include corruption of the political system, difficulty of finding female scientists in PE processes, hostile media and civil society groups publicly questioning the legitimacy of PE, and unfortunate regulation that hinders opportunities for delegating power to the people.

Deficit based obstacles were minimal. Participants' inadequate understanding of scientific issues or inadequate capacity to handle e-participation was mentioned as a problem in two cases. Therefore, the deficit thinking that has been a persistent issue and problem in the area of R&I activity (see e.g. Irwin, 2001), seems to be fading away within innovative PE processes.

Overall, many of the obstacles are related to each other, so that inadequate managerial capacities make life difficult in most other areas, including effective framing of issues, choice of right methods, keeping right partners involved, mobilising funding and so on. However, in the spirit of Lindblom's science of muddling through, we at least know what the typical challenges facing PE are. In Figure 15 we have summarised the challenges and indicated how they link to the earlier drafted evaluation criteria. The overall vision is that key challenges of PE will ensure adequate professional capacities, high motivation, technical skills and adequate impact.

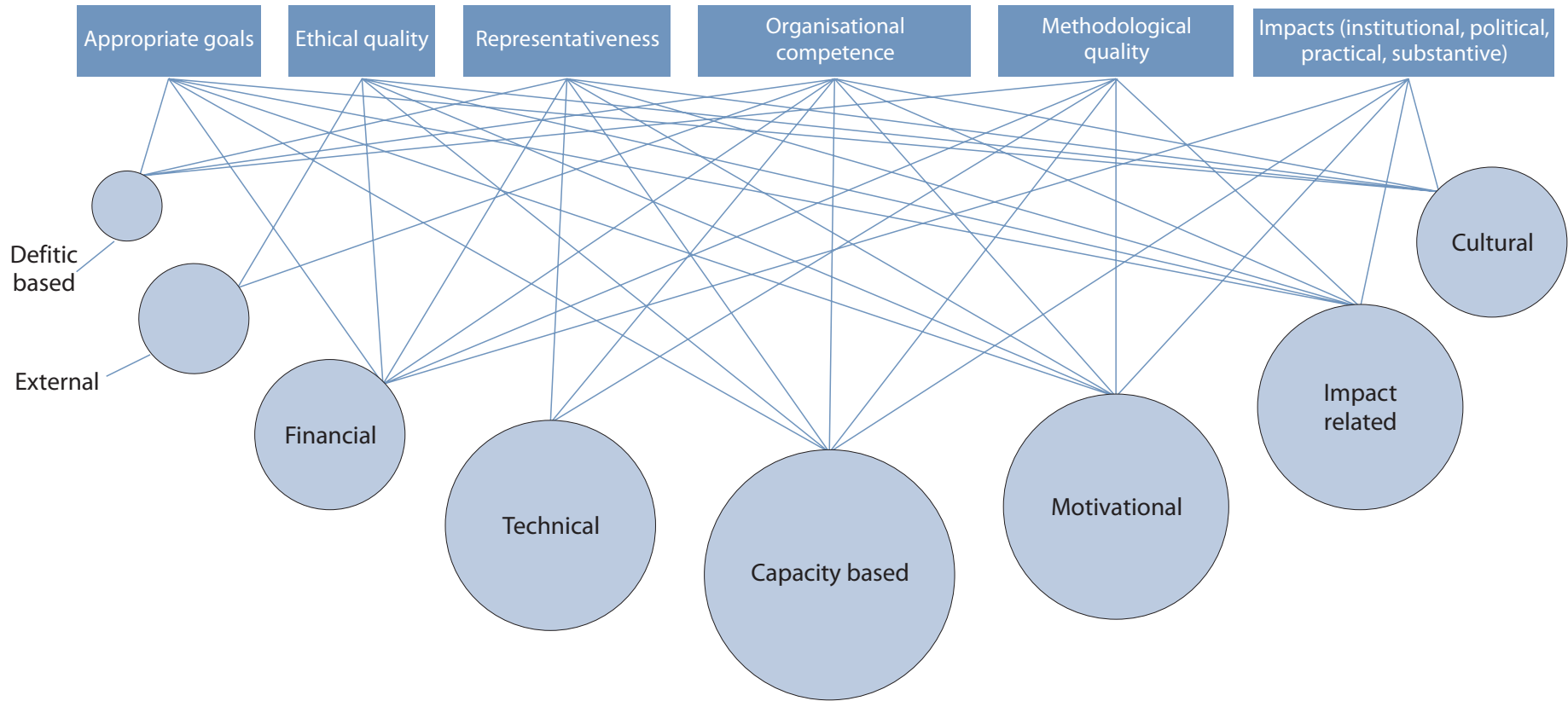


Figure 15. Main obstacles of PE (balls) and their relation to different evaluation criteria (boxes)⁶¹.

10 Discussion

Public engagement has become an important theme in the development of research and innovation activities in Europe and beyond. By setting PE as one of five thematic elements of responsible research and innovation (in addition to open access, gender, ethics and science education)⁶², the European Commission promotes fundamental changes in the way in which civil society influences – and is expected to influence – research activities. Promoting PE means giving more weight to citizens and stakeholders in the definition of research needs, in the critical reflection of current and future research priorities, and in the implementation of research and innovation activities. Reflecting the interactive and dynamic nature of PE, we can even claim that **PE is the heart and spirit of responsible research and innovation**: it opens practices of research and policy to the public and stakeholders; it involves ethical principles that highlight responsibility, (gender) equality, democracy, as well as effectiveness and efficiency of public decision making; it explores new ways of informing the public about prospects and risks of technoscience, and it mobilises citizens' capacities to address related societal challenges.

Europe is not alone in this process. The American Association for the Advancement of Science (AAAS), the world largest general scientific society is also devising its PE policies. At the time of writing this study, the AAAS was preparing its own 'logic model of public engagement with science', which involved systematic work for the definition of appropriate visions and goals for PE, and consideration of relevant PE activities and inputs that are needed to reach desired outcomes from PE activity – outcomes such as the public's trust in and positive affect with science, better ability and comfort of scientists to convene relevant communities to deliberate scientific issues, and an increased motivation of research actors to conduct responsive research.

It is the purpose of the PE2020 project, and this study in particular, to contribute to a better understanding of the characteristics, trends, and impacts of innovative PE. By analysing a global sample of innovative PE processes, we have drawn lessons from the state-of-the-art in the field and developed conceptual models that are both intended to support evaluation of PE practices and put PE in perspective as an element of dynamic and responsible R&I governance. Such work is necessary, since **better understanding of innovative PE processes can contribute to a better capacity to develop European R&I governance and to develop better strategies to address societal challenges facing European societies**.

Even though our objective was not to conduct historical research, what we found describes the evolution of the PE field. Among the main observations are that **there has been a shift of PE from traditional models of public communication and consultation, where dialogue between decision makers and the public is narrow and restricted, to public deliberation where such dialogue is intensive and influential**. We regard this shift as an indicator of the increasing methodological maturity of the PE field. Furthermore, the continuum of theory and praxis, embedded in the deliberative approach, can increase the robustness, credibility and relevance of method development, which in the long run can help to consolidate the whole field of PE by providing scientific evidence for governance innovation. Other categories of PE studied, including various forms of public participation and public activism, represent increasingly interesting approaches to the governance of R&I, yet experiences are limited to make strong judgements on their relevance and usability in this context.

Some earlier studies have paid attention to the limited impacts of PE, and criticised PE for its tendency to remain an 'intra-mural' exercise (e.g. Grönlund et al., 2014; Kies and Nanz, 2013; Rask, 2013; Goodin and Dryzek,

2006; Rip, 2003). Contrary to these studies, **we found innovative PE to have truly versatile impacts, not only on research and innovation but also on the environment, society, politics – and individuals.** Prominent examples of the latter effects include political empowerment of youth and development of ‘scientific citizenship’, i.e. new understandings of the rights, duties and responsibilities of citizens in relation to science and technology (See D4.1; Irwin, 2001). PE stimulates such impacts by creating opportunities for mutual learning between scientists, stakeholders and members of the public.

We found that **most of the impacts of innovative PE can be described as practical.** Such impacts include cognitive and attitudinal changes (e.g. better awareness of environmental and scientific issues), development of new capacities (e.g. new professional skills, methods and platforms of collaboration) and mobilisation of resources for addressing scientific and societal challenges (e.g. research funding, political commitment, public awareness, and social acceptance). A sub-category of practical impacts includes impact on policy making (e.g. development of policy recommendations, informing R&I policy making with citizens’ viewpoints, and joint definition of research agendas). Other types of impacts included **normative impacts, such as democratisation and increasing responsibility of research.** Instances of normative impacts included consensus building, community building, political empowerment, increased gender equality in science, and introduction of the principles of deliberative democracy to R&I governance. Finally, perhaps surprisingly, we observed that **innovative PE only limitedly contributed to new scientific knowledge.** Considering that our primary focus has been on PE projects related to R&I, this could be seen as a disappointing result. However, there were important deviations to this pattern. Citizen science and science shop, in particular, emerged as new concepts that involve both co-design and co-implementation of research and innovation. Thus, instead of drawing the conclusion that PE is impotent in engaging the public in actual research activities, we pay attention to these and similar concepts that provide even radical potential in developing more engaging research practices.

To sum it up, PE can provide new tools and approaches for the development and renewal of R&I governance in Europe and beyond. Innovative PE

expresses the spirit of both ‘tentative governance’ (Kuhlman and Rip, 2014) and ‘dynamic governance’ (Guldbrandsen, 2014; Neo and Chen, 2007), where solutions are explored through pilot schemes and experimentations rather than by introducing deductively driven or ready-made solutions. In addition to an entrepreneurial spirit of risk taking, we observed that innovative PE has contributed to new capacities that help research actors to address societal challenges and complex governance problems better. Such capacities include anticipation, reflection, transdisciplinarity and continuity, which we included as the key capacities of dynamic and responsible R&I in our **‘composite model of participatory performance’** (Figure 11). We also reckoned that PE is supportive of the EU’s strategic priorities related to the efforts to ‘open up’ European research and innovations processes. In particular, we found innovative PE to be effective in conducting international science diplomacy, creating collaborative efforts and enduring networks that can foster and spread new SiS practices in EU partner countries and beyond.

10.1 A vision of PE benefitting European R&I activities

Despite widespread and positive individual impacts of PE, an overall vision of PE activity has remained unarticulated. How can innovative PE ameliorate European research and innovation activities, if at all? To correct this flaw, we propose the following vision of PE, which invokes answers to this question (Figure 16).

Our vision of PE benefitting European R&I activities is built around the notion of better involvement of actors (see the box at 11 o’clock in Figure 16). Better involvement occurs, when the ‘right people’ are gathered together to address the ‘right issues’ through the ‘right PE tools and methods’ (see, Figure 14). While PE can be a rewarding experience in itself for the citizens, there is robust evidence of participant learning, indicating that through PE processes citizens can develop an expanded understanding of the nature of the issues, as well as an increased sense of political efficacy, or a sense of opportunities to act on behalf of one’s interests rather than feeling helpless and

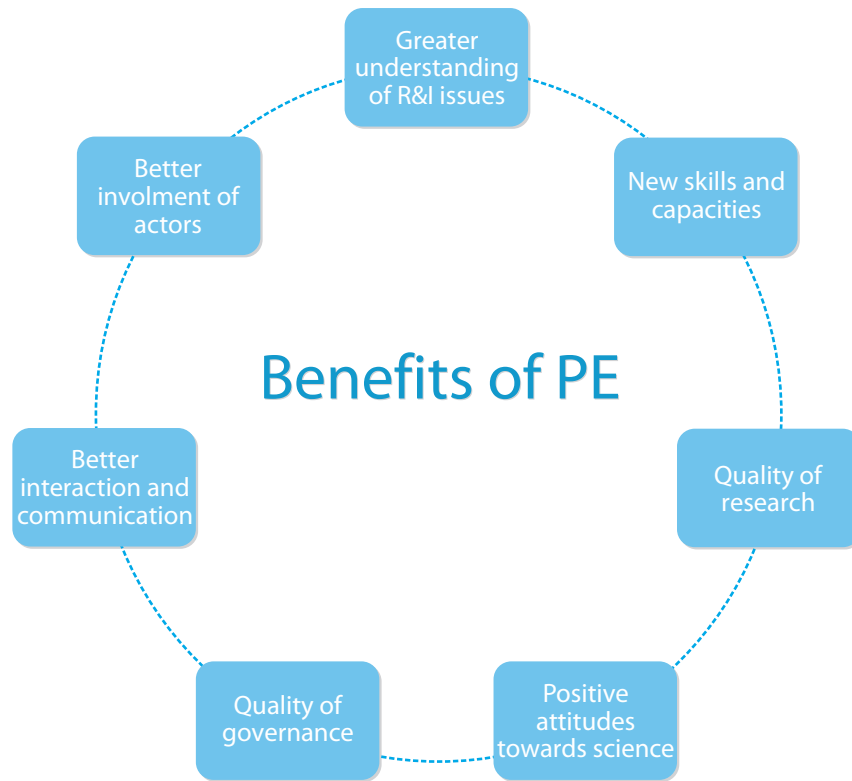


Figure 16. A Vision of PE benefitting European R&I activities.

alienated from reality. Even better, participation in collective problem solving efforts through PE processes helps citizens to develop new knowledge and skills that help them practically tackling even most challenging issues and problems (in *Let's do it!*, for example, citizens were instructed to clean their living environments from toxic waste materials, and they effectively did so in more than 100 countries). The possession of new skills and capacities, in our vision, contributes to better quality research as more people are able to provide their experience and expertise in collective problem solving efforts.

Unlike the infamous 'deficit model' (Irwin, 2001), through which provision of 'correct information' on science is expected to develop more positive attitudes toward it, positive attitudes toward science, in our vision are expected follow from a better quality of research. By better quality we mean research that in addition to an academic quality has also ranks high in 'societal peer review' (cf. Funtowicz and Ravetz, 2003), and which in addition to scientific expertise, also mobilises practical skills and societal capacities that are needed to address societal challenges and challenging research issues effectively.

Finally, like in positive psychology, which has established causalities between positive attitudes and better performance rates (e.g., Seligman and Csikszentmihalyi, 2014), we expect that a positive societal 'tune' can help to develop better R&I governance approaches, where public engagement, interaction and communication will remain key elements, as they have been defined in the EU's RRI policies and its thematic priorities. Following this logic, we have gone through a 'virtuous cycle' of PE, which is fundamentally our vision of PE benefitting European R&I activities.

10.2 Critical issues and further research

Now, after contemplating a positive vision of PE, we end this study by pointing to some critical issues that need to be addressed before the vision of PE benefitting European R&I activities could be fulfilled fully or partially. Some of the critical issues are related to the obstacles of PE, while other issues are related to the uncertainties of this business and to the need for further research on this theme.

An important critical issue is that **compared to the high expectations, PE is currently too weak to redeem its promises of increased societal relevance and high impact of R&I**. In our study of the 104 challenges related to the implementation of the 38 innovative PE cases, we found that **an inadequate capacity of the organisers of PE to manage complexities involved is the main challenge**. Such complexities included effective selection of the participants, management of tensions between new actors, appropriate framing of the issues, and right timing of the processes, to name

a few. A particular difficulty was an inadequate capacity to evaluate PE processes. (This issue we have partly tackled by suggesting a synthetic evaluation framework). In decreasing order of magnitude, other major challenges included low motivation of the participants (often due to culturally bound ideas of appropriate roles of experts vs. laymen in research activities), technical problems (e.g., inadequate facilitation skills and other hindrance of effective management of deliberations), low political impact, inadequate funding, cultural and environmental conflicts, and finally, an underestimation of the capacity of the citizens to deal with complex issues. (This latter challenge was only a minor concern in our sample).

As the list of obstacles was gathered from a sample of highly innovative PE processes, we can expect similar problems to emerge in any pioneering organisation that starts to introduce PE in its organisational practices and structures. Therefore, it is important to acknowledge that early lessons have already been learned, and insights on how to avoid the worst pitfalls can be found in various places, such as the dozens of PE toolkits available on the Internet. (In D4.1 we analysed 18 such design tools). The RRI-tools⁶³ project provides perhaps the most topical site and resource for European PE planners of research activities, as this is a site that gathers together resources from all EU funded projects in the field of RRI and PE. The results of PE2020 will also be later made accessible via its web site through a design toolkit based on a 'critical approach', which acknowledges the inherent dilemmas of the PE practice, and suggests relevant solutions.

Finally, we remark that implementing dynamic and responsible research and innovation through a flourishing culture of PE is far from a finished project. The field is full of activities, experiments and ideas worth further clarification. We end up this study by suggesting a list of seven research questions, both academic and practical, that in our view would deserve further attention:

- We found that U.S. and European PE cases in our sample emphasised different virtues: while U.S. partners are more interested in building civic capacities through PE processes, European counterparts are more focused on the policy impacts PE. **Are there really such cultural differences between U.S. and European PE activities, or is this merely a coincidence due to the small size of our sample?**
- Funders of PE are interested in evaluating the economic impacts of PE⁶⁴, which is a fair demand considering the increasing volume of public expenditure in this field. At the same time, however, our experience is that none of the innovative PE cases studied directly aimed to create financial revenues, and if they did so, this happened indirectly.⁶⁵ To tackle this issue, we propose the following research question: **To what extent is it reasonable to model and evaluate the economic impacts of public engagement?**⁶⁶ – The 'footprints' of the 38 PE cases could provide a starting point for such evaluation.
- We found that three quarters of the PE cases studied involved the 'fourth sector' (e.g., Williams, 2002) by including e.g. randomly selected citizens or other unorganised entities such as individual philanthropist and hybrid networks under formation. In this study we identified four sub-categories of fourth sector actors, including hybrid experts, randomly selected participants, life world experts and 'field experts'.⁶⁷ To understand the challenges related to the participation of the fourth sector better we suggest the following research question: **Which sub-groups belong to the fourth sector and how does their involvement have an impact on the responsible governance of R&I?**
- We evidenced that 'upstream engagement' (e.g., Joly and Kaufmann, 2008) is an increasingly supported approach among innovative PE processes, especially in anticipatory projects. Upstream engagement aims to open up decision processes at an early stage of agenda setting and planning. Tuscan Law No. 69/07 is perhaps the most extreme example of upstream engagement, as this is basically a scheme for supporting public deliberation on any issues that are proposed by the inhabitants of the Tuscan region. If the issues are evaluated as being relevant by a competent authority, public engagement procedures become financially and organisationally supported by the authority. To understand the potential of upstream engagement for the governance of R&I better, we suggest the following research question: **What are the alternative models of upstream engagement that could be applicable to the governance of R&I? What are their main limitations?**

- Creation of continuity was suggested as being an important capacity that is needed both to balance dynamic governance and sustain dynamism in the long run. We identified both spatial, temporal and institutional dimensions of continuity, and reflected that the systemic approaches both in innovation studies (e.g. Smits and Kuhlman, 2004) and studies of deliberative democracy (e.g., Parkinson and Mansbridge, 2012; Dryzek, 2010) both back up the notions of institutional embedding and creation of continuities between separate policy interventions. As the arguments for continuity seem strong while the means to reach it are unclear, we propose a study of the following question: **What is the essence of the capacity to create continuity? How can such capacities be developed in the context of PE activities?**
- One of the surprises we encountered was the highly limited contribution of PE to the production of scientific knowledge. At the same time, we acknowledge that citizen science and science shop activities have been highly successful in this area, and that they will most likely expand in the near future. What raises our curiosity is the following question: **Is there an untapped potential in co-creation of knowledge through public engagement? What could be the best means to support co-creation of scientific knowledge in future PE processes?**

- The world of public activism is vibrant, and as our only case of this category, *Let's do it!* suggests, there is a high potential for it to accomplish the tasks that we can expect from most successful PE process. By using our own definitions of successful PE, we can clearly see that *Let's do it!* has left a big impact footprint in society, politics and environment; it has worked upon noble and widely justified goals, and from the point of view of public policy, it has been extremely efficient, as the need for public subsidies has been minimal. At the same time public activism causes a dilemma for public policy makers: **What are the rationales, options and threats of harnessing public activism to serve dynamic and responsible R&I?**

Some of these questions can be banal for a social or political scientist who may have worked on these topics for years perhaps. For us these questions are just a sample of some of the more intriguing dilemmas of public engagement. The era of public engagement in research and innovation has just begun, and major questions still remain in the air.

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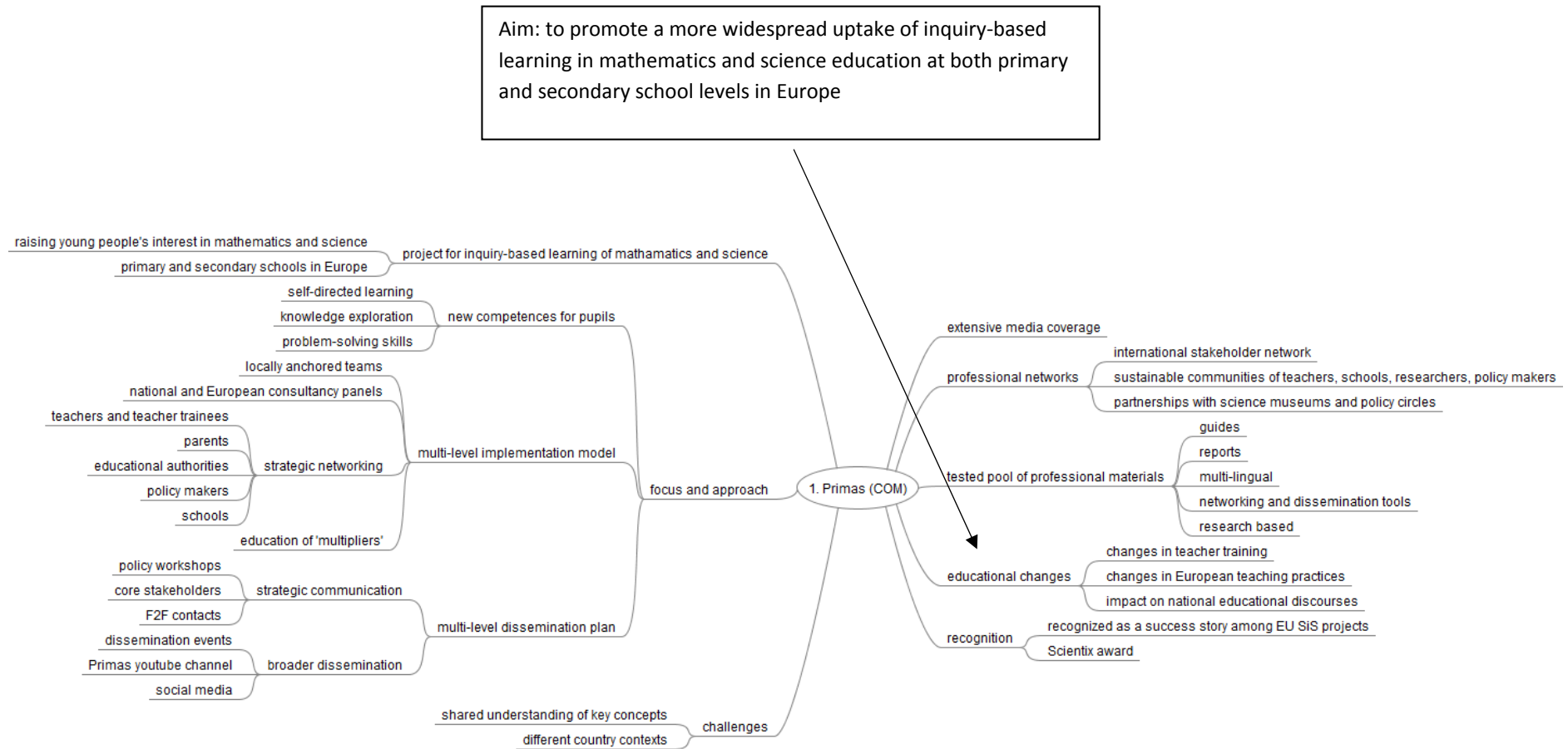
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APPENDICES

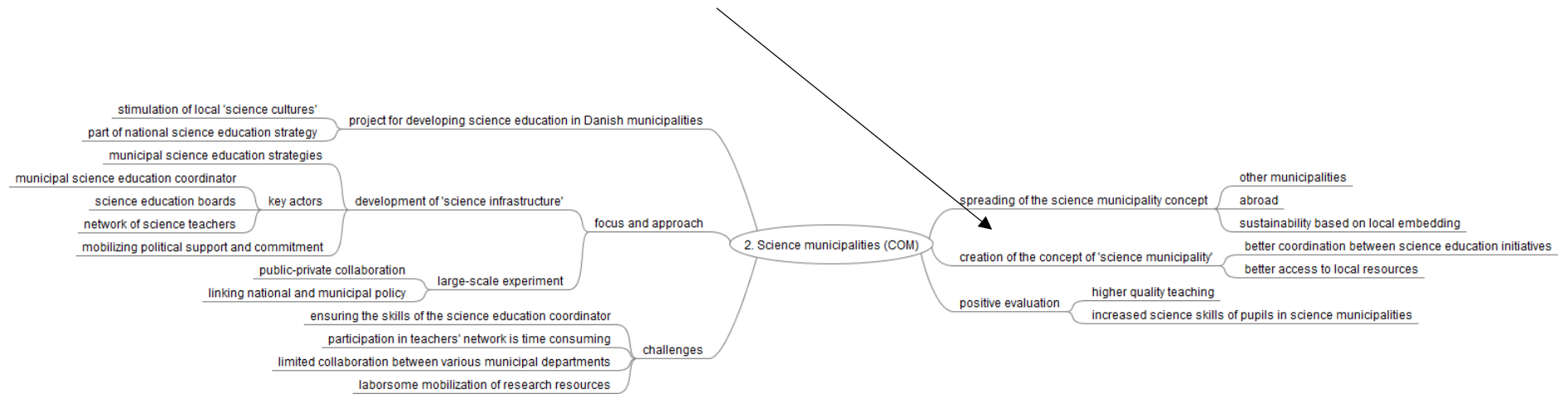
APPENDIX 1. Cognitive maps of 38 innovative PE cases

Map 1: PRIMAS – Promoting inquiry in mathematics and science across Europe



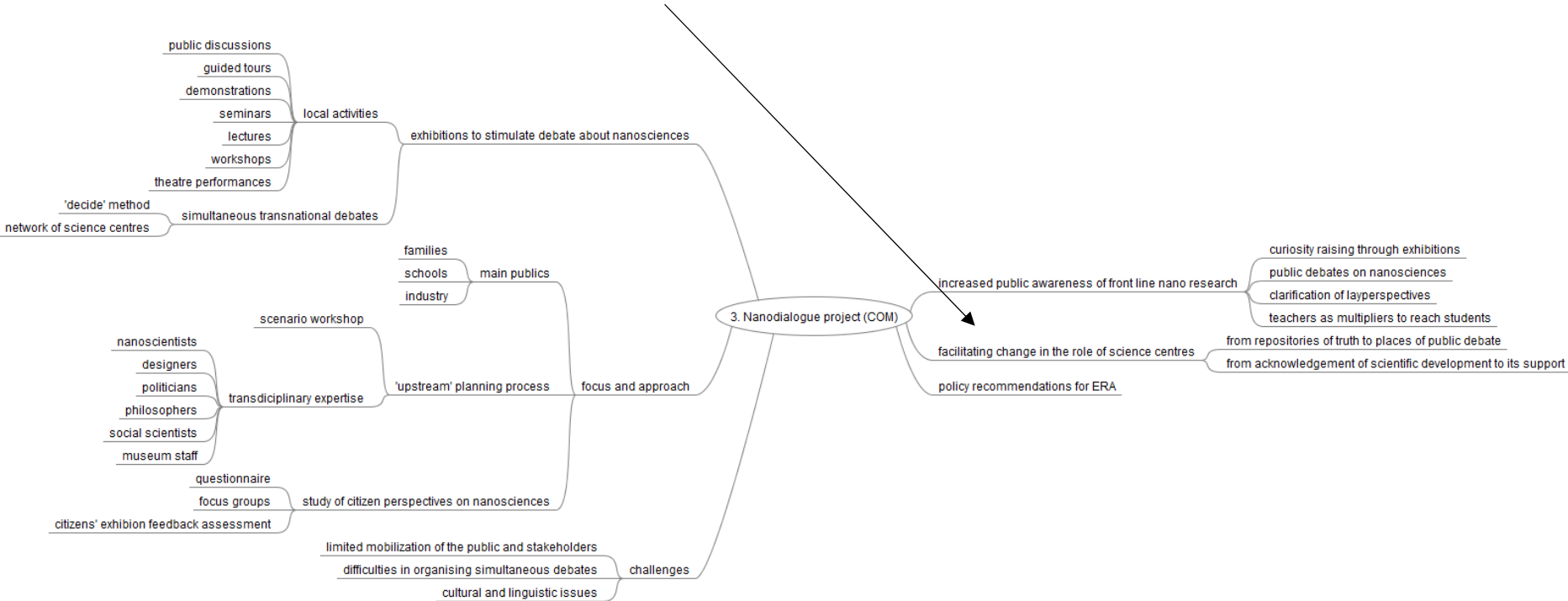
Map 2: Science Municipalities

Aim: to activate and coordinate all positive local forces and resources in the 25 participating municipalities towards a common purpose of improving the quality of science education

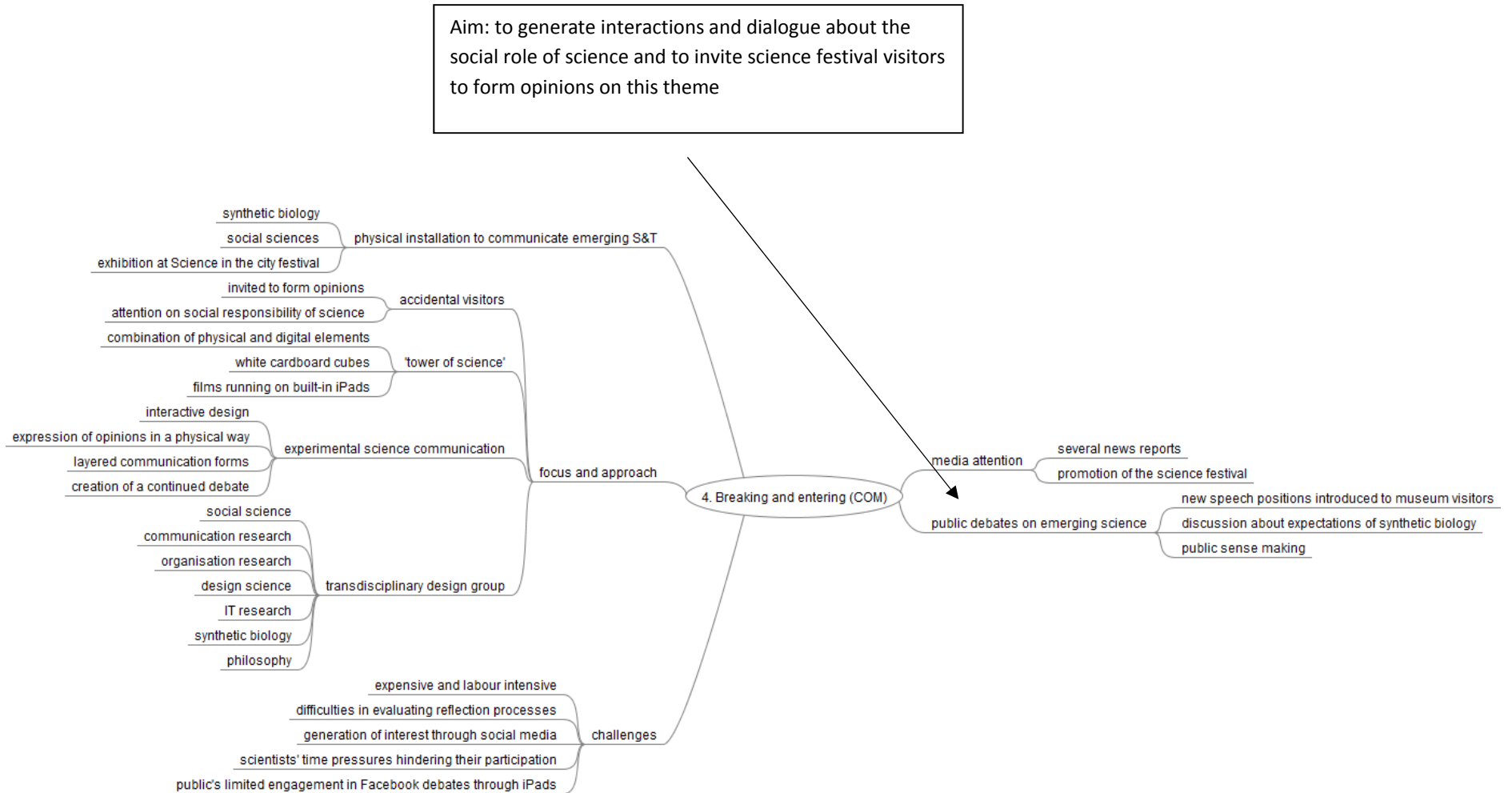


Map 3: Nanodialogue Project

Aim: to raise curiosity and stimulate debate on nanotechnologies and nanosciences, both for the general public and more sophisticated targets

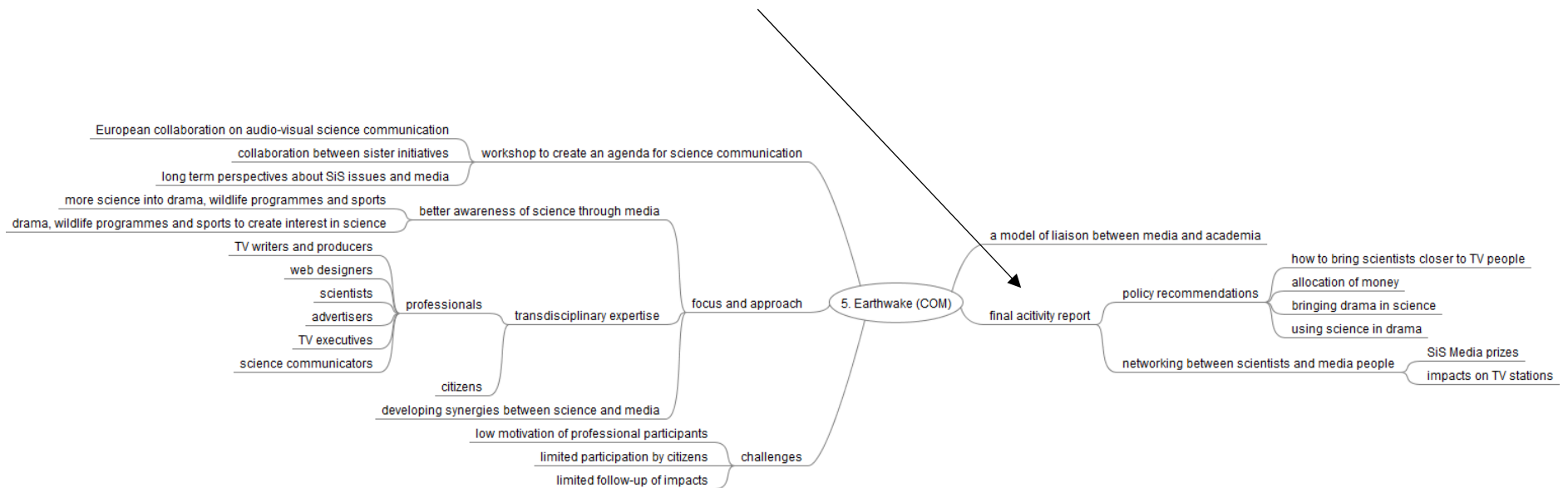


Map 4: Breaking and Entering – Explore how science and society relate

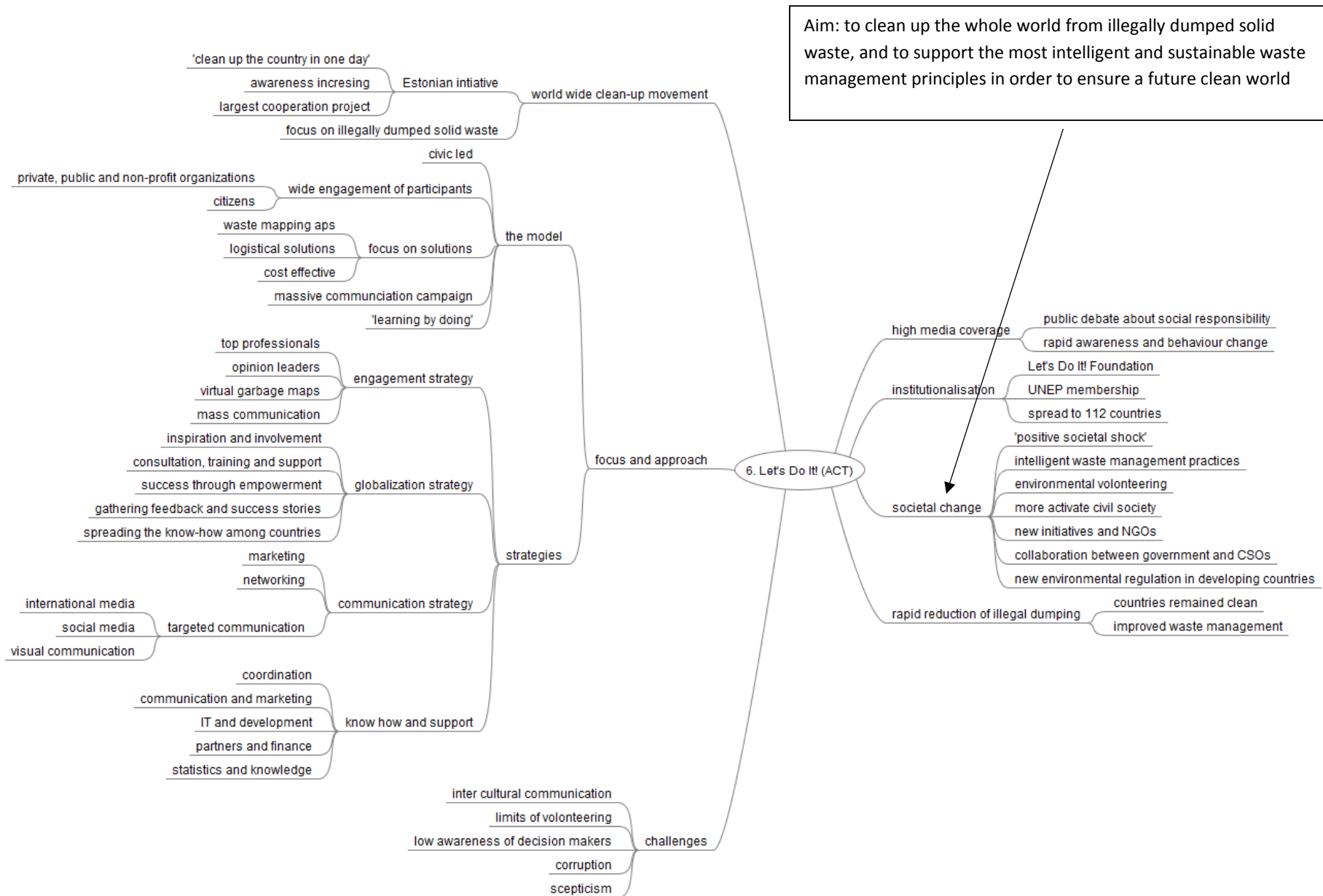


Map 5: EARTHWAKE

Aim: to develop recommendations to harness the appeal of popular strands of TV such, such as drama, wildlife programmes and sports, to create new awareness and interest in science

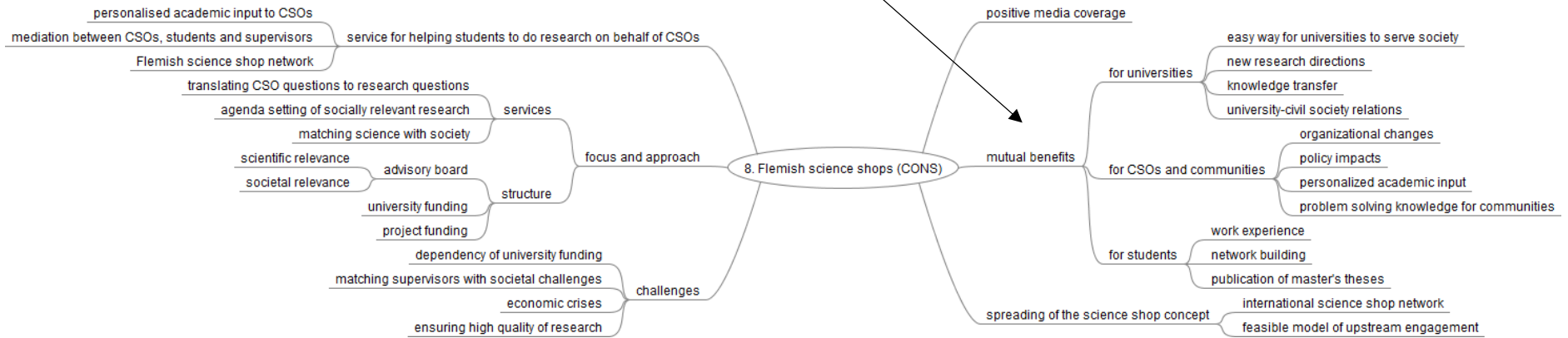


Map 6: "Let's Do It" – Movement and World Clean-up



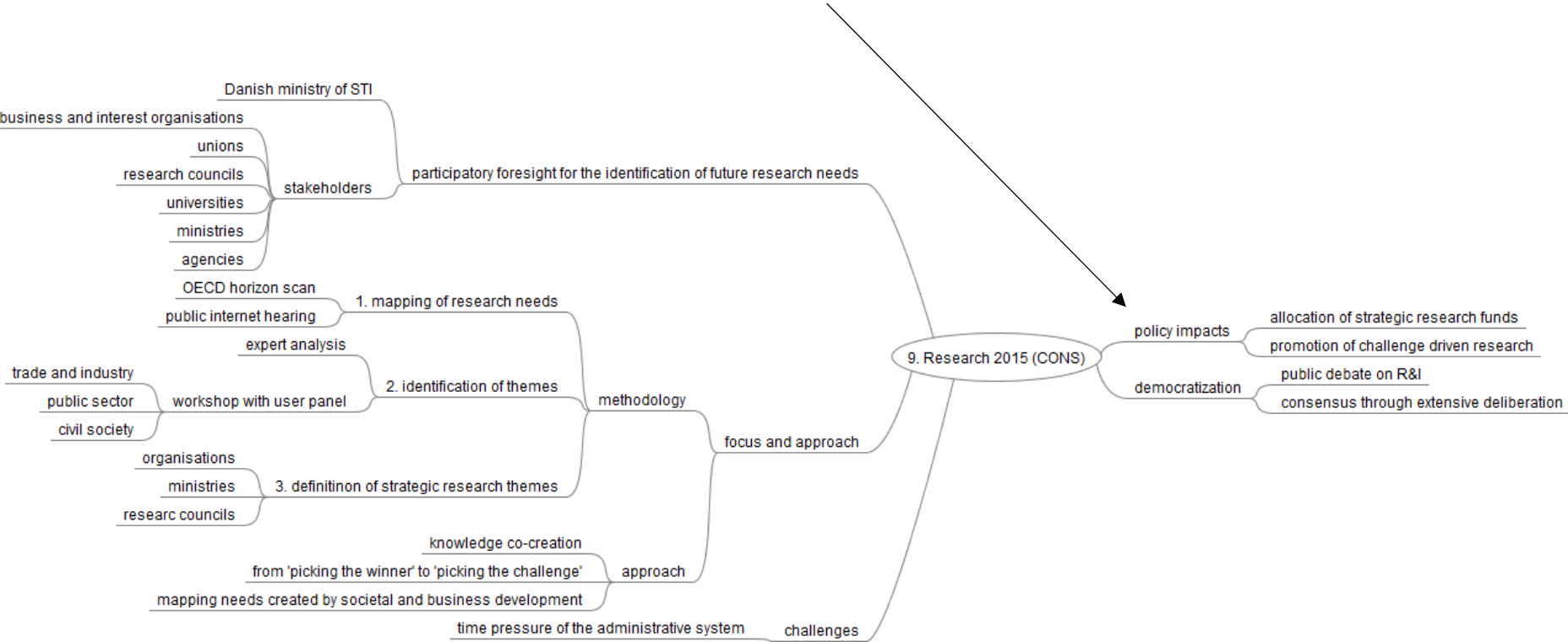
Map 8: Flemish Science Shops

Aim: to assemble questions from civil society organizations (CSOs), translate them into research questions, and act as a mediator between CSOs and academia in order to do research on behalf of CSOs, provide work experience for students, and bring research results under attention of the wider public



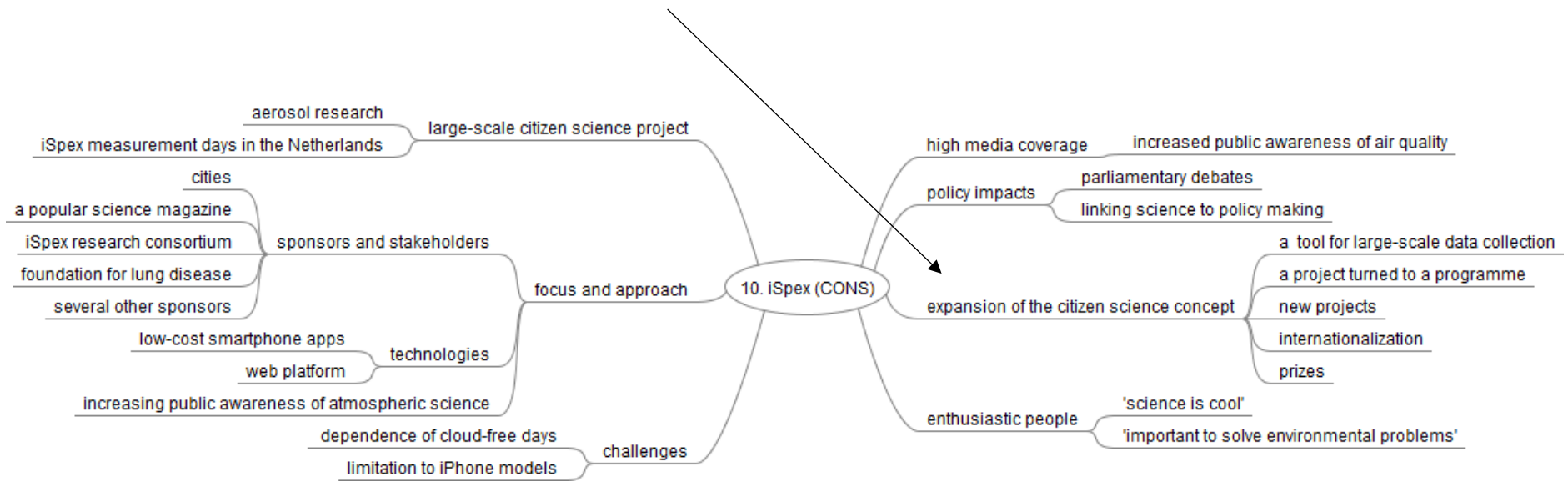
Map 9: RESEARCH 2015

Aim: to identify future research areas in Denmark in order to increase a systematic and robust basis for the prioritisation and allocation of strategic research funds



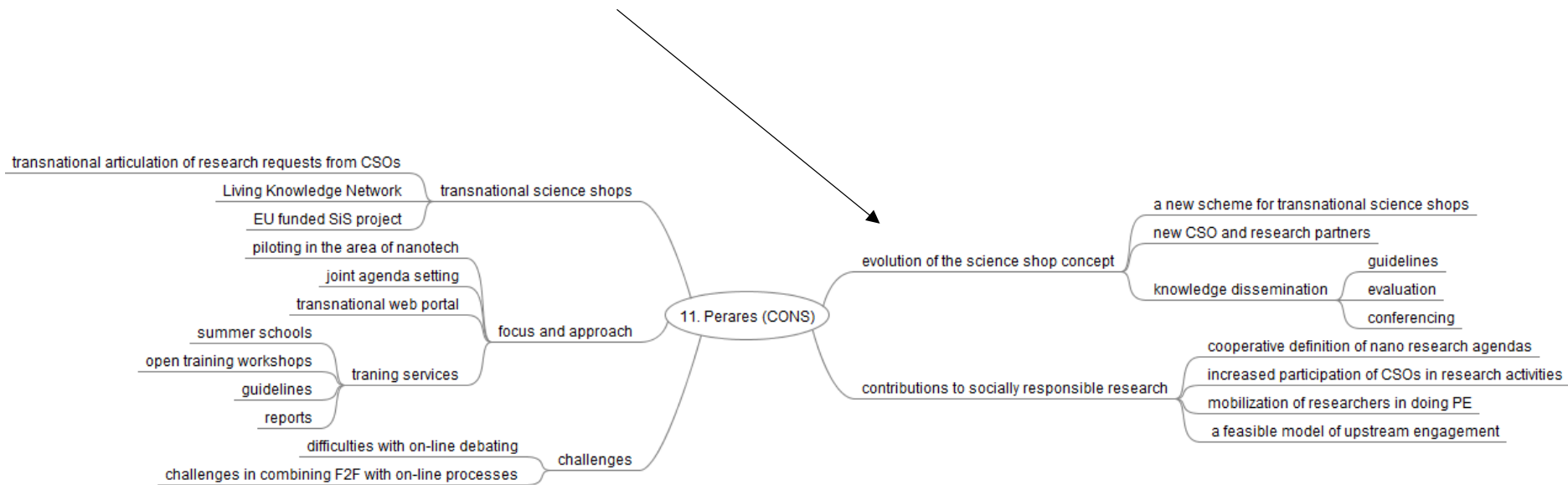
Map 10: iSPEX

Aim: to generate public awareness on atmospheric science and help citizens to contribute to scientific knowledge by going out and performing formalised measurements with their smartphones



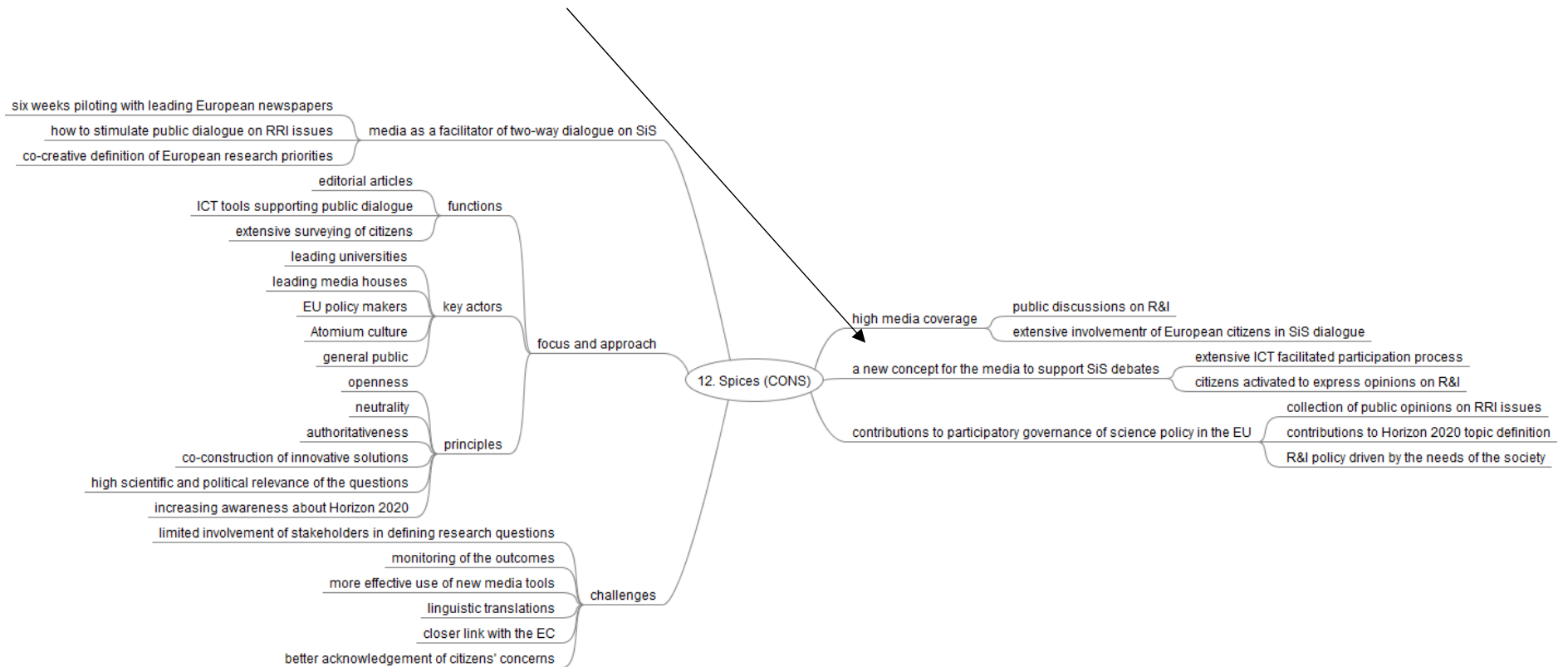
Map 11: PERARES – Public Engagement with Research and Research Engagement with Society

Aim: to strengthen interaction in formulating research agendas between higher education institutes and civil society organisations at the regional and transnational/ European level



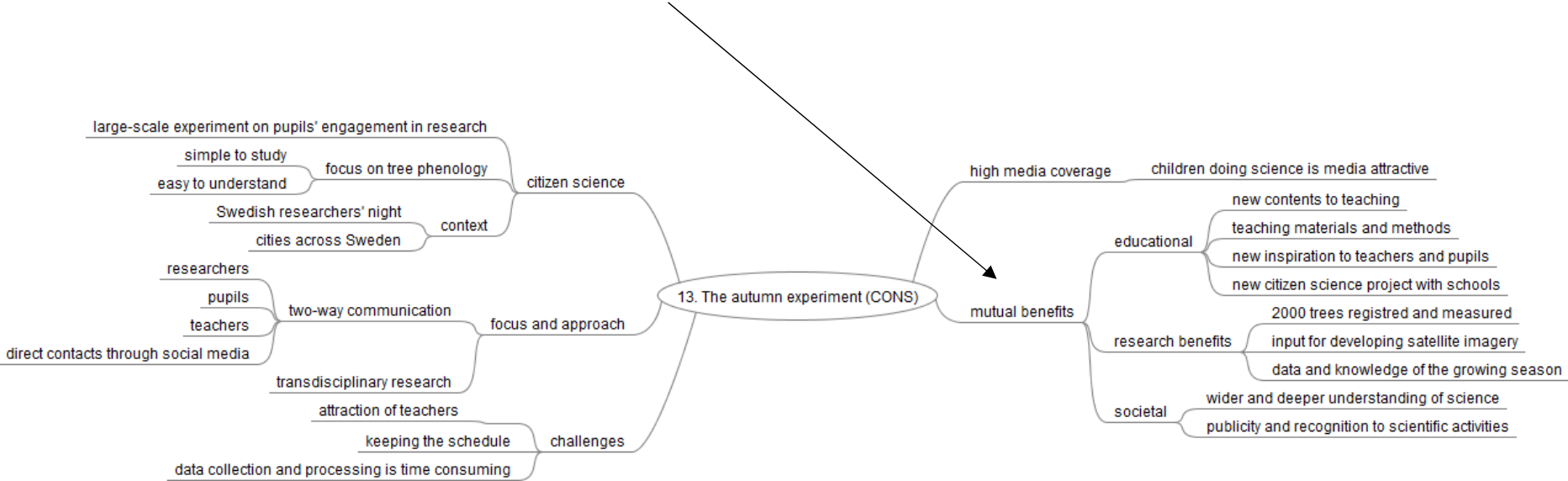
Map 12: SpICES – Special initiative for Citizen Engagement in Science

Aim: to assess how the media can facilitate a stronger two-way dialogue between science and society in order to construct a participatory way of developing science policy at the EU level



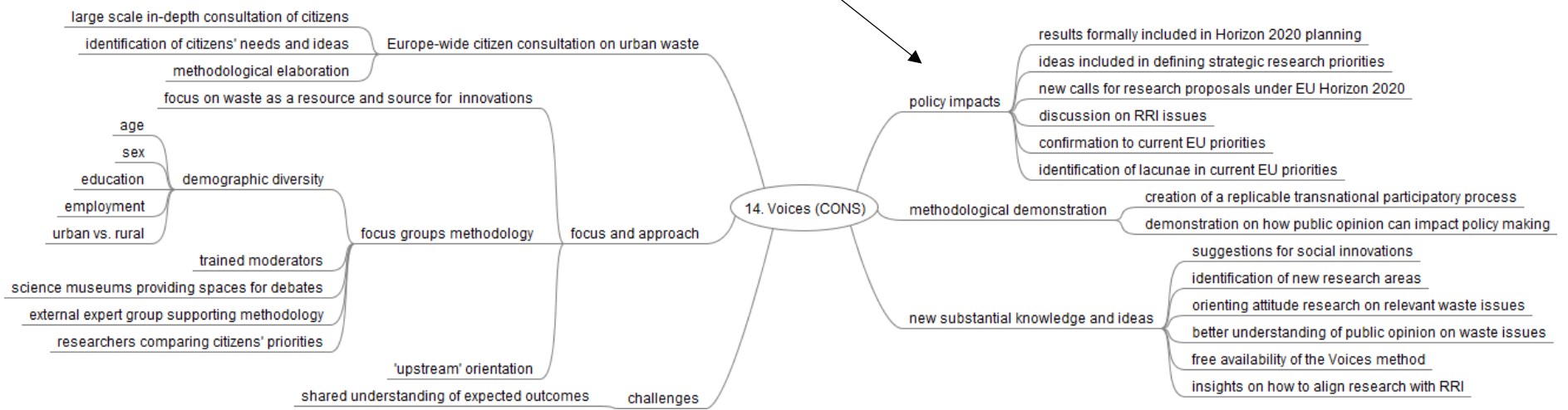
Map 13: The Autumn Experiment

Aim: to experiment large-scale citizen science by engaging pupils to gather observation data on autumn leaves, to provide researchers with more data, pupils with experience of research, teachers with new teaching materials and society with better awareness of relevance of science in our daily lives



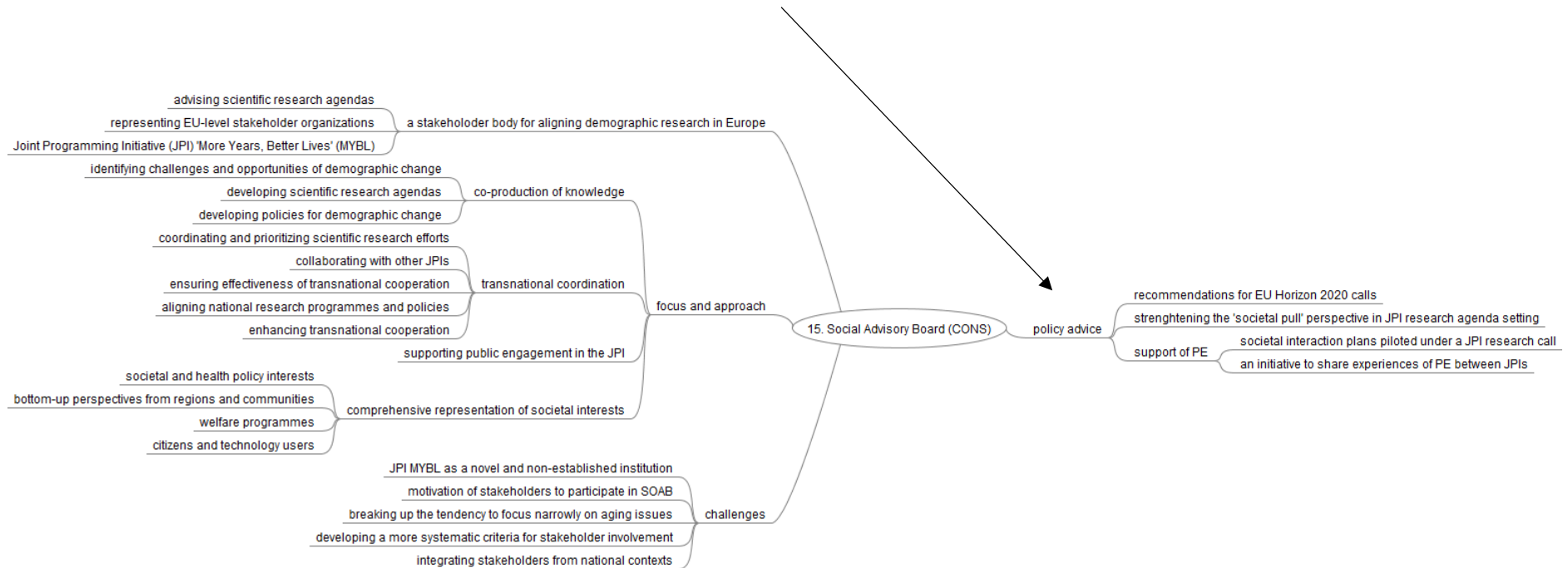
Map 14: VOICES – Views, Opinions and Ideas of Citizens in Europe on Science

Aim: to identify citizens' ideas, preferences, values and expectation with regard to research priorities for the theme 'Urban waste and innovation', and to yield methodological insights about citizen participation in EU research agenda setting



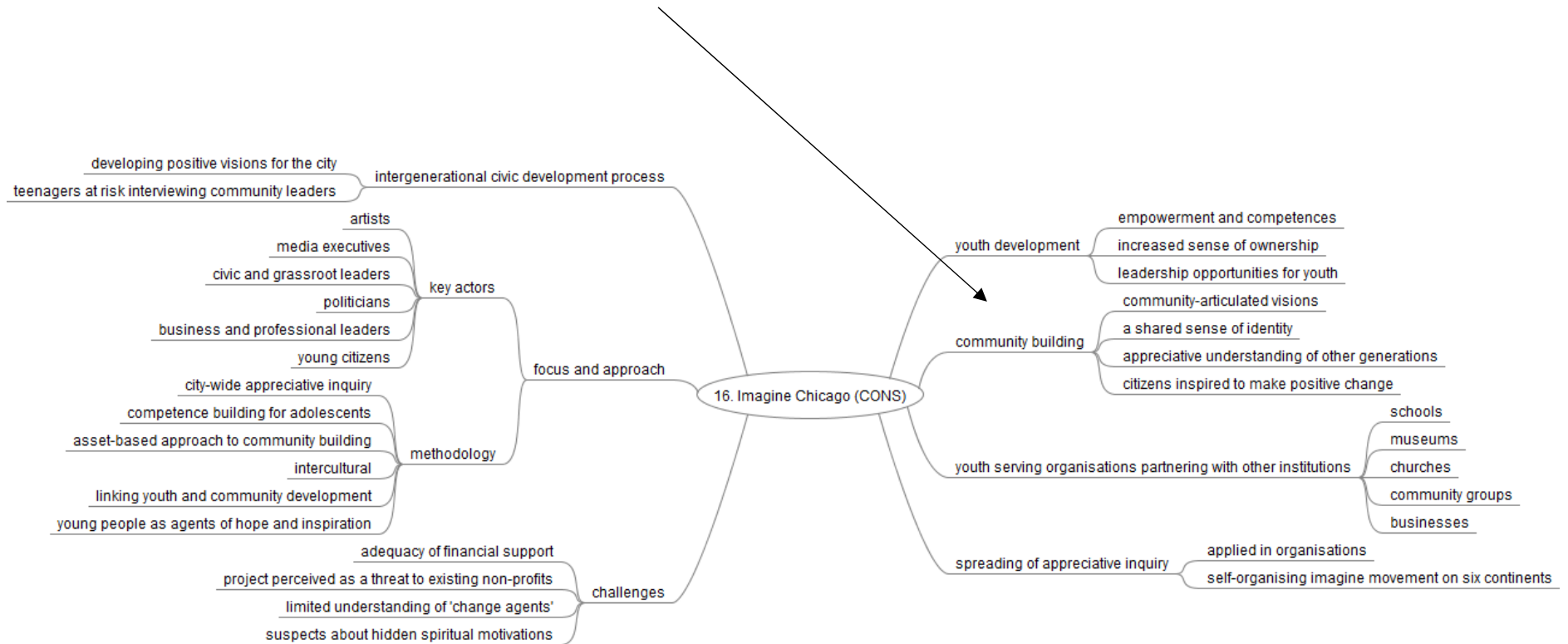
Map 15: Social Advisory Board

Aim: to contribute to the formulation of a scientific research agenda addressing the challenge of demographic change in Europe, by providing a 'societal pull' perspective balancing the 'scientific push' perspective in the context of the Joint Programming Initiative (JPI) on demographic research



Map 16: Imagine Chicago

Aim: to cultivate hope and civic engagement in Chicago and to help realise an economy 'in which nothing and no one was wasted'



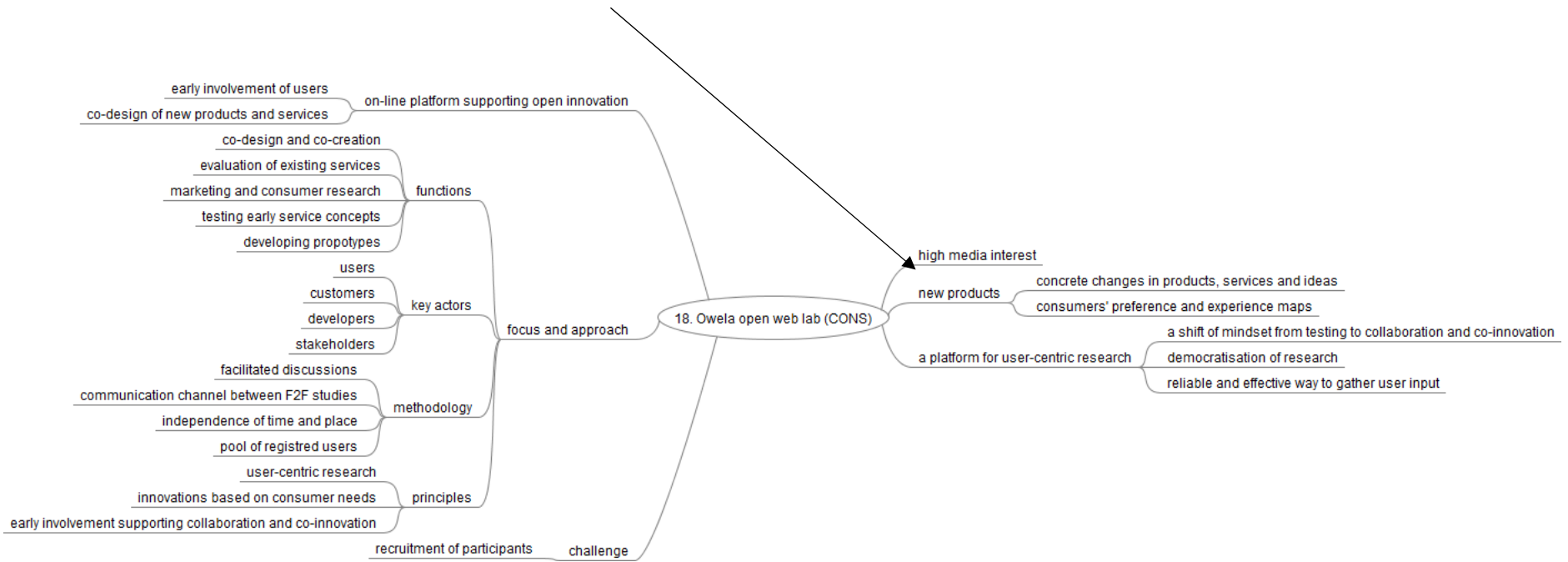
Map 17: Bonus Advocates Network

Aim: to promote and enhance activities of a macro-regional research and development programme BONUS in a national setting by facilitating communication between the national stakeholders and BONUS



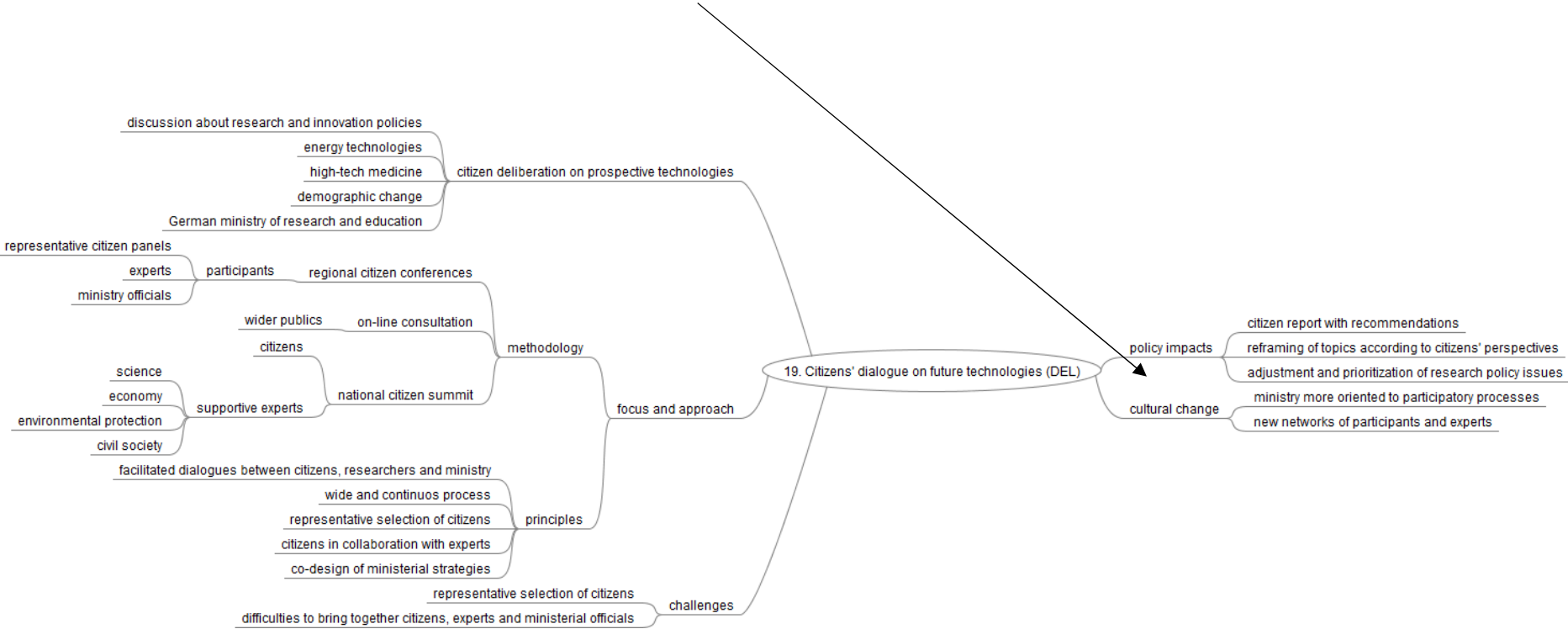
Map 18: Owela Open Web Lab

Aim: to provide an on-line platform for open innovation, where new services and products can be designed and co-created together with users, developers and stakeholders



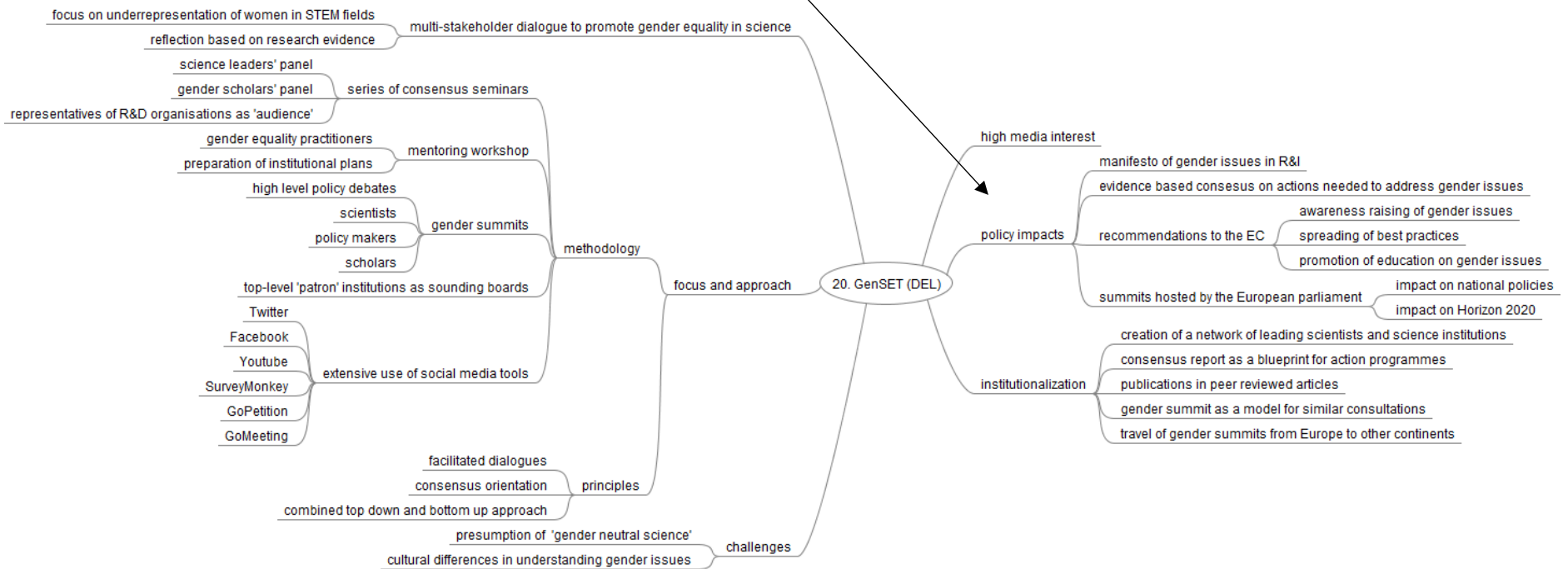
Map 19: Citizens' Dialogue on Future Technologies

Aim: to initiate a wide and continuous deliberation with the public about prospective challenges in relation to technology development and research and innovation policies



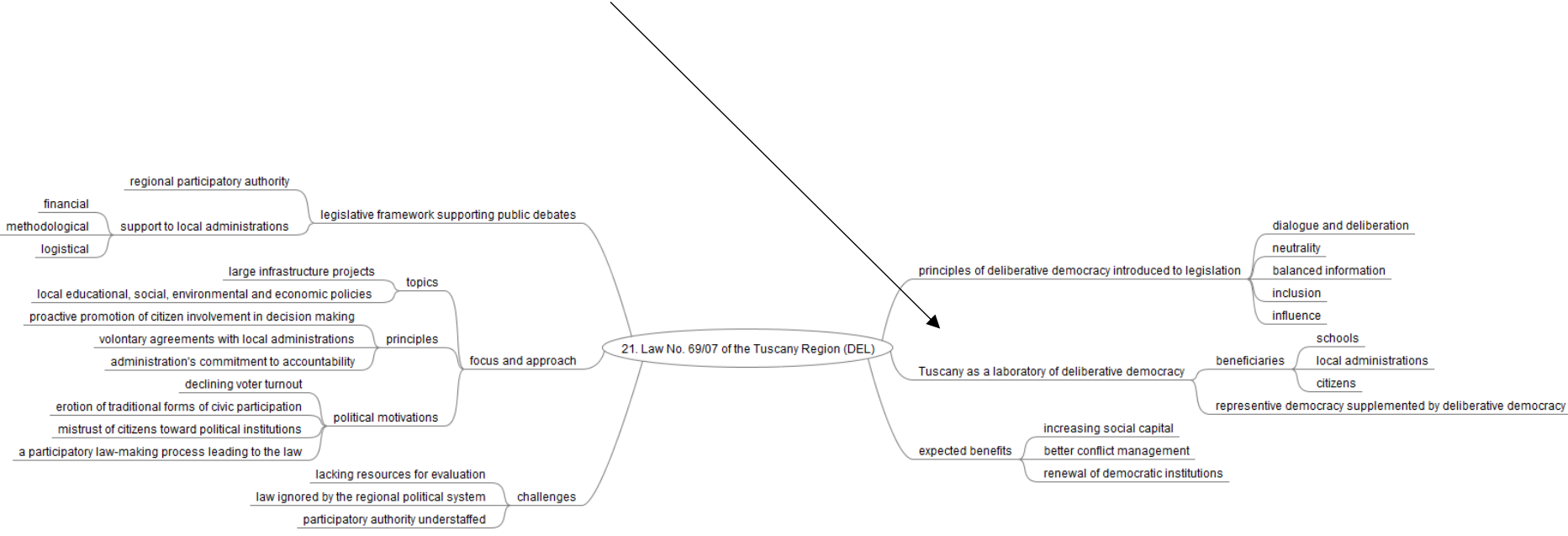
Map 20: GenSET

Aim: to raise awareness of gender issues in science, develop multi-stakeholder dialogue, improve gender equality policies and promote knowledge how institutions can address gender issues



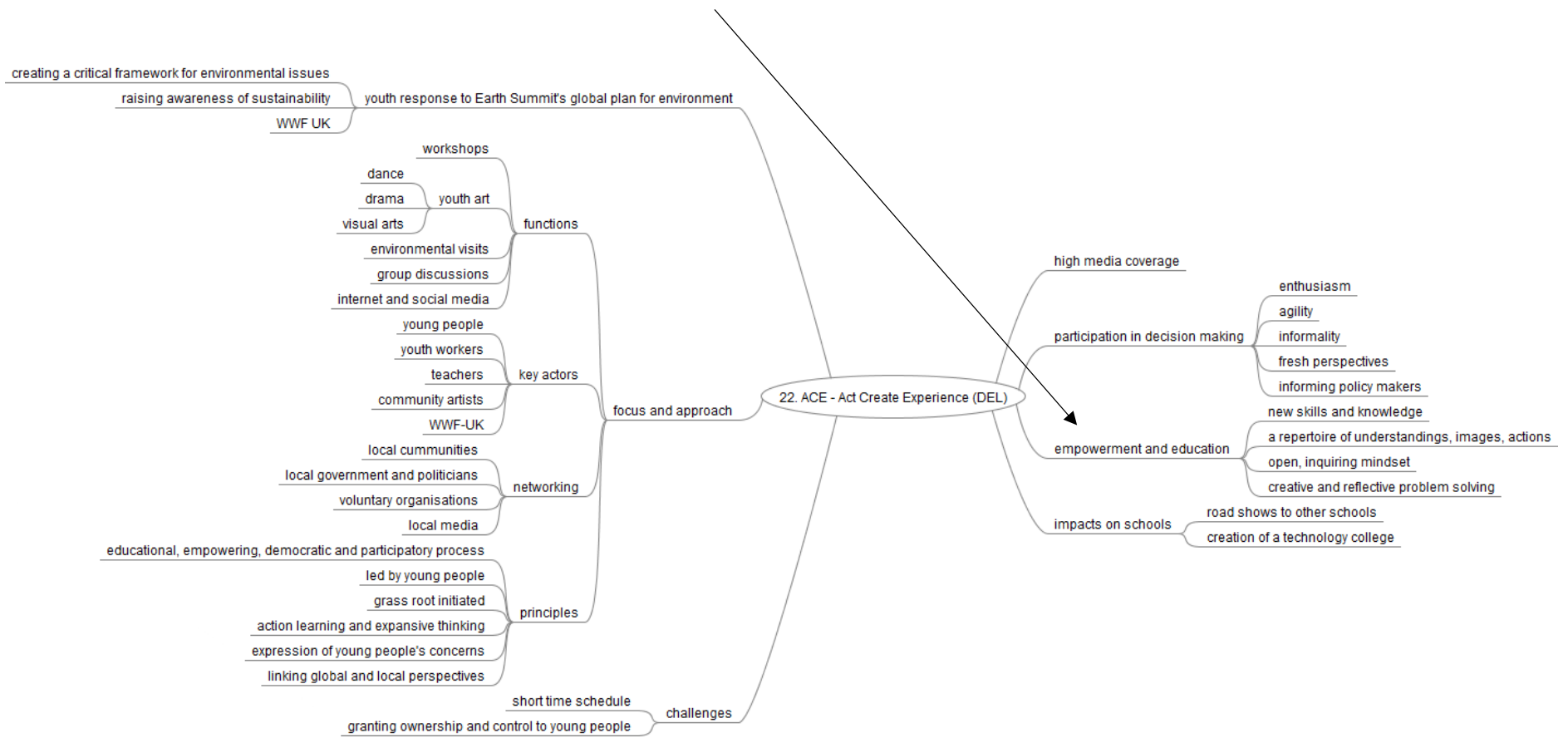
Map 21: The creation and composition on Law No. 69/07 of the Tuscany Region

Aim: to promote proactively citizen involvement as an ordinary form of local and regional administration and government



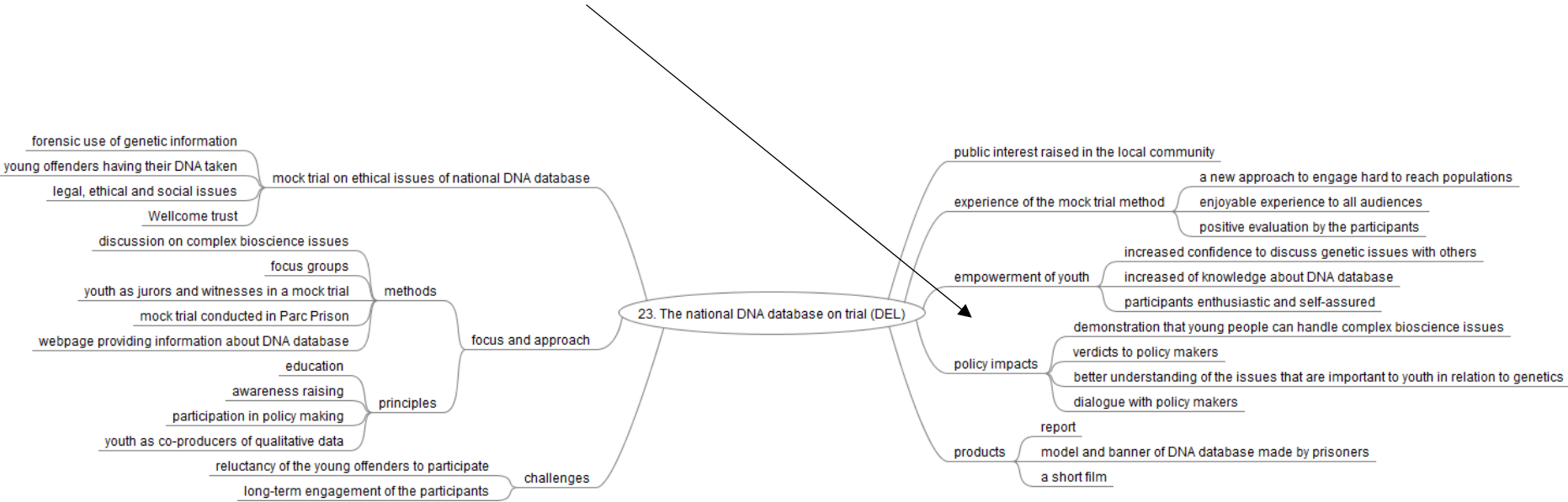
Map 22: ACE - Act Create Experience

Aim: to create opportunities for young people to develop skills in environmental thinking and communication, to encounter new experiences that challenge, stretch and stimulate, and to participate in decision-making processes.



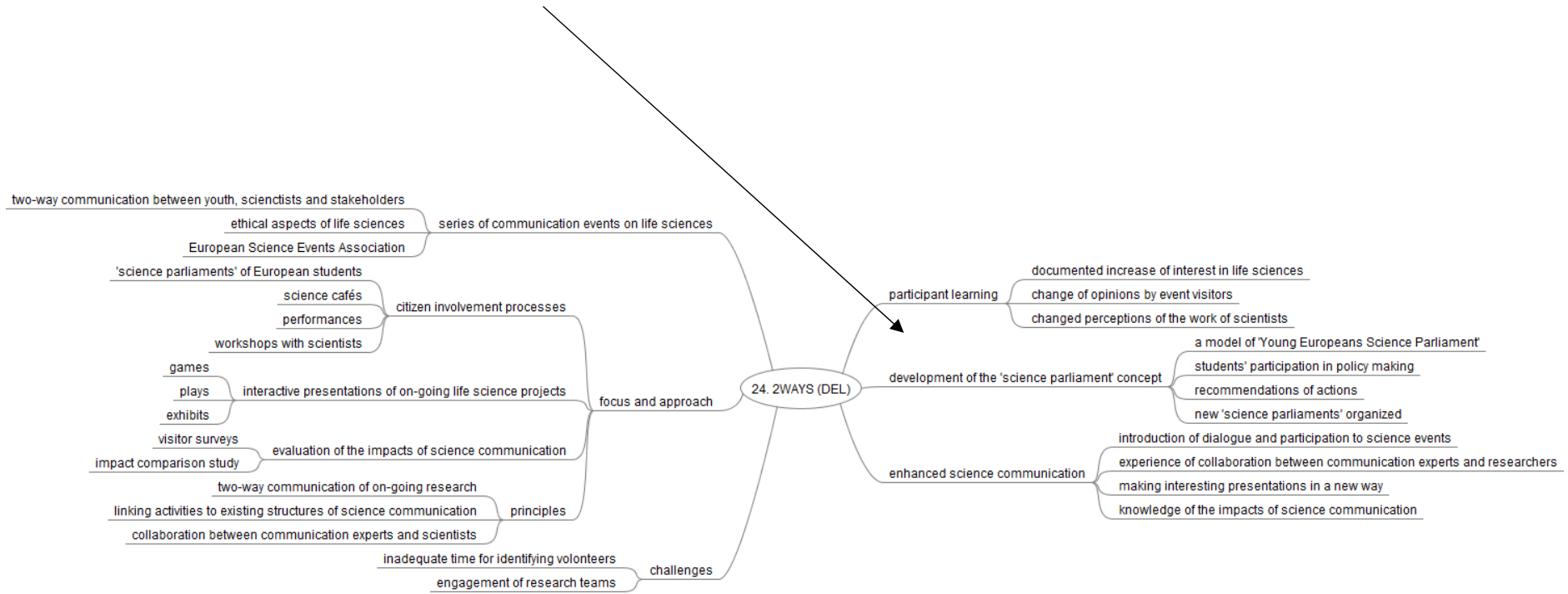
Map 23: The National DNA Database on Trial

Aim: to support education, awareness raising and public participation in policy making by allowing some young people in South Wales to engage with complex bioscience issue (genetics) over an extended period of time through a mock trial process



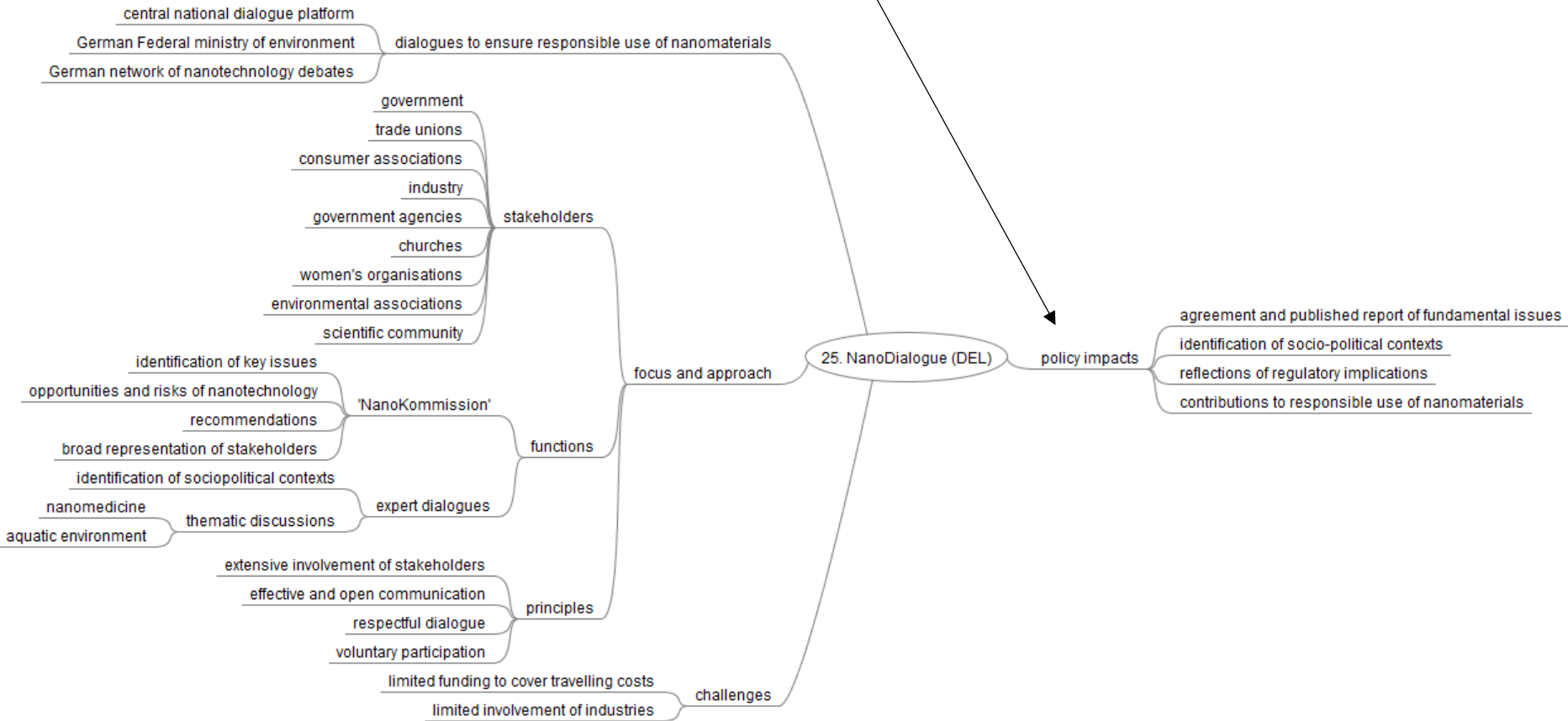
Map 24: 2WAYS

Aim: to increase awareness and knowledge about European life science research, and involve European citizens, especially youngsters, in an intensive two-way dialogue with science experts and other stakeholders



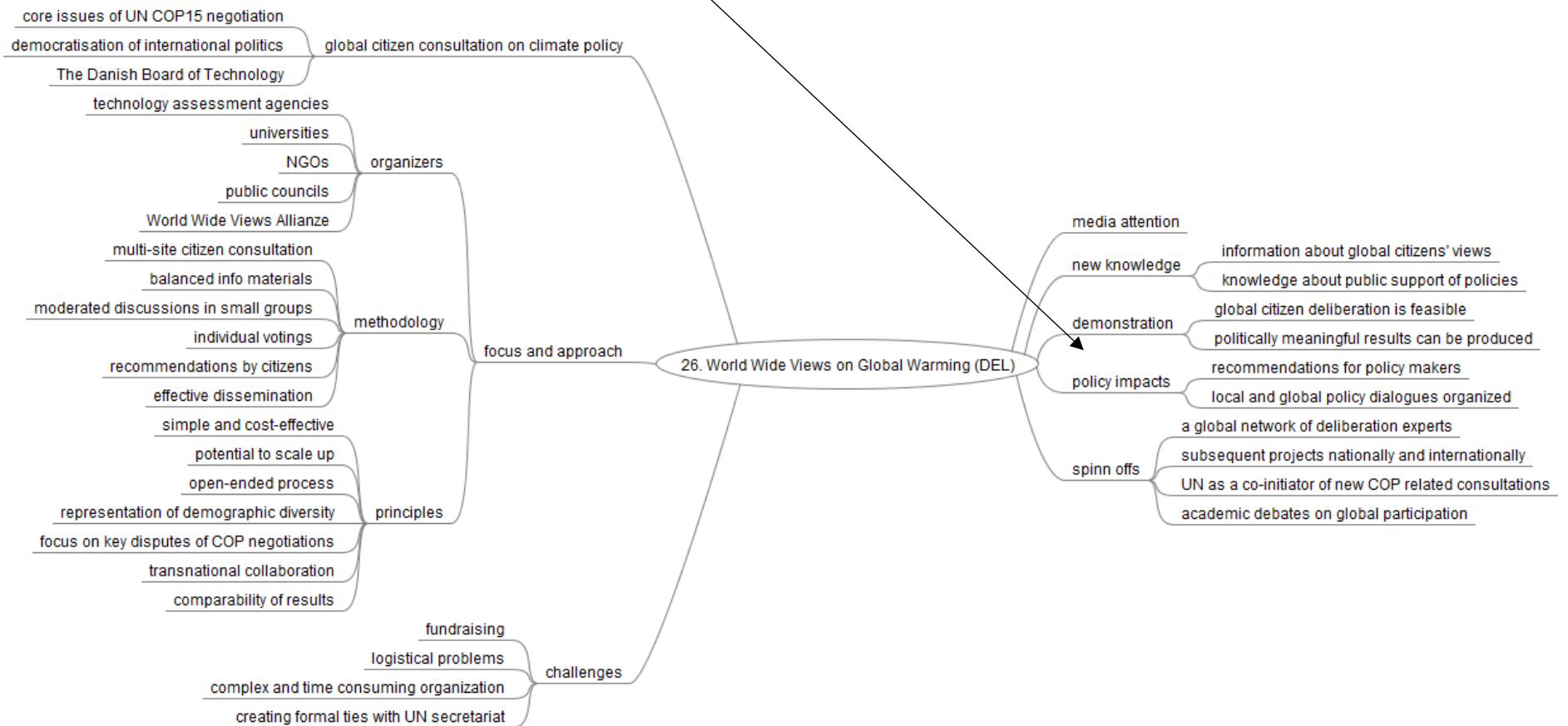
Map 25: NanoDialogue

Aim: to foster exchange among stakeholders in society on the opportunities and risks presented by nanotechnologies and in doing so help to ensure responsible and sustainable use of nanomaterials



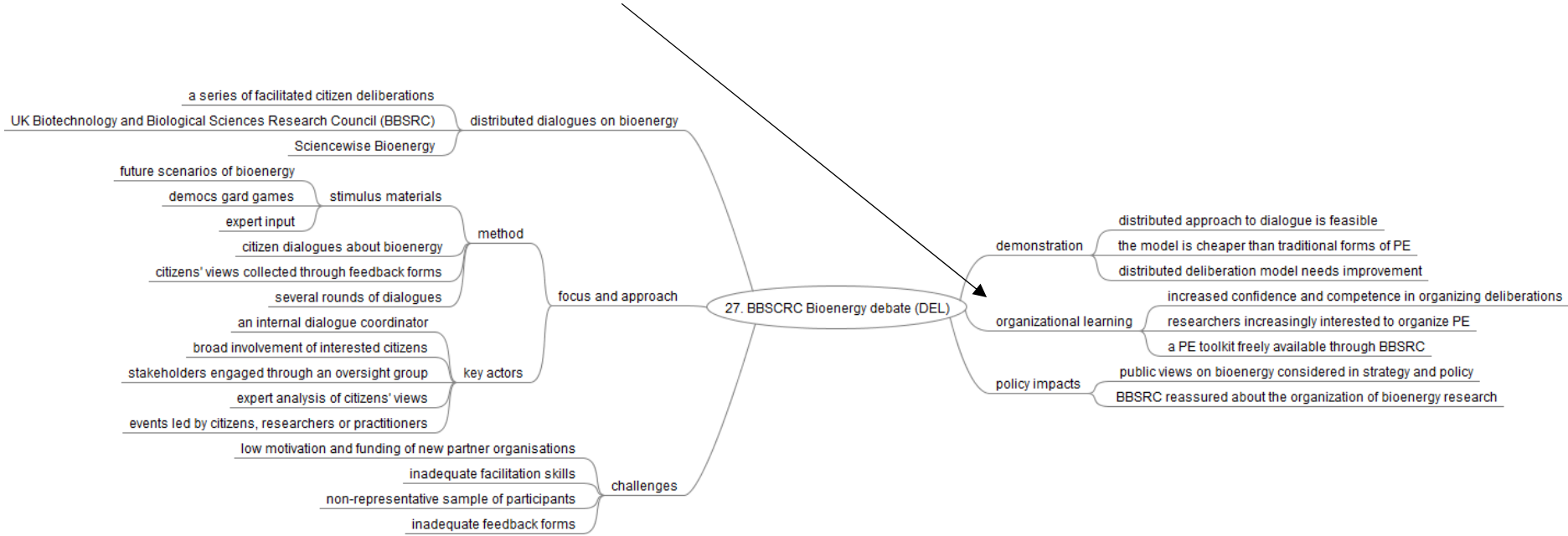
Map 26: World Wide Views on Global Warming

Aim: to give citizens an opportunity to express their views on some of the key issues negotiated at COP15 and engage policy makers in a dialogue about citizens' views



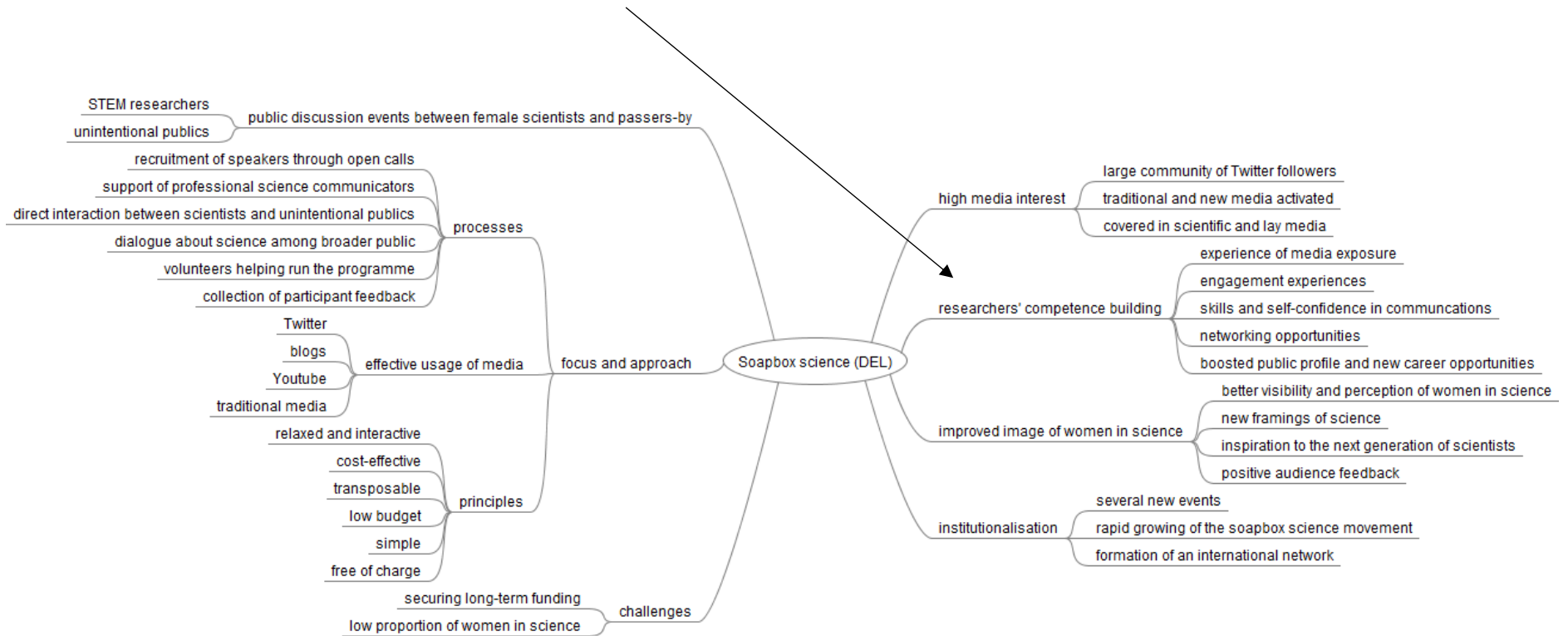
Map 27: BBSRC Bioenergy Dialogue

Aim: to explore the public views on bioenergy, consider those views in the strategy and policy development in bioenergy, and pilot a new distributed approach to public dialogue



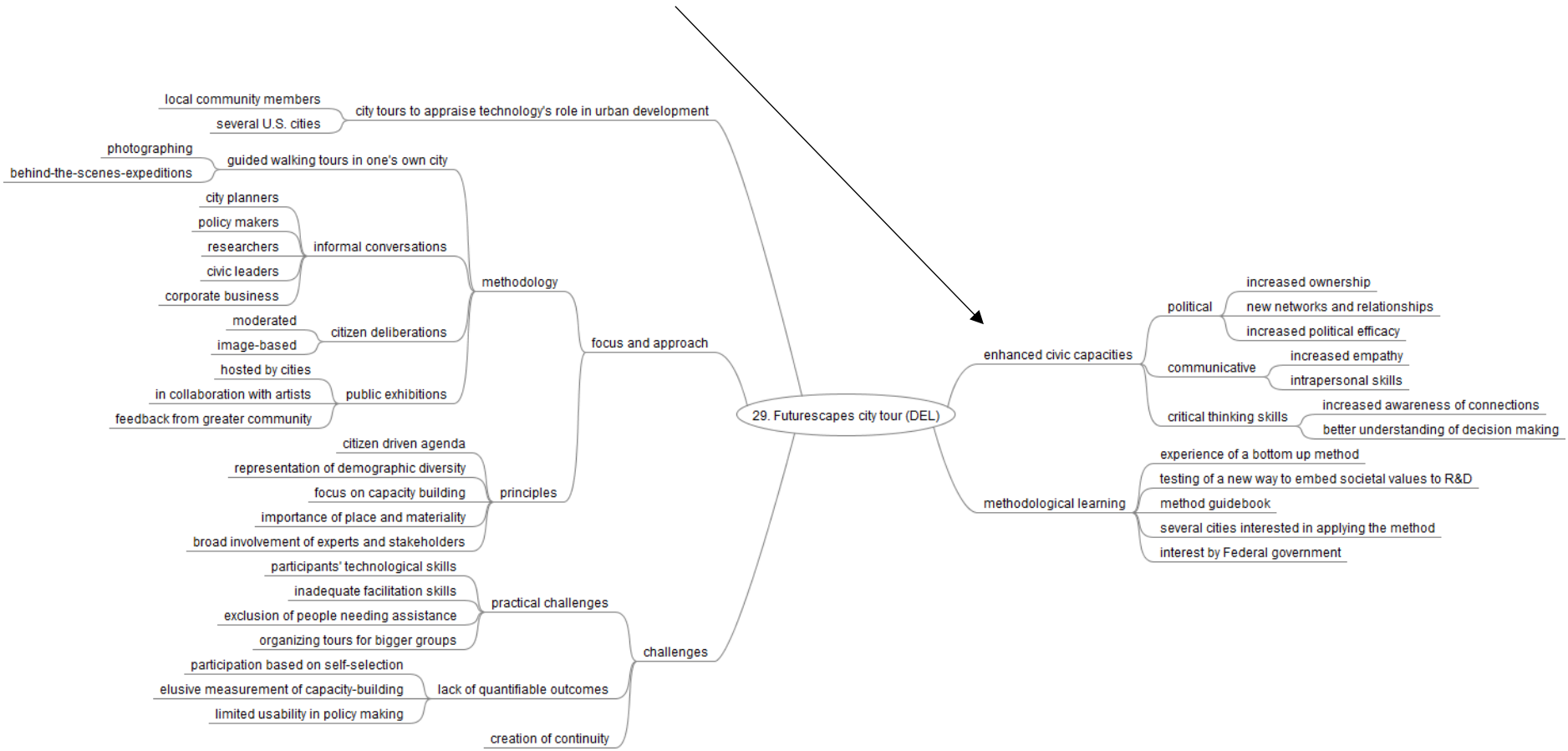
Map 28: Soapbox Science

Aim: to engage citizens across the whole spectrum of society, to improve the visibility and perception of women in science, and to establish Soapbox as a leading UK voice for women in science



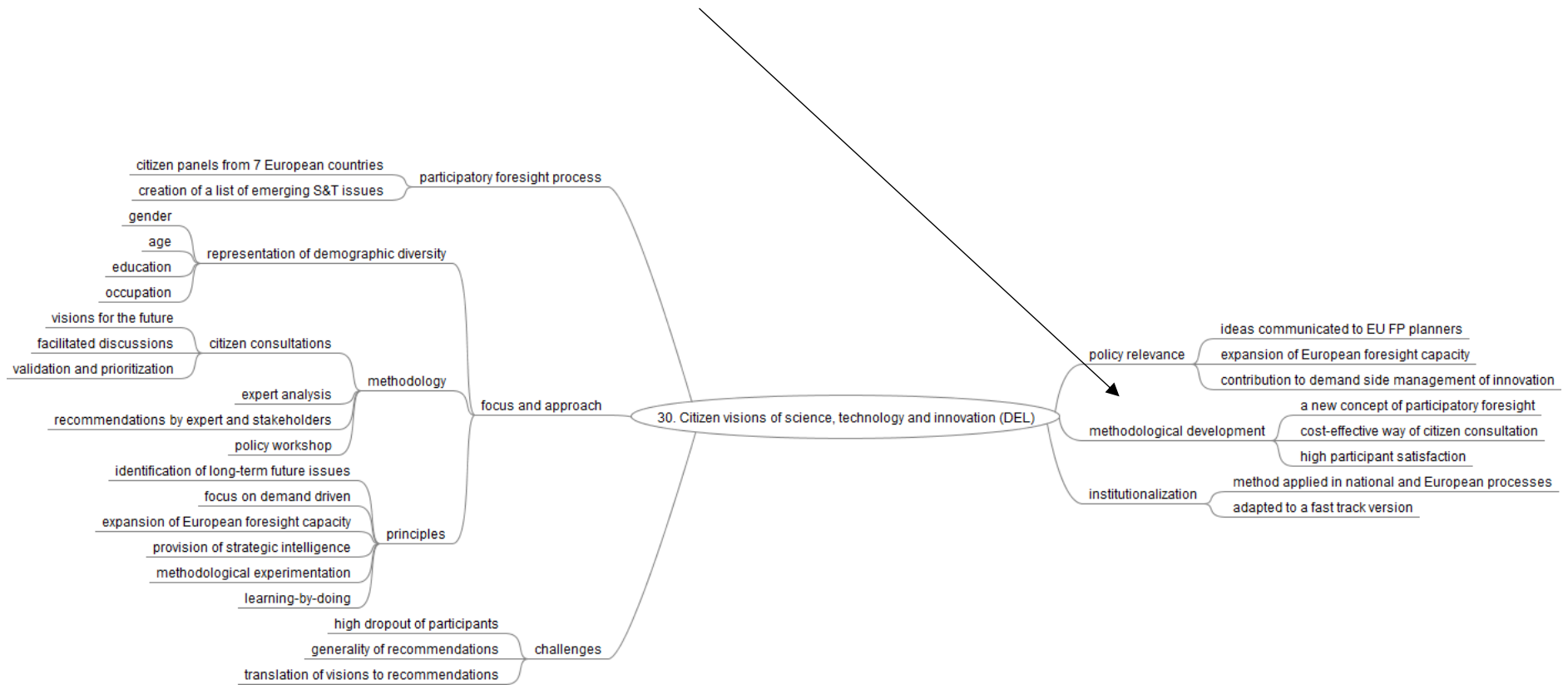
Map 29: Futurescape City Tour

Aim: to engage local community members about technology's impact on their cities in order to embed citizens' values into local systems of innovation



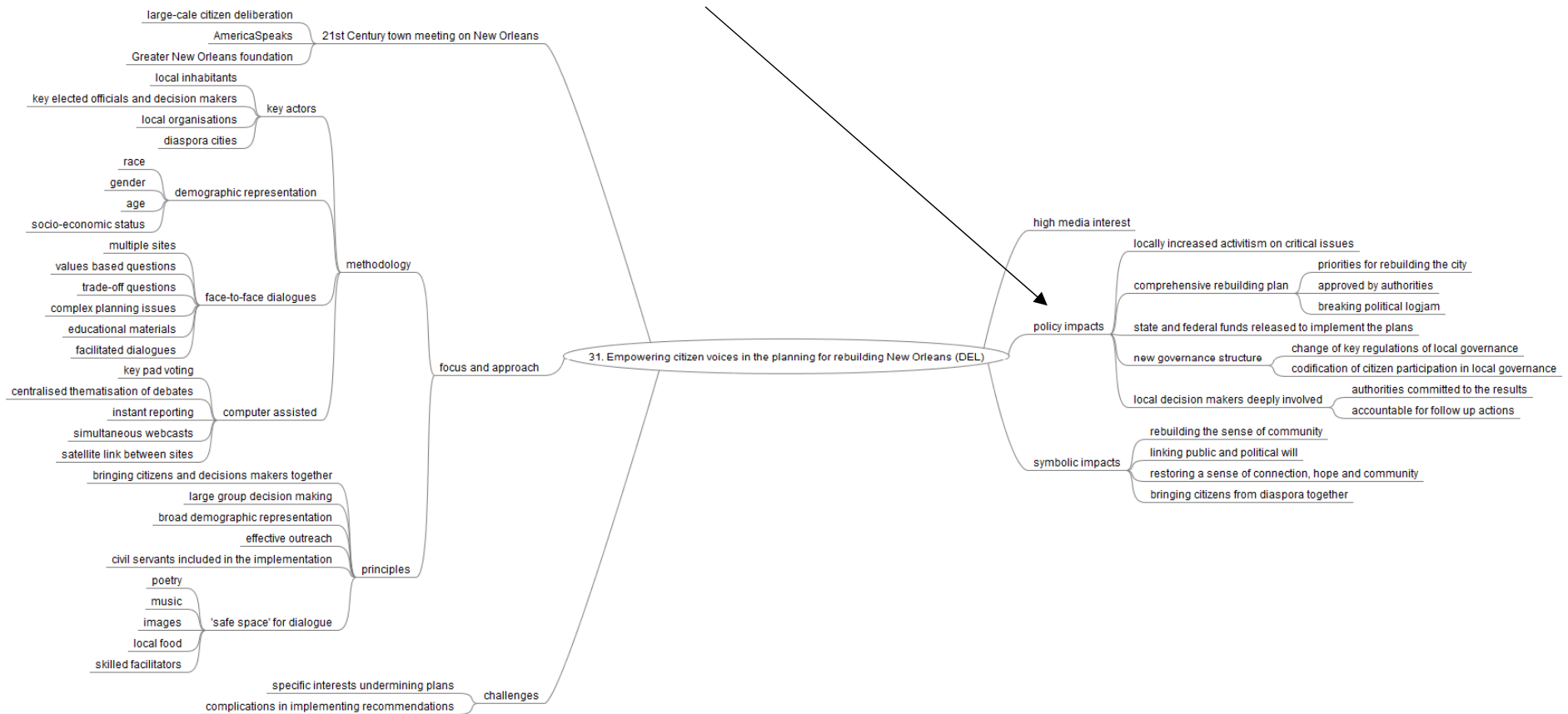
Map 30: Citizen Visions of Science, Technology and Innovation

Aim: to produce a list of new and emerging issues for European S&T, produce a set of policy options of relevance to future European framework programmes, and base these products upon a novel and cost-effective process of citizen participation in seven member states, supported by the analytical capacity of experts and stake-holders



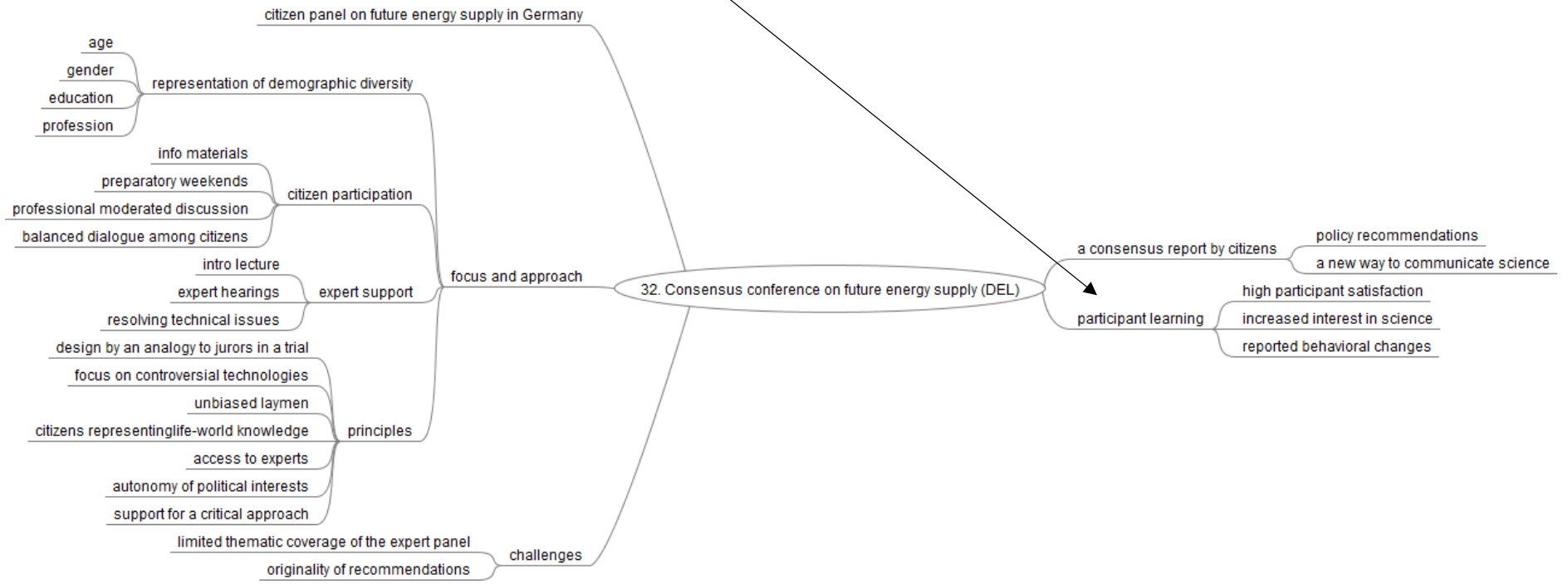
Map 31: Empowering Citizen Voices in the Planning for Rebuilding New Orleans

Aim: to bring citizens and decision makers together in a deliberative process, in order to devise an actionable plan for rebuilding New Orleans, and to rebuild the sense of community and institutionalise a new level of government accountability and active citizen participation in the operations of New Orleans



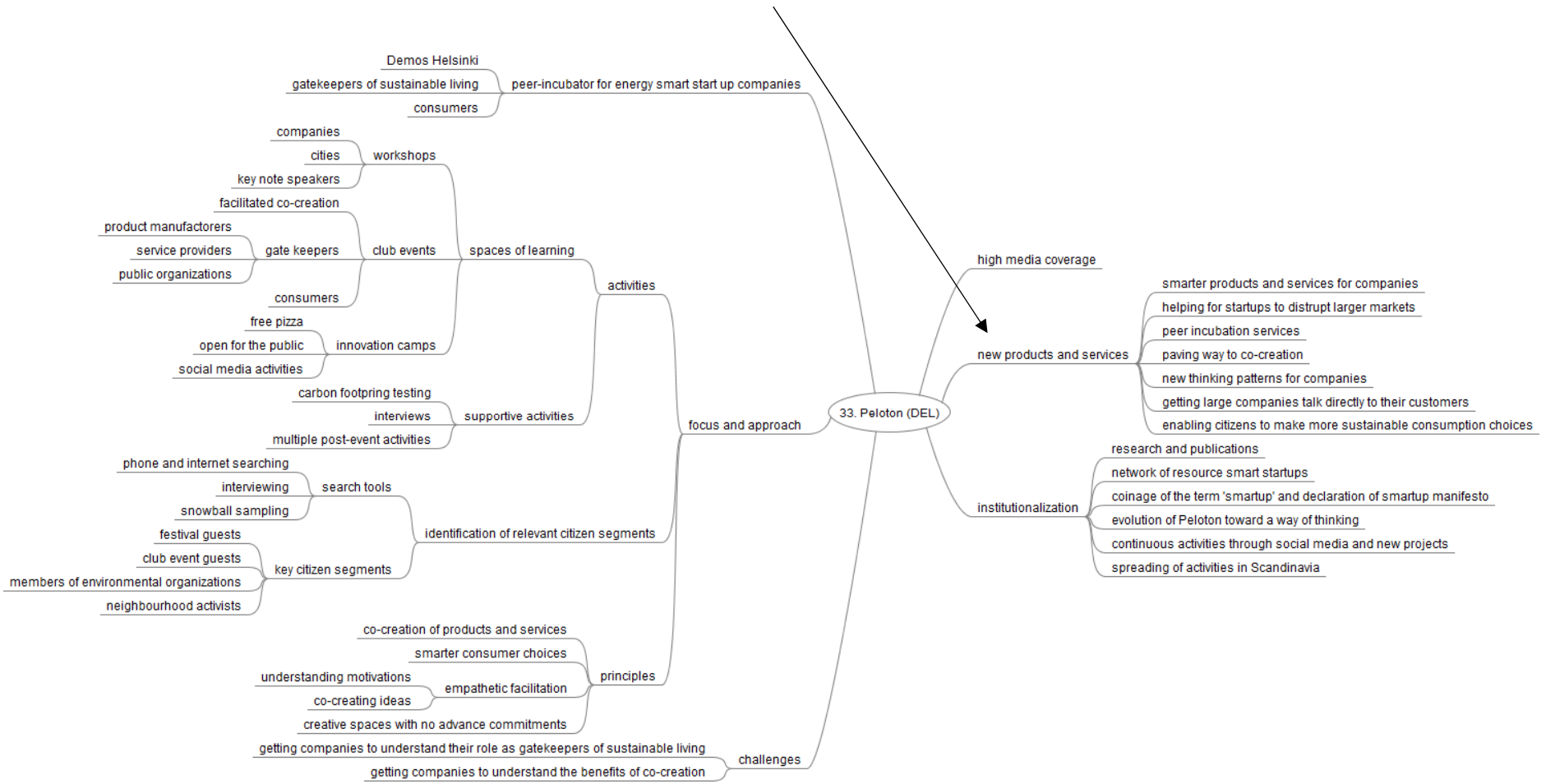
Map 32: Consensus Conference on Future Energy Supply

Aim: to formulate recommendations for future energy supply in Germany through a balanced dialogue between citizens



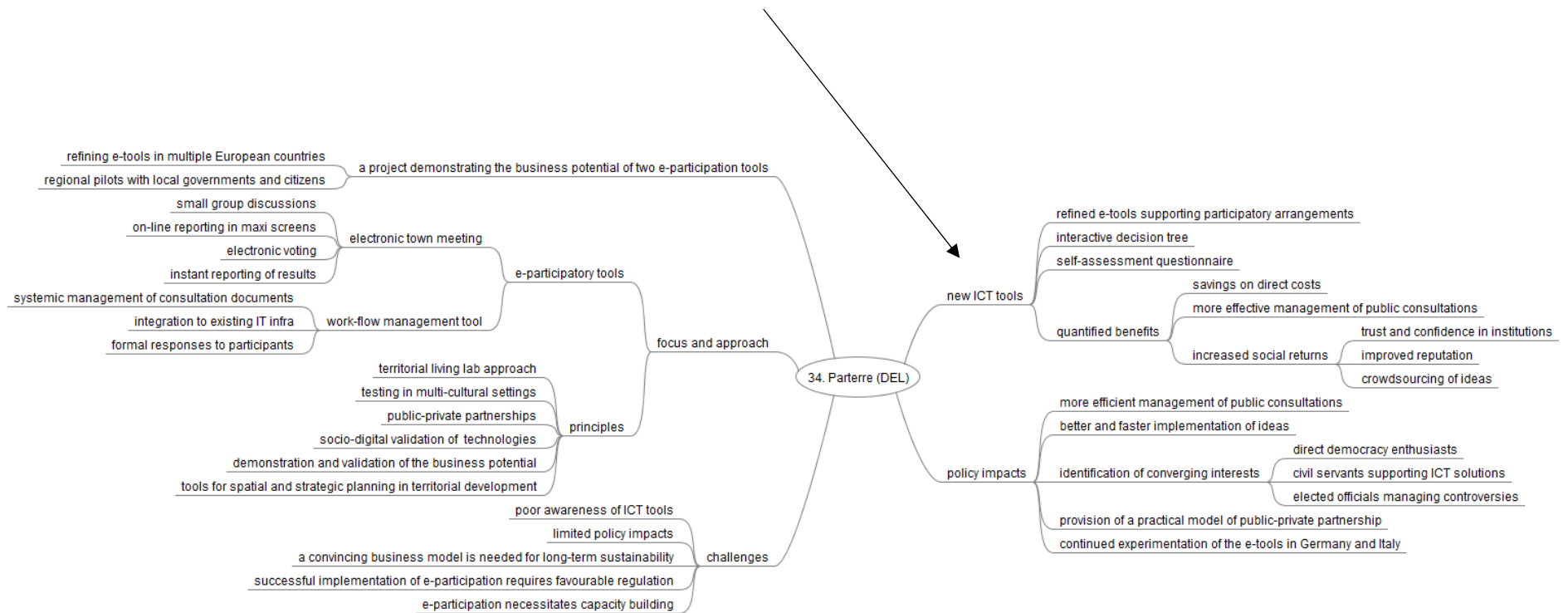
Map 33: Peloton

Aim: to implement innovative ways for citizens to participate in the co-creation of new products and services, in order to enable citizens to make more sustainable consumption choices



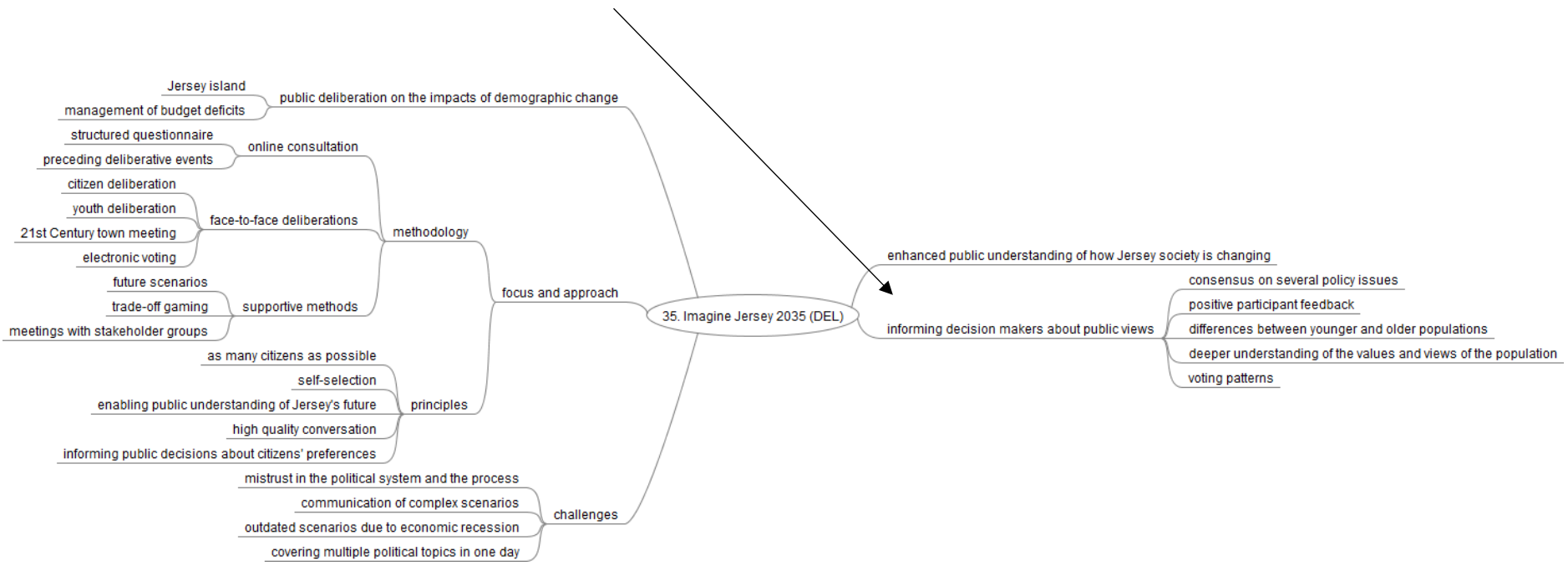
Map 34: PARTERRE

Aim: to demonstrate and validate the business potential of two novel eParticipatory tools for spatial and strategic planning in territorial development at the European level



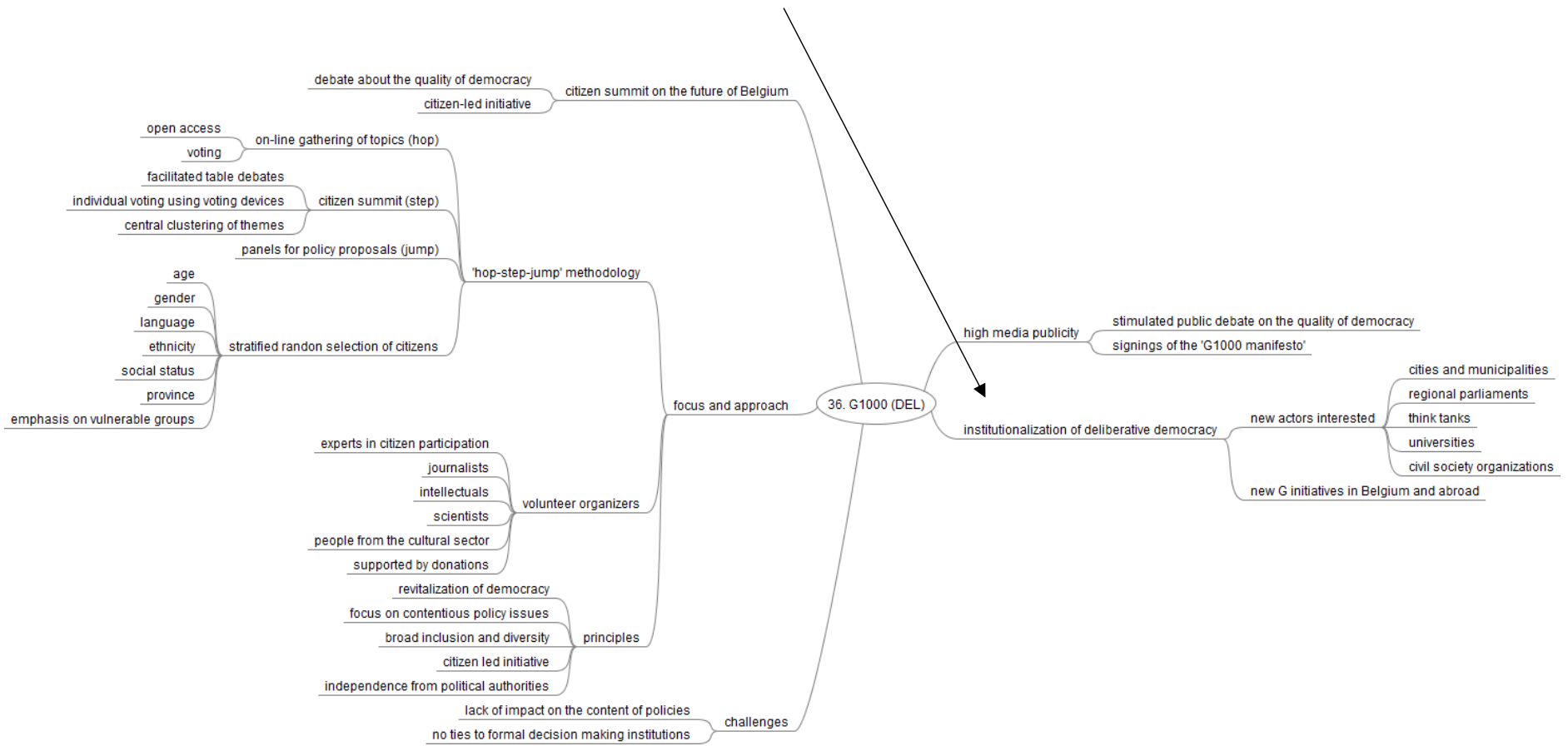
Map 35: Imagine Jersey 2035

Aim: to inform and engage the public in a deliberative process on the struggles in Jersey regarding current and forthcoming impacts of demographic change



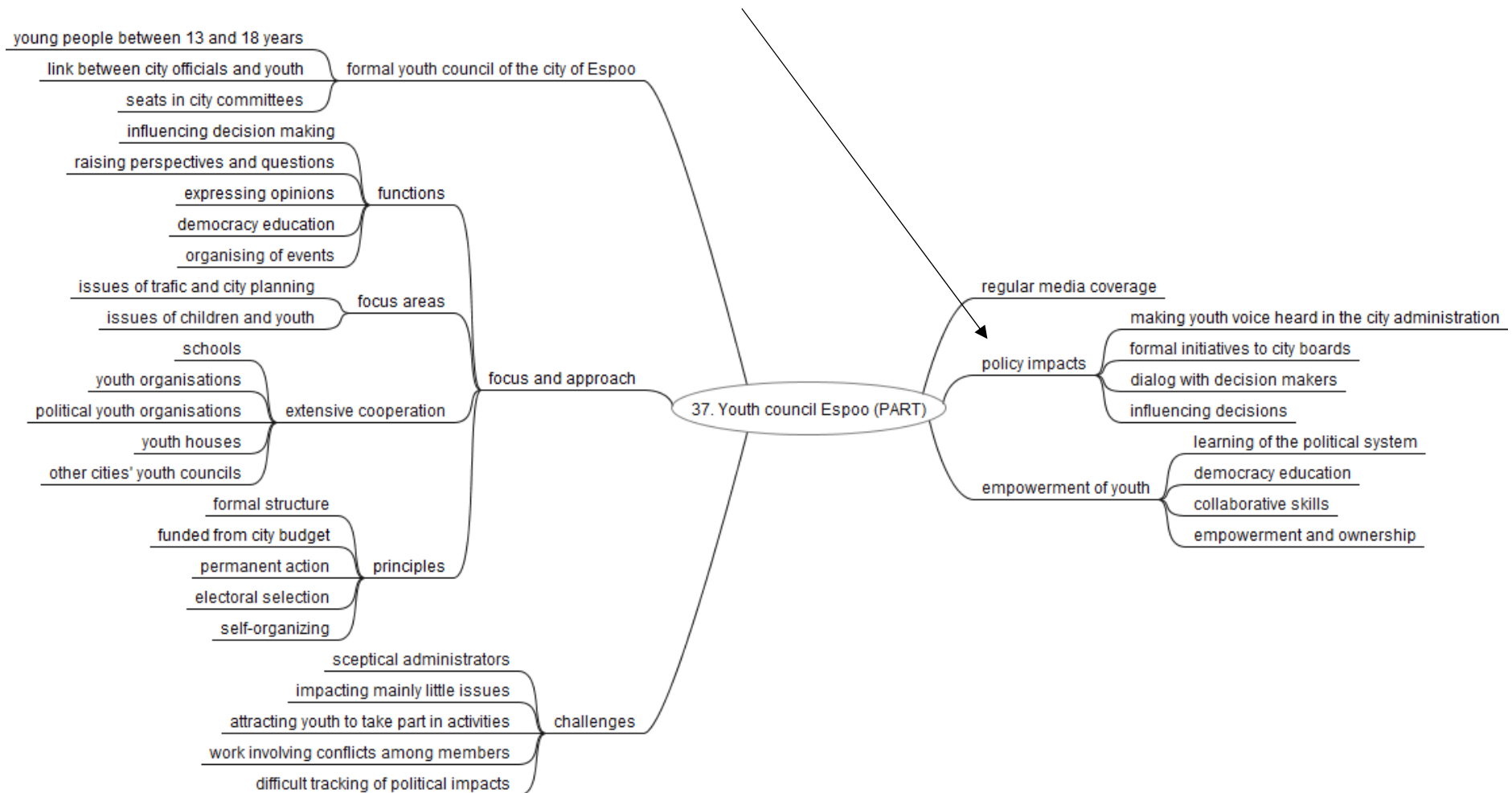
Map 36: G1000

Aim: to be a citizen initiative that is capable of innovating democracy by gathering together ordinary citizens in a setting, which is conducive to open and un-coercive deliberation on contentious political issues, and to let citizens experience democracy and try to build bridges over highly polarised issues



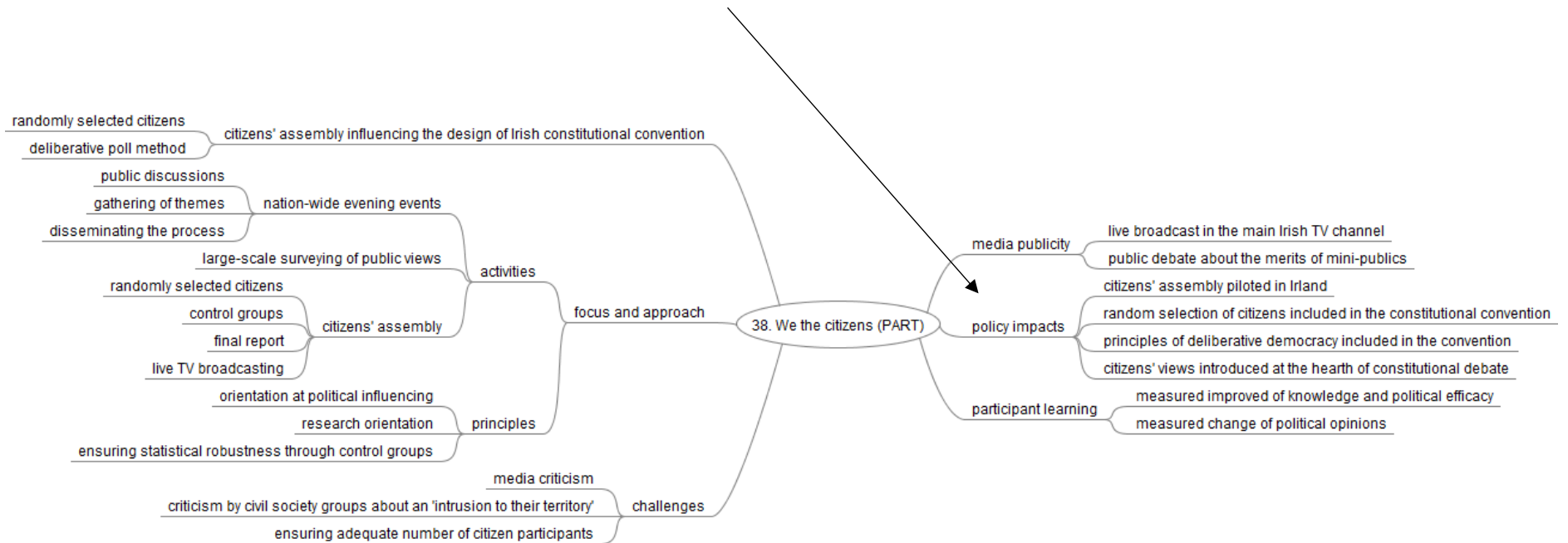
Map 37: Youth Council Espoo

Aim: to influence decisions that concern children and young people but also those issues that are important to young people as municipal citizens



Map 38: We the Citizens

Aim: to influence discussions among senior government politicians about the design and operation of a planned Irish constitutional convention and to inform public debate about the merits of mini-publics (deliberation) as a means of engaging ordinary citizens in debates over constitutional reform in Ireland



APPENDIX 2. Patterns of communication and participant selection

Title	Selection methods	Type of communication	Type of media				No of different media	Level of communication	Direction of communication	Evidence of formalization		Transdisciplinarity
			Internet	Translated	Printed	Other						
PRIMAS – Promoting inquiry in mathematics and science across Europe	uncontrolled	F2F, media	X				2	two way	S2P	Yes	Report, plan	No
Science Municipalities	self-selection	F2F	N/A	N/A	N/A		N/A	two way	S2P	Yes	Report, survey results	N/A
Nanodialogue Project	uncontrolled	F2F, media	N/A	N/A	N/A		4	two way	S2P	Yes	Feedback	Yes
Breaking and Entering – Explore how science and society relate	uncontrolled	F2F, media	X				2	two way	S2P	Yes	Report, survey	Yes
EARTHWAKE	controlled	F2F	N/A	N/A	N/A		N/A	two way	S2P	Yes	Report, recommendations	Yes
“Let’s Do It” – Movement and World Clean-up	uncontrolled	F2F, media	X	X	X		3	two way	P2P	Yes	success stories	No
DEEPEN Project	controlled, uncontrolled	F2F	N/A	N/A	N/A		N/A	two way	S2P	N/A	N/A	Yes
Flemish Science Shops	controlled	F2F	N/A	N/A	N/A		N/A	two way	S2P	Yes	Report	No
RESEARCH 2015	controlled	F2F, media	X				1	two way	S2P	Yes	Recommendations	Yes
iSPEX	controlled	F2F, media	X				1	two way	S2P	Yes	data on measurements	No
PERARES – Public Engagement with Research and Research engagement with Society	uncontrolled	F2F, media	X				1	two way	S2P	Yes	Report	Yes
SpICES – Special initiative for Citizen Engagement in Science	self-selection	F2F, media	X		X		2	two way	S2P	Yes	Survey results	Yes
The Autumn Experiment	self-selection	F2F, media	X		X		2	two way	S2P	Yes	Report	No
VOICES – Views, Opinions and Ideas of Citizens in Europe on Science	controlled	F2F, media			X		2	two way	S2P	Yes	Report	Yes
Social Advisory Board	controlled	F2F					N/A	two way	S2RofP	Yes	Research Agenda	Yes
Imagine Chicago	controlled	F2F, media			X		N/A	two way	P2P	Yes	Survey results	N/A
Bonus Advocates Network	controlled	F2F					N/A	two way	S2RofP	Yes	Research Agenda	Yes

Title	Selection methods	Type of communication	Type of media				No of different media	Level of communication	Direction of communication	Evidence of formalization		Transdisciplinarity
			Internet	Translated	Printed	Other						
Owela Open Web Lab	uncontrolled	Media	X				2	two way	S2P	Yes	Report	Yes
Citizens' Dialogue on Future Technologies	controlled	F2F, media	X		X	Phone	4	two way	S2P	Yes	Report, recommendations	Yes
GenSET	controlled	F2F, media	X				2	two way	P2S	Yes	Report	Yes
The creation and composition on Law No. 69/07 of the Tuscany Region	uncontrolled	F2F, media	X				1	two way	P2S	Yes	Report	Yes
ACE – Act Create Experience	uncontrolled	F2F, media	X	Radio, video	X	Post	6	two way	P2S	Yes	policy	Yes
The National DNA Database on Trial	uncontrolled	F2F, media	X	Movie			2	two way	S2P	Yes	Report	No
2WAYS	uncontrolled	F2F, media	X				1	two way	S2P	Yes	Report, outcomes	Yes
NanoDialogue	controlled	F2F	N/A	N/A	N/A		N/A	two way	S2P	Yes	Report	Yes
World Wide Views on Global Warming	controlled	F2F, media	X				2	two way	S2P	Yes	Report	N/A
BBSRC Bioenergy Dialogue	uncontrolled	F2F	N/A	N/A	N/A		N/A	two way	S2P	Yes	Survey results	No
Soapbox Science	uncontrolled	F2F, media	X	TV	X		4	two way	S2P	Yes	Survey results	No
Futurescape City Tours	controlled	F2F, media	X				1	two way	S2P	Yes	Guidebook	Yes
Citizen Visions on Science, Technology and Innovation	controlled	F2F, media			X		2	two way	S2P	Yes	Guidebook	Yes
Empowering Citizen Voices in the Planning for Rebuilding New Orleans	controlled	F2F, media	X	TV			3	two way	S2P	Yes	Guidebook, plan	Yes
Consensus Conference on Future Energy Supply	controlled	F2F, media	X		X	Phone	4	two way	S2P	Yes	Report	Yes
Peloton	controlled	F2F, media	X			Phone	3	two way	S2P	Yes	Manifesto	Yes
PARTERRE	undefined	F2F, media	X	Screen			3	two way	S2P	Yes	Report	Yes
Imagine Jersey	uncontrolled	F2F, media	X				1	two way	P2S	Yes	Report, survey results	N/A
G1000	controlled	F2F, media	X	TV	X		3	one way	P2S	Yes	Manifesto	Yes
Youth Council Espoo	controlled	F2F, media					2	two way	P2S	Yes	Report, plans	N/A
We the Citizens	controlled	F2F, media	X	TV			2	one way	P2S	Yes	Report, survey	Yes

N/A – undefined; X – exist.

F2F – face-to-face communication; P2S – Public to sponsor; S2P – Sponsor to public; S2RofP – Sponsor to representatives of public; P2P – public (volunteers) to public.

APPENDIX 3. PE approaches

Title	Category of PE	Mechanism
PRIMAS – Promoting inquiry in mathematics and science across Europe	Public Communication	Awareness raising activities
Science Municipalities	Public Communication	Awareness raising activities
Nanodialogue Project	Public Communication	Awareness raising activities
Breaking and Entering – Explore how science and society relate	Public Communication	Installation
EARTHWAKE	Public Communication	Awareness raising activities
“Let’s Do It” – Movement and World Clean-up	Public Activism	Social movement, awareness raising
DEEPEN Project	Public Consultation	Focus groups, forum theatre
Flemish Science Shops	Public Consultation	Science shops
RESEARCH 2015	Public Consultation	Foresight panel
iSPEX	Public Consultation	Crowdsourcing (citizen science)
PERARES – Public Engagement with Research and Research engagement with Society	Public Consultation	Science shops
SpICES	Public Consultation	Public opinion surveys
The Autumn Experiment	Public Consultation	Crowdsourcing (citizen science)
VOICES – Views, Opinions and Ideas of Citizens in Europe on Science	Public Consultation	Focus groups
Social Advisory Board	Public Consultation	Stakeholder consultation (consultative panel)
Imagine Chicago	Public Consultation	IMAGINE (Appreciative Inquiry, AI)
Bonus Advocates Network	Public Consultation	Stakeholder consultation (consultative panel)
Owela Open Web Lab	Public Consultation	Co-creation spaces
Citizens’ Dialogue on Future Technologies	Public Deliberation	Citizens’ Summit
GenSET	Public Deliberation	Consensus seminar
The creation and composition on Law No. 69/07 of the Tuscany Region	Public Deliberation	21st Century Town Meeting
ACE – Act Create Experience	Public Deliberation	ACE (act, create, experience)
The National DNA Database on Trial	Public Deliberation	Mock trials
2WAYS	Public Deliberation	Science parliaments
NanoDialogue	Public Deliberation	Technology Assessment

Title	Category of PE	Mechanism
World Wide Views on Global Warming	Public Deliberation	Citizen Panel
BBSRC Bioenergy Dialogue	Public Deliberation	Formal public dialogue
Soapbox Science	Public Deliberation	Science event
Futurescape City Tours	Public Deliberation	Walking tours (material deliberation)
Citizen Visions on Science, Technology and Innovation	Public Deliberation	Citizen Panel
Empowering Citizen Voices in the planning for Rebuilding New Orleans	Public Deliberation	21st Century Town Meeting
Consensus Conference on Future Energy Supply	Public Deliberation	Consensus Conference
Peloton	Public Deliberation	Gatekeeper analysis method
PARTERRE	Public Deliberation	Electronic town meeting (eTM)
Imagine Jersey 2035	Public Deliberation	21st Century Town Meeting
G1000	Public Deliberation	Citizens' Summit
Youth Council Espoo	Public Participation	Youth Councils

APPENDIX 4. PE mechanisms*

Title	Science parliament	Meetings	Survey	Voting	F2F dialogue	Consultation	Event	Focus group	Games	Workshop	Media	Online	Conference	Exhibition	Discussion	Comments	Materials	Panels	Reports
PRIMAS - Promoting inquiry in mathematics and science across Europe							X				X	X					X		X
Science Municipalities	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Nanodialogue Project						X	X	X		X				X	X				
Breaking and Entering – Explore how science and society relate												X					X		
EARTHWAKE										X	X	X							
“Let’s Do It” – Movement and World Clean-up					X						X						X		
DEEPEN Project								X							X				
Flemish Science Shops						X											X		
RESEARCH 2015										X		X						X	
iSPEX												X							
PERARES – Public Engagement with Research and Research engagement with Society										X	X	X	X						
SpICES			X								X	X							
The Autumn Experiment							X				X	X					X		X
VOICES – Views, Opinions and Ideas of Citizens in Europe on Science								X									X		X
Social Advisory Board			X												X	X			
Imagine Chicago			X		X			X											
Bonus Advocates Network										X									
Owela Open Web Lab												X							
Citizens’ Dialogue on Future Technologies					X					X		X	X						

Title	Science parliament, trial	Meetings	Survey	Voting	F2F dialogue	Consultation	Event	Focus group	Games	Workshop	Media	Online	Conference	Exhibition	Discussion	Comments	Materials	Panels	Reports
GenSET					X					X			X						
The creation and composition on Law No. 69/07 of the Tuscany Region	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
ACE – Act Create Experience							X			X	X		X						
The National DNA Database on Trial	X							X											
2WAYS	X		X														X		
NanoDialogue															X				
World Wide Views on Global Warming				X				X				X			X		X		
BBSRC Bioenergy Dialogue			X		X		X		X										
Soapbox Science					X		X					X							
Futurescape City Tours		X		X		X	X								X		X		
Citizen Visions on Science, Technology and Innovation			X							X									X
Empowering Citizen Voices in the Planning for Rebuilding New Orleans				X	X		X					X			X		X		X
Consensus Conference on Future Energy Supply													X		X		X		
Peloton							X			X					X				
PARTERRE				X			X					X					X		X
Imagine Jersey 2035		X	X	X		X	X	X	X			X							
G1000												X	X					X	
Youth Council Espoo					X		X												
We the Citizens		X	X				X				X		X						

*The following reading instructions apply. X – there was information about the application of this particular mechanisms. N/A – undefined issue. As some of the categories applied are not self-evident, we provide the following definitions for clarification: Meetings refer to simplistic conversations with various stakeholders where neither discussion nor decision is preceded. F2F dialogues refer to communication without any other supportive tools. Workshops refer to trainings for competence building to gain hands-on knowledge on specific field or issue with the purpose to proceed further with discussion and decision. Discussion refers to debating.

APPENDIX 5. Impact areas, learning and continuity

Title	Impact areas	Repetition of PE case		Reflection	Changes
PRIMAS – Promoting inquiry in mathematics and science across Europe	Culture	Yes	still ongoing	N/A	Yes
Science Municipalities	Government	Yes	expanded to other municipalities	No	Yes
Nanodialogue Project	Societal	No	no intention defined	N/A	Yes
Breaking and Entering – Explore how science and society relate	Societal	Yes	Planned to continue	Yes	Yes
EARTHWAKE	Societal	Yes	Planned to continue	Yes	Yes
“Let’s Do It” – Movement and World Clean-up	Societal	Yes	still ongoing	N/A	Yes
DEEPEN Project	Government	Yes	Planned to continue	Yes	Yes
Flemish Science Shops	Societal	Yes	still ongoing	N/A	Yes
RESEARCH 2015	Societal	No	no intention defined	N/A	Yes
iSPEX	Technological	Yes	still ongoing	Yes	Yes
PERARES – Public Engagement with Research and Research engagement with Society	Societal and technological	Yes	Planned to continue	Yes	Yes
SpICES	Societal	Yes	Applied to other initiatives	Yes	Yes
The Autumn Experiment	Societal	No	no intention defined	Yes	Yes
VOICES – Views, Opinions and Ideas of Citizens in Europe on Science	Societal	Yes	Applied to other initiatives	N/A	Yes
Social Advisory Board	Government	Yes	still ongoing	N/A	Yes
Imagine Chicago	Societal	Yes	expanded abroad	Yes	Yes
Bonus Advocates Network	Government	No	no intention defined	N/A	Yes
Owela Open Web Lab	Societal and technological	Yes	still ongoing	N/A	Yes
Citizens’ Dialogue on Future Technologies	Government	No	no intention defined	Yes	Yes
GenSET	Societal	Yes	expanded abroad	Yes	Yes
The creation and composition on Law No. 69/07 of the Tuscany Region	Government	Yes	still ongoing	N/A	Yes
ACE – Act Create Experience	Societal	Yes	still ongoing	Yes	No
The National DNA Database on Trial	Culture	No	no intention defined	Yes	No

Title	Impact areas	Repetition of PE case		Reflection	Changes
2WAYS	Culture	Yes	repeated	Yes	No
NanoDialogue	Government	Yes	still ongoing	Yes	Yes
World Wide Views on Global Warming	Societal and technological	Yes	applied to other initiatives	Yes	No
BBSRC Bioenergy Dialogue	Government	No	no intention defined	No	No
Soapbox Science	Culture	Yes	still ongoing	No	No
Futurescape City Tours	Government	No	no intention defined	Yes	Yes
Citizen Visions on Science, Technology and Innovation	Government	Yes	applied to other initiatives	Yes	No
Empowering Citizen Voices in the Planning for Rebuilding New Orleans	Government	No	no intention defined	Yes	No
Consensus Conference on Future Energy Supply	Technological	No	no intention defined	Yes	No
Peloton	Technological	Yes	still ongoing	Yes	Yes
PARTERRE	Technological	Yes	planned to continue	Yes	Yes
Imagine Jersey 2035	Government	No	no intention defined	No	Yes
G1000	Culture	Yes	applied to other initiatives	No	No
Youth Council Espoo	Government	Yes	still ongoing	Yes	No
We the Citizens	Government	Yes	Irish constitutional convention	Yes	No

APPENDIX 6. Innovativeness

PE case	Features of innovativeness																
	Multi-level stakeholders	Support of media	Transferability	Approach of increasing dialogue	Concept of idea	Results achieved (x) or their effect (X)	Creation of mediator's role	Reality-based practices for students	Deliberative youth	Costs effectiveness	Trust credit in EC	Effective management choice	Scope	Flexibility to get involved	Initiative by policy maker	Learning	Length of PE exercise
PRIMAS – Promoting inquiry in mathematics and science across Europe	x	x	x	x													
Science Municipalities						X	x					x				x	
Nanodialogue Project	x			x													
Breaking and Entering – Explore how science and society relate				x													
EARTHWAKE	x			x													
“Let’s Do It” – Movement and World Clean-up	x				x	x											
DEEPEN Project				x													
Flemish Science Shops							x	x									
RESEARCH 2015				x													
iSPEX	x																
PERARES – Public Engagement with Research and Research engagement with Society	x			x					x								
SpICES – Special Initiative for Citizen Engagement in Science		x															
The Autumn Experiment			x	x													
VOICES – Views, Opinions and Ideas of Citizens in Europe on Science	x					X				x							
Social Advisory Board	x			x							x						
Imagine Chicago	x			x		X											
Bonus Advocates Network	x											x					
Owela Open Web Lab	x			x									x				
Citizens’ Dialogue on Future Technologies				x											x		

PE case	Features of innovativeness																
	Multi-level stakeholders	Support of media	Transferability	Approach of increasing dialogue	Concept of idea	Results achieved (x) or their effect (X)	Creation of mediator's role	Reality-based practices for students	Deliberative youth	Costs effectiveness	Trust credit in EC	Effective management choice	Scope	Flexibility to get involved	Initiative by policy maker	Learning	Length of PE exercise
GenSET	x	x		x													
The creation and composition on Law No. 69/07 of the Tuscany Region				x													
ACE – Act Create Experience	x																
The National DNA Database on Trial	x					x / X										x	
2WAYS			x	x													
NanoDialogue	x															x	
World Wide Views on Global Warming	x			x		X											
BBSRC Bioenergy Dialogue	x			x													x
Soapbox Science	x		x	x													
Futurescape City Tours				x													
Citizen Visions on Science, Technology and Innovation			x	x					x								
Empowering Citizen Voices in the Planning for Rebuilding New Orleans	x	x	x	x					x								
Consensus Conference on Future Energy Supply				x													
Peloton		x	x	x													
PARTERRE						X						x					
Imagine Jersey 2035	x			x												x	
G1000	x			x												x	
Youth Council Espoo			x			X		x									
We the Citizens				x		X						x					
TOTAL:	21	5	8	26	1	10	2	1	1	3	1	1	4	1	1	5	1

Notes

- 1 While working on this study, the lead author has been in communication with the U.S. AAAS Center for Public Engagement with Science and Technology. In their draft of the ‘logic model of public engagement with science’ they define PE as follows: “The Center acknowledged that there are multiple ways to define public engagement with science, but for the purposes of this meeting and for AAAS programs, the Center defines it as intentional, meaningful interactions that provide opportunities for mutual learning between scientists and members of the public.”
- 2 In Deliverable 1.2 we defined ‘public activism’ as activities that “aim to inform decision-makers and create awareness in order to influence decision-making processes.” In this publication, however, we have adopted a broader understanding of this concept, including social movements as an instance of public activism. As social movements do not only inform decision making, but also directly implement changes (e.g. in the case of *Let’s do it!*, by cleaning toxic waste from the environment), we also conceptualise ‘public activism’ as a functional rather than supportive type of PE (see Figure 5).
- 3 Consumer Society Research Centre at the University of Helsinki, Finland.
- 4 Vilnius University International Business School, Lithuania.
- 5 We use *italics* when we refer to the 38 case studies reported in the cognitive maps, fully described in Deliverable 1.2.
- 6 We are grateful for this distinction to our ‘sister project’ ENGAGE2020 (2013-2015). Advised by the project officer of PE2020, we pay particular attention to the levels of project definition and programme development.
- 7 For the definition, see <http://ec.europa.eu/programmes/horizon2020/en/h2020-section/responsible-research-innovation>. If the ideas of anticipation and reflexivity can be taken directly from the given definition, the idea of transdisciplinarity can be more clearly be read from the two paragraphs that follow the given definition: “*Responsible Research and Innovation (RRI) implies that societal actors (researchers, citizens, policy makers, business, third sector organisations, etc.) work together during the whole research and innovation process in order to better align both the process and its outcomes with the values, needs and expectations of society. In practice, RRI is implemented as a package that includes multi-actor and P in research and innovation, enabling easier access to scientific results, the take up of gender and ethics in the research and innovation content and process, and formal and informal science education.*” In our reading the role of PE is among the core aspects of RRI.
- 8 Dynamic Governance. Available at: <http://www.governancealive.com/dynamic-governance/>.
- 9 Reputation equity, UK registered design No. 4019241, <http://marlandsykes.com/reputation-equity.php>
- 10 The types of **participants, sponsors or organisers** could help to learn to/by whom specifically PE was run and try to answer to the question whether the public was involved randomly or selected. In this regard, it is very likely that we would find not a single model, but few models and all they would be treated stochastic. In addition, they would match quite specific empirical situations and won’t be as general as theories (Bailer-Jones, 2003), and it is suggested also to consider researcher’s approach in the context of direct or indirect communication for examining pilots in WP3 and, consequently, identify factors that determine success of PE: media (science journalists), PE platforms, CSOs, science and innovation agencies as mediators, decision makers, business. **Stochastic** (also called probabilistic) models (Börner et al., 2012) make it possible to predict the behaviour of an object or phenomenon if the influence of several unknown factors is sizable—the subsequent state is determined both by predictable actions and by a random element. They cannot predict the exact behaviour but predict the probability that a particular value will be observed at a particular time within a known confidence interval. Ranges of values (in the form of a probability distribution) are used to describe each model variable.
- 11 Urpelainen’s (2013) model of dynamic governance **combines the bottom-up approaches with governmental visions**. Applying this model we consider that while politically feasible actions at time *t* will have an effect on PE at that

time t , they can also change the PE "game" from time $t+1$ on. Even if actions on programme or project level have limited potential to enhance PE at time t , it does not follow that they cannot lay the foundation for more ambitious engagement in the future. The idea of Urpelainen's **model lies on the use of small wins to bridge the gap between local reality and national or European aims**. Moreover, this model is aimed at government officials who are concerned about research and innovation but face political constraints at the domestic and international level.

- 12 A system of organisation that blends characteristics of chaos and order.
- 13 Cases: 1-4, 6-8, 11, 13, 14, 16, 18, 19, 21-24, 26-38.
- 14 Cases: 3, 7, 14, 19, 21, 26, 27, 30, 32, 34, 36 and 38.
- 15 Cases: 4, 6, 18, 28, 29, 31 and 33.
- 16 Cases: 5, 9, 10, 12, 15, 17, 20 and 25.
- 17 If the multiplicity of communications can be regarded as a sign of innovativeness, a less innovative feature is that in majority (almost two third) of the cases, the main direction of communication was from the sponsor to the publics participating in these processes. Only in six cases the direction was the opposite, from the publics to the sponsors, while only few cases the direction was from public to public (see Appendix II).
- 18 Other interesting cases where cities or municipalities are as partners, include cases 6, 10, 13, 16, 17, 21, 29, 31, 33, 35 and 37.
- 19 Examples of other international processes include cases 1,5, 6, 11, 12, 14, 15, 17, 20, 24, 30 and 34.
- 20 One third of PE cases did not state clearly how many media they used.
- 21 See, <https://ec.europa.eu/programmes/horizon2020/en/h2020-section/societal-challenges>
- 22 Characteristics of societal challenges are appositely analysed in the literature on 'wicked problems' (Roberts, 2000; Australian Public Service Commission, 2007).
- 23 An observation is that challenge F is "Europe in a changing world - inclusive, innovative and reflective societies". As this project is from the U.S., the relevance is only regarding the substance, not the geography.
- 24 Processes other than R&I-focused PE processes were included in our sample, as the border between R&I and other themes is often vague. The case of World Wide Views on Global Warming is illustrative of this: its focus is primarily on climate politics, while at the same time climate change is only understandable through scientific theories and technological instruments. Further, this event was organized by the Danish Board of Technology Foundation (DBT), an agency specialized in supporting public debates on technoscientific issues.
- 25 There is however a major qualification to this general observation. On closer inspection, the majority of the PE initiatives at first seemed to be aimed at mainly generating awareness on R&I, also contributed political processes. PRIMAS, for example, aimed at influencing "context, policies and effecting policy-making processes".
- 26 In the CIVISTI project, for example, development of attractive public transportation was considered to be the most important research priority by citizen panels in seven EU member countries (Jacobi et al., 2011); In the CASI-project, sustainable transformation of urban traffic infrastructure was considered among the top ten research priorities by citizen panels in 12 EU countries (Matschoss et al., 2015).
- 27 Bächtiger et al. (2014, 225-226), for instance, state that "to date, too few mini-publics have had a discernible impact on actual policy-making."
- 28 This research strategy can claim to be 'uncritical'. In defence, we maintain that given the limited resources available, we preferred to invest in understanding the 'big picture' rather than inspecting the details. We also try to be explicit about this fact and encourage the reader to personally assess the plausibility of the findings.
- 29 The point of the TAMI model is to distinguish between three issue dimensions (scientific and technological, societal and policy related aspects), and three impact dimensions (knowledge, attitudes and action related). We found it useful to keep the issue areas as such, but considered it better fit to use different categories of impacts. We ended up with substantive, practical and normative dimensions, reflecting the three main rationales of PE, as often repeated in literature on PE (e.g. Fiorino, 1990).
- 30 After making this bold claim, we add the qualification that in certain cases, demarcation between different impacts was difficult. In most cases, however, it was rather easy to classify the examples. For example, The Autumn Experiment (case 13) that contributed to "scientific measurement and data" seemed clearly to be an example on how a citizen science project contributes to new knowledge by providing measurement and data on natural phenomena. More difficult cases were e.g. "expansion and institutionalisation of PE" and "conceptualisation" that we classified as practical impacts. "Expansion and

- institutionalisation of PE” we decided to allocate in this category, as seems neither be about generation of new knowledge nor about realisation of certain norms, but rather about practices that are not so much scientific or technical, but rather social (or to some extent political) in nature. “Conceptualisation” in our examples was about many things, but most often it was about the giving names, vocabularies or definitions to new issues related to R&I activities, be them a method of long-term participatory foresight (CIVISTI) or a concept of ‘science municipality’ (Science Municipalities). For sure, some other ways of classifying could have been possible, but found the current one best reflecting the cases.
- 31 Irish constitutional convention is a new venture in participative democracy in Ireland tasked with considering certain aspects of the Constitution to ensure that it is fully equipped for the 21st Century and making recommendations to the Oireachtas on future amendments to be put to the people in referendums. The Convention is a decision-making forum of 100 people, made up of 66 citizens, randomly selected and broadly representative of Irish society; 33 parliamentarians, nominated by their respective political parties and including an elected representative from each of the political parties in the Northern Ireland Assembly, see <https://www.constitution.ie/>.
- 32 Here we included the following 19 cases that reported of policy impacts (see the cognitive maps): 5, 7, 9, 10, 14, 15, 19, 20, 23, 25, 26, 27, 30, 31, 32, 34, 35, 37, 38.
- 33 *Imagine Chicago*, for example, contributed to community building by strengthening a shared sense of identity, helping appreciate understanding of other generations, and it contributed to youth development by providing them with empowerment, new types of competence, increased sense of ownership and leadership opportunities. *Futurescape City Tour* enhanced civic capacities through following elements: increased ownership, new networks and relationships, increased political efficacy, increased empathy, intrapersonal skills and skills in critical thinking. Empowering Citizen Voices in the *Planning for Rebuilding New Orleans* contributed to ‘symbolic effects’, including rebuilding the sense of community, restoring sense of connection, hope and community.
- 34 We are not suggesting that *Let’s do it!* would have lost its power as a social movement; we only observe that it has become more structured and in that sense its original identity as a spontaneous social movement has changed. We also maintain that similar contradictions are less pronounced for other types of activities, such as projects, as they are often to some extent formal from the beginning. There were highly different ways in which the studied PE processes had extended. 2WAYS, for example, covers approximately 30 European cities; GenSET has expanded to North America, Africa, Asia-Pacific and Europe; Science Municipalities involves 25 out of 98 Danish Municipalities; and *Imagine Chicago* processes have taken place in specific neighbourhoods of Chicago and in towns and cities around North and South America, Europe, Asia, Africa, and Australia. None of such cases reported of a decreased vitality of such concepts, even though we observed some level of formalisation and ‘structuration’ taking place along with the geographic expansion.
- 35 Following Neo and Chen (2007), we have adopted a broad definition of these concepts. Anticipation refers to foresight type of activities oriented at anticipating future development; reflection refers to public scrutiny of academic findings or regulatory processes; transdisciplinarity refers to research and planning processes that purposely involve not only researchers from different disciplines but also actors beyond academia; continuity refers to activities that aim at embedding new activities in existing institutions or otherwise building bridges between separate interventions. We have given more specific definitions in later sub-sections. The most remarkable difference to Neo and Chen’s (2007) list of key capabilities of dynamic governance is that we replaced their notion of the ‘capability to think across’ with the notion of ‘transdisciplinarity’.
- 36 Neo and Chen (2007, p. 8) defines **dynamic governance** as follows: “Dynamic governance is the ability of a government to continually adjust its public policies and programs, as well as change the way they are formulated and implemented, so that the long-term interests of the nation are achieved. Dynamism in governance is essential for sustained economic and social development in an uncertain and fast changing environment, and in an increasingly demanding and sophisticated society where citizens are more educated and more exposed to globalization.”
- 37 See, http://europa.eu/rapid/press-release_SPEECH-15-5243_en.htm
- 38 The three points are reconstructed on the basis of Moedas’s talk, see http://europa.eu/rapid/press-release_SPEECH-15-5243_en.htm
- 39 The brainstorming session was held in January 2015 in a consortium meeting in Aarhus.
- 40 Democratic legitimacy is a composite term. It can refer to both legality and psychological tendency of the participants or observers of PE processes to perceive the results and process as acceptable. ‘Fairness’ is a related concept, proposed e.g. by Renn (2008, p. 283) to be included among basic design features of any participatory process.

- 41 Another interesting example of ways to measure institutionalisation of PE opens by asking participants to describe how they have communicated their experiences with other people. Warburton (2011, p. 82), for example, found in the evaluation of the UK Sciencewise-ERC activities, that each dialogue participant is likely to talk to 30 others; this multiplied with the number of Sciencewise-ERC participants during years (more than 13 000 people) means that some 400 000 members of the UK public have heard about their PE activities and related R&I themes.
- 42 As a distinction to ‘external efficacy’ that refers to participants’ beliefs about the responsiveness of governmental authorities and institutions to citizen demands, here we are talking about actual acts of account giving by governmental authorities. The first aspect can be measured through polls, while the latter aspect requires a study of policy impacts.
- 43 We observe that there is a distinction between acceptance and acceptability. The difference is that acceptability refers to the attitude on R&I applications before their implementation, whereas acceptance refers to the attitude after their implementation (Gärling et al., 2008). Harnessing PE to increase acceptance of already implemented R&I solutions can be democratically suspect, while finding ways to design more acceptable applications can be more easily justified.
- 44 Some level of satisfaction is important to ensure that participants and stakeholders are willing to continue engaging in deliberative processes.
- 45 As we are discussing what might work are success criteria for (innovative) PE processes, we did not include innovativeness among such criteria, but rather looked for other ‘external’ characteristics of (innovative) PE.
- 46 Citizen science and science shops are perhaps the two most obvious counter examples to this trend.
- 47 As many as 13 out of the 35 PE initiatives carried out in Europe (i.e., more than one out of three) have been directly funded by EC or in the framework of EC-funded programmes (PRIMAS, Nanodialogue Project, EARTHWAKE, DEEPEN, PERARES, SpiCES, VOICES, SOAB, BONUS Advocate Network, genSET, 2WAYS, CIVISTI and PARTERRE).
- 48 The capital letter (A) refers to the category of ‘appropriate goals’ in the synthetic evaluation framework in Figure 14.
- 49 Additionality can be evaluated either ex post, as is often done in the practice of program evaluation, or it can be done ex ante, as an initial eligibility screen for issuing credits of a PE process.
- 50 Actually, the salient role of the public sector, and the EC in particular, in funding innovative PE, resembles Mariana Mazzucato’s (2015) vision that state has historically played a vital role as an active risk taker and funder of such research that has later resulted in important technological breakthroughs such as Internet, GPS, its touch-screen display and the voice-activated Siri.
- 51 An example is the World Wide Views method that has been criticized from losing connectivity between global policy question and participants’ local experiences of environmental problems (Rask and Worthington, 2015).
- 52 Were PE processes only focusing on factual issues, then the Condorcet’s jury theorem would provide a simple solution to the identification of right participants: if the probability (p) that each voter is more likely to vote correctly rather than incorrectly is greater than 1/2, then adding more voters increases the probability that the majority decision is correct (Wong, 2015). As the point of PE, however, is mostly in the reflection of normative and practical matters, some other ways of identifying the right people are needed.
- 53 To concretize this point: as crowdsourcing, citizen science and other forms of PE might provide more efficient ways of organizing research activities than conducting the same activities by academic professionals, a reflection of the potential applicability of PE should perhaps requested from all EU research proposals. This is actually close to one of the pilots of PE2020, where we took part in the Academy of Finland piloting of ‘societal interaction plans’, where researchers were requested to make extensive plans of their SiS activities, and where the evaluation of such plans preceded scientific peer review (for further information, see www.pe2020-eu/).
- 54 Even some of the most ambitiously oriented PE processes proved to be rather successful in this sense. *Let’s do it!*, for example, aimed “to clean up the whole world from illegally dumped solid waste, and to support the most intelligent and sustainable waste management principles in order to ensure a future clean world”. When looking at its achievements, *Let’s do it!* has rapidly helped reducing illegal waste dumping and introduced more effective waste management strategies in 112 countries (for sure a closer critical examination of these impacts is warranted). *G1000* aimed “to be a citizen initiative that is capable of innovating democracy”. *G1000* managed to organize an unprecedented grass root political movement in Belgium (remaining without government at that time) leading to the signing of the ‘G1000 manifesto’ proposing betterments to democratic institutions, and similar political mobilization processes have later been organized in other parts of Belgium

- and other countries. *PARTERRE* is an example of a more modestly targeted PE process that aimed “to demonstrate and validate the business potential of two novel eParticipatory tools for spatial and strategic planning in territorial development at the European level.” Also *PARTERRE* can be called successful, as it finally managed to quantify the benefits of the studied eParticipatory tools.
- 55 This idea is relative to the idea of ‘social media footprinting’, but PE footprinting covers a broader spectrum of activities (see e.g. <http://www.socialmediatoday.com/content/managing-your-social-media-footprint>).
- 56 We did some simple statistics by counting the numbers of different types of impacts and checking whether they correlated with media attention. As mentioned, we didn’t find strong correlation, but definition of broad vs. narrow impacts seemed a bit arbitrary for this purpose. In future evaluations this issue could be explored more systematically.
- 57 Despite its name, Social Advisory Board can be classified as ‘technically oriented’ PE in the sense that it represents a stakeholder based governance innovation rather than a direct PE innovation involving publics or supporting public deliberation through mass media.
- 58 Type I deliberation according to Bächtiger et al. (2010, p. 36) focus on deliberative process, emphasize rational, communicative discourse and orient at consensus, while Type II deliberation focus on deliberative institutions and outcomes, accept all kinds of communication (including rhetoric, emotional discourse, story-telling etc.), and welcomes outcomes, such as preference structuration, meta-consensus and increased intersubjective rationality.
- 59 Actually, we had three partners that happened to carry out independent analyses of the challenges. The Italian group identified 10 clusters, Lithuania group 11 clusters, and the Finnish group originally 12 clusters; finally, the Finnish group aggregated the categories ending up with 8 main clusters. While someone could take this as an indication of the inaccuracy of political and social sciences, our take is that this time we have even more robust classification as it has been considered by several independent analysts (yet we acknowledge that a fourth analyst would propose yet another classification).
- 60 For a discussion of this problem in the context of the World Wide Views on Global Warming -project, and a proposal to ‘build an alliance between deliberation and NGOs’, see Rask et al. (2012b).
- 61 The size of the bubbles corresponds with proportion of challenges per theme divided by the total number of challenges mentioned. For example, we counted 28 challenges out of the total number of 104 challenges mentioned; respectively we identified 22 motivational challenges out of 104.
- 62 See, <https://ec.europa.eu/programmes/horizon2020/en/h2020-section/responsible-research-innovation>, accessed 25 April 2016.
- 63 See, <http://www.rri-tools.eu/>, accessed 26 April 2016.
- 64 For example, our research consortium has been occasionally asked to provide insights on this issue. Unfortunately, we have not been able to provide much insight on available tools for economic impact evaluation in this field.
- 65 Resource mobilization, however, is an identifiable function of PE. It includes types of activities, including fund raising (e.g. *Empowering Citizen Voices in the Planning for Rebuilding New Orleans*), matching innovators, start-ups and funders (Peloton), funding societally relevant research (*Flemish science shops*); most frequently it is about taking part in research prioritisation and allocation of research funds (e.g. *Societal advisory board, Tuscan Law No. 69/07*). Examples of potential indirect economic gains include avoidance of costly societal conflicts over acceptance of new technologies, new ideas feeding innovation activities, and creation of new collaborative networks and platforms supporting research and innovation.
- 66 Evaluation of the Sciencewise-ERC is one of the rare examples of evaluations that go far in the quantification of the impacts of PE (Warburton, 2011). For example, there is an estimation that each dialogue participant is likely to talk to 30 others about the PE process and its substance, which provides a basis for comparing the costs of communicating through other means (a step that has not actually taken in this evaluation study).
- 67 Field experts in this context refer to domains of expertise that is not based on scientific expertise but on a combination of experience based expertise and systematisation of such experiences, as in the case of authorised gym instructors. Life world experts refer to expertise gained through systematic organisation of experiences based on one’s direct contact with the issues, as for example in the case of patient-activists. There is some discussion on such typologies in the context of science and technology studies, here the concept of ‘field expert’ was adopted from Professor Esa Väiliverronen’s new book (2016) where he elaborated these concepts (unfortunately in Finnish only).



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