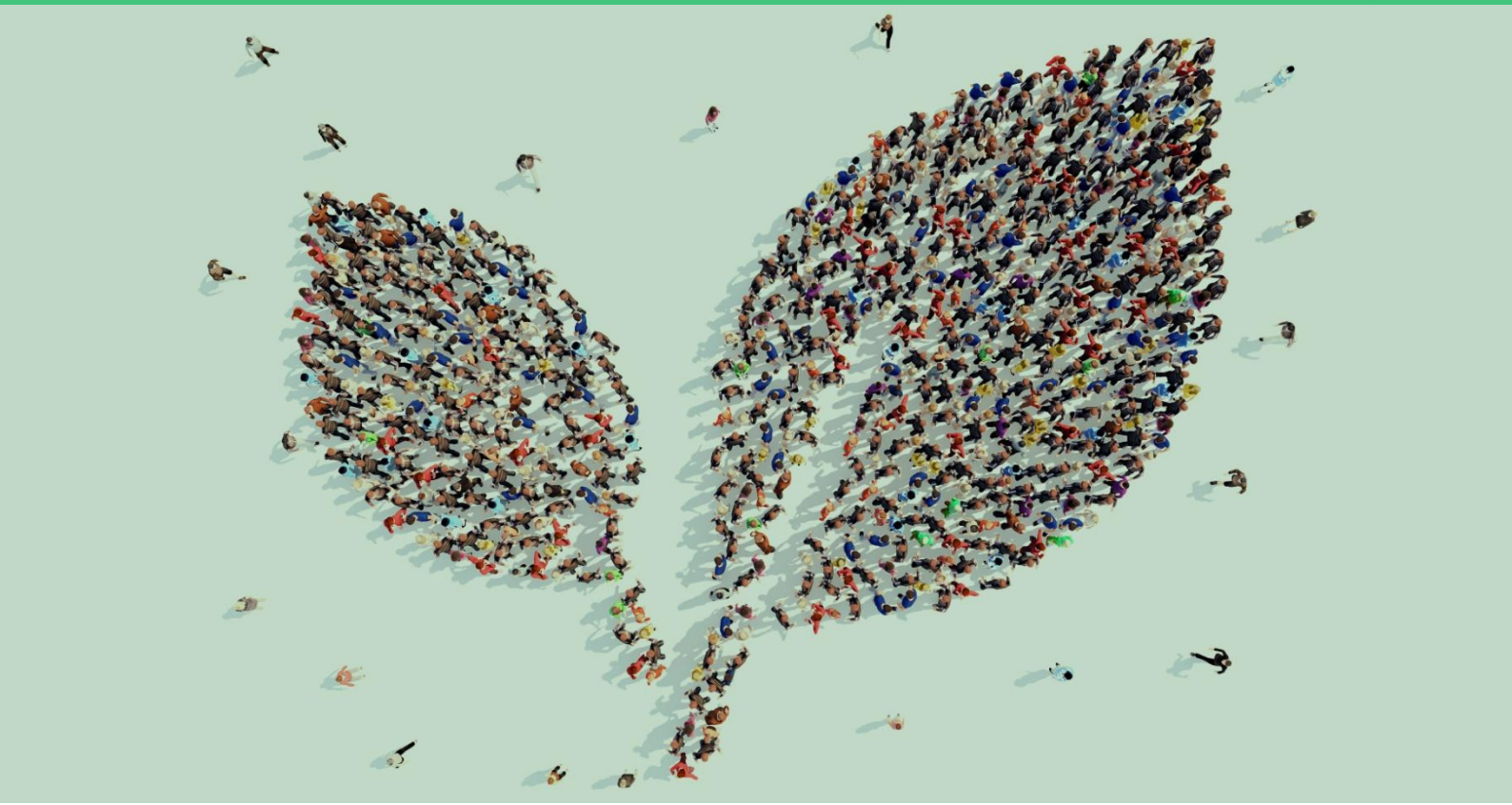
BioSTEP

Promoting stakeholder engagement and public awareness for a participative governance of the European bioeconomy



Public engagement in the bioeconomy: outlining an analytical framework for BioSTEP

November 2015

Barbara E. Ribeiro and Kate Millar

This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 652682.

Document information	
Project name:	BioSTEP
Project title:	Promoting stakeholder engagement and public awareness for a participative governance of the European bioeconomy
Project number:	652682
Start date:	1st March 2015
Duration:	36 months

Report:	BioSTEP Working Paper
Work Package:	N/A
Work Package leader:	N/A
Task:	N/A
Task leader:	N/A
Responsible author(s):	Barbara E. Ribeiro, Kate Millar (UNOTT)
Internal peer review:	Holger Gerdes (Ecologic)
Planned delivery date:	N/A
Actual delivery date:	M9
Reporting period:	N/A

Dissemination level of this report		
PU	Public	x
PP	Restricted to other programme participants (including the Commission Services)	
RE	Restricted to a group specified by the consortium (including the Commission Services)	
CO	Confidential, only for members of the consortium (including the Commission Services)	

ACKNOWLEDGMENT & DISCLAIMER

This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 652682. Neither the European Commission nor any person acting on behalf of the Commission is responsible for how the following information is used. The views expressed in this publication are the sole responsibility of the author and do not necessarily reflect the views of the European Commission.

EXECUTIVE SUMMARY

This is an internal working paper to support discussions on the theory and practice of stakeholder and public engagement in the BioSTEP project. BioSTEP responds to EC calls on broader engagement in science and technology by not only analysing stakeholder and public engagement in the bioeconomy in Europe, but also supporting it through the promotion of different engagement activities. This working paper focuses on the topic of public engagement, being somewhat different from stakeholder engagement, aiming to support a discussion on what it might mean *for* and *in* BioSTEP. That is, what we understand by public engagement and how in practice BioSTEP is engaging with publics. The main objective of this paper is to start outlining an analytical framework for public engagement in BioSTEP by exploring the topic in public policy and part of the academic literature.

Table of contents

Figures

Tables

Abbreviations

EC	European Commission
EU	European Union
CSOs	Civil Society Organisations
CSR	Corporate Social Responsibility
IA	Impact Assessment
IAP2	International Association for Public Participation
NGOs	Non-Governmental Organisations
RRI	Responsible Research and Innovation (RRI)
STS	Science and Technology Studies
TA	Technology Assessment
UN	United Nations
UNECE	United Nations Economic Commission for Europe
UNEP	United Nations Environment Programme

1 Introduction

The aim of this document is to set out a briefing on the nature and purpose of public engagement in order to support the development of a common understanding within the BioSTEP project. In order to do this the report briefly explores:

1. The policy context of public engagement;
2. The possible role of public engagement in BioSTEP;
3. Understandings of different types of stakeholders and publics;
4. Why we engage with publics, specifically examining the justifications for engagement;
5. The different forms of engagement and at which levels they operate; and concludes by
6. Reflecting on public engagement in BioSTEP as we move forward with the project tasks.

2 Public engagement and public policy

As far back as the 1992 Rio Declaration, policy-makers, scientists, industry representatives, etc. have discussed the need to engage with different 'voices' and stakeholders. The Rio Declaration (Principle 10)[1] set out a requirement to strengthen access to environmental-related information, facilitate engagement and access to justice as part of national environmental policies and practices. In Europe this led to the implementation of the Aarhus Convention in the EU in 1998,[2] which set out a requirement to engage with citizens and stakeholders. The UN requirements were further developed in the UNEP (Bali) guidelines for as Rio+20 national action plans.[3]

In terms of science and technology development at an EU level, the Aarhus Convention might be seen as the first step to formalising a requirement to engage with the public, However even before the Aarhus there was an interest in and need for wider engagement in research and innovation governance in the European Union (EU). Over the last decade, Member States and the European Commission (EC) have continuously supported structured public participation in issues involving scientific and/or technological dimensions (Felt 2007). This interest has been further fuelled by a growing perception that there is a public uneasiness and a sense of fear related to the risks of emerging science and technology. Although this perception has already been extensively challenged (see Felt 2007), governmental responses have included investing in programmes that support different forms of "public engagement".

---

[1] Principle 10 was adopted 1992 as a part of the Rio Declaration, stating that: *"Environmental issues are best handled with participation of all concerned citizens, at the relevant level. At the national level, each individual shall have appropriate access to information concerning the environment that is held by public authorities, including information on hazardous materials and activities in their communities, and the opportunity to participate in decision-making processes. States shall facilitate and encourage public awareness and participation by making information widely available. Effective access to judicial and administrative proceedings, including redress and remedy, shall be provided.*"

[2] United Nations Economic Commission for Europe (UNECE) Convention on Access to Information, Public Participation in Decision-Making and Access to Justice in Environmental Matters was adopted on 25 June 1998.

[3] Bali Guideline Implementation Guide:
http://www.unep.org/civil-society/Implementation/Principle10/tabid/105013/Default.aspx

There is an extensive literature on the topic of public engagement in science and technological innovation. However, this briefing will focus only on research work and policy initiatives that might help us as a consortium deliver the objectives of BioSTEP. Before discussing public engagement in the project it is important to note some of the EC recent initiatives, which give shape to the broader research policy context of BioSTEP. In terms of current developments, under H2020's key action of Responsible Research and Innovation (RRI), public engagement has been highlighted by the EC as being strategic in terms of three main objectives:

- To increase society's scientific literacy and thus its ability to participate in democratic processes involving science and technology developments;
- To contribute by including diverse perspectives in research design and results; and
- To align research and innovation with societal needs to help overcoming a range of societal challenges.[4]

The new H2020 objectives promoting the uptake of RRI, which is intended to build on the longstanding sustainability principles, appears to be encouraging the involvement of a range of representative (e.g. researchers, industry, etc.) and public voices in the development of science, technology and innovation so that these can in some form be co-created to ensure wider societal benefit.

3 Public engagement in BioSTEP

BioSTEP responds to the recent call outlined above by not only analysing stakeholder and public engagement in the bioeconomy in Europe, but also supporting it through the promotion of different engagement activities. This working paper focuses on the topic of public engagement, being somewhat different from stakeholder engagement, aiming to support a discussion on what it might mean *for* and *in* BioSTEP.[5] That is, a) what we understand by public engagement; and b) how in practice BioSTEP is engaging with publics. These two dimensions are complementary and translate across the project.

The main motivation for producing this document is a need for defining a common understanding among BioSTEP partners with regards to public engagement in terms of the bioeconomy. This is important because our agenda and understanding of the topic affects the way we communicate with our audiences, such as stakeholders and publics, it shapes the message we are presenting as a group, and affects the opinion of those who will formally evaluate and informally critic our project. Therefore, while BioSTEP supports the development of a more participatory governance of the bioeconomy with a strong focus on its practical level, a discussion on the theoretical and methodological background of public engagement, and on the assumptions and more fundamental aspects is also needed. This involves reflecting on some key aspects of this topic, which we believe can be extended to the bioeconomy from a multidisciplinary discussion of public engagement in the governance of science and technology.

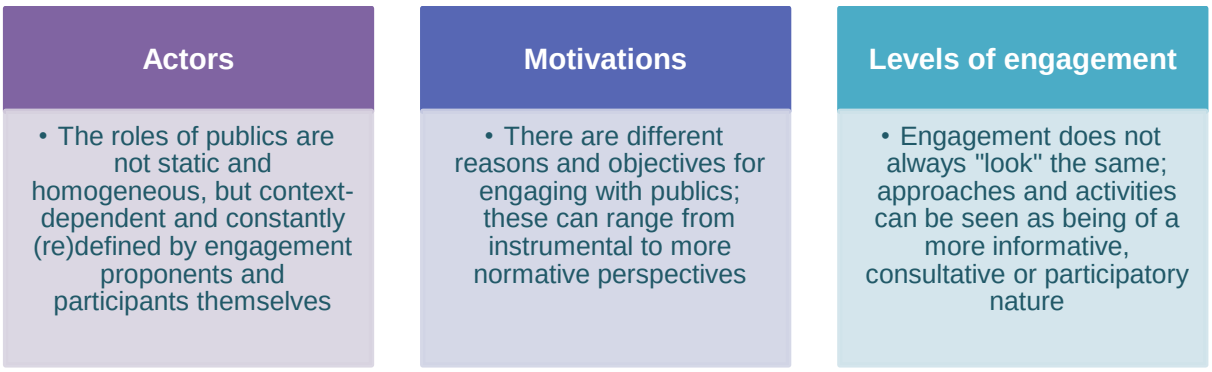
[4] http://ec.europa.eu/programmes/horizon2020/en/h2020-section/public-engagement-responsible-research-and-innovation.

[5] This paper can be seen as complementary to the DoA and BioSTEP's Public Engagement and Knowledge Sharing Strategy, including reflections at both the conceptual and methodological level. It also looks for supporting future documents that may inform the different tasks in the project.

This paper outlines a tentative framework for the analysis of public engagement in BioSTEP. This framework is composed by three main dimensions (see Figure 1):

- The 'actors' we engage with and their imagined roles;
- Our motivations to engage with publics; and
- The levels of engagement supported by our (engagement) activities.

Figure 1: Outline of an analytical framework for public engagement in BioSTEP



We first explore each of these dimensions in sections 2 to 4, before proposing a series of questions that are intended to facilitate reflection in BioSTEP regarding what public engagement might mean in this project (Section 5).

4 Many publics: Understanding stakeholders and publics

Those disciplines who develop theory and practice on public engagement, such as impact assessment, environmental management, and spatial planning often use stakeholder analysis methods to map those that affect or are affected by a specific issue. Although these approaches tend to group all actors, including institutions, under the same umbrella term, i.e. stakeholders, and not necessarily in a consistent way across studies, in stakeholder analysis the various categories of stakeholders are differentiated comprehensively and in detail (see e.g. Ross 2003; Brugha and Varvasovszky 2000; Reed et al. 2009).

However, while broad and detailed classifications of different groups are adopted within specific disciplines, this is not the case of the widespread use of the term stakeholder. Using terms such as stakeholders, the public, citizens, interested parties interchangeably, as synonyms and without specifically defining them, is rather common practice. Definitions are important, since despite the fact that groups may share some interests and concerns, they are never a completely homogeneous mass of actors. Without a clear understanding of their definitions, this may leave some of these terms meaningless or to may lead to terminological abuse. In discussions around corporate social responsibility (CSR), for example, the use of 'stakeholders' and 'society' as synonyms, or the view, by corporations, of society as equal to the market have been heavily criticised (see Ihlen 2008). Others have also pointed to the risks of adopting an uncritical "stakeholder language" where the civil society is regarded as only another actor, with a limited position in relation to other more powerful players. Here there is a risk of the civil society being reduced to the limited view of citizens as a mass of consumers in the context of neoliberal societies (see Goven 2006).

In the project's early work (e.g. the proposal and the work of the first few months) a distinction between stakeholders and publics was proposed. These two groups or categories represent BioSTEP's 'target groups', according to the project's Public Engagement and Knowledge Sharing Strategy. The table below (Table 1) lists the terms currently used to refer to groups of actors identified under these two categories (i.e. these terms are taken directly from different reference documents produced within the project to date).[6]

Table 1: Terms used in BioSTEP to refer to the categories of stakeholders and publics

Stakeholders	Publics
• Policy-makers • Government (European, national, regional) • Local government • Government bodies • Quasi-public bodies • NGOs • NGOs/CSOs • Financing institutions • Entrepreneurs • Individual businesses • Business (sectorial) associations • Trade unions • Industry • Industry representatives • Industry and start-up companies • Consultancy • Universities and research centres • Science • Scientists • Researchers • Bioeconomy interest groups • Media bodies	• The general public • Interested public • Wider publics • The public • Citizens • Active citizens • End-users • Consumers

As shown in Table 1, the categories that are included as being representative of stakeholders are larger in number and are further specified when compared to those included as representatives of publics. In this document we are focusing our attention on 'publics', as a generally overlooked part of society when compared to stakeholder groups in the broader context of new modes of governance of science and technology, and more specifically in the context of BioSTEP.

Looking at the different terms set out in Table 1 it is apparent that using the plural form of public, i.e. publics, is helpful when trying to recognise these as heterogeneous masses, with complex and differ-

[6] These documents are the DoA, the public engagement and knowledge sharing strategy and the first draft of D3.1. It is worth noting that actor groups within each of the two categories are not necessarily mutually exclusive. Also, the use of these groups and categories is not always consistent across all documents (e.g. at times, citizens may be quoted when referring to publics, but not end-users; or policy-makers and scientists are highlighted separately from stakeholders, as if these groups were not contained in that category).

ent social and political agency. These heterogeneous groups can take many forms and, for example, mobilise around issues of common concern (Mohr et al. 2013). This recognition of publics is also part of the contribution of political science (the contextualist and deliberative turn) in this discussion, which can allow publics to be understood as political categories (Varughese 2012).

A further way of thinking about publics is to consider them as the category 'scientific-citizen publics' and it is useful here within BioSTEP to bring this to our attention (table 2).

Table 2: Publics as political categories (based on Varughese 2012)

Category	Description
Scientific citizenship	Usually restricted to participatory management and resolutions of risk controversies through deliberative activities. Sometimes criticised for being too structured, providing only limited interactions between citizens and experts, and for not being representative
Scientific-citizen publics (post-deliberative democratic conceptualisation)	Considers wider and more inclusive public deliberation, aiming at capturing the diverse, multicultural and context-specific nature of deliberations. Supported for attempting to understand citizenship in more discursive terms

Although the categories above are part of rather theoretical discussions, there are two important points of practical relevance with regards to the specific notion of scientific-citizen publics. First, that we should not limit ourselves to imagine public participation only in a regulatory context, i.e. when publics are required to participate or provide input, in pre-defined ways, in activities aiming at some sort of closure. Second, that it is important to recognise and understand the dynamic nature of notions of 'expertise' and 'citizenship' across different socio-political contexts. This is because what we understand by experts and lay publics, i.e. citizenship (and their imagined roles and differences) affects the ways we promote and analyse the relationship between science, knowledge and engagement.

With regards to the second point, attempts to embed knowledge from members of the public (lay knowledge or "contributory expertise"), in decision-making has been criticised for excluding 'ideas' that do not match those of 'western science' (see Leach and Scoones 2003). What might be one of the most challenging aspects of engaging with publics (and their diverse rationalities), is how difficult it is to accommodate and consider the social and political elements of people's understanding (or framing) of problems related to science and technology. In technology assessment (TA), for example, experts often prioritise technical rationality and attempt to set out boundaries between what is seen as 'sound science' and public 'opinion', or between 'facts' and 'values' (see Sclove 2010).[7] By doing this, we can fail to understand and acknowledge people's diverse views. Most importantly, we might ultimately fail to recognise what issues are of public concern and are of relevance in discussions around science and technology.[8]

Leach and Scoones (2003:5) suggest we should consider the notion of "contributory perspectives" as opposed to "expertise". So rather than selecting specific members of lay publics that are considered as having 'the right' (or the 'capacity') to participate, processes aim to broaden the scope of participa-

[7] See also Stengers (2000) for a more general and philosophically informed analysis.
[8] See Wynne (2007) for an interesting discussion about the difference between public issues involving science and technology and scientific issues.

tion, welcoming contributions that challenge socio-political agendas instead of focusing on the technology *per se*. Drawing on theories of democracy, science and technology studies (STS) and development studies, Leach and Scoones (2003) set out three lines of thinking that can inform different political notions of citizenship in the context of public engagement (Table 3):

Table 3: Different notions of citizenship (based on Leach and Scoones 2003)

Notion	Citizens' imagined 'roles'	State's imagined 'roles'
Liberal	Citizens are entitled to universal rights granted by state and act rationally pursuing their own (individual) interests. The assumption here is that all citizens have adequate resources for rights-claiming. Publics are mostly conceived in terms of customers and users in liberalised markets. This means that they chose among options and services but do not play major roles in agenda setting or technology development	State's role is to protect and enforce citizens' rights. Participation is something to which all citizens have equal right and it is enacted in democratic politics. These are overseen and protected by a state that is supposed to be benevolent. In it, elected elites rely on accredited scientific and technocratic expertise to inform decision-making on science and technology development
Communitarian	Citizens are socially embedded members of a community. There is a pursuit of the common good and local agendas are prioritised over individual interests. There is a focus on indigenous knowledge, and knowledge is assumed to be held by "the community". This lay knowledge is seen as culturally embedded and geographically specific, i.e. it is recognised that different problem framings are possible	The role of the state in agenda setting and in the governance of science and technology is minor, if not absent
Civic republican	Citizens' roles are a sort of mix of the above two. Individuals are part of collectivities (factional groups) who press claims in the political realm. Citizenship here is build around a common civic identity based on common public culture. Diversity in terms of interests and knowledge of publics is recognised and there are individual obligations to participate in communal affairs	The state recognises the diversity of interests and of groups of citizens. Participation is not confined to representative political systems but take more deliberative forms. Claims and interests related to knowledge and experience emerge and are refracted through political dialogue. The aim is to reach collective agreement through deliberative forums

These notions of citizenship are not without problems, as discussed below. However, they illustrate and suggest that there are different ways to imagine the roles of publics and the State, thus the relationship between science and society. This will vary according to different socio-political contexts and the objectives of engagement activities.

When thinking about specific citizenship in public engagement practice, i.e. mini-publics, Felt and Fochler (2010) note that citizenship's roles for both groups, those who promote engagement and citizens themselves, are not static. For example, those who run engagement processes attempt to bring together an ideal set of citizens considered to be 'disinterested' and/or 'interested', 'sceptical' and/or 'supportive' (of scientific and technological progress), 'informed' and/or 'misinformed', as if these were clear-cut categories. Felt and Fochler (2010) demonstrate that citizens also had their self-imagined roles and identities, which were created and re-created in public engagement exercises, many times with a great deal of influence by any given situation.

One more generic approach that still acknowledges diversity among publics is to set out four major groups: (i) campaigning publics, (ii) civil society publics, (iii) latent publics and (iv) diffuse publics (see Mohr et al. 2013). Table 4 describes these categories in more detail.

Table 4: Different types of publics (based on Mohr et al. 2013)

Publics	Description
Campaigning publics	Well-organised groups with a clear voice on the issue at stake. Their voice is projected through collectives such as NGOs and social movements
Civil society publics	Organised groups that do not specifically engage with the same issue but are visible to policy makers and others. Their voice is embedded in voluntary/third sector groups, e.g. registered charities, community groups and internet-based collectives
Latent publics	Groups lacking the resources to become an organised public, but who could potentially become one of the above. Their voice is dormant, and people are usually – although erroneously – seen by engagement proponents as not having particular or established views on an issue
Diffuse publics	The voices of these groups are captured through opinion polls and surveys. It may not be possible to know whether these publics identify themselves as being part of any of the other groups above

A point raised by Mohr et al. (2013) is that a static perspective of 'the public', along with the assumption that public behaviour and views are possible of being captured by research in advance of an engagement process, is misleading. Understandings of publics are always provisional as these will to be revealed through engagement and interaction, "rather than assumed to have fixed views and aspirations" (Mohr et al. 2013:4).

What the experience with public engagement seems to show us is that categorisations of publics (and citizens) are highly dynamic and context-dependent. We thus must bear in mind that:

a) any publics (or representatives of publics) are *a priori* 'qualified' to participate in public engagement experiments;

b) attention should be given to how engagement practice is being presented from the start and what are the assumptions regarding the role of publics (and experts) and

c) that categories are not static and may be redefined by publics themselves.

To ensure that publics are involved in science and technology, it is important to allow engagement exercises to explore 'public issues' (related to science and technology), such as future benefits, research investments etc. instead of narrowing down discussions to purely technical or scientific risk matters (Wynne 2007). Ideally, publics belonging to any of the groups described above who are involved in engagement initiatives would then be free to propose alternative ideas about what is the problem and whether a technology can respond to this problem.

5 Why engage with publics? Exploring engagement rationales

It is argued that the development and governance of science and technology innovation, in historical terms, has not been driven by a diverse group of people, but rather by a small elite group of scientists and politicians. Among other aspects, the growing interest in engaging with publics has its roots in responding to a crisis in trust, where public distrust in the handling of scientific and technological controversies by the State (and its experts), helped eroding the relationship science-society and is claimed to have fuelled public opposition to technical change (Irwin 2006). In the past few years, as a response to this, there has been increased emphasis on and a support for public engagement initiatives. This has notably been around controversial topics (Goven 2006).

It has been argued that possibly too much focus has been put on evaluating the methods and more procedural elements of engagement exercises, rather than questioning the motivations behind these. For Goven (2006), reflecting on the purposes of engagement is crucial. So just as reflecting on its strengths and pitfalls, and as a step that should precede any promotion of public engagement (especially that of evaluation), we must clarify its purpose and understand its political-economic context.

It is possible to identify three accounts of motivations or rationales for promoting public engagement with science and technology, (1) instrumental (2) substantive or (3) normative, which are set out in Table 5 (Marris and Rose 2010; Pallett 2012):

Table 5: Main motivations for bringing publics 'in' (based on Marris and Rose 2010 and Pallet 2012)

Narrative	Description
Instrumental	Public engagement seeks to **improve public trust and reduce conflict** to smooth the way for emerging technologies. It could also help achieving pre-determine outcomes to serve the interests of more powerful actors
Substantive	Public engagement aims at **incorporating lay knowledge to decision-making processes** and to improve the suitability of technological developments for their embedding in society
Normative	Public engagement **responds to a ethical need or a 'right' of publics to be involve in decision-making processes**, since science and technology directly affect our lives and are ultimately funded with public money

From a normative standing point, besides the ethical obligation to engage with those who are interested in or affected by science and technology, one of the strongest motivations to engage with publics is that we expect these developments to contribute to broader societal goals, which can only be defined and embedded in scientific and technological development through dialogue with publics.

However, while initiatives of public engagement have increasingly been supported in democratic societies – especially in countries like Denmark and The Netherlands (Irwin 2006) – their objectives, quality and impact have been at times taken for granted. The theory and practice of public engagement have been criticised on different grounds and for different reasons. Mainly for drawing on instrumental rationales, being limited by an only-rhetorical power (Irwin 2006), reinforcing mainstream visions of problems (Leach and Scoones 2003), and in particular for a tendency to support superficial dialogues and to reinforce the notion of a public that has limited scientific understanding also referred to as 'public knowledge deficit' (Stilgoe et al. 2014). This notion, which is popularly know as 'the deficit model', is based on the widespread idea that a lack of trust by the publics or a negative public perception of science and technology is a direct result of misinformed publics, i.e. that people who lack information on (the benefits of) science and technology tend to be opposed to these.

Drawing on this assumption of a deficit ('deficit model'), public engagement initiatives gained popularity and it has been claimed that they were promoted in an attempt to increase public support of emerging science and technologies. This meant that, through public engagement (and somehow against the original objectives of the proponents of engagement), those claiming to hold the expertise for it, would create spaces, define rules, design and implement initiatives aimed at promoting participation of publics, yet they might be creating only a certain type of public involvement and support (Felt and Fochler 2010). Certainly, there is still a long-way to go in the transition from 'deficit' to 'democracy' in more participatory forms of scientific governance. What is often seen are engagement processes that can be described as hybrid attempts at democratising science, where both forms coexist through different aspects of the engagement exercises (Irwin 2006). Despite the valid criticism, and recognised by Irwin (2006) himself, public engagement is still a sort of social experiment.

6 Different ways to 'engage': Exploring levels and forms of engagement

The Aarhus Convention adopted in 1998 distinguishes between citizens' access to information and citizens' participation in decision-making (UN Economic Commission for Europe 1998). The Convention indicates that the channels through which citizens' get informed (in this specific case, on environmental matters) include any form of written, visual, aural or electronic material. As for citizens' participation, the Convention states that citizens are allowed to comment on the plans, programmes and policies proposed, being their input taken into account to inform these developments.

As developed from practice in Impact Assessment (IA) processes, and in line with such a distinction, for any projects' implementation there are at least two different approaches through which publics get involved in decision-making: a *consultative* and a more *participatory* one (see Roberts 2003). While a consultative approach sits together with more conventional forms of public information and education in the public engagement spectrum, a participatory approach lies towards the opposite end, suggesting more inclusive practices aimed at having a direct effect on overall decision-making (see Figure 2).

Figure 2: Public engagement spectrum in the context of impact assessment (based on Roberts 2003)

Consultative approaches tend to be more…

- Advisory
- Fixed
- Controlled
- Prescriptive
- Linear

Participatory approaches tend to be more…

- Non-directive
- Empowering
- Uncertain
- Flexible
- Representative

Many organisations focused on promoting engagement and training practitioners have put forward what are considered as core values and principles that govern public participation. The International Association for Public Participation (IAP2), for example, suggests a number of values for public engagement, including: [9]

- Directly involving citizens in decision-making processes;
- Decisions take into account the publics' input, i.e. that this input influences the decision;
- Design of engagement itself is agreed and co-produced with publics;
- Publics are aware of how their input may affect the decision.

[9] These core values are indicated in IAP2's website: http://www.iap2.org/?page=A4 (last visited on 21 October 2015).

As a response to one-way approaches such as public hearings and expert panels, The Centre for Advances in Public Engagement suggests important principles of public engagement, which include:[10]

- Listening to publics allowing people to express their interests and concerns in their own language and terms;
- Attending people's leading concerns;
- Engaging with marginalised groups.

With a focus on the evaluation of public participation methods in the field of risk management, Rowe and Frewer (2000) have reiterated the distinction between consultative and participatory approaches. They attribute 'lower levels' of engagement to practices of top-down, one-way flow of information transmission or communication between scientists, regulators and the public; 'higher' levels to consultation exercises, focus groups and questionnaires; and 'even higher' levels to dialogue initiatives giving the opportunity to publics to have some authority in the decision-making process and characterised by a two-way flow of information exchange. In a later work (Rowe and Frewer 2005), they differentiate between three forms of engagement: (1) communication, (2) consultation and (3) participation mechanisms. The principle remains the same: communication implies a flow of information from a "sponsor" to public representatives; in consultations information flows from public representatives to the "sponsor" and in public participation there is a two-way flow of information (Rowe and Frewer 2005:255).

Different forms of engaging with publics (i.e. from more connected to consultative, to participatory approaches) should not be regarded as 'better' or 'worse' than one another. They are simply adequate to different situations and depend on the objectives of the organisers and participants of engagement activities. As noted by Roberts (2003), one cannot completely separate consultation and participation, as the outcomes of activities are typically located somewhere between both engagement approaches. Outside regulation or impact assessment, in the case of broader dialogues around science and technology, not all activities experimenting with public engagement aim at being fully participatory or assuming deliberative-democratic aspects (Tlili and Dawson 2010). In fact, the complexity of motivations, objectives and characteristics of such activities, which range from citizen's juries to science festivals makes it rather hard to situate practices. One of the reasons for this is because the field of public engagement with science and technology sits at the intersection between informal science education, democratic processes and 'science as entertainment' (Tlili and Dawson 2010).

In a comprehensive exploration of the theory and practice of public participation, Cornwall (2008) highlights the disputed nature of the term and the perspectives on different 'degrees' and 'kinds' of participation. She picks up on three key contributions on typologies of participation which try to illustrate, a) how participation "is ultimately about power and control", b) how the motivations of engagement organisers shape interventions and c) how there are "different interests at stake in various forms of participation" (Cornwall 2008:271) (see Annex 1). However, and despite the assessment of usefulness and prominence of these typologies, Cornwall (2008) argues that, when put into context, the different forms of participation become more ambiguous. Again, and as indicated earlier, the categories become blurred when these are analysed in practice.

[10] Public engagement: a primer from public agenda (01/2008). Available at: http://www.publicagenda.org/files/public_engagement_primer.pdf (last visited on 21 October 2015).

As a summary of what has been discussed in this paper, we can identify three broad models (Felt 2007) – which hopefully are helpful for thinking about public engagement with science and technology in BioSTEP (see table 6).

Table 6: Models of science and society relationships (based on Felt 2007)

Model	Description
Public education	Science and technology are sources of societal progress, but their **development should be protected from societal intervention** (i.e. publics do not intervene in process of knowledge creation). Potential public mistrust on **science derives from public illiteracy**, as well as ignorance and superstitions. **Scientists and experts, whose roles are of instructing and educating publics, must tackle this mistrust**
Public dialogue and participation	Science and technology are open to **societal debate** (with public authorities, industry and citizens), **although publics do not participate in the creation of scientific knowledge**. The limits between expert and lay knowledge become blurrier. The **existence of open debates legitimises decisions**
Public co-production of knowledge	Science and technology are **intertwined with society**. Citizens and other interest groups get **actively involved in the process of knowledge production of direct use for them** (scientists, experts and lay publics collaborate and work together in hybrid collectives). Knowledge is still created in formal R&D spaces, such as laboratories, but it **takes into account actions from citizens**

It should come as no surprise that by adding detail to the topic of public engagement with science and technology we ended up complicating the picture. As such we recognise that engagement is not at all straightforward both in theory and practice, however by posing a series of key questions that emerge from what has been discussed so far here, the next section proposes a reflection exercise for BioSTEP that should strengthen our work by helping us understanding our current perspectives on public engagement in our work and their potential implications for our planned engagement activities.

7 Reflecting on public engagement in BioSTEP

Based on the discussion presented in this working paper, there seems to be value in reflecting on our own views and practice on public engagement. This is important to help us recognise and discuss our assumptions and goals, as well as develop our approaches and write up the scope and limitations of our work. In doing so, in BioSTEP we suggest we discuss some of the following questions:

1. Who are the publics we are engaging with (i.e. what is our understanding of these publics)? If we categorise them, are we able to explain the relevance of such a categorisation in our work?

2. Based on which criteria (informed by a set of assumptions or context) are we selecting / inviting publics? Are we open to reassess these assumptions?

3. What are our motivations to engage with publics, within the remit of the project?

4. How are we engaging and how would we classify the different activities we are promoting in the participation spectrum?

5. What do we expect in terms of impact from our engagement activities (what are the changes we are hoping for)?

List of references

Brugha, R. and Varvasovszky (2000). Stakeholder analysis: a review. *Health Policy and Planning, 15*(3), 239-246.

Cornwall, A. (2008). Unpacking "Participation": models, meanings and practices. *Community Development Journal*, *43*(3), 269–283.

Felt, U., Wynne, B., Callon, M., Gonçalves, M. E., Jasanoff, S., Jepsen, M., Joly, P.-B., Konopasek, Z., May, S., Neubauer, C., Rip, A., Siune, K., Stirling, A. and Tallacchini, M. (2007). Taking European Knowledge Society Seriously. Report of the Expert Group on Science and Governance to the Science, Economy and Society Directorate, Directorate General for Research. Luxembourg: Office for Official Publications of the European Communities.

Felt, U. and Fochler, M. (2010). Machineries for making publics: Inscribing and de-scribing publics in public engagement. *Minerva, 48*, 219-238.

Goven, J. (2006). Dialogue, governance, and biotechnology: acknowledging the context of the conversation. *The Integrated Assessment Journal*, *6*, 99–116.

Ihlen, Ø. (2008). Mapping the environment for corporate social responsibility. Stakeholders, publics and the public sphere. *Corporate Communications: An International Journal, 13*(2), 135-146.

Irwin, A. (2006). The politics of talk: coming to terms with the 'new' scientific governance. *Social Studies of Science, 36*(2), 299-320.

Leach, M., and Scoones, I. (2003). *Science and citizenship in a global context*. IDS Working Paper 205.

Marries, C. and Rose, N. (2010). Open engagement: Exploring public participation in the biosciences. *PLoS Biology, 8*(11), e1000549.

Mohr, A., Raman, S., & Gibbs, B. (2013). *Which publics? When?* Retrieved from http://www.sciencewise-erc.org.uk/cms/assets/Uploads/Which-publics-FINAL-VERSION.pdf.

Pallett, H. (2012). *The (Re)publics of Science: Changing Policy and Participation.* 3S Working Paper 2012-04. Norwich: Science, Society and Sustainability Research Group.

Reed, M.S., Graves, A., Dandy, N., Posthumus, H., Hubacek, K., Morris, J., Prell, C., Quinn, C.H. and Stringer, L.C. (2009). Who's in and why? A typology of stakeholder analysis methods for natural resource management. *Journal of Environmental Management, 90*(5), 1933-1949.

Roberts, R. (2003). Involving the public. In H.A. Becker and Vanclay, F. (Eds.), *The international handbook of social impact assessment: conceptual and methodological advances* (pp. 258-277). Cheltenham: Edward Elgar.

Ross, H. (2003). Environmental mediation. In H.A. Becker and Vanclay, F. (Eds.), *The international handbook of social impact assessment: conceptual and methodological advances* (pp. 296-314). Cheltenham: Edward Elgar.

Rowe, G., & Frewer, L. J. (2000). Public Participation Methods: A Framework for Evaluation. *Science, Technology & Human Values*, *25*(1), 3–29.

Rowe, G. (2005). A Typology of Public Engagement Mechanisms. *Science, Technology & Human Values*, *30*(2), 251–290.

Sclove, R. (2010). *Reinventing technology assessment: A 21st century model*. Washington, DC: Science and Technology Innovation Program, Woodrow Wilson International Centre for Scholars, April 2010.

Stengers, I. (2000). Another look: Relearning to laugh. *Hypatia, 15*(4), 41-54.

Stilgoe, J., Lock, S.J. & Wilsdon, J. (2014). Why should we promote public engagement with science? *Public Understanding of Science, 23*(1), 4-15.

Tlili, A. and Dawson, E. (2010). Mediating science and society in the EU and UK: From information-transmission to deliberative democracy? *Minerva, 48*, 219-238.

UN Economic Commission for Europe (1998), *Convention on Access to Information, Public Participation in Decision-Making and Access to Justice in Environmental Matters*, 25 June 1998, Aarhus, Denmark. Available at: http://www.unece.org/fileadmin/DAM/env/pp/documents/cep43e.pdf (last visited on 21 October 2015).

Varughese, S.S. (2012). Where are the missing masses? The quasi-publics and non-publics of technoscience. *Minerva, 50*, 239-254.

Wynne, B. (2007). Public Participation in Science and Technology: Performing and Obscuring a Political–Conceptual Category Mistake. *East Asian Science, Technology and Society: an International Journal, 1*, 99-110.

8 Annex 1: Key contributions on participation typologies highlighted by Cornwall (2008)

Arnstein's (1969) ladder of participation	
Citizen Power	Citizen Control Delegated Power Partnership
Tokenism	Consultation Informing Placation
Non-Participation	Therapy Manipulation

White's (1996) typology of interests			
Form	**What 'participation' means to the implementing agency**	**What 'participation' means for those on the receiving end**	**What 'participation' is for**
Nominal	Legitimation – to show they are doing something	Inclusion – to retain some access to potential benefits	Display
Instrumental	Efficiency – to limit funders' input, draw on community contributions and make projects more cost-effective	Cost – of time spent on project-related labour and other activities	As a means to achieving cost-effectiveness and local facilities
Representative	Sustainability – to avoid creating dependency	Leverage – to influence the shape the project takes and its management	To give people a voice in determining their own development
Transformative	Empowerment – to enable people to make their own decisions, work out what to do and take action	Empowerment – to be able to decide and act for themselves	Both as a means and an end, a continuing dynamic

Pretty's (1995) typology of participation	
Type	***Characteristics of each type***
Manipulative participation	Participation is simply a pretence, with 'people's' representatives on official boards, but who are un-elected and have no power
Passive participation	People participate by being told what has been decided or has already happened. It involves unilateral announcements by an administration or project management without any listening to people's responses. The information being shared belongs only to external professionals
Participation by consultation	People participate by being consulted or by answering questions. External agents define problems and information-gathering processes, and so control analysis. Such a consultative process does not concede any share in decision-making, and professionals are under no obligation to take on boards people's views
Participation for material incentives	People participate by contributing resources, for example, labour, in return for food, cash or other material incentives. Farmers may provide the fields and labour, but are involved in neither experimentations nor the process of learning. It is very common to see this 'called' participation, yet people have no stake in prolonging technologies or practices when the incentives end
Functional participation	Participation see by external agencies as a means to achieve project goals, especially reduced costs. People may participate by forming groups to meet predetermined objectives related to the project. Such involvement may be interactive and involve shared decision-making, but tends to arise only after major decisions have already been made by external agents. At worst, local people may still only be co-opted to serve external goals
Interactive participation	People participate in joint analysis, development of action plans and formation or strengthening of local institutions. Participation is seen as a right, not just the means to achieve project goals. The process involves interdisciplinary methodologies that seek multiple perspectives and make use of systemic and structured learning processes. As groups take control over local decisions and determine how available resources are used, so they have a stake in maintaining structures or practices
Self-mobilisation	People participate by taking initiatives independently of external institutions for resources and technical advice they need, but retain control over how resources are used. Self-mobilisation can spread if government and NGOs provide an enabling framework of support. Such self-initiated mobilisation may or may not challenge existing distributions of wealth and power