SUSTAINABLE INNOVATION BACKCASTING AND PARTICIPATORY DECISION MAKING

The road from intervention to innovation

Udo Pesch[1], Jaco N. Quist[1]

[1]Delft University of Technology, Delft, The Netherlands

Abstract

Participatory intervention methods can be seen as tools to solve the problems that are the results of locked-in institutional practices. To repair such institutional problems, participatory tools have to address three sets of questions.First, who to select as a participant, and what is the function of the selected participants? Second, how can learning of participants of a project expand to wider society? Third, what is the status of the future in a method? The method of backcasting is attended here as a case, it will prove that not all of the issues introduced here are dealt with in a satisfactorily fashion, whereas it is contended that the explicit addressing of these three sets of questions will improve the effectiveness of such participatory intervention methods.

Keywords

Participatory intervention methods, backcasting, institutional lock-in, stakeholder selection, learning

1. Introduction

It is widely argued that sustainable development requires the creation and public acceptation of new technologies that are more sustainable than current technologies (see for instance Weaver et al. 2000, Mulder 2006). However, the resilience of existing

institutional structures seems to hamper the proliferation of many sustainable technologies. Even though actors coming from politics, business and society might agree on the necessity to have sustainable technologies, the uptake of new technologies proceeds at a disappointingly slow rate. The difficulty to have incumbent technologies taken up by society can be attributed path dependent socio-technical development, which. For instance, Unruh (2000) refers to the carbon lock-in, which stands to the resilience of existing fossil fuel based technologies and current socio-technical systems and current societies.

With institutional structures, we mean domains such as the state, the market, and science. These domains hand over *rules* and *practices* that guide actors in their decisions. In relation to new technologies and innovations, we observe that these domains have an inclination to predispose interest-based, risk-aversive and short-term oriented decisions. For instance, the government the time frame of just a few years is dominant, because of the need to score at periodical elections. At the same time, concrete influence into political decisions is not only exerted by elections, but in general much more so by lobbying and consultation processes in which particularistic stakes trump the public interest (Pesch 2005).

In other words, our institutional domains constrain decision in a way that is too myopic and particularistic to facilitate the development and diffusion of breakthrough technologies that are necessary to move towards a sustainable society. To actively stimulate the creation of sustainable technologies and innovations, methods of decision-making have been developed that aim to bring to together: (i) to facilitate the collaboration of actors from different societal domains like business, research, government, the wider public and public interest groups, (ii) to assimilate long-term perspectives into current decisions, (iii) to take a broad systemic perspective, and (iv) to use a broad notion of sustainability (Quist 2007). In general, these methods do not aim to replace the existing institutional power structures, but function as auxiliary approaches that have the potential to repair the shortcomings of traditional patterns of decision-making. The family of these newly developed methods will be denoted here as 'participatory intervention instruments. 'This family of participatory instruments includes backcasting (Quist 2007, Vergragt 2005, Quist and Vergragt 2006, Robinson 2003, Drehborg 1996, Carllson-Kanya et al 2008), whereas transition management (Rotmans et al 2001, Loorbach 2007), participatory integrated assessment (Van de Kerkhof et al

2004, Van de Kerkhof 2004) and constructive, participatory and interactive technology assessment (Schot and Rip 1996, Schot 1999, Grin et al 1997).

One of the methods that belongs to the family of participatory intervention is thus 'backcasting'. Our focus in this paper is on participatory backcasting – leaving out backcasting without stakeholder involvement. In addition, the broader relevance of our analysis to the related instruments will be addressed in the final discussion. Backcasting literally means looking back from the future and in this sense it is the opposite of forecasting in which is looked to the future from the present. The intention of backcasting is first to involve a variety of participants and let them develop an image of a desirable future[1], and second to collectively find out how that future could have been achieved and through what pathways or trajectories that could have happened. This is followed by setting agendas towards that desirable future and defining next step. Backcasting involving a broad range of societal actors can be framed as a social experiment and that is why we propose the term backcasting experiment for this (Quist 2007). In a backcasting experiment, a design of a future socio-technological system is generated/developed, critically assessed by different societal actors, and at the same time the backcasting experiment may create commitment at relevant actors, so that the new design is supported, but also that new technological development and related/supporting cultural, structural and institutional changes may follow out of the project (Drehborg 1996, Giddens 2009).

A growing number of studies shows that both participatory and non-participatory backcasting leads to desirable sustainable future visions, thoroughly analyzed and resulting in pathways towards the future vision and follow-agendas (Weaver et al 2000, Quist 2007, Bannister et al 2001). Empirical research also shows that backcasting experiments deliver promising results in terms of impacts and spin-off; (Quist 2007), However, the effectiveness of backcasting experiments as instruments that repair some intrinsic failures in the dominant political and economic system and the prevailing decision-making structures has not yet addressed. In this paper, we will contend that this repair of institutional features depends on the way that a participatory intervention

[1] Desirable or normative future refers to the other major distinction between backcasting and forecasting. Whereas the focus in backcasting is on normative desirable futures, the focus in forecasting is on likely and predictable futures.

instrument deal with the following three constitutive elements, *involvement* (or participation), *learning* and *future*.

It will be argued that it is no straightforward matter to incorporate these constitutive elements into participatory intervention methods in an integral and balanced way. Both elements invoke new problems and dilemma's which have to be resolved, which often burden organizers of these methods with the task to deal with these problems. In the following three sections, some of the main theoretical issues that 'involvement', 'learning' and 'future' pose for participatory intervention will be identified. Subsequently, we will try to retrieve to which extent the method of backcasting in particular is hindered (or not) by these issues, and with that make an assessment of the potential of backcasting to repair the deficiencies of current democratic decision-making structures and what challenges are to develop backcasting further to resolve this deficit.

2. Involvement

Participation by the public is one of the foundations of liberal democracy (Benn & Gaus 1983). In general, such participation merely involves periodical elections since the rise of liberal democracies. Only since the 1970s, participation by non-governmental actors has been introduced as a significant asset in policy-making (Hisschemöller 2005). Arguments given in favour of the introduction of stakeholder and citizen participation do not only pertain to the increase of level of democracy in decision-making, in the sense that the accountability and legitimacy is of decisions believed to become larger. It is also claimed to enhance the quality of decisions, because new knowledge is brought into the decision-making process, especially forms of knowledge that is not provided by regular science, such as local experience (Van de Kerkhof 2004).

The field of environmental policy is one of the domains in which the role of more extensive participation has manifested itself most significantly (Carter 2007). Also in the domain of technology assessment, public, citizen and stakeholder participation has gained support in the last two decades (Joss 1999); up to the extent that it has become an integral constituent. This has led to concepts and terms like interactive TA (Grin et al 1997), constructive TA (Schot and Rip 1997, participatory TA (Schot 1999), parliamentary TA and public TA. Finally, in policy making and public decision making a shift towards stakeholder involvement and decision-making has taken place too under

the assumption that this takes place in networks in which is the government is one actor instead or the hierarchical actor in command (Kickert et al 1997, De Bruijn and Ten Heuvelhof 2000).

The beneficial effects of stakeholder participation often appear to be taken for granted. However, 'democracy' is an ambiguous concept (Pesch 2005), as we will see below, it brings together contrastive ideologies, so the question can be raised how the involvement of non-governmental actors makes a decision-making process more democratic. Or, in other words, what is the democratic problem that participatory methods aim to solve, and will the introduction of such methods not lead to new problems?

These questions will be addressed by first looking at fundamental problem that is related to periodic elections and referendums, which is that preferences of the general public are aggregated to the highest order of abstraction. This means that elections are inarticulate and the representative quality of parliament for the public as a whole is questionable, which makes that decisions that are taken in name of the public are often perceived as not representing the public. On the contrary, decisions are perceived to be taken in institutional isolation or based on particularistic lobbying. Newly developed forms of decision-making try to warrant preferences of the individuals that make up the public to be articulated more clearly. However, the possibility of individual articulation leads to new problems. First, who is entitled to take part in this process of articulation? A second problem is how individual preferences can be transformed into a public preference. In each method of participatory decision-making, these problems have to be addressed, although not necessarily in an explicit fashion.

In relation to the first issue, we can broadly distinguish three types of participants: the general public, stakeholders and experts (Gethmann 2002). However, in none of these instances, a fixed recipe exists for deciding who is in and who is out. These types will be shortly discussed; subsequently the transformation of individual preferences into an overall statement will be addressed.

Before we can designate a person as belonging to the 'general public', it has to be determined what this 'general public' is. However, there are appears to be no clear-cut demarcation, as the concept of the 'public' is intrinsically ambiguous (Pesch 2005). The 'public' can be seen as the aggregation of all individual citizens, but the 'public' can

also be seen as an organic entity that transcends the simple aggregation of individuals. Analytically these two perspectives can be distinguished, and they may also be related to two distinct theoretical traditions, respectively the pluralist and the communitarian discourse (Huitema et al. 2007). From the pluralist perspective, the selection of a particular participant should be based on his or her representativeness of the whole of the public. In the communitarian discourse, representation is a nonsensical notion. A group of participation is believed to establish its own identity that is distinct from the general public. In other words, the group of participants constitutes a 'mini-public' whose preferences cannot be simply equated with those of the 'general public'.

A second type of participators concerns the category of 'stakeholders'. A denominator that can be unclear in itself (Van de Kerkhof 2004), but generally relates to organisations that are affected by, or that can affect the issue addressed in the participatory method at stake. However, these organisations are represented by individuals that can be selected because they are capable of looking beyond current interests and issues.

The determination of stakeholders is no easy process, especially dealing in the matters of sustainable innovations – as these eventually affect everyone. In other words, some pragmatic demarcation methods to select stakeholders from the general public should be applied. The introduction of such pragmatic methods – such as the snowball method – contradicts the theoretical ambition of most participatory processes to have an appropriate assembly of stakeholders.

Also in relation to the third group of participants, the 'experts', a fundamental problem between theory and practice emerges. The designated roles of such 'experts' are diverse, in some cases, they are believed to have state-of-the-art knowledge about the technology at stake, and therefore should be involved in assessment processes before others can have their say (Decker 2000). Other authors, however, stress that the core of the participatory process is to bring 'experts' and stakeholders or the lay public together (Rip 2006, Irwin 2005). In the latter, experts are seen as a particular category of stakeholders that have a stake too.

Another quintessential question is *who* is regarded to be an expert. Which individual is supposed to have superior knowledge in a certain domain? Collins and Evans (2002) introduced the 'problem of extension' as a reaction to this problem, they claimed that there is a 'hard core' of knowledge over which certain people dispose, while

others do not. This claim invoked some fierce reactions (Jasanoff 2003, Wynne 2003), as it was disputed that certain kinds of knowledge are superior to other kinds of knowledge, for instance local knowledge or user knowledge. As Mitroff et al. say: "An expert is not a special kind of person, but each person is a special kind of expert, especially with respect to his or her own problems" (1983: 25).

In sum, we may distinguish two ways of designating expertise knowledge to people. First, experts are distinguished upon the basis of their professional performance, and they are introduced to rationalise politics and society. In the second way, also lay people are considered to experts and they should be engaged in decision-making processes involved in order to enhance the quality of 'expert knowledge' – analogous to Ravetz's notion of extended peer review (1996).

The question about who to involve for a participatory intervention method opens up a number of problems. First, how can a certain group represent the general public; second, how to demarcate stakeholders from non-stakeholders; and third, who is an expert and what role do experts play in a project? A common feature of these problems is that theory is not conclusive on how to deal with them. Besides having to decide upon whom to involve, another question was how to transform the input of individual participants into a singular collective expression. This question has a clear connection to the problem of having a specific group representing a broader general public, which was identified above. It has been said that there are two contrastive conceptualisations of the 'public'. In the first conceptualisation, the 'public' is the simple aggregation of individual preferences; while in the second conceptualisation, the 'public' preference exceeds this simple aggregation. In a pluralist perspective, the selection of participants should be based upon representative qualities; the eventual aggregate preference of the participants then can be taken as a proxy for the preference of the general public. In a communitarian perspective, the 'public' has an identity of its own, based on the consensus that emerges out of deliberation of the community (Habermas 1996).

Participatory projects are not by definition communitarian or pluralist – although most methods appear to be framed in communitarian terms (cf. Huitema et al 2007). The involvement of stakeholders can just as easily imply the prolongation of the institutional status-quo. Stakeholders may be introduced as a continuation of elite forms of decision-making or, contrarily, to empower groups that have been left out. Similar tendencies can

also be seen in the involvement of experts, these can be brought in as authoritative agents, but they can also take part of a mutual learning process. Another pitfall is that policy agents often comprehend participatory procedures to be forums to inform stakeholders about decisions already taken. In the best cases, participatory procedures are understood as consultation rounds. With that, these procedures tend to be used to create public support, while prolonging existing power relations.

There is quite a range of issues to be settled. Which kind of participants have to be involved; and how the input of these participants will be used? In case of the method of backcasting – and this is also valid for other methods that are related to Technology Assessment (cf. Grin et al. 1997; Smit & Van Oost 1999) –, these issues appear to be not that acute, predominantly because backcasting projects do not have the pretence of representing the general public. Instead, groups of participators are mostly involved to test the social robustness of a design, to develop new guiding ideas and to facilitate the societal uptake of these ideas.

In other words, backcasting is not aimed at decreasing a democratic deficit, but it is predominantly geared as a tool to produce sustainable technologies that are more likely to be successful. This alternative emphasis of backcasting does not imply that the considerations presented earlier in this section are not relevant for organizing this kind of project. Participants of a backcasting project should be selected with great care, taking the following reflections in mind.

First, in order to test the social robustness of a design, it is important to gather actors that represent a variety of societal perspectives. Representativeness, thus, is not so much a goal in itself, but a means to unleash opposition from different societal angles. Nevertheless, the same tension between group dynamics and representativeness is still present; the social processes inside of the group of participants might create a distance between the group and the society at large. This potential threat has to be attended by the organizer of a backcasting project.

Second, in order to warrant the institutional back-up that is necessary to facilitate further promotion of the sustainable trajectory, influential actors from politics, industry and society have to be involved. Again, a profound tension emerges here: actors that have the institutional position to exert substantial influence so to create a new

institutional regime, in general, also the ones most depending on the existing institutional status quo.

In sum, the job of the organizer of a backcasting project is one of balancing. Different tensions have to be acknowledged and attended. A variety of people have to be involved that represents a reservoir of creativity, influence and commitment, subsequently these actors have to be managed so to unfold the full potential of backcasting.

3. Learning

Learning is usually related to the assimilation of new information, and the application of that new information to subsequent actions. In literature, different forms of learning have been articulated, such as 'social learning', 'reflexive learning', 'higher-order learning', and 'policy learning'. What is common to all these forms of learning is that they imply *change*: those who learn, undergo a change in knowledge and/or action. Second, the change is not merely a change but also an *improvement* (Van de Kerkhof 2004).

Participatory intervention is aimed at changes in social behavior so that we can come closer to a sustainable society. 'Learning' therefore is one of the constitutive elements of participatory intervention methods. These instruments should be unambiguously oriented towards the capacity of people to learn. The importance of learning in participatory intervention becomes more clear if we related to the capacity that change of conduct can be achieved in the existing institutional structures. As claimed earlier, these structures have a bias to persevere in existing patterns of behavior, so that they effectively obstruct the capacities of people to learn.

Two questions have to be answered in this question. First, it has to be explored how exactly existing institutional structures prevent learning. Second, we have to find out how participatory intervention tools allow for effective learning. The fundamental issue that emerges from this discussion is how does learning among a group of stakeholders lead to behavioral change outside of this group – this issue relates to points raised in the previous section about which conceptualization of the 'public' is used in a certain participatory method.

We will contend that learning about new technology pertains to the creation of new meanings, and as such we are dealing with a communitarian discourse on democracy (Pesch & Quist 2008). The consequence of this perspective is that participatory intervention instruments have to address the issue of how results are scaled up so that behavioral changes will pertain to society as a whole, and not just a selected group of stakeholders

4. Long term and short term future

The third constitutive element of participatory intervention, that of 'future', shows a pattern that has some similarities with the situation of 'involvement' and 'learning'. Also in this case there are intrinsic tensions and ambiguities that are often not made explicit. At the same time, there are crucial differences, because making decisions with the long-term future in mind is not associated with democracy. In fact, such decisions are often associated with non-democratic regimes, in which a blue-print design of social reality is pursued, while neglecting short-term societal needs. Furthermore, thinking about the long-term future may be apprehended as irrelevant, because the far away future cannot be predicted, let alone be managed (cf. Boersema 2001).

The question arises whether it is possible to address long-term issues in a democratic setting, and, even in case that this question is affirmed, whether it is possible to include the attention for long-term concerns in participatory methods. Indeed, Fred Steward (2008) sees the balancing of short-term activities with long-term visions as possibly the greatest challenge for participatory intervention methods. The method of backcasting precisely seems to take up this challenge (also see Giddens 2009). The question remains whether backcasting can solve the tensions and ambiguities that prevail in relation to long-term decision-making.

Here, we will identify four areas of tension. **First** of these concerns the fundamental unpredictability of future developments. It is this fundamental impossibility to know what the future that necessitates us to develop all kind of tools, methods, and heuristic frameworks to anticipate what lies ahead of us. The other three tension areas straightforwardly evolve from this fundamental unpredictability. The **second tension** involves the way how we construct future visions are constructed. In the end, these visions are based on an assessment of today's developments or today's problems and,

while in the future totally new, unexpected developments may emerge. A **third** problematic aspect concerns the heterogeneity of visions and expectations. It can easily be the case that a vision about a certain technology appears to be shared by all participants, while in fact a closer look reveals that this consensus is only terminological or rhetorical, and participants have other time-scales, implications, meanings, etc. A **final** difficulty concerns the different styles of politics necessary to achieve either short-term or long-term goals. According to Grunwald (2000), long-term goals require an authoritarian style of politics instead of participatory methods. Before these issues will be elaborated, we will pay attention to the underlying question, namely to what extent can we control or manage the future. Afterwards, we will explore how the method of backcasting deals with the questions raised here, and we will contend that the observed theoretical pitfalls do not pose a threat for the legitimacy of backcasting-projects. In fact, the existing tension areas can be resolved by the confrontation of the plurality of these tensions.

The role of long-term visions is among others described by Grin (2000). He talks about such visions as '*futuribles*', or attainable futures – and makes a connection with the German notion of *Leitbilder*, which means 'guiding vision'. The emphasis upon visions emerges from the consideration that future developments are dependent upon ideas, notions, persuasions that are collectively held. In general, people are not aware of these visions; but taking a reflexive stance opens up the possibility to actively utilise such visions as a policy tool to pursue a more sustainable future: "the question is *not* whether it is possible to shape the future according to some shared vision, but rather when it is possible to shape the visions that *are* guiding us into ones that we like better" (p. 11). In other words, our common future is influenced by a set of future visions, and it might be worthwhile to find out if these visions can be employed deliberately so that a more desirable future may be achieved. It needs to be realized that within society various competing visions are at play, but that due to social processes certain visions become more supported and thereby more dominant, providing more guidance to developments and actors. Studies on technology dynamics validate Grin's claim that future visions can have an important role. *Expectations* about the qualities and benefits of certain scientific developments and technologies are an indispensable condition to create funding, establish organisations and institutions (Van Lente 1993; Rip and Van Lente 1998).

In other words, visions and expectations govern our activities, however, until now not in a conscious manner. A method that could actively help to create and develop such visions and expectations appears to be an important asset to existing decision-making processes. Such a method could act as a coordinating force, and open up opportunities for investment, create of expectations, stimulate institutional cooperation, etc. The prospects for backcasting are promising. But how do these prospects hold in relation to the tension areas that were introduced above? Let us look more in more detail at these issues.

To start with, what are our capacities to look into the future? According to Van 't Klooster (2008), there appear to be two ways in which people make predictions about future developments. First of these concerns that current developments are extrapolated into the future. This technique is recognizable in the work of econometrists and scenario-builders. In the second approach, a normative end-status is taken as a starting point of reflections. Clearly, this approach is the foundation of the backcasting method, but one can also recognize this approach in utopian and dystopian accounts. Also in this normative approach, there is an element of extrapolation, because it revolves around the expectation that the scale of certain problems will be substantially bigger or smaller. In other words, most future accounts reason from today's situation, and as such are quite fundamentally conservative.

A second fundamental problem is the heterogeneous character of expectations. Expectations may be simultaneously framed in terms of fifty years and in terms of a few months, they may be framed in terms of progress (as a generic public good) and in terms of a specific problem-solver. Nanotechnology for instance is seen as the 'most important scientific development of this time', 'the technology that will solve cancer', while is at the moment used to stop your clothes from getting wet, and your socks from smelling bad. This plurality of expectations implies that common future visions are susceptible to incoherence and incompleteness, that might lead to doubts about the commonality of the proposed vision – is the meaning of the vision genuinely shared by all participants, or is the commonality simply rhetorical?

A third problem, observed by Grunwald (2000), concerns the fundamental dilemma between the long-term and the short-term routes towards sustainability. Short-range policies have to be orientated towards the public acceptance of technologies,

which implies that policies must concentrate on *current* levels of acceptance. In turn, this focus on current levels of acceptance might go to the extent of *future* levels of acceptance, especially as public perceptions of the risks and benefits tends to be unstable, due to their susceptibility of dramatic events. In general, policies concentrating on acceptance therefore are incrementalist and anti-innovative by nature, above all trying to 'massage' the public by establishing contextualising strategies and bottom-up procedures. It is only evident that long-term requirements ask for another policy disposition. The stakes that are incorporated in the aspiration towards a more sustainable society suggest that it is not wise to wait for the public to accept new technologies, but that it is necessary to enforce a stable framework of expectations and obligations that bind both innovators and the public to a common orientation.

So how can backcasting work its way around these issues? A first important characteristic is that backcasting allows 'visions' to be used in an instrumental fashion. One of the aims of constructing 'visions' is the creation of a common ground that binds different actors. To find a common ground, it is sometimes necessary for actors to leave their interest-based starting points. In this, the strategic role of visions is important: the projection of a far away future enables the liberation of participants from their current interests, so that they might take a more objective stance towards a particular problem. In this way, the future provides participants with a Rawlsian 'veil of ignorance'.

Indeed, literature suggests that visions and expectations that become shared and adopted amongst sets of actors, may be crucial for providing guidance (where to go) and orientation (what to do). Whereas this has been clearly shown for emerging visions (e.g. Dierkes et al. 1996) and expectations (Van Lente 1993), this needs further investigation for the case of deliberately desirable visions and backing expectations. Recently, first evidence of this has been shown for spin-off of participatory backcasting (Quist 2007), yet this needs to be further substantiated.

Also, the vagueness that often can be found in expectations about the future may not be considered to be a problem *per se*. Mutual misunderstanding can have its positive side-effects, namely that it can hold actors together even though different interests are pursued. In order to find a common ground, a certain extent a conceptual vagueness and abstraction can make people think that they have embarked on a similar cause. For instance, the concept of 'sustainable development' suffers from great imprecision and

even contradiction (Giddens 2009), but has played an important role in overcoming the antagonism between environmentalists and industry, so that effective measures could be taken, even though a closer look would reveal the different understandings of sustainable development.

A final issue that is to be addressed here, concerns the fundamental unpredictability of future developments. As already been said, future visions can be used in an instrumental way in backcasting. This does not imply that such visions should be implausible; on the contrary, if a vision is more credible, it can be expected to be more attractive for actors to commit themselves to that vision, enhancing the chances that actions will be undertaken. Also in this respect backcasting holds several trump cards, because this method raises problem perceptions from a wide societal range, making the eventual future vision more resilient to unexpected developments. The confrontation of different perspectives functions as a reality check that prevents one-sided vision to become prevalent.

In this section, it has been argued that given our current understanding of how future visions may coordinate and align activities. With that, it seems a sensible idea to create decision-methods that could explicitly be used to develop desirable future visions. An important issue was whether such long-term visions could also be created in a manner that is reckoned to be democratic.

Backcasting takes up this challenge by juxtaposing stakeholder participation and designing long-term future visions. Even though a number of crucial difficulties have been identified and described, the promise of backcasting can still be maintained – especially because seems to be working its way around different dilemma's, cancelling out different threats.

5. Future, learning, and involvement

This paper started with the observation that the dominant approaches to collective decision-making fell short on incorporating attention for broad public engagement and long-term concerns. Especially in the field of sustainable development, new decision-making methods that address both these shortcomings have been developed.

In order for these new methods to function some dilemma's have to be resolved. We have shown how the dimension of 'involvement' invokes queries about who to select, and which overall goal is to be served. These queries are strongly related to the dimension of 'learning', which is one of the elementary goals of participatory intervention instruments. The dimension of 'future' brings in the heterogeneity of expectations, the different values backing visions and the dilemma between short-term and long-term requirements.

The tensions observed here are generally not recognised in participatory intervention theory, which implies that managing these tensions becomes the burden of the organisers of concrete projects. With that, also the success of a particular project depends upon the skills and intuitions of the organisers (cf. Reuzel et al. 2007). It would enhance the legitimacy of participatory intervention methods, if their underlying assumptions are made explicit, and attainable for those involved in these methods.

Underlying this observed gap between theory and practice of participatory intervention, is a tension that is invoked by the *reflexivity* that is intrinsic to these kinds of methods. The uptake of reflexivity in decision-making processes basically means the introduction of an 'alien' notion: reflexivity urges decision-making processes to be opened up, whereas the essence of decision-making which implies a process of closure (Lynch 2000; Stirling 2006). This problem has been denoted as the 'efficacy paradox', which refers to the "contradicting requirements of opening up and closing down in social problem-solving processes" (Voß et al. 2006: 420, also see Stirling 2005).

Here we have concentrated on backcasting as one particular participatory intervention method. Obviously, it would be very interesting to apply the analytical framework presented here to other participatory intervention methods, such as constructive technology assessment, strategic niche management, transition management, and participatory integrated assessment. As for now, we may conclude by giving some final reflections on the potential of backcasting as a method that restores some elementary shortcomings of prevalent decision-making processes.

It is stressed by Voß et al. that reflexive governance requires the balancing of these diverging motions. In our account on backcasting we have shown that this method appears to be very fit to this requirement, because it allows contrastive pulling forces to be balanced. The most salient strong points in this respect are that an unbiased

approach is guaranteed by two features. First the involvement of a wide range of societal actors decreases the chance that eventual future vision is strongly one-sided. Second, future visions can be used in such a way that actors do not consider their institutional position to be under threat; again this guarantees a certain level of objectivity. At the same time, backcasting projects may trigger interesting new developments; the initial disinterestedness can be transformed in personal and institutional commitment.

At the same time, we should not underestimate the drawbacks of backcasting. Most notably, these can be found in the aspect of representativeness. As has been claimed at the end of section two, the main function of backcasting is not to redeem the democratic deficit, but to generate new guiding ideas and to test the social robustness of new designs. This focus might go to the extent of attention for the representativeness and democratic level of group decisions. If backcasting is apprehended as a method that repairs both the democratic deficiency and short-sightedness of current forms of decision-making, then it seems to be a matter of the highest priority for organizers of backcasting projects to constantly keep an eye upon the questions whether the selection of the group represents the general public and whether internal group dynamics do distance this group from the public. In other words, backcasting does not discharge organizers from being on their guard.

References

Kickert, W.J.M., Klijn, E.H. & Koppenjan, J.F.M. (1997). Managing complex networks. Strategies for the public sector. London: Sage Publications.

Beck, U. (2006). Reflexive governance: politics in the global risk society. In J.P. Voß, D. Bauknecht & R. Kemp (eds.), Reflexive governance for sustainable development (pp. 31-56). Cheltenham UK: Edward Elgar.

Benn, S.I., & Gaus, G.F. (1983). The Liberal Conception of the Public and the Private. In S.I. Benn & G.F. Gaus (eds), Public and Private in Social Life (pp. 31-65). London and Canberra: Croom Helm.

Boersema, J.J. (2001). How to prepare for the unknown? On the significance of future generations and future studies in environmental policy. Environmental Values 10: 35-58.

Carter, N. (2007). The Politics of the Environment. Ideas, Activism, Policy. Second edition. Cambridge, etc.: Cambridge University Press.

Collins, H.M., & Evans, R. (2002). The third wave of science studies. Studies of expertise and experience. Social Studies of Science 32(2): 235-296.

De Bruijn, J.A. & Ten Heuvelhof, E.F. (2000). Networks and decision making. Lemma: Utrecht.

Decker, M. & Ladikas, M. (2004). Bridges between science, society and policy. technology assessment - methods and impacts. Springer: Berlin.

Decker, M. (2000). Replacing human beings by robots. How to tackle that perspective by technology assessment? In J. Grin & A. Grunwald (eds.), Vission assessment: Shaping technology in 21st century society. Heidelberg, etc: Springer Verlag.

Dierkes, M., Hoffmann, U., & Marz, L. (1996). Visions of technology: social and institutional factors shaping the development of new technologies. Frankfurt & New York: Campus Verlag/St. Martin's Press.

Gethmann, C.F. (2002). Participatory technology assessment: some critical questions. Poiseis & Praxis 1(2): 151-159.

Grin, J., Van de Graaf, H., & Hoppe, R. (1997). Technology assessment through interaction, Rathenau Institute. The Hague: The Netherlands.

Grin, J. (2000). Vision assessment to support shaping 21st century society? Technology assessment as a tool for political judgement. In J. Grin & A. Grunwald (eds.), Vission assessment: Shaping technology in 21st century society. Heidelberg, etc.: Springer Verlag.

Grunwald, A. (2000). Technology policy between long-term planning requirements and short-ranged acceptance problems. New challenges for technology assessment. In J. Grin & A. Grunwald (eds.), Vission assessment: Shaping technology in 21st century society. Heidelberg, etc.: Springer Verlag.

Habermas, J. (1996). Three Normative Models of Democracy. In S. Benhabib (ed.), Democracy and Difference. Contesting the Boundaries of the Political (pp. 21-30). Princeton: Princeton University Press.

Hisschemöller, M. (2005). Participation as knowledge production and the limits of democracy. In S. Maasen & P. Weingart (eds.), Democratization of Expertise? Exploring novel forms of scientific advice in political decision-making (pp. 189-208). Dordrecht: Springer.

Huitema, D., M. van de Kerkhof & U. Pesch (2007). The Nature of the Beast: Are Citizens' Juries Deliberative or Pluralist? Policy Sciences 40: 287-311.

Irwin, A. (1995). Citizen Science. A Study of People, Expertise and Sustainable Development. London: Routledge.

Jasanoff, S. (2003). Breaking the Waves in Science Studies: Comment on H.M. Collins and Robert Evans, 'The Third Wave of Science Studies'. Social Studies of Science 33(3): 389-400.

Joss, S. & S. Bellucci (2002). Participatory Technology Assessment. European Perspectives. Centre for the Study of Democracy.

Joss, S. (1999). Public participation in science and technology policy – and decision-making – ephemeral phenomenon or lasting change? Science and Public Policy 26(5): 290-293.

Lynch, M. (2000). Against Reflexivity as an Academic Virtue and Source of Privileged Knowledge. Theory, Culture & Society 17(3): 26-54.

Mitroff, I., R. Mason & V. Barabba (1983). The 1980 census: Policymaking amid turbulence. Massachusetts: Lexington Books

Mulder, K.F. (2006). Sustainable Development for Engineers: A Handbook and resource Guide. Sheffield: Greenleaf.

Pesch, U. (2005). The Predicaments of Publicness. An Inquiry into the Conceptual Ambiguity of Public Administration. Delft: Eburon.

Quist, J. (2007). Backcasting for a sustianable future. The impact after 10 years. Delft: Eburon.

Ravetz, J.R. (1996). Scientific Knowledge and its Social Problems. New Brunswick & London: Transaction Publishers.

Reuzel, R., Grin, J., & Akkerman, T. (2007). The role of the evaluator in an interactive evaluation of cochlear implementation: shaping power, trust and deliberation. International Journal for Foresight and Innovation Policy 3(1): 76-94.

Rip, A. & Van Lente, H. (1998). The Rise of Membrane Technology: From Rhetorics to Social Reality. Social Studies of Science 28(2): 221-254.

Rip, A. (2006). A co-evolutionary approach to reflexive governance – and its ironies. In J.P. Voß, D. Bauknecht & R. Kemp (eds.), Reflexive governance for sustainable development (pp. 82-102). Cheltenham & Northampton: Edward Elgar.

Sabatier P.A., & Jenkins-Smith, H.C. (1999). The advocacy coalition framework: an assessment. In PA. Sabatier (ed.), Theories of the policy process (pp. 117-166). Oxford Westview Press: Boulder.

Smit, W.A., & Van Oost, E.C.J. (1999). De wederzijdse beïnvloeding van technologie en maatschappij. Een Technology Assessment-benadering. Bussum: Coutinho.

Smits, R. (2002). Innovation studies in the 21st century: questions form a user's perspective, Technological Forecasting and Social Change 69: 861-883.

Steward, F. (2008). Breaking the boundaries: Transformative innovation for the global good. NESTA paper.

Stirling, A. (2005). Opening up or closing down? Analysis, participation and power in the social appraisal of technology. In M. Leach, I. Scoones & B. Wynne (eds.), Science and Citizens: Globalization and the challenge of engagement (pp. 218- 231). London: Zed Books.

Stirling, A. (2006). Precaution, foresight and sustainability: reflection and reflexivity in the governance of science and technology. In J.P. Voß, D. Bauknecht & R. Kemp (eds.), Reflexive governance for sustainable development (pp. 225-272). Cheltenham & Northampton: Edward Elgar.

Van de Kerkhof, M. (2004). Debating climate change: A study of stakeholder participation in an integrated assessment of long-term climate policy in the Netherlands. Utrecht: Lemma.

Van Lente, H. (1993). Promising Technology: The dynamics of expectations in technological developments. Enschede: University of Twente.

Voß, J.P., R. Kemp & D. Bauknecht (2006). Reflexive governance: a view on an emerging path. In J.P. Voß, D. Bauknecht & R. Kemp (eds.), Reflexive governance for sustainable development (pp. 419-438). Cheltenham & Northampton: Edward Elgar.

Weaver, P., Jansen, L., Van Grootveld, G., Van Spiegel, E., & Vergragt, P. (2000). Sustainability technology development. Sheffield: Grealeaf Publishers.

Wynne, B. (2003). Seasick on the Third Wave? Subverting the Hegemony of Propositionalism: Response to Collins & Evans (2002). Social Studies of Science 33(3): 401-417.