Technological Forecasting & Social Change 169 (2021) 120802

Contents lists available at ScienceDirect

Technological Forecasting & Social Change

journal homepage: www.elsevier.com/locate/techfore

Stakeholder inclusion in scenario planning—A review of European projects

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ARTICLE INFO

Keywords:
Scenario planning
Stakeholder inclusion
Engagement
Europe
Participatory
Foresight

ABSTRACT

Stakeholder inclusion is a core element of many scenario planning practices. The literature on this topic is vast and has documented that involving stakeholders in such processes is crucial to secure an impact on actual decision making and produce positive societal outcomes. However, few studies have homed in on more detailed questions about exactly why, how and to what ends engaging diverse stakeholders matters to scenario planning. This study of stakeholder inclusion in scenario planning for policy making reflects on four detailed key arenas. We first investigate the concept of stakeholders and how the scenario planning literature considers them. We explore the different types of relevant actors to include in a participatory scenario process, and we probe which methods are used to identify stakeholders to engage. Second, we investigate the role or function of stakeholders in the scenario planning process and find that stakeholder involvement has specific and detailed functions in particular phases of scenario planning. Third, we explore which methods are used to include stakeholders in scenario planning processes. Finally, in a synthesis across the study, we explore some of the key tensions and open questions related to including stakeholders in scenario planning processes.

1. Introduction

In modern democratic societies, few question the normative value of stakeholder involvement in addressing contemporary societal challenges or problems. Creating opportunities for broad public and professional debate and deliberation is often viewed as a good in and of itself (Stirling 2008). However, stakeholder involvement is also viewed as instrumentally necessary in order to gather and synthesize the knowledge and perspective required to make sense of many societal challenges.

Public engagement in science and technology has been studied for several decades (Kern 2015; Rowe and Frewer 2005; Selin et al., 2016; Stilgoe et al., 2014; Stirling 2008). The literature on this topic is vast and has documented that involving stakeholders and citizens in debates and research about science and technology is crucial to secure an impact on actual policy making and produce positive societal outcomes. The last decades have seen increasing calls to integrate stakeholder involvement, and expert and public deliberation have been placed high on the political agenda, especially in Europe. The Rome Declaration emphasized that 'early and continuous engagement of stakeholders is essential for sustainable, desirable and acceptable innovation' (EU-Council 2014). Stakeholder engagement is also a key issue in more recent documents from the European Union, such as the implementation strategy for Horizon Europe; the 2021–2027 Framework Programme for Research and Innovation (European Commission 2020).

As innovation is largely about the production of novelty and is challenged by multi-variate uncertainties, stakeholder engagement is regularly tuned to the future. Stakeholders, members of the public, and other experts are pressed to explore critical uncertainties in order to inform or devise policy recommendations. Methods such as scenario planning, Delphi studies, horizon scanning, and other foresight methods have for long regularly been deployed in policy settings (Bradfield et al., 2005; Luke Georghiou et al., 2008). The idea is that prediction is not a viable mechanism to deal with social, political, regulatory, cultural, technological and economic uncertainties has long been challenged. More than 50 years ago, Olaf Helmer noted a change in attitudes towards the future, a shift away from striving for prediction to acknowledging uncertainty and indeterminacy (Helmer 1967).

Scenario planning in particular is increasingly used as a method to engage stakeholders to explore uncertainties, plot alternative futures and devise resilience policy and strategy options (Cairns et al., 2013; Ramirez and Wilkingson 2016). These approaches focus attention on

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https://doi.org/10.1016/j.techfore.2021.120802
Received 4 September 2020; Received in revised form 22 March 2021; Accepted 10 April 2021
Available online 27 April 2021

grappling with and clarifying uncertainty, leaning into ambiguities rather than obscuring them and attempting to make explicit the variety of competing views of the future in play. A central purpose of scenario planning is to open up the future, disclose a number of new possibilities, and avoid lock-in of perspectives focused on a single outcome. This is regularly achieved by bringing in diverse and often unconventional views to extend the range of points of view brought to bear on a problem or challenge.

Thus, at the core of the scenario planning methodology is a focus on stakeholder inclusion. Scenario planning has long approached the future as a discursive space where a variety of competing worldviews vie to make sense of uncertainty and complexity. Through a series of 'strategic conversations', as articulated by van der Heijden (1996), 'scenarios are developed collectively to build shared images of possible futures…scenarios nurture openness to change by allowing more complexity in future states of a system and the environment to be taken into account.' The perceptions of those involved in such processes—the subjective judgements of experts, the public and other stakeholders—surface and are collectively debated. The participative nature of most approaches to scenario planning has led some scenario scholars to refer to scenario planning as a social technology where trust, expertise, power and social influence matter (Ramirez and Wilkingson 2016; Selin 2006). This underscores that stakeholder inclusion in scenario planning is intrinsic to the methodology itself. However, few studies have homed in on more detailed questions about exactly why, how and to what ends engaging diverse stakeholders' matters to scenario planning: Who is considered a stakeholder? Which types of stakeholders should be chosen? What are the methods to engage stakeholders? What are the roles or functions of stakeholders in scenario planning? What are the possible tensions and challenges in general when including stakeholders?

Aggravating the scientific pursuit of these questions is the practical reality that such future-focused methods are used in a wide array of settings, seldom follow the same protocol, and are oriented towards achieving diverse and often incommensurate aims. Furthermore, many projects are scantily tracked in the academic literature, and the results are often kept confidential or presented with little publicly available detail on the methods. Nevertheless, there is a need to establish which approaches to stakeholder inclusion work well and what sorts of effects they produce. In an analysis of scenario planning in public policy, experienced scenario scholars from the European Environment Agency concluded that 'further efforts should be directed to learn more systematically from cases of "good practice" and to synthesize this knowledge base' (Volkery and Ribeiro 2009). In this paper, we take up this call to develop the knowledge base and explore how stakeholder inclusion is treated in scenario planning. By conducting a systematic review of the literature, we investigate why stakeholders are included in scenario planning processes, how such projects are practically implemented, what sorts of challenges they face, and what outcomes they produce.

This study of stakeholder inclusion and scenario planning in policy making reflects on four key themes. First, we consider what is meant by 'stakeholders' and how to explore the most commonly engaged *types of stakeholders*. Second, we investigate the *role or function* the stakeholders play in the process. Third, we explore which *methods* are used to integrate stakeholders into scenario planning processes. Finally, in an act of synthesis across the study, we explore some of the *key tensions and challenges* in including stakeholders in scenario planning processes. In doing so, we aim to illuminate one aspect of scenario planning practice—stakeholder inclusion—that is often assumed and celebrated but seldom examined directly and systemically.

2. Method and data

Our study makes use of a systematic review of the scenario planning literature. In stage one of our effort, we look to the literature to understand how stakeholder inclusion is addressed on a conceptual basis. We draw heavily on articles published in *Technological Forecasting and Social Change, Futures*, and *Foresight*, giving weight to highly cited articles as a rough indicator of influence. Our first assessment of the scenario planning literature is that it is dominated by three groups of articles. One group presents overviews and typologies of the scenario literature and scenario planning in general. Another group suggests variations on scenario planning or new ways to conduct specific elements of the scenario process, often based on what has been learned from a single case. A third group reports on actual scenario planning projects and shares the results of a project, with such cases being dominated by energy, climate and physical planning (e.g., land use). Given the practice-based focus of our inquiry, we devoted the most detailed effort to reviewing practical case studies or articles that offer a detailed account of scenario planning in practice. The articles were retrieved through searches on SCOPUS and restricted to journal articles. While there are many books on scenario planning, some of which deal directly with participation, stakeholders and engagement, we chose to rely on the peer-reviewed academic literature. We also narrowed our scope to English-language articles and appreciate that this choice is another limitation. Further, in narrowing our search, we focused on practical cases that were conducted in Europe. While scenario planning is practised around the world, we hoped to enable better comparability by focusing on one region. While there is much cultural variation across Europe, there are some large institutional factors (i.e., the EU and the political systems in general) that bind European countries together, creating relative homogeneity. We believe that limiting ourselves to Europe is a necessary constraint but realize the importance of a broader study that could explore differences in stakeholder inclusion in different parts of the world.

We attempted to be disciplined in our systematic review. The keywords in the SCOPUS searches reflected the overall aim of the study and included the following search string: (participatory OR stakeholder*) AND (involvement OR contribution) AND (process* AND scenario*). This search resulted in 198 articles published between 2003 and 2016. The abstracts of the articles were examined according to our study scope, and 95 articles were extracted as relevant. Thereafter, the articles were evaluated for relevance against the research questions. Articles that included an appropriate description of the stakeholders, stakeholders' functions and applied participatory methods were migrated to the final list of 30 articles (see Table 1). Given our concern with practice, we excluded conceptual papers that did not discuss the results of any particular project. We also excluded papers that merely mentioned that stakeholders were involved without discussing methodology. Other papers that focused only on the end product—often scenarios—were excluded due to their lack of emphasis on methods and participatory techniques. Other studies evaluated only specific tools, such as multicriteria analyses, to choose the best scenario and thus lacked reflections on participatory or stakeholder efforts. Four of the thirty articles were published in journals that, generally speaking, target the international academic foresight or scenario communities, i.e., *Technological Forecasting and Social Change* and *Futures*. Most of the remaining journals are domain oriented, covering the theme analysed in the articles, e.g., *Forest Policy and Economics, Building Research and Information*, and *Energy Policy*. As several of the articles discuss the results of large and well-known projects, we have added project acronyms in Table 1.

From this engagement with the scenario planning literature and the systematic review of the case studies, we seek to contribute to the growing understanding of best practices.

3. Stakeholder inclusion in the scenario literature

The scenario planning literature has produced several reviews and categorizations of scenario planning and the scenario development process, but these reviews have typically contained very limited descriptions of the role of stakeholders (Amer et al., 2013; Bishop et al., 2007; Börjeson et al., 2006; Bradfield et al., 2005; van Notten et al. 2003; Varum and Melo 2010). The theme is mostly limited to a short

Table 1
Projects and articles selected for the review.

Authors & year	Title	Source	Region	Theme	Project acronym
(Markmann et al., 2013)	A Delphi-based risk analysis—Identifying and assessing future challenges for supply chain security in a multi-stakeholder environment	Technological Forecasting and Social Change	Global, focus on Europe	Supply-chain security	Competitiveness Monitor
(Schippl 2016)	Assessing the desirability and feasibility of scenarios on eco-efficient transport: a heuristic for efficient stakeholder involvement during foresight processes	Foresight	Europe	Sustainable transport	STOA Eco-Efficient Transport
(Gravagnuolo et al., 2015)	Assessment of waterfront attractiveness in port cities—Facebook 4 Urban Facelifts	Int. J. of Global Environmental Issues	Torre Annunziata, Italy	Port-city development	n.a.
(Karger 2013)	Citizen scenarios for the future of personalized medicine: A participatory scenario process in Germany	Int. J. of Interdisciplinary Social and Community Studies	Germany	Personalized medicine	n.a.
(Eames et al., 2013)	City futures: Exploring urban retrofit and sustainable transitions	Building Research and Information	UK	Urban transportation	Retrofit 2050
(van Berkel and Verburg 2012)	Combining exploratory scenarios and participatory backcasting: Using an agent-based model in participatory policy design for a multi-functional landscape	Landscape Ecology	Achterhoek region, the Netherlands	Rural development	RUFUS and VOLANTE
(Carlsson et al., 2015)	Combining scientific and stakeholder knowledge in future scenario development—A forest landscape case study in northern Sweden	Forest Policy and Economics	Vilhelmina municipality, Sweden	Forest management	INTEGRAL
(Brand et al., 2013)	Constructing consistent multiscale scenarios by transdisciplinary processes: The case of mountain regions facing global change	Ecology and Society	Visp region, Switzerland.	Global change in mountain regions	MOUNTLAND
(Carter and White 2012)	Environmental planning and management in an age of uncertainty: The case of the Water Framework Directive	Journal of Environmental Management	Mersey Basin, Northwest England, UK	Water environment, water resources	WaterProof Northwest
(Schneider and Rist 2014)	Envisioning sustainable water futures in a transdisciplinary learning process: combining normative, explorative, and participatory scenario approaches	Sustainability Science	Swiss Alps	Water use, water governance	MontanAqua
(Kok et al., 2015)	European participatory scenario development: strengthening the link between stories and models	Climatic Change	Europe	Freshwater	SCENES and CLIMSAVE
(Plieninger et al., 2013)	Exploring futures of ecosystem services in cultural landscapes through participatory scenario development in the Swabian Alb, Germany	Ecology and Society	Swabian Alb, Germany	Landscape development, rural area	HERCULES
(Blom-Zandstra and Keulen 2008)	Innovative concepts towards sustainability in organic horticulture: Testing a participatory technology design	Int. J. of Agricultural Sustainability	Netherlands	Horticulture	n.a.
(Jessel and Jacobs 2005)	Land use scenario development and stakeholder involvement as tools for watershed management within the Havel River Basin	Limnologica	Havel River basin, Germany	River basin management	Management in the Havel River Basin
(Schauppenlehner-Kloyber and Penker 2015)	Managing group processes in transdisciplinary future studies: How to facilitate social learning and capacity building for self-organised action towards sustainable urban development?	Futures	Korneuburg, Austria	Future urban perspectives for a city	Korneuburg 2036
(Madlener et al., 2007)	New ways for the integrated appraisal of national energy scenarios: The case of renewable energy use in Austria	Energy Policy	Austria	Renewable energy	ARTEMIS
(Bergez et al., 2011)	Participatory foresight analysis of the cash crop sector at the regional level: Case study from southwestern France	Regional Environmental Change	Midi-Pyrénées region, France	Cash-crop sector	n.a.
(Videira et al., 2003)	Participatory modeling in environmental decision-making: The Ria Formosa Natural Park case study	Journal of Environmental Assessment Policy and Management	Ria Formosa Natural Park, Portugal	Environmental decision making	n.a.
(Walz et al., 2007)	Participatory scenario analysis for integrated regional modeling	Landscape and Urban Planning	Grisons canton, Switzerland	Regional development, mountain agriculture	ALPSCAPE
(Patel et al., 2007)	Participatory scenario construction in land use analysis: An insight into the experiences created by stakeholder involvement in the Northern Mediterranean	Land Use Policy	Northern Mediterranean	Land use	MedAction
(Upham et al., 2014)	Scaffolding, software and scenarios: Applying Bruner's learning theory to energy scenario development with the public	Technological Forecasting and Social Change	Greater Manchester city, UK	Energy systems and emissions	n.a.
(Videira et al., 2009)	Scoping river basin management issues with participatory modeling: The Baixo Guadiana experience	Ecological Economics	Baixo Guadiana River Basin, Portugal	River basin planning	ADVISOR
(Gemen et al., 2015)	Stakeholder engagement in food and health innovation research programming—key	Nutrition Bulletin	Europe	Food and health	INPROFOOD

(*continued on next page*)

Table 1 (*continued*)

Authors & year	Title	Source	Region	Theme	Project acronym
	learnings and policy recommendations from the INPROFOOD project				
(Mont et al., 2014)	Sustainable lifestyles 2050: Stakeholder visions, emerging practices and future research	Journal of Cleaner Production	Europe	Sustainable lifestyles	SPREAD
(Bizikova et al., 2012)	Sustaining Multifunctional Forestry Through the Developing of Social Capital and Promoting Participation: A Case of Multiethnic Mountain Communities	Small-scale Forestry	Slovensky Raj National Park, Slovakia	Sustainable forest management	n.a.
(Zegras and Rayle 2012)	Testing the rhetoric: An approach to assess scenario planning's role as a catalyst for urban policy integration	Futures	Portugal	Land use and transportation in cities	n.a.
(Hagemeier-Klose et al., 2014)	The Dynamic Knowledge Loop: Inter- and Transdisciplinary Cooperation and Adaptation of Climate Change Knowledge	International Journal of Disaster Risk Science	Rostock, Germany	Climate change	n.a.
(Palacios-Agundez et al., 2013)	The relevance of local participatory scenario planning for ecosystem management policies in the Basque Country, northern Spain	Ecology and Society	Basque Country, Spain	Ecosystem management	Millennium Ecosystem Assessment in Biscay project
(Hansen and Larsen 2014)	Use of scenarios and strategic planning to explore an uncertain future in Greenland	Regional Environmental Change	Greenland	Industrial development	n.a.
(Volkery et al., 2008)	Your vision or my model? Lessons from participatory land use scenario development on a European scale	Systemic Practice and Action Research	Europe	Land use	PRELUDE

notice on data collection via stakeholder input, mentions of stakeholder workshops, focus groups and citizen juries (van Notten et al. 2003), or a remark distinguishing between the roles of external experts and stakeholders (Amer et al., 2013; Bradfield et al., 2005).

Interestingly, the very early works in the scenario literature show no particular interest in stakeholder inclusion (Jantsch 1967; Kahn and Weiner 1967). In the newer scenario literature, stakeholder inclusion is dealt with, but under several different terms. The business-oriented scenario literature tends to use the term "actors" (Godet 2000; Hughes 2013) or refers to experts' involvement or experts' judgement (Phadnis et al., 2014). The policy-oriented literature that deploys scenario planning features phrases such as consultation process with experts (van Notten et al. 2003), participatory scenario development (Kok et al., 2015), stakeholder integrated research (Gramberger et al., 2014) and stakeholder engagement (Cairns et al., 2016).

Most mainstream strategy textbooks contain a definition of stakeholders, typically defining them in relation to a firm or an organization. A classic strategy textbook defines stakeholders as '… those individuals or groups that depend on an organization to fulfill their own goals and on whom, in turn, the organization depends' (Johnson et al., 2012). The literature focusing on scenarios and foresight concerning public decision making often has a wider definition: 'Stakeholders are members of the public, who own the problem or challenge under discussion and have a stake in the future. Stakeholders might be individuals, informal groups or well-established organisations' (de Smedt 2013). However, this approach seems to lack the inclusion of actors who have great power in changing the direction of projects or initiatives without necessarily 'owning the problem' or having a financial stake in it. The concept of stakeholders is contested and debated (Miles 2017), and we opt for a broad definition that includes those affected by the outcomes of the scenario planning effort. Following stakeholder theory, we recognize the centrality of the relationships that flow between a diverse set of actors—not only those working within the organization or community convening the scenario planning but rather all who are affected. As Freeman et al. note, stakeholders are 'those groups and individuals who can affect or be affected by their actions' (Freeman et al., 2010, p9).

In the field of public policy and environmental management, the concept has been further teased apart. One contribution to this field points out that stakeholders have often been defined as formal groups with a common interest (Colvin et al., 2016). This is seen as distinct from citizen participation, which is seen as collecting representatives of the public. In this field, the use of the term stakeholders includes a strategic role for the participant: the concept of stakeholders can be either normative, with all people with an interest in an issue being included, or strategic, with stakeholders who can pragmatically contribute to the success of the project being included (Miles 2017).

For the purposes of our article, we keep the notion of stakeholders broad and follow the lead of the cases that we mine. We deploy a definition of stakeholders to include all individuals who have been engaged in the scenario planning exercise and integrated into the process for their point of view or perspective.

Based on this broad definition, we found in the literature that stakeholders often fall neatly into three categories: subject-matter experts; professionals from other organizations, agencies or communities; and members of the public. However, there is more nuance to explore.

Rowe and Frewer (2005), scholars of public engagement, divide types of stakeholders by the extent to which they are representatives of the broader community, often segmenting public groups in terms of age, occupation, institution, geography, opinions and so on. Other scholars (Andersen and Jæger 1999; Van Asselt and Rijkens-Klomp 2002) distinguish between types: policy makers, business representatives, citizens, and experts. Sometimes this parsing is as simple as experts and non-experts (Soste et al., 2015; Stirling 2008). In this case, the scenario process is dependent on the experts' judgemental assessment of the scenario process, and such experts are often characterized as end users or policy makers (Soste et al., 2015) and representatives from business, government, NGOs and sciences (Kok et al., 2015). Quite specific to the scenario planning literature is the intentional use of a stakeholder to inject novel or unusual thinking into a process. These so-called remarkable people are brought in for their knowledge of the domain but also often for their creative or inventive perspectives (Bradfield et al., 2005; van der Heiden 1996). Another common focus detected in the literature is citizens (Repo and Matschoss 2018). While some use the term 'grassroots' (Smith et al., 2014), for others, 'grassroots' often refers to quite well-organized stakeholders with some expertise or clear and pre-defined viewpoints. In addition to typologies of stakeholders, the issue of the identification and selection of representative stakeholders is also central in the literature (Gramberger et al., 2014). Hence, while these three stakeholder types—experts, professionals and the public—are repeated in the literature, there is nuance regarding what representativeness means, how to ensure authentic diversity, and how to secure a perspective focused on the collective.

3.1. Stakeholder inclusion in practice-based scenario cases

Most of the projects that we assessed in our systematic review were

careful to list which stakeholders or types of stakeholders were included. The most common stakeholder type was professional representatives from various organizations closely relevant to the topic. For example, a project about sustainable transport included representatives from both public and private transport organizations in its scenario planning activities (Schippl 2016). Another common type of stakeholder is people who do not represent an organization but rather represent themselves owing to a personal or professional relation to the topic. Such personal stakeholders could be farmers, forest owners, business owners or residents directly affected by the outcome of the process (Bizikova et al., 2012).

Few projects included citizens in their participatory methods. Only five of the thirty assessed projects explicitly reported including citizens in their participatory activities. In two projects (HERCULES and ADVISOR), citizens were included in the same scenario development workshops as the remaining stakeholders (Plieninger et al., 2013; Videira et al., 2009). In these cases, the citizens were found through a stakeholder analysis (as were the rest of the included stakeholders). The ADVISOR project (river basin planning) aimed to 'get the whole system in the room' when arranging a workshop (Videira et al., 2009). In the ALPSCAPE project (regional development and mountainous agriculture), the team included representatives of the general public, primarily teachers and pastors. They were found through a 'snowball' approach that involved asking representatives to nominate others. Thus, the citizens were stakeholder representatives, not just representatives of the general population. This was also the case in the ADVISOR project, where the invited citizen group included leaders of environmental NGOs and women's groups, teachers, and presidents of student associations (Videira et al., 2009). The MontanAqua project (water governance) found the participating citizen through stakeholder analyses, but they were involved only in the initial interviews (and not the building workshop). The authors of one report—the Competitiveness Monitor—mentioned that they analysed the representativeness of the participants (gender, nationality, working sector) but included only experts and not members of the general public (Markmann et al., 2013).

Many of the reviewed projects mentioned the inclusion of experts with specific knowledge on the topic of the scenario planning process. Experts can come from academia (universities, research institutions, etc.), industry, national and local government, stakeholder organizations, and pressure groups (Carlsson et al., 2015; Eames et al., 2013; Schneider and Rist 2014). Some of the most knowledgeable experts in an area can be employed by organizations (NGOs, firms, public administration or government). In several cases, the reviewed papers blurred the distinction between experts and stakeholder representatives.

An important issue mentioned in some of the reviewed articles is the situation of university researchers often constituting the core team running the project but also acting as experts in the domain under investigation. Thus, they sometimes serve dual roles as project owners and process facilitators as well as actors shaping the final results, often through subtle means such as framing the initial charge, guiding discussions and revising the final outcomes. This setup could lead the core project team to unconsciously influence the final content of the scenario outcomes (Carlsson et al., 2015; Plieninger et al., 2013). Such a dual role blurs the distinction between who is a stakeholder shaping the outcomes and who is not.

The selection of stakeholders to participate in the scenario process was performed differently among the case studies that we assessed in our systematic review. The level of analysis involved in the selection effort was more often than not vague. It became apparent that the discipline of choosing and inviting stakeholders was not an integrated part of the application of scenario methods. Some projects, e.g., MOUNTLAND, did not discuss how stakeholders were chosen at all (Madlener et al., 2007). Nevertheless, our review of articles that addressed the selection process revealed three typical approaches to selecting stakeholders (see Table 2). In the first approach, the authors refer to 'stakeholder analysis', but only a few provide details. One case mentioned that the selection criterion for such generic stakeholder analysis was active engagement in the public debate on the subject (Hansen and Larsen 2014). In another approach, the authors mentioned a snowball or co-nomination methodology. For example, in the ADVISOR project, the project team suggested stakeholders that they themselves found relevant and afterwards asked those initial nominees to suggest others (Videira et al., 2009). Another, more defined approach articulated clear criteria for the selection of stakeholders such as representation of regions, levels of decision making, gender and profession (Volkery et al., 2008). In addition to this matter of the representativeness of the stakeholders, there was some reference to personality traits or personal capabilities as criteria for selection. Volkery et al. (2008) posited that stakeholders should be able to abstract from their institutional context and commit to a creative process with an uncertain, open ending (Volkery et al., 2008). In one instance, we found a comprehensive approach. In the CLIMSAVE project, researchers applied the so-called Prospex-CQI method for the selection of stakeholders (Gramberger et al., 2014). In that method, three measures are applied to choose stakeholders: C—criteria, which involves defining a set of criteria and categories for stakeholder groups that affect the topic of research, are affected by it, or both; Q—quota, which sets specific minimum quotas for all categories; and I—individuals, which involves identifying individuals who fit the categories, with the overall selection fitting the set quotas. In this method, the identification of individuals is performed in the last step in an effort to minimize bias (Kok et al., 2015). Overall, the systematic review of the literature provided no clear picture of the resources allocated to the selection of stakeholders. However, the three approaches mentioned above probably do not differ significantly in terms of resource intensity.

Table 2
Most common approaches to identify stakeholder participants.

Approaches to identify stakeholders	Key feature
Stakeholder analysis	Desk study by project team
Snowball or co-nomination	Process involving stakeholders
CQI approach	Desk study by project team

In summary, our assessment of the literature resulted in identifying five main types of stakeholders (see Table 3). The first type is experts with expertise in the topic explored through the scenario process. Although not all scenario planning studies regard experts as stakeholders, we argue, on the basis of the aforementioned contributions to stakeholder theory, that they should be included in the definition. Experts are often identified and selected through bibliometrics, co-nomination or snowball approaches. Such experts can be found, for example, in academia, industry, public administration, NGOs or grassroots organizations. Experts might not have a personal stake in the outcome of the process, but in many cases, they do. Scenario planning exercises differ, and in many cases, experts can be highly affected, albeit professionally, by the outcome of the project.

The second type is stakeholder representatives, or representatives of organizations or groups with a stake in the outcomes of the scenario process. Such stakeholder representatives do not need to be experts on

Table 3
Overview of types of stakeholders.

Type of stakeholder	Contribution
Experts	Expertise in the topic
Stakeholder representatives	Viewpoints from representatives of organizations or groups with a stake in the outcome of the scenario process
Personal stakeholders	Viewpoints from people with a stake in the outcome of the scenario process
Remarkable people	Viewpoints from people with experience, knowledge, creativity, inventiveness
Citizens	Representative viewpoints of the general public with or without a direct stake in the outcome of the scenario process

the topic, but they are included because they have a stake in the outcome of the process or an agenda to express the (often political) viewpoint of the organization that they represent. Policy makers and other end users are among the key stakeholder representatives. A third type of stakeholder, personal stakeholders, is closely related to the second. Personal stakeholders are included to express their own viewpoints, experiences and knowledge. Both stakeholder representatives and personal stakeholders are identified and selected through stakeholder analyses or combinations of stakeholder analyses and co-nomination/snowball approaches. A fourth type is 'remarkable people', or those who are brought in to inject creativity or diversity into the dialog. Like personal stakeholders, they are included due to their unique perspectives, although they do not necessarily have a direct stake in the venture. The fifth type of stakeholder is citizens, or members of the general public. Ideally, citizens should be included in an approach that strives for representation of all members of the public affected by the scenario process.

4. Methods for stakeholder inclusion in scenario planning

The broader literature on public deliberation and civic engagement has identified approximately 100 processes or methods for stakeholder inclusion (Rowe and Frewer 2005). The general scenario literature is also very rich in suggestions of methods for stakeholder inclusion; however, most rely on some version of a workshop (Cairns et al., 2016; Volkery and Ribeiro 2009). The literature is filled with stakeholder workshops, futures forums, envisioning workshops, focus groups, and citizen juries (van Notten et al. 2003). Another standard method for engaging stakeholders is interviewing (Amer et al., 2013). Some scenario projects interview scores of people. Interviews are designed to map blind spots, reveal surface knowledge about the focal issue, and help individuals question their assumptions. They are typically organized as individual interviews following a structured questionnaire. However, they can also be organized as group interviews. Within the workshop genre, the literature mentions dozens of different engagement mechanisms, from individual and group brainstorming (Bradfield et al., 2005) to the Delphi method to include stakeholder viewpoints in scenario processes (Nowack et al., 2011) to utilizing role playing, with a group of people in the present day being asked to act and make decisions in a future situation (Bishop et al., 2007). Scenario planning also uses a number of design-inflected processes that make use of speculative design, mediated futures, and other creative methods (Selin et al., 2016).

4.1. Methods for stakeholder inclusion in case studies

Although the general scenario planning literature is very rich in suggestions for methods for stakeholder inclusion, only three methods were frequently utilized in the thirty reviewed articles: workshops, interviews and different forms of questionnaires and surveys. Three articles mentioned web-based methods for involving stakeholders (Gemen et al., 2015; Patel et al., 2007; Schauppenlehner-Kloyber and Penker 2015), and five articles mentioned other methods, such as seminars (Bergez et al., 2011), an open-space conference (Gemen et al., 2015), and student assignments (Hansen and Larsen 2014).

All except one of the reviewed articles reported on processes that included some kind of workshop. One common format of stakeholder inclusion is a single workshop event. For example, both the RUFUS and VOLANTE projects (van Berkel and Verburg 2012) and the INTEGRAL project (Carlsson et al., 2015) held a day-long workshop. Another format is a series of workshops that include the same core group of stakeholders over several days and in some cases over several years. Several projects were organized with three one-day workshops over a longer period (Brand et al., 2013; Carter and White 2012; Eames et al., 2013; Kok et al., 2015). The MontanAqua project arranged frequent stakeholder workshops with 12 participants over several years (Brand et al., 2013). A third format is parallel workshops. For example, one project arranged parallel workshops in three different geographical areas included in the study (Jessel and Jacobs 2005). The number of participants in each workshop varied from 11 (Brand et al., 2013) to 70 (Videira et al., 2003). However, in the latter case, breakout sessions were applied to boost participation. Most individual workshops had between 10 and 30 participants. When workshops were held in series, the project teams reported difficulty maintaining the same group and the same number of participants. One project held a series of three workshops with 57 participants in the first workshop, 9 in the second and 20 in the third. The reviewed articles contained no systematic information on the actual sites of the workshops except that they were often located in the community (city, region) of the stakeholders. One article mentioned that a workshop was held in Brussels to make it attractive EU-affiliated civil servants and organizations. The reviewed articles seldom reported on commercial process facilitation software, mediated spaces or other technologies of engagement.

An often mentioned advantage of the workshop method is how live interaction supports joint learning and the creation of a shared language and helps to secure the participants' commitment to the results (Palacios-Agundez et al., 2013; Upham et al., 2014; Videira et al., 2003). However, this format also presents some key tensions and challenges. Many of the reviewed articles reported on challenges securing responses to the invitation to participate in the workshops. In one case, 70 stakeholders were invited, but only 14 participated in a half-day workshop (Carlsson et al., 2015). In particular, business representatives find it difficult to allocate time for participation, which might lead to asymmetries in the results. For instance, the INTEGRAL project encountered problems engaging all the planned stakeholder groups because many were small-scale entrepreneurs who could not afford to spend much time on workshops since they received no financial compensation (Carlsson et al., 2015; Videira et al., 2009). It is also worth noting that people who are economically or socially disadvantaged can face further obstacles to participation, thus narrowing the pool of potential stakeholders from the general public. Another challenge is the format of a series of workshops. When three workshops were planned with the same group of participants, there were continuity problems. Important for further study is finding a way around the asymmetries related to workshop participation. That is, a workshop is often designed to enable a group to freely deliberate on a topic; however, not all participants are able to contribute equally. For example, an article reported including minorities of whom approximately 95% had been educated to only the primary school level (Bizikova et al., 2012). Their previous negative experiences in participating in public meetings about local community issues inhibited them from participating fully in the workshop. One minority representative commented that 'they won't take our comments seriously anyway' (Bizikova et al., 2012). One study emphasized the importance of experts engaging as equal partners with laypeople in discussions (Karger 2013). However, it might be very difficult to implement this idea in practice due to asymmetric prerequisites. Thus, while workshops are a common method, barriers to participation related to diversity, equity and inclusion warrant careful navigation and closer attention.

Interviews were another common method deployed to engage stakeholders. Thirteen out of the 30 reviewed cases reported using interviews as a method to involve stakeholders, most often in conjunction with a workshop. The reviewed articles detailed two types of interview methodologies for including stakeholders: narrative or open-ended interviews and structured or guided interviews. In some cases, the interview guides contained a questionnaire that was completed during the interview (Gravagnuolo et al., 2015). Interviews typically took place before the first workshop but were also deployed in between or even after workshops to evaluate the results. In other cases, key stakeholders who were not able to participate in a workshop were interviewed to secure their input (Schneider and Rist 2014). While most interviews were conducted with individuals, one article reported on semi-structured interviews being performed with focus groups of six stakeholders (Hagemeier-Klose et al., 2014). The INTEGRAL project

devised interviews to capture both qualitative and quantitative information. In the first phase of the scenario building process, the researchers sought barriers and drivers affecting forest management in the study area (Carlsson et al., 2015). The second phase of the interviews contained a quantitative part, where stakeholders were asked to rank a preliminary list of factors that they considered most important for forest management. The combined list of barriers and drivers was then discussed at a subsequent workshop. A few of the reviewed articles contained information about the length of the interviews, which varied from 45 to 120 min. The structured interviews were typically shorter in length. In our sample derived for the systematic review, the number of stakeholder interviews varied between 15 and 78. Most cases reported a number of interviews between 30 and 40. An advantage of interviews compared with workshops and questionnaires is the response rate. Very few of those invited for an interview refused to participate. In one case, 2 out of 40 invited stakeholders refused to be interviewed (Bizikova et al., 2012). Interviews offer more flexibility for participants but limit engagement in the process to information sharing, typically at the front end of a scenario development process.

Only two of the reviewed articles reported using a thorough Delphi survey for stakeholder inclusion. In one case, a real-time online Delphi survey 80 experts (out of 754 invited) provided the only input from external stakeholders (Markmann et al., 2013). Another article reported using a Delphi survey before and after a workshop (Mont et al., 2014). In that case, the first round of the Delphi survey enabled 40 (out of 110 invitees) stakeholders to provide input into the creation of the scenario quadrant. A 2-day workshop with 54 participants developed narrative scenarios based on this input. In the second round of the Delphi survey, 50 stakeholders provided additional details and arguments for each scenario. The reason for the limited use of the Delphi technique might be that it is perceived as more time consuming than other techniques (Markmann et al., 2013). Apart from the iterative element of a Delphi survey, it is similar to a survey or questionnaire, and 8 of the 30 reviewed articles reported using different kinds of surveys or questionnaires in combination with workshops or interviews. In one case, an online survey was sent to participants one month before a ½-day workshop with 21 stakeholders (Schippl 2016). In another case, a survey was sent to 18 stakeholders for evaluation and modification of scenarios produced by a research team and based on three regional conferences and structured interviews with stakeholders in the same regions (Jessel and Jacobs 2005). Surprisingly, none of the reviewed papers reported using very large internet-based surveys except for one paper that reported using a web-based game with almost 2000 participants (Gemen et al., 2015). This finding might be due to the retrospective nature of the literature review, as there has been a notable increase in online deliberative tools and games over recent years. A survey of more recent or ongoing projects would likely show a different result. The key challenge of the Delphi technique—and questionnaires in general—is response rates. The reviewed articles mentioned a response rate as low as 10% when participants were invited (Markmann et al., 2013). However, this rate can be improved or mitigated by committing participants to complete the questionnaire during workshops or interviews. Another challenge is the required time for respondents to complete the questionnaire. Although the time required to complete a questionnaire is much less than that needed to participate in a workshop, respondents often tire before the end of the questionnaire. One article suggested that the use of a real-time survey—in that case a Delphi survey—might mitigate this problem (Markmann et al., 2013). The reviewed articles provided no evidence of optimal length, but one mentioned that 25 min was perceived as too long (Gravagnuolo et al., 2015).

The review showed no clear relationship between the method of involvement and the number of stakeholders. Practical issues related to facilitating workshops limit how many stakeholders can be included in one workshop, but that issue can be addressed by arranging several parallel workshops or—on the rise since our review concluded—using virtual conferencing. What determines the choice of *method* seems rather to be the *function* of the stakeholder inclusion and the consideration of the *type* of stakeholder included. As we will discuss below, there is a messy correlation between the three key aspects of stakeholder inclusion that we explore here. A clear observation across the methods, however, is the importance of a well-structured, well-prepared, and transparent process with a professional—or at least experienced—team of facilitators.

In summary, despite the array of engagement methods available, the scenario studies published in the reviewed articles tended to rely on workshops, interviews and surveys. While there is wide variety in how a workshop is designed, specific details are seldom captured in reviewed articles. Workshops are arranged in different formats, and while the specific design of a workshop—where it is located, how it is facilitated, the tone, and the nature of the activities—influences the effectiveness of stakeholder inclusion, the reviewed articles often omitted such details. These details are not just procedural but also relate to important questions of fairness. When the focus is squarely on stakeholder inclusion, a host of ethical questions arises about the extent to which 'outsider' perspectives are dignified with respect or ignored and how different methods of inclusivity are deployed. Thus, attention needs to be paid not only to diversifying the range of methods deployed but also to how the methods authentically and inclusively draw in eclectic and underrepresented stakeholder perspectives. In table 4, we summarised key tensions and challenges for the three methods.

Interestingly, none of the reviewed articles mentioned an ethics protocol or commented on ethical issues in relation to methodologies for including stakeholders in scenario planning. The European Union in 2018 introduced the comprehensive General Data Protection Regulation (GDPR). It is obvious that this new legislation will have a significant effect on future projects with stakeholder inclusion. However, as all the reviewed papers reported on projects finalized before 2018, we found no comments or considerations regarding the GDPR.

5. Functions of stakeholder inclusion in scenario planning

Any discussion of stakeholder inclusion must address *why*: what role is the stakeholder to play, and why does it matter? The most common refrain in the scenario planning literature is that including stakeholders is crucial to secure an impact on actual policy making (Volkery and Ribeiro 2009). It has been argued that securing stakeholder ownership of both the process and the outcome (Soste et al., 2015) is a key factor for successful implementation of the results (Calof and Smith 2010). The idea here is that if the individuals expected to *use* the scenarios have a role in *creating* the scenarios, they will have a lived sense of the worlds created and a better chance of internalizing the learnings and enacting the results (Ramirez and Wilkingson 2016). While ownership or buy-in of the results of scenario planning is key, there are also other reasons for engaging stakeholders.

By and large, the literature agrees on some functions of stakeholder inclusion. Each function is related, in a different way, to the knowledge brought to bear on the scenario development process. To grasp these

Table 4
Overview of methods for stakeholder inclusion and the related key tensions and challenges.

Method for stakeholder inclusion	Key tensions and challenges
Workshops	Time consuming for participants Calendar and availability issues Asymmetries in participants' engagement
Interviews	Limited knowledge sharing among participants
Surveys/Delphi	Low response rates Fatigue before completing questionnaire Limited knowledge sharing among participants

different functions, it is helpful to anchor them in a standard approach to scenario planning (see Fig. 1).

The first function of stakeholder involvement is at the front end of the scenario process and is associated with scanning the strategic environment, identifying future trends and assumptions to challenge, and providing basic data. The literature has used terms such as idea generation (Nowack et al., 2011) and data collection (van Notten et al. 2003). Stakeholder inclusion in this research phase can capture the perspectives and knowledge of a large and diverse group of experts (Bradfield et al., 2005). Stakeholder engagement in research generation can be directed to the empirical arena under study (e.g., the intersections of the energy and transport system) or focused on the broader contextual environment (advances in AI or new demographic trends). Scenario-based research is often not just about collecting existing knowledge but also about creating new ideas through interviews, workshop dialogues, or other data-gathering or creative methods. Such input not only is about expert-based knowledge on known future trends but also may draw in 'wild cards' (Mendonça et al., 2004), or what Herman Kahn labelled 'thinking the unthinkable' (Kahn 1962), which may be performed by lay members of the public or other professionals.

The second function for stakeholder involvement often discussed in the literature is prioritizing the trends and challenges identified during the research phase (Soste et al., 2015). The aim here is to reduce the number of trends and challenges and identify the most important driving forces. This function has also been named the consolidating function (Nowack et al., 2011). As a part of this effort to prioritize, stakeholders can also be involved in defining the criteria for choosing the trends and challenges to be included in further analysis. Very often, the key criteria are 'impact' and 'predictability' (Schoemaker and Mavaddat 2000), but other scholars have suggested 'discomfort' and 'ignorance' as viable criteria for prioritizing areas of attention (Ramírez and Selin 2014).

The third function is building scenarios or crafting narratives. Narratives are often crafted by a project team, but in this more creative process, stakeholders can be invited to envision alternative worlds and to articulate plot lines, characters and settings that provide a lived sense of what the world might feel like (Bradfield et al., 2005; van Notten et al. 2003; Soste et al., 2015). Narrative world building in scenario planning is a hallmark of this method and serves as a means to display a rich array of uncertainties in an interactive way. Instead of tracking one trend or dealing with one uncertainty at a time, storytelling enables the inter-weaving of multiple uncertainties, revealing novel causal connections. In some scenario planning exercises, professional storytellers are brought in to support this process(Flowers 2003), but more often, the creative construction of narratives is undertaken by participants and stakeholders in a workshop setting.

The fourth function of stakeholder inclusion in the scenario process is vetting the preliminary scenarios in relation to their fit with the overall purpose of the exercise and in relation to possible strategies or adaptation options devised from the scenarios (Nowack et al., 2011). In this function, stakeholders' vetting of the scenarios contributes to the reliability of the scenarios and develops trust and consensus among the stakeholders (Bradfield et al., 2005; Selin 2006). Vetting is often undertaken to ensure that the scenarios are challenging, divergent, plausible and helpful to decision making. The criterion of plausibility has been extensively explored in the literature (Ramírez and Selin 2014; Selin and Pereira 2013), as it distinguishes the approach from other model-based forecasting approaches that rely instead on probability.

The fifth function of stakeholder inclusion in a scenario planning process is strategy or policy formulation (Cairns et al., 2016). Scenarios are often constructed to aid in decision making or to create recommendations for public policies or corporate strategies. Once alternative futures are mapped out, augmented with narratives, and vetted for quality, stakeholders can be engaged to assess the implications of the scenarios. Sometimes these implications reveal potential vulnerabilities or new opportunities. Sometimes, scenarios are used as a wind-tunnel test of an existing policy option, strategy or choice. Involving stakeholders at this stage serves to solidify the learning and promote new actions.

In addition to these five functions, the literature often mentions two other functions. Prior to the actual scenario building, an effort is made to establish the scope and clarify the aims of the project. The inclusion of stakeholders—especially senior policy advisors and policy makers—at this stage can contribute to ownership of and engagement in the process and its results (Calof and Smith 2010; Soste et al., 2015). Finally, learning of stakeholders and the public is an often-mentioned function. This function is directed towards educating stakeholders and facilitating their uptake of the outcomes of the scenario effort (Calof and Smith 2010; Soste et al., 2015; Volkery and Ribeiro 2009).

5.1. *Functions of stakeholder involvement in practice-based scenario cases*

Let us now turn to the functions of stakeholder involvement in the literature assessed in the systematic review. We can find evidence of stakeholder involvement in all of the phases described above.

Most scenario planning exercises are orchestrated in a top-down manner. The project team usually conducts a stakeholder analysis before choosing to invite particular stakeholders. However, in several of the reviewed cases, stakeholders were already included in the planning of the scenario process. In this initial phase, stakeholders can provide lists of relevant key actors (Plieninger et al., 2013), insight into local concerns and issues (van Berkel and Verburg 2012), definitions of problems and goals (Brand et al., 2013; Schneider and Rist 2014), and increased general awareness of the project (Jessel and Jacobs 2005). In some cases, this function is formalized in advisory groups of stakeholders that are included in planning the project (Walz et al., 2007) and review the work of the project team during the project (Eames et al., 2013). In one project, local stakeholders were the ones who initiated the scenario planning process. Thus, they put together a multi-disciplinary

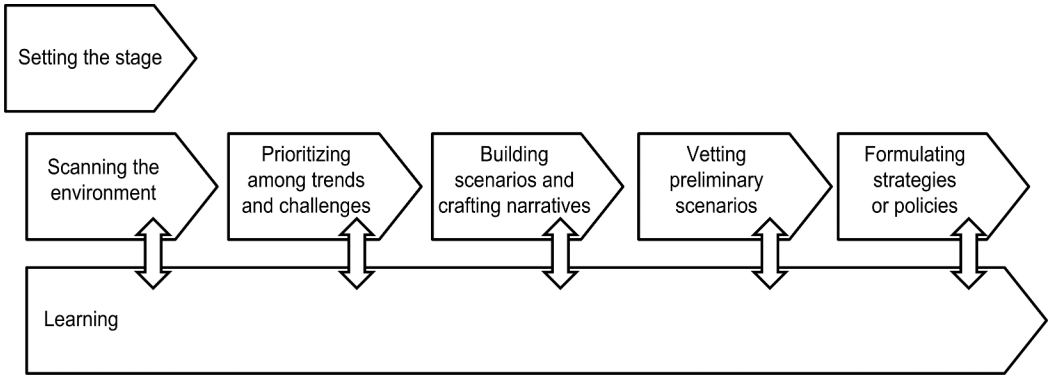

Fig. 1. A standard approach to scenario planning.

group of experts to investigate the cash-crop sector through foresight methods (Bergez et al., 2011). In another case, concerned citizens initiated a project exploring future urban perspectives for the city of Korneuburg in Austria (Schauppenlehner-Kloyber and Penker 2015). Thus, these projects presented a bottom-up approach to scenario planning, providing a contrast to the remaining projects, in which the researchers and experts were the initiators of the process and the stakeholders were chosen by them. In general, the inclusion of stakeholders from the very beginning improves the chances of successful use of the results. The MOUNTLAND case reported some difficulties in the use of the results of the study by politicians and policy makers; in hindsight, these key stakeholders should have been involved from the beginning of the project (Brand et al., 2013a).

A typical function of stakeholders is to provide input during the phase of scanning the strategic environment, identifying future trends and providing background data. One of the most common functions of stakeholders in participatory processes is to bring knowledge from the 'outside' and 'real world' into the project. In one of the cases, the INTEGRAL project, the main function of stakeholder inclusion was actually the gathering and evaluation of key political, socioeconomic, ecological and technical factors (Carlsson et al., 2015). Although this is a passive way of including stakeholders, their contributions are valuable. Another example of stakeholders being included to 'inform' the researchers was the Mountland project, which concluded as follows: 'We showed that the place-based knowledge and values of stakeholders were very important elements in broadening perspectives and in developing strategies that were geared toward more desirable states. In addition, a transdisciplinary approach makes sure that scientists focus on problems that are really relevant for the people in the study regions' (Brand et al., 2013). In the material, we found three types of input from stakeholders. The first type is assessing or mapping the current situation as well as the existing problems and challenges to the current situation (Carlsson et al., 2015; Gravagnuolo et al., 2015; Hagemeier-Klose et al., 2014; Videira et al., 2009). In some cases, the stakeholders provide this input based on discussions of material provided by the project team. There may be illustrative photos or fact sheets describing the current situation (Gravagnuolo et al., 2015). The second type relates to stakeholders' visions or projections for long-term development. In these cases, such visions are created in workshops as a collective or shared vision among a group of stakeholders (Gemen et al., 2015; Patel et al., 2007). The third type is the central element in scenario planning: identifying key factors and driving forces (Hagemeier-Klose et al., 2014; Hansen and Larsen 2014; Mont et al., 2014; Palacios-Agundez et al., 2013; Plieninger et al., 2013; Schauppenlehner-Kloyber and Penker 2015; Volkery et al., 2008; Zegras and Rayle 2012).

An important function of stakeholders is to identify the key factors and challenges from longer lists and to categorize them according to different criteria. Several of the reviewed cases reported only that stakeholders contributed to refining a list of drivers but provided no detailed information on criteria or how this priority setting came about (Carter and White 2012). As mentioned above, the two criteria of uncertainty and importance are frequently applied. In other cases, criteria such as feasibility and desirability were mentioned (Markmann et al., 2013; Schippl 2016). In model-based scenario planning projects, such as the SCENES and CLIMSAVE projects, stakeholders were asked not only to assess drivers according to certain criteria but also to value them (low, medium, high) (Kok et al., 2015). In some cases, stakeholders also identified the relationships between the key factors (Carlsson et al., 2015; Videira et al., 2003). A part of this function of stakeholders can also be to define the criteria for prioritizing (Bizikova et al., 2012).

Another typical function of stakeholders in the projects was that they were directly involved in creating either storylines or qualitative scenarios (Brand et al., 2013; Hagemeier-Klose et al., 2014; Karger 2013; Kok et al., 2015; Mont et al., 2014; Palacios-Agundez et al., 2013; Patel et al., 2007; Schneider and Rist 2014; Zegras and Rayle 2012). In some projects, they provided input into scenario narratives prior to the creation. In other projects, stakeholders evaluated qualitative scenarios after they were created by the facilitators (Bizikova et al., 2012; Blom-Zandstra and Keulen 2008; Carlsson et al., 2015; Carter and White 2012; Plieninger et al., 2013). In the PRELUDE project, a group of stakeholders was given full responsibility for developing long-term alternative land use scenarios in cooperation with experts and modellers. Experts and the sponsoring organization, the European Environment Agency, played only a supporting role (Volkery et al., 2008). This approach, where stakeholders played a larger role in creating the storylines rather than only providing input or evaluating them, resulted in a strong feeling of ownership. The authors suggested that this approach caused the stakeholders to focus on creating a common solution rather than expressing inflexible pre-determined opinions or views (Volkery et al., 2008). Thus, the fact that the participants had the power to construct the storylines made them more aware of the need to reach consensus regarding alternative futures. However, others found that stakeholders may not be knowledgeable about all external factors. This may then lead to the creation of unrealistic, implausible storylines that do not align with scientific knowledge. This was seen as a key tension and challenge in scenarios where local stakeholders were in key roles (Carlsen et al., 2012).

The next phase in a standard scenario planning process concerns vetting the preliminary scenarios. Depending on the circumstances, the function of the stakeholders is more or less active. In some cases, stakeholders were asked only to discuss (in workshops) or comment on (in interviews) the scenarios, and the project team then worked to include these comments in revisions of the scenarios (Blom-Zandstra and Keulen 2008; Jessel and Jacobs 2005; Walz et al., 2007). In other cases, stakeholders had a more active function of refining the initial scenarios (Bergez et al., 2011; Hagemeier-Klose et al., 2014). Another function of stakeholders was to prioritize between different scenarios, resulting in a preferred scenario or several scenarios (Brand et al., 2013; Gravagnuolo et al., 2015). The ARTEMIS project asked stakeholders to prioritize among 16 scenarios developed by the research team. The stakeholders' role in this project was to prioritize among scenarios that depicted trends, challenges and technological solutions related to Austrian electricity and heat production from renewable energy sources (Madlener et al., 2007). The stakeholders also contributed criteria for ranking the scenarios (Madlener et al., 2007). In some model-based scenario projects, the vetting function of the stakeholders included how the scenarios were modelled and the resulting impacts (van Berkel and Verburg 2012; Jessel and Jacobs 2005; Videira et al., 2009; Walz et al., 2007).

The final phase in a standard scenario planning process is strategy or policy formulation. Here, stakeholders are involved in both defining lists of strategies and prioritizing among them. In some cases, stakeholders contributed to listing possible policy interventions (van Berkel and Verburg 2012; Gemen et al., 2015; Plieninger et al., 2013), and in other cases, they also prioritize among possible interventions or policies (van Berkel and Verburg 2012; Gravagnuolo et al., 2015). In the HERCULES project, the participants jointly identified and substantiated management options and ranked them according to their importance and vulnerability (Plieninger et al., 2013). As we saw above, such ranking criteria can differ. In cases where scenarios are depicted as desirable or preferred futures, stakeholders can work to ideate the innovations that would be needed to realize that scenario (Blom-Zandstra and Keulen 2008) or otherwise identify policies and actions that could lead to desirable futures (Palacios-Agundez et al., 2013; Patel et al., 2007). Akin to other functions for stakeholders, the idea of involving a diverse group in the strategic use of scenarios relates to the hope that differences of opinion will lead to fruitful challenges and insights. In these cases, there was some concern about the speed of such deliberative processes and how the process of social science does not fit the need for fast results in the politics and policy arena (Mont et al., 2014).

Finally, stakeholder inclusion in scenario planning relates to learning among stakeholders and the public. Many of the studied projects highlighted learning as specifically important in the scenario process.

'Turning results into (long term) action requires learning processes, which facilitate a shift in values, structures and processes and lead to empowerment for self-organised action and learning processes' (Schauppenlehner-Kloyber and Penker 2015). In another case, the researchers involved stakeholders in exploring public perceptions of emission rates. The stakeholders were asked to work with very well-defined issues and create scenarios through emission scenario software (Upham et al., 2014). The process was very controlled towards the answers that the researchers needed, but the process was also focused on educating the stakeholders and the public. In other cases, stakeholders reviewed the work of the project team with the aim of adjusting the process or learning from the effort (Eames et al., 2013). Finally, the work of stakeholders throughout the process can also strengthen their mutual interactions and create a shared language (Videira et al., 2009).

Several of the reviewed articles included some kind of computational model in the scenario planning process, e.g., RUFUS and VOLANTE (van Berkel and Verburg 2012), ALPSCAPE (Walz et al., 2007), MedAction (Patel et al., 2007), PRELUDE (Volkery et al., 2008), MontanAqua (Schneider and Rist 2014), SCENES and CLIMSAVE (Kok et al., 2015), ADVISOR (Videira et al., 2009), Millennium Ecosystem Assessment in Biscay (Palacios-Agundez et al., 2013), and the Ria Formosa Natural Park project (Videira et al., 2003). All the projects that included models in the scenario planning process were associated with land use (including ecosystem management) and the water sector. In our analysis of these articles, we found three main functions for stakeholders. The first related to the phase of building scenarios and crafting scenarios. In some projects, such as the ALPSCAPE project (Walz et al., 2007), stakeholders were included in the process to elaborate the modelled scenarios. In these cases, stakeholders elaborated on inputs into the models, while the project team operated the model. MedAction, PRELUDE, MontanAqua, SCENES and CLIMSAVE all included a Story and Simulation (SAS) approach (Alcamo 2008). In such approaches, qualitative scenario methods are combined with the use of simulation or optimization models. Here, stakeholders are involved in developing stories and linking stories to quantitative models. In such a process, stakeholders (often together with experts and the project team) develop storylines of explorative scenarios. Next, the stakeholders and experts interpret the scenarios as quantifiable statements. The statements can then be translated by the experts into model variables (Gramberger et al., 2014; Kok et al., 2013, 2015). In general, the stakeholders responded positively to this combined quantitative and qualitative scenario process. However, some of the stakeholders in the SCENES and CLIMSAVE projects noted that their estimation of key model parameters as being completed without them knowing enough about the subject (Kok et al., 2015). Another key function of stakeholders in the model-based scenario planning process is vetting the preliminary scenarios. In one case, the preliminary model was presented to the participating stakeholders in a workshop, and they were invited to actively revise the model by commenting on the structure. In addition, they worked to define discrete variables, allowing them to learn about the model building and features (Videira et al., 2003). Additionally, the RUFUS and VOLANTE projects used the modeling results to spur discussion among the stakeholders and to supplement stakeholder interviews, and this input was then used by the project team to revise the model (van Berkel and Verburg 2012). A third function stakeholders can have is to assess possible policies via the models. Some cases used the term 'policy experiments' to refer to such simulations (Videira et al., 2003).

The assessment of the literature indicates that stakeholders are set up to fulfill a multitude of functions. In Table 5, we summarize the findings. We find that stakeholders were used liberally in the initial phase to identify trends and driving forces but were used less regularly in what we call the 'use' phase of determining strategic implications and embedding the learning. This finding suggests a limitation of the study in that, with our focus on the academic literature, we may have generated a sample with more focus on developing scenarios than on making use of them. In more corporate or business-oriented projects, the weight of the practice is on developing strategic insight and action in light of the scenario stories.

Table 5
Overview of the functions of stakeholders in scenario planning.

Standard phases in scenario planning	Functions of stakeholder inclusion
Setting the stage	• Initiate scenario planning projects • Provide lists of other relevant stakeholders • Increase general awareness of the project • Constitute formalized advisory group
Scanning the environment	• Assess/map current situation • Develop visions or projections for the future • Provide input for factors and driving forces affecting future development
Prioritizing among trends and challenges	• Identify criteria for prioritizing among factors and forces—and visions • Prioritize among factors and driving forces—and visions
Creating storylines, crafting scenarios	• Provide input for storylines and craft scenarios • Directly create storylines and craft scenarios
Vetting preliminary scenarios	• Discuss or comment on preliminary scenarios • Refine preliminary scenarios • Prioritize between scenarios
Formulating strategies or policies	• Identify lists of possible policies and strategies • Prioritize between possible policies and strategies • Set criteria for prioritization • Participate in policy experiments
Learning	• Educate stakeholders • Review the process and the work of the project team during the scenarios planning process

Last, we observed a tension in terms of non-expert stakeholders contributing unrealistic visions or creating unhelpfully implausible storylines that do not align with contemporary scientific knowledge. When the focus is squarely on stakeholder inclusion, a host of questions arise about the extent to which 'outsider' perspectives are considered valid. Thus, in addition to diversifying the range of methods deployed, research is needed on how the methods of stakeholder engagement authentically and inclusively draw in stakeholder perspectives to produce better knowledge—and societal—outcomes.

6. Conclusion and discussion

In this piece, we first investigated the concept of stakeholders and how the scenario planning literature and case studies considered them. Here, we identified the different types of actors relevant to inclusion in a participatory process, and we presented a typology of stakeholders. We also probed which methods were used to identify stakeholders to engage. We found that while it is clear that calls for greater participation and inclusion are on the rise, disciplined approaches for the selection of participants—in particular citizens and under-represented or marginalized voices—are lacking.

Second, we investigated the detailed processes or methods deployed for stakeholder inclusion. We found that only three methods were frequently utilized: workshops, interviews, and different forms of questionnaires and surveys. We found no clear relationship between the method of inclusion and the number of stakeholders. However, we found challenges in how some stakeholders are integrated into the process, particularly when there are power asymmetries.

Third, we investigated the functions of stakeholder inclusion in scenario planning and presented an overview of these functions during the standard phases of scenario planning. As mentioned in the introduction, broad public and professional debate and deliberation is viewed as a good in and of itself but is only cursorily referred to in the broader scenario planning literature. We discovered that stakeholder inclusion has specific and detailed functions in scenario planning, though it is most often used in the early stages of a scenario planning

process to scope the agenda and identify and rank driving forces of change.

Finally, the paper explored key tensions and challenges in stakeholder inclusion in scenario planning. In the following, we will discuss the most important of these key tensions and challenges.

The literature review also revealed how often stakeholders are assumed to be a stable type when in practice, stakeholders are experts *and* non-experts, representatives of the public *and* holding on to special interests, with clear stakes *or* clearly affected. In several cases, the reviewed papers revealed a blurred distinction between experts and stakeholders and a blurred distinction between stakeholders and the project team. It can be a source of tensions and a key challenge of stakeholder inclusion in scenario planning that some of the most knowledgeable experts in an area are employed by NGOs, firms, public administration or government and at the same time serve as stakeholder representatives. Furthermore, in many of the reviewed papers, the members of the research team facilitating the scenario process were also scholars within the field of the scenario process and hence also potential stakeholders in the outcome. However, these tensions generally remained unexamined. We suggest that scenario planners carefully and clearly define their roles, and we find a need for further research and attention to the research ethics and professional standards of the core project teams and process facilitators.

It is clear from the cases that engaging stakeholders requires skill, time and resources. Some experts, members of the public and stakeholder representatives from industry and NGOs become fatigued by being included in many such processes. At the same time, our review revealed that personal stakeholders such as farmers and small-scale entrepreneurs often need to prioritize their own businesses before voluntary engagements (Carlsson et al., 2015). This often means that representatives from local, regional and national organizations, scientists, and students are easier to engage, albeit at the expense of a breadth of diverse perspectives. We recommend that scenario planners be careful about such potential bias in the invited perspectives.

Across the cases, we observe discrepancies between how open or closed the process was to outside influence. Some of the cases revealed that the scenarios were pre-packaged for stakeholder consumption—often due to time and resource constraints—so that only small aspects of the project were called into question by the external stakeholders. The focus was often on providing data and expert assessments in the first phases of the process and on securing commitment and ownership from key decision makers. There is a risk of over-determining the results of the scenario planning effort by overtly narrowing the scope of participation of diverse stakeholders, leading to what Rodegher calls 'strawman participation' (Rodegher 2015). Strawman participation refers to a form of tokenism where social and structural barriers prevent authentic contributions and power from shaping outcomes. Limiting the influence of stakeholders can lead to narrow framing or the propagation of group think. This gives rise to broader questions about the distribution of power and influence in scenario planning, which have been examined at length by other scenario planning scholars (Bourgeois et al., 2017; Cairns et al., 2013; Cairns et al., 2016; Cairns and Wright 2019; Wright et al., 2013).

Through this analysis, it becomes apparent that when the goal is to maximize the diversity of the outlook and focus on inclusion, it is important to select participants who might truly have a different perspective, even if it is contrary or unpalatable. Diversity of thought, in addition to cultural, ethnic, racial, gender and socioeconomic diversity, adds to the rigor of scenario planning. At its base, scenario planning is a mechanism for thinking in terms of radical alternatives to today's world in order to prepare for a changed future. This often involves overturning existing patterns of power and can be controversial. Including a diverse array of stakeholders in a scenario planning process helps to broaden standard lenses and conventional perspectives and, in doing so, provokes challenge. However, unconventional input can create implausible storylines, contradict contemporary scientific knowledge, and even challenge the foundations of modern democratic societies. We find that finding a balance and managing divergence will be key challenges for scenario planners in the years to come.

If the aim is to increase diversity and inclusion, considering the role of power and how it influences equitable decision making and deliberation is paramount. More research and experimentation are needed to determine which types of stakeholders ought to be selected to participate to avoid a situation where the usual, connected and historical stakeholders continue to be engaged to the exclusion of relevant others. Research is also needed to develop formats for the inclusion of stakeholders with limited traditions and experiences with participation in such processes. If stakeholder inclusion is to truly influence a scenario planning process and move beyond 'strawman participation' (Rodegher 2015), it is necessary to attend to who is involved, why and through which mechanisms with an eye on power. Greater transparency in published research studies about the details and challenges of stakeholder inclusion will be a step forward.

CRediT authorship contribution statement

Per Dannemand Andersen: Conceptualization, Formal analysis, Writing – review & editing. **Meiken Hansen:** Methodology, Formal analysis, Writing – review & editing. **Cynthia Selin:** Formal analysis, Writing – review & editing.

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