Structure in creativity: An exploratory study to analyse the effects of structuring tools on scenario workshop results

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ABSTRACT

Scenario projects increasingly combine quantitative models with qualitative, participatory products in order to make scenarios more coherent, relevant, credible and creative. A major advantage of adding participatory, qualitative scenarios is their ability to produce creative, innovative, non-linear products. Integrating participatory results with quantitative models, however, can lower their credibility of both products when they are not consistent. The low level of structure in most participatory output limits possibilities for linking them to quantitative models. More structure could be introduced, but this might hamper the creativity of the workshop results: outcomes (process) and outputs (storylines). This paper tests a new method to analyse the creativity of scenario storylines in order to analyse the effects of structuring tools on the creativity of workshop results. Both the perceptions of participants and the resulting storylines of nine case studies across Europe are used in the analysis. Results show that the use of structuring tools can have a negative effect on the creativity of the workshop, but the influence seems to vary between the different tools. The study shows the benefit of using indicators for the scenario quality criteria. More research is needed to develop indicators for other scenario quality criteria, to improve those developed here and to study the impact of structuring tools with a larger data set.

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1. Introduction

The world is becoming increasingly complex, which makes it hard, if not impossible, to predict what the future will bring us. Scenarios are frequently used to increase our understanding of the future when uncertainty is high [1–4]. They capture a range of uncertainties by describing and analysing a set of possible futures, instead of trying to predict one single outcome [1,3]. Commonly, qualitative stories are developed – often in a participatory manner – to explore future uncertainties in socio-economic, cultural, political and institutional aspects as linked to environmental factors (e.g. [5–8]). Models are used to enhance this information and are especially well suited to study the linkages between environmental factors and demonstrate their impacts [9–12]. Both types of scenarios have their advantages and disadvantages [13]. In order to create scenarios that incorporate the best of both types they are often developed together (e.g. [10,14–17]).

As the input from policy makers and other stakeholders is mainly in the storylines and the input from scientists and experts mainly in models, it is important that these products are linked (e.g. [18–20]). Discrepancies between the products

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may lower the trust of stakeholders in models and the credibility and scientific status of the overall results. Furthermore, limited exchange between stakeholders and experts leads to a loss of 'negotiated science' [21] and social learning [22]. One way of combining qualitative and quantitative scenarios is by using the Story and Simulation (SAS) approach [18]. In this iterative process, storylines and model results are compared and revised until both products are consistent. A range of potential problems inhibits a complete link between models and storylines, among others related to time and resource limitations and differences in system description [10,13]. An important problem, which is highlighted in this paper, is related to the low level of structure of the qualitative output. Due to the rather unstructured and vague output of many participatory workshops, quantification of the storylines remains difficult.

A number of studies have defined criteria for the quality of scenarios (e.g. [23–26]). Most of them mention credibility and creativity. A scenario needs to be credible to have impact; if they are not credible, people will discard them. At the same time, scenarios should be creative to challenge current views and provoke new ideas [19,24]. Alcamo and Henrichs [24] state that: "*the SAS approach produces credible results because it can incorporate state-of the art computer models for generating numerical information about environmental changes and their driving forces and for checking the consistency of qualitative scenarios.*" In other words, the credibility of scenarios increases if storylines and models are better linked. We hypothesise that a more structured output from the participatory process enhances the link between qualitative and quantitative scenarios in the SAS approach. Structuring qualitative output therefore increases the credibility and, consequently, the quality of scenarios.

Structure is difficult to define but links to aspects like the number of rules, internal consistency and explicitness. Vervoort et al. [27] added aspects that link to structure in their criteria for capturing Complex Adaptive Systems, such as showing systems connectedness and feedbacks and transferability of methods to other scenario exercises and contexts. In short, structure can be linked to credibility, internal consistency, explicitness and whether or not there are clear underlying rules and assumptions.

In scenario literature, creativity is one of the quality criteria, an overview of which is given by van Vliet [20]. Different authors address different reasons for the need of including creativity as a criterion. Most argue that creativity is needed to challenge mental models and perceptions of the future (e.g. [19,24,28]). Scenarios are creative when they:

- Provoke new, creative thinking [24,29].
- Are thought-provoking and surprising [19,24,27].
- Challenge current views about the future [24,28].
- Inform about the implications of uncertainty [24].
- Are not simple variations on the same theme [28,30].
- Widen the range of alternatives considered [19].
- Help to overcome the availability bias [31].

Most of the authors also look at the actual use of scenarios, for instance in methods like scenario analysis [32] or scenario planning [33,34]. We limit ourselves to the role of creativity during the participatory scenario development workshops.

Most of the mentioned aspects of creativity are rather difficult to analyse. This is due to both the lack of literature and methods on how to study creativity and the fact that creativity encompasses a wide variety of aspects ranging from 'thought-provoking' to 'inform about uncertainties' and 'widen the range of futures'. Therefore, we have opted to broaden our scope and to study creativity literature in general, to look for indicators for creativity that can be used to study the resulting scenarios from several different workshops in an objective manner.

There is not one definition for creativity; according to Bruner [35] "effective surprise" is the main criterion for creativity, while Keil [36] sees creativity as the ability to look at things differently. Amabile [37] argues that creativity is exhibited when a product or service is generated that is both novel and useful. Although there is no single definition, many authors agree that divergent-thinking is an important skill relevant to creativity (e.g. [38–40]), although it does not represent creativity fully [41]. Divergent thinking relates to the creation of several new ideas [42]. In scenario literature, it is assumed that creativity can be increased by involving stakeholders. In an open atmosphere diverse groups can learn from each other, compliment arguments and thus come up with new and creative concepts for future developments. Involvement of a wide range of stakeholders can lead to a wide range of ideas. It is therefore preferable to involve diverse stakeholders and to ensure that there is room for creative and non-linear thinking, which increases creativity and, consequently, the quality of scenarios.

1.1. Structure versus creativity

As said, both structure and creativity are important for the quality of scenarios, but there seems to be a tension between them. Our hypothesis is that overly focusing on structure will decrease the level of creativity, as a more structured approach lowers the freedom of action and thinking by forcing more rules. van Vliet et al. [13] presented a participatory scenario development framework that aims to balance between creative and structuring tools. This is hypothesised to increase the quality of the developed scenarios as they gain more credibility (by including structure), while maintaining creativity.

However, before this idea could be tested we needed to measure the level of creativity of the workshop results. This paper presents the indicators used to do so and the results of the analysis, in order to show how these indicators can be used. These results can, in turn, be used to study how adding structure affects creativity.