(Scenario analysis)
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Scenario Analysis

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Introduction

The term ‘scenario analysis’ is used in the SustainabilityA−Test project in a very general way, including the phases of defining scenarios, developing scenarios and interpreting the results.

A manifold of definitions exists in practice and in the literature on what ‘scenario analysis’ is. However, most scenario developers would agree that scenarios are constructed especially to assist in the understanding of possible future developments of complex systems. In the SustainabilityA−Test project, scenarios are also assumed to provide some form of future perspective to an integrated assessment. Scenarios are made up of a set of explicit ‘if–then’ propositions that explore the consequences of a range of driving force assumptions (i.e. each scenario should include a set of driving forces as well as a representation of resulting pressures, states, impact and/or responses). A scenario can take many forms including an image, a graphic, a table, or text.

The scenario analysis tool group in the SustainabilityA−Test project comprises tools that can be used to develop scenarios. Using existing (i.e. already developed) projections, data series or qualitative story−lines is not considered as using scenario analysis in the SustainabilityA−Test project. Scenario analysis tools in this project thus refer to the development of scenarios.

Role of scenario analysis tools in an integrated assessment

Scenario analysis tools are powerful tools in integrated assessments especially in Phase II of an integrated assessment, called ‘finding options’ in the SustainabilityA−Test project.

Scenario analysis tools are mainly used in Phase I (problem framing), Phase II (finding options), and Phase III (Analysis) of an integrated assessment. In any situation where scenario analysis tools are used, the tools are used in conjunction with other tools, especially participatory tools and modelling tools.

In Phase I – providing future perspectives to problem framing – scenario analysis contributes to the building of knowledge about the problem and its cause and effect relationships. Suitable scenario tools are capable of helping to get over narrow views on the problem area, like brainstorming, workshops (like ‘future conferences’) and other participatory scenario−building exercises.

In Phase II – finding options – scenario analysis plays an important role in visioning futures and setting the objectives. Scenarios are used to elucidate visions on sustainable futures and pathways, including policy interventions and variation of framework conditions. At this stage of the integrated assessment, the main drivers are identified and a broad spectrum of possible future developments, or possible pathways to certain objectives, is described. An important role for scenario application in this phase is a first clustering of promising policy options that can be further investigated in Phase III (analysis).

In Phase III – analysis – further steps of analysis are based upon the results of the scenario definition processes. Scenario calculation often provide the data series needed by the more analytical tools to calculate expected impacts, costs and benefits of various policy options.
In Phase IV – follow-up – there is no particular role for scenario analysis tools. Existing projections and scenarios might be used for ex-post evaluation of implemented policies, but this is not considered application of scenario analysis tools in the SustainabilityA–Test project.

**Choosing between different scenario analysis tools**

There are various ways to develop scenarios, and various reasons for doing so. Probably the most important factor determining what method to use is reason for which the scenario is.

Three typical reasons for developing scenarios can be distinguished, which more or less link to the different phases of integrated assessment. These are (Westhoek et al., 2006):

1. Strategic orientation, to answer questions such as what alternative ‘worlds’ can be expected, what preparations are needed, what if current assumptions are wrong, and what would be robust strategies?
2. Advocacy/vision building, to answer questions such as what are the positive changes that are needed (e.g. structural changes, value changes, etc.)?
3. Policy optimisation, to answer questions such as what policy variant is most effective, cost-efficient, fast, acceptable, etc?

There are many additional considerations for choosing one scenario development tool over the other. Four of these are discussed in further detail below:

1. Type of desired scenario – participatory vs. non-participatory and qualitative vs. quantitative (or hybrid);
2. Problem content – the nature and scope of the issue to be addressed (Steyaert and Lisoir, 2005);
3. Scenario outcome – types of outcomes that the approach is good producing (Involve, 2005);
4. Whether or not the tool requires specific (scenario) expertise to be applied.

Each criterion is explained in more detail below, followed by an overview Table mapping a few tools for scenario development to the criteria.

**Type of scenarios**

There are several types of scenarios that can be produce by a tool or combination of tools. Several scenario characteristics were already mentioned in this chapter from which two are strongly affected by the type of tools used:

1. participatory vs. non-participatory scenarios with respect to inclusion of stakeholders
2. qualitative vs. quantitative (or hybrid) scenarios with respect to knowledge used.

If the scenario aims to explore more the values of the issues at stake, it is important to use tools that allow participation of stakeholders. On the other hand, if the scenario has as main objective to support the assessment with data series, it is probably more appropriate to use quantitative tools.

**Problem Content**

The nature and scope of the issue to be addressed can be regarded based on four aspects (Steyaert and Lisoir, 2005):

1. Knowledge – to what extent does the society already possess a general knowledge of the subject?
2. Maturity – to what extent has the society already developed opinions or even legislation on the subject? Do strong views exist or is the issue so emergent that norms have not become established?
3. Complexity – is the subject highly complex, such that a great deal of (technical) information is
required?
4. Controversy – is the issue highly controversial and has the debate become polarised, such that consensus is difficult to reach?

Scenario Outcome

Different tools produce different types of outcomes that can go from simple gather of information to the production of a scenario. Four types of outcomes that can be produced by tools are considered (Involve, 2005):

1. Information – some methods are good for gathering the information necessary to characterise a scenario;
2. Organise information – some methods are good to organise the data to be used in the scenario’s building;
3. Produce a scenario – methods that involve the development of a complete scenario;
4. Hybrid – some methods are good to gather information and produce a new scenario.

| Method*          | Reason Strategic Advocacy Policy orientation / vision building | Type Participatory Qualitative Quantitative Knowledge Maturity Complexity Controversial | Outcomes Gather Organise Produce Hybrid Trends V V ± ± + + V V Cross Impact V V V ± ± + ± ± Relevance trees and morphologic analysis V V V V + + + + V Modeling, simulating, training V V V V ± ± ± ± V Participatory methods** V V V V ± ± ± ± V V Interactive brainstorming V V V V ± - + ± V V Scenario workshops V V V V + ± ± ± Intergrated foresight management model V V V V - - ± ± Ranking method V V V ± - ± ± V |

Table 1. Selection criteria for scenario analysis tools
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*) Note that when a method is said to be useful in terms of the criteria mentioned here, denoted by ‘V’, this is based on the typical application of the method. An empty cells means that a method is not particularly good for that specific situation.

**) Participatory methods are those tools that can help with building a scenario such as Focus Group, Delphi survey and in–depth interviews. These tools are described in the Participatory tools chapter.

***) With respect to contents, the “+”–sign denotes high suitability, the “−”–sign low suitability and the “m” medium suitability of a tool for situations where there is a high level of common knowledge, a high level of maturity (most participants have formed their opinion), high complexity and a highly controversial issue. “±” denotes that the tool can be used for all cases.

An additional important differentiation between approaches for developing scenario analysis is the one that of backcasting and forecasting scenario analysis. While the forecasting approach starts with current situations and explores possible development alternatives, in backcasting a desired future situation is taken as the analytical starting point and possible different strategies or strands of development that lead to that situation are described and evaluated.

As the Forecasting scenarios is the most expanded in the scenario analysis, a short description is given in the webbook.

References

Involve (2005), People & participation – How to put citizens at the heart of decision–making, Beacon Press