

Methodological Approach of the Scenario Development

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Introduction

The stakeholder-based scenario technique is a crucial element of the ONEforest decision support system. In a five-step procedure, key factors were identified and used to derive different future projections for each key factor. The combination of consistent key factor projections then led to narratives that describe different future scenarios in the CSRs and were discussed with stakeholders. For the modelling, these qualitative narratives were translated into quantitative assumptions of the decision support system, such as demand for wood-based products or industrial technology investments in each Case Study Region (CSR).

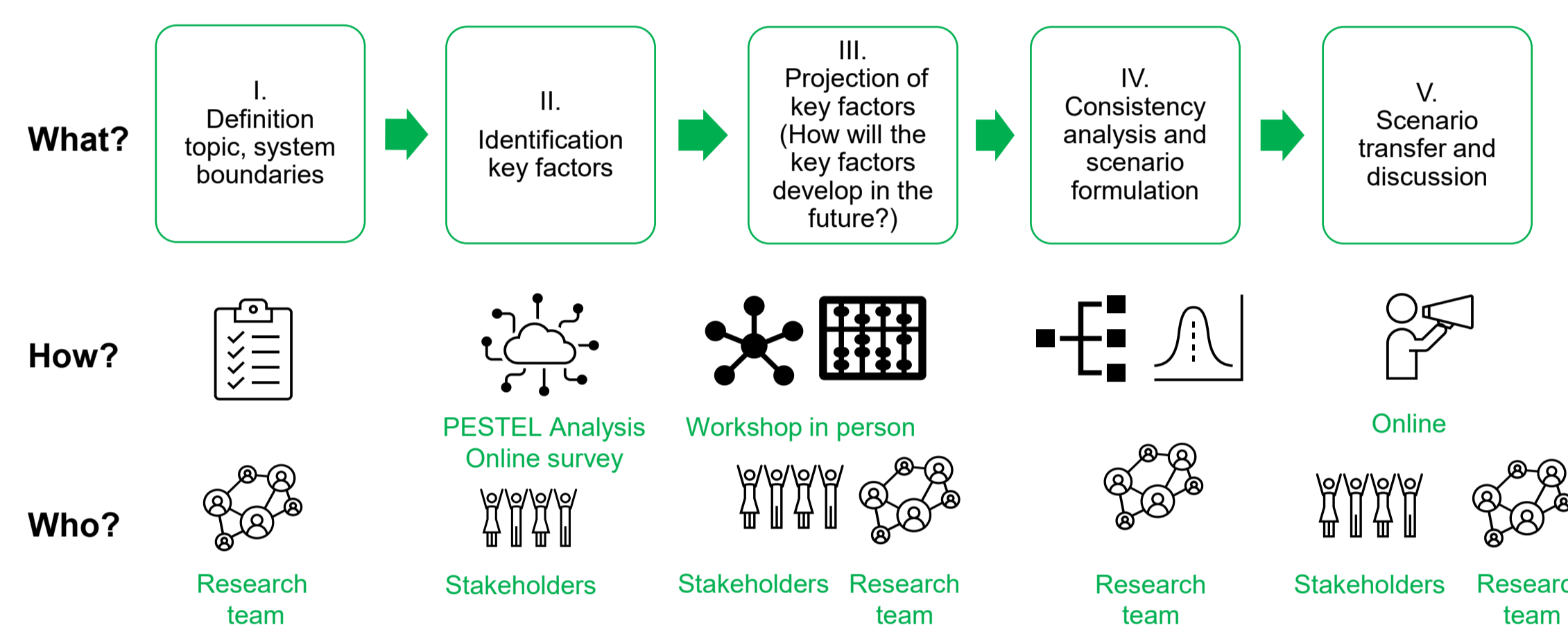


Figure 1: Methodological Procedure of the Scenario Development

Sources for the development of the scenario technique methodology:
- Vilja Varho, Petri Tapio, Combining the qualitative and quantitative with the Q2 scenario technique – The case of transport and climate, Technological Forecasting & Social Change 80 (2013) 611–630
- Iris Gräßler, Philipp Scholle, and Henrik Thiele, Scenario Technique, in: Sándor Vajna (Ed.), Integrated Design Engineering, Interdisciplinary and Holistic Product Development, Cham, 2020, pp. 615–645

Methodological Approach of the Decision Support System

The decision support system is based on forest growth models and combines them with a multi-criteria optimisation approach to reflect stakeholders' priorities. The corresponding impacts on the wood industry are modelled with a System Dynamics approach that uses material flow analyses and (social) life cycle assessment (Figure 2). Thereby, different forest management options in the CSRs are linked with their impacts on the wood value chain. The approach serves as a blueprint for other European regions to balance FES. Using a scenario technique, different future developments in the political, technological, environmental, economic and social fields are considered to assess the robustness of forest management options in relation to stakeholders' priorities.

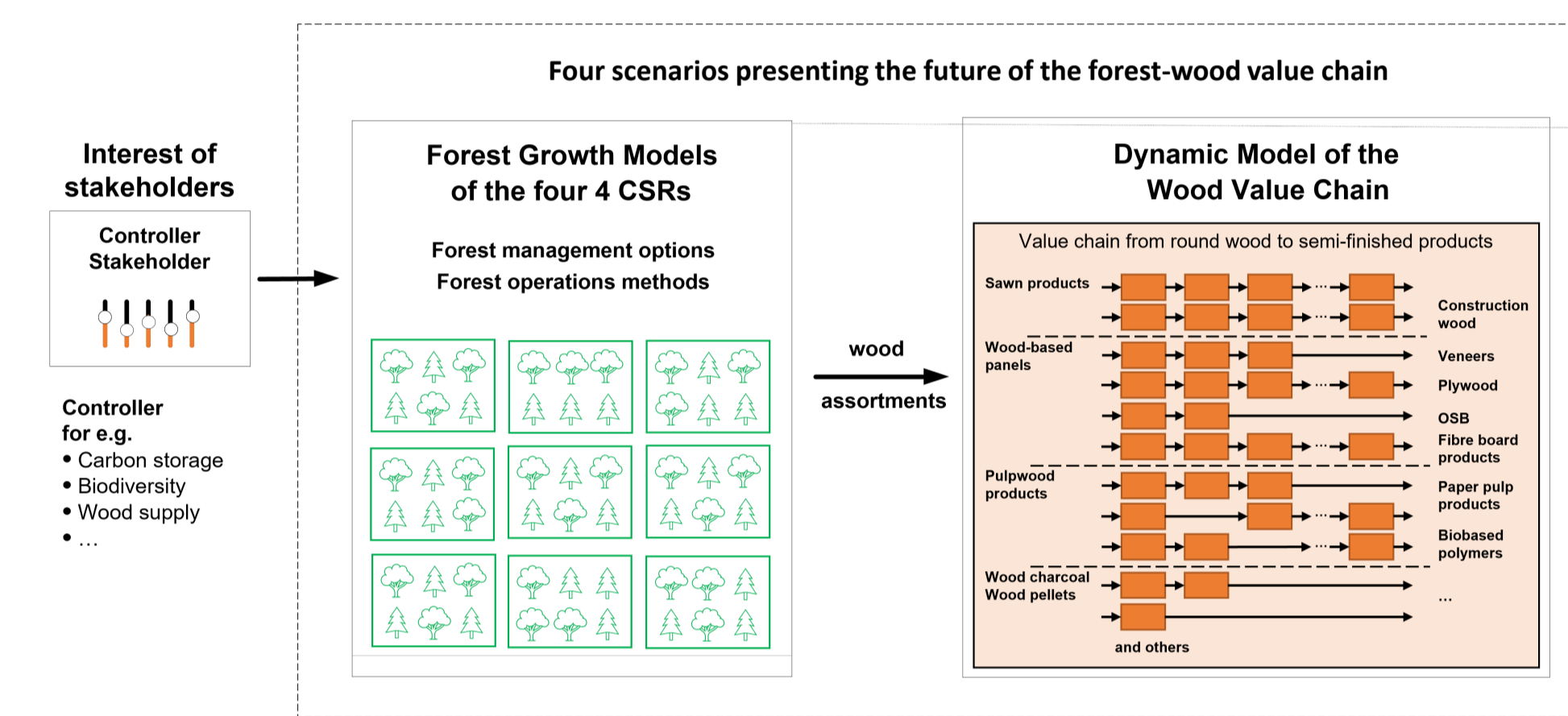


Figure 2: Methodological Approach of the Decision Support System

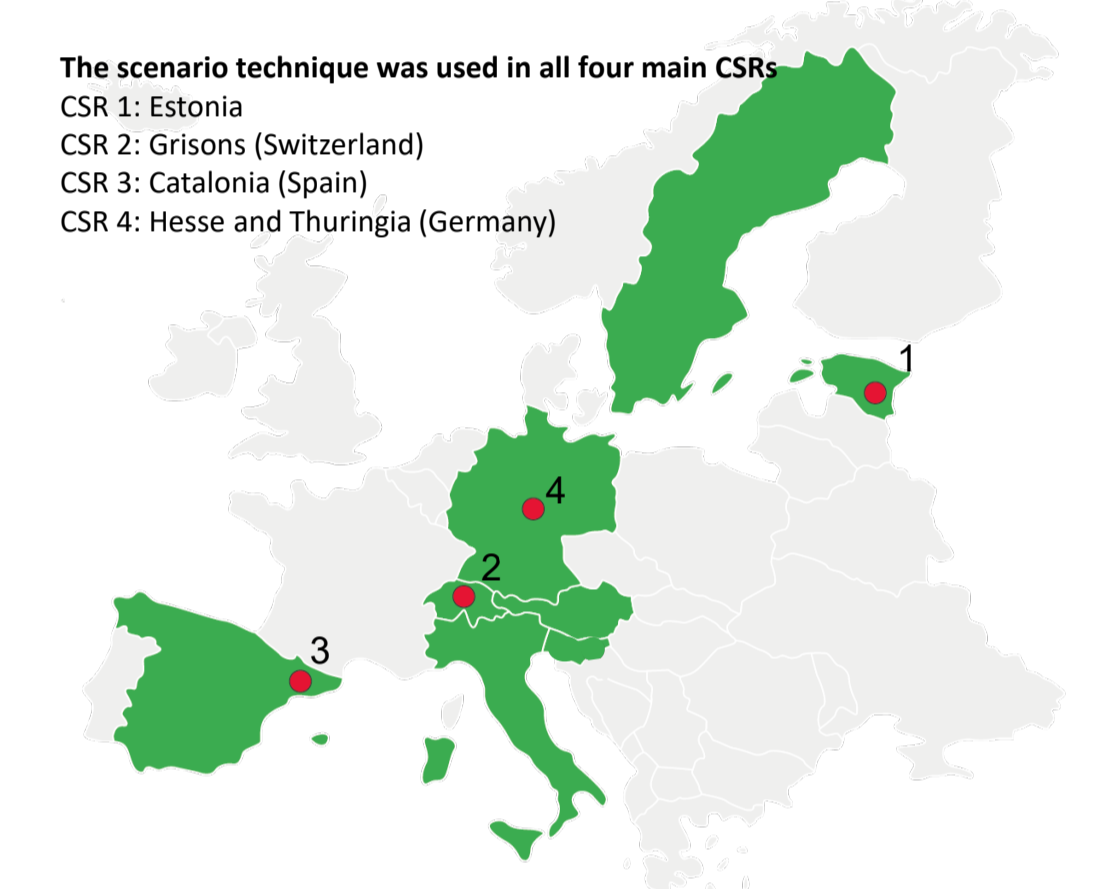


Figure 3: Main CSRs of ONEforest

Phase II: Identification of key factors

Phase II of the scenario technique was based on a PESTEL analysis. The research team searched for relevant literature about key factors applied to the forest wood value chain (FWVC). The total result of the search was 345, after screening the title 43 articles were selected to read the abstract. After reading the abstract, 14 articles were selected to be read full-text. Finally, 12 articles were eligible to get the key factors. These key factors were grouped in six dimensions political, economic, social, technological, environmental and legal based on PESTEL framework. In each dimension the factors were clustered in categories which were then bundled into seven key factors. During a workshop in each of the four CSRs, these key factors were verified by the stakeholders.



Figure 4: Methodological Procedure of the PESTEL Analysis

Next steps after the workshop (Step III, IV and V)

In **phase III** of a scenario development key factors and their drivers are revised to capture missing factors or exclude non-relevant factors and drivers. For the identified key factors, different projections for the future are developed. These projections are established separately for each key factor. **Phase IV** of the scenario technique includes scenario formulations and descriptions. The resulting continuous texts are so-called narratives. In the ONEforest project after the consistency analysis of the projected key factors, a scenario selection algorithm was used to select the combinations of projections that show a high degree of consistency. The result was the basis for the narratives. In **phase V** the derived scenarios are presented and discussed. For the ONEforest project the scenarios were discussed in an online workshop with the stakeholders.

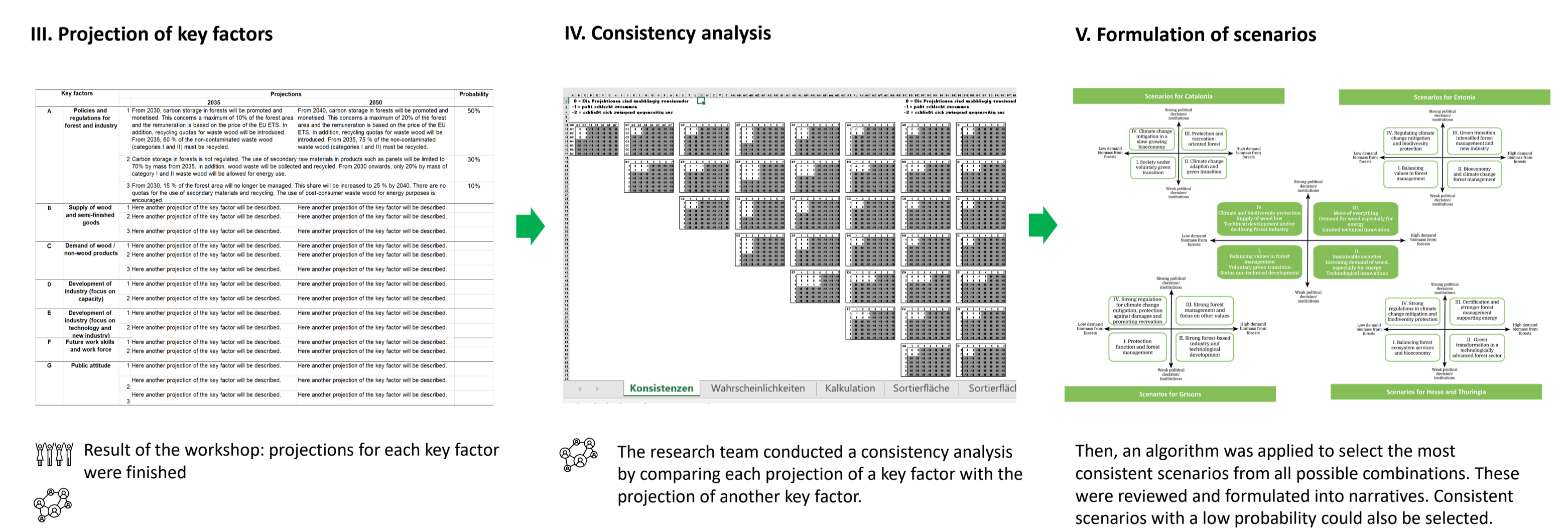


Figure 5: Step III, IV and V of the scenario development

Results: Assessment of Social, Environmental and Economic Impacts

As a result, social, environmental and economic indicators from the forest down to the wood processing industry are provided to support stakeholders in decision-making. By taking into account different future scenarios until 2060, stakeholders can discuss the impact of the forest management options in their CSRs with a long-term perspective on comprehensive indicators from (social) life cycle assessment, material flow analysis and value added calculation. Intention is to increase the mutual understanding between the different stakeholders by providing information based on indicators and to support decision-making in times of high uncertainty.

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