

## Constellation analysis

This method develops constellations of social actors, natural elements, technical elements as well as signs/symbols with regard to an issue. It involves heterogeneous groups with the intention to find the constellation most participants can agree to.

### What is the «Constellation analysis (CA)»?

The constellation analysis (CA) develops constellations. Constellations are relations between heterogeneous elements that build a cohesive cluster. Four types of elements are differentiated: social actors, natural elements, technical elements as well as signs/symbols. During the CA, equal importance is assigned to all elements and there is a focus on the relations between them. This method involves experts from science and practice with the intention to find the constellation reflecting the perceived reality most participants can accept or even share.

### Why should it be applied?

CA is a methodological approach that has been designed to cope with complex situations that require interdisciplinary and transdisciplinary cooperation for the development of solutions (Kruse 2008: 48).

CA has been implemented with different objectives such as mapping the diversity of perspectives, development of strategies, integration of results, as well as the analysis of the implementation of policy measures and of their impact on the structure of a constellation over a longer period of time (Schäfer et al. 2010: 121). The method has been proven to identify meaningful constellations in sustainability, technology and innovation studies so far.

### When should it be applied?

CA can serve problem framing, the integration of results, and the development of strategies for changing a situation. The method can be carried out at different points of the project for adjustment and/or tracking of changes in the constellation.

### How does it work?

CA is typically conducted following several steps in a workshop setting, moderated by a facilitator.

#### 1. Identify, analyse and illustrate elements and relations between them

- a) Identify the most important elements of 4 types
  - social actors (e.g., persons or groups),
  - natural elements (e.g., air, water, landscape etc.),
  - technical elements (e.g., hardware, power stations, objects), as well as
  - signs/symbols (e.g., standards, laws, rules, current political or social concepts).
- b) Arrange the elements in a way that corresponds to the way they are correlated. Each of the four types of elements is regarded as having equal importance within the CA; there is no a priori hierarchy between the four types. The most important elements for the question under consideration are then identified in a discussion on equal footing amongst participants (Kruse 2008: 49; Schäfer et al. 2010: 120).

Mapping is done using index cards on a (physical or digital) whiteboard. Constellations are built from the centre, putting the most important elements on a ring. Those elements, which are grouped besides each other in 'clusters', are in close interaction (Schäfer & Kröger 2016: 529). After mapping the central elements, team members from different disciplines and/or experts from practice propose to add further elements, judging their relevance in a discursive mapping process.

Furthermore, the interrelations between elements are analysed and mapped. Relations are shown in two ways: a) Positioning elements close to each other implies that they are related (above mentioned 'clusters'). Elements which are mapped far from each other only have loose or no relations. B) Further relations are typified by symbols for relations (e.g., directional, conflicting, hampered, feedback relation).

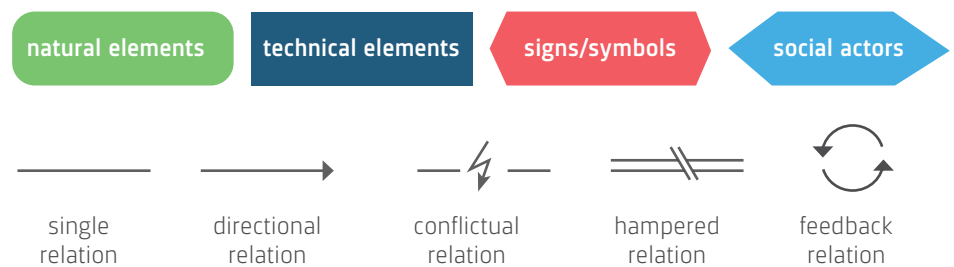


Figure 1: Types of elements and relations of a constellation analysis (Schäfer & Kröger 2016)

## 2. Analyse and interpret the functional principles and characteristics of the constellation.

Identifying the most important elements and clarification of the relations between them on a micro level in step 1 is necessary to be able to understand the structure and logic of a constellation in step 2. This step focuses on the identification of regularities, patterns and functional principles and is referred to as the macro level of a constellation. Questions which are helpful for the interpretation are, for example, whether a dominant constellation can be differentiated from a niche constellation, which is often the case when innovation or transition processes are analysed. Examples for functional principles are (economic) efficiency, precaution, control or co-existence of humans and nature.

## 3. Examine the dynamics that affect the constellation.

In step 3, the stability of the constellation is analysed. Are there, for example, self-enhancing dynamics that stabilise the dominant constellation? Is the dominant constellation challenged by e.g., a new regulation on a national or European level or by changing demands on the side of the consumers?

These three steps are the basic principle of every constellation analysis (see <https://go.transdisciplinarity.ch/cadownloads> or Schön et al. 2007 for checklists in German for conducting these three steps for different areas of application).

There are several possibilities how CA can be developed depending on the size of the group and available time resources: a) the whole team passes through all the steps of CA as a group, b) part of the team prepares maps to discuss them in the whole team, c) single members of the team prepare maps and discuss them with other team members (Schäfer & Kröger 2016: 529, referring to the German text of Schön et al. 2007: 21). The advantages and disadvantages of the choice of how to perform it should be considered for the ongoing process.

In a follow-up process, the figure of the constellation is cleared and an accompanying text (description and interpretation) is formulated.

Depending on the participative character of the research process, the figure and the text can be adapted in several iterative rounds.

The figure of the constellation may serve as starting point to look into various questions.

<b>How are thought-styles bridged?</b>	<p>Constellation analysis is not restricted to any particular scientific theory or discipline, but is applied primarily for linking different disciplines or perspectives. The method helps to bridge thought styles by bringing together various approaches, data sources, and forms of knowledge to create a picture of the constellation at large that can be shared by all disciplines and actors involved. By including natural and technical elements as well as social actors and systems of signs, it draws the attention to the variety of factors which influence certain constellations (Schäfer et al. 2010: 132).</p> <p>The mapping steps oblige the actors involved to refer to each other's perspective (Schäfer et al. 2010).</p> <p>The development of a figure in a group helps to integrate different perspectives in a joint constellation – or make different views transparent. As a preparatory step, constellations can first be developed separately by different homogeneous actor groups (e.g., "the farmers", "the environmentalists") and the different constellations can be compared and discussed in a second step in a heterogeneous group.</p>
<b>What's the output/outcome?</b>	<p>The output of a constellation analysis is a visualisation of the examined constellation and a corresponding accompanying text. The outcome is an increased mutual understanding of different perspectives amongst the participants, points of consent and dissent (Schäfer et al. 2010: 120f).</p> <p>The aim is to create a picture and a description of a constellation that all practitioners and researchers involved can accept or even share (Bruns &amp; Ohlhorst 2011; Schön et al. 2007). In case that it is not possible to reach an agreement on the constellation, it is also helpful for an ongoing project to identify conflicting perspectives already in an early stage. In that case the dissent should be documented and the team should agree on the identified conflicting perspectives (Schäfer &amp; Kröger 2016: 529, referring to German text of Schön et al. 2007: 21).</p>
<b>Who participates in what role?</b>	<p>Moderation by a facilitator who guards over the conceptual and methodological principles is needed. Constellation analysis can be done on paper or digitally (white board). Do not underestimate that creating the constellation digitally during the workshop requires a lot of experience by the moderator.</p> <p>Scientists and stakeholders participate as experts. Given the limited resources of certain actors, we recommend to define a 'core team' that moderates the process, consolidates the visualisation of the constellation and formulates a draft of the accompanying text, which describes and analyses the constellation, whereas others are involved with lower degree of intensity.</p>
<b>What do I need to prepare?</b>	<p>Get a clear notion of the conceptual and methodological principles of the constellation analysis. Decide whether the method will be carried out with index cards on a pin board or by using digital means. For a thorough discussion onsite meetings are preferred but the method can also be carried out online, e.g., by using a virtual flip chart. Prepare the white board, index cards, symbols to specify relations, and potential digital support services accordingly. Index cards may have a different colour and different shape (for black&amp;white printouts) for each type of elements. Decide which actors (experts from science and practice) will be part of the process of mapping the constellation. Considering the representation of different interests and the availability of resources (esp. time), define the roles of different actors in the process: Who is part of the 'core team'? Who are the central actors that are involved intensively in the mapping and interpretation process and which actors are involved with lower intensity (e.g., giving feedback at one point of the process)?</p>
<b>When not to use this method?</b>	<p>The method was developed as a tool for interdisciplinary cooperation based on the assumption that technical, natural and social developments are closely intertwined in current societies and can only be analysed and influenced when taking this heterogeneity into account. It may not be applied in research projects that are interested only in some of the four elements and not in their interaction.</p>

## Where can I learn more?

Selected references (in chronological order):

- Schön S, Kruse S, Meister M, Nölting B, Ohlhorst D 2007. Handbuch Konstellationsanalyse. Ein interdisziplinäres Brückenkonzept für die Nachhaltigkeits-, Technik-, und Innovationsforschung. München.
- Kruse S 2008. Structuring Multiple Perspectives in Environmental Decision-Making: Flood Protection in the Middle Elbe River. In: Edmundson R, Rau H (ed.), Environmental Argument and Cultural Differences: Locations, Fractures and Deliberations. Oxford: Peter Lang Publisher, 37–64.
- Schäfer M, Ohlhorst D, Schön S, Kruse S 2010. Science for the Future: Challenges and Methods for Transdisciplinary Sustainability Research. In: African Journal of Science, Technology, Innovation and Development (AJSTID), Special Issue on 'Innovation for Sustainability' 2(1), 114–137.
- Bruns E, Ohlhorst D 2011. Wind power generation in Germany – a transdisciplinary view on the innovation biography. The Journal of Transdisciplinary Environmental Studies (TES) 10(1), 45–67.
- Schäfer M, Kröger M 2016. Joint problem framing in sustainable land use research. Experience with Constellation Analysis as a method for inter- and transdisciplinary knowledge integration. Land Use Policy 57, 526–539.

This method profile strongly refers to the method description (in German; Summary in English) on the website of the TU Berlin: [https://www.tu-berlin.de/ztg/menue/projekte\\_und\\_kompetenzen/konstellationsanalyse/v\\_menue/die\\_konstellationsanalyse/](https://www.tu-berlin.de/ztg/menue/projekte_und_kompetenzen/konstellationsanalyse/v_menue/die_konstellationsanalyse/).

Check the online profile on [transdisciplinarity.ch/toolbox](https://transdisciplinarity.ch/toolbox) for updated and commented resources (e.g. most recent publications, experience reports, videos, links).

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## SDGs: The International Sustainable Development Goals of the UN

In this publication, the Swiss Academies of Arts and Sciences make most notably a contribution to SDGs 4, 16, 17:

> [sustainabledevelopment.un.org](https://sustainabledevelopment.un.org)

> [eda.admin.ch/agenda2030/en/home/agenda-2030/die-17-ziele-fuer-eine-nachhaltige-entwicklung.html](https://eda.admin.ch/agenda2030/en/home/agenda-2030/die-17-ziele-fuer-eine-nachhaltige-entwicklung.html)



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