Integrative Qualitative Systems Mapping (IQSM) approach for knowledge integration in transdisciplinary research

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Systems approaches provide tools to address the increasing complexity of societal challenges. However, current qualitative system map (QSM) approaches lack the ability to visualize findings early on in a research process and systematically document and integrate qualitative data in an efficient, low-resources manner. Therefore, we propose a novel application for QSM – Integrative Qualitative System Map (IQSM) – which was developed in the WaterStressAT project.

Introduction to IQSM

- The IQSM approach combines several system visualization tools including causal loop diagrams (CLD) and concept models.
- The main building blocks of IQSM are elements, connections, and potentially feedback loops, without the aim to build full causal loop diagrams, but to foster systems thinking, and deep thinking about the system boundaries, and important relationships.
- A key advantage of IQSM are flexible labels, which is similar to concept maps and cognitive mapping. They help addressing aggregation questions that cannot be immediately resolved.
- They are useful to explore and integrate heterogenous and cross-sectoral perspectives and knowledge on water stress as well as other climate adaptation contexts in a systemic way.
- They ascertain that interviews and discussions with stakeholders stay focused and have been captured accurately through continuous reflections.

The main IQSM components

- **Data Integration**

Data integration is the most important step and comprises a) integrating meaningful units of information, b) categorizing information, and c) aggregating information.

- **Data Analysis**

It refers to the continuous regarding, exploring, arranging, and modulating of data to extract and map relevant information

- **Visualization**

Visualization describes the transformation of ideas, written text, and tables into maps consisting of elements and their connections (early visualization attempts are central to the IQSM process).

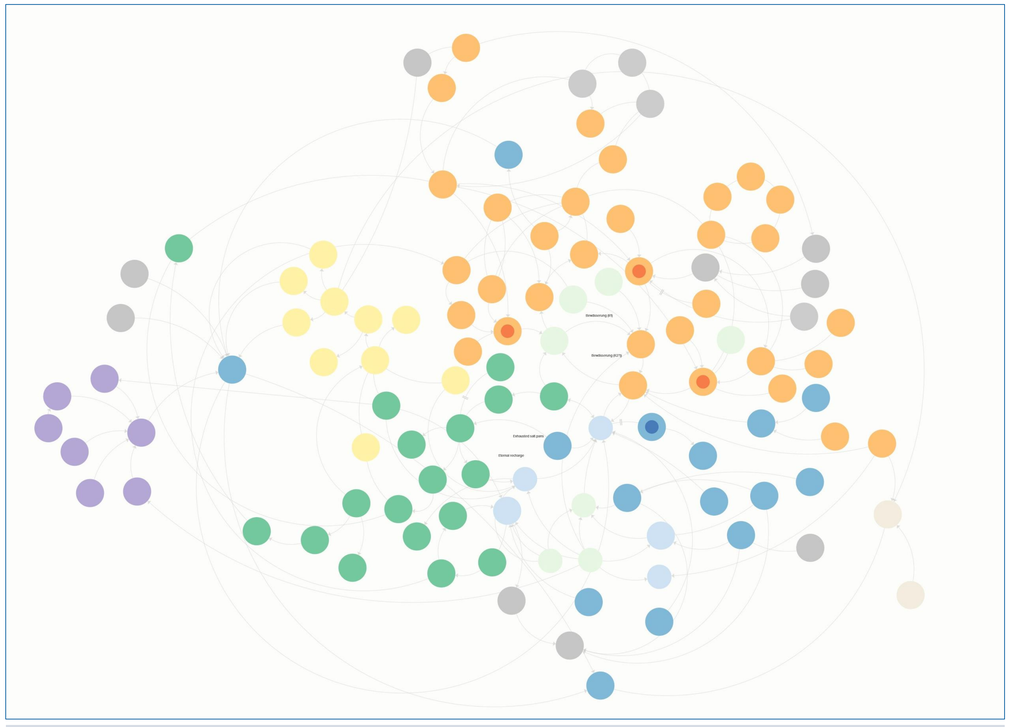
- **Reflection and Validation**

The IQSM process anticipates potential changes in problem framing, boundary setting, and aggregation, as new information is integrated into the project.

Integrative Qualitative Systems Map for Neusiedl am See

Quantitative Data Input

Examples:
- CWATM: Community water model downscaled for Seewinkel and Pinzgau regions (Burek et al. 2020)
- ECHO: Hydro-economic model downscaled to Seewinkel region (Kahil et al. 2019)



Qualitative Data Input

Examples:
- Transdisciplinary core team meetings and stakeholder workshops
- Policies, local and regional strategic plans, as well as local, cross-sectoral knowledge

Scenario Output

- Co-designed options for future water (demand) management
- Qualitative management scenarios for different sectors such as agriculture

Communication Output

- Knowledge integration and knowledge repository, also for further modelling.
- Communication across disciplinary and secotral boundaries, including regioanl planners, local policymakers, citizens, or farmers.

Application of IQSM in transdisciplinary research

- Baseline for scenario design (FSA) and modelling (CLDs/SD)
- Exploring diverse climate adaptation perspectives and discoureses at different governance levels
- Communicating across disciplines and at the science-society interface
- Ensuring focused and accurate stakeholder interviews/discussions
- Focusing on relevant sub-systems for co-production effectiveness

WaterStressAT: Project Description

- In Austria, increase in water demand as well as exacerbating climate change impacts might create local and seasonal hot-spots of water stress.
- It is thus important to understand the status quo and future development of these phenomena to identify potential areas of tension.
- WaterStressAT assesses water availability and demand in two Austrian case studies, one of them being Neusiedl/See, through transdisciplinary research under a set of regional development and climate change scenarios.
- During the project, the IQSM approach was developed for integrating and conserving diverse knowledge and to explore the systems implications of (water) management options in a flexible and context-specific manner.

Case Study: Neusiedl/See (Eastern Austria)

Originally a floodplain with valuable nature conservation areas such as lakes and fens, large areas were drained in the past for land cultivation.
Recently, groundwater levels reached critical lows, with negative effects on agriculture, ecosystems, and tourism.
Managing agricultural irrigation needs and potentially transforming agricultural practices require intervention not only at farm level.

(The QR code above leads to the full interactive system maps on kumu.io)

References:
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