International Sustainability Transitions Conference 2016, 6-9 September 2016, Wuppertal

Summary of Dialogue Session

Draft version: 7th of October 2016

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The role of learning in understanding and governing sustainability transitions

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1. Session rationale and format

Processes of change are frequently conceptualized as learning processes by transition scholars. Several learning concepts are used in the sustainability transitions literature, including higher order learning (e.g., Broto et al., 2014), learning-by-doing (e.g., van den Bergh et al., 2007), and social learning (e.g., Kemp et al., 2007), amongst others. Despite the importance of learning, the underlying learning concepts are often not clearly defined and elaborated in transition research (van Mierlo et al., 2010; Beers et al., 2014). Thus, the sustainability transitions literature does not specify how exactly learning takes place and how learning processes can be supported.

The need for a more differentiated understanding of learning in transformative science was already mentioned more than ten years ago by Marleen van de Kerkhof and Anna Wieczorek (see van de Kerkhof and Wieczorek, 2005). Nevertheless, progress towards a systematic and comprehensive appraisal of learning in sustainability transitions has been limited since then. The following questions have been addressed in this dialogue session:

- What is the status-quo of conceptualizing learning in sustainability transitions? What is the potential of learning concepts to understand and guide fundamental societal change?
- What are the most promising learning concepts for understanding and governing sustainability transitions? What are current research gaps?
- Can transformative research draw upon findings from other research fields, such as social-ecological systems research, to design evidence-informed interventions that aim at fostering learning in the context of sustainability transitions?

The dialogue session took a learning perspective to address conceptual and methodological challenges of transformative science. Learning concepts can become a powerful theory of change for transformative science drawing upon findings from various research fields, such as social-ecological systems research, educational psychology, public policy and education for sustainable development. A learning lens supports action and solution orientated research by translating broad societal challenges into specific learning objects (*what* has to change?), learning subjects (*who* has to change?) and supportive learning factors (*how* can we facilitate change?).

Due to the great interest in the session, the session was divided in two parts. Part I consisted of five presentations (10 min) and subsequent discussions between presenters and the audience (~5 min). Part II included an interactive panel discussion using the fishbowl format.

2. Session Part I: Presentations

The first part of the session (see Figure 1) started with an introductory talk by Johannes Halbe that presented a framework to structure various learning concepts that have been applied by transition scholars. In the second talk, PJ Beers provided an overview of the state-of-the-art of conceptualizing learning in transition research. In the third talk, Eefje Cuppen discussed harmony and conflict models of learning. Talks four and five finally presented conceptual and empirical research on specific learning concepts, namely higher order learning (presented by Jaco Quist) and social learning (presented by Annette Bos).

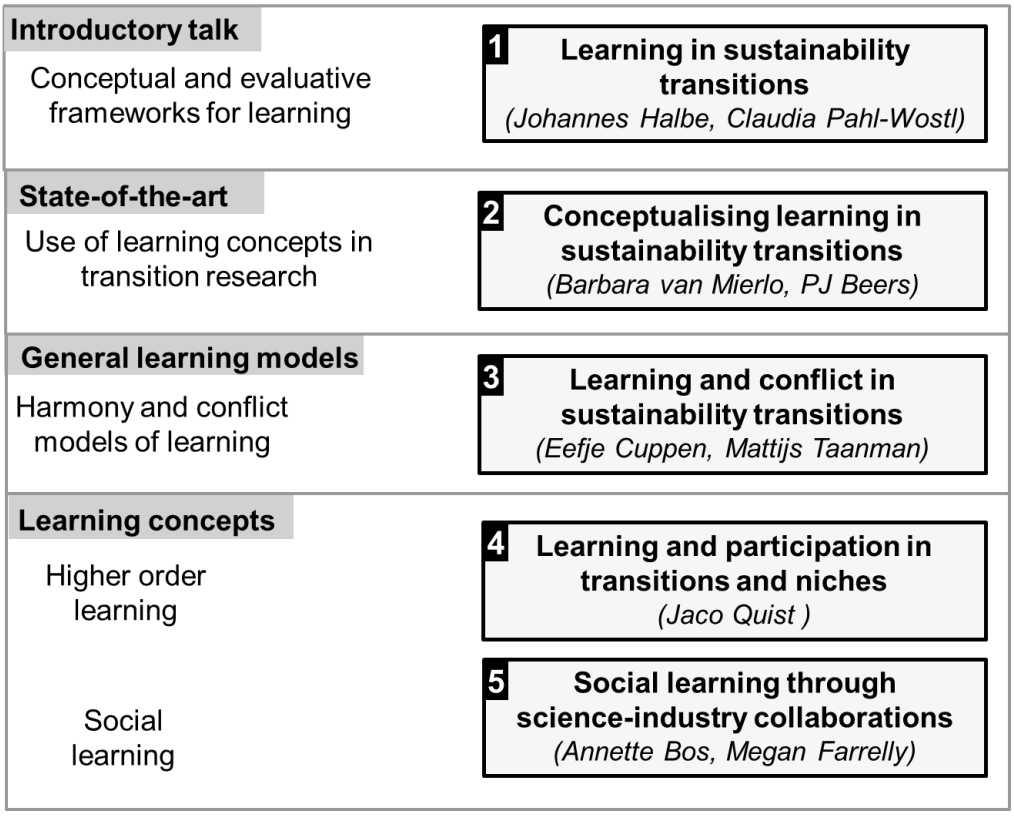

Figure 1: Structure of session part 1.

In the following, a short summary of each presentation is provided in section 2.1, before discussions are summarized in section 2.2.

2.1 Presentations

- Presentation No. 1 -

Learning in sustainability transitions

Johannes Halbe[1], *Claudia Pahl-Wostl*[1]

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This dialogue session brings together leading scholars working on learning conceptualizations (e.g., Pahl-Wostl, 2009; van Mierlo et al., 2010; Quist and Tukker, 2013) and practical applications of learning concepts to understand and govern transitions (e.g., Cuppen, 2012; Bos et al., 2013). In this introductory talk, we explained the rationale and outline of the session to the audience. The presentation also included a review of the state-of-the-art of research on learning-related concepts and frameworks.

First, an overview of learning concepts applied by transition scholars was provided based upon a recent systematic review of learning concepts in sustainability transitions (Halbe et al., submitted).

Various research strands in transition research refer to learning concepts often without providing details on the underlying learning theories and mechanisms. The review of learning concepts focused on the main transition research streams of transition management, strategic niche management, the multi-level perspective and technological innovation systems (cf. Markard et al., 2012).

Based upon the review of learning concepts by Kerkhof and Wieczorek (2005) and further conceptual work (e.g., Halbe, 2016), the various dimensions of learning in sustainability transitions have been identified. The conceptual framework developed by Halbe et al. (submitted) differentiates between learning concepts that are related to learning intensity, objects, outcomes and processes. Based upon this conceptualization, four learning contexts in sustainability transitions are defined (see Halbe, 2016): (1) in an individual learning context, an individual takes action to tackle a sustainability problem; (2) in the group learning context, a group takes collective action; (3) in an organizational learning context, individuals or groups act as representatives of an organization; (4) in the policy learning context, governmental and non-government actors interact in addressing a sustainability issue through public policy making and implementation.

Finally, approaches for visualization and evaluation of learning in sustainability transitions have been reviewed. The evaluative framework by Forrester and Wiek (2014) and the Management and Transition Framework (MTF) (Pahl-Wostl et al., 2010) are promising approaches towards the design of evidence-informed interventions. These approaches allow for a visualization and analysis of past transition processes consisting of a sequence of activities that are linked by specific outcomes (e.g., new institutions or products). Such ex-post analyses of barriers to and drivers of transition processes enable the design of evidence-informed interventions in the future.

- Presentation No. 2 –

Conceptualising learning in sustainability transitions

Barbara van Mierlo[1], PJ Beers[2]

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Learning is considered to be a key process in sustainability transitions and the wider domain of studies about transformative change for a sustainable development. It is generally seen as a way of coping with uncertainty as well as the diversity of actors' perspectives and interests and developing a variety of options for change. To ensure that any particular elaboration of the ambiguous concept of sustainable development is both meaningful to the people whom it concerns as well as practical, learning is an essential element of initiatives seeking to contribute to a sustainable development.

In an early review of the relevance of perspectives that address action-oriented social processes of learning towards sustainability Loeber et al. (2007) inferred that while in this area commonly used key concepts and models are interesting and each have specific advantages, none of them seems to be sufficiently geared towards the context of sustainability transitions. In conclusion, learning in transitions were specified as follows: 1) Learning is the process of reviewing the 'theories-in-use' that actors hold by explicating and scrutinising tacit theories, beliefs and assumptions, thus activating them to radically change their practices; 2) In the learning new practices become aligned on the basis of a

congruency of meanings of sustainability between heterogeneous parties; 3) In the learning actors challenge and redefine the very structures that hinder their progressing aspirations for more sustainable practices.

Nowadays, learning is still hardly conceptualised for sustainability transitions and even more seldom a key topic of study. In our contribution, we scrutinized the value of three theoretical perspectives that have been developed by at least one of us, as a follow-up on the above mentioned review. It was a personal reflection on three attempts at developing new theoretical perspectives, each of which have been tested in single empirical case studies of initiatives for 'transitions in the making':

1. Learning by systemic instruments (Van Mierlo et al. 2010);

2. System learning (van Mierlo, Arkesteijn, and Leeuwis 2010);

3. Integrative, discursive perspective on learning (Beers et al., in press);

On the basis of a comparison and analysis of the strengths and weaknesses, we aimed to contribute to the discussion of what is specific about learning in the context of sustainability transitions and what theoretically and empirically is needed to improve our understanding of it. In addition, we reviewed the value and limitations of the three perspectives when used in action research geared at enhancing, facilitating and accelerating such learning on the basis of our own experiences.

- Presentation No. 3 –

Learning and conflict in sustainability transitions

Eefje Cuppen[1], Mattijs Taanman[1]

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Learning is a key concept in the literature on transitions, as it is deemed crucial for innovation and system change towards sustainability. Methodologically, efforts to foster learning for transitions focus on the 'how' question of learning. Such efforts are based on approaches such as joint visioning, coproduction, knowledge sharing in networks, co-design and participation. All of these approaches to foster learning in transitions are based on a so-called harmony-model of learning: there is a strong focus on converging judgment before the implementation of some measure or development passed by stakeholders with different interests or ambitions. Although these approaches surely have their merits, we argue that they 1) underutilize the value of 'lived' conflict in articulating (normative) diversity, and 2) neglect the politics of transitions.

We presented a conflict-model of learning that is geared at enabling analysis, identification and inclusion of normative diversity in transitions. Our contribution was constructed around two pillars. Firstly, we discussed the importance of conflict and diversity in participatory settings. Based on a discussion of coproduction methods and insight on group dynamics, we identified the limitations of prevalent harmony-model (mainly vision-based) approaches in transition studies. Secondly, we drew upon societal conflict as a source of normative learning in transitions. Transitions studies have so far addressed conflicts in a very narrow way, analyzing them by and far as conflicts between niches and regimes. We argue that societal conflict create the potential for normative learning in sustainability

transitions. This argument is based on an understanding of societal conflict as an informal assessment of sustainable transition pathways. Societal conflicts articulate public values that are related to the direction, speed and means of transition and they give insight into potential societal and ethical impacts and risks. We draw upon analysis of two Dutch energy projects: a CCS project and a shale gas exploration project. Both projects are illustrations of how local energy projects can grow out to national controversies that put on the agenda questions pertaining to the normative dimensions of the energy transition. This involves questions related to justice, fairness and inclusion, resulting in normative conflicts such as on the question who is allowed to assess the public interest of a particular project or technology.

Based on synthesis of the discussions of the two pillars, we presented a conceptual framework on the 'how' question of learning, and articulated the connection between learning and conflict in a transition studies framework. Based on this, we developed a research agenda to further theory and methods that can foster learning through conflict in sustainability transitions.

- Presentation No. 4 -

Learning and participation in transitions and niches:
Results from backcasting experiments and circular building projects

Jaco Quist

Faculty of Technology, Policy & Management, Delft University of Technology

Learning is considered key to transitions and niche experiments. The underlying assumption is that any change is preceded by learning among actors and stakeholders involved, leading to increased awareness and understanding, changes in worldviews and value systems, and understanding of alternative problem definitions, solutions, approaches, and ways of acting. However, learning is still poorly defined and a range of conceptualisations has been proposed and applied including (i) first and higher order learning, (ii) social learning, (iii) policy-oriented learning, (iv) single and double-loop learning, and learning in innovation systems (learning-by-searching, learning-by-doing, learning-by-using, and learning-by-interacting).

The presentation reviewed a range of learning concepts, partly building on Quist and Tukker (2013) and Brown et al (2003) and related learning to degrees of participation building on Arnsteins' ladder of participation and how learning may lead to changes in policy belief systems building on Sabatier and Jenkins (1999) and actor appreciation systems building on Frank Fischer (1995, see also Grin and van de Graaf 1996). A higher order learning conceptualisation was proposed building on Brown et al (2003) distinguishing between three interrelated shifts: (1) in the problem definition and perceived s)olutions, (2) in the principalapproaches for solving the problem, and (3) in shared learning and understanding at the group level reflected by the relationships among the actors involved.

This framework was applied to two types of cases highlighting first and higher order learning. First, results were shown from learning in three participatory backcasting experiments in sustainable food consumption and production, and second, learning results were shown from recent cases on circular economy in the built environment. The latter included a case of newly constructed offices, an office renovation project, and a demolition case, all aiming at circular building practices.

The talk concluded that higher order learning can be identified in all cases, but that it does not always lead to higher order learning at the group level In addition, generating visions and visioning stimulates higher order learning among actors involved.

- Presentation No. 5 -

Social learning through science-industry collaborations

Annette Bos[1], Megan Farrelly[2]

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Learning is widely recognised as an important mechanism for bringing about change. Within the field of sustainability transitions, learning is considered essential for sustaining niche development, and ultimately a transition. Collective learning among a wide range of societal actors is deemed necessary to challenge knowledge and assumptions underlying prevailing socio-technical systems. Furthermore, such learning is thought to provide opportunities and levers that promote a shift in ways of doing, thinking and organising. Here, social learning emerges to mobilise emergent networks and inspire collective action for attaining sustainable futures.

Against this background, it is increasingly acknowledged that social learning, co-creating of knowledge and mobilising networks for transformative change requires greater level of interaction between and among research, government and industry actors. This has resulted in a rise of the number of science-industry collaborations that explicitly focus on generating learning situations by co-creating knowledge and pathways for sustainability transitions. Despite the growing number of these collaborations there remains limited insight in their novels ways of seeking actor engagement, creating conditions for social learning and niche development.

The presentation showcased novel mechanisms that apply social learning principles with the aim to strengthen niche development within a science-industry collaboration focused on transforming urban water management. Drawing on empirical insights from five embedded case studies within the science-industry collaboration, we discussed to what extent particular mechanisms embedded in the program design created an environment where social learning could occur and strengthen niche networks.

The mechanisms described during the presentation are unique research-industry style workshops, referred to as ‘research synthesis’, which applied social learning principles to the early formative stages of significant real-life land development projects. While running a series of participatory workshops is just one of many instruments to potentially foster learning that contributes to collaborative action and change, the study provides alternatives for otherwise traditional, linear science-industry engagements.

2.2 Discussion points

- *A member of the audience was interested in the question of what skills and competences should be taught in a classroom situation.* A classroom situation is a particular learning context which has a high relevance in sustainability transitions. The experiential learning concept is a useful concept to guide learning about sustainability issues in schools and universities. Learning of students can be supported through the direct experience of sustainability issues (e.g., an affected ecosystem) or innovations (e.g., community garden initiatives) followed by a reflection about these experiences. Schools and universities can thereby be important agents of change by interacting with external stakeholders (e.g., firms, initiatives, public organizations) and inducing reflective thinking about sustainability issues.
- *How can knowledge be transferred from one region to another?* There are various KKT (Knowledge Translation and Transfer) tools available that can help to transfer knowledge. Today, knowledge exchange is increasingly facilitated through social media and networks, such as youtube, facebook or pinterest. A way forward would be to, on the one hand, apply methods that elicit case-specific lessons learnt, and on the other hand, generate general lessons that can also be applied in other contexts. A first steps is provided by Halbe et al. (submitted) who conducted a systematic review of learning factors that were found to support learning in case study research. Several learning factors were identified that were found across multiple cases (e.g., funds and space for community projects), and thus can be considered as having general relevance in supporting learning. Participatory modelling is a suitable method to investigate more case-specific factors that support learning (e.g., collaborations between specific actors). The design of effective transition governance process can draw upon these case-specific and general learning factors.
- *How can learning between experiments be fostered?* Learning between experiments can be fostered through organising communities of practice or using knowledge management approaches. Scholarship points to the need to have individuals or organisations which operate as boundary spanners and/or intermediaries which actively seek insights across projects to collate and process this information for broader translation. Nevertheless, there has still been relatively little attention paid to the processes and mechanisms of learning between experiments and their pathways to influencing change.
- *Why are the concepts of sensemaking (Karl Weick), kinesthetic learning and societal learning not mentioned even though they are very relevant for sustainability transitions?*
    - Various learning concepts are relevant and should be considered
    - Concept of societal learning is very useful to explain learning at a macro-level. Other learning concepts (e.g., experiential learning) focus more on micro-level processes, while others bridge micro-and macro level learning (e.g., triple-loop learning). Research on learning in sustainability transitions has to consider these learning processes at different levels; in particular, it is important to analyse cross-level interactions, i.e., how learning at a micro-level (e.g., in a niche or classroom context) can lead to macro-level change (e.g., change in societal values).
- *What is the difference between learning, capacity building and networking activities? Often, various processes are considered as learning processes – is there the danger to label everything as learning? How can it be avoided?*

3. Session Part II: Panel Discussion

Part II of the session was divided into two panel discussions using the fishbowl format (see Figure 2). Panel A focused on general conceptualizations of learning in transition research. Panel B discussed learning concepts for transformative science, i.e., science that aims at having an active impact on current transition processes. Each panel was introduced by a short introductory talk which were provided by Barbara van Mierlo (Panel A) and PJ Beers (Panel B).

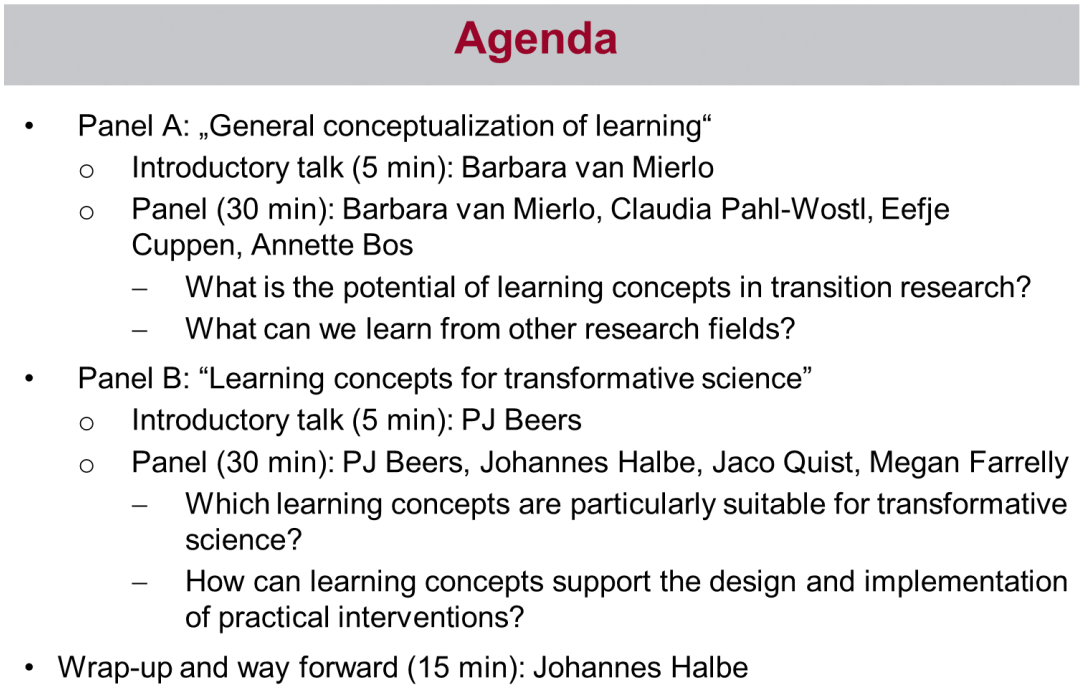

Figure 2: Structure of Session Part II

In the following sections, each introductory talk and panel is succinctly summarized.

3.1 Panel A: General conceptualization of learning

Introductory talk: Barbara van Mierlo

- Current literature: Learning often mentioned but very diverse.
- Is the concept of learning important for transition research?
    - If yes, how? E.g., focus on long-term, multi-level processes
    - Micro-level concept important for transitions (“transitions in the making”)

- Assumptions have to be investigated:
    - Assumption 1: Learning takes place in organized settings/interventions; however, learning often also takes place in an uncoordinated way.
    - Assumption 2: Consensus seems to be an key outcome of learning; however, contestations of hold assumptions can be critical as well; learning processes can also be relevant to deal with conflict in a constructive way.
    - Assumption 3: Learning is assumed to be always positive and preceding change.

Panel discussion

- Learning in transitions research:
    - Learning in transition research has also to address normative aspects. It is also important to address learning linked to interactions and institutional change.
    - While multiple types of learning take place, transition research should answer the question of what kind of learning triggers fundamental change.
    - A focus should also be devoted to the various competences that are needed for learning in sustainability transitions. One can distinguish between individual competence and group competence to solve a problem. Transition research could draw lessons from the field of Education for Sustainable Development. A close exchange with practitioners is needed to identify suitable methods and tools to foster learning.
    - Transition research could also address the problem of moving from learning to action; How to routinize lessons learnt (new perspectives do not necessarily have to lead to changed behavior)?
    - A lot of people are not used to learn (caution of elite formation); thus transition research should also be aware of the exclusion of certain societal groups.
- Multi-level learning concepts:
    - Multi-level learning concepts can be promising approaches to bridge individual learning, group learning and broader societal learning. While social learning can be applied for a group context, societal learning addresses more the diffusion of findings and institutional change.
    - Operationalizing the distinction between double and triple-loop learning is difficult.
- Conceptualize, design and evaluate learning processes
    - Learning concepts and frameworks are required to allow for comparative research and de-contextualization of findings.
    - In addition, learning concepts can help to design formal as well as informal settings in which learning can occur. Designed learning processes can aim at intentional learning outcomes or provide self-organized learning environments (i.e., without having preset desired learning outcomes). Often it is hard to get people involved in formal settings; thus, the design of informal settings is an interesting research topic.
    - When monitoring learning: researchers don´t see what people are learning when they want them to learn what the researchers want. Thus, it often stays obscure what people have really learned. Scientist could provide a more diversified account

of learning to help people to reflect. In general, researchers should be aware of their framing that might favor the choice of concepts and methods.

- Learning through conflict:
    - Learning does not have to be consensual, but can also involve conflict (see presentation No. 3).
    - Learning processes can take different directions at different phases (e.g., progressing from conflict to a more consensual model of learning). It would be interesting to investigate how we can guide processes from polarization to understanding.

3.2 Panel B: Learning concepts for transformative science

Introductory talk (5 min): PJ Beers

- Transformative science has to address diversity of transition processes including actor diversity, diverse functional contexts and levels (e.g., local niches – transition arena), diverse timescales (e.g., monitoring the learning as a history of experiments), and diverse depth of change (e.g., optimization vs. transition, loop learning). In addition, the unit of analysis should be chosen carefully.
- Learning concepts can help to identify what is key for transitions. Cognitive difference may be a challenge as well as source of diversity and conflict.

Panel discussion

- Transformative research:
    - *Transformative research* reflects a paradigm change in science towards a more **active engagement** of researchers in processes of fundamental societal change; however, it is closely linked to other approaches, such as 'transdisciplinarity' and 'action research'.
    - Definition by the WBGU: "Transformative research actively advances the transformation by developing innovations in relevant sectors. It includes, for example, research into alternative patterns of consumption, which is essential for the development of new business models such as the shared use of resource-intensive infrastructures, as well as research into technological innovations, e.g. efficiency technologies" (WBGU, 2011, p. 2).
    - Transition can also be supported through external factors, such as environmental or social crises; thus, transformative research can consider these societal developments.
    - By contrast, *transformation research* aims at **understanding transition**: "Transformation research is a new scientific discipline which focuses specifically on our understanding of transformation processes in a historical and present-day context. It identifies specific determinants and causal relationships in the general context of transformations, and relates them to the future transformations towards a low-carbon society" (WBGU, 2011, p. 2).

- Design of learning processes in transformative research:
    - Stakeholder selection was discussed as a challenge for transformative research: How can we bring everyone to the table and help them to develop an own understanding given the diversity of actors. Who determines who is sitting at the "table"? Methods are needed that guide stakeholder selection.
    - Process design is another challenge: What kinds of processes do we need to improve learning? Understanding of processes and mechanisms is important. Which process design can be used within available resources? This could be also helpful for planners to avoid undesired consequences of stakeholder engagement (e.g., stalemate of positions) during planning phase.
- Methods to support learning:
    - Methods are needed to address identity crises of stakeholders, as they might have the fear of losing identity with change. Thus, the 'novelty' that is introduced/addressed in transformative research needs to be balanced in order to avoid an overstraining of stakeholders. A closer understanding of such processes of de-learning/de-knowing is required.
    - Various methods are available to trigger curiosity of stakeholders, such as role-playing games or board games.

4. Overall findings

The sessions produced a number of important findings, which are summarized below:

- The sessions showed the **diversity of learning concepts** that are relevant for societal transitions. Frameworks and concepts are needed that systematize and integrate this conceptual diversity. **Multi-level learning frameworks** are required that connect learning processes at the micro-level (e.g., individual and group learning, learning in a classroom context) to macro-level learning processes (e.g., at the societal level).
- Besides formal learning environments (e.g., classrooms, orchestrated participatory processes), **informal and incidental learning processes** are also central in sustainability transitions. Such informal and incidental learning processes require more research in order to understand underlying mechanisms of learning as well as approaches to actively support them. In addition, informal learning processes might be central to also address people who are not used to formal learning.
- Learning is often understood in a harmony model, i.e., learning is assumed to support consensus and concerted collective action. However, a **conflict model of learning** can also be highly relevant to deal with contested normative aspects and support rethinking of assumptions, points of view and practices. Transition processes might require harmony and conflict models of learning at different phases; however, further research is needed to understand learning through conflict and allow its purposeful application in transformative research.

- The need for **knowledge transfer** across initiatives and regions is another overarching theme that was discussed in the sessions. Knowledge transfer can be accomplished in a purposeful way by using social media as well as in a more incidental way by word-of-mouth. Research synthesis and comparative research are promising approaches to determine lessons learnt from local initiatives that are generally applicable. These lessons learnt can comprise specific facilitation methods, process designs or context factors that were found to support learning.
- Methods are needed that help **progressing from insights** that stakeholders might gain through direct experiences of group discussions **towards practical action**. This might also involve de-learning of familiar practices and de-knowing of previous convictions. Such change processes can cause anxieties if people leave their comfort zone. This emotional dimension requires more attention.

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