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# **Recent advances in TIS research – Towards a new phase in transition studies**

**Jochen Markard, Nuno Bento, Christian Binz, Marko Hekkert,  
Jörg Musiolik, Bernhard Truffer**

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The technological innovation systems (TIS) approach has become one of the key frameworks for the study of emerging technologies in and beyond the context of sustainability transitions. It focuses on understanding the dynamics of an innovation system associated with a specific technology. The approach is often used to assess the performance of a TIS, to identify shortcomings and to derive policy recommendations for the support of a selected technology (Bergek et al., 2008; Hekkert and Negro, 2009). Since its inception, the framework has seen several conceptual developments, including a clarification of scoping issues, TIS functions as a central tool for performance assessment, a strategic perspective on system building, international and global ties within TIS, and suggestions for the analysis of TIS contexts (Bergek et al., 2015; Binz et al., 2014; Markard et al., 2015).

At the same time, however, there are also new conceptual challenges, especially when the TIS is used for sustainability transition studies. One of these challenges is how to study whole system reconfigurations, i.e. to move beyond the focus on specific technologies. Ongoing transitions such as the energy transition currently enter into a new phase of accelerated development, in which multiple emerging and mature technologies interact. Other conceptual challenges include the decline of incumbent technologies, intensified struggles among actors or transition processes transcending sectoral and national boundaries.

**The dialogue session will bring together leading TIS scholars to discuss the challenges for studying transitions as they accelerate and become more pervasive.**

In particular, we will discuss the following topics:

- Beyond early stages: Different phases of TIS development including maturity and decline
- Mission oriented innovation systems: Interaction of multiple technologies and system building.

- Beyond the classics: User-driven innovation, platform technologies, service innovation (e.g. car sharing, circular economy, smart grid)
- International and global TIS: Conceptualizing multi-scalar TIS configurations in different industry types
- Related concepts and literatures: Regime, innovation ecosystems, NIS, RIS, catching-up

## References

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## Conference Track

Theoretical contributions to transition frameworks

## Author biographies

### ***Jochen Markard***

Jochen Markard works as a senior researcher at the Department of Management, Technology, and Economics of ETH Zurich. In his research, Jochen studies the interaction of technology, actors and strategies, policies and politics. Jochen applies concepts from innovation and transition studies, management studies, and

political sciences. His overall ambition is to contribute to theory development and a better understanding of complex phenomena.

***Nuno Bento***

Nuno is post-doctoral researcher at the DINÂMIA'CET of ISCTE – Instituto Universitário de Lisboa. His main research interests include the formative phase of new technologies, the diffusion of innovations in time and space, and the analysis of emerging low-carbon energy systems.

***Christian Binz*** is a group leader in the Department of Environmental Social Sciences at Eawag, Switzerland. His research interest focuses on the geography of transitions. He draws on transition studies, economic geography and sustainability science to explore how multi-scalar institutional arrangements influence transitions in the water and energy sectors.

***Marko Hekkert***

Marko Hekkert studies the dynamics of emerging technological fields. Most of his studies focus on technological fields that contribute to a more sustainable society like renewable energy technologies. Theoretically he aims to contribute to the innovation systems perspective by improving our knowledge how emerging innovation systems develop and what type of micro mechanisms (power, lobby, research, strategy, expectations, resources) determine the dynamics of innovation systems.

***Jörg Musiolik*** is a senior researcher at the Institute of Sustainable Development at the Zürich University of Applied Science (ZHAW). He is interested in analyzing the dynamics of transitions by combining the TIS framework with concepts from strategic management and business studies. His empirical focus is on different radical technologies such as fuel cells and e-mobility in addition to a focus on innovation networks as well as complex governance processes in smart cities and regional energy systems.

***Bernhard Truffer*** is a full professor at the Faculty of Geosciences at Utrecht University in the Netherlands. He is head of the Department of Environmental Social Sciences at Eawag – Swiss Federal Institute of Aquatic Science and Technology in Switzerland. He is Associate Editor of Environmental Innovation and Societal Transitions (EIST).