Urban *BaWü-Labs:* Challenges and Solutions when Expanding the Real-World Lab Infrastructure

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Urban areas provide space and place for experimentation with sustainability transitions in real-world laboratories. Members of the existing urban laboratories in Baden-Württemberg and experts have discussed the challenges of these innovative research settings, as well as possible solutions.

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Cities are locations with both a high environmental impact and constant dynamic development, thus providing excellent opportunities to research and experiment with sustainability transformations (Evans et al. 2016, König 2013). As such, they are the target of multiple upcoming research programs (e. g., the German program *Zukunftsstadt,* EU *Horizon 2020* call on smart and sustainable cities). Recognizing this, the state of Baden-Württemberg (BaWü) has expanded its pioneering real-world lab research infrastructure and set up seven urban real-world labs, focusing on cities as spaces to experiment with transformation (see box 1). The urban real-world labs cover diverse topics, ranging from participatory city planning and sustainable mobility to sustainable energy in addition to refugee integration and education. With this development, BaWü is now home to 14 comprehensive real-world labs, together representing one of the largest assemblages of transformative lab research settings Europe-wide (for more examples see Schäpke et al. 2017).

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Inter-Colloquium on Urban Real-World Labs

Participants from the urban labs convened with experts from sustainability and transformation sciences to discuss some of the challenges and possible solutions to urban real-world lab research. To facilitate learning between labs and to augment the empirical basis of discussions, practitioners from pre-existing real-world labs participated as well (for an overview see Schäpke et al. 2015). This notice is written as part of the accompanying research to the real-world labs (Wagner et al. 2016), which hosted the event together with the funding Baden-Württemberg Ministry for Science, Research and Arts (MWK).

Theresia Bauer, Minister of Science, Research and Arts in Baden-Württemberg, began the inter-colloquium by reasserting the importance of the real-world labs and BaWü's continued commitment to this field of research. The main program of the event allowed for exchange and learning for progressing urban real-world lab research, combing three perspectives:

1. *James Evans* and *Andrew Karvonen* presented an overview on European developments.
2. Members of the urban *BaWü-labs* provided case specific conceptual and empirical insights, presenting on achievements as well as obstacles encountered in their work.
3. External experts hosted topical workshops which approached challenges and solutions in specific areas. These included:
   - space, scale and time as key dimensions of configuring urban real-world labs (speakers: *Kathleen De Flander, Andrew Karvonen*),
   - possibilities and challenges of transdisciplinary research in practice: focusing the role of research in real-world labs *(Michael Stauffacher, Florian Keil)*,
   - transformative research: approaches, challenges and experiences *(Maja Göpel, Timo von Wirth)*,
   - experiments, labs and projects: intervention and collaboration in participatory research *(Martina Schäfer, Guido Caniglia)*, and

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- education and learning in real-world labs *(Ariane König, Mandy Singer-Brodowski)*.

Core Challenges and Solution Options for Real-world Lab Research

To close, a fishbowl discussion invited participants to link perspectives and to draw overarching conclusions. These are presented in the form of eight core challenges and a number of (highlighted) solution options. Insights are related to the discourse on real-world labs and transdisciplinary research to reflect the broader state of debate.

BOX 1:

BaWü-Labs in the Funding Line Reallabore Stadt (Urban Real-World Labs)

- *Reallabor Schorndorf* develops and tests a demand-based, digitally supported public transport system (led by the German Aerospace Center).
- *Go Karlsruhe!* analyzes options and develops methods for realizing a more pedestrian-friendly city (led by Karlsruhe University of Applied Sciences).
- *Energielabor Tübigen* collaboratively investigates pathways for generating 50 percent of the local energy supply from renewable sources (led by the University of Tübingen).
- *Stadt:quartiere 4.0* engages citizen participation in city planning via digital procedures and simulations to convert neighborhoods to real-world labs of change (led by the University of Stuttgart).
- *Stadt-Raum-Bildung* investigates how to shape educational landscapes that allow individualized and cooperative forms of learning and convert schools into catalysts for urban societies (led by SRH University Heidelberg).
- *Reallabor Asyl* investigates social and economic integration of refugees, via language acquisition, job training and social support (led by Heidelberg University of Education).
- *BUGA:log* tests autonomous vehicles in urban supply to reduce traffic during the national garden show in 2019 (led by Heilbronn University).

MORE INFORMATION:
https://mwk.baden-wuerttemberg.de/de/forschung/forschungspolitik/wissenschaft-fuer-nachhaltigkeit/reallabore

1 ***Assuring continuity*** of real-world lab research and the ***balance of different time requirements*** for each lab, such as the long-term horizons of transformative processes and short(er)-term funding or between science and practice. This confirms earlier *BaWü-lab* examinations (e. g., Wagner et al. 2016, West et al. 2017) and repercussions in research-policy debates (WBGU 2016).

Stretch funding periods, for example, by including a funded pre-proposal stage or grant prolonged funding for institutionalizing successful real-world labs; embed lab projects in larger fund-raising and structural development activities.

2 ***Assuring (long-term) participation*** of practice partners and the ***meaningful co-production*** of lab activities and results – a common challenge in real-world labs (Rhodius et al. 2016) and transdisciplinary research in general (Lang et al. 2012).

Assure representation of practice partners' goals in project setup, start participation of stakeholders early, co-develop funding proposal with practice partners and co-apply; set incentives for and acknowledge participation; build on intermediary persons linking to project partners; manage expectations by clarifying aims and limitations of labs; be concrete and allow action; draw on expertise on transdisciplinary collaboration.

3 Establishing the ***lab as a concrete space*** within the city, so that relevant real-world processes are captured and a space for interaction of stakeholders is created, as discussed in the real-world lab discourse (Parodi et al. 2016).

Become visible in a concrete place with a symbolic meaning to stakeholders; define the limits of the real-world lab research along relevant geographical, administrative, and cultural entities; provide and maintain a clear aim and focus, particularly in the case of large real-world labs.

4 Unleashing the transformative potential of real-world labs through ***scaling up and transferring*** innovations and lab processes, although lab research is marked by its specific context. A challenge broadly discussed in real-world labs, in addition to transdisciplinary science (De Flander et al. 2014, Wissen Hayek et al. 2015).

Identify and use characteristics of the urban context to allow transfer of insights to similar contexts, integrate into policies or spread insights via embedding in (smaller or larger scale) educational activities.

5 Cognitive ***integration of knowledge*** in transdisciplinary collaboration, hindered by complex, scientific language or lacking acknowledgement of integration tasks, a task frequently encountered in transdisciplinary work (Bergmann et al. 2012, pp. 112 ff.).

Develop common products (e. g., a glossary or collected questions) as mandatory tasks of real-world labs.

6 ***Balance competing demands*** of scientific discipline and (practical) real-world lab research, particularly in early career scientific work (PhD writing) and beyond, as described for real-world lab research (West et al. 2017).

Conscious choice of supervisor; be explicit and have a clear agreement on demands; attune work to demands of future career (be it practical or more scientific).

7 Unclear expectations that are conflicting with the rather ***unconventional roles of researchers*** in real-world labs – a common challenge in real-world labs (Wanner at al. forthcoming) and beyond (Wittmayer and Schäpke 2014).

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Clarify role expectations and particularities of transdisciplinary research with project partners in early project phases.

8 Allow for an ***experience-based learning*** cycle including a supportive learning setting of active and reflexive elements, as highlighted in real-world lab discourse (Caniglia et al. 2016, Schneidewind and Singer-Brodowski 2015).

Combine place-based experimentation in bounded real-world lab settings with embedding in theoretical context and reflexive practice.

The majority of these challenges is not specific to the urban context, but apply to real-world lab research in general. Some are real-world lab specific (e. g., challenge 3 and 8), while others occur in transdisciplinary research more broadly. This calls for mutual learning based on differentiated views on real-world labs as a particular form of transdisciplinary research (Jahn and Keil 2016, Rückert-John and Schäfer 2017, Ukowitz 2017).

Outlook

Further development of real-world labs as research settings requires synthetic learning from empirical experiences as well as conceptual discussions. Upcoming activities include a public conference on the *BaWü-Labs* in April 2018 as well as a *GAIA* special issue on real-world labs to be released in 2018.

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References

Bergmann, M. et al. 2012. *Methods for transdisciplinary research: A primer for practice.* Frankfurt am Main: Campus.

Caniglia, G. et al. 2016. An experience-based learning framework. *International Journal of Sustainability in Higher Education* 17/6: 827–852.

De Flander, K. et al. 2014. Resilience and real-life laboratories as key concepts for urban transition research. *GAIA* 23/3: 284–286.

Evans, J., A. Karvonen, R. Raven. 2016. *The experimental city.* Milton Park, UK: Routledge.

Jahn, T., F. Keil. 2016. Reallabore im Kontext transdisziplinärer Forschung. *GAIA* 25/4: 247–252.

König, A. 2013. Introduction: Experimenting for sustainable development? Living laboratories, social learning and the role of the university. *Regenerative Sustainable Development of Universities and Cities* January: 1–23.

Lang, D. J. et al. 2012. Transdisciplinary research in sustainability science: Practice, principles, and challenges. *Sustainability Science* 7: 25–43.

Parodi, O. et al. 2016. Von "Aktionsforschung" bis "Zielkonflikte": Schlüsselbegriffe der Reallaborforschung. *Technikfolgenabschätzung – Theorie und Praxis* 25/3: 9–18.

Rhodius, R., M. Pregernig, B. Koch. 2016. Herausforderungen transdisziplinären Arbeitens im Reallabor "Wissensdialog Nordschwarzwald". *Technikfolgenabschätzung – Theorie und Praxis* 25/3: 19–25.

Rückert-John, J., M. Schäfer (Eds.). 2017. *Governance für eine Gesellschaftstransformation.* Wiesbaden: Springer.

Schäpke, N., M. Singer-Brodowski, F. Stelzer, M. Bergmann, D. J. Lang. 2015. Creating space for change: Real-world laboratories for sustainability transformations. The case of Baden-Württemberg. *GAIA* 24/4: 281–283.

Schäpke, N. et al. 2017. *Reallabore im Kontext transformativer Forschung. Ansatzpunkte zur Konzeption und Einbettung in den internationalen Forschungsstand.* IETSR discussion papers in transdisciplinary sustainability research 1. Lüneburg: Leuphana University of Lüneburg.

Schneidewind, U., M. Singer-Brodowski. 2015. Vom experimentellen Lernen zum transformativen Experimentieren. *Zeitschrift für Wirtschafts- und Unternehmensethik* 16/1: 10–23.

Ukowitz, M. 2017. Transdisciplinary research in real-world laboratories: A plea for unity in diversity. *GAIA* 26/1: 9–12.

Wagner, F., N. Schäpke, F. Stelzer, M. Bergmann, D. J. Lang. 2016. *BaWü-labs* on their way: Progress of real-world laboratories in Baden-Württemberg. *GAIA* 25/3: 220–221.

Wanner, M., A. Hilger, J. Westerkowski, M. Rose, F. Stelzer, N. Schäpke. Forthcoming. Towards a cyclical concept of real-world laboratories: A transdisciplinary research practice for sustainability transitions. *disP The Planning Review.*

WBGU (German Advisory Council on Global Change). 2016. *Humanity on the move: Unlocking the transformative power of cities.* Berlin: WBGU.

West, C., E. Marquardt, U. Gerhard. 2017. *Co-design* und *co-production* von Wissen für die nachhaltige Stadt: Das Reallabor *Urban Office* in Heidelberg. *GAIA* 26/1: 58–59.

Wissen Hayek, U. et al. 2015. Quality of urban patterns: Spatially explicit evidence for multiple scales. *Landscape and Urban Planning* 142: 47–62.

Wittmayer, J. M., N. Schäpke. 2014. Action, research and participation: Roles of researchers in sustainability transitions. *Sustainability Science* 9/4: 483–496.

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