GAIA

3 | 2020

ECOLOGICAL PERSPECTIVES FOR SCIENCE AND SOCIETY
ÖKOLOGISCHE PERSPEKTIVEN FÜR WISSENSCHAFT UND GESELLSCHAFT

- MOBILITÄT, SUFFIZIENZ UND SPRACHE
- KOSTENWAHRHEIT IN DER KLIMAPOLITIK
- REFLECTING ON TRANSDISCIPLINARITY WITH *I2S*

From niche to mainstream: the dilemmas of scaling up sustainable alternatives

At the heart of transition research lies the question of how to "scale up" sustainable alternatives from a protected niche to the creation of mainstream practices. While upscaling processes are often seen as an essential element that contributes to societal transformation, upscaling itself remains a fuzzy concept. We argue that some fundamental dilemmas of upscaling can be identified, for example, the different understanding of the concept by researchers and practitioners. The dilemmas should be addressed in a more reflexive way by those from the worlds of science and practice who are involved in collaborative research settings.

Karoline Augenstein, Boris Bachmann, Markus Egermann, Verena Hermelingmeier, Annaliesa Hilger, Melanie Jaeger-Erben, Alexandra Kessler, David P. M. Lam, Alexandra Palzkill, Paul Suski, Timo von Wirth

The question of how to trigger societal change to realize a more sustainable future is at the core of debates on sustainability. Increasingly, research on sustainability transitions is focusing on how to scale up sustainable innovations, accelerate transitions or increase the impact of sustainability initiatives (Ehnert et al. 2018, Roberts et al. 2018, von Wirth et al. 2019, Kivimaa et al. 2019, Lam et al. 2020). Approaches in transdisciplinary research such as real-world laboratories or transition experiments (Wanner et al. 2018, Schäpke et al. 2017) as well as policymaking and public research funding for sustainability aim to institutionalize sustainable alternatives and thus introduce these isolated, protected niche endeavors into wider society. However, from sustainability transitions research, we know that the (simple) scaling up of an alternative may conflict with the evolutionary nature of societal change.

Scaling up from an experiment or a niche means that new ways of "doing, thinking, organizing" (Ehnert et al. 2018) emerge in a given system as the new normal, rather than scaling or spreading one specific *element* within given and unchanged institutional structures. The term *up*scaling is thus used here to indicate a qualitative shift towards a structural transformation of a societal (sub) system.

Structural change and co-evolutionary processes

The focus on experimenting in niches as the starting point for structural change is grounded in co-evolutionary theories of innovation.[1] Considering the complexity and non-linearity of co-evolutionary processes, the aspirations of policymakers, scientists, or actors from civil society to proactively and strategically foster a specific type of radical change are questionable or at least highly challenging. We have identified three basic dilemmas of up-

---

1 Innovation has been described as the process in which a "variation environment" provides a range of novel alternatives from which a "selection environment" determines which options break through and become successfully adopted, followed by a (re-)stabilization of new structures and communications (Rip and Kemp 1998, Nelson and Winter 1982).

Jun.-Prof. Dr. Karoline Augenstein | augenstein@uni-wuppertal.de

Boris Bachmann | b.bachmann@uni-wuppertal.de

Verena Hermelingmeier | hermelingmeier@uni-wuppertal.de

Annaliesa Hilger | ahilger@uni-wuppertal.de

Jun.-Prof. Dr. Alexandra Palzkill | palzkill@uni-wuppertal.de

all: Center for Transformation Research and Sustainability (transzent) | University of Wuppertal | Döppersberg 19 | 42103 Wuppertal | Germany

Dr. Markus Egermann | Leibniz Institute of Ecological Urban and Regional Development | Dresden | Germany | m.egermann@ioer.de

Prof. Dr. Melanie Jaeger-Erben | Technische Universität Berlin | Chair Transdisciplinary Sustainability Research | Berlin | Germany | jaeger-erben@tu-berlin.de

Alexandra Kessler | Collaborating Centre on Sustainable Consumption and Production | Wuppertal | Germany | a.kessler@scp-centre.org

David P. M. Lam | Leuphana University Lüneburg | Institute for Sustainable Development and Learning | Institute for Ethics and Transdisciplinary Sustainability Research | Lüneburg | Germany | lam@leuphana.de

Paul Suski | Wuppertal Institute for Climate, Environment, and Energy | Wuppertal | Germany | paul.suski@wupperinst.org

Ass. Prof. Dr. Timo von Wirth | Erasmus University Rotterdam | Erasmus School of Social and Behavioural Sciences | Dutch Research Institute for Transitions (DRIFT) | Rotterdam | The Netherlands | vonwirth@drift.eur.nl

scaling connected to core aspects of transdisciplinary research on sustainability transitions: 1. inter- and transdisciplinary knowledge integration *(Babylon dilemma)*, 2. foundational theories of change impacting science-policy collaboration *(simplification dilemma)*, and 3. political or strategic concerns in science-practice collaborations with grassroots initiatives *(scaling-aversion dilemma)*. Understanding and framing the challenges of upscaling as aspects of these fundamental dilemmas can foster theory-building across an increasingly dispersed field of research, stimulate critical reflection of lessons learned, and can help identifying common ground upon which to relate findings and increase our shared knowledge basis.

The *Babylon dilemma*

The *Babylon dilemma* addresses the challenge of understanding precisely what "upscaling" means when we consider the different usages and understanding of the concept by researchers and practitioners based on diverse underlying ontologies, epistemologies as well as practical expertise. The dilemma describes a situation whereby an increasingly substantial knowledge base on upscaling is created *within* disparate fields while at the same time it becomes increasingly difficult to integrate and share this knowledge *across* research fields due to their diverse concepts, theoretical assumptions and underlying epistemologies.

Sustainability transitions research has drawn on various theories to develop a range of frameworks that model upscaling and its processes (Lam et al. 2020). It is precisely here that the *Babylon dilemma* can hinder research on upscaling due to (conflicting) conceptualizations and underlying epistemologies. For example, by applying a socio-technical and strategic niche management perspective, Naber et al. (2017) propose that upscaling consists of four processes: *growing, replication, accumulation* and *transformation*. In contrast, Ehnert et al. (2018) adopt an urban governance perspective to identify five acceleration processes that together increase the speed of urban transitions. These are *upscaling, replicating, partnering, instrumentalizing* and *embedding*. Further, van den Bosch and Rotmans (2008) apply a transition management and multi-level perspective to study how transition experiments can contribute to transitions through the three processes of *deepening, broadening* and *scaling up*. Despite the common aim of fostering sustainable alternatives, upscaling is used in diverse ways to describe different sets of dynamics.

Of course, we do not advocate building or conforming to some overarching dominant framework within the still fledgling field of research on transdisciplinary sustainability transitions. Rather, the *Babylon dilemma* can be usefully sustained to accommodate conceptual plurality, thereby reserving time and resources in transdisciplinary research processes to establish a reflexive dialogue between researchers and practitioners from different fields.

The *Simplification dilemma*

The *Simplification dilemma* addresses the conflict between "getting a grip" on desired processes of change by condensing them into simple terms and replicable practices versus the need to understand and embrace the complexity of social change and to accept that innovation and transformation is neither predictable nor controllable.

This dilemma spotlights the potential risk of oversimplifying processes of change in the debate on upscaling. A good example of such tendencies is the discourse on social innovation for sustainability. Scientists and policymakers often highlight the importance of "grassroots" or social innovation, that is, bottom-up processes of social change, for sustainability transitions. For nearly a decade, social innovations have ranked high on political agendas, such as the European Commission's innovation policy.[2] Yet the political definitions of upscaling are generally limited to the dissemination of new products, services and models and an expected increase in their positive societal impact. This notion is not only important for the study of social sustainability, since it frames the thematic orientation of third party-funded projects. It also shows that the simplification dilemma might be closely related to the *Babylon dilemma:* in the absence of a comprehensive and robust model of (up)scaling, the concept is susceptible to normative or programmatic superposition. It seems reasonable that complexity must be reduced in order to be able to distinguish leverage or starting points. Nevertheless, from the standpoint of social scientific research and theory on innovation (e.g., Rammert 2007, Nelson and Winter 1982), we can identify two fallacies of instrumental simplification.

First, complex processes of innovation are not a question of design or of copying best practices. Several authors have already pointed out that the emergence of social innovation on the political agenda is a kind of counter-reaction to the "steering pessimism" of the second half of the 20th century (Schubert 2018), which was accompanied by a trend towards social engineering. On the other hand, a form of economic thinking became mainstream that defined all societal progress as a consequence of entrepreneurial action to create something new and superior to the old (John 2014). In recent years, the term "social innovation" has evolved into a reflexive instrument of control, namely forms of policy that aim for a more acceptable and "soft" community-based, bottom-up invention (Beck and Kropp 2012, Grimm et al. 2013).

Second, social innovations should solve current sustainability problems (and the more upscaled they are, the better) while not "disturbing" the system. They are seen as "repairing" but not "impairing" the current setup. Yet this perspective is ambivalent, as the focused innovative initiatives are simultaneously drowned in expectations and trivialized. Their impact is conceived as manageable or tamable; a clear, almost causal relationship between problem and solution is constructed while ignoring the political and

---

2 Social innovations are described by the European Commission as "new ideas that meet social needs, create social relationships and form new collaborations": *https://ec.europa.eu/growth/industry/policy/innovation/social_en*.

© Wolf Sondermann

FIGURE 1: Urban sustainability initiatives, such as *Utopiastadt* in Wuppertal, Germany, address the dilemmas of upscaling in their efforts to develop sustainable alternatives locally, get involved in transdisciplinary processes and help create spaces for experimentation and reflexive dialogue with researchers and policy-makers. The photo shows *Bahnhof Mirke* – a former station and now the *Utopiastadt Campus*.

economic context, which may not only have caused the problem but will surely be affected by the solutions. Thus, we suggest paying greater attention to the following factors: the promotion of open-ended and reflexive experimentation, an adjustment of measures in view of their impact and a focus on the long-term observation of initiated processes of change.

The *Scaling-aversion dilemma*

The *Scaling-aversion dilemma* addresses the tension faced by emerging social or sustainability innovations between remaining in a small, alternative and unique niche versus growing in size and striving for broader societal adoption.

When alternative models or initiatives aim to grow in scale, these initially more sustainable models run the risk of transforming and indeed losing their original core identity. This dilemma has been observed empirically. Investigations into the scaling (up) of sustainability innovations during transition experiments have found that growth and broader diffusion is not always considered an achievable or even desired goal. Specifically, research into bottom-up innovations emerging from the activities of local sus-

tainability initiatives showed that these may not aspire "to contribute to the further dissemination of the alternative they foster" (Pesch et al. 2019, p. 304). Smith et al. (2014) documented this phenomenon for grassroots innovation movements, concluding that local participants in these movements are "not always very interested in wide-scale relevance"; instead, local innovators appear to be more concerned with "devising ingenious local solutions that cope better with their immediate circumstances" (Smith et al. 2014, p. 8). For certain grassroots innovators, key elements of their identity as alternative innovators are to remain local, small and distinct from the mainstream.

The accepted belief that it is possible and desirable to scale up from an individual, local sustainability innovation to achieve broader change can be ambivalent. Certainly, the notion of scaling is not straightforward in terms of the likely structural variations that may result. There is the risk of imposing a conception of linear growth on sustainable alternatives ("the bigger, the better") that have emerged in local contexts, and which may thus be associated with granularity, particularity and insularity. There is no doubt that scalable and adaptable solutions are needed to make substantial progress in transformative efforts towards more sustainable practices. Yet can alternative practices, anchored in bottom-up in-

>

novation and local sensitivities, be usefully applied on a broader scale? Loorbach et al. (2020) recently addressed this predicament by positing the "translocal diffusion" of innovations, that is, sustainability initiatives which are locally embedded and contextualized but whose innovations are diffused by means of a translocal (learning) network of other initiatives and actors (figure 1).

and allow for the reframing of problems and solution strategies (Schneidewind et al. 2018, p. 14, Oberlack et al. 2019). To overcome the dilemmas of upscaling, policies and governmental initiatives on grassroots innovation must pay greater attention to the problems of complexity while taking account of co-evolutionary dynamics. Essentially, this means that more emphasis should be

Researchers engaged in inter- and transdisciplinary research collaborations should also be more sensitive to epistemic plurality, work explicitly with boundary objects and adopt novel forms of facilitating knowledge integration as a fundamental element of research projects.

In this view, bottom-up innovation paired with the idea of favoring practical rather than political problem-solving will always oscillate between "attending to local specificities whilst simultaneously seeking wide-scale diffusion and influence" (Smith et al. 2014, p. 6). Seyfang and Smith (2007) argue that variations or niches may have two types of benefit that help to explain aspects of the scaling-aversion dilemma. One type values "the niche for its own sake (intrinsic benefits), the other as a means to an end (diffusion benefits)" (p. 593).[3] Innovating actors may have diverse motivations and aspirations regarding the group of intended beneficiaries or the choice of a model to spread their innovation, depending on their particular personal or social goals.

Implications for science and practice

Many of the upscaling challenges which emerge in sustainability-oriented processes can be understood in terms of the described dilemmas. They cannot be "solved" in any straightforward way; instead, the dilemmas demand intensive reflection on theoretical assumptions and problem definitions as well as a reframing of research questions and policy approaches. We argue for a more explicit recognition of these underlying dilemmas, proposing this perspective as a starting point for theory-building across various fields of research. Such a reframing can guide the integration of different disciplinary approaches and lessons learned in science-practice collaborations.

These dilemmas can be usefully explored by means of collaborative research settings and dialogue at the science-policy interface, ideally designed as learning arenas to enable *reflexivity*. Real-world laboratories and similar approaches can be suitable settings for such reflexive processes if they are conceptualized as research infrastructure to mobilize tangible resources for experiments as well as to foster the development of interpretive schemes and norms. These can provide fertile ground for reflexivity to emerge

placed on the role of *experimentation,* acknowledging the value of learning rather than adhering to short-sighted solutionism. We argue for a shift in focus that moves away from a limited and frequently technocentric conceptualization of innovation and experimentation towards building up capacities for reflexive learning.

Recommendations

Drawing on these general insights, we make the following suggestions for researchers, policymakers, funding bodies and civil society initiatives engaged in transdisciplinary research into sustainability transitions.

Researchers should pay attention to the joint knowledge production, especially in the context of science-practice collaborations (see *Babylon dilemma*). This is not merely an issue for researchers from different disciplines who are working together, but also when an attempt is made to bridge the divide between academic and practical knowledge (Lam et al. 2019, also Rose and Maibaum 2020, in this issue). It is vital that researchers in this field collect and systematize empirical evidence, for example, through meta-studies comparing experiments from different fields. Researchers engaged in inter- and transdisciplinary research collaborations should also be more sensitive to epistemic plurality, work explicitly with boundary objects and adopt novel forms of facilitating knowledge integration as a fundamental element of research projects, which in turn also need to be taken into consideration by funding institutions.

Policymakers should be aware that their control over innovation and transformation is limited at best (see *Simplification dilemma*). They should target the "innovativeness" of involved actors to allow greater contingency in future-oriented deliberations and experimentation. It is not primarily the scaling and diffusion of particular types of innovation that requires increased attention,

---

3 Pesch et al. (2019) reframed this by distinguishing between "simple niches", which do not actively seek regime change, and "strategic niches", which specifically seek such change.

but rather the dead end into which innovation policy finds itself when action is guided towards instrumentalization and the idea of controlling the emergence and impact of specific alternatives. Scientists and practitioners must examine whether and how transformation-related intentions can be coupled with a new understanding of "organising the unplannable" (WBGU 2011, p. 1).

Similarly, we must shift the focus of research and policy towards building innovative capacities, that is, human abilities and political responsibilities that can better enable new forms of transition (see *Scaling-aversion dilemma*). Due to the many uncertain factors underpinning innovative processes more innovations fail than succeed (with success here measured by long-term adoption). Nonetheless, useful lessons can be learned about innovation and the emergence of innovative capacities by studying such failures. If an emerging innovative process is measured only in terms of its ability to upscale, this places an excessive and narrow focus on its successful implementation. To counter such bias, it would be helpful to combine and introduce the experimental settings of civil society initiatives and transdisciplinary research projects into experimentation ecosystems, to develop more suitable impact and evaluation criteria, and to engage with intermediary actors at the science-policy interface responsible for knowledge transfer and dissemination.

This type of experimental (transformative) research and policymaking requires *responsibilization* among policymakers, funders and researchers alike, that is, responsibilities need to be taken for risks and uncertainties beyond existing growth models and business cases; also, other actors such as grassroots innovators need to take responsibility in the research process. Given the increasing extent and range of actors involved in governing sustainability challenges, we recommend caution in making post-political interpretations of (transformative) innovation, in particular assuming that social change and innovative solutions happen in an institutional vacuum where "anything goes".

References

Ehnert, F. et al. 2018. The acceleration of urban sustainability transitions: A comparison of Brighton, Budapest, Dresden, Genk, and Stockholm. *Sustainability* 10/3: 612.

Grimm, R., C. Fox, S. Baines, K. Albertson. 2013. Social innovation, an answer to contemporary societal challenges? Locating the concept in theory and practice. *Innovation: The European Journal of Social Science Research* 26/4: 436–455.

Kivimaa, P., S. Hyysalo, W. Boon, L. Klerkx, M. Martiskainen, J. Schot. 2019. Passing the baton: How intermediaries advance sustainability transitions in different phases. *Environmental Innovation and Societal Transitions* 31: 110–125.

Lam, D. et al. 2020. Scaling the impact of sustainability initiatives: A typology of amplification processes. *Urban Transformations* 2: 3.

Lam, D., B. Martín-López, A. Horcea-Milcu, D. Lang. 2019. Three principles to facilitate the process of co-designing sustainability intervention strategies that integrate local initiatives: Experiences from Southern Transylvania. *Ambio* 49: 1451–1465.

Loorbach, D., J. Wittmayer, F. Avelino, T. von Wirth, N. Frantzeskaki. 2020. Transformative innovation and translocal diffusion. *Environmental Innovation and Societal Transitions* 35: 251–260.

Naber, R., R. Raven, M. Kouw, T. Dassen. 2017. Scaling up sustainable energy innovations. *Energy Policy* 110: 342–354.

Nelson, R., S. Winter. 1982. *An evolutionary theory of economic change.* Cambridge, MA: Harvard University Press.

Oberlack, C. et al. 2019. Theories of change in sustainability science. Understanding how change happens. *GAIA* 28/2: 106–111.

Pesch, U., W. Spekkink, J. Quist. 2019. Local sustainability initiatives: innovation and civic engagement in societal experiments. *European Planning Studies* 27/2: 300–317.

Rammert, W. 2007. *Technik – Handeln – Wissen: Zu einer pragmatistischen Technik- und Sozialtheorie.* Wiesbaden: Springer VS.

Rip, A., R. Kemp. 1998. Technological change. In: *Human choice and climate change.* Vol. II, Resources and Technology. Edited by S. Rayner, E. Malone. Columbus, OH: Battelle. 327–399.

Roberts, C. et al. 2018. The politics of accelerating low-carbon transitions: Towards a new research agenda. *Energy Research and Social Science* 44: 304–311.

Rose, M., K. Maibaum. 2020. Meeting the challenge of (co-)designing real-world laboratories. Insights from the *Well-Being Transformation Wuppertal* project. *GAIA* 29/3: 154–160.

Schäpke, N. et al. 2017. *Reallabore im Kontext transformativer Forschung: Ansatzpunkte zur Konzeption und Einbettung in den internationalen Forschungsstand.* IETSR Discussion Papers 01/2017. Leuphana University Lüneburg.

Schneidewind, U., K. Augenstein, F. Stelzer, M. Wanner. 2018. Structure matters: Real-world laboratories as a new type of large-scale research infrastructure. A framework inspired by Giddens' structuration theory. *GAIA* 27/S1: 12–17.

Schubert, C. 2018. Social innovation. In: *Innovation society today.* Edited by W. Rammert, A. Windeler, H. Knoblauch, M. Hutter. Wiesbaden: Springer VS. 371–391.

Seyfang, G., A. Smith. 2007. Grassroots innovations for sustainable development: Towards a new research and policy agenda. *Environmental Politics* 16/4: 584–603.

Smith, A., M. Fressoli, H. Thomas. 2014. Grassroots innovation movements: challenges and contributions. *Journal of Cleaner Production* 63: 114–124.

Van den Bosch, S., J. Rotmans. 2008. *Deepening, broadening and scaling up: A framework for steering transition experiments.* Rotterdam: Knowledge Centre for Sustainable System Innovations and Transitions.

von Wirth, T., L. Fuenfschilling, N. Frantzeskaki, L. Coenen. 2019. Impacts of urban living labs on sustainability transitions: Mechanisms and strategies for systemic change through experimentation. *European Planning Studies* 27/2: 229–257.

Wanner, M., A. Hilger, J. Westerkowski, M. Rose, F. Stelzer, N. Schäpke. 2018. Towards a cyclical concept of real-world laboratories: A transdisciplinary research practice for sustainability transitions. *disP – The Planning Review* 54/2: 94–114.

WBGU (German Advisory Council on Global Change). 2011. W*orld in transition. A social contract for sustainability.* Berlin: WBGU.

Karoline Augenstein
BA in European studies and MA in sustainability economics and management. 2015 PhD, University of Wuppertal. 2010 to 2017 research fellow at the Wuppertal Institute for Climate, Environment and Energy. Since 2017 junior professor and co-leader of junior research group *Urban Up – Upscaling-Strategien für eine Urban Sharing Society* at the Center for Transformation Research and Sustainability, University of Wuppertal. Research areas: sustainability transitions, narratives and urban real-world labs.