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Research paper

From "living lab" to strategic action field: Bringing together energy, mobility, and Information Technology in Germany

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ABSTRACT

Against the backdrop of the transformation of the German energy system, a new dynamic is emerging between the previously separate economic fields of renewable energy systems, transportation, and information and communication technologies (ICT). The trend towards digitalization and interconnectivity is prompting the formation of new corporate alliances and business ideas. We argue that the increasing interactions between actors in these sectors are evidence of the emergence of a new intersectoral field. Building on concepts from neoinstitutionalism, particularly, the framework of strategic action fields (SAF), we examine the overlaps and dynamics that are arising in an exemplar of what policy makers and planners often refer to as "living labs." With help of this case study we observe the cross-field innovation activities taking place at a particular local site. Our empirical examination draws upon a four-year-long ethnography of an innovation campus in Berlin, the German capital. This case reveals the development of interdependent interests and collaborations between both different industries and between companies and academic institutions. These interconnections are built, in part, by socially skilled actors, who act as border crossers between established fields.

1. Introduction

Lately, one can observe the emergence of a diverse set of local innovation sites, which policy makers, planners, and engineers have dubbed "living laboratories" for research and development (R&D) [1–3]. Social scientists, however, should not understand these often locally situated public-private-partnerships exclusively as spaces of experimentation, co-creation, and invention for future technologies. We argue that living labs also give momentum to the emergence of institutional formations between formerly separate industries, disciplines, and policy areas. In this paper, we aim to examine how these micro-level innovation activities contribute to the emergence of a new field. The field in focus comes out of three, in principle, distinct innovation areas: renewable energy systems, transportation, and information and communication technologies (ICT). We draw upon a large corpus of qualitative data collected over the time of four years at an urban innovation campus.

We consider this self-declared living lab to be an example of a broader empirical phenomenon: the mushrooming of these kinds of public-private partnerships across the world, especially in Europe [4], where the transition towards a sustainable society has become a pivotal issue for policy makers. Setting up sites of experimentation as test beds for sociotechnical innovations appears to be a popular solution for achieving this goal [5]. A number of such collaborative initiatives are deliberately set up between established industries and disciplines in order to facilitate and foster intersectoral stimulation [6,7]. With regard to sustainability, the co-evolutionary transformation of both energy systems and transportation has stayed at the top of green growth and climate change mitigation agendas [8–11]. Social scientists have studied a variety of recent developments, in particular the state-driven attempts to transform national energy and transportation systems [12–14].

A profound transformation is currently underway in global energy supply systems. Since the ratification of the 2016 Paris climate treaty and even earlier, the majority of industrialized and emerging countries have striven to transform daily life and economic activity to achieve environmental goals. However, in many countries established structures prevail or co-exist with new alliances around low-carbon technologies. Governments throughout the world attempt to reconcile energy transitions with powerful

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incumbent industries, whose success is considered by policy makers to be synonymous with the viability of the overall national economy.

The urban innovation campus we have been studying represents a particularly enlightening setting for not only analyzing field emergence but also the German sociotechnical imaginaries related to sustainability with their manifold tensions [15]. On the one hand, both the German government and the German population see themselves as pioneers; after all, the government has abandoned nuclear energy and the country has a remarkably strong environmental movement by international standards [16]. On the other hand, many experts see Germany as dominated by incumbent industries. As an export-oriented economy with a high share of energy-intensive manufacturing businesses, Germany has found it difficult to implement the energy transition [17]. A similar problem seems to impede change among automobile manufacturers, who adhere to their still successful strategy, which hinges on exporting gasoline-demanding premium cars [18]. Added to this, Germany has an intertwined and hierarchical system of energy producers and users, which is already under pressure due to the volatility of renewable energy generation capacities and their uneven distribution [19].

In this paper, we focus on a particular kind of "sociotechnical niche" [20], an urban site of innovation designed to foster and promote the convergence between formerly separate industries. The campus is located in Berlin, the German capital, where the notion of an arguably game-changing *Energiewende* (energy transition) has dominated both the policy debates and the media discourse for years. We analyze the local dynamics, strategies, and negotiation processes at the campus based on expert interviews, participant observation and document analysis. In our opinion, this spatially confined niche provides an interface between renewable energy systems, transportation, and ICT – revealing both moments of convergence and of conflict. Due to the digitalization of electricity, transport, and communication, industrial actors with divergent product cycles, industrial logics, and innovation cultures are colliding in collaborative settings. Based on the guiding concept of what the actors refer to as "mobility-to-grid,"[1]; an institutional framework was constructed, thus allowing actors from different industries and academia to collaborate.

Conceptually, we integrate the theory of strategic action fields (SAF) [21,22] with the approach of local innovation sites to capture the early processes of field emergence by looking at the particular actors' strategies and interactions in order to conceptualize these interactions on an organizational, rather than on a technological or discursive level. We argue that the increasingly dense interactions between three formerly disparate areas should be read as evidence for the emergence of a new intersectoral field.

This prompts a series of questions from an economic and technological perspective, which in turn allows us to draw some initial conclusions about the dynamics that are present when new fields are established or existing fields are restructured. Specifically, we would like to know: How does the local experimental context enable and shape the interaction between actors from largely separate economic sectors, namely renewable energy systems, transportation, and ICT? How do players in this emerging field view and evaluate this entanglement, especially their relationships with competitors and partners? What strategies do new and established companies from various industries utilize? Finally, can we identify a common conception of an intersectoral field beyond the confines of the innovation campus, and if so, what does it look like?

2. Strategic action fields and field emergence

2.1. Approaches to sociotechnical transitions

In this article, we study the emergence of a new field caused by transitions in neighboring fields and the development of new strategic interests and collaborations between actors from these fields. In most current studies on energy transitions such dynamics have been framed in terms of sociotechnical niches [23,24]. The multi-level perspective (MLP) on technological transitions views such incubation spaces [25: 400], which are protected from economic competition, as a starting point for radical innovations [26,20,27]. From this perspective, technological transitions can only be understood by analyzing niches in close proximity to stabilized regimes. These stabilized regimes are defined as the dominant "rule-set of grammar" [28: 338], and are embedded in routines, technological artifacts and social networks, as well as macro-level sociotechnical landscapes, which consist of "technology-*external* factors" and "deep structural trends" [29: 1260]. These technology-external factors can include, inter alia, political decisions, economic development, environmental changes, and the like. In the study of transition processes, this threefold approach has become the most fruitful and widely used framework to study the emergence and change of sociotechnical arrangements. Our analysis connects to this body of literature insofar as we investigate societal, political, and economic developments in a – spatially defined – technological niche and relate such developments to larger institutional settings. We also build on the work on "multi-regime interactions" [30,31], which lays emphasis on the interrelated transformation dynamics on different levels on different sectors. In a similar vein, we are interested in the interactions and dynamics between at least three different sociotechnical domains: renewable energy systems, transportation, and ICT.

However, the MLP comes with certain caveats that limit its applicability for conducting an actor-centered analysis, which we propose for answering our research questions. A number of scholars have criticized the MLP for lacking a systematic and explicit "account for power, agency and general political economy phenomena" [32: 265]. Geels and others have addressed the issues of power and agency, among other criticisms, in their recent work [33–35]. However, most MLP-studies still focus on dynamics and interactions between relatively disembodied niches and regimes – not on socially skilled actors and their concrete actions. While this seems to be rather unproblematic when it comes to explaining *longue durée* transitions from one regime to another [12,36,30], it proves an obstacle for studying the emergence of new arenas of social action. We react to these conceptual shortcomings by applying the theory of SAF to capture the strategies of the actors involved in the creation of these new arenas, taking into account the current phenomenon of laboratory sites of innovation.

2.2. From organizational fields to strategic action fields

When approaching intersectoral dynamics in terms of actors, strategies and agency, the first question that needs to be addressed is how to conceptualize a pre-commercial niche. Scholars in organization studies have examined domains of institutionally connected actors as "organizational fields" [37–39]. DiMaggio and Powell define organizational fields as "sets of organizations that, in the aggregate, constitute an area of institutional life" [37: 148]. These networks of organizations are reproduced and stabilized by common "meaning systems" [40: 57–59]. Such systems of meaning

[1] Whenever we refer to the intersectoral field between renewable energy systems, transportation, and ICT in the particular case of the urban innovation campus we examined, we will use the term "mobility-to-grid," which the involved actors use to demarcate their local niche and what we view as their strategic action field.