

Strambach, Simone; Pflitsch, Gesa

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Micro-dynamics in regional transition paths to sustainability - an analysis of organizational and institutional change in Augsburg's transition topology

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Simone Strambach and Gesa Pflitsch

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Prof. Dr. Dr. Thomas Brenner
Deutschhausstraße 10
35032 Marburg
E-Mail: thomas.brenner@staff.uni-marburg.de

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Micro-dynamics in regional transition paths to sustainability - an analysis of organizational and institutional change in Augsburg's transition topology

Simone Strambach

Geography of services, communication and innovation,
Philipps-University Marburg, simone.strambach@geo.uni-marburg.de

Gesa Pflitsch

Economic Geography and Location Research, Philipps-University Marburg,
gesa.pflitsch@geo.uni-marburg.de

Abstract:

While there has recently been an increased interest in urban and regional transitions to sustainability, there are little profound insights about the emergence, design and enforcement of regional transition paths to sustainability (RTPS). The latter are characterized by organizational and institutional dynamics that affect multiple regimes and cannot fully be captured with the niche-regime categories of the multilevel perspective (MLP). This paper is therefore based on recent approaches from evolutionary economic geography (EEG) that focus on how actors at the micro-level use the plasticity of paths to enact change. The transition path and underlying micro-dynamics over more than 30 years in the Augsburg region revealed in an empirical study are visualized in the form of a transition topology. The results show that RTPS are not a determined process which follows a prescribed course of events from the beginning. Actors use the interpretative flexibility of institutions and establish organizational proximity between different institutional logics to break up institutional consolidations and allow new configurations within the path.

Keywords: Sustainability transitions, regional paths, institutional change, organizational change, micro-dynamics

JEL Classifications: B52, D83, Q01, R11

1. Introduction

In light of the global acceleration of anthropogenic climate change, the increasing resource scarcity and social fragmentation, cities and regions are confronted with the challenge to develop in a more sustainable i.e. nature and human compatible direction. This requires a fundamental transformation of their socio-technical infrastructure (cf. Hodson/Marvin 2010, Bulkeley et al. 2011). Researchers from the field of urban studies therefore increasingly refer to Geel's (2004) prominent multilevel perspective (MLP), which offers a tool to capture socio-technical change processes in their entirety. The importance of urban governance activities to create spaces for experimentation are strongly emphasized (cf. Bulkeley et al. 2014, McCormick et al. 2013). At the same time spatial aspects have received more attention in the sustainability transition literature after some seminal contributions pointed out the influence of the spatial institutional environment on socio-technical transitions and their multi-scalar character (cf. Truffer/Coenen 2012, Coenen et al. 2012, Raven et al. 2012). Both research streams - sustainability transition and urban studies - place emphasis on similar issues to initiate and manage transitions at the urban or regional scale. The importance of niche developments, transition management, shared visions, intermediary organizations and entrepreneurial change agents is frequently highlighted (cf. McCormick et al. 2013, Hansen/Coenen et al. 2015).

Empirical studies have shown that urban and regional transition processes are highly complex and that they are based on dynamics on the micro-level. However, a largely open question is how these micro-dynamics are connected with long-term transition processes at the aggregated urban or regional system level. To gain insights into this connection we introduce the notion of *regional transition paths to sustainability* (RTPS) and examine three important aspects that have not been explored in depth in the above mentioned research streams that explicitly focus on the geography of sustainability transitions. *First*, by shifting the focus to RTPS, the implementation and integration of new sustainable solutions in many different regimes is acknowledged, which is also strongly influenced by more general regional social and economic goals (cf. Hodson/Marvin 2010, McCormick et al. 2013, Rohrer/Späth 2014). The focus of most transition studies on specific socio-technical regimes, primarily from the utility sector, does not fully encompass the thematic breadth of sustainability in a regional transition process. In particular, the social dimension of sustainability is rarely recognized. *Second*, the possibilities to deliberately manage change in regional transitions to sustainability are clearly limited. Regional transition paths are characterized by the intersection of institutional settings, multi-regime dynamics and place-specificity. They are thus shaped by actors from many different institutional settings and regimes, often with conflicting interests and intentions. Any attempt to manage a regional transition process by one particular actor group will therefore likely face resistance (cf. Shove/Walker 2007). Institutional theory also shows that the possibilities of purposely initiating and guiding institutional change in regional paths are limited, as the outcome of actions always depends on the actions of others (cf. Lawrence/Phillips 2004, Lawrence et al. 2011). Moreover, the specific spatial institutional environment enables and constrains

actors in their possibilities for action (cf. Gertler 2011). *Third*, the RTPS framework highlights the importance of following transition processes through long periods of time. Many studies in the transition literature focus on the initial stage of a transition process (cf. Hansen/Coenen 2015, Brown et al. 2013) and thus do not capture the outcome of the dynamics at the micro-level at later points in time. How and if changes are stabilized is not considered in depth.

In agreement with scholars from institutional theory, we argue that we need to acknowledge the “contingent and emergent nature” of institutional change and “adopt a broad, processual understanding of strategy” in order to better understand the interplay of actors and structure in RTPS (Lawrence/Phillips 2004: 708). This requires analysis of the dynamics actors induce with their activities and what outcomes these activities have in the long run, while considering the specific environment in which these actors are embedded. A longitudinal and process-oriented approach is followed, with the aim to better understand how actors at the micro-level enact organizational and institutional change towards sustainability in regional paths. For this purpose a transition topology was developed, which captures the RTPS of the Augsburg region across different institutional settings over a time-span of more than 30 years. At the same time it enables consideration and examination of the underlying micro-dynamics. The transition topology establishes a link between certain events over time and thus brings dynamics to the fore which have remained largely hidden in transition research so far. Our framework and analysis not only contribute to the newly emerging field of the geography of sustainability transitions (cf. Hansen/Coenen 2015), but might also be informative for policy-makers and public actors as well as actors from civil society who want to initiate a transition in their city or region.

The paper commences with a section outlining our concept of RTPS and elaborates on possible sources of change on the micro-level. Afterwards the methodological procedure developed to chart a regional transition path and the choice of the Augsburg region as an exemplary case are elaborated. The presentation of the results is followed by a discussion about how actors induced organizational and institutional change in Augsburg's regional transition path.

2. Sources of organizational and institutional change in regional transition paths to sustainability

Sustainability transition research has highlighted the need for a radical transformation of existing socio-technical regimes in order for society to develop in a more sustainable direction (cf. Geels 2004, Geels 2011).¹ From a regional or urban perspective it is the challenge to implement and integrate multiple new sustainable solutions in different socio-technical regimes and adapt them to the specific local circumstances. The region can be conceptualized as an open system, which contains a wide range of socio-technical regime configurations that have developed in a co-evolutionary and place-specific way over time.

¹ For a detailed discussion about the concept of socio-technical regimes see Markard/Truffer 2008.

Rohracher and Späth (2014) have shown that in order to initiate and stabilize transition processes in the region's socio-technical infrastructure, a broader organizational and institutional change in the regional system is necessary. The latter paves the way for further changes in many socio-technical regimes over the long run. Studies from the field of urban transition research show that these organizational and institutional changes are usually not targeted at a specific socio-technical regime, but strongly influenced by more general regional goals (as e.g. carbon reduction or economic growth targets) (cf. Hodson/Marvin 2010, Higgins 2013, Dielemann 2013, Ryan 2013, Khan 2013, Hamann/April 2013, Rohracher/Späth 2014). We therefore argue that the emergence of the regional transition path cannot be fully explained with the niche-regime categories of the MLP (cf. Block/Paredis 2013, Rohracher/Späth 2014). Changes in RTPS are thematically broader, more complex and hard to capture. They do not emerge in protected spaces, where heterogeneous actors are spared from prevalent institutional structures.

How actors use existing institutional settings for new purposes, or how institutions are re-combined and provided with new social practices, has not received much attention in the sustainability transition literature so far. Regimes are seen as relatively stable institutional settings, which have formed over a long time span and which guide actor's behavior. The plasticity and changeability of institutional settings through individual and collective actors are underestimated (cf. Fünfschilling/Truffer 2015, Quitzau et al. 2013). We therefore refer to recent approaches from evolutionary economic geography (EEG) that argue for a more differentiated understanding of path dependency, path creation and dynamics within established paths (cf. Boschma/Martin 2010, Strambach 2010, Strambach/Halkier 2013, Trippel/Tödting 2013). The basic argument is that regional paths are not coherent in themselves and thus leave room for creative and reflexive actors at the micro-level to enact change (cf. Strambach/Halkier 2013). Strambach and Halkier (2013) argue that the ambiguity of institutions and the interpretative flexibility even of formal institutions is a main source of plasticity in regional paths. Even if these change processes are not radical, but rather gradual at first, they do have the potential to lead to more fundamental changes over the long run (cf. Mahoney/Thelen 2010). The latter underlines the argument that it usually takes a considerable amount of time until regional transition processes become visible at the macro-level.

In particular, sustainable innovations that require the combination of knowledge of actors from different institutional settings are often connected with path plasticity (cf. Strambach/Halkier 2013, Strambach/Klement 2013). Innovation processes aiming at sustainability, in which actors' ecological, economic and social needs and aims must be considered and balanced, necessitate complex search, evaluation and negotiation processes between different actor groups. The cooperation of different stakeholders from the economy, but also of political, intermediary and civil society actors, is necessary (cf. McCormick et al. 2013). These actors need to combine their resources, competences and their cumulative knowledge. This causes diverse tensions, and controversial interests need to be overcome. Combinatorial knowledge dynamics thus require "the transformation,

recombination or creation of institutions at the micro-level, as they imply coping with many different cognitive, technological, organizational and institutional interfaces” (Strambach/Klement 2013: 67). Recent approaches in economic geography have shown that these processes can be facilitated through the setup of specific organizational structures. Combinatorial knowledge dynamics are often combined with the development of new organizational forms in regional paths. In particular temporary forms of organization such as trade fairs, conventions, conferences or festivals have been highlighted in economic geography as an opportunity for actors from different institutional settings, even competing organizations, to interact and develop their ideas (cf. Bathelt/Schuldt 2008, Rychen/Zimmermann 2008, Torre 2008, Cohendet et al. 2014). According to Cohendet et al. (2014), temporary events enable actors to exchange tacit knowledge with other cognitive proximate actors or with actors from competing organizations that have similar or opposing interests: „[Temporary events] also contribute to attract individuals with different backgrounds and cognitive frameworks that otherwise would rarely interact, thus increasing the chances of ‘unexpected encounters’ and the cross-fertilization of contrasting ideas, which can often be at the origin of major creative endeavours and/or fruitful collaborations“ (Cohendet et al. 2014: 939). The authors conclude that a regional environment which provides these spaces for interaction is therefore particularly fruitful for the development of radically new ideas. It can be assumed, however, that more permanent organizations as well as changes in organizational routines in existing organizations are also important for the anchorage and stabilization of a transition process in the region. Particularly, as they enable trust building and ongoing learning processes between actors.

Seeing path plasticity and combinatorial knowledge dynamics as a source of change in RTPS underlines the argument that institutional and organizational change are contingent and their outcome open ended. From the evolutionary perspective these processes are the result of both purposeful actions and unintended and unforeseeable consequences. Outcomes are produced through the interplay of actors from different fields and through actors seizing opportunities that open up in the regional path (cf. Lawrence/Phillips 2004, Lawrence et al. 2011). Hence, our research is guided by the questions: How do actors use the plasticity given in the regional path to enact organizational and institutional change towards sustainability? How do they overcome the barriers in sustainable innovation processes given by competing institutional logics? How do incremental changes at early points in time induce more fundamental changes over the long run?

3. Methodology and case

3.1 Methodological procedure

Given the explorative character of this research and the complex nature of processes, a qualitative research design was chosen. Furthermore, a longitudinal approach was required in order to track the transition dynamic over time. A mix of data sources was used in order to reconstruct the transition process in different institutional settings and to cross-validate

the findings. Overall, two narrative and ten problem-centered interviews with actors from different organizations that were deeply involved in the transition process, seven unstructured participatory observations (during workshops, project meetings and public fairs), two document analyses (a preliminary and a more targeted one after the interviews) were conducted. Moreover, several telephone calls helped to clarify and enhance empirical findings. In the end the results were validated by discussing them with some of the interview partners as well as the members of the city's sustainability advisory board.

As a research heuristic, the actor-centered institutionalism approach was used for detecting and ordering empirical facts (cf. Mayntz/Scharpf 1995, Scharpf 2000). The basic assumption behind the approach is that social phenomena are the results of interaction of intentional acting actors. These interactions are structured by enduring institutional settings in which they take place. Based on the structuration theory and the duality of structures (Giddens 1984) it is assumed that results of interactions in turn have impacts on institutional settings by contributing to gradual institutional changes over time. The central analytical categories of this approach are actor constellations as well as the action orientations and outcomes of interaction processes in time. These key features enabled us to explore empirically the connection between actors and systems and to reconstruct causal processes in RTPS. Outcomes of interactions were analytically differentiated as organizational and institutional changes, defined as events in time and mapped in what we label a transition topology (see figure 1). The aim of such a directed graph is to identify the processes through which these changes are generated. Empirically concrete events in time, as the results of interaction processes, were used as representations for institutional and organizational change.

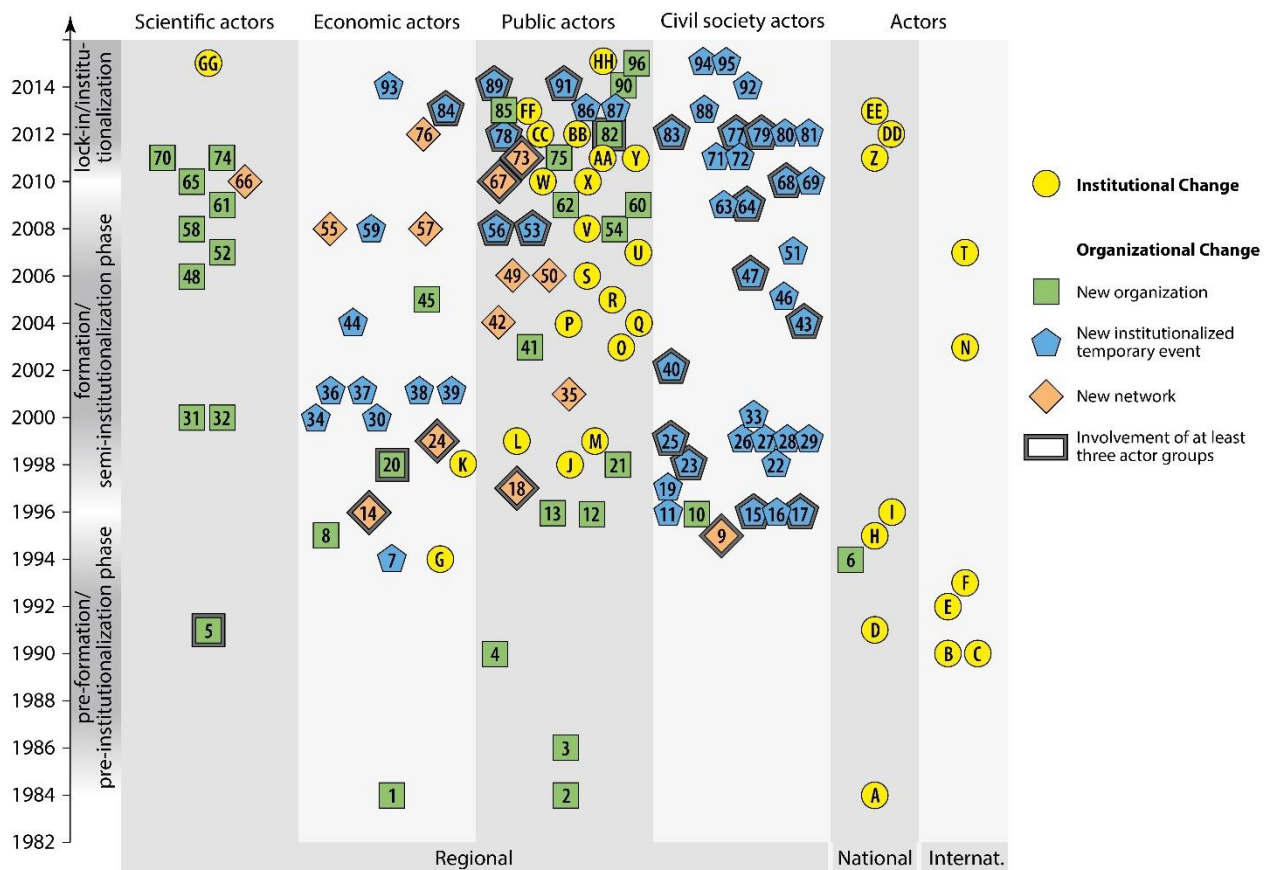


Figure 1: Transition topology of the Augsburg region
 Source: Own graphic, Cartography: Christiane Enderle

Institutional changes were operationalized as events, which reflect a change in rules, norms or cognition related to sustainability. Such an event could be the implementation of a new formal regulation as well as the announcement of new voluntary standards, which legitimize new social practices in favor of sustainability or de-legitimize unsustainable behavior. Organizational changes are events which indicate the establishment of a new organizational form. They were further differentiated into an entirely new body of organization, networks and institutionalized temporary events according to their temporality and their degree of formalization. A new organization can refer either to the foundation of a new independent organization or a new department within an existing organization. Responsibilities and competencies are clearly defined in formal organizations. Organizations are further characterized by a clear rule system and hierarchical structures. Compared to networks and temporary organizations, they are more stable and have their own administrative, technical and financial resources. Networks are defined as a loosely coupled group of independent actors with a common interest. They are organized in a non-hierarchical form, do not have their own resources and are more fluid than formal organizations. Finally, new institutionalized temporary events were operationalized as the start of a series of events, where actors meet repeatedly for a specific purpose over a limited time.

3.2 The Augsburg case: a broad shift towards sustainability

Two years ago, Augsburg was awarded with the German sustainability prize to appreciate the city's remarkable engagement in the fields of climate protection, economic and demographic change. According to the jury, it was not Augsburg's outstanding performance in one specific field, but the diversity of achievements and their increasing integration into one overall process that led to this decision (cf. Stiftung Deutscher Nachhaltigkeitspreis 2013). The city of Augsburg has a sustainability program compiling 75 goals in the social, economic, ecological and cultural dimensions, as well as indicators which make achievements measurable (Stadt Augsburg 2016). Augsburg therefore provides a particularly suitable case for analyzing a regional transition process, which spans many different regimes.

Taking the example of the ecological dimension, based on the document analysis the outcomes of the transition process in Augsburg become visible in several regimes already. The city of Augsburg has e.g. increased its production of renewable energies amongst others by the installation of several hydropower stations or bioenergy plants. In 2009, Augsburg fed in far more renewable energy into the grid than other comparable cities in Germany (as e.g. Freiburg, Münster or Heidelberg) (cf. Stadt Augsburg 2013). Augsburg has also reduced its CO₂ emissions e.g. by shifting all its buses to regenerative biofuels – as the first city in Germany. Moreover, a large number of pilot projects in the field of sustainable construction were implemented, ranging from single private initiatives to the construction of the world's first CO₂ -neutral soccer arena. In parallel, Augsburg's economy has undergone a significant structural change towards a more resource efficient and environmentally sound economy (cf. BMWi 2014). The latter has been accompanied by the establishment of an excellent research and education infrastructure in this field (cf. Thiel/Joel/Dallner 2015). Moreover, the districts in the Augsburg region have officially recognized sustainability as a strategic goal for Augsburg's regional economic development agency, which is also actively involved in the Local Agenda 21 (LA 21) process.

This is all the more remarkable as Augsburg's economy was affected by a dramatic economic downturn in the 1960/70s – caused by the decline of the textiles industry, which had shaped Augsburg's economy for centuries. Employment numbers in the textiles industry declined rapidly since the 1960s, while the machinery industry managed a structural change.² However, as a classical production site with relatively weak research infrastructure and a resource-intensive machinery industry, the region was at a comparatively disadvantage to manage the grand challenges posed by climate change and resource scarcity. This makes the initiation of this broad transition process towards sustainability in the region even more interesting.

2 Calculation based on monthly industry reports from the Bavarian Statistical Office by the Office for Statistics and Urban Research in Augsburg. This information was assessed through personal communication with the latter.

4. Actors and micro-dynamics in Augsburg's transition path towards sustainability

The transition topology (see figure 1) shows that there are many actors from different institutional settings that contributed to the regional transition process with varying intensity. The main actors, which played a particularly important role, are the LA 21, the city's environmental advisory board and an environmental competence center (Kumas). Analysis of the empirical material makes it apparent that these actors were involved in all different phases of the transition process. They induced a considerable number of organizational and institutional changes over time. The following therefore focuses mainly on these three actors and their contribution to the transition process.

4.1 Regulatory push and institutional plasticity

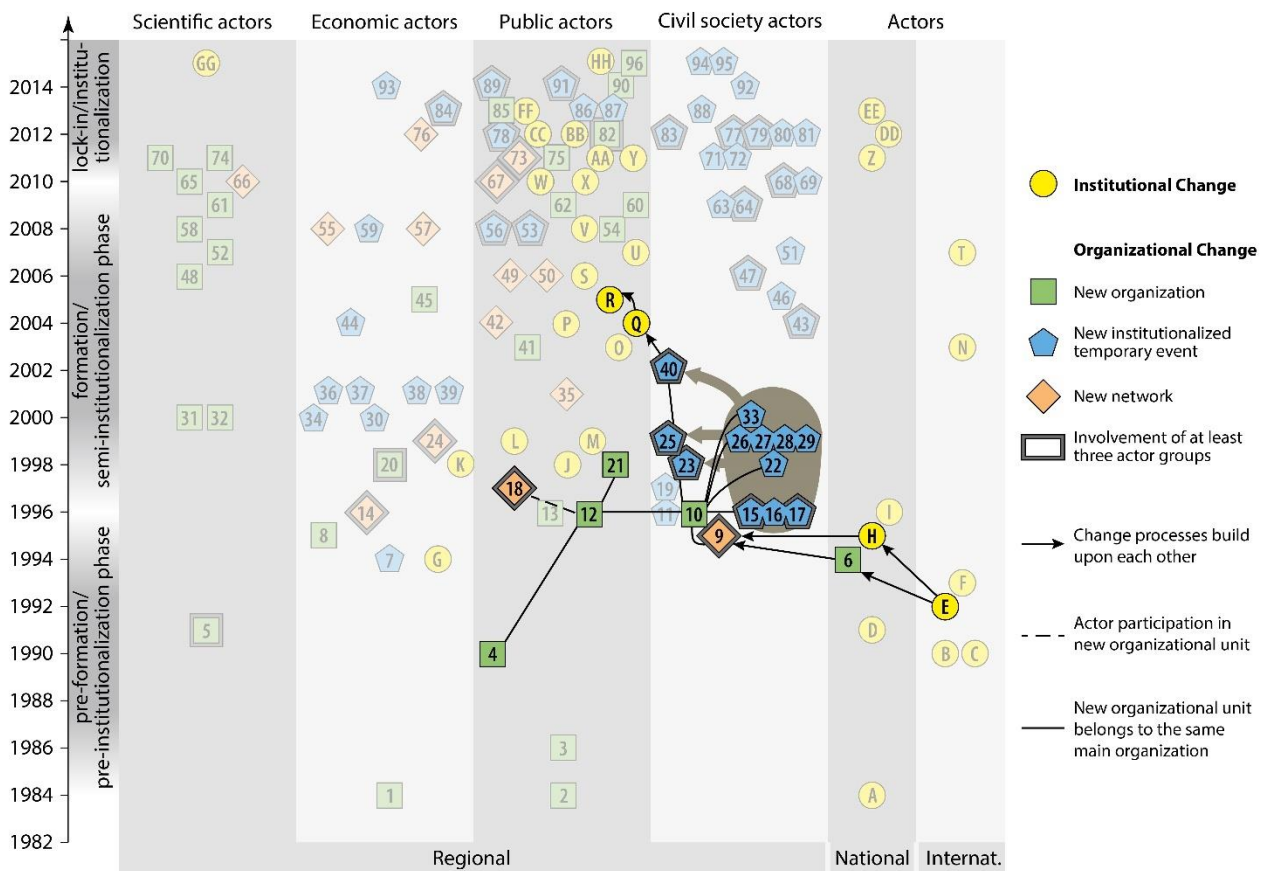


Figure 2: Local Agenda (phase 1-2)
 Source: Own graphic, Cartography: Christiane Enderle

Augsburg's LA 21 was established due to impulses from outside the region, starting with the Rio conference on sustainability in 1992, where cities all over the world were called upon to initiate local agenda groups (this event is represented by character E in figure 2).³ In Germany the LA 21 process fell within the responsibility of the Federal Environmental

³ See appendix for the concrete content of the topology.

Agency (BMU) and was therefore strongly focused on environmental aspects. Inspired by the first LA 21 processes in Munich and Berlin (6), actors from the 'Werkstatt Solidarische Welt', an organization active in the field of developmental issues, started networking and communicating with the most influential environmental groups in Augsburg, a loose group of solar engineers as well as with the city's environmental office (9).

Shortly before the local elections in 1996, the Bavarian conservative government declared Augsburg an 'environmental competence region' and announced that it would move its state department for the environment to Augsburg. The oil shock in 1973 had put Augsburg's resource intensive industry under massive pressure. Helping the region to gain back its economic prosperity through the development of an environmental industry became the key for success for the local conservative party in the elections in 1996. When the decision was made official, the later head of Kumas immediately brought together all relevant stakeholders from the economy, the scientific and public field to define what this label should mean for Augsburg. At the same time, the newly established LA 21 used this 'window of opportunity' for their purposes by initiating a discussion in civil society about appropriate strategies and actions for an environmental competence region. The speaker of the LA 21 explained: "So we became the legitimization or concretization of the expectations that the general populace had for an environmental competence region." As the topology reveals, the group's exertions finally led the city in 1998 to establish a permanent part time position for the LA 21 in the city's environmental office (21) and to set up an environmental advisory board (18). The latter is a committee of experts that is able to make direct proposals to the city council.

While taking advantage of the new environmental orientation of the region, the LA 21 tried to raise attention for a holistic understanding of sustainability including social and economic aspects right from the beginning. Initially, however, this met with little understanding in the public field, where the topic was regarded as purely environmental. As the head of the environmental office explained: "It took years until colleagues from other areas came to the meetings and until they also felt responsible for what happened in this process." The progress the LA 21 has made in this regard over a time span of more than 15 years becomes apparent in the renaming of the environmental advisory board as agenda advisory board in 2003 and later as sustainability advisory board in 2012. The renaming and the associated thematic expansion of the advisory board in 2003 could only be achieved, because the LA 21 had by then worked out concrete sustainability guidelines. Moreover the organization implemented a sustainability award for exemplary sustainability projects, which made the topic more tangible for actors in the public field. Another indicator for the broader understanding of sustainability in the city administration is the separation of the LA 21 from the environmental office in 2014. Since then it functions as a stand-alone unit in the department for the environment, sustainability and integration.

4.2 The connection between organizational and institutional change

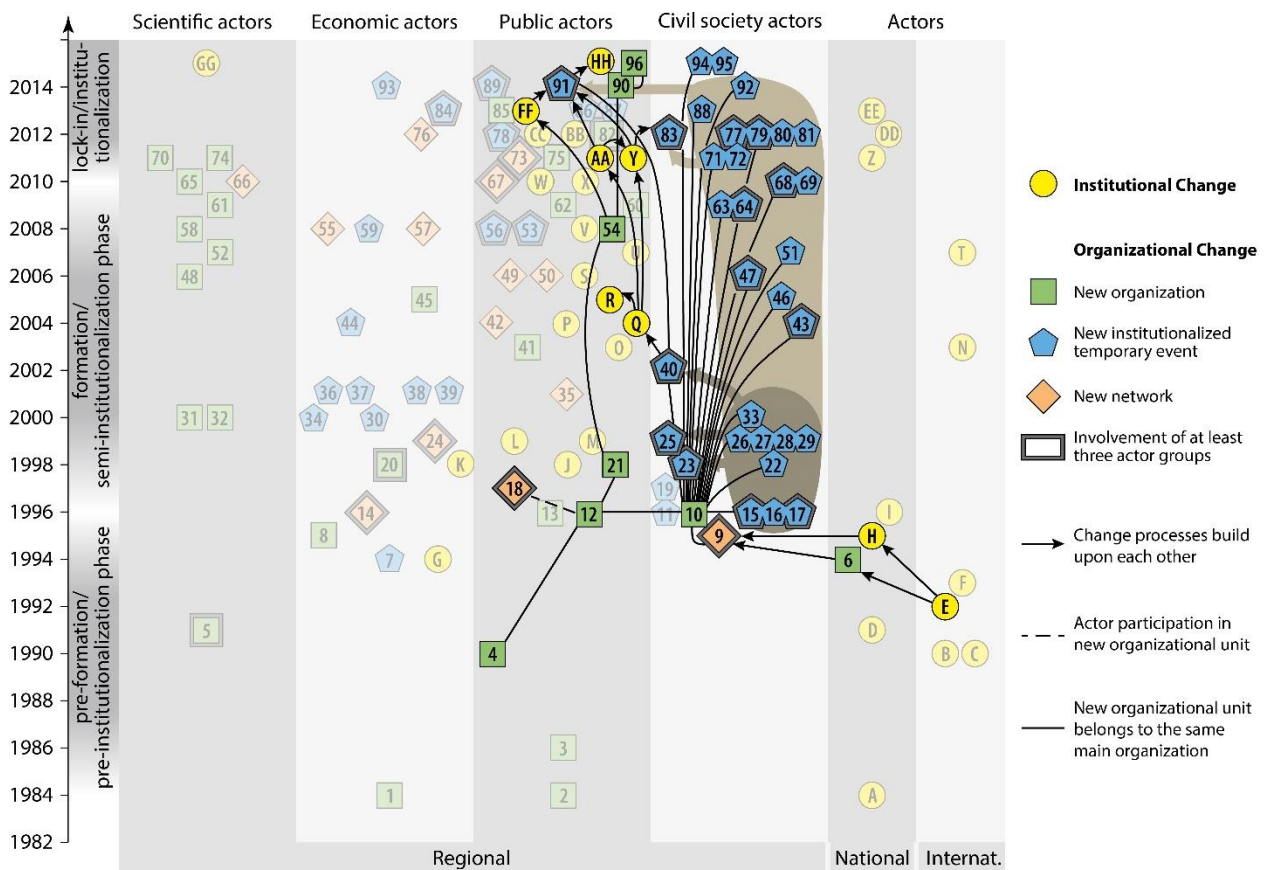


Figure 3: Local Agenda (phase 1-3)

Source: Own graphic, Cartography: Christiane Enderle

As the topology (see figure 3) shows, the LA 21 induced many organizational changes, which facilitated further organizational and institutional changes at later points in time. The establishment of expert forums where sustainable practices were discussed in certain thematic fields such as energy, urban development or mobility (15-17) and where concrete project ideas were developed is worthy of particular mention. Each forum was led jointly by a thematic expert in the relevant field and a moderator, who organized and structured the meetings. The aim was to bring together actors with different capabilities and specialized knowledge who were already working on or were interested in a specific sustainability-related topic and provide them with the necessary resources. Right from the beginning the forums attracted actors from different institutional settings. With a few exceptions, all forums brought together actors from at least two different institutional fields. The first forum on energy issues e.g. contained several actors from the economic and public field, as well as from civil society. Like the other forums, it was of a temporary and rather fluid nature as composition of the members fluctuated strongly from time to time. Often smaller subsidiaries developed on a current topic or problem that quickly disappeared again when the problem

was solved. Over the last years, the energy forum began to dissolve as the topic is now more intensely and efficiently dealt with in formal organizations from the public, economic and scientific field as e.g. the chamber of industry and commerce or the regional energy agency. Nevertheless, some core members of the energy forum are still active in order to point out gaps and give innovative impulses to these organizations (e.g. through the organization of a symposium for passive house design).

Through the topology it becomes apparent what outcome the combinatorial knowledge dynamics generated in these forums induced over time and in other institutional fields. The knowledge generated in the forums provided the basis for the establishment of sustainability principles and, later, for the development of indicators to measure the achievements (23, 25). Moreover, in 2002 when the political situation shifted from a conservative to a social-democratic government, the LA 21 also initiated the creation of concrete goals for Augsburg in a series of public workshops with representatives from civil society, public organizations, the city administration, politicians as well as actors from the economic field (40). In 2004 these sustainability goals (Q) were handed over to the city council. As the head of the environmental office stated:

„I think that a whole lot of contacts came out of this. I always found it amazing how some actors who I had always thought coordinated with each other, didn't do that at all. Having a round table like that - regardless of what the specific topic was - really helped the exchange of ideas - in fact even was the starting point for that“.

In 2011, the city council instructed the LA21 to expand and update their sustainable action program (AA) to use it as a basis for an integrated urban development concept (Y) as well as a sustainability assessment (FF) for all further city council resolutions.⁴ The latter means that both the actors in the city administration that develop a proposal, and the members of the city council that decide about it, have to adhere to the sustainability guidelines.

⁴ When the city council in 2011 decided to update the sustainable action program, it also recommended to use it as a basis for the sustainability assessment. In 2016 the assessment was implemented in about one quarter of the city's departments. It is currently in a test phase. The final decision to use the new action program as a basis for the urban development concept was taken in 2015.

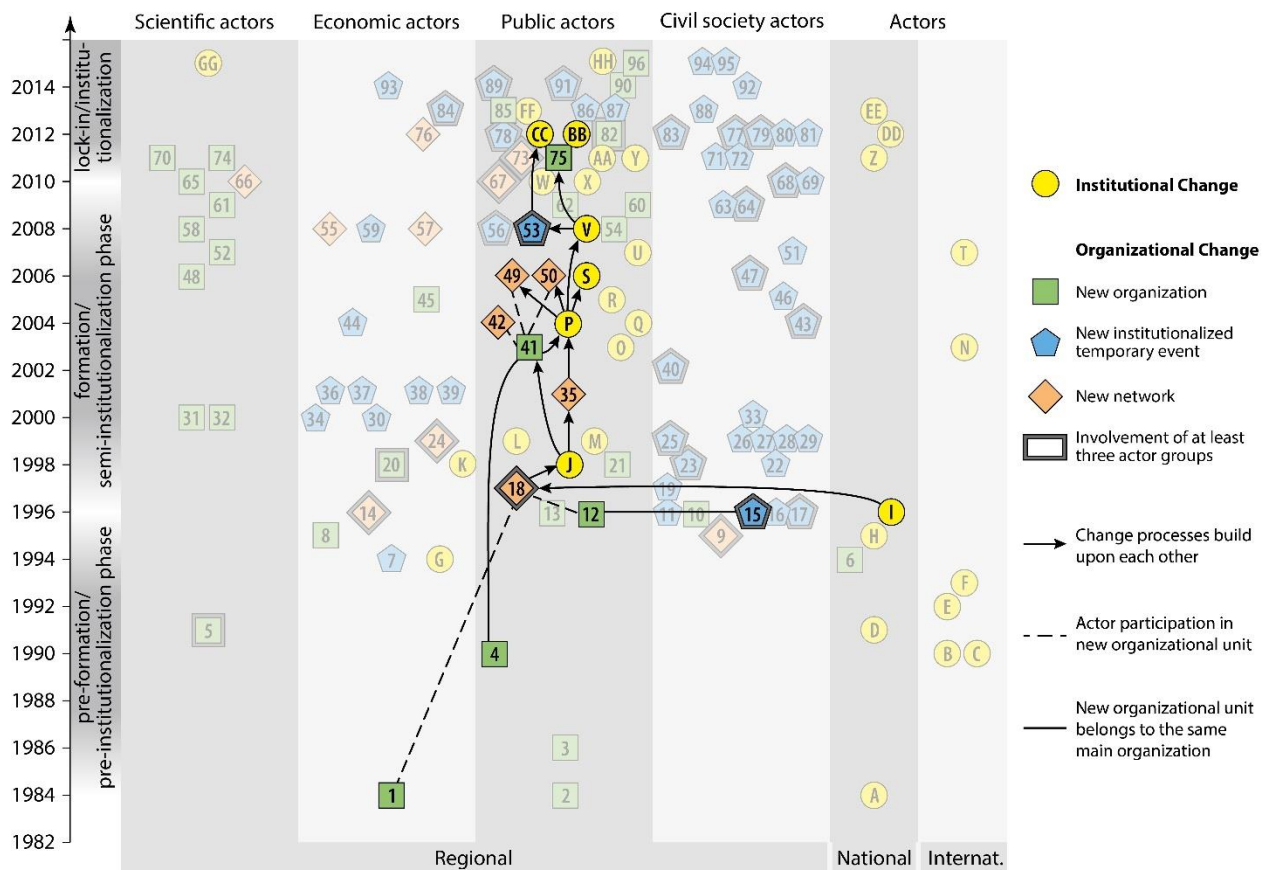


Figure 4: Advisory board

Source: Own graphic, Cartography: Christiane Enderle

The topology also shows the important role of the environmental advisory board (18). Many ideas developed by the LA 21 forums got access into the city council in an indirect way over the board which passed them on to the city council. The latter transformed several of these proposals into binding legal decisions, so that actors in the city administration had to implement them. As the topology illustrates, the ideas to join the climate protection alliance of European cities and to establish an energy agency, both of which emerged in the LA 21 energy forum, were introduced to the city council through the environmental advisory board. By joining the climate protection alliance of European cities, Augsburg committed to concrete CO₂ emission reduction goals (J). A CO₂ reduction concept was developed which included an action plan, forming the basis for all further climate protection measures throughout the following years. In 2002/3 the city of Augsburg also set up a new climate protection office (41) with the main goal to foster networking activities between different regional actors and to initiate the development of a municipal climate protection concept. At a regional development conference (53) the department also introduced the idea to establish a regional climate protection concept (CC) as well as a regional energy agency (75), which lay the ground for many changes in multiple regimes as e.g. the setup of biomass heating plants by the local utility company or the implementation of a smart metering pilot project in several private households.

The environmental advisory board also built an important platform for intensive communication and learning processes between actors from different institutional fields. It consists of up to 25 important individuals or organizations from the economic, political, scientific and civic fields and meets four times a year. Since the advisory board is not focused on a specific dimension of sustainability, as are many of the forums, conflicts between the ecological, economic, social and cultural dimensions can be identified and discussed. Due to the relatively stable membership, an understanding for the perspective of actors from other institutional settings has been developed over time. The interviews conducted make it obvious that only through the support of such actors from the economic and scientific field in the advisory board the ideas developed in the forums were taken more seriously by the city council. The manager of the LA 21 office explained:

“The director of Kumas provided a bridge into the traditional industry and trading sector. [...] When we needed a city council resolution and the advisory board supported this, the issue was taken far more seriously by urban politicians.”

The hybrid organizational structure of the LA 21 was another important organizational prerequisite in order to initiate further organizational and institutional changes in the city of Augsburg. In addition to its position in the city's environmental office, occupied by a member of the city administration, the LA 21 maintained their civil society based organizational units and speakers right from the beginning. In 2005, the former civic speaker of the LA 21 took over. As the interviews revealed, it was clear to everyone from the beginning that this person with a background in the non-profit sector would not strictly adhere to the conventions of the city administration. Described by the manager of the LA 21 office:

“The fact that I came from the outside world gave me a lot more freedom within the city administration. They knew that I was passionate about what I did, and when I was a bit too direct they also understood that I didn't come from an administrative background.”

In parallel two new civic speakers were chosen, assuring that the LA 21 would not get “too mainstream.” The manager of the LA 21 office always made sure that the civic speakers were integrated in important decision processes. At the same time, the civic speakers could, when needed, exert pressure on the city administration or politics from outside. It becomes apparent from the topology (see figure 3), since this change in personnel the number of expert forums further increased, indicating an expansion of the topic of sustainability into several thematic fields. Moreover, from inside the administration the new manager of the LA 21 office was able to initiate a transformation of the environmental advisory board, so that all dimensions of sustainability were evenly represented by the members of the board. The interviews showed this hybrid structure to be a critical success factor in Augsburg's transition process.

5. Discussion and conclusion

With the aim to understand how actors enact organizational and institutional change in RTPS, in the following, the three questions developed in the conceptual part of this paper are discussed: (1) How did the LA 21 make use of institutional plasticity? (2) How did it overcome the barriers in sustainable innovation processes due to conflicting institutional logics? And (3) how did incremental changes at early points in time induce more fundamental changes in the long term?

Making use of the plasticity of institutions

The emergence of the main actor groups in Augsburg's transition path underlines the argument that RTPS do not emerge in protected spaces where actors are shielded from existing institutional structures. The declaration of Augsburg as an 'environmental competence region' was a regulatory push to set incentives for actors to build upon the existing, historically evolved economic structures. The declaration was only possible because Augsburg's machinery industry provided the potential to develop more environmentally sound technologies. The LA 21 initially used the interpretative scope of the new label in order to get a foothold in the city administration. It interpreted it much more broadly than originally intended by the Bavarian state department and thus also developed a definition that contrasted significantly with that of the regional actors from the public and economic field. However, instead of distancing themselves from these actors, the LA 21 started to communicate and even join forces with them in the advisory board.

The role of personal networks between actors that are key persons in different organizations and networks simultaneously becomes apparent here. This underlines the finding of Brown et al. (2013) that establishing connections between different intermediary organizations is important, as no organization can achieve the transition on its own. The head of the LA 21 worked closely together with the head of Kumas and other influential actors from the economic and political field that acted as boundary spanners by establishing acceptance for the ideas of the LA 21 in organizations from their respective institutional settings. The support of these highly reputed actors in the advisory board from different institutional fields provided legitimation for the city council to pass resolutions, which then had to be implemented by the actors in the city administration. Over the course of time, the LA 21 thus successfully attached new elements to the environmental focus of the region, so that, step for step, a responsibility for the agenda process in other departments of the city administration developed.

Establishing organizational proximity between different institutional logics

The creation of organizational proximity through new organizational platforms, both of a temporary as well as a more permanent nature, was crucial in order to integrate actors from different institutional fields with divergent perspectives and interests. The LA 21 forums provided an opportunity for mutual problem framing and knowledge combination between actors with very different cognitive frameworks and intentions (cf. Strambach/Klement 2013).

In line with Cohendet's (2014) argument on the role of temporary organizations, it can be stated that particularly the LA 21 forums enabled the integration of new ideas from a more informal urban milieu into the formal organizations in the public, economic and scientific fields.

Through the integration of new groups, the LA 21 was also able to constantly expand and update their knowledge base. In turn, this enabled the organization to keep pace with the dynamic nature of sustainability and to adapt to changing circumstances (cf. Hodson/Marvin 2010). Over the years, sustainable thinking has penetrated a considerable amount of different regimes (e.g. mobility, energy supply, housing) and thematic areas (e.g. integration, religious tolerance, freedom of art and culture). This stabilizes the transition process when transition dynamics slow down in a particular field. Rohracher and Späth (2014) have illustrated how quickly such a dynamic can lose momentum, if the process is too narrowly focused or solely connected to a specific group of actors. Compared to the forums, the advisory board composed of actors from different institutional settings who interacted on a continual basis facilitated trust building and reduced cognitive distances. This becomes particularly important when decisions have to be made which require a careful weighing of different sustainability goals against each other.

Another crucial factor for the success of the transition process has been the hybrid organizational structure of the LA 21 and thus the establishment of permanent organizational proximity between different institutional logics. While the LA 21 was in an opposing position to the actors from the public field in the beginning, a growing understanding and responsibility for the process was created through the establishment of the position in the city administration. However, it was important that the two different institutional logics never merged, but that the LA 21 kept its roots in civil society in order to continuously supply the process with fresh ideas and critically reflect on its development. This hybrid constellation also enabled the LA 21 to exert pressure on the city administration or politics if necessary. At the same time, the position in the city administration provided the LA 21 with financial resources and stability, which Hodson and Marvin (2010) also found to be a decisive success factor for intermediary organizations.

From incremental to more fundamental changes

The topology shows how the LA 21 forums paved the way for the current implementation of more sustainable technologies and the development of more sustainable consumption patterns in different regimes. Even if additional impulses from outside were necessary, many of the developments today could not have been implemented so easily without the previous, pioneering work of the LA 21 forums. Even though the outcomes of more general projects were not targeted at specific regimes, they contribute to gradual changes in specific regimes, which become visible later in time. An indicator for the success and stabilization of the regional transition process is the current transformation of the energy forum. Its pioneering work is not required in the same manner as in the 1990s anymore. The topics of renewable energy and energy efficiency are already implemented by rules and laws and also fully

established in existing organizations. Moreover, with the establishment of the energy agency the topics are institutionalized in form of a new more permanent organization. However, a small number of people still meets in the forum in order to continuously supply the process with new innovative ideas and challenge these organizations to take the process to the next level.

At the beginning the LA 21 was a peripheral actor that over time moved much closer into the center of the path. While in an early phase sustainable practices were critically evaluated and often even rejected, over time sustainable practices gained legitimacy and became an action-orientation for many actors in the region in different thematic fields. The provisional implementation of the sustainability assessment for all further city council resolutions in 2016 makes it particularly apparent, that the incremental changes lead to transformative change in the path. The normative sustainability principles, indicators and goals, to which development the LA 21 has made an important contribution, are currently being transformed into binding regulations. Thus today an alignment of regulative, value-based and cognitive forces can be observed.

Conclusion

In order to shed light on the micro-dynamics of RTPS, a longitudinal case study in the Augsburg region was conducted, in which a particularly broad transition process is taking place that spans many different regimes. Through the transition topology, dynamics over time and between different institutional settings became visible that have so far remained largely hidden in transition studies. The topology provides an appropriate tool to conduct systematic comparisons with other regions in the future. Overall, the results of the case study underline the argument that RTPS are the outcome of emergent and contingent processes at the micro-level. This means that actors cannot easily create an action plan or a task force to initiate a transition in their city or region. They should rather focus on the potential that is already given in the regional path and create opportunities for exchanges and encounters between actors from different institutional settings.

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Appendix 1: Legend of institutional and organizational changes in the transition topology of the Augsburg region

Institutional change	
A	Implementation of stricter environmental regulations for industrial companies by the German federal government
B	Announcement of voluntary climate protection standards by the Climate Alliance of European cities (Alianza del Clima e.V.)
C	Implementation of an eco-management program (Eco-Profit) aimed at the build up of local networks for environmental protection by the city of Graz
D	Implementation of a new environmentally-compatible waste management act by the Bavarian state government following a public referendum
E	Recommendation of the United Nations (UN) to start Local Agenda 21 (LA 21) groups and implementation of a framework convention on climate change
F	Ordinance of voluntary eco-management and audit regulation (EMAS) by the European Union (EU)
G	Implementation of European voluntary eco-management and audit scheme (EMAS) by several companies and public organizations in Augsburg
H	Recommendation of the German Association of Cities and Towns to implement LA 21
I	Declaration of the Augsburg region as an 'environmental competence center' by the Bavarian state government
J	Accession of the city of Augsburg to the climate alliance of European cities (Alianza del Clima e.V.) and adoption of the alliance's voluntary standards
K	Implementation of an annual award for processes, products, services or concepts which demonstrate environmental competence by KUMAS (Kumas Leitprojekte)
L	Implementation of the Eco-Profit program in Augsburg by the city council
M	Implementation of the city administration's environmental principles by the city council of Augsburg
N	Declaration of the Global Marshal Plan key goals and foundation of a Global Marshal Plan Initiative
O	Resolution of the city council about the renaming of the environmental advisory board into agenda advisory board
P	Resolution of a CO2-reduction concept by the city council of Augsburg
Q	Implementation of the LA 21's sustainable action program by the city council of Augsburg including a regular monitoring and reporting of the progress
R	Implementation of an award for exemplary sustainability projects in Augsburg by the city council (Zukunftspreis)

S	Environmental agreement between the city of Augsburg and the local industry
T	Announcement of the millennium goals by the UN
U	Adoption of Global Marshall Plan and UN Millennium goals by the city council of Augsburg
V	Implementation of an action plan (9-Punkte-Plan) for climate protection by the city council of Augsburg (+ several other resolutions to foster the local energy transition)
W	Implementation of the regional climate protection plan by the three districts in the Augsburg region
X	Resolution of the city council to apply for the label 'fair trade town'
Y	Resolution of the city council to prepare an urban development concept
Z	Resolution of a nuclear exit plan until 2022 and a key issue paper for an accelerated energy system transformation by the German federal government
AA	Resolution to update the sustainability action program by the city council of Augsburg
BB	Resolution about the continuation of the agenda advisory board and its renaming into sustainability advisory board
CC	Implementation of a regional climate concept
DD	Declaration of Augsburg as the second most sustainable city in Germany (behind Freiburg) by the German Sustainability Award Foundation e.V.
EE	Declaration of Augsburg as the most sustainable city in Germany by the German Sustainability Award Foundation e.V.
FF	Resolution of the city council to prepare a sustainability check for the city administration of Augsburg
GG	Declaration of resource efficiency as a superior objective in the university of applied science's development plan
HH	Implementation of the sustainability goals by the city council of Augsburg (Zukunftsleitlinien)
Organizational change	
1	Establishment of the post of an environmental consultant in the local chamber of industry and commerce (IHK)
2	Establishment of a department for environmental protection and safety in the city administration of Augsburg
3	Establishment of an environmental laboratory in the city administration of Augsburg
4	Establishment of an environmental department in the city of Augsburg
5	Establishment of a recycling research center (bifa institute) by the Bavarian state government, the IHK and the city of Augsburg

6	Foundation of first Local Agenda 21 (LA 21) groups in Germany (Munich, Berlin etc.)
7	Establishment of a working group on environmental management systems within the IHK, which meets twice a year
8	Establishment of an environmental incubation center (UTG) by the IHK, the chamber of crafts (HWK) and the Bavarian state government
9	Foundation of a network between the 'Werkstatt Solidarische Welt', the 'Bund Naturschutz' as well as a group of solar engineers with the aim to build a LA 21 group in Augsburg
10	Foundation of the LA 21 group in Augsburg
11	Dedication of the One-World-Workshop series to the LA 21 topic
12	Dedication of a temporary position in the city administration of Augsburg to the LA 21 group
13	Establishment of the Bavarian state office of the environment (LfU) through the integration of several Bavarian state offices and relocation of the LfU to Augsburg by the Bavarian state government
14	Establishment of a steering committee by (IHK) to define an action plan for the 'environmental competence center'
15	Foundation of a LA 21 forum on energy issues (FF Energie)
16	Foundation of LA 21 forum on development policy issues (FF Eine Welt)
17	Foundation of LA 21 forum on mobility issues (FF Verkehr)
18	Establishment of an environmental advisory board in the city administration of Augsburg
19	Start of a two-parted education series for a future-oriented Augsburg (Zukunftsfähiges Augsburg) by the LA 21
20	Establishment of an environmental competence center (KUMAS)
21	Dedication of a permanent position to the LA 21 in the city administration
22	Foundation of LA 21 forum for a sustainable urban development (FF Nachhaltige Stadtentwicklung)
23	Start of a workshop series for the development of sustainability guidelines for the city of Augsburg (Leitlinien)
24	Foundation of the "Eco-Profit" network
25	Start of a workshop series for the development of sustainability indicators for the city of Augsburg
26	Integration of a forum on poverty and social discrimination issues into the LA 21 (FF Armutskonferenz)
27	Foundation of LA 21 forum for a family friendly Augsburg (FF Familienfreundlichkeit)

28	Foundation of LA 21 forum to implement the Eco-Profit program in Augsburg (FF Ökoprofit)
29	Foundation of LA 21 forum for a partnership between generations (FF Partnerschaft der Generationen)
30	Establishment of annual Bavarian waste and disposal days by KUMAS
31	Establishment of applied environmental research center at the University of Augsburg (WZU)
32	Establishment of the center for material and environmental research at the University of Augsburg (AMU)
33	Foundation of LA 21 forum to foster civic commitment (FF Bürgerstiftung)
34	Foundation of an annual exhibition on renewable energies (Renexpo) in Augsburg
35	Establishment of an expert commission on CO2 reduction by the city of Augsburg
36	Establishment a working group on international issues within the KUMAS network, which meets twice a year
37	Establishment of a working group on project management within the KUMAS network, which meets twice a year
38	Establishment of a working group on environmental education within the KUMAS network, which meets twice a year
39	Establishment of a working group on environmental medicine within the KUMAS network, which meets twice a year
40	Start of a three-parted workshop series for the definition of concrete sustainability goals for the city of Augsburg
41	Establishment of a municipal climate protection office
42	Establishment of a working group on climate protection by the city of Augsburg and the local public utility company
43	Foundation of LA 21 forum on nature conservation and environmental education (FF Nanu! e.V.)
44	Establishment of annual Bavarian water protection days by KUMAS
45	Foundation of the Bavarian state environmental cluster in Augsburg
46	Foundation of LA 21 forum for sustainable education (FF Bildung und Nachhaltigkeit)
47	Foundation of a LA 21 forum for the implementation of an online guide for sustainable consumption (Lifeguide)
48	Establishment of a study program on global change ecology at the University of Augsburg
49	Foundation of a network for energy efficient modernization of buildings (e+haus) by the municipal climate protection department

50	Foundation of a consulting network of engineers and architects on the topic of energy efficiency by the municipal department for climate protection
51	Foundation of LA 21 forum on sustainability in the financial sector (FF Fließendes Geld)
52	Establishment of a study program on environment and process engineering at the University of Applied Science Augsburg
53	Establishment of annual regional development conferences (Regionale Chancenkonzferenz)
54	Increase in personnel of the municipal LA 21 department
55	Foundation of a corporate network in the local chamber of crafts (HWK) and start of climate protection program
56	Establishment of several regional climate conferences for the preparation of a regional climate protection plan by the three regional districts in cooperation with various regional actors
57	Establishment of an energy consultant pool (EnergieManagerPool) by the IHK for the implementation of a national support program for energy efficiency in SMEs
58	Establishment of a study program on energy efficient building at the University of Applied Science Augsburg
59	Establishment of annual Bavarian emission protection days by KUMAS
60	Establishment of a regional (economic) development agency (Regio Augsburg Wirtschaft GmbH)
61	Establishment of a research center for material resource management at the University of Augsburg
62	Establishment of a new position for a cycling official for the city of Augsburg
63	Foundation of LA 21 forum to promote the usage of recycling paper (FF Papierwende)
64	Foundation of LA 21 forum on climate protection issues (FF Prima Klima)
65	Establishment of a new chair for resource strategies at the University of Augsburg
66	Foundation of a working group with the aim to foster sustainability at the University of Augsburg
67	Establishment of a steering committee for a skills initiative for the Augsburg region by the Regio Augsburg Wirtschaft GmbH
68	Foundation of LA 21 forum on fair trade issues (FF Fairtrade Stadt)
69	Foundation of LA 21 forum to strengthen regional economic activities (FF Unser Land)
70	Establishment of a study program on economic engineering focused on resource management at the University of Augsburg
71	Foundation of LA 21 forum for social and ecological sustainability (FF ThinkCamp)

72	Foundation of LA 21 forum on urban gardening (FF Urbane Gärten)
73	Foundation of a strategic alliance for demographic management, innovative capability and resource efficiency (ADMIRE) funded by the German federal government by the University of Bayreuth, the Faktor10 research institute and the Regio Augsburg Wirtschaft GmbH
74	Establishment of a study program on climate and environmental sciences at the University of Augsburg
75	Establishment of a regional energy agency by several regional organizations
76	Foundation of a network with the aim to foster corporate responsibility in the Augsburg region (Augsburger Schule)
77	Foundation of the LA 21 working group on corporate responsibility (FF Unternehmerische Verantwortung)
78	Establishment of event series about the local energy transition by the municipal climate protection department taking place at least every six months
79	Foundation of LA 21 forum to promote the consumption of organic, regional and seasonal food in Augsburg (FF Biostadt)
80	Foundation of LA 21 forum on refuge and asylum issues (FF Flucht und Asyl)
81	Foundation of LA 21 forum for a self-determined life for girls and women (FF Terre des Femmes)
82	Establishment of an advisory board for the Augsburg innovation park on resource efficiency
83	Start of workshops for the development of a sustainable urban development concept by the LA 21 forum for a sustainable urban development (Stadtwerkstatt)
84	Establishment of a first sustainability day for the regional economy (Fokus N) by the LA 21 forum on corporate responsibility
85	Establishment of the Augsburg innovation park GmbH
86	Relocation of the annual Bavarian climate weeks to Augsburg
87	Establishment of a lecture series on climate protection in Bavaria by the state department for the environment (LfU) and the university of Augsburg
88	Foundation of LA 21 forum to implement the transition town model in Augsburg (FF Transition Town)
89	Foundation of a network to develop an IT based assistant for elderly people by several regional non-profit organizations, research facilities and private companies (ASYST)
90	Relocation of the municipal LA 21 department from the climate department to a new staff position for environment, sustainability and integration and increase in personnel
91	Start of workshops for the further development of the sustainability goals for the city of Augsburg

92	Foundation of LA 21 forum on education issues (FF Bildungsbündnis)
93	Organization of a discussion series to foster environmental competence in regional companies by KUMAS and the local unites of the Federation of German Industries (VDI and VDE)
94	Foundation of LA 21 forum for a sustainable redevelopment of a local shopping mall (FF Schwabencenter)
95	Foundation of LA 21 forum on animal rights (FF Tierrechte)
96	Increase in personnel of the municipal LA 21 office

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