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Image and implementation of sustainable urban development: Showcase projects and other projects in Freiburg, Heidelberg and Tübingen, Germany

Image und Umsetzung nachhaltiger Stadtentwicklung – Vorzeigeprojekte und andere Vorhaben in Freiburg, Heidelberg und Tübingen

Abstract: The principles of sustainability are currently applied in Germany and many other countries as important guidelines for urban development. However, different forms of understanding regarding sustainable development and different approaches concerning its implementation can be found in various spatial contexts. This paper focuses on Freiburg, Heidelberg and Tübingen, three cities in southwestern Germany. These cities produce different images due to ambitious urban development plans which are based on the three pillars of ecological, economic and social sustainability in different ways. Numerous similarities between these three cities notwithstanding, they highlight different aspects of sustainable urban development and emphasise them via particularly widespread awareness of 'showcase projects'. For Freiburg, this includes Vauban and Rieselfeld, for Heidelberg Bahnstadt, and for Tübingen Französisches Viertel and Loretto. The central questions in this paper are therefore: How do images and the implementation of sustainability differ with regard to the three pillars of sustainability? How can differences and similarities with regard to the three pillars of sustainability be explained and what consequences can be drawn for future studies in sustainable urban development? Following a classification of research perspectives on sustainable urban development, distinguishing between more practically oriented aspects, on the one hand, and theory-based critical considerations, on the other, this article examines showcase projects from the three selected cities on the basis of planning documents, websites, local newspapers and academic literature. Moreover, further projects are taken into consideration. The paper concludes with general observations and discussions concerning the image and implementation of sustainable urban development.

Keywords: Sustainable urban development, conversion areas, image, Freiburg, Heidelberg, Tübingen

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Zusammenfassung: Die Prinzipien der Nachhaltigkeit gelten gegenwärtig in Deutschland wie auch in zahlreichen anderen Staaten als wichtige Leitlinien für die Stadtentwicklung. Dabei lassen sich jedoch in verschiedenen räumlichen Kontexten unterschiedliche Formen des Verständnisses von nachhaltiger Entwicklung und unterschiedliche Ansätze für deren Verwirklichung finden. Im Fokus dieses Beitrags stehen mit Freiburg, Heidelberg und Tübingen drei südwestdeutsche Städte, die mit ambitionierten Planungsvorhaben der Stadtentwicklung unterschiedliche Images konstruieren, welche in den drei Bereichen der (ökologischen, ökonomischen und sozialen) Nachhaltigkeit unterschiedlich verankert sind. Ungeachtet zahlreicher Ähnlichkeiten zwischen diesen drei Städten werden von ihnen unterschiedliche Aspekte einer nachhaltigen Stadtentwicklung besonders hervorgehoben und durch vielfach besonders wahrgenommene ‚Vorzeigeprojekte' betont. Dazu zählen in Freiburg Vauban und Rieselfeld, in Heidelberg die Bahnstadt und in Tübingen das Französische Viertel und das Loretto Quartier. Die zentrale Fragestellung dieses Beitrags lautet daher: Wie unterscheiden sich das Image und die Verwirklichung von nachhaltiger Entwicklung im Hinblick auf die drei verschiedenen Bereiche der Nachhaltigkeit? Wie lassen sich Unterschiede und Ähnlichkeiten unter Berücksichtigung der drei Bereiche der Nachhaltigkeit erklären und welche Rückschlüsse können daraus für künftige Untersuchungen von nachhaltiger Stadtentwicklung gezogen werden? Nach einer Einordnung von Forschungsperspektiven auf nachhaltige Stadtentwicklung, bei der unterschieden wird zwischen einerseits eher praxisbezogenen Aspekten und andererseits theoriegeleitet kritisch-hinterfragenden Betrachtungen wurden für diesen Beitrag auf der Grundlage von Planungsdokumenten, Webseiten, Lokalzeitungen und wissenschaftlicher Literatur einige Vorzeigeprojekte aus den drei ausgewählten Städten untersucht. Zusätzlich werden auch andere Projekte in die Untersuchung einbezogen. Der Beitrag endet mit allgemeiner gefassten Beobachtungen und Diskussionen bezüglich Image und Umsetzung nachhaltiger Stadtentwicklung.

Schlüsselwörter: Nachhaltige Stadtentwicklung, Konversionsflächen, Image, Freiburg, Heidelberg, Tübingen

1 Introduction

[S]ustainable development of human settlements combines economic development, social development and environmental protection, with full respect for all human rights and fundamental freedoms, including the right to development (UN 1996: 1).

Building on the Brundtland Report and the 1992 UNCED World Summit in Rio de Janeiro, the basic principle of sustainable development has increasingly influenced the objectives of spatial development in the years and decades that have followed. This trend has been supported and reinforced by the Aalborg Charter (European Conference on Sustainable Cities and Towns 1994) and the Local Agenda 21 (UN 1992; cf. Hermanns 2000). The concept of sustainability has been defined in numerous ways. However, the Brundtland Report (WCED 1987: 37) sketches out the basic idea of this concept: sustainability enables the needs of people to be satisfied today, without destroying life-sustaining ecosystems for future generations. Therefore, sustainability is a dynamic process and not a static condition.

Global discussions about sustainable development have been carried on well beyond the 1990s and the importance of sustainability has been emphasised in current agreements. With the New Urban Agenda (UN 2016), the UN member states presented a document that deals with the development, functioning and sustainable design of cities – and this happened in the context of a strongly urbanised world with the prospect of a persistent increase in planetary urbanisation. The New Urban Agenda is meant to serve as a toolbox for decision-makers at the municipal level. It is a guideline with the aim of encouraging political actors in their commitment to sustainable and integrated urban development. The New Urban Agenda is also an essential element for the implementation of the UN Sustainable Development Goals, in particular the SDG 11: Make cities and human settlements inclusive, safe, resilient, and sustainable (UN 2015b). By promoting energy-efficient and renewable energy-boosting urban development, the New Urban Agenda has contributed to the implementation of the decisions of the UN Climate Change Conference COP 21 held in Paris (UN 2015a).

Putting urban development into practice means breaking down and implementing the abstract objectives for improving and securing living conditions in context-specific real-world projects at the municipal scale (Weiland 2010; Yigitcanlar/Teriman 2015). In the academic literature, two broader perspectives on sustainable urban development can be identified (Ahvenniemi/Huovila/Pinto-Seppä et al. 2017; Bibri/Krogstie 2017): a first

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perspective that is intended to prepare and accompany planning (referred to as planning-oriented approaches), on the one hand, and a second perspective that seeks to question planning and discourse, on the other (referred to as planning-critical approaches). The planning-oriented perspective focuses on application and best-practice projects to improve structures and processes within and resulting from planning processes to foster sustainable development (Milbert 2013; Portney 2013; Roseland/Spiliotopoulou 2016). The second perspective mainly focuses on critically observing achievements, problems and narratives that go along with sustainable urban development projects (Freytag/Gössling/Mössner 2014; Mössner/Krueger 2018; Schulz/Krueger 2018).

The coexistence of these two perspectives on sustainable urban development forms the starting point of this paper. The aim of our paper is to understand planning processes by taking into account these two perspectives. To do this, we examine several sustainable urban development projects in the light of both perspectives. We critically discuss the narratives and images connected with sustainable urban development projects, and we reflect on the application of measures related to the three pillars of sustainability (ecological, economic and social sustainability) (Hassan/Lee 2015; Huang/Wu/Yan 2015) in urban development projects.

The focus of our paper is placed on three cities in southwestern Germany, which can be associated with distinct images of urban development that are more or less related to the three pillars of sustainability. However, the implementation of measures to invigorate sustainability in local urban development projects in these three cities does not vary much, but rather shows similarities. In our analysis, we take a closer look at the German cities of Freiburg, Heidelberg and Tübingen. These three cities are university cities located in the state of Baden-Württemberg (southwestern Germany). They possess similar basic parameters with regard to economic development, population growth and availability of development land (e.g. due to conversion areas).

The central questions to be addressed in this paper are: How do the images and the implementation of sustainable urban development vary with regard to taking up the three pillars of sustainability? How can differences and similarities in the extent to which the three pillars of sustainability are considered be explained, and what consequences can be drawn for future studies in sustainable urban development? The main aim of this paper is to better understand sustainable urban development projects within the

often contradictory contexts of applying measures to strengthen sustainability and developing a narrative of distinct unique qualities to be associated with a particular city.

Our paper is organised in the following way. In Section 2, we outline two main perspectives on sustainable urban development, distinguishing between planning-oriented approaches and planning-critical approaches. Section 3 introduces and explains the selection of Freiburg, Heidelberg and Tübingen, the three German cities that form the focus of this paper. Moreover, we explain in Section 3 how we use the three pillars of sustainability as a framework to identify and analyse images of urban development, showcase projects and other projects of urban development in the selected cities. Sections 4 and 5 provide a discussion of our results with regard to the question of how the three pillars of sustainability are emphasised in the images of urban development, in showcase projects and in other projects of urban development in the three selected cities. Section 4 focuses on the image and on showcase projects, while Section 5 is dedicated to other projects in the selected cities. Section 6 summarises our results and Section 7 provides an outlook on how the results can inform and support future studies in sustainable urban development.

2 Two perspectives on sustainable urban development

The academic literature reveals a number of disciplines involved with sustainable urban development (Ahvenniemi/Huovila/Pinto-Seppä et al. 2017; Bibri/Krogstie 2017). As discussed above, we suggest making a distinction between two main research perspectives: first, a perspective that is intended to prepare and accompany planning (referred to as planning-oriented approaches) and, second, a perspective that seeks to question planning and discourse (referred to as planning-critical approaches).

Planning-oriented approaches that aim to contribute to sustainable development and support its implementation require close cooperation with practitioners (e.g. Jepson/Edwards 2010; Roseland 2012; Portney 2013; Roseland/Spiliotopoulou 2016; Miller/de Roo 2016). In the case of this research perspective, the focus is placed on the creation of suitable indicators (Mascarenhas/Coelho/Subtil et al. 2010; Dempsey/Bramley/Power et al. 2011; McManus 2012; Milbert 2013) and the analysis of good

or poor examples and related implications for urban planning processes (Drilling/Schnur 2012; Nijkamp/Perrels 2014; Yigitcanlar/Teriman 2015; Wagner/Mager/Schmidt et al. 2019).

In Germany, implementation-oriented sustainable urban development is informed and analysed by studies carried out by the Federal Institute for Research on Building, Urban Affairs and Spatial Development (BBSR). The BBSR examines sustainable urban development within the context of its capacity as an academic consultant. Its goal is to provide suggestions and impulses for all of the actors involved in urban development. The focus is placed explicitly on the provision of an informational basis for urban policies through the observation and documentation of best-practice examples (Milbert 2011; Breuer/Schmell 2012; Zarth/Jakubowski 2012; Breuer 2013; Hoymann 2013).

Planning-critical approaches that examine sustainable urban development from a critical perspective cover a wide range of normative political topics. They aim to question what is widely referred to as sustainability in urban development (e.g. While/Jonas/Gibbs 2004; Krueger/Gibbs 2007; Schulz/Krueger 2018). Swyngedouw (2007) takes a rather provocative position when he asks whether anyone is against sustainable development. He criticises the fact that sustainability is predominantly viewed as being essentially good and that there is not much space for questioning sustainability in the prevailing (post-political) context. According to Swyngedouw (2007), sustainable development becomes a meaningless term if it appears in a multitude of different and sometimes even contradictory forms and formats around the world. Swyngedouw (2007) also criticises that the term "sustainable development" has been frequently used to distract from the (re-)production of social inequalities and to disguise and foster neoliberal urban development.

Krueger and Gibbs (2007) take a critical perspective when they characterise the concept of sustainable urban development as a paradox. They point out that this concept is part and parcel of neoliberal urban development practices, and put forward the argument that anything that is conducted in the name of sustainability should be critically examined. Also from a planning-critical stance, While, Jonas and Gibbs (2004) have presented the concept of the "sustainability fix". They focus on existing conflicts between the three pillars of sustainability and explain how sustainable urban development projects primarily serve to place investments and to make a profit without taking seriously the social and ecological aspects of sustainability.

Planning-critical approaches can take up the concept of the sustainability fix to criticise the use of the term "sustainable urban development" as an image and a narrative that is represented and mobilised in the wider context of urban branding and urban policies (Long 2016). Nevertheless, the urban image that is created need not necessarily correspond to what is actually implemented and realised in the area of sustainable urban development. This paper examines possible discrepancies between the image and the implementation of sustainable urban development, using the examples of Freiburg, Heidelberg and Tübingen. All three cities feature districts that have been picked up both in planning-oriented approaches as best-practice examples (e.g. Buehler/Pucher 2011) and as suitable for analysis from a planning-critical perspective (Freytag/Gössling/Mössner 2014).

All in all, not only critical or application-oriented perspectives (differentiating between *how* sustainability is discussed) can be considered, but also a varying understanding of *what* topics should be covered by the term sustainability. Even if there is global consensus on the need for sustainable development, there are different opinions about what should be part of this concept. In general, sustainability can be conceptualised as encompassing and combining the following "three pillars" or "three dimensions": ecology, economy and society (Hassan/Lee 2015; Huang/Wu/Yan 2015). However, the relationship between the three dimensions is contested and is the subject of on-going discussions. This debate includes engagement with the concept of "weak sustainability" and the concept of "strong sustainability" (Huang/Wu/Yan 2015; Ott 2016). The concept of weak sustainability demands that ecological, economic and social needs are considered as equally important. In contrast to this, the concept of strong sustainability requires the overall priority of ecological needs (Döring 2004). In spatial planning, the concept of strong sustainability is particularly relevant for landscape planning as sectoral planning (Ott 2015; Riedel/Jedicke/Reinke 2016). Urban, regional and state planning as comprehensive spatial planning at different levels of scale more frequently follows the concept of weak sustainability and attempts to advocate ecological, economic and social needs on equal grounds (Kühnau 2016). In this paper, the three pillars of sustainability are understood to be of equal importance in the following analysis of urban development projects and urban images. We conceptualise sustainable urban development as an on-going contested and context-specific process to be empirically observed and analysed

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Table 1: Characteristics of the three cities considered

Characteristics	Tübingen	Freiburg	Heidelberg
Population (31.12.2015)	87,464 inhabitants	226,393 inhabitants	156,267 inhabitants
City area	153 km^2	111 km^2	109 km^2
Population development (2005-2015)	+ 4.8%	+ 4.8%	+ 9.3%
City founding	1191	1120	approximately 1220
University founding	1477	1457	1386
Students (university only)	27,152 (2015)	26,467 (2014)	30,898 (2014)
Tourism (overnight stays in 2015)	238,500	1,448,500	1,388,800

Source: Statistisches Landesamt Baden-Württemberg

both in terms of planned and realised urban projects and in terms of urban images and related narratives.

3 Selected cities and methodology

In the following section we introduce the selected cities and present the methodology of the empirical analysis.

3.1 Selected cities

Our selection of cities is based on three-step logic. Firstly, we decided that the cities had to have land available where urban development projects could be realised. Secondly, the cities had to be currently experiencing a phase of growth that made it necessary to implement urban development projects. Thirdly, the cities had to have a focus on sustainable development in planning and politics. Cities that met all three criteria were identified in Germany, in the southwestern part of the country.

After the need for sustainable development was emphasised in 1992 in Rio, this need was included in the amendment of German Planning Acts in 1998, specifically in the Federal Building Code (§1 Abs. 5 BauGB) and in the Federal Spatial Planning Act (§1 Abs. 2 ROG). During the 1990s – before sustainable development became mandatory by law – several pioneer cities planned urban development projects focusing on sustainability (e.g. Wekel 2010). This testing of suitable measures to foster sustainable development was facilitated by two parallel developments in Germany in the 1990s: the new availability of brownfields in some prospering cities and the increasing acknowledgement of sustainability as

an important aim (starting in 1992, when sustainability loomed into focus on the Rio Conference and in 1998, when sustainability was included in the German Planning Acts).

After the end of the Cold War and the withdrawal of Allied troops in the early 1990s, new areas could be developed on former military sites in German cities. This resulted in an option to base new urban districts on the principles of sustainability. However, in the 2000s it could be observed that the topics of globalisation and metropolitan regions gained increasing importance, and economic issues moved back into the focus of urban development initiatives (Stakelbeck/Weber 2010; Growe 2012a; Growe 2016).

Nevertheless, sustainable urban development was promoted and implemented in the course of the rehabilitation of former military or industrial sites in prospering cities. The increasing importance of sustainability in urban planning and urban policies has been supported in Local Agenda 21 initiatives and in a strengthening of environmental politics and the Green party in several cities in Germany during the past few years. Until recently, Freiburg had a Green party city mayor (Dieter Salomon between 2002 and 2018), Heidelberg has a city mayor with a strong environmental background (Eckart Würzner since 2006), and Tübingen has a Green party city mayor (Boris Palmer since 2007). This rising importance of sustainability and environmental issues has been taken up and mirrored in numerous municipal initiatives and documents, such as annual sustainability reports, for example. In Heidelberg and in many other cities, the guidelines and goals for sustainable policies are documented in the urban development plan.

In our selection, we have taken into account cities that have already achieved a certain level of international
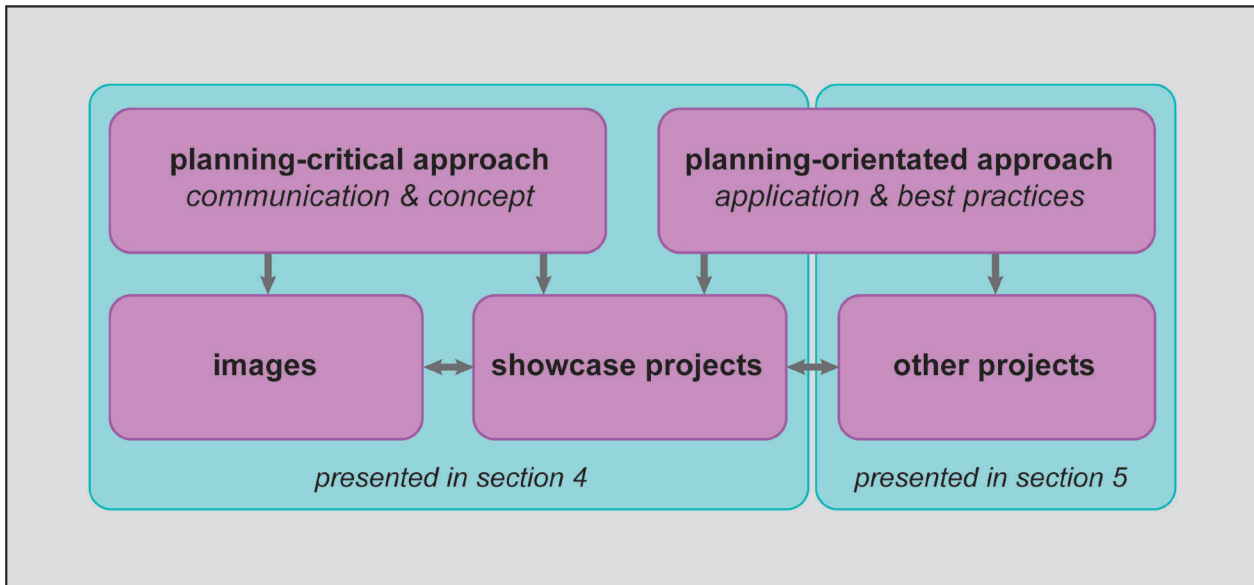
Figure 1: Conceptual linkages between the analysed elements: images, showcase projects and other projects

visibility in the area of sustainable urban development. Furthermore, we considered cities that are characterised by current population growth, and in which the university and tourism play an important role. In general, the selected cities are shaped to some extent by knowledge-based activities and services (Growe 2012b).

Finally, we decided that the selected cities should be more or less similar in terms of their population and located within the same state in order to limit potential differences with regard to the overarching political framework. All these criteria are met by the cities of Freiburg, Heidelberg and Tübingen (see Table 1).

All three of the selected cities were founded in the Middle Ages, in the 12th or early 13th century. They already had a university by the end of the Middle Ages, and they served as important markets and commercial centres. In the age of industrialisation, these three cities experienced less radical change and expansion than was typical for other cities and metropolises at the end of the 19th century and in the 20th century. At present, Tübingen covers the largest area of the three cities, while Freiburg has the most inhabitants and tourist overnight stays, and Heidelberg displays the strongest increase in population over the past ten years. The three selected cities show similar patterns in terms of their structure and development and they can easily be compared with each other (see Table 1).

3.2 Empirical-methodological approach

In our analysis of the selected cities, our aim is to identify to what extent the three pillars of sustainability are considered in urban images, showcase projects and other projects of sustainable urban development (see Figure 1).

Our analysis is organised in the following two steps. Firstly, we focus on the pillars of sustainability with respect to communication by and about the cities, and we identify the image of the cities as related to sustainable development. Part of this step is a focus on showcase projects, as these projects play a crucial role in shaping the image of the selected cities. Secondly, we focus on urban development projects beyond the showcase projects in these cities and analyse the measures that have been taken in order to put sustainable development into practice in the urban development projects considered here.

The main aim of the first step of our analysis is to identify the image of the cities with regard to sustainability. To do so, we analyse communication about urban development and sustainability in the three selected cities. Communication by the city administration (taking into account information on the city's website or in planning brochures) is included, as well as communication about urban development projects (taking into account information in local newspapers and the use of urban development projects of the respective city as best practice).
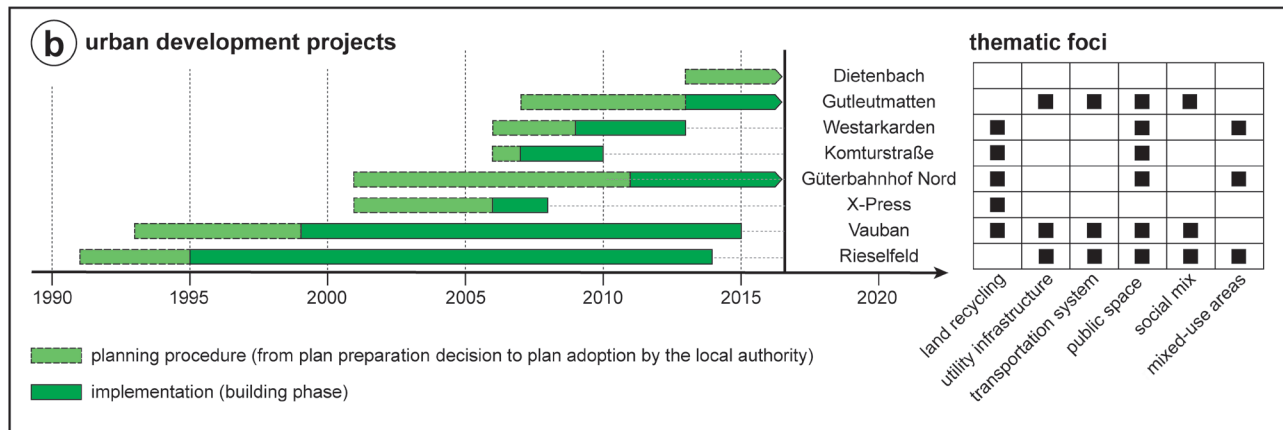
b urban development projects

thematic foci

Project	land recycling	utility infrastructure	transportation system	public space	social mix	mixed-use areas
Dietenbach						
Gutleutmatten		■	■	■	■	
Westarkarden	■			■		■
Komturstraße	■			■		
Güterbahnhof Nord	■			■		■
X-Press	■					
Vauban	■	■	■	■	■	
Rieselfeld		■	■	■	■	■

(Timeline axis: 1990, 1995, 2000, 2005, 2010, 2015, 2020)

planning procedure (from plan preparation decision to plan adoption by the local authority)

implementation (building phase)

Figure 2: Analysing the three pillars of sustainability for an urban development project

Table 2: Characteristic criteria for measures of urban development related to the three pillars of sustainability

Pillar of ecological sustainability	land recycling
	utility infrastructure
	transportation system
Pillar of economic sustainability	mixed-use areas
Pillar of social sustainability	public space
	social mix

These sources and materials have been searched for references to one or more of the three pillars of sustainability (ecological, economic and social). Building on this first step of the empirical analysis which focuses on the images of the selected cities, a second step of analysis was carried out to examine how measures to support sustainable urban development have been implemented in the selected cities. In this step, the focus is not only on the prominent showcase projects, but also on the implementation of sustainable planning in several urban development projects that have been realised in the three cities since the 1990s.

To analyse the implementation of measures to support sustainability in urban development projects, we consider criteria for best-practice projects (Breuer 2013; Milbert 2013). The considered criteria encompass the urban structure and the planning process. With regard to urban structure, we follow Breuer (2013) who systematises indicators according to the following aspects: resource efficiency and emission reduction in support of the ecological pillar, social diversity and local supply to support the pillar of social sustainability, and local value creation and employment for the economic pillar of sustainability (see Table 2). Beyond the individual measures, the urban structure of sustainable urban development projects has the aim of allowing a variety and mix of functions, social structures and designs. Thus, our analysis focuses on the degree to which the urban development projects emphasise all three pillars of sustainability. Based on the criteria suggested by Breuer (2013), we deduced characteristic criteria for the three pillars of sustainability that are summarised in Table 2.

In our analysis, we assessed documents and plans relating to various urban development projects in the selected cities. In particular, we searched for information that would tell us if and how measures to support sustainability were supported through the planning and realisation of transport facilities and the use of public space, for example.

Except for the criteria of "land recycling", the relevant measures were only analysed in the case of urban development projects that had already completed their planning phase. This allowed us to ground our analysis on coordinated plans. Only the criterion of "land recycling" was considered for all development projects, since the location of the projects was already known prior to the completion of the planning phase. As sources of information about the concepts of the urban development projects, we used descriptions of urban development projects on websites and print media that were published by the municipalities, as well as the explanatory texts complementing the construction plans for the urban development projects. On the right, Figure 2 gives an example of how different measures can be evaluated with regard to urban development projects. If the sources and documents revealed an emphasis on specific measures to support sustainability, the respective box was marked with a black square. If no evidence for specific measures to support sustainability could be found, the respective box was left empty.

The left part of Figure 2. shows the temporal dimension of the urban development projects. To display

the temporal dimension of the projects, we distinguish between two phases: the planning procedure and the implementation phase. The planning procedure includes initiation of the planning procedure, public participation, public display, adoption and approval of the plan. Notwithstanding that the respective urban development projects were certainly discussed in the cities prior to the initiation of the planning procedure, the starting point of the formal planning procedure can be pinpointed for all urban development projects in all selected cities. The planning procedure is followed by the implementation phase. In the implementation phase, the ideas and goals of the planning procedure are physically implemented through material building processes. The result of this phase is the new urban structure.

4 Guidelines for sustainable urban development: Image and showcase projects in the selected cities

The guidelines for urban development in Tübingen, Freiburg and Heidelberg are presented in the following sections. Although all three cities can be associated with the concept of the "compact city" and show clear dedication to sustainable urban development, it is possible to identify specific sustainability-related images for each of the three cities. For each of these urban images, we can identify supporting showcase projects in each of the selected cities.

4.1 Tübingen

Tübingen has followed a path of sustainable urban development since the 1990s. This path is marked by a particular focus on inner development and revitalisation. This involves realising urbanity, compactness and diversity in urban development. The focal point of the relevant measures is mainly directed at the conversion of areas that were formerly used by the military in the southern part of the city. In Tübingen particular attention has been paid to the social dimension of sustainability (Steffen 2001).

The urban development projects, which can be seen as showcase projects, and have received wide consideration among experts, are Französisches Viertel and Loretto. Among the eight urban development

projects that we identified in Tübingen, these two are the most prominent. Both projects were planned at the beginning of the 1990s on military conversion areas. During the conversion of these areas in the southern part of Tübingen, which were previously used by the French armed forces, the main objective was to realise a social mix and to integrate various functions, especially the integration of residential and commercial spaces (Pätz 2017; Feldtkeller 2018). Französisches Viertel can be qualified as being urban, compact and diverse. It is widely recognised as a successful realisation of planning-oriented goals (Feldtkeller 1999; Feldtkeller/ Scharf 2015). The great success of Französisches Viertel as a sustainable urban development project has been confirmed by several awards, not only at the state level of Baden-Württemberg, but also at national and international levels (including the European Urban Development Award in the category "Conversion and Renewal" 2002 and the National Prize for Integrated Urban Development and Building Culture 2009).

In Tübingen the urban image related to the implementation of sustainable urban development has a clear focus on the social dimension of sustainability. This corresponds to the guidelines for urban development (Stadt Tübingen 2003) which were approved in 2003 by the municipal council and which underline the "social dimension" as the most important aspect of sustainability. The priority of the social dimension emerges very clearly in the showcase projects of Französisches Viertel and Loretto. This is expressed both in the planning processes and in the focus on a social and functional mix within the projects (Feldtkeller 1999; Feldtkeller/Scharf 2015).

4.2 Freiburg

In the past few years, the city of Freiburg has been positioned very successfully as a sustainable city or "green city", and it has also been widely acknowledged as such in the international arena (Buehler/Pucher 2011; Medearis/Daseking 2012). This has been supported by intensive marketing activities, for example by the city of Freiburg being represented with its own pavilion at the World EXPO 2010 in Shanghai. The city of Freiburg has won several environmental and sustainability-related prizes and awards that have added to its success and visibility as a forerunner. The role of Freiburg as a pioneer in sustainable urban development has not only been recognised and confirmed by planners, architects and politicians, but it has also been praised and reinforced

in numerous academic articles (some of which are cited below) and also in media that reach a wider public.

Primarily, the prevalent image of Freiburg as a "green city" has been supported by technical ecological innovations (FWTM 2016). Fastenrath (2015: 17 ff.) identifies and reconstructs the "development of a 'green' construction path" in Freiburg. He emphasises that the energy efficiency standards for new buildings, which were set up in Freiburg in 1992, were repeatedly amended and reinforced in the following years, thus making a substantial political contribution to energy innovations. In particular, the showcase projects of Vauban (including Solarsiedlung) and Rieselfeld were planned and built according to sustainable urban development guidelines.

Rieselfeld was planned at the beginning of the 1990s. In spite of its location on greenfields, a guiding idea and objective of this urban development project was to create urbanity through a social and functional mix (Humpert 1997; Schelkes/Schüle 1997; Schelkes 2001). Drawing upon the planning experience from Rieselfeld, the urban development project of Vauban was used to enhance the existing concepts for socially oriented planning and to complement them with advancements in ecologically oriented planning (Fabian 2008). In the case of Vauban, a priority was to integrate sustainable supply systems and service facilities in terms of waste removal, energy supply (using solar energy and low-energy buildings) and water management (providing rainwater infiltration). The ecologically sustainable transport concept in Vauban is particularly well-known and has been praised as an important step on the way to creating car-free urban neighbourhoods (Stadt Freiburg 2006; Stadt Freiburg 2016). The high visibility of the Vauban showcase project has substantially contributed to the prevailing image of Freiburg as a city with ecologically oriented urban development (Haag/Köhler 2012; Fastenrath 2015).

Moreover, sustainable urban development is enhanced by the mobility concept and the application of participatory processes in the showcase projects. In Freiburg the social dimension of sustainable development is primarily associated with civic engagement, participation of citizens and their active involvement in sustainable development (including the creation of building communities) and more generally rising environmental awareness (Hamiduddin 2015; Hamiduddin/Daseking 2016). Interestingly, the protest movement that prevented the construction of a nuclear power plant in Wyhl near Freiburg in the 1970s still forms an important part of the collective memory and identity of the activists and politicians who are currently engaged in sustainable development initiatives in Freiburg (Rohracher/Späth 2014; Mössner 2016).

4.3 Heidelberg

In Heidelberg, urban development has experienced particularly strong dynamics during the past few years. Key elements that have contributed to the recent growth include the urban development of Bahnstadt, and the withdrawal of the American armed forces and the closure of the NATO headquarters, which opened up extensive areas for urban conversion measures. The planning and erection of the Bahnstadt urban development project, as well as the initiatives of the International Building Exhibition (IBA 2012-2022) featuring the title "Wissen Schafft Stadt" (Knowledge Makes Cities) have a high degree of visibility and can be considered as showcase projects.

The urban development of Bahnstadt covers a considerable area of more than 100 hectares. The area was formerly used as a goods station, including the adjacent shunting grounds. The project stands for future-oriented urban development that combines leisure, science and research, and commercial activities within an attractive setting of green and open spaces. An architectural highlight of Bahnstadt is the SkyLabs building, which houses laboratory facilities and research institutions and symbolically stands for cooperation between scientific research and the economy (Meusburger 2016). With its focus on scientific communities and the knowledge economy, the Bahnstadt project underlines that the economic dimension of urban sustainable development plays an important role in Heidelberg. As a showcase project, Bahnstadt is planned with accommodation for approximately 5,000 inhabitants and nearly 7,000 new jobs to be created through the development of a scientific cluster at "Campus II" and a technology park, for example (Stadt Heidelberg 2013).

In spite of the prominent role of scientific communities and the knowledge economy (Stadt Heidelberg 2017), other dimensions of sustainability are also considered in the development of the Bahnstadt project (Köhler 2008; Stadt Heidelberg 2014). The ecological dimension of sustainability, for example, is taken up by initiatives in space saving (conversion area), renewable energies (district heating supply based on up to 100% regenerative raw materials) and by planning what is currently the largest passive house estate worldwide. Therefore, this new urban development illustrates a combination of

the economic dimension of sustainability (emphasised in communications about the project), the ecological dimension of sustainability (by planning a passive house estate), and the social dimension (by erecting the barrier-free education, care and community centre "B³").

Another showcase project in Heidelberg is the International Building Exhibition (IBA 2012-2022) featuring the title "Wissen Schafft Stadt". This project focuses on strengthening the linkages between the city and its university. Here, the main idea is that the future development of Heidelberg primarily depends on the knowledge economy, which is to be jointly pushed forward and promoted by the university, the other research institutions and knowledge-based service industries that are located in the city (Gerhard/Hoelscher 2017). The performance and competitiveness of Heidelberg as a location for science and research are underscored by the outstanding position of Heidelberg University as a successful "university of excellence" with a particularly high degree of recognition and visibility at national and international levels (Meusburger/Schuch 2011). It is planned that cooperation between science and the knowledge economy should be supported and enhanced both in the Bahnstadt project and in the former military areas that will be converted in the future. The International Building Exhibition (IBA) serves to facilitate knowledge-based initiatives and cooperation in Heidelberg, for example, through the Real-world Lab "Urban Office – Sustainable Urban Development in the Knowledge Society" (Gerhard/Hoelscher 2017).

5 Implementation of sustainable urban development beyond the showcase projects

An important question concerns how to implement sustainable urban development beyond the showcase projects in the three selected cities. As pointed out in the previous section, each of these cities has a particular focus on one of the different dimensions of sustainable urban development that is illustrated and promoted through relevant showcase projects and corresponding urban images.

However, urban development is not limited to a few prominent showcase projects and related images. Since the 1990s, a number of urban development projects have been planned and implemented in all three selected cities. But to what extent is the image and profile of each

city reflected in its other sustainable urban development projects?

To answer this question, we identified several urban development projects in the three cities, which have been planned and largely completed since the 1990s. Including the showcase projects, we identified and analysed a total of eight urban development projects in Tübingen, eight projects in Freiburg and twelve projects in Heidelberg (see Figures 3, 4 and 5).

5.1 Tübingen

After the planning and implementation of Französisches Viertel and Loretto, the two showcase projects, further urban development projects were taken up in the mid-2000s (Pätz 2017; Figure 3). Similar to both showcase projects, the majority of the six other urban development projects in Tübingen put a strong emphasis on the social dimension of sustainability (Feldtkeller 2018). Nevertheless, in almost all of these projects the desired mix of functions includes the economic dimension of sustainability as well, and in the case of the projects developed on conversion areas the ecological dimension is also taken into account (Feldtkeller 2016).

Another project in Tübingen, the "Alte Weberei", shows that conflicts may occur when putting sustainable urban development into practice. The city's aim of focusing on development within the existing building structure involves several areas that are "difficult" to repurpose and build on. This is the case with the Alte Weberei project, for example, which received the area recycling prize of the state of Baden-Württemberg. On a commercial conversion area and in direct proximity to the Neckar river, a mixed-use project was developed, in which the costs of area recycling and an ambitious flood protection scheme led to very high construction costs. Consequently, in this case the focus on social sustainability and affordability of the housing units was neglected in favour of advancements in ecological sustainability (space saving, reduction of traffic routes, eco-efficient power supply via connection to the district heating network).

5.2 Freiburg

In Freiburg, eight urban development projects were identified for this study, and, as in Tübingen, the prominent showcase projects were planned in the 1990s (Figure 4). Nevertheless, not all of the urban
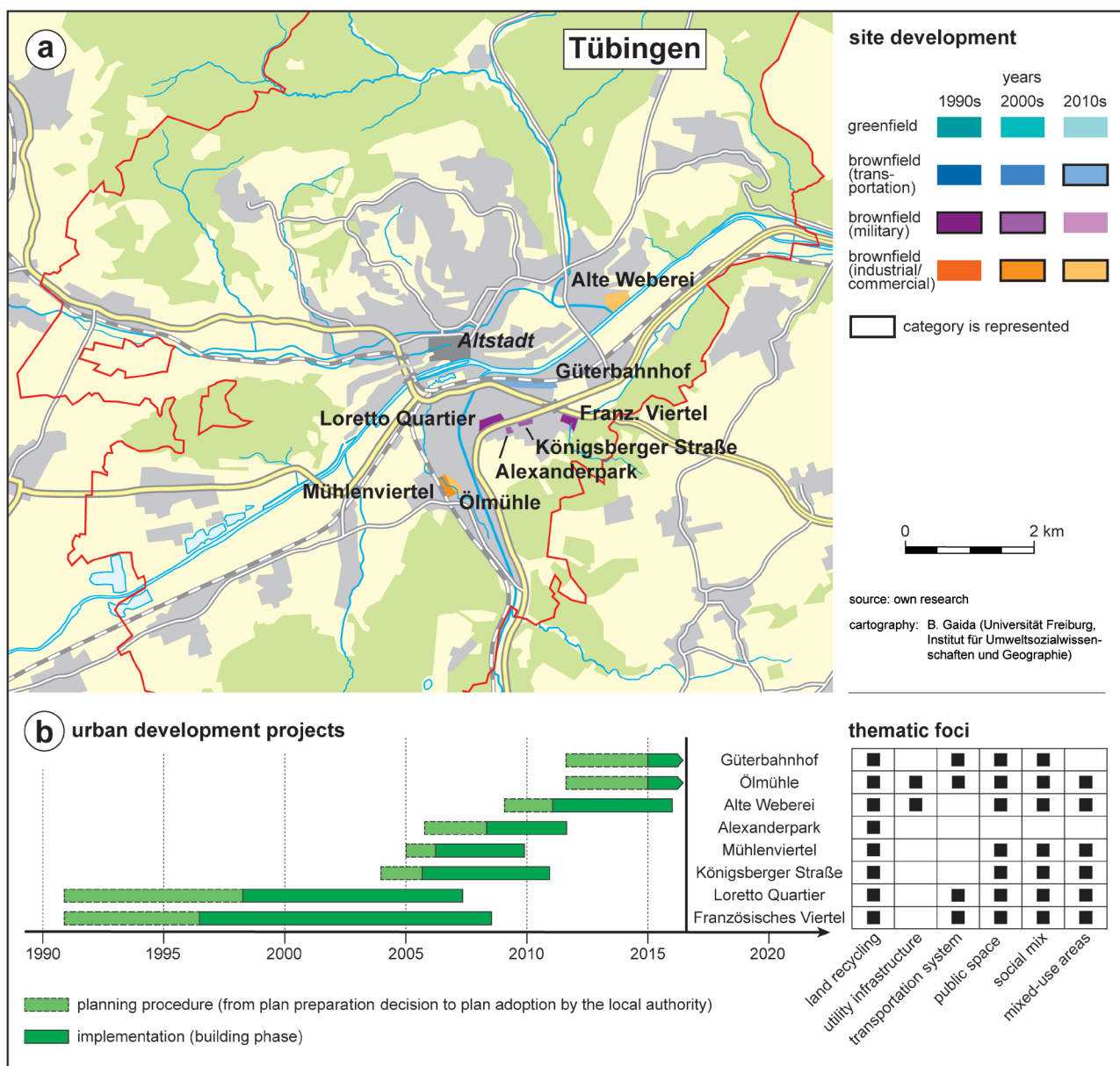
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and other projects in Freiburg, Heidelberg and Tübingen, Germany

Figure 3: Urban development projects in Tübingen

development projects in Freiburg correspond to the goals and the image associated with the Vauban showcase project. For example, Güterbahnhof Nord (the former freight rail station in the north of the city) was planned in the 2000s, and focuses especially on a functional mix (commercial and residential), aiming to create living space for diverse social groups (e.g. students and seniors). Here, in contrast to the Vauban project, no explicitly ecologically oriented mobility concept or supply and disposal facilities were developed. In fact, the motivation was rather to respond to an increasing demand for urban development in the prospering city of Freiburg (Stadt Freiburg 2017).

Another example of an urban development project without an explicitly ecological focus is Gutleutmatten in Freiburg. This project was developed on greenfields (former allotment gardens), and the goal was to create approximately 500 new housing units for 1,200 to 1,300 inhabitants. Here, the focus was on the social dimension of sustainability. According to the marketing concept of Gutleutmatten, roughly half of the housing units were to be subsidised fixed-rent apartments. In the construction plan, the focus on social sustainability was complemented by several elements of ecological sustainability, such as car-sharing parking spaces and rainwater infiltration areas.
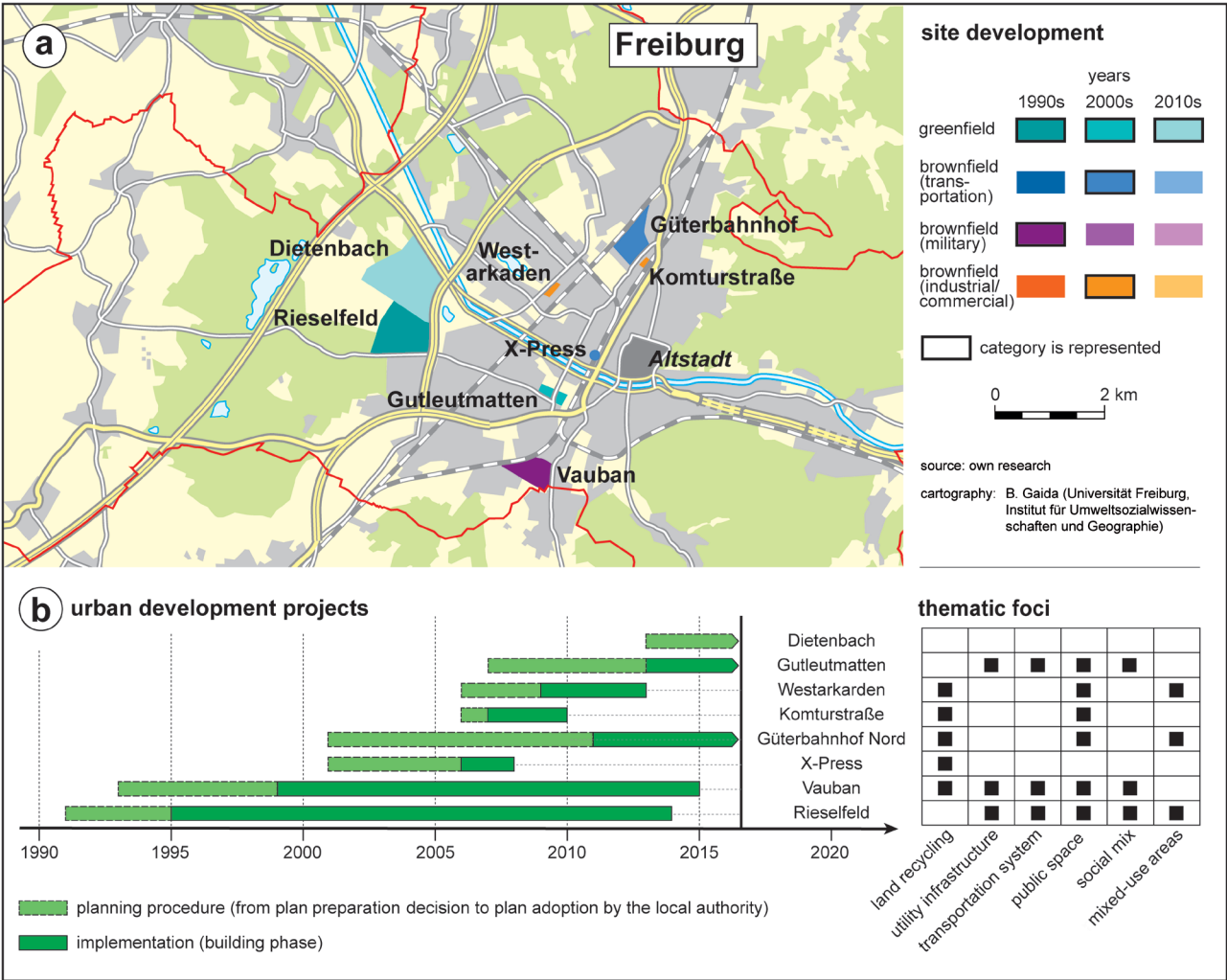
Figure 4: Urban development projects in Freiburg

5.3 Heidelberg

In Heidelberg, twelve urban development projects were identified that have been planned and largely completed since the 1990s (Figure 5). The development started in the early 1990s with residential housing on greenfields at the edge of the city. Moreover, smaller inner-city urban development projects were planned on industrial and commercial conversion areas during the 1990s. The planning of larger conversion areas began only later in the course of the 2000s.

The aim of integrating and combining different dimensions of sustainability is seen very clearly in the first plans for the larger military conversion areas in Heidelberg, which have been opened up for urban development since the 2010s as a result of the withdrawal of the American troops (Stadt Heidelberg 2017). As a showcase project, the International Building Exhibition

(IBA) serves to support and enhance the realisation of several other sustainable urban development projects. The Patrick Henry Village project, for example, is designed to create the "knowledge city of tomorrow". Ecological components are taken into account when enabling and securing the circulation of natural resources (e.g. water cycles) and the preservation of clean air. The Campbell Barracks project and parts of the Mark Twain Village project are intended to be connected by a "green band of knowledge" consisting of knowledge institutions (serving the economic and social dimensions of sustainability) combined with open spaces (serving the ecological dimension of sustainability).

One of the few urban development projects in Heidelberg that were developed without being connected to the knowledge economy is the Quartier am Turm project. This project was developed on a former industrial site with the aim of providing new space for
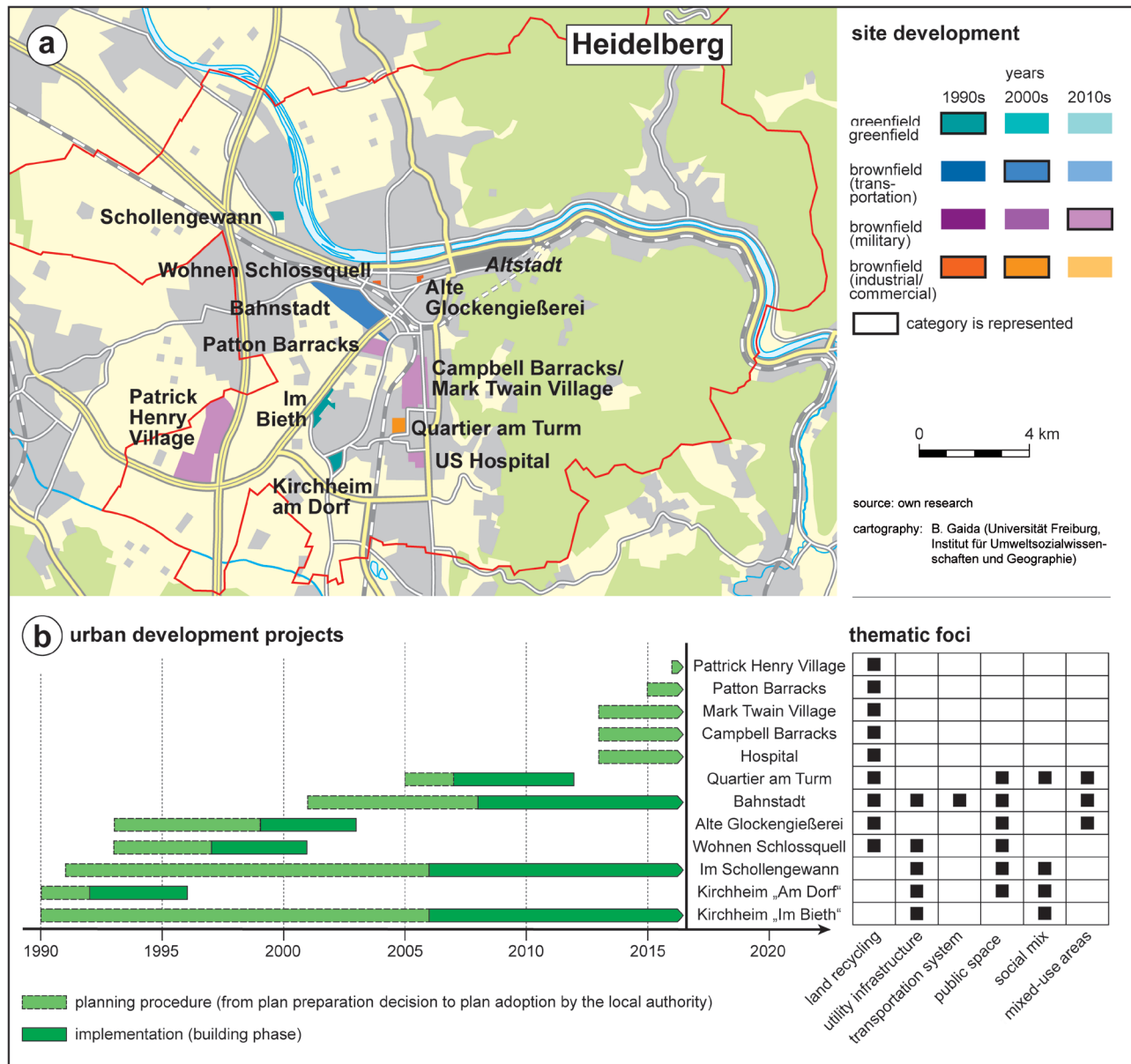
Figure 5: Urban development projects in Heidelberg

residential and commercial use. It was planned to include numerous infrastructure and service facilities, including a kindergarten, supported living for elderly people and people suffering from dementia, green spaces with playgrounds, shopping amenities and restaurants. Through the attraction of service companies a compact neighbourhood was to be created. Subsidised residential housing was created on two of the nine construction sites of Quartier am Turm. The project's attractiveness for families is confirmed by the fact that it is listed among the neighbourhoods with the most children in Heidelberg (Noe 2011). Therefore, the focus of this urban development project is more on the dimension of

social sustainability than is the case with the Bahnstadt showcase project, which has shaped the image of Heidelberg by giving high priority to the dimension of economic sustainability.
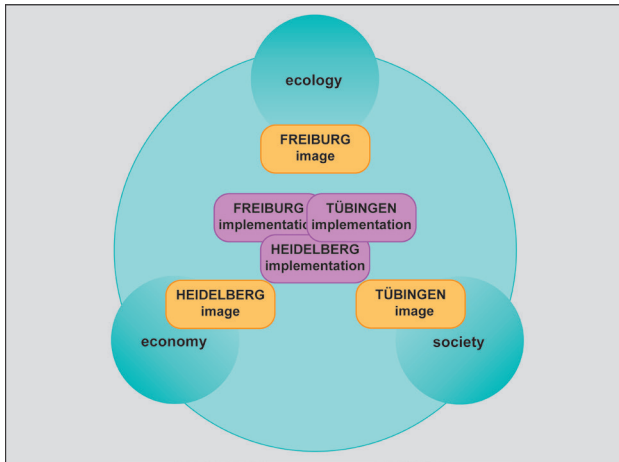
Figure 6: Positioning urban development projects according to the three pillars of sustainability

6 Overview: Sustainable urban development projects in the selected cities

Considering the three selected cities, our study shows very clearly that the prevailing urban image of each of these cities focuses on a different dimension of sustainable development. While aspects of social sustainability are emphasised in Tübingen, Freiburg positions itself first and foremost as ecologically sustainable. Finally, Heidelberg stands primarily for the economic dimension of sustainability and linkages between the city, its university and research institutions and the knowledge economy (see Figure 6).

One prominent showcase project in Heidelberg is the Bahnstadt development. This project stands for a readjustment of urban development with a particular emphasis on enhancing the scientific community and the knowledge economy. Compared with the showcase projects in Freiburg and Tübingen, the Bahnstadt development in Heidelberg was planned about ten years later. This is linked to the availability of military conversion areas, which became available in Freiburg and Tübingen at the beginning of the 1990s when the French troops started to withdraw from these two cities. However, in Heidelberg the withdrawal of the American troops occurred only a decade later. Thus, the historical context and the social trends and challenges that were discussed while the Bahnstadt project was being planned were different from those that were prevalent ten years earlier, when the projects of Vauban and Französisches Viertel were planned in Freiburg and Tübingen. Both

of the latter showcase projects reflect that the topics of ecology and social justice were regarded as increasingly important by urban planners from the 1980s and started to be implemented in sustainable urban development in the 1990s. However, the plans for the Bahnstadt project, which were designed in the 2000s, indicate a shift in priorities putting particular emphasis on the scientific community and the knowledge economy. Nevertheless, various aspects of ecology and the social dimension of sustainability are not neglected in the Bahnstadt project. In fact, the planning of Bahnstadt draws upon innovative concepts that have been developed, tested and improved since the 1990s (e.g. buildings with low-energy design and passive houses).

Looking at the particular sites where urban development projects are planned and realised within a city, it can be seen very clearly that the implementation of sustainable urban development is strongly determined by spatial constraints and is locally contingent. For example, in the case of Freiburg there are more developments taking place on greenfields than in the other two selected cities, although the urban image of Freiburg has a focus on the ecological dimension of sustainability. Here, the underlying reason is that the pressure on the housing market due to a growing population cannot be effectively absorbed by other areas in Freiburg. Compared with the situation in Heidelberg, there are fewer and smaller conversion areas available in Freiburg. In Heidelberg, on the other hand, several large conversion areas only became available after the withdrawal of the American troops in the 2010s. Heidelberg was the European headquarters of the American troops, and the withdrawal of these troops opened up development opportunities on approximately 180 hectares. In these circumstances, it is evident that current concepts for urban development are limited to brownfields in Heidelberg. Individual projects on greenfields were only realised in Heidelberg at the beginning of the 1990s. And in Tübingen, since the beginning of the 1990s, urban development projects have been planned and implemented exclusively on conversion areas and not on greenfields. All in all, our analysis shows that the implementation of sustainable urban development depends on particular spatial conditions, is locally contingent, and is characterised by changes resulting from technical and social innovations.

Taking into account both the showcase projects and the other urban development projects in the selected cities, it becomes clear that these three cities do not exclusively refer to one particular dimension of sustainability (whether ecological, social or economic).

However, in each of the cities there are individual accentuations that are supported and communicated by corresponding images and urban policies. The establishment of these local profiles and priorities goes hand-in-hand with the pillars of sustainability that are highlighted by the showcase projects. In terms of their urban images, the cities are obviously concerned about emphasising their particular expertise and individual positioning in sustainable urban development. This can be understood as a strategy of interurban competition.

Thus, the production of images and the promotion of showcase projects appear to be reductionist. It can be assumed that urban development projects in each of the selected cities respond to the three pillars of sustainability in a much more balanced way than is reflected in the individual urban images and showcase projects. Even within the showcase projects, we can see that the implementation of sustainable urban development is more balanced than is suggested by the way these projects are presented in communication and marketing activities. The Bahnstadt project in Heidelberg, for example, puts particular emphasis on the economic dimension of sustainability, although the ecological and social dimensions of sustainable urban development are picked up as well.

This analysis of three selected cities shows that sustainable urban development is implemented in various projects using different approaches that complement each other. Consequently, sustainable urban development should not be considered as a universal approach, but rather as an overall concept that needs to be adjusted to the specific local conditions, and with reference to the showcase projects in the respective city and at other locations. In fact, showcase projects can serve to set standards and to give best-practice examples for innovations and further development.

7 Outlook: Image and implementation of sustainable urban development in the light of two different research perspectives

Drawing upon the cities of Tübingen, Freiburg and Heidelberg, we have analysed and reflected on the interplay between images, showcase projects and other projects in implementing sustainable urban development. We have pointed out that urban images with a focus on

a particular dimension of sustainability can help a city to position itself in the context of interurban competition. Consequently, in each of the selected cities, one particular dimension of sustainability is emphasised through the urban image, which is promoted by individual showcase projects. The polarising effect of the urban images is underscored by the fact that the related showcase projects have been awarded several prizes. However, the other, less prominent, urban development projects complete and round off the overall image of sustainable urban development in the three selected cities. Compared with the showcase projects, the other projects are less influential and they are communicated in a less polarising way. Nevertheless, the other projects make a very important contribution to translating the sustainability process into urban spaces and thus to reaching and including a larger proportion of the citizens in their everyday environment.

Within the academic literature, two broader perspectives on sustainable urban development can be identified: planning-oriented approaches, on the one hand, and planning-critical approaches on the other hand (see Section 2). Both perspectives usually have a focus on showcase projects of sustainable urban development, which tend to be intensely promoted and have a high degree of visibility that is not limited to academic scholars and practitioners. The main aim of planning-oriented approaches usually consists of documenting and evaluating showcase projects as pioneers with innovative contributions to sustainable development. Moreover, planning-oriented approaches serve to inform the public about path-breaking trends and newly developed standards with regard to specific aspects of sustainability.

Planning-critical approaches basically serve to question the contribution and the impact of showcase projects. Here, a main criticism refers to the lack of comprehensive sustainability (in the sense of integrating and balancing all three dimensions of sustainability) that results from focusing on specific aspects of sustainable development when realising a showcase project. Another concern of planning-critical approaches is to deconstruct the communication of showcase projects in urban policies and marketing initiatives, and to unveil their embeddedness within the logics and conditions of neoliberalism. Nevertheless, our analysis has shown that it is important not just to focus on individual showcase projects, but rather to look at a large number of urban development projects within one city, in order to get a wider picture of contributions to sustainability. This makes it possible to counterbalance and overcome the

often one-sided urban images of sustainability that are related to showcase projects.

To conclude, we would like to encourage both academics and practitioners not to focus too much on showcase projects, but rather to explore other sustainable urban development projects. It is worthwhile to study a project's given contingency and to take a broader stance that includes the context of other projects in the relevant city and beyond. Finally, it is important to differentiate between the planning and implementation of sustainable urban development projects and the prevailing urban images that are related to these projects and initiatives.

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