Spatial Requirements on University Sites of the 1960s and 1970s

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There is consensus in regional economic literature that urban structures are stimulating innovations by knowledge transfer. Creating knowledge is no longer exclusively generated by scientists but produced by combining practitioners, scientists, creatives and highly qualified manpower. Knowledge, particularly research and science knowledge, is available inside and outside the 'laboratory' and is created in different locations and conditions.

Universities are grave components of cities relating to innovation, regional and global knowledge transfer and by responding to society shifts. Assuming that knowledge society has specific demands on space and urban structures, I argue that knowledge society causes spatial demands on university sites as well.

The research project considers a special type of universities – the large-scaled campus universities, founded in the 1960s and 1970s outside the city centres. Challenges and measures for advancing the sites rise on different scales of urban design: constructional, spatial and strategic. Based on own research the speech gives answers on different levels:

- *How do spatial conditions influence the inter-relation of university and society in context of innovation processes?*
- *According to social dynamics, university sites have changed under spatial and architectural aspects. Especially the campus universities of the 1960s/1970s do not meet the spatial demands of today's knowledge society. Which measures of urban design help to stimulate interaction between 'creatives' to create knowledge and innovation?*
- *Regarding the local and regional policy, how can different stakeholders be involved in these processes to combine the interests and goals?*

1. Introduction – Cause and Focus

Universities as parts of cities and regions are of vital importance to face the structural change from industrial society to knowledge society. As locations of informational and social exchange processes universities contribute the alliance of knowledge intensive players and institutions with their regional and local conditions.

In urban and spatial research the role of universities within regional and urban context and their importance as attractive locations for working, culture, living and life for employees of knowledge-intensive branches are broadly investigated (Florida, 2005; Matthiesen, 2009). In contrast the structural and spatial impact of universities, their impact on the urban fabric as well as the (spatial) requirements the knowledge society has on university sites are not yet deeply explored. An academic void in current spatial and regional research is raising the question of the importance of the structural and spatial character of university sites and the character's impact on the attractiveness in context of knowledge-society.

This research project presents a part of the findings of a PhD research, which dealt with a special type

of universities: Universities which were founded as new universities in the western part of Germany in the 1960s and 1970s. The research acts on the assumption, that universities and their spatial conditions and surroundings – each location offers specific circumstances and needs – do play a leading role for facing the structural change from industrial society to knowledge society. The focus of research is set on the structural and spatial components of university sites. In principal the sites are faced with the same challenges, but depending on the specific type of site – different dates of origin offer a different pattern and integration into the urban fabric as well as varying types of uses and spaces –, different measures, implications and strategies have to be implemented individually.

One of the main targets of the research was to find principles for the conceptual and strategic development of the universities of the 1960s and 1970s. The explanation of structural and spatial features within university sites and their impact on the urban fabric are the main value proposition.

2. Theoretical Background

2.1 *Knowledge Society – basics and spatial demands*

Although the concept of knowledge society is discussed differentiated and controversial, it is more than a buzz-phrase (Wiesner/Wolter, 2005 p. 34). It is consensus, that society is changing from an informational-based to a knowledge-based society, but different positions are assuming whether this change is already accomplished or still processing.

Within the knowledge society theoretical or research knowledge is a central, dominating factor regarding not only economical growth and production, but moreover it is influencing social behaviour and public life (Wiesner/Wolter, 2005, p. 35). Research and knowledge are transformed to production factors, universities are economic location factors and knowledge is the trading good which can be „sold“ (Elm, 2002, p. 17). Based on the complex attributes a multidimensional reflection of the knowledge society is necessary to understand its economical, technical, historical, social and cultural features (Höhne, 2003, p. 62). Global availability of knowledge, permanent dynamic and diversification of knowledge production, transdiciplinary, the influence on different features and the concluding demand of “lifelong learning” are of most importance (Wiesner/Wolter, 2005, pp. 36–37).

Within the knowledge society the implicit form of knowledge, intimated connected with persons, is the central value. This tacit knowledge is created through exchange. For this reason space is gaining importance to create, advance and transfer the knowledge (‘learning by doing’; interaction). Boarderlines between science and society are fading and getting more permeable (Nowotny, 2006, p. 27). Characterizing knowledge society, three main attributes can be summarized:

- *Human capital* in combination with its knowledge is an important resource in 21st century, as factor of production and as immaterial economical and tradable good or service.
- The distinguishing mark of this form of knowledge production is that creating knowledge is no longer done by scientists exclusively. It comes into existence through combining practitioners, scientists, creatives and highly qualified manpower. In this context highly qualified and creative people and their requirements are the main driver in the environment of innovation competition and for the economical power of cities and regions which are competing in acquiring the „smartest heads“. *Space* in which highly qualified and creative people are meeting is increasing in importance. Knowledge, particularly research and science knowledge, is available in and outside the ‘laboratory’, that means that the context of knowledge and its practice and implementation is enlarging and it is used by experts and laypersons. Knowledge is expanding and is produced in different locations and conditions.

- A City, or *urban structures* in general, as interaction platform for knowledge owners and knowledge environment is getting more and more attention to develop knowledge networks for science and economy. Of course knowledge owners can work everywhere in terms of globalization, but this fact again increases competition of cities to gain them as their citizens. Thus society is addressee as well as producer and developer (Nowotny, 2006, pp. 33-34).

Analogous to the meanwhile corrected misunderstanding of informational society discus, knowledge is ubiquitary available and the meaning of spatial and context specific physical or cognitive distances is decreasing or leading to the "death of distance" (Cairncross, 1997), due to availability and usage of new technologies, space is gaining importance and urban accommodations are the baselines for current society. Castells emphasized in 1996 that the relevance of space is increasing especially in cities and moreover in metropolitan areas (Krücken, 2006, p. 60). Therefore the transformation from information to knowledge is a complex and interactive process, which needs local space and face-to-face context of knowledge-innovators. The combination and transfer of diversified knowledge relies on locations where social relationships between knowledge-keepers are necessary for emerging learning and knowledge processes (Dörhöfer, 2010, p. 107). "Although information technology does allow for a greater flexibility in terms of location, particularly for some office functions, it is also resulting in new urban concentrations for face-to-face activity. People need human contact and the city is the place for that, even if technology allows us to do otherwise if we choose" (Ward Thompson, 2002, p. 68). A city, or urban structures and functions in general, provides innovations and networks, knowledge is evolved from (Kunzmann, 2004; Etzkowitz/Klofsten, 2005; Matthiesen, 2009). In context to knowledge society cities are acting as hubs and production locations of knowledge. They provide privileged locations for knowledge transfer, knowledge generation and knowledge exchange. Current urban and regional studies identify these types of locations as "Knowledge-Cities", "Cities of Knowledge" or "knowledge-based cities" (Matthiesen, 2004, p. 11; Matthiesen/Mahnken, 2009, p. 16; Kunzmann, 2004, p. 29). Based on their agglomeration advantages cities have the possibility to enforce a system of spatial and cognitive interaction between different actors and institutions of the knowledge society. Therefore cities force the exchange of tacit knowledge (Amin/Cohendet, 2004; Boschma, 2005; Matthiesen, 2009).

Universities are grave components of cities relating to innovation, regional and global knowledge transfer and in responding social shifts. The innovation effect of universities is undisputed. Within this context universities are a landmark and a central position for demographical and structural development of cities and inner-city accommodations due to their contribution as incubators of a knowledge-based city development. Of special interest is the direct impact of universities on their spatial surroundings and urban fabric as well as on social, economical and cultural sectors. The criteria for integration and linking university sites, the spatial surroundings are the main tasks in this context. It can be assumed that universities are spending a major contribution regarding the development of cities and regions as 'sticky knowledge places' for knowledge-intensive actors and institutions. They are important incubators for the knowledge-based formation, because "in a healthy knowledge society the university becomes the city, and the city becomes the university" (Corneil/Parsons, 2007: 115).

2.2 The Role of Universities

Universities today are global acting institutions, but have deep roots to the local layer. The university can be seen as an important building block of the city, especially the European city. Universities and their spatial context have always reflected social, political and economic conditions (Rüegg, 1993, 1996, 2004, 2010).

The expansion of knowledge during the last 4 decades, especially in the area of higher academic education (Martin Trow, 1974, called it the "shift from elite to mass education"), created new tasks and a different comprehension of the institution 'university'. In knowledge society with theoretical knowledge as a strong baseline universities and research institutes are axial institutes – they are schools of knowledge society (Mittelstraß, 2002, p. 67).

Universities keep their status as research locations by generating new knowledge, especially advanced research as well as application oriented knowledge. They are enlarging their position as "think tanks" and the ability of identifying relevant knowledge as well as absorption and distribution the according knowledge to students, scientists and free economy. In summarize, universities act on different levels:

- accumulation of knowledge
- creation of knowledge
- distribution of knowledge
- commercialization of knowledge
- sustainability of knowledge (Schneidewind, 2009, 12)

Besides these tasks universities are faced with other challenges, which not only deal with their core businesses. Since 1999 the Bologna-Process is the most intensive change in teaching and research European universities have to face. On the one hand universities and research institutes should act global and be cross-linked for gaining best output in research and teaching, on the other hand they should act entrepreneurial and compete in international rankings and ratings. Today's universities are "diversified, expanded, globalised, 'marketised', 'technologised', neo-liberalised and potentially privatised" (Morley, 2012, 27). The challenges are very diverse, as figure 1 shows.

To maintain university competences, which were traditionally developed, and to create new competences, new organisational structures must be realized internally but as well according to spatial requirements. Transdisciplinary, project studies, practical use of theories, their transformation into "real life" or life-long learning need new or different spatial conditions (Hubig, 2002, pp. 46-47).

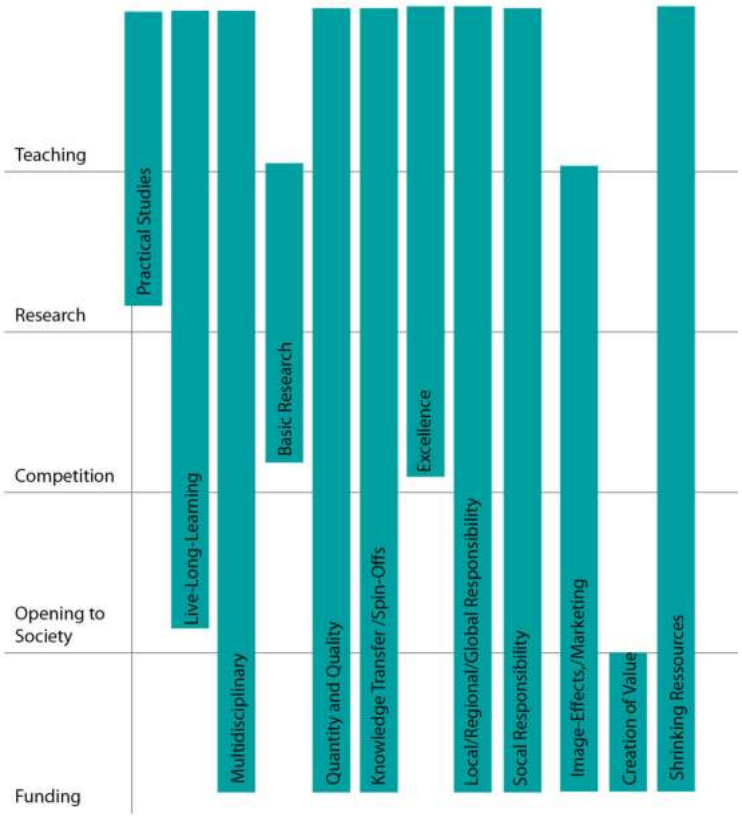

Figure 1: Challenges for Universities

As described before, there is a close cause-effect-relationship between the discussion about the knowledge society and the spatial level of the 'city'. Urban structures with their properties (density, utilisation, cultural and social structures) are particularly suitable for generating and distribution knowledge. It arrives at the conclusion that 'urbanity' in context of knowledge-society is gaining more importance. Urbanity offers a structure, knowledge can be developed from in the most effective way. Knowledge society requires certain urban parameters. Looking at universities as institutionalized knowledge economy for a city, the question of spatial circumstances and how structural and spatial needs can be covered is arising. According to these manifold tasks there is no regional demand for pure knowledge location: Diversity, communication and transfer are the main focus, but without loosing the objective of education and science:

- Functional mixing of university functions and peripheral utilization (spare time, living, working)
- Spatial hierarchies
- Identifying architecture
- Social concentration and interaction
- Access, interface to cities
- Consideration of complex requirements of internal and external users

Assumed that knowledge society has specific demands on space and urban structures (Perry, 2008; Benneworth/Charles/Madanipour, 2010), the assumption is that knowledge society causes spatial demands on university sites. In this context it is the 'Third Role' of universities, which has to be regarded in urban and regional planning. In concepts for developing university sites 'urbanity' has a leading role, not only because of measures regarding the site itself, but to combine the site with its spatial and functional surroundings. These projects and current developments are often associated with terms like knowledge economy, the requirements of the knowledge society and the knowledge-based designing and development of cities and urban structures. These terms constitute the strategies of universities and cities and their marketing. Not only in cities, in which the universities are deep-rooted, but also in small cities, which use colleges or universities – often as new founding or settlements – for establishing a profile in the regional, national or international competition.

The question of structural and spatial development and designing of university sites is getting more important in current urban planning discourses. Urban design concepts, development frameworks or campus plans are evolved, which explain the function, scale, siting and cost of new developments and the improvement of existing facilities to produce an academic setting that is both functional and spatial. From an urban planning point of view different aspects are in the focus of the research, especially regarding questions of urbanisation and linking the sites with the urban fabric. Christiaanse defines, that the discussion about attractiveness of the interdependency of university sites and the urban pattern need a specific design and handling of the spatial conditions, to break up boarders and open the reputed 'gated community' of the campus (Höger/Christiaanse, 2007, p. 29). Similar aspects should be taken into account during the planning phase of company campus areas. As private projects with influence on the image and attractiveness of cities they symbolize a new configuration of private spaces in the public grid of cities.

Current company and management strategies are forecasting future developments of universities with the campus-principle as a major orientation in planning. Open structures, public spaces and a new social architecture are the core elements for interacting in terms of the knowledge society. Beside the physical level it is the social, intellectual and sustainable structures, which have to be taken into consideration. Baseline of the physical development or their guidelines is the public spaces, the buildings and the infrastructure. But in addition to that the strategic approach is important to combine different stakeholders and their development goals.

Spatial Focus: Universities of the 1960s and 1970s in Germany

The research project considers with a special type of university sites – the large-scaled campus universities, founded between the 1960s and 1980s, the so called 'reform universities' in Germany. Because of the increasing numbers of students in the 'economical boom era', higher educational space was needed and so it was decided from the government not only to extract existing sites, but developing new ones. Those developments accompanied with a reform of education and organization, which was reflected in the construction and spatial guidelines, the structural and physical appearance, the design-guidelines, the hierarchy of public spaces and the composition of buildings. These new university sites of this time were build as campus-universities outside the city centre and – like Jessen (2003) depicts – do not settle the claims of the current society, which are linked with and open to society and the composition of the city.

The new sites were designed as universities with all the typical faculties. But they should also offer public and social space. That meant a big demand for building space. The areas needed to offer more than 100 ha for all the buildings and spaces which were needed. The sites of this modern construction area followed a typical hierarchy and structure:

- Density is reduced from the inside to the outside
- Core with important functions (library, cafeteria, audimax, administration)
- Crossing axis (functional- and open-space-axis)
- Public infrastructure as boarders
- Surrounding landscape

The sites today are approximately 50 years old – build of concrete and steel, they need to be reconstructed in different topics. The interior, especially laboratories and central uses like canteen kitchen or libraries, need refurbishment. The suburban campus-sites need to be improved on different spatial and functional levels to strengthens their role as activators for economical and spatial innovation (knowledge-clusters, research and technology parks), as Christiaanse and Hoeger illustrate by examples like the Science City ETH Zürich or the Hightech-Campus Berlin-Adlershof (Höger/Christiaanse, 2007).

As the foundations of universities in the 1960s/1970s often were instruments of a 'structural change 1.0', which besides the reform and spread of education was boost by industrial location, the aims of the current 'structural change 2.0' are the qualification and advancement of these university sites and settlements as „knowledge scapes" (Matthiesen, 2009). These advancements often are closely connected with urban and/or regional development concepts, strategic processes and urban governance. The universities of the 1960s/1970s made their cities to 'university headquarters'. Todays concepts have additional ambitions: with structural and spatial measures, their physical and functional linking to urban sorroundings and strategical devices for local and regional policy they are purposed to be developed to 'knowledge-based cities'.

3. Hypothesis

For detecting the challenges of the university sites of the 1960s and 1970s, their (spatial) basic conditions are faced with the (spatial) demands of the knowledge society (Figure 2). It is obvious, that most of the spatial conditions are divergent to society's demands.

As a result of the comparison of the conditions of the university sites with the demands of the knowledge society, the hypothesis for the empirical studies can be drawn: *The university sites of the 1960s and 1970s in Germany do not correspond to the demands of today's knowledge-society*.

If we think of the requirements of the knowledge society spatial conditions need to be improved or reformed, and of course terms like live-long-learning need specified conditions. In summery, the starting position of the large-scaled sites offers a lot of potential for the needs of the knowledge-society. The challenge is first the existing gap between the city and the campus, on the other hand the retention of the typical modern structure and details. Challenges and measures for advancing the sites rise on different levels and scales: constructional (micro-level), spatial (meso-level), strategic (macro-level).

LEVEL		DEMANDS OF THE KNOWLEDGE-SOCIETY		CONDITIONS OF THE UNIVERSITY SITES
		Density	=	Density
		differentiated by its typology	||	concentrated
		Human Scale	||	Functional Scale
Urban Design		Variability of Built Spaces	=	Variability of Built Spaces
		Coherent Morphology	=	Coherent Morphology
		heterogeneous and linked	||	closed and definied
	Morphology	Spatial Hierchy	||	Institutional Hierarchy
		Mix of Uses and Functions	||	Separation of Uses and Functions
		Spatial Sequences	=	Spatial Sequences
		Public Spaces	||	University-Public Spaces
	Functional Space	Consideration of Secondary Functions	||	Separation of Uses and Functions
		Meeting-Spaces	=	Meeting-Spaces
		in spatial sequences	||	in central functions
		offhanded spaces	||	plannend spaces
		social proximity	||	spatial proximity
	Social Space	Integration/net-structured	||	orthonally organised
		Identity	||	Functional Identification
	Atmosphere	Open	||	Closed
Spatial and Spatial Design	Urban Pattern and Intersections	Integration	||	Separation
		Clustering	||	Centralization
		Participation	||	Separation of University and Public
		Glocal	||	Regional
		Interdisiplinary	=	Interdisiplinary
		Mix of Uses and Functions	||	Functions for University-Uses
Strategic		Knowledge-based Development, Network of Stakeholders	||	University as a self-sufficient Player

Figure 2: Comparison of Demands and Spatial Conditions

4. Methodology: 3 Case-Studies

The hypothesis and the findings of the theoretical comparison of the conditions and demands are surveyed by the analysis of three case studies. It was asked, which spatial and strategic elements exist at university sites of the 1960s and 1970s. For understanding today's conditions the history and the development of the sites must be analyzed. Besides the finding for each case-study a main question for the empirical work is, if the findings can be compared or generalized, or if each site has individual conditions.

The Ruhr-University of Bochum (1962), the University of Bielefeld (1969) and the University of Siegen (1972) acted as case studies for the empirical work. All universities were founded in the 1960s/1970s in the federal state of North Rhine Westphalia, in the western part of Germany.

For the analysis of the case studies different methods were used, according to the different approaches on spatial and strategic layers and levels identified in the theoretical framework (Figure 3). The *study of historic literature* and documents gives information about the foundation of the sites and the social and political backgrounds in the 1960s and 1970s, by which guidelines of design and architecture were influenced. The *enquiry of current concepts* for the development of the sites gives information about the strategies of a knowledge-based development.

For the empirical research *interviews with stakeholders* were fundamental. The guided interviews with a total of 14 stakeholders gave important information about the history of the sites, their future development and, according to the professions and responsibilities of the stakeholders, interesting and different views on tasks of development and challenges. For every case study at least one stakeholder belongs to the municipality/planning department, to the management/administration of the university and to the "Bau- und Liegenschaftsbetrieb NRW", the agency, which is responsible for management and operating of the university's sites and buildings.

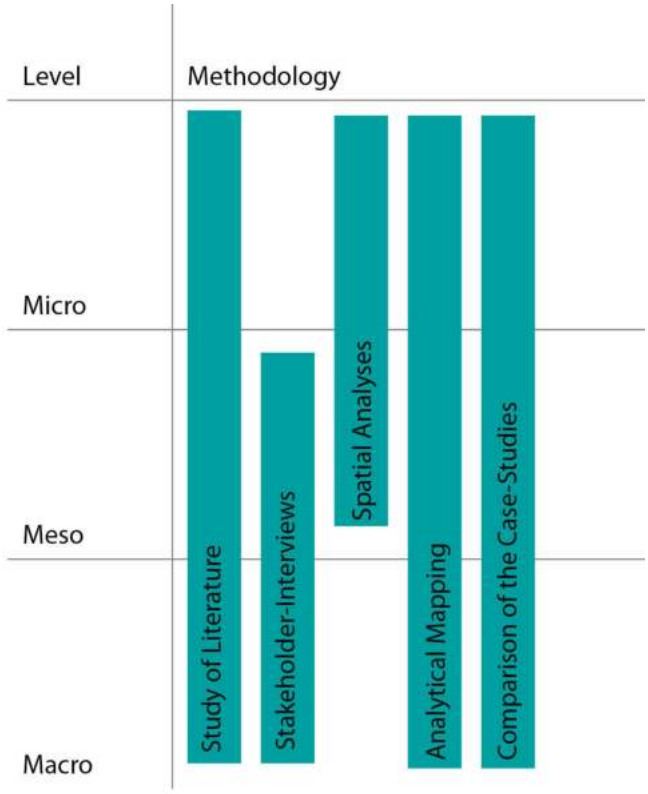

Figure 3: Research Methods

Besides the interviews, *spatial analyses* were the central method for finding out principles on the macro-, meso- and micro-level of the universities. The main characteristics of the spaces were visualized in maps (analytical mapping) of different spatial and thematic layers. The findings of the spatial analyses, combined with the information of the stakeholder-interviews, gave a well-grounded characterization of the different sites, their abilities and challenges on following levels:

- Morphology and Building Characteristics
- Functional Space
- Social Space
- Urban Pattern and Intersections
- Atmosphere
- Strategic Level

Exemplary on the functional level the functions and their interaction were investigated. As the analysing map of the case-study of the Ruhr-University of Bochum shows (Figure 4) the functions are mostly separated in a main part of 'teaching, learning and research', which is supplemented by the main axis with central functions like the library or the Auditorium maximum. Corresponding to the separation of the functions the social spaces of the sites in total are different as well (Figure 5). The character of the social space follows the density and the types of functions. In the central axis there is a high social density. Students and researchers meet here, get in communication and use the space for recreation. The spaces between the buildings do not work as meeting places very well, because people just go here to reach their offices or lecture halls.

In a last analytical step the findings of the three case studies were reflected and compared. The aim was to find out, if the particular findings show commonalities and regularities. This last step sets the ground for the central findings and the conceptual work of the project.

Figure 4: Functional Space, Case-Study Ruhr-University of Bochum

5. Findings and Conclusions

As a result of the comparison of the central empirical findings different fields of action can be identified. These fields can be found on mainly four levels:

- Functional Space
- Social Space
- Urban Pattern and Intersections
- Strategic Level

It is not imperative to develop kinds of 'patent remedy' for acting in these levels, but options and restrictions which offer possibilities for improving the sites in terms of the requirements of the knowledge-society. The empirical work has shown, that – besides lot of differences – similarities and spatial principals can be found.

The sites are separated from their surroundings and the urban patterns by their dense and – in some cases – brutal morphology and by their mono-functional character as well. The *functional spaces* concentrate on learning and research, but do not open the sites for other groups than members of the university. The knowledge-society asks for different and urban structures, with mixed uses and spaces for communication. The university sites of the 1960s and 1970s do not offer these needs. Current planning strategies focus on opening the sites by mixing function and making the sites attractive for other users, for example by cultural events or scientific programmes for new audiences.

Figure 5: Social Space, Case-Study Ruhr-University of Bochum

Corresponding to the functional spaces the *social spaces* are characterised. Although it was a requirement in the date of origin to create different spaces for meeting and communication, the spaces today do not correspond with the demand of the knowledge society. First the interdependence with the functional space asks for more public and mixed-uses, secondly the design of the spaces need to be improved. Often the original materials of the 1960s and 1970s today are in a bad condition. Furthermore today's society asks for smaller dimensions of public spaces than the sites do offer.

The social spaces do not invite the public – so it can be summarized that the spaces are not really public spaces. In the consequence they are used primary by students and researches. To connect the public with the university the opening of the sites is necessary – functional, as described, but as well by opening its boarders to the urban fabric. The *urban pattern* often separates the sites from the surrounding, often residential areas. So the functional gap is intensified by a morphological breakout. This problem of different morphologies and intersections cannot only be solved by building smooth transitions, but has to be solved by functional measures as well.

The last level is the *strategic level*, which connects different stakeholders to increase awareness for the importance of universities for the development of the city or/and the region. The 'Leitbild' of the "Knowledge-based Development" describes the process of interaction between municipality, university and society to strengthen common goals. To manage this important aim some municipalities have an own "Knowledge-Manager", who arranges round-tables to bring stakeholders together, or promotes public activities.

Regarding to the hypothesis the empirical findings confirm the statement, that *the university sites of the 1960s and 1970s in Germany do not correspond to the demands of today's knowledge-society*. But – with a closer look to the case-studies the characters of the sites and the different levels – the challenges are not the same in detail. This leads to the conclusion, that for identifying planning strategies and measures for designing, a deep going analysis of the spatial conditions is essential. This analysis has to consider the needs of the users – students, researchers, management – as well as the demands of society to create lively sites and to integrate the peripheral university sites into the urban fabric – where people meet, communicate, research and create new innovations.

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