Fraunhofer
IAO

INTEGRATED RESOURCE MANAGEMENT IN ASIAN CITIES: THE URBAN NEXUS

MORGENSTADT BENCHMARKING AND CITY DEVELOPMENT CONCEPTS

FULL REPORT

Fraunhofer
IAO

FRAUNHOFER INSTITUTE FOR INDUSTRIAL ENGINEERING IAO

MORGENSTADT BENCHMARKING AND CITY DEVELOPMENT CONCEPTS

The Urban Nexus & Sustainable Urban Governance

MORGENSTADT BENCHMARKING AND CITY DEVELOPMENT CONCEPTS

Integrated Resource Management in Asian Cities: the Urban Nexus – Sustainable Urban Governance

Constanze Heydkamp, Steffen Braun, Alanus von Radecki

Fraunhofer Institute for Industrial Engineering IAO
in Stuttgart.

Project number: 130829
Project partner: GIZ project „Integrated Resource Management in Asian Cities: the Urban Nexus“

Content

Executive Summary

The Fraunhofer Institute for Industrial Engineering (IAO) has been integrated into the Urban Nexus framework by the project »Integrated Resource Management in Asian Cities: the Urban Nexus« in order to deliver a fundamental study on the given governance aspects in the three Urban Nexus partner cities, Ulaanbaatar, Da Nang, and Korat. The study will serve to develop strategic and systemic measures to support innovative and future-oriented city development, as well as to supply all of the Urban Nexus partner cities with an instrument to be used further on for self-evaluation.

Fraunhofer has grounded experience in city systems analysis due to the Morgenstadt Initiative, which was introduced in 2012. It addresses the »City of the Future« by analyzing, for example, how cities which are leading in sustainable development worldwide have reached this position and how their achievements can be transferred to other cities even if located in a different environment and culture. The methodology developed for the Morgenstadt Initiative was adjusted to the Urban Nexus project and focuses mainly on urban governance aspects in the context of the food, water, and energy sectors. Integrated resource management in this context is seen as approach to secure food, water, and energy provision and enable sustainable development.

For each one of the three analyzed cities Ulaanbaatar, Da Nang, and Korat, a city profile was developed. It contains 1) an explanation of the most promising success factors to bring each city further with regard to integrated resource management, 2) a list of impact factors that directly influence urban development in each city, as well as 3) first recommendations on how to improve the urban governance framework for integrated urban development. While we acknowledge that integrated resource management needs to be developed on different levels, the Morgenstadt approach focuses on an urban scale. The city profiles, which were developed based on the Morgenstadt framework, hint towards possible low-cost and easy-to-realize solutions on city basis which might add critical value on the path towards an urban NEXUS. The collection of recommendations made for the cities in the study at hand are potential solutions for their municipal administrations to consider. They serve as initial input for a change in viewing angles and can be discussed, assessed, and discarded or modified, as each administration wishes. The complexity of continuous urban development and urban governance makes integrated and individual strategies to reach predefined goals necessary. These strategies are needed as a platform to coordinate and cluster measures and to enable each municipality to adapt to changes and be resilient towards disruptive events in the long-term.

Besides generally improving awareness about the necessity and benefits of integrated planning for food, water, and energy security, the concept of sustainability, and the value added by good governance, three success factors for sustainable urban governance were identified as common ground for improvement across the analyzed cities:

- Usage of Statistical Data for Informed Municipal Decision-Making.
- Improvement in Specialized Expertise in the Municipal Administration.
- Usage of Cross-Sectoral Communication Models.

These three success factors have been integrated into a project idea named »Sensing Nexus« which will be introduced as an outlook in the final chapter of this report.

List of Figures

List of Abbreviations and Acronyms

ASEAN	Association of Southeast Asian Nations
BID	Business Development District
BMZ	German Federal Ministry for Economic Cooperation and Development
BRT	Bus Rapid Transit
CSR	Corporate Social Responsibility
DATRAMAC	Da Nang Traffic Light and Public Transportation Management Center
GIZ	Deutsche Gesellschaft für Internationale Zusammenarbeit
IAO	Institute for Industrial Engineering
IBP	Institute for Building Physics
ICT	Information and Communications Technologies
IFAD	International Fund for Agricultural Development
IGB	Institute for Interfacial Engineering and Biotechnology
IMF	International Monetary Fund
JICA	Japan International Cooperation Agency
KOICA	Korea International Cooperation Agency
m:ci	Morgenstadt: City Insights
MDGs	Millennium Development Goals
NGO	Non-governmental Organization
PPP	Private Public Partnership
R&D	Research & Development
RE	Renewable Energies
SDGs	Sustainable Development Goals
SF	Success Factor
SME	Small- and medium-sized enterprises
SPI	State-Pressure-Impact Indicators
UB	Ulaanbaatar, Capital City of Mongolia
UN	United Nations
UN ESCAP	United Nations Economic and Social Commission for Asia and the Pacific
UNU	United Nations University
WDESP	Water Drainage and Environmental Sanitation Project
WWTP	Centralized Waste Water Treatment Plant Ulaanbaatar

1
Project Introduction & Methodology

The report at hand focuses on existing governance aspects in relation to food, water and energy security in the three selected nexus partner cities, Ulaanbaatar, Da Nang and Korat. It produces a city profile for each city, which serves to develop strategic and systemic measures to support innovative and future-oriented city development and/or infrastructure projects as well as to supply the cities with an instrument to be used further on for self-evaluation. This first chapter introduces the report's background, including information on the project objectives and methodology.

1.1 The Urban Nexus Project

The »City Profiling and Benchmarking« executed by the Fraunhofer Institute for Industrial Engineering IAO is carried out in the context of the »Integrated Resource Management in Asian Cities: The Urban Nexus« project, implemented by UN ESCAP and GIZ with funding from BMZ. Developments underlying the Urban Nexus debate and the project itself are inefficiencies in the food-water-energy nexus induced by provision gaps which are likely to increase due to growing populations, improving living standards, and global climate change (die 2013; SWP 2013a; SWP 2013b). According to SWP (2013a), Asia is considered the biggest challenge in terms of sustainable provision of food, water, and energy and interlinked provision risks within the nexus. According to Valieva (2013) poor governance adds to the situation.

The overarching Urban Nexus project goal is to improve capacities (institutional and personal) for integrated urban resource management in selected Asian cities. Therefore, its initial aim is to target »the local level, by providing technical advice to municipal administrations/planning offices through international and national experts and [to facilitate] the establishment of Nexus Task Forces« (GIZ 2013e). As stated by the Stockholm Environment Institute (SEI 2011) »the nexus approach highlights the interdependence of water, energy and food security and the natural resources that underpin that security – water, soil and land. […It] provides an informed and transparent framework for determining trade-offs and synergies that meet demand without compromising sustainability«. Improving governance across sectors and increasing efficiency are two aspects that are detailed further in the Urban Nexus approach. Interactions across the Urban Nexus are water for energy, energy for water, water for food, energy for food, etc. For those »additional benefits that outweigh the transaction costs associated with stronger integration across sectors« (ibid.: 5) are examined. To improve the outcomes on basis of these interdependencies, three guiding principles are central to the Urban Nexus: »Investing to sustain ecosystem services«; »creating more with less«; and »accelerating access, integrating the poorest« (ibid.: 5).

1.2 From »Sustainability« to the »Urban Nexus«

The idea of »sustainability« originated in the forestry industry and has been acknowledged since the first written definition was given in the Brundtland Report in 1987 as »Sustainable development is development that meets the needs of the present without compromising the ability of future generations to meet their own needs« (WCED 1987). In this context, three dimensions of sustainability, economic development, social development, and environmental protection, have been defined as guiding principles for long-term global development (UN 2011). According to the Rat für Nachhaltige Entwicklung (2014) »you cannot have one without the other«. Thus,

sustainable development is such a development that balances economic, environmental and social interests, and no single dimension may be affected negatively by any development in another dimension. If this is not possible, compensation has to take place. Therefore, including all stakeholders, using forms of integrated planning, and executing and monitoring development in a comprehensive manner is the key to sustainable urban development. This basic understanding underlies the Morgenstadt approach, but the term »sustainability« has been filled with meaning beyond this basic definition. Over the past decade the discussion has matured and has produced parallel as well as interlinked developments. For instance, the United Nations (UN) agreed upon implementing the eight Millennium Development Goals (MDGs) by 2015 to improve sustainable development worldwide. The post-2015 agenda arranges for Sustainable Development Goals (SDGs) which are said »to reduce barriers both among countries and among sectors« (die 2013: 1). This reference to sectoral silo-thinking directly links to the food-water-energy nexus, an approach which was introduced at the »Bonn2011 Conference« that took place from 16-18 November, 2011. The inclusion of the nexus is not directly named in the *List of Proposed Sustainable Development Goals to be attained by 2030*, but the call for »holistic and integrated approaches to sustainable development that will […] lead to efforts to restore the health and integrity of the Earth's ecosystem« (UN DESA 2014) shows the interlinkages between the two concepts sustainability and the nexus. The consequences on the ecosystems, e.g. on water availability, are intensified by global climate change. In this context, the term »resilience« has entered the discussion and has replaced »sustainability« in certain contexts. Human settlements and societies are put to test by the effects of global climate change in addition to urbanization trends and changing lifestyles. Even though »different patterns of urbanization will occur in different countries« according to IFAD (n.y.), cities will face similar challenges: »planning, feeding and governing larger and more numerous cities« (ibid.). The vulnerability of urban systems expresses itself in food, water, and energy security, closing the loop to the Urban Nexus (SWP 2013a).

Gies (2012, according to GIZ 2013d) goes as far as calling the Nexus »the new vocabulary to define sustainable development« and GIZ (2013d) states that global institutions »make the nexus and water security out to be the new 'development imperative'«. At the same time the regulatory framework and the policy regulation I many Asian countries are not yet transferred to be fit for integrated resource management. In the light of poor governance quality, incremental improvements are expected in Asia, not comprehensive reform (SWP 2013a: 60 et sqq.). By integrating the Urban Nexus approach into the SDGs, which includes the integration of »robust mechanisms of implementation review« (UN DESA 2014) as well as measurable indicator systems and monitoring infrastructure (Brandi et al. 2013), expectations will be clearer to cities and assessment will be handable for them (World Economic Forum 2014).

Parallel to this increased attention and acknowledgement, there are still open questions concerning its rentability. Due to the short time the project »Integrated Resource Management in Asian Cities: the Urban Nexus« has been running, reference projects need to be realized, their results assessed, and best practices made visible to meet the project goal of integration and knowledge exchange amongst Asian cities.

Due to the specific approach of the study at hand, it can only base on existing perspectives mentioned above with a strong focus on urban governance as key element for urban transformation in general.

1.3 The Role of Urban Governance

The term »governance« describes »the process – by which authority is conferred on rulers, by which they make the rules, and by which these rules are enforced and modified« (The World Bank Group 2013). According to BMZ (2014), supporting good governance means creating political framework conditions that enable social, ecological, and economic development. Thus, good governance is a precondition to sustainable development, since the latter has a social, an economic, and an ecological dimension and is characterized by their balance. There are a variety of indicator sets analyzed by different institutions to measure good governance on the country level. They cover, for example, indicators in the fields of political stability, separation of powers, democratic actions, respecting human rights, public participation in political decision-making, violence, rule of law and control of corruption, transparency, regulatory quality, and the state's effectiveness. In an urban context, the definition given by BMZ is transferred to a smaller scale from state to municipal level (BMZ 2014; The World Bank 2014). Similar indicators are looked at to identify a sustainable urban governance city profile: for example, competence or ruling level, strategic orientation, public participation, inter-disciplinary knowledge exchange, motivation for sustainable actions, and levers used to design urban development in a sustainable way. They can be found in the 13 success factors for sustainable urban governance, which are described in detail in chapter 2.

1.4 Morgenstadt Framework for Urban Innovation

Between May 2012 and October 2013, twelve Fraunhofer institutes initiated the project »Morgenstadt: City Insights« (m:ci) with thirty industrial business partners and six cities, aimed at creating an inventory of solutions for sustainable urban development. Freiburg, Berlin, Copenhagen, New York City, Singapore and Tokyo were selected by the partners for in-depth study: In these cities, over one hundred inspiring best practice projects for sustainable urban development in eight sectors (see Figure 1) were analyzed by almost fifty Fraunhofer researchers, who conducted interviews, engaged in discussions and visited project sites. The goal was to investigate how these model projects were conceptualized, initiated and implemented, to measure their achievements, and identify which actors and key factors created conditions for these cities to successfully transition towards sustainable urban systems. Additionally, it was determined under which conditions these solution approaches could be transferred to other cities (Fraunhofer-Gesellschaft 2013a).

Figure 1: The eight sectors analyzed in Morgenstadt phase I from left to right are: Governance, Buildings, Energy, Mobility, Production & Logistics, ICT, Water and Security (Fraunhofer-Gesellschaft 2013b)

A distinctive feature about the Morgenstadt approach compared to other sustainability assessment concepts worldwide is that qualitative data is analyzed as well as quantitative data. The approach aims at answering three major questions:

- What is the sustainability performance of a city?
- How does the city address sustainability?
- Why do or don't things work in this city?

To answer these questions, the Morgenstadt approach consists of three modules of information:

- A set of quantitative indicators: categorized into **pressure**, **state,** and **impact indicators**.
- **Success factors for sustainable urban development**: structured into three basic categories (see Figure 2). The 83 success factors identified in m:ci phase I are listed in Annex A1.
- **Impact factors**: individual drivers, framework conditions, local structures, and systems that have a strong impact on sustainable development in each city.

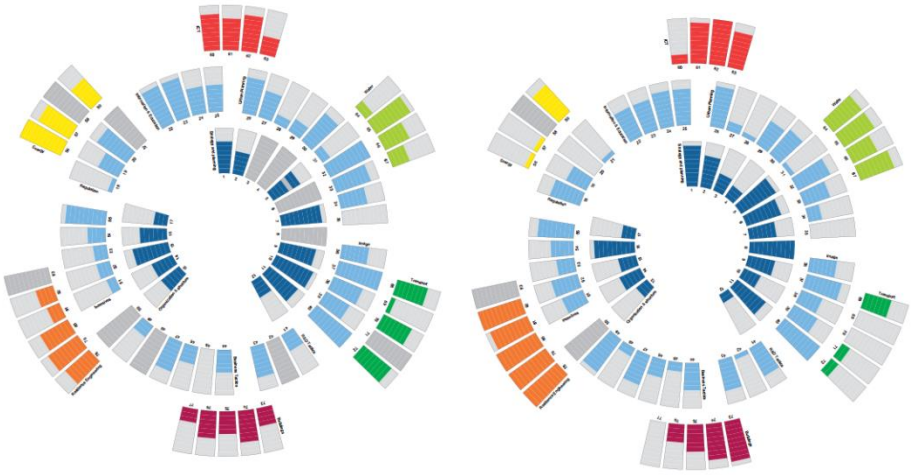


Figure 2: City profile comparison for Copenhagen (left) and New York City (right). Each segment depicts one of these success factors for sustainable urban development. The inner dark blue circle includes success factors dealing with »Urban Leadership«. The lighter blue circle depicts »Urban Governance Levers« and the outer colorful circle shows certain »Points of Action«, clustered into sectors. The segments' filling depicts the existing importance of one success factor in a specific city. The rating is based on an ordinal scale system reaching from 1-10. (Fraunhofer-Gesellschaft 2014)

1.5 From Morgenstadt to the Urban Nexus

The contractual outline of the transfer of the Morgenstadt methodology to the Urban Nexus project benchmarking allowed for an in-depth analysis by one Fraunhofer IAO employee in three Urban Nexus partner cities. GIZ chose Ulaanbaatar, Da Nang, and Korat for the research trips due to the status of their participation in the Urban Nexus project as well as the status of the planned projects for integrated resource management.

The analysis is based on interviews with experts from the municipalities, regions, national government, and NGOs in every city to gather quantitative and qualitative data. About ten interviews were conducted in each city over the duration of a three- to four-day visit. The interview partners were recommended and appointments made by local GIZ staff after Fraunhofer IAO gave input on the topics and institutional levels needed. The research trip to collect data through expert interviews took place between February 8 and 28, 2014. Each interview took ca. 1-2 hours, beginning with a short introduction of the interviewer, the interpreter, the Urban Nexus project, the Morgenstadt project, the interview intention, as well as the usage of interview data. It was guaranteed that no quotes would be able to be tracked back to a certain interview

partner; thus, the sources are anonymized in this report. Furthermore, the interviews were not recorded.

To offer city profiling and benchmarking to the Urban Nexus project, the Morgenstadt model was adjusted (see box at the end of chapter for major changes) to fit the Urban Nexus partner cities but is still based on the three information modules: quantitative indicators, success factors, and impact factors.

The **list of 24 quantitative indicators** that were collected in the analyzed cities can be found in Annex A2. These indicators were selected due to the focal points of the Urban Nexus being food, water, energy and closely-related topics: waste, traffic, and buildings. Another reason for their selection was that their complexity should be kept at a minimum to guarantee availability and reliability of data. For example, most cities offer information regarding total energy production, but the amount of energy needed in the preparation of wastewater to reach a certain quality standard before the water is released into the environment is hardly available. Generally, a cutting of indicators from the extensive m:ci list had to be done due to capacities in the project.

To meet the current situation in the Urban Nexus partner cities with respect to existing challenges, which differ widely from the six frontrunner cities that were analyzed in the Morgenstadt project, the following **13 additional success factors for sustainable urban governance** were developed for the Urban Nexus partner cities:

Strategy & Planning	Defining a City's Management Model for Strategic Value Creation
	Comprehensive Sector Strategies for Strategic Urban Development
	Good Financial Condition as Door Opener to Sustainable Urban Development
	Usage of Statistical Data for Informed Municipal Decision-Making
Organization & Structure	Usage of Cross-Sectoral Communication Models
	Municipal Authority as Motivation for Responsible Development
	Public Participation Enabling Sustainable Urban Development
	Improving Specialized Expertise
Methods & Levers	Accomplishing Successful Law Enforcement
	Urban Services: Regulation and Incentives Creating Municipal Income
	Sustainability Awareness and Motivation for Integrated Planning
	Establishing Successful Urban Planning Tools
	Acknowledging Private Sector Inclusion in Urban Development

Detailed information on these success factors can be found in chapter 2 of this report.

Impact factors enabling or limiting sustainable urban development were named by the interview partners directly and were afterwards clustered by the Fraunhofer researcher. The factors as such give additional insight into the local experts' perception of urban development hurdles and hint towards possible points of action. A list of the identified impact factors in the three analyzed cities can be found in chapter 3.

Major changes to the Morgenstadt model and the approach itself to fit the Urban Nexus project:

- A selection of 24 quantitative indicators was analyzed instead of the whole catalogue due to capacities and the project's focal points being governance in context with food, water, and energy.

- While the Morgenstadt model consists of 84 success factors, only a selection of those 84 was analyzed in the interviews for the Urban Nexus project, due to capacities and the project's focal points being governance in context with food, water, and energy.

- Since the Morgenstadt success factors were developed based on worldwide frontrunner cities in terms of sustainable urban development, a large number of the success factors are not relevant in the Urban Nexus partner cities, or in other words, the yes-or-no questions analyzing the existence of certain success factors would mostly have been answered with no, which makes individual recommendations difficult. Therefore, additional 13 success factors were developed as outcome of the interviews taken in Ulaanbaatar, Da Nang and Korat, which directly address the challenges for sustainable urban development, the interview partners have mentioned.

- While the teams analyzing the six cities in the Morgenstadt project consisted of at least five experts from different fields of research (e.g. energy, buildings, mobility), the capacities in this project allowed for only one Fraunhofer expert to travel and conduct interviews in the three Urban Nexus partner cities.

- Due to the missing group of experts as described in the bullet point above, the team meetings each evening could not take place in which the interview outcomes of each day were discussed.

- To gather enough expert interviews (ca. ten per city) in the three analyzed cities, up to four expert interviews were scheduled per working day – average of three interviews per day – which limited time post-processing and preparation in between interviews on-site.

- The research trips in the Morgenstadt project took two weeks to every city, whereas this project's capacities allowed only for a total of 13 days for conducting interviews, including traveling.

2
What are Key Factors for Sustainable Urban Governance in Nexus Cities?

In this chapter the 13 success factors, which were identified for the Urban Nexus partner cities, will be described in detail. Each description includes a general definition of the meaning of each success factor as well as a neutral objective as target state. The success factors serve as a reference point and necessary basis for sustainable urban governance, which addresses the food-water-energy nexus in an integrated way, and can be used as an inspirational framework for all of the Urban Nexus partner cities. The success factors at hand can be understood as a collection of modules which can be assembled in different ways, depending on a city's individual background, to address each city's individual nexus strategy.

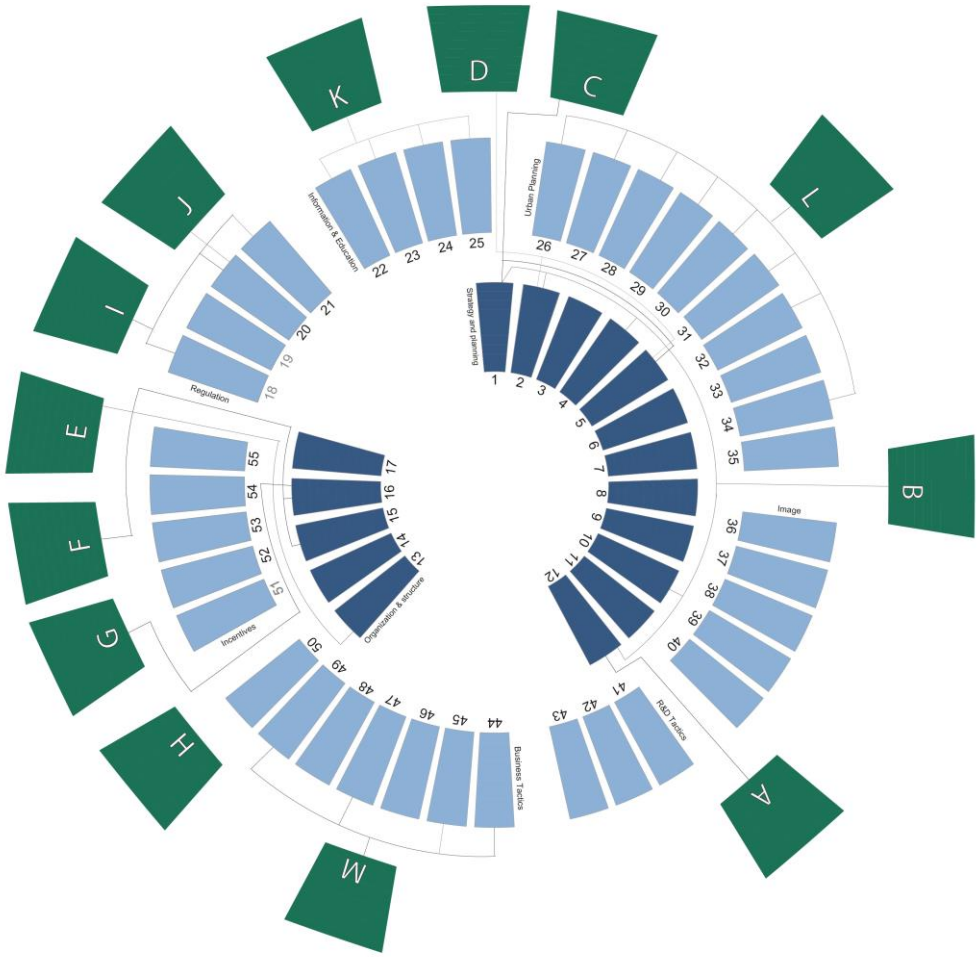


Figure 3: The extended Morgenstadt model (Fraunhofer IAO)

The Urban Nexus success factors (green) can be understood as a precondition to the m:ci success factors (blue); therefore their nature is of a broader kind, but not all of the Urban Nexus success factors have to necessarily be addressed in order to reach sustainable urban governance. A list of the 13 success factors is given in chapter 1.5.

2.1 Defining a City's Management Model for Strategic Value Creation (SF-A)

A management model for a city describes one major purpose for the city's being and source of value creation. Historically there have been a number of reasons for cities to develop: trading posts like Chicago, harbor cities as gateways like Istanbul, religious centers like Munster or university cities like Cambridge. While Brasilia's function is to offer a home for the national government, Sun City inhabits solely retired people. In the past the purpose of cities was strongly dependent on their location: e.g. by the sea, a lake or river, in a valley or on a hill, or on trading routes. To become a successful industrial city during the twentieth century implied the availability of natural resources, which were mainly processed close to the resource exploitation site, while the distribution of **human capital** along with political and cultural frameworks has become more important in post-industrial and service-oriented cities. Therefore, **reducing barriers for certain industrial branches or research fields** on a municipal or higher level are oftentimes used as a measure to strengthen certain focal points for urban development. It must be mentioned that the goal is not to create a single branch monopoly, but to **intensify existing strengths.** The target is to improve a municipality's chance in the worldwide city competition for inhabitants, industry players, and money. Over time a city's management model can change structurally or can be changed intentionally. The idea behind this concept is to stay competitive and create income.

The target for every city is to identify its strengths and potentials concerning certain industries and future markets and therefore, understand its own management model. Cities can then align their strategies for urban development, infrastructure projects, strategic cooperations, etc. with the management model and future vision for the city. Once a management model has been implemented and followed, it has to be constantly reviewed and developed further, along with technological development, internationalization, or other global trends. The management model supports **generating a defined city brand,** which can be used for marketing in the fields of inhabitants, businesses, tourism, etc., and supports at creating municipal income through taxes as well as wealth in the urban community due to secure jobs, etc. Understanding a city's major purpose enables decision-makers to consider possible impacts from neighboring industries and guides necessary short- and long-term development.

2.2 Comprehensive Sector Strategies for Strategic Urban Development (SF-B)

The term »strategy« describes the combination of single measures to form a complex long-term plan which follows a clearly defined goal. Even though the term's origins are in the military field, strategies can be used in different contexts, such as businesses, municipalities, or for the outline of individual careers. However, strategies do not only consider oneself but must also take into consideration competitors, as well as neighboring fields. By defining a strategy in the business field, mainly two questions are answered: »Where will I/we be in x years?« and »How do I/we make money then?». This approach is also adapted to cities: Even when focusing on integrated resource management in the context of the Urban Nexus project, sector strategies are defined by the municipalities, e.g. for budget allocation, which is oftentimes structured sectorally. Designing these sector strategies so that they foster an integrated approach, they need to cover all aspects relevant to this sector plus integrate neighboring sectors as well as key fields for all sectors, such as ICT. The best case would be to include thematic experts from the own sector as well as experts from other departments to

cross-check whether plans and decisions made for one sector have consequences on another one. Using synergies between sectoral projects and strategies is the goal of this procedure, aiming at creating best possible outcomes for as many sectors as possible and especially not wasting any potential or in the worst case scenario, hindering one sector's development due to a strategy in another sector.

The target for every city as a whole is to have an overarching development strategy in place, **including a vision and long-term goal(s)** in different action fields as well as across all sectors. According to the definition given above, a strategy for a city or a department includes not only a goal, but also a **catalogue of measures** taken in a **certain amount of time** to reach the formulated goal. These should then be developed in the city's departments as well as in a cross-departmental manner. The measures have to be in line with the city's overall strategy and have to be goal-oriented. To guarantee efficient management, **responsibilities** as well as indicators to measure whether an action has been successful have to be defined. Also including **monitoring and feedback units** and being able to flexibly adjust to unexpected developments are strongly recommended.

2.3 Good Financial Condition as Door Opener to Strategic Urban Development (SF-C)

Every city aims to be in good financial condition to employ a sufficient number of municipal staff members with certain expertise to guarantee a high service level, urban infrastructure implementation projects, maintenance of existing infrastructures, security measures, development projects, and savings for the future. A good financial condition means the ability, for instance, to withstand economic disruption and meet the demands of growth or decline. The path that has to be followed to reach this goal differs from city to city, depending on the national framework and geographical background, the city's management model, and the opportunity to create income, e.g. through industrial taxes. According to the Civic Federation (2013) there are four dimensions of solvency to analyze the financial condition of any national or local government: cash, budget, long-run, and service level. Analyzing and monitoring is the key to making improvements and reaching the set goals. It gives insight into the municipality's performance. The major goal is not to analyze the financial condition once, but to track changes constantly over time to identify potentials for increases in efficiency and savings as well as investment needs. SWP (2013b) states that »at the local level, poor infrastructure holds back potential for integrated and sustainable resource management« which needs to be addressed by investment. Moreover, to increase a city's financial ability by attracting investors, prestigious projects, e.g. also Urban Nexus projects, which are a role model to other projects within the city or the region, need to be financed.

Enlarging the **portfolio for innovative funding sources** is also crucial to improve performance. While micro credits, which have been in use and tested in a number of developing countries and might also be interesting for Urban Nexus projects (SWP 2013a), new ways of **crowd funding** – a large number of people donating smaller and larger amounts of money for a predefined cause, e.g. urban development projects – or more effectively **including citizens in financing projects** in their own urban quarters to improve living conditions on site, should be considered in the municipalities (cf. Interview #1311). Practice examples for these innovative formats include the redevelopment project Davis Island Pool in Tampa, USA, the installment of Glyncoch Community Center in Wales or the Memphis Civic Solar project, USA (The Guardian 2014). For such purposes, websites have developed which enable crowd funding, such as IOBY (in our back yard) in New York City or bettervest, which is specialized on

energy efficiency projects (ioby 2014; Bettervest GmbH 2014). In m:ci a **participatory budget** was identified as a success factor, since it enables the citizens to decide on which projects they would like to finance with the budget the city offers. Besides public participation in financial matters, identifying a **municipality's management model** and possibly **creating a city brand for professional marketing** can support improving the city's financial situation on a long-term perspective.

2.4 Usage of Statistical Data for Informed Municipal Decision-Making (SF-D)

Collecting, analyzing, and interpreting statistical data is necessary to track the performance of certain sub-systems in a municipality (e.g. mobility, energy, water, economy) as well as cross-sectoral developments and the total system's performance. Informed decision-making is built upon statistical data and implies more than knowing certain quantitative values that have been collected frequently, but having an understanding of interrelations between indicators and knowledge of how they may be rated and improved to make sure misleading presumptions are taken into consideration (FAO 2013). Having access to and taking into consideration all of the relevant facts before making a decision concerning urban development is the key to informed decision-making. It enables decisions to be made reasonable and comprehensible.

A target state for each city includes (1) knowing the city's performance and (2) being able to compare it to previous years as well as (3) being able to make prognoses for upcoming years.

In addition to statistical data collection on a yearly basis, e.g. in statistical yearbooks, to support informed municipal decision-making, an increasing number of municipalities worldwide uses modern information and communication technologies that draw quantitative information from real-time sensor data and automatically assess this data to support mayors and decision-makers in cities. Especially when decisions have to be made quickly, for example, when the security of the city's inhabitants is at risk, modern technologies are used to support decision-makers. Single projects implementing **control centers for automated urban data analysis** create big data, which has to be managed. Using such systems offers another advantage that the city benefits from over the long-term: Progressively filling up databases with data from previous decades as well as current measurements and fostering the information stored in such pools of knowledge make **prognoses** possible. Rating, for instance, the vulnerability of certain urban districts due to former storm or flooding damages and then adapting building standards and infrastructure norms to the individual conditions across the city can be one measure that profits from such data analysis. **Statistical data collection and sophisticated (real-time) analysis** is a success factor that could – if managed well – support improved urban development in all of the Urban Nexus partner cities. The open access to this data and contribution to it by different departments is necessary to improve integrated planning and knowledge exchange between sectors. Decisions made in one department must incorporate consequences which might occur in other sectors (SWP 2013a), therefore information systems are typically seen as method to avert market failure occurring due to missing or incomplete information (ibid.).

SWP (2013a) adds that moreover, future scenarios ranging from positive to negative extremes including predicted developments in different disciplines (e.g. environment, population, technology) and disruptive events should be considered for informed municipal decision-making.

2.5 Usage of Cross-Sectoral Communication Models (SF-E)

In every communication process there is a sender and a receiver of a message. In general three types of communication models are identified in communication science: a linear communication model, an interactive model, and a transactional model. The first model was introduced in 1948 by Laswell and describes a one-way linear process. The interactive communication model includes the assumption that feedback is involved in this process and thus, both actors take turns speaking and listening. The transactional model includes external factors, such as each actor's background and acknowledges that communication is a continuously changing process (Rogers 2002). There are seven buzz words, the seven C's, which help communication overcome barriers: Clarity, Credibility, Content, Context, Continuity, Capability and Channels. In the analysis at hand, a focus was put on the channels of communication. Besides this, continuity and credibility were implied by the interview partners.

The approach the Urban Nexus proposes states that »conventional policy- and decision-making in 'silos' […] needs to give way to an approach that reduces trade-offs and builds synergies across sectors« (SEI 2011: 7). Platforms for dialogue and »inter-agency« mechanisms are proposed by SWP (2013a), as well as budget for cooperative projects which are linked to certain food-water-energy nexus criteria. From a m:ci perspective the target state for the Urban Nexus cities can be described as creating **learning organizations** that monitor their structures and organization as well as their communication processes. While flat hierarchies and the inclusion of citizens in urban development processes are oftentimes seen as a success factors that reduce barriers in European and Western cultures, the two Asian cities analyzed in the course of m:ci showed that these are not the only applicable measures to reach the set goals. It is highly recommended in hierarchical cultures that inter-disciplinary exchange is supported and implemented top-down. Thus, strong urban leaders are needed who are supportive of a paradigm shift within their municipality.

Furthermore, m:ci identified **institutionalizing administrative structures for communal sustainable development** to be a promising measure to introduce cross-departmental sustainable urban development in a municipality. The key to its success is linking this administrative position directly to the municipality's mayor instead of one of the sectoral departments. This insight is in accordance with die (2013), stating that »it will require a whole-of-government approach, instead of being the exclusive remit of ministries of environment and/or development cooperation«. Integrated resource management needs to be institutionalized across all departments apart from »turf battles« (SWP 2013a: 70). Political will is inevitable to manage the integration of the Urban Nexus approach into urban planning and development (SWP 2013a).

2.6 Municipal Authority as Motivation for Responsible Urban Development (SF-F)

The m:ci project has identified **incentives** as well as **regulations** to be measures encouraging the municipality's **inhabitants** or **local businesses** to change their habits. SWP (2013) refers to the same mechanisms to realize a more efficient handling of resources and adds criteria: An adequate price setting which reflects all costs of the usage of resources. If a city wants its inhabitants and employees to think in an integrated way and behave according to it for more reasons than just financial benefits, the motivation has to be rooted deeper within the municipality itself. While it is acknowledged that the analyzed municipalities can only act in terms of the authority given to them by their national governments, it should be mentioned that »**increased municipal authority**«, e.g. in terms of budget allocation or changing organizational

structures, has proven to be a success factor for sustainable urban development in m:ci phase I. This means that most cities in the m:ci project have a certain authority and see this as important step on their path to sustainable urban development. Granting larger authority to a municipality will shift responsibilities towards the city and its leaders who will be held **personally accountable** for urban development, e.g. project sites, content of projects, followed processes, budget usage, transparency and inclusion of public opinion. The pressure they are experiencing to be re-elected forces the city's leaders to make reasonable decisions. It can also be assumed that local leaders are familiar with locally existing individual situations so that they can easily find locally-fit solutions which promise effective outcomes. But the assumption that any city which gains authority will automatically become more efficient in the usage of budget or the integration of resource management is wrong. Along with the sheer ability and mandate from the national level to act more autonomously, the capacities to fulfill newly gained tasks are absolutely necessary on the municipal level to enable responsible urban development and governance. To manage a successful transition, awareness and acknowledgement of the need for and the benefits of integrated planning within the municipal administration staff and the general public are crucial. Thus, this success factor (SF-F) is closely linked to SF-K »Sustainability Awareness and Motivation for Integrated Planning«. It is also dependent on the availability of urban leaders with the political will to promote the Nexus approach throughout their city.

2.7 Including Public Participation in Urban Development Structures (SF-G)

Involving citizens in urban decision-making enhances a **public consciousness for urban development, legitimates decisions** and prevents complaints in the aftermath. Citizen involvement starts at informing the public about plans (top-down) and stretches to asking a city's inhabitants what they want and need in their city, listening to and including suggestions, and making use of citizens that actively take responsibilities, for example, for a certain city quarter in terms of financing development projects, e.g. via crowd funding on the platform »IOBY« (ioby 2014) or enriching urban development by inter-disciplinary creativity, e.g. crowd sourcing as in the project »nextHAMBURG« (nexthamburg e.V. 2014). Private stakeholders such as non-governmental networks and forerunners who are responsible for nexus-relevant activities in the cities should be included as recommended by SWP (2013a). In addition, establishing inter-disciplinary panels for development projects with members of all affected groups within the urban population can be proposed to improve integrated development projects (SWP 2013a).

In general, the continuous growing process of all the cities analyzed in the Urban Nexus project leads to **limited municipal capacities**. Increasing the role of public participation in urban development seems like a plausible solution to meet this challenge. Furthermore, urban development that includes all of the relevant, affected stakeholders **promises agreement, understanding, and support**.

Below a number of benefits from public participation are listed for different steps of the process:

- **Planning process**: In addition to existing top-down planning methods, public participation makes use of the citizens' local knowledge of their city quarter, their daily habits, needs, and proposed priorities. Moreover, obtaining a wide range of various ideas for urban development in a creative process with people in distinct socio-economic levels with different points of view improves the number and creativity of proposed solutions. Collecting feedback and negative reactions from the

public early on in urban development processes and ensuring transparency in all activities, e.g. related to land acquisition, compensation, resettlement, and rehabilitation measures during urban development projects, improves the people's agreement and acceptance for certain development projects. (WWF 2007)

- **Decision-making process**: Ensuring the acceptance of certain projects or project designs by letting the city's inhabitants vote and letting the majority decide prevents future public dissatisfaction and possible needs for alterations or modifications and reduces pressure on municipal authorities and politicians. Furthermore, fully disseminating key information about the project to all of the affected persons and other stakeholders, such as local NGOs (e.g. project background, purposes, studied alternatives, possible environmental and resettlement issues etc.) can be part of public participation in the decision-making process.
- **Realization process**: Obtaining cooperation and participation of all of the affected people and relevant institutions throughout all of the phases of implementation to guarantee successful project execution and implementation.

Recent developments in countries all over the planet have shown the importance of civil society inclusion in decision-making to prevent public discontent and possible reactions against urban development projects, e.g. Stuttgart 21 (Germany) or Gezi-Park (Turkey) demonstrations in 2010 and 2013. But, what does public participation have to do with the Urban Nexus? Integrated planning does not only mean sectorally integrated, but also means including all stakeholders affected by urban planning and therefore the city's inhabitants. New formats offer potentials to design more efficient planning processes in the Urban Nexus partner cities, including integrative solutions.

2.8 Improvements in Specialized Expertise (SF-H)

To improve specialized expertise in the municipal administration, three focal points for action were identified in the course of the interviews conducted in UB, Da Nang and Korat: 1) integrating sustainability concepts and lifelong learning approaches into general school education to **improve a basic understanding** of sustainable urban development; 2) integrating **applied project work** in general education as well as higher education that prepares students for their future field of work; 3) expanding opportunities for municipal administrative staff to attend **advanced trainings, qualification workshops, and adult education classes** to keep up to date with current developments in their field of expertise and develop their knowledge further.

In addition, according to the Urban Nexus project goals, it is important to include **cross-sectoral capacity building** in all steps of education and training: Moreover, to encourage people to be **creative** and **innovative** and to get involved in urban development by **identifying interfaces and synergies** cooperatively. Ensuring cross-sectoral knowledge or knowledge that extends above the boundaries of one's own field of expertise creates wider acceptance for colleagues' work in other municipal departments and a better understanding of how the city functions. As already mentioned in context with the success factor »cross-sectoral communication models«, in strictly hierarchical systems, this has to be triggered and implemented top-down and supported from the highest municipal or even national level.

2.9 Accomplishing Successful Law Enforcement (SF-I)

While laws are made on the national level, cities have opportunities to introduce additional rules that support sustainable urban development. Since, in the Morgenstadt context, cities are the main focus of the analysis, law enforcement is examined only in

accordance with their effect on human actions in an urban context. Therefore, this chapter only highlights the characteristics of law enforcement, mainly the understanding of the value and the importance of law enforcement in general.

Simply having a set of laws does not create a functioning urban environment. But the people's interpretation and enforcement have to be looked at very closely to define the law's value. Law enforcement is oftentimes abrogated for example, when **knowledge about laws** is missing, when a breaking of the law is not detected at all, if there are not enough **capacities to control offenses** or no one can be held responsible for violations. On this account, some of the interview partners in all three analyzed cities stated the importance of **contacts for filing complaints** in the cities to expose deficits, for example, when buildings are not constructed according to permits. Modern forms of feedback mechanisms are based on smartphone apps or online platforms, e.g. Boston's »Citizens Connect« project (City of Boston 2014). Another reason for a shortfall of law enforcement is connected to the **gravity of penalties** or **the chance to buy the way out** of an official penalty either in currency or by »knowing the right people«. Furthermore, it is important for city officials to realize that even if the monetary penalties for the failure to comply with set standards are usually gained by the state, not by the municipality, the enforcement of a law still has additional value for the urban society and therefore, has to be given high priority. Transparency is therefore a major goal to be reached and increase law enforcement within the Urban Nexus partner cities.

2.10 Urban Services: Regulation and Incentives Creating Municipal Income (SF-J)

Urban Services include essential services that the city provides to its inhabitants as well as businesses located in the municipality. These cover, amongst others, clean water provision, sanitary sewer systems, street cleaning services and waste management, fire and security services, public transport services, lighting systems and urban health. Providing adequate services to all groups of inhabitants at urban densities and thus, higher capacities than rural areas, is the urban service provision's major goal. According to USAID (2013: 2), »[i]mproved urban services delivery [can be seen] as the key to unlocking the potential of an increasingly urbanized world«, especially in the context of the prognosed rapid urban growth in Asia and the coverage and security of urban services supply.

Gaps in urban service provisions need to be identified, and possible sources of regular long-term income need to be discovered, since improvements in service provision as well as maintenance of operation need to be guaranteed. Improving urban services can for example include: First, extending opening hours for municipal institutions to meet the needs of a more flexible urban population – this produces an **increase in labor expenses**. Second, the extension of an urban pipe system to reach new city quarters and provide their inhabitants with clean water or a sewer system – this necessitates **high levels of infrastructure investment** and leads to **higher running costs** for a larger system. Third, equal access to education or health services – this requires programs that **support the financially weak**. These three examples demonstrate that improving urban services usually creates additional costs. To achieve and sustain an improvement in urban services, income has to be created within the municipality and revenue amounts have to be able to account for additional expenses. **Increased market orientation** for urban service providers without giving the service provision completely over to private institutions has been identified in the Morgenstadt project as well as by USAID to be a major goal for municipalities to operate in an economically sustainable fashion. **Cross- financing between sectors** can be considered to support

those services that do not bring in the needed amount of money for sustainable development. (Fraunhofer-Gesellschaft 2013b; USAID 2013)

A concrete possibility to create income is the urban services themselves: by paying fees for certain services, the municipal's inhabitants contribute to improved service provision. Tariffs for drinking water, electricity provision, or waste collection offer great potential for municipal income, given that the city's inhabitants are able to afford the set prices. Introducing tariffs will affect the population: Firstly, they can be seen as regulations forced upon the city's inhabitants and businesses creating awareness for the implicit value of certain goods or urban services. Knowing about provision risks in the availability of water, energy, and food today and in the future, this awareness is absolutely necessary to manage an increase in the efficient use of resources. Secondly, if **consumption-oriented tariffs** are introduced, inhabitants or businesses that use fewer resources will be rewarded with lower costs. More efficient methods and products will gain interest on the market. Both, **restrictions and incentive mechanisms** can be used in the urban services field, e.g. to reduce energy and water consumption or waste production in the cities. In all three analyzed cities, consumption-oriented tariffs for different services are either already established or are being introduced or discussed at the moment. According to the interview partners, the current tariffs cannot cross a certain limit and therefore, are not able to cover the expenses the municipalities face. This problem is also discussed by USAID (2013) which states that **pro-poor delivery models** have to be established considering that a large number of future urban inhabitants will live in poverty. SWP (2013a; SWP 2013b) agrees and recommends pro-poor tariff structures, which are staggered depending on the size of a household and its income, to guarantee basic services to all.

2.11 Sustainability Awareness and Motivation for Integrated Planning (SF-K)

As discussed in chapter 1.2 the term »sustainability« has developed over time and to not assume wrongly, that every interview partner had the same understanding of the term »sustainable urban development« and to respect different cultural understandings and a variety of interpretations, the interview partners were asked what sustainability meant to them in the context of urban development in their city. The answers proved that there were varied understandings which mostly did not embrace all three dimensions of sustainability but focused on the environmental dimension. Hence, a comprehensive cross-sectoral understanding was present only to a limited extent. This hinders an understanding for the benefits and necessities of integrated urban planning as well. The nexus »must be placed on the political agenda« (SWP 2013b: 4) but to create long-term security for food, water, and energy provision, short-term costs will be produced. SWP (2013b: 4) examines the problems this indicates: »Unfortunately, political decision makers operate within short-term election cycles and tend to avoid taking on extra burdens within that time span«. Thus, the pressure from the public needs to increase, which requires an awareness and acknowledgement of the risks proposed by the current handling of the subject matter of the food-water-energy nexus. But this group of stakeholders – the public – is noticeably larger than the urban decision-makers, which implies a timely process of education and awareness raising campaigns until a large enough penetration rate is accomplished to raise expectations. Time we do not have…

Awareness of general sustainability topics in a city's population and in this context, understanding connections between certain actions and environmental, economic, and social effects, is crucial to sustainable urban development. So is an understanding for consistently following sustainable methods and the long-term nature of sustainability

itself. If awareness about the scarcity of certain goods, the predicted food, water, and energy risks as well as the irreversible impact of environmental damages is present amongst the public, a political will to introduce new forms of integrated resource management, which is more efficient and secures the provision, will grow (SWP 2013b). As die (2013: 3) concludes: a »'grow now, clean later' maxim is dangerous« and will most likely be more expensive than proactive measures now. The planetary boundaries make clear that »the world must become vastly more efficient in the way it consumes resources« (SWP 2013b: 5) and so do the quickly growing populations in Asia.

Motivation to behave sustainably in everyday life is mainly conflicted by an individual feeling of comfort or convenience when choosing less sustainable solutions, for example, using a private fuel driven car instead of public transport services that are powered by renewable energies. This motivation can be stimulated by **policies offering incentives** (e.g. financial benefits for fuel-saving cars) when acting sustainably or by **creating a normative understanding** (e.g. by putting a value to ecosystem services) and **social pressure** to act sustainably. Furthermore, regulations and penalties can motivate the people to act more sustainably. Again, a mix of measures needs to be individually chosen. It can nevertheless be stated that for cities that lack law enforcement, incentives promise a higher level of motivation than regulations.

Probably the best solution is a mix of measures to increase awareness across all stakeholders within the cities: Strong urban leaders, top-down incentives and regulations, specially trained municipal staff, broad awareness campaigns and education programs, etc. »When it comes to mobilizing the political will, the UN's post-2015 agenda and the post-Rio+20 process of formulating the SDGs or the water, energy and food sectors will play an important role« according to SWP (2013b: 4), but it will not be enough to pave the way for the Urban Nexus cities in the future.

2.12 Establishing Successful Urban Planning Tools (SF-L)

Urban planning is integrated into a national framework, which defines potential opportunities for municipalities to design their local variations in urban development. Every city has the public duty to enforce urban planning in their municipal area. Urban planning should be reasonable, sustainable, and with vision for the uniqueness of a territory. The city's inhabitants' rights and safety should be the highest ranking priority in urban planning and for decisions made within the municipality. In this context, minorities have to be respected and considered. To fulfill these requirements, mandatory and optional urban planning tools are used and if necessary, modified to meet local requirements. A healthy balance between bureaucracy, mandatory laws, execution reality, and optional tools must be found. **Mandatory tools** are laws and norms that the state has power to enforce in urban planning. As mentioned in chapter 2.9, laws and norms are only considered valid and useful if there is the will and power to enforce them. Taking this as a requirement, urban development can additionally be influenced by **optional tools** on municipal level, e.g. locally higher standards than the national ones (as the m:ci practice example shows for a city quarter in Freiburg, Germany) or nexus-criteria for development projects as SWP (2013a) recommends.

When using the term »tools« in urban planning, primarily plans of different scales, commandments, prohibitions, or communal charters come to mind. The GIZ baseline study asked whether a city had existing regional, local, and master plans in use, a question which all of the three analyzed cities answered with YES. In the conducted interviews it became clear that the existing plans are **updated on a regular basis** and are **formally functioning well** (cf. Interviews #1105; #1803; #2708; #2709). But,

according to the interview partners, there are issues occurring within the context of urban development engagement in informal arrangements. For example, in UB, informal apartment buildings are built because there is no regulation fining such violations in formal urban planning (cf. Interview #1105). Also, due to the law that every Mongolian citizen has the right to own 0.07 hectares of land that is not occupied already, urban development is sprawling in the directions the citizens steer it instead of the experts' planning. In Korat it was stated (cf. Interview #2607) that the use of building codes instead of comprehensive urban planning in form of a master plan is commonly used by and promoted across municipalities, as it is a more convenient and quick way to regulate urban development in the region. These interview answers show the limits of urban plans. Furthermore, the **quality of such a plan**, its distinct content, or means of enforcement are highly relevant. Therefore, in the context of the Urban Nexus and governance recommendations, a concept to objectively measure and compare the urban planning tools at hand has to be developed. It also has to be considered that a master plan may mean something else in different languages.

The variety of available urban planning tools reaches much further than the three named plans. Selle & Wachten (n.y.) have identified six clusters of urban planning tools: regulatory instruments (e.g. building right), modes of working that target communications or persuasion, sources of financial support, communal participation in the market (e.g. acquisitions of lots for transfer phases), developing locations by urban investment (e.g. creating »addresses« as in the Bilbao effect) and finally, process management. Besides regional, master, and local plans which are integrated in the GIZ baseline studies, the following list shows a selection of possible tools which could be considered by the Urban Nexus partner cities for the future:

- Rescue master plans including places of refuge and vulnerable area plans for **civil defense** responsibilities, optimally based on **scenario-based vulnerability studies**.
- Introducing **supportive programs,** such as **financial incentives,** to motivate stakeholders in a non-forceful manner to apply the city's long-term development wishes particularly with regard to integrated resource management.
- Establishing **life time building standards** or **quality standards** not only for buildings, but for any infrastructure construction work including methods, processes and procedures and at the same time an institution for monitoring purposes.
- Focusing on **nature protection and rehabilitation** as well as biodiversity improvement spaces in inner city areas.

As for many other success factors, it has to mentioned that these instruments cannot be seen isolated but must be integrated into a **comprehensive strategy**. The dependencies between different tools have to be understood by the professional staff and therefore, loopholes identified and in some cases even used for urban development, e.g. active installment of certain businesses in a city quarter to improve living standards as has been managed by locating the European Patent Office in a former run-down city quarter in Munich, Germany. Benefits from a comprehensive strategy are amongst others: Controlled city expansion area wise, a consistent urban landscape, allowing resources which are usually thought to be ubiquitous by humans to recover, e.g. fresh air corridors, water sheds, or controlling the rent level.

2.13 Acknowledging Private Sector Inclusion in Urban Planning (SF-M)

The city-related consequences of decisions made in the private sector are made visible when a company announces the opening of a new branch or factory. The decision is almost devotionally awaited by possible candidates, because it is connected closely to tax revenues, work security, and an increase in attractiveness for (service) suppliers as well as inhabitants. It became clear in some of the interviews, that attracting private industry is a major challenge for the municipalities. Thus, they fear scaring the private sector off by having high regulations or by not being able to offer them incentives. **Offering space for innovation and creation** as well as **business development**, is seen as an important long-term factor for economic stability – but not at any price! Restrictions securing the ecosystem's recovery and enabling secure food, water, and energy provision on the long-run need to be considered. Besides **attracting the private sector** to settle and stay in a municipality, the **founding of enterprises and start-ups** has to be focused on by any city. To accomplish economic sustainability in a healthy way, a strategy has to be followed which **defines certain business fields of interest** and includes incentives and regulations within this context. For example, emissions and waste production or water and electricity use have to be considered to prevent attracting businesses that stress the urban environment more than they add value.

A topic discussed to a lesser extent is how businesses can add direct value to the city they are located in and setting urban development impulses. There are different forms for private sector commitment in urban areas dealing with urban development: **crowdsourcing, sharing-models, commercial street management, business improvement districts (BID), vacancies management**, etc. can be named as possible forms of inclusion. Moreover, »**corporate social responsibility**« has become a keyword over the past years, which describes private industry actor commitment in urban development. Meisterhans (2014) states that »The UN, World Bank and International Monetary Fund (IMF) champion corporate social responsibility as an element of good governance.« The major idea behind this concept is binding companies to caring for the environment they are located in and taking actions to improve this environment. What factory owners have been doing in Great Britain since the Industrial Revolution was offering housing, schooling, and health services for their employees. The advancement in today's society could be seen in offering benefits to the whole city quarter the company is located in instead of only their employees. For instance, sponsoring extra-curricular activities, a sports stadium, a park or opening the company grounds to cultural events and exhibitions for the public to attend. The question in this context is not only which roles can the private sector play to add value to urban development, but also which synergetic effects can be expected from a successful coexistence of public and private stakeholders. Benefits for the municipality can be seen in reducing the group of people that needs to be provided with services by the city itself and therefore, improving the quality of service provision for those that remain. Benefits for the private sector are found in an improvement in the company's image, the employee's satisfaction, and their motivation to work for such a company, and thus, less fluctuation can be expected.

Last, but not least, SWP (2013a) states that stakeholders who undertake nexus-relevant activities within a city (e.g. non-governmental organizations, insurance companies), should be acknowledged for their power to mobilize and contribute to the overall effects of the nexus approaches.

3
Impact Factors Identified in the Urban Nexus Cities

The impact factors for Nexus-conform development listed in this chapter have been named by the interview partners when asked which factors are barriers to successful urban development and which are supportive. The factors are formulated in a neutral way and have been summarized to only cover what can be put in context with the urban governance success factors in chapter 2.

National level politics
Describes the influence that decisions on the national level have on urban development. They can be both supportive and limiting for the municipalities' chance to flourish.

International attention
Describes the positive pressure created by international attention for a city in general, e.g. in terms of environmental protection, as well as possibilities offered by this attention, e.g. in terms of funding.

Collective understanding
Describes a common code of behavior in the local urban culture which is based on solidarity and a collective understanding of the urban population with common goals and rules of living closely together in an urban environment.

Poverty
Describes the correlation between poverty and sustainability in terms of financing sustainable actions and ways to motivate the urban population to act sustainably.

Rural to urban migration
Describes not only the need to enlarge services and infrastructure supply within the city boundaries along with a growing population, but also the chances it brings for cost effectiveness, e.g. in terms of public transport, and the social issues it might cause due to a possible difference in culture, education, religiousness, skilled expertise, etc.

Fast city growth
Describes mainly spatial growth and the city administration's chance to monitor urban development (e.g. compliance with norms or consistent city scape) and intervene if necessary. Fast spatial city growth affects the city's surrounding eco-system and its capacities to serve the city and its inhabitants, e.g. fresh air production.

Urban planning capacity building for citizens
Describes the need to not only offer specialized expertise in the city administration, but also strengthen common knowledge about urban planning as well as building standards, insulation norms, processes, responsible contact persons, and rules on property level in the broad population.

Transparency
Describes transparency of municipal administration structures, e.g. responsibilities, processes, information distribution, as well externally (to the public society) and internally (to members of the city administration).

Cross-departmental knowledge-sharing
Describes the value of knowledge, e.g. quantitative indicators, planned projects, former project results, etc., which is shared across departments to ensure efficiency and an inter-disciplinary understanding within the city administration.

Specialized expertise
Describes improvement of specialized expertise or up-to date knowledge of processes, structures, standards etc. within the municipal administrative staff.

Occupation of positions
Describes the process of filling positions in the municipal administration, either according to personal contacts or according to expertise and the consequences following such a decision.

Acceptance for other department's tasks
Describes the knowledge about the city administration as a system which needs all of its departments and staff members to function well. Also the knowledge and acceptance about other departments' tasks, goals, visions and contact persons for certain topics.

Short-term thinking
Describes the clash between short-term goals and the long-term nature of sustainability for which a continuity of actions is needed.

Integrity
Describes the influence that non-official agreements have on the realization of a city's sustainability goals, e.g. due to avoiding the agreed upon standards and norms or corruption.

Delay of budget allocation
Describes the limited possibilities to plan and implement projects for sustainable urban development with a long-term focus due to a delay or loss of budget.

Bureaucratic and long processes
Describes inefficiencies in the city's administrative processes, e.g. when gathering information or reaching responsible contact persons.

Outdated infrastructure, hard- and software
Describes inefficiencies in the municipal administration due to the use of outdated hard- or software, missing tools to support the staff's daily work, or limited access to those tools. Also outdated infrastructure oftentimes limits sustainable urban development, due to high maintenance costs and capacities in general.

4
City Profiles: Success Factors & Recommendations for Sustainable Urban Governance in Three Nexus Cities

This chapter presents the interpretation of the benchmarking results. Besides city-specific results and recommendations, a number of general recommendations could be drawn from all three of the Urban Nexus partner cities. It has to be taken into account, that the recommendations are based on the interviews which were conducted in the UB, Da Nang, and Korat. Therefore, such recommendations are highlighted in this report, which are closely related to the current problems identified by the municipal staff and local experts. The Morgenstadt approach follows the premiss that individual local characteristics have to be taken into account when analyzing cities and making recommendations. Accepting this as key to the Morgenstadt approach, the three most limiting success factors for urban governance and development across all three analyzed cities are:

- Usage of Statistical Data for Informed Municipal Decision-Making.
- Improvement in Specialized Expertise.
- Usage of Cross-Sectoral Collaboration Models.

Usage of Statistical Data for Informed Municipal Decision-Making

In general, this success factor is not yet recognized for its value by the decision-makers in either one of the three Urban Nexus partner cities. When talking about the need for changes in paradigms, acknowledging the importance of statistical data is one major lever. Recognizing that not only the sheer data collection, but its aggregation and analysis to generate knowledge is the key to sustainable municipal decision-making. Obviously the collected data is the basic precondition for this mechanism to be able to function.

The availability of SPI-indicator values in the three Urban Nexus partner cities that have been analyzed needs to be improved to enable comprehensive city analysis and comparison. A difference in availability between state, pressure, and impact indicators (see chapter 1.4 and Annex A2) was detected, mainly the first are being collected at the moment. In all three cities, values vary widely and answers given in the interviews and other sources are contradicting. This observation is in accordance with the SWP's (2013a) statement that data availability and evaluation need to be improved to enable risk analysis in the Nexus context and to guarantee reliable data, more capacities are needed. The distribution of relevant and trustworthy information to all municipal departments as well as to the public is necessary to use the full effectiveness of the collected information for the city as a whole and will on the long-run enable benefit sharing by multiple use of resources (ibid.).

Measures to improve this success factor are for example, creating awareness for the importance of statistical data collection **from top level** of a city and **reserving time in the staff's work hours** for it. Also, collecting funds that **finance regular data collection** or the **implementation of measuring devices** can be seen as measure to improve informed municipal decision-making. The first step is data collection and the second step is creating **topic-related indicator sets** (SF2), e.g. sustainability, health, climate change. In this context, collecting data that specifically directs the **development of urban structures and population** is necessary, e.g. type of buildings, population structure in certain city quarters, etc. Indicator sets will improve

knowledge about the characteristics of the Urban Nexus in each city if indicators are used that are interlinking different sectors, e.g. water and energy: How much energy is used to treat one liter of water? Or how much energy is used to treat one liter of waste water to meet the standards for it to be released into the river? Moreover, the number of ratio values in the indicator sets should be increased. This has proven difficult due to missing accountable population numbers in the entire three Urban Nexus partner cities in which interviews were conducted, since a large amount of ratio values is per capita based. The large number of unregistered settlers in the cities makes the calculation of ratio values impossible. A set of Nexus indicators on project base can furthermore be recommended and installing a Nexus Impact Assessment in political decisions (SWP 2013a). Finally, **trainings** throughout the different levels of the municipal administration have to be acknowledged for their importance and integrated into existing structures. In this context, trainings that teach the municipal staff how to collect, store, and interpret data from one's own department and from other municipal departments, especially about the dependencies, is quite important to improve the database and the foundation for informed municipal decision-making. This is the sheer basis to introduce **evidence-based decision-making**, which is one of the success factors identified in the six Morgenstadt cities. As of now, in none of the analyzed Urban Nexus partner cities this was named as practice, e.g. in identifying vulnerable areas from flooding in the city. The exposure to natural hazards can be rated high in Ulaanbaatar and Da Nang and therefore states the vulnerability of certain urban quarters. Vulnerability analysis on a small scale is not addressed sufficiently on municipal level and its potential can therefore not be used for urban decision-making. Measuring vulnerability of certain cities or city quarters by looking backwards in history does not meet the needs for sustainable urban development, especially in the faster growing cities in Asia. Instead, forecasting the consequences of natural or man-made disasters by considering scenario analysis and creating plans, e.g. escape routes, for different scenarios is urgently necessary. According to SWP (2013a) in the past, risks were oftentimes politically assessed ex-post, which cannot be continued when so much is at risk for future generations.

One measure to improve the current perception of data collection to be a time-consuming and unessential task which comes along with certain municipal positions could be **decreasing bureaucratic hurdles** for the exchange of data between departments. Entering data directly into a **digital database** instead of asking for every piece of information separately and assuring municipal staff logins to see the necessary data could be one simple measure which on the one hand improves the employees' perception towards statistical data and on the other hand saves time and resources within the municipality on the long run. On the short-term increased coordination will produce costs and inefficiencies. A well-planned and managed system is thus necessary (SWP 2013a). **Responsibilities** about the collection, the entering, and the monitoring of the data have to be communicated from the top level and given full support. Knowledge about the city system's performance is absolutely necessary to be able to make effective improvements.

Suggested measure:

- Establishment of **open data platforms for evidence-based urban decision-making** as a critical success factor for integrated planning and efficient resource management, including Urban Nexus focal points as key areas of interest. As an example, please see Berlin Open Data Portal.

Improvement in Specialized Expertise

Trainings in general should be made necessary for municipal staff to guarantee their technical and professional knowledge to be up to date and to improve learning organizations in the municipalities (SF14). A number of interview partners across all three analyzed cities stated that either in their own department or in neighboring departments, trainings for the staff members are needed to improve specialized expertise. Based on the Morgenstadt model and the best practices analyzed in the six cities within the project, it has become clear that systemic change happens when sustainability is broadly understood and practiced within the municipality. Therefore, the analysis of the three Urban Nexus partner cities has shown that not only do experts need to stay up to date with their expert knowledge, e.g. as architect about new more energy efficient materials, or as urban planner about new concepts and worldwide best practice examples for sustainable urban development, but also does knowledge need to be integrated in an overarching way across all sectors, departments and ages.

Trainings for municipal staff and especially the leaders to develop their professional knowledge as well as their knowledge of sustainability and cross-sectoral dependencies is recommended. Possibly, introducing a point system for attended professional workshops and trainings and linking it to a pay raise system. **Reserving time for training sessions** within the working hours, **creating a position for staff development** in the municipality who organizes training opportunities, and even forming cross-departmental groups attending those workshops and trainings improves cross-sectoral understanding as well as getting to know other departments, their staff, and their tasks. This measure will – as a basic instrument – strengthen the understanding for the Urban Nexus and the many interlinkages it addresses across sectors. Furthermore, it will enable cross-departmental exchange and thus activate the municipality's staff members' potential.

Offering **sustainability days, sustainability classes, or sustainability projects,** that include the Urban Nexus approach and are not only included in general school education, but are also targeted toward adults, can impart knowledge about the connections between personal actions and effects on the environment (see Morgenstadt success factors SF23, SF24, SF25). This can have a positive impact on the participants' families and spreading of sustainability awareness and knowledge, as mentioned in one school project in UB (Mohr 2014c). What is quite important in this context is the organization and execution by staff that is skilled in sustainability as well as proper didactics to not only provide the content, but to also make sure that it reaches the target group. Changing the peoples' perception about certain traditional behavior and integrating sustainable decisions into their everyday life asks for a constant integration of sustainability topics into local media and schooling for example. The following example sees to illustrate how the perception is a major key to an actual behavioral change: In many countries in Asia or South America, traveling by bike, walking or using public transport are signs of poverty. These modes of traffic are therefore avoided whenever possible while many families equate their improvement in social status with the ownership of a private car. Seeing the more sustainable modes of traffic as such and benefiting from using them will be one goal for many Asian cities to improve the quality of urban life. In urban planning this means that an overall understanding of sustainable urban development is needed. Banning bicycles from the cities as has happened in Calcutta (BBC News India 2013), or banning e-bikes in Beijing (Zeit Online 2009), obviously is the wrong approach to sustainable urban development. But such devastating decisions for sustainable urban development are made whenever knowledge about inter-relations between perception and action is not existent or not taken seriously and when decisions are solely made on behalf of one sector – in this example mobility.

Suggested measure:

- Design and implementation of a **comprehensive capacity building program for continuous specialized expertise improvement** within the municipalities addressing urban governance and considering international experts to integrate a holistic understanding of integrated resource management, in this context.

Usage of Cross-Sectoral Collaboration Models

The communication models in all three analyzed Urban Nexus partner cities are strictly hierarchical and organized in a sectoral way when looking at the channels for communication. This limits **cross-departmental and therefore cross-sectoral and inter-disciplinary exchange,** which is highly valuable for a comprehensive awareness of the interlinkages between sectors and the acknowledgement of the importance of integrated planning and resource management. Therefore, if strict hierarchical structures are existent, as is the case in all of the three cities, cross-sectoral communication has to be actively implemented from the top level. This can, for example, be managed by organizing interactive trainings and workshops with attendants from different departments who actively have to participate and communicate about certain topics with each other during the workshops. Also, encouraging cross-departmental data and information exchange from the top level will be necessary to decrease bureaucratic efforts. As has been mentioned before, most often it is not the acceptance of security risks within the Nexus, the availability of technological solutions or concepts, but the political will (SWP 2013a).

Moreover, in typical modern communication models, there is not only a sender and a receiver, but also feedback included in the communication process to guarantee a long-term evaluation and improvement of structures. Incorporating **constructive feedback mechanisms** into municipal administration structures will hence improve cross-departmental acceptance and knowledge sharing as well, for example, by offering feedback cards on which staff members can write serious ideas for efficiency improvement in the given processes or online platforms which enable exchange of ideas for improvement.

The **Urban Nexus task forces** do have the potential to integrate cross-sectoral thinking and cross-sectoral projects in the cities. They consist of local experts who not only know and understand each city's individual characteristics, but also have knowledge of path dependency, previous development plans, projects etc. Their installation is one of the success indicators for the Urban Nexus project and their work consists of »breaking open of silo thinking«, including different levels and sectors, and assessing concrete investment projects for their nexus-compliance in the cities (UNESCAP 2014). Their installation is step one to cross-sectoral cooperation, but incorporating the benefits of cross-sectoral work and understanding into every day urban development needs to address a larger group of people within the cities (SWP 2013a). The Urban Nexus task force's installment and permanent work throughout the Urban Nexus project – and hopefully even beyond – are therefore seen as great opportunity to secure the provision of food, water, and energy in the Urban Nexus partner cities.

Suggested measure:

- Creation and establishment of **cross-sectoral joint projects** enabling benefit sharing for all stakeholders and design of **motivational schemes for inter-disciplinary collaboration,** e.g. support from top level to work interdisciplinary**,** which will enhance a broad cross-sectoral understanding and enable integrated planning based on the nexus approach.

4.1 UB City Profile

As the coldest capital in the world, UB faces a different initial position than the other Urban Nexus partner cities and faces a different set of challenges and opportunities. The extreme temperatures as well as the fact that UB is the only capital included in the Urban Nexus project make UB unique. Furthermore, Mongolia's culture is based on nomad life moving in gers across the vast pasture lands during the short summers. UB's major challenges and opportunities as identified in interviews with experts in February 2014 are listed in the following box:

- Rapid urban population growth and urban sprawl[1]
- Lack of infrastructure expansion along with urban growth[2]
- Informal buildings hinder planned urban development[3]
- City-wide air pollution mainly due to burning raw coal in stoves[4]
- Spreading of soil contamination[5]
- Finding new reliable sources of drinking water[6]
- Introducing consumption-oriented tariffs[7]
- Pollution of river Tuul by waste water[8]
- Energy production at its limit[9]
- Search for decentral short-term solutions for electricity and heat production, water supply and waste water disposal services[10]
- Missing long-term strategic approach reaching across election terms[11]
- National decentralization efforts to decrease pressure on the capital city[12]
- Improving the urban environment by installing green areas[13]
- Direct communication and anarchical societal let us assume that change of deadlocked processes and structures is easily possible, while the principle of seniority and the suspiciousness of foreign consulting prevents of an atmosphere of constructive debate[14]

Figure 4: UB's major challenges and opportunities at a glance according to the interview partners (Fraunhofer IAO)
[1]Cf. Encyclopedia Britannica 2014a; GIZ 2013c; Statistics Office UB 2012; UN Habitat 2013; [2]Cf. ADB 2008; Interviews #1001; #1206; #1412; [3]Cf. Meikle 2011; Interviews #1003; #1105; Discussion #0201; [4]Cf. No Author 2007; The World Bank 2009; Interview #1002; [5]Cf. GIZ 2013c; No Author 2007; Sorokina & Enkh Amgalan 2012; Interview #1310; Mohr 2014c; [6]Cf. No Author 2007; Interviews #1206; #1002; #1001; #1105; #1310; [7]Cf. No Author 2007; Interviews #1206; #1208; [8]Cf. No Author 2007; Mohr 2014c; Interview #1206; [9]Cf. GIZ 2013c; Mohr 2014c; The Mongol Messenger 2014; [10]Cf. Interviews #1002; #1206; [11]Cf. e.g. Interviews #1002; #1001; [12]Cf. Interviews #1001; #1104; [13]Cf. Interviews #1003; #1310; [14]Cf. GIZ 2011c

The main impact factors which were named by the interview partners as supportive of urban development in UB are:

- Specialized Expertise in the Municipal Administration.
- Cross-Departmental Knowledge Sharing.
- International Attention for the City.
- Internal and External Transparency of Structures, Processes, etc.

This list depicts which factors need to be addressed and focused on to generate a successful basis for integrated resource management as approach to sustainable urban development and to improve the success factors' positive development. The same goes for the impact factors that hinder sustainable urban development in UB, but this picture was quite differentiated and no consensus was reached by the experts – this shows that the hindering impact factors depend greatly on the department or position an interview partner was in and differ for the success factors looked at.

The following figure shows the extended Morgenstadt model. For a detailed explanation of this model, please see the chapters 1.4 and 1.5 as well as Figure 2 on page 11. The brightly colored filling in the segments stands for the extent to which a certain success factor is present in the analyzed city at the moment.

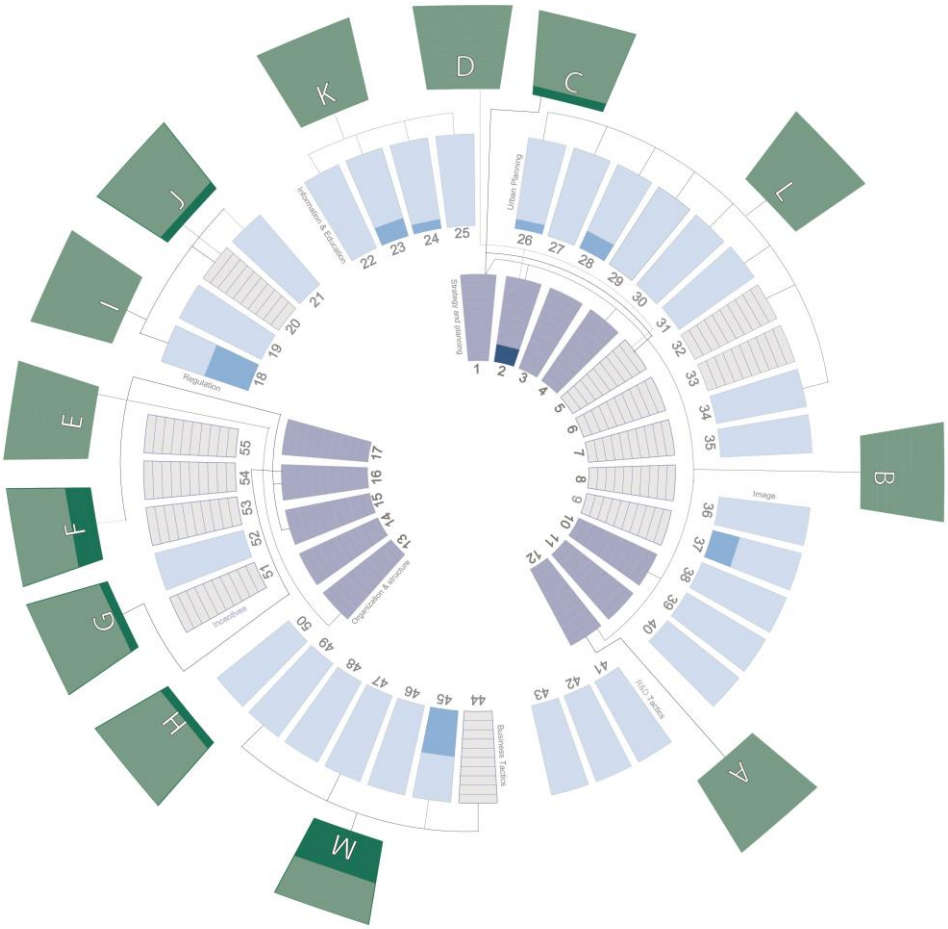


Figure 5: Urban Governance City Profile Ulaanbaatar (Fraunhofer IAO)

This city profile shows that six success factors which have been identified in m:ci are being addressed by UB and offer high potential for urban development if addressed thoroughly in the long-term:

- Definition of indicators; creation of a performance measurement system for sustainability and climate change (SF2) – *The definition of a sustainability indicator system is currently in process in UB.*

- Regulation of building processes (SF18) – *There are regulatory guidelines and rules existent in UB, but law enforcement and the procurement for deliberate non-compliance pose a problem.*
- Awareness/Education: Creating awareness for sustainability through the integration of sustainability issues in education and information campaigns (SF23) – *The school refurbishment projects across UB can be seen as a measure that adds to awareness raising, since the school children spread their knowledge about energy-efficient buildings or waste water use and treatment within their families.*
- Development and implementation of market and center concepts (SF28) – *According to the conducted interviews, UB has defined certain sub-centers in the city within the master plan that shall be focused on for further local development and to reduce pressure on the current city center, especially considering traffic congestion and air pollution.*
- Creation of a green, attractive urban environment for creating a green image (SF37) – *Over the past year, the city planted public urban places and improved the green urban image. Due to the short summers and extreme cold winters, the annual duration for such green areas in UB is strictly limited. For example, integrating an urban forest aisle or a green belt with local species that can manage the unique climate could be considered. Access to those spaces must be free to the public.*
- Assignment of urban development tasks to large private companies (SF45) – *see the success factor »Acknowledging Private Sector Inclusion in Urban Planning« for more details.*

Furthermore, the most promising Urban Nexus success factors in UB are:

- Acknowledging Private Sector Inclusion in Urban Planning (SF-M)
- Defining a Management Model for Strategic Value Creation (SF-A)
- Sustainability Awareness and Motivation for Integrated Planning (SF-K)
- Municipal Authority as Motivation for Responsible Development (SF-F)
- Urban Services: Regulation and Incentives Creating Municipal Income (SF-J)
- Accomplishing Successful Law Enforcement (SF-I)

The Urban Nexus success factors' current status and expected possibilities for improvement will be described in detail in the following paragraphs as well as certain initial recommendations will be given.

Sustainability Awareness and Motivation for Integrated Planning

Sustainability awareness in UB consists of mainly environmental (cf. Interviews #1001; #1002; #1003; #1206; #1311; #1412) and, to an extent, economic (cf. Interviews #1002; #1104; #1105; #1208; #1310) aspects in the city administration, according to the interview partners. Thus, no interview partner's definition described a comprehensive understanding of the three dimensions of sustainability, nor has the Brundtland Report definition been referred to once. Awareness for environmental issues is probably higher because air pollution and water quality are two of the most pressing issues and visible for UB's citizens. For example, banning certain license plates from traffic each day during the week creates an awareness of air pollution. In the

interviews, it has oftentimes been criticized that »others« need to be taught what sustainability means instead of thinking about personal ways to contribute to improvements. Apart from this observation, compared to the municipal and national staff, the interviewed NGO deals with social aspects of sustainability and is thus covering such topics when explaining the term.

As long as there is no comprehensive and integrated understanding of the meaning of »sustainability«, introducing Urban Nexus projects, which follow an integrated approach across sectors, can be considered difficult. Overall, a common understanding of the necessity and benefits of projects integrating the sectors food, water, and energy, would help the municipality to become more sustainable. Currently, sectoral thinking creates insuperable barriers for future-oriented, long-term precautionary politics. In addition, most interview partners gave the impression, that on the municipal and national level, staff is mostly motivated to respect sustainability issues, only if economic profit or personal career benefits can be expected from it. This is in conformity with the SWP (2013a) statement that short-term thinking on political level is widely spread and can only be met by public pressure. Due to the importance of personal contacts and networks, **leaders that support and promote sustainability topics are needed urgently** in UB

At the moment, there are not many incentives available on citizen level, which promote resource efficiency and thus, benefits are not visible to the public. Pilot projects have shown that insulation improvements in apartment buildings decrease heating costs as well as emissions and other pilot projects dealing with installing meters to measure water consumption and to introduce consumption-oriented tariffs have proven reasonable, but the investment costs are still considered high. Pro-poor staggered tariffs for water and energy consumption on a consumption-oriented basis need to be implemented quickly to raise awareness and understanding for the value of these goods. The key word is **incentives for resource-efficient behavior**.

Moreover, a **broad and long-term campaign,** including a number of different projects which are organized and monitored by one institution and address every section of the population, can be recommended to create awareness for this topic. Whether this campaign addresses solely integrated resource management as the heart of the Nexus approach or overall sustainability topics with a special focus on the Urban Nexus is dependent on the possible capacities. Anyways, this campaign should include marketing in terms of TV commercials, billboard signs, but also educational programs for professional staff and the general population. Furthermore, a festival with different activities can be integrated to reach as many UB citizens as possible. Once such a campaign has temporarily brought attention to the topic, regular events have to take place in the city and the municipality to keep the citizens' interest. If at the same time, monetary and non-monetary incentives for the involvement in sustainable actions is introduced and violations are exposed to the public, this might have a big impact on the Mongolian capital and the **initial awareness** that has to be created. What is important to keep sustainability on UB's long-term agenda is the **cross-party understanding and agreement** that integrated resource management should be on every party platform, and therefore, a common understanding between the parties has to be reached as well as a cross-party panel institutionalized dealing with Nexus topics.

At the same time the usage of statistical data for informed municipal decision-making should be addressed and the development as well as the implementation of comprehensive sector strategies will automatically be improved once **awareness for integrated planning** is reached. Organizing cross-departmental interactive workshops will until then serve for **knowledge exchange** and hopefully **identification of synergies** and common necessities in different departments and sectors that can be combined in projects. In context with the Urban Nexus, it has been shown that

»security of urban service supply and health« was one of the aspects named by interview partners when asked for a sustainability definition. Urban service supply can be understood as the supply of energy production, water distribution, and waste water treatment, waste collection, food supply, etc. Also »working profitably as urban service provider« was named in a number of interviews and seen as a hurdle for sustainable development in UB at the moment. In the Urban Nexus understanding, sustainability can only be reached by integrated resource management and projects that abide to this idea. Therefore, an understanding for the terms »integrated«, »comprehensive« or »sustainable« needs to be created as common basis for sustainable urban development, specifically urban development coherent with the Urban Nexus approach.

Defining a Management Model for Strategic Value Creation

For UB no concrete management model could be identified in the course of this city analysis project. Defining a management model will enable UB to develop a long-term strategy not only for urban development, but for urban development in accord with economic targets and set goals. Therefore, it will help improve UB's financial situation to guarantee long-term financing of development projects in the future. What is of utter importance is the understanding and acceptance of such a management model across political parties and other temporal acting institutions.

Some interview partners (cf. Interviews #1002; #1104; #1309; #1310) mentioned the **mining industry**, as a focal point for Mongolia's industrial development, which could be established into a comprehensive management model and which offers great potential for improvement within the water-energy Nexus (ADB 2014). Being the seat of government would be another aspect to describe UB's orientation, but the capital offers much more than a sole governing city like Canberra or Brasilia. By doing an **image analysis**, UB could find out, what the city's inhabitants perceive as outstanding for UB and also what people internationally associate with Mongolia's capital. The social sciences offer a portfolio for such analysis, including methods like analyzing the most used pictures in tourist guides. Including public participatory approaches in the process of defining UB's management model, can be considered relevant, because the model will later gain the inhabitant's acknowledgement and support during an implementation phase. Especially interesting is the difference in internal and external perception of UB, meaning how UB citizens see their capital, how other Mongolians see their capital and how people from different states and cultures around the planet see UB. On basis of this current image of Mongolia's capital, a **suitable management model can be developed together with the relevant actors**. With regard to the Urban Nexus, this image analysis should include today's understanding of food, water and energy security amongst the local people and identify where they want to stand in the future. The outcome of this analysis should be enclosed in the definition process of the management model.

Once a management model has been decided upon, a **short- and a long-term strategy** have to be developed to meet the set goals, including sub-goals, concrete measures and responsibilities, evaluation methods to monitor the success of the process, and financing budget. For the purpose of pointing out how thought-through such a management model needs to be on the long-run, we will be assuming that UB decided, for example, to become an international tourist destination. This would entail goals such as: 1) Finding different events and things to do that match the different seasons, with a focus on the long and cold winters, e.g. museums, theatres, shopping malls. 2) Training personnel to speak the most common foreign languages and learn about international cultures as well as their expectations towards service. 3) Offering university majors that relate to the tourism industry. 4) Developing infrastructures that

meet the needs of the tourists, e.g. bus lines to highly frequented destinations within the city, international ticket vending machines, skiing resorts that are in accordance with the ecosystem that surrounds the capital etc. It has to be stated that becoming a tourist destination is not a direct recommendation for UB, it's simply serving as an example to show what types of considerations have to be made in context with defining a city management model and developing a strategy to implement this model on two different time scales, short- and long-term.

Acknowledging Private Sector Inclusion in Urban Planning

It can be recommended that UB encourage »corporate social responsibility« (CSR) approaches and include these in public tendering processes as well as city quarter development strategies. Since the topic of CSR is currently becoming more and more relevant in industrialized countries, certain ideas and practice examples can be found, but need to be assessed and adapted to the Urban Nexus partner cities. **Collaborating strongly with the businesses** in certain city quarters and encouraging them to invest in the quarter as well as looking into **giving incentives to those businesses that offer additional benefits to their urban environment**, can be considered by UB's municipal administration in this context. Cities have a great power to design the public tendering or bidding processes and the concepts for buildings and whole quarters, which they should make use of more effectively. More information on the target state for this success factor can be found in chapter 2.13. This especially has to be considered in context with the lack of willingness to work together and pool capacities to reach urban development goals and to get involved in community development projects in the Mongolian culture. This has been mentioned by GIZ (2011b) as well as the local NGO which was interviewed and deals with financing local development projects in ger areas. UB should create own best practices by declaring certain urban quarters as **innovative urban labs for innovative public inclusion approaches**.

Another format, which was analyzed in Berlin, Germany, within the Morgenstadt project, can be considered for UB: **concept-driven development** (Fraunhofer-Gesellschaft 2013c). As of today, the format is not put into implementation, but the potentials offered by it are clear: Instead of handing a slot to the highest bidding investor, the best concept for the planned infrastructure wins it. The investor is then bound to the concept they have presented. By this, cities can make sure that certain criteria are truly considered, which are not included in the building code.

Municipal Authority as Motivation for Responsible Development

The country's central attention to UB is one reason to offer chances for the capital city to customize rules and laws on national and regional level to its needs, having in mind the city's long-term development and fulfilling the inhabitants' needs. The motivation will grow over time, once the **urban services** provision is covering nearly 100% of the urban area and therefore every citizen in UB. It has become clear that decentral solutions following the maxim of »no decision in one sector shall cause negative effects in another sector« are needed in UB. For example, solutions which discharge waste water directly into the ground do have a negative impact on the local environment, especially soil and water body, and at the same time do not contribute to energy or food production. Criteria for such decentral solutions need to be defined, having in mind long-term as well as short-term benefits for todays as well as future generations. Besides looking at the coverage, it will be necessary to implement financing schemes that create income for the municipality. In this context, motivation can be triggered by regulations and penalties, which require **successful law enforcement** in terms of urban development.

4.2 Da Nang City Profile

Da Nang is the fifth largest city in Vietnam and is located in the central Vietnamese region, functioning as a regional center. It is a famous Vietnamese and international tourist destination that offers a long coastline as well as different cultural heritage sites and natural points of interest in close vicinity. The World Bank (2013a: 2) notes that Da Nang »is widely viewed as a well-planned and well-governed city, with a generally higher quality of infrastructure compared to other cities« in Vietnam. Da Nang's current and future major challenges as well as opportunities are listed in the following box:

- Rising water demand and salt intrusion in the available drinking water sources[1]
- Effective and efficient waste water collection and treatment[2]
- Minimizing damage caused by flooding events[3]
- Extending public transport[4]
- Fighting noise pollution and managing solid waste disposal[5]
- Dealing with rural to urban migration and growing challenges in context with this migration[6]
- Inconvenient bureaucratic administrative processes[7]
- Having defined an eco-friendly city strategy[8]
- Using tourism as major source of income[9]
- Unchallenged urban center in the region[10]
- Solidarity and trust in superiors in the Vietnamese culture enables strong leaders to drive change and sustainability[11]

Figure 6: Da Nang's major challenges and opportunities at a glance according to the interview partners (Fraunhofer IAO)
[1]Cf. Nguyen 2009; NGO 2013; Interviews #1802; #2007; #1906; #2007; #2008; [2]Cf. Mohr 2014b; The World Bank 2013a; Nguyen 2009; [3]Cf. NGO 2013; Mohr 2014b; Nguyen 2009; Interview #1803; [4]Cf. The World Bank 2013a; IBM 2013; Cities Today 2013; [5]Cf. AUICK 2014; Interview #1904; [6]Cf. Interviews #1906; #2007; [7]Cf. Interviews #1803; #1904; #1801; #0220; #2111; Discussion #0218; [8]Cf. NGO 2013; Interviews #2010; #1801; [9]Cf. Discussion #0202; Interview #2009; [10]Cf. Interviews #1906; #2007; #2008; [11]Cf. Interviews #1801; #2606

Impact factors that were mainly named by the interview partners as supportive of urban development in Da Nang are:

- Collective Understanding in the Vietnamese Culture.
- International Attention for Da Nang as Tourism Destination.
- Fast City Growth Bringing Attention and Income.
- Internal and External Transparency of Structures, Processes, etc.

This list depicts, which factors need to be addressed and focused on in the future. The same goes for the impact factors that have been identified to have a limiting impact on sustainable urban development in Da Nang, if they are not addressed carefully:

- Missing Continuity of Actions.
- Delay of Budget Allocation.
- Bureaucratic and Long Processes.
- Outdated Infrastructure / Hard- and Software in Use.

The following figure shows the extended Morgenstadt model. For a detailed explanation of this model, please see the chapters 1.4 and 1.5 as well as Figure 2 on page 11. The brightly colored filling in the segments stands for the extent to which a certain success factor is present in the analyzed city.

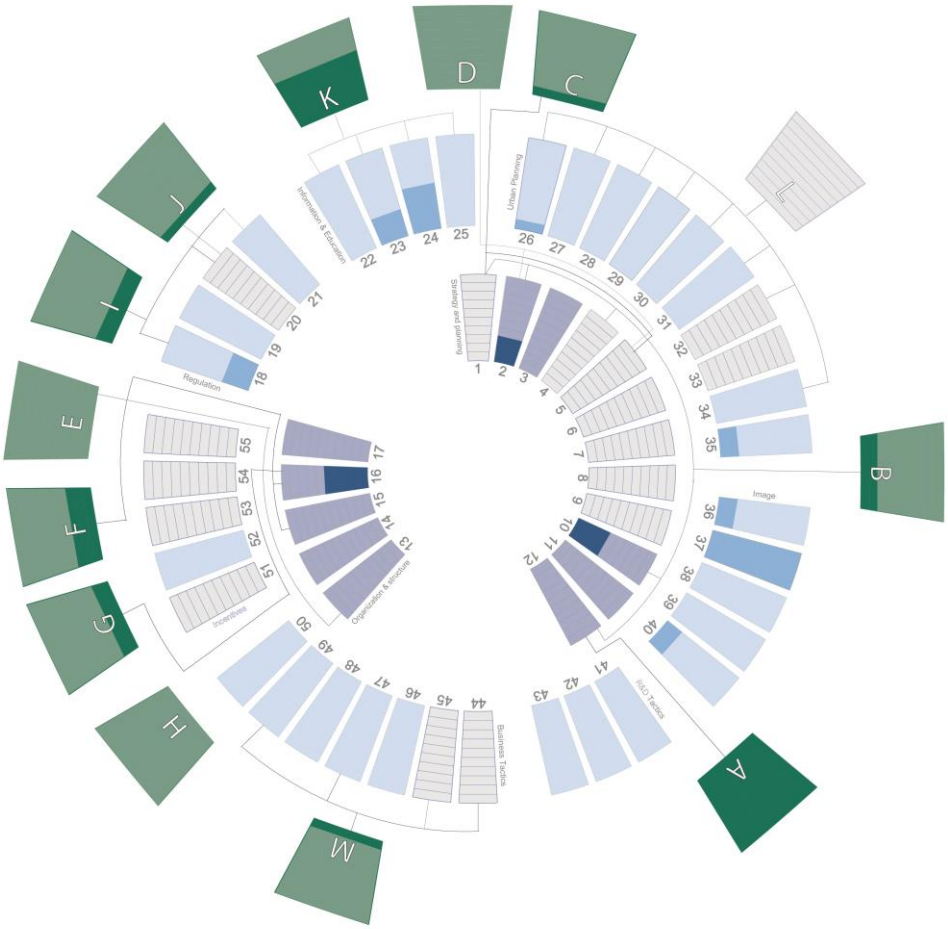


Figure 7: Urban Governance City Profile Da Nang (Fraunhofer IAO)

This city profile shows, that 11 success factors which have been identified in m:ci are being addressed by Da Nang and offer high potentials for urban development if addressed thoroughly. The following list depicts an excerpt of those success factors which need additional explanation, the full classification can be found in Annex A2:

- Defining of indicators, creation of a performance measurement system for sustainability and climate change (SF2) – *The national Vietnamese government is currently developing a set of sustainability indicators.*

- Awareness/Education: Creating awareness of sustainability through the integration of sustainability issues in education and information campaigns (SF23) & Awareness raising campaigns for saving resources (SF24) – *See SF »Sustainability Awareness and Motivation for Integrated Planning«.*
- Development of green inner city industry parks (SF35) – *The spatial accumulation of businesses and industry in inner city industry parks is already happening in Da Nang. Their combined waste water treatment and supply with energy are already managed in this context. The greening of these sectors and the generation of comprehensive projects that use synergies across sectors can be managed more easily on this basis.*
- Cluster management (support of specialized and small businesses through networking, promotion and marketing, communication, and enabling market access) (SF36) – *See explanation for SF35 above, the basis is already available in Da Nang and could be used more intensively in the future.*
- Professional city marketing / Creating an international image for/by the city (SF40) – *As international tourist destination, Da Nang already has created an international image for the city which could be carried on using its »eco-friendly« city image more strongly in the future.*

The most promising Urban Nexus success factors in Da Nang are:

- Defining a City's Management Model for Strategic Value Creation (SF-A)
- Sustainability Awareness and Motivation for Integrated Planning (SF-K)
- Acknowledging Private Sector Inclusion in Urban Planning (SF-M)
- Including Public Participation in Urban Planning Structures (SF-G)

Their current status and expected possibilities for improvement will be described in detail in the following paragraphs as well as certain recommendations will be given.

Sustainability Awareness and Motivation for Integrated Planning

Sustainability awareness in Da Nang can be considered pretty high, as mentioned in previous chapters already, due to the plan to become an eco-friendly city by 2020. This goal has been promoted throughout different municipal departments and is known by other civil actors as well. Sustainability awareness in Da Nang puts a main focus on environmental protection (cf. Interviews #1801; #1802; #1905; #2010; #2111). Social factors (cf. Interviews #1801; #1904; #1905; #2007; #2008; #2111) also play an important role.

Environmental aspects of sustainability are mainly described as protection or conservation. Renaturation or a man-made increase in natural resources is not considered. Social sustainability aspects are being addressed in a number of projects, mainly dealing with education or training. The **importance of awareness raising** is present and the understanding of the **duration of sustainability processes** is characteristic for Da Nang – most interview partners stated that the term sustainability describes projects that are long-term. In some interviews, this was the only overall statement made in connection with a sustainability definition. Considering economic sustainability, Da Nang's biggest industry is tourism. Income from the tourism industry is mainly seen as possibility to fulfill the goal to become an eco-friendly city (cf. e.g. Interview #2009). Bringing economic goals and activities in line with ecological sustainability is one of the major tasks, according to one of the interview partners in

the industrial field. Naturally, environmental protection is a basic precondition to create revenue from tourism in Da Nang, therefore putting a **focus on environmental protection** in terms of sustainability is self-evident. This can be seen as great basis to introduce the Nexus approach on a broad scale in Da Nang's public and municipal staff. The common understanding of the importance of sustainability will be helpful in establishing integrated planning on the long-run and integrated resource management in pilot projects serving as role model for other projects in the future.

The interviews conducted in Da Nang state that motivation for sustainable actions comes mainly from higher political levels, since adherence to national laws and plans offers support and **back-up from a higher level,** which is needed to implement projects or strategies on municipal level. For example, the national government is working on a sustainability indicator system at the moment, which will be introduced in 2015. The municipalities do not feel the urge or the authority to make their own set earlier or set higher goals for themselves. Therefore, the urban leaders need to be confident of the benefits of integrated resource management.

As far as the comprehensive understanding and connections between the sustainability dimensions goes, the interview partners' understanding varied widely. While some interview partners named two to three dimensions of sustainability and their comprehensive application in projects, the following extract out of one of the interviews, exemplifies a different picture: One of the interview partners stated that educational projects, which are based on funds, are not sustainable at all, because they will never be able to carry themselves without funding. This comment makes aware the **missing connection** made between the small-scale effects education might have on Da Nang's families today and the large scale effects these might create in the future. This exemplifies the need to continue awareness raising for the interdependence of short- and long-term benefits of certain measures carried out in the cities.

To guarantee **natural resource protection**, specialized personnel in biology for example needs to be included in the municipal staff or **collaborating university work** groups, as is already done in agriculture. Collecting statistical data on the state of the environment is crucial to enabling **early detection of mismanagement**. Therefore, cross-departmental or even cross-institutional cooperation is recommended for Da Nang's sustainable urban development in the future, which can be managed in accordance with national laws and improves the long-term ability to reach a comprehensive and integrated understanding for sustainable urban projects.

Defining a City's Management Model for Strategic Value Creation

Out of the three analyzed Urban Nexus cities, Da Nang has the strongest management model, dealing with tourism. It has identified unique features and used natural resources (coastline, beaches) to define its model and has built upon previous developments in the tourism field that enables value creation for the whole region. The positive aspects of an intact management model and therefore, a steady source of income, can and need to be used as a basis for Da Nang's further urban development and can be seen as anchor for improvements in urban governance.

To stay attractive as a tourist destination, the natural resources (beaches, ocean, forest) and cultural heritage sites in Hoi An and Hué as well as the connection between Da Nang and those sites need to be **protected and maintained**. Therefore, their status should be tracked frequently, and concrete measures have to be taken to prevent degradation or loss of natural resources that are the basis for Da Nang's tourism industry. Responsibilities within the municipality for this process have to be clearly defined, and it is recommended that current bureaucratic and long processes be

quickened to save the sensitive ecosystems around Da Nang on the long-run. According to the interviews conducted in Da Nang, the protection of natural resources needs a strong and environmentally-interested city government to **introduce needed mechanisms and structures from top-down**, since the communication model and the cultural structures accept hierarchical decisions and act according to them. In this context, it was also mentioned that in Da Nang decisions are often made in favor of the tourists, a disadvantage to vulnerable natural areas. The **natural resources that are considered worthy of protection need to be defined**, and **compensation norms need to be developed** if it is necessary in specific cases to use protected land for other uses.

Furthermore, **services for the tourism industry** and its neighboring branches need to be addressed, e.g. simple public transport to flexibly and safely reach the destinations of choice, and to offer a wide variety of jobs for the locals. This also includes creating possibilities for Da Nang's inhabitants to have access to trainings in terms of setting up businesses, local law for service delivery, or developing standards for tourist accommodations, etc. In this context it has to be mentioned that it is not wise to focus on a monopoly industry in any city; therefore, Da Nang should develop its management model to further include neighboring branches and industries that do not threaten the tourism industry, but strengthen Da Nang's economy in case of tourism collapsing at some point in the future.

What Da Nang may not forget in urban development – and the city has done this very well so far – is the **local population** and its right for public spaces in the urban center as well as the neighboring rural areas. The riverfront pedestrian area as well as public parks along the beach serve the tourists as well as the locals and are good examples to be considered in Da Nang's future development and urban planning.

Acknowledging Private Sector Inclusion in Urban Planning

Da Nang centralizes industrial activities in industry parks on city territory (cf. Interview #1803). This offers potential for clustering interests as well as noise, pollution, and commuting traffic etc., but also a cooperative waste water treatment or energy production plant for the industries settled in this park. **Green inner city industry parks,** have been identified as a success factor for sustainable urban development in m:ci phase I, and could be considered in Da Nang. Pilot projects in Germany are just now being discussed within a m:ci working group. Ideas and concepts based on the general idea of green inner city industry parks would have to be developed and adapted to Da Nang's local environmental rules and laws.

Apart from the current form of private sector inclusion in urban planning and urban development in Da Nang, it can be recommended that Da Nang encourage »corporate social responsibility« (CSR) approaches and include these in public tendering processes as well as city quarter development strategies. Since the topic of CSR is currently becoming more and more relevant in industrialized countries, certain ideas and practice examples can be found, but need to be assessed and adapted to the Urban Nexus partner cities. **Collaborating strongly with the businesses** in certain city quarters and encouraging them to invest in the quarter, as well as looking into **giving incentives to those businesses that offer additional benefits to their urban environment**, should be considered by Da Nang, for example: making hotels responsible for the waste collection on the beach connected to their premises or defining a requirement to satisfy the hotels' energy needs with renewable energies on their own premises. Cities have a great power to design the public tendering or bidding processes and the concepts for buildings and whole quarters, which they should make use of more effectively. More information on the target state for this success factor can

be found in chapter 2.13. This especially has to be considered in context with the strong collective understanding in the Vietnamese culture and therefore the possibilities to make certain urban actors feel responsible for their urban environment. It has to be mentioned that every municipality has to identify its own concept and strategy to achieve the most value-adding situation for the municipality through the inclusion of private industry in urban planning. Therefore, Da Nang should create its own best practices. Declaring certain urban quarters as **innovative labs for such industry inclusion ideas** can be considered to create attention and knowledge about which concepts might work in Vietnam and which outcomes can be expected from them.

Including Public Participation in Urban Planning Structures

The already high awareness for sustainability-related topics in the civil society enables the inclusion of innovative forms of public participation in the existing urban planning structures in Da Nang. While forms of voluntary work in associations and clubs is widely common, and public consultation is established in Da Nang, innovative forms of inclusion in the **planning process** as well as the **realization process** can be considered. During the planning process, Da Nang's inhabitants could for example, share their vision for their city quarter and propose concrete projects which could later on be financed cooperatively by the inhabitants. The project »nextHAMBURG« (nexthamburg e.V. 2014) could serve as a reference in this context. A festival or event for Da Nang's people could be used as a stage for such an inclusion in terms of a brainstorming. Also, a **contest** comparable to the »my LA2050 grants challenge« (Goldhirsh Foundation 2013) could be planned and executed by the municipality – possibly a lot smaller than the one for LA – to learn about the inhabitants' ideas and commitment for their city and also to encourage them to become more active in their city quarter. During the realization process, Da Nang's inhabitants could not only be included as workers, but additionally workshops could be offered by the municipality so that the people get an extra benefit out of their support, e.g. learning how to grow certain vegetables, how to tile, or properly prepare their home for a storm.

4.3 Korat City Profile

The city's official name is Nakhon Ratchasima and it is located circa 260km northeast of Thailand's capital city Bangkok. It is located in the biggest province in Thailand area-wise and is the second biggest population-wise after Bangkok (Ongsomwang & Saravisutra 2010). The following box shows current as well as future major challenges and opportunities for Korat:

- Urban population growth putting pressure on land, infrastructure and urban services[1]
- Expanding business center casting out small local business structures[2]
- Finding new sources for water supply[3]
- Dealing with treated and untreated waste water released in river[4]
- Increasing resilience to meet flooding during rainy season[5]
- Addressing noise and air pollution[6]
- Focusing on waste separation, recycling and reduction[7]
- Law enforcement identified as major problem for urban development[8]
- Dealing with the aftermath of the Decentralization Act[9]
- Growing importance as regional transportation hub[10]
- Existing high awareness for community health services[11]
- Usage of the variety of urban planning tools and integrating public participation[12]

Figure 8: Korat's major challenges and opportunities at a glance according to the interview partners (Fraunhofer IAO)
[1]Cf. Boonyabancha & Chalitanon 1996; National Statistical Office 2000; National Statistical Office 2010; Ongsomwang & Saravisutra 2010; Rothbaum et al. 2004; Interview #2607; [2]Cf. Rothbaum et al. 2004; Interview #2606; [3]Cf. Mohr 2014a; GIZ 2013a; Interview #2710; [4]Cf. Mohr 2014a; UNCRD 2006; [5]Cf. GIZ 2013a; Interview #2503; [6]Cf. ASEAN-German Technical Cooperation 2013; UNCRD 2006; Interview #2402; [7]Cf. GIZ 2013a; Interviews #2402; #2605; [8]Cf. Interviews #2402; #2503; #2606; #2607; [9]Cf. Mohr 2014a; Interviews #2401; #2402; #2503; #2504; #2708; #2709; [10]Cf. Rothbaum et al. 2004; Chetthamrangchai et al. 2001; Interviews #2605; #2606; [11]Cf. Rothbaum et al. 2004; Interview #2402; [12]Cf. Rothbaum et al. 2004; GIZ 2013a; Interviews #2607; #2708; #2709

Impact factors that were mainly named by the interview partners as supportive of urban development in Korat are:

- Specialized Expertise in the Municipal Administration.
- Cross-Departmental Knowledge Sharing.
- Collective Understanding as Korat's Inhabitants.
- Internal and External Transparency of Structures, Processes, etc.

This list depicts, which factors need to be addressed and focused on. The same goes for the impact factors that have been identified to have a limiting impact on urban development in Korat:

- Delay of Budget Allocation.
- Bureaucratic and Long Processes.

The following figure shows the extended Morgenstadt model. For a detailed explanation of this model, please see the chapters 1.4 and 1.5 as well as Figure 2 on page 11. The brightly colored filling in the segments stands for the extent to which a certain success factor is present in the analyzed city.

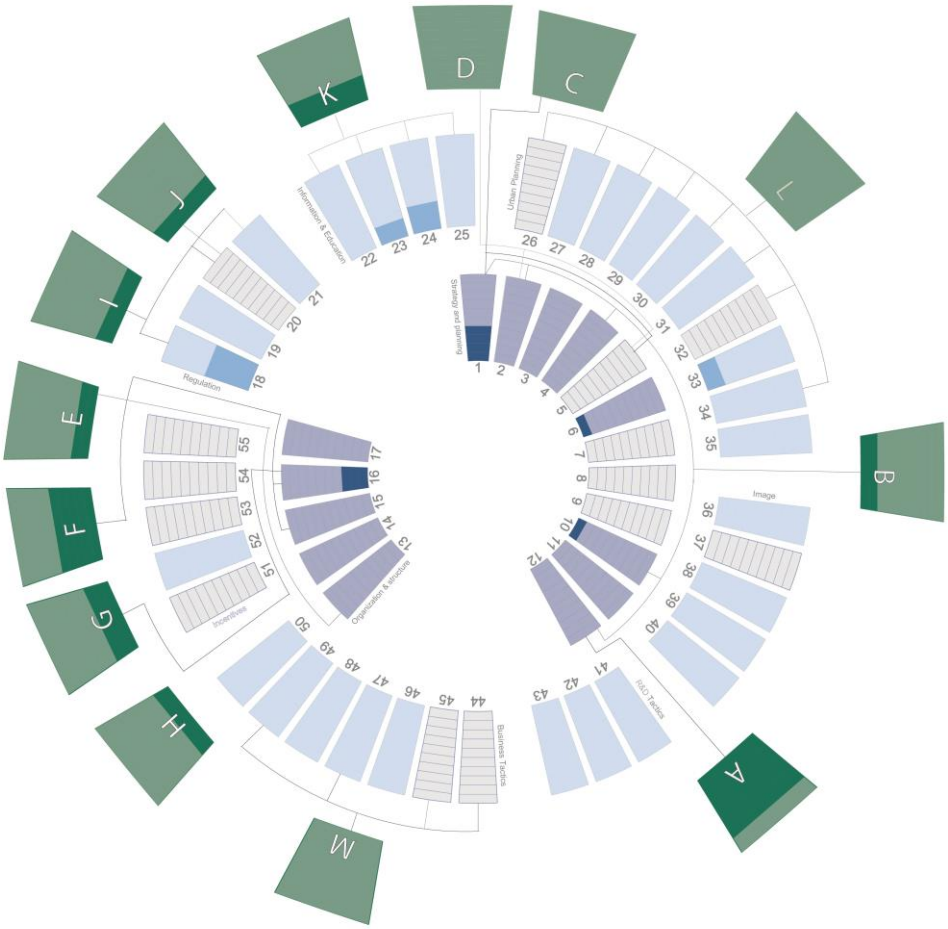


Figure 9: Urban Governance City Profile Korat (Fraunhofer IAO)

This city profile shows, the success factors which have been identified in m:ci and are already being addressed by Korat. They offer high potentials for future urban development if addressed thoroughly. The following list depicts an excerpt of those success factors which need additional explanation, the full classification can be found in Annex A2:

- Creation and administration of platforms for citizen participation (SF16) – *In context with former awareness raising campaigns for health and clean air, citizens have already been participating in designing their urban environment. Furthermore, the shift towards budget planning on district level and therefore, the inclusion of project*

ideas from the city quarters directly, describes a big step towards increased modern citizen participation.

- Regulation of building processes (SF18) – *According to the interview partners, the building standards for Korat are strictly followed, although problems arise in terms of specialized expertise, e.g. if building standard updates are made and the municipal staff is unsure how to interpret and implement new developments.*
- Awareness/Education: Creating awareness of sustainability through the integration of sustainability issues in education and information campaigns (SF23) – C*ampaigns for clean air and health have intensively been focused on and show effects in terms of the inhabitants' knowledge and understanding/acceptance of these topics in urban development. This can be built upon when addressing the Nexus in awareness campaigns in the future.*
- Awareness raising campaigns for saving resources (SF24) – *In context with SF23, saving resources has been discussed, especially water due to scarcity during the dry season.*
- Transport oriented development (SF33) – *In accordance with Korat's strategy to become a »Food Kitchen«, logistics routes and transport possibilities will be more strongly focused on, such as extending the railway line between Korat and Bangkok.*

The four most promising Urban Nexus success factors in Korat are:

- Municipal Authority as Motivation for Responsible Urban Development (SF-F)
- Defining a City's Management Model for Strategic Value Creation (SF-A)
- Including Public Participation Structures for Sustainable Development (SF-G)
- Sustainability Awareness and Motivation for Integrated Planning (SF-K)

Their current status and expected possibilities for improvement will be described in detail in the following paragraphs as well as certain recommendations will be given.

Municipal Authority as Motivation for Responsible Urban Development

The municipal staff in Korat demands more authority as stated by the Decentralization Act and is thus, willing to take responsibility for local actions and decisions. This can be interpreted as a positive development and is exemplified in the proactive decision of one of the interview partners to organize an event to establish a carbon-free Korat. This proves the thesis stating that with a greater institutionalized municipal authority, responsibility within the municipality grows, which leads towards adapted and customized solutions for the city's individual challenges. It has also proven successful that the local politicians are held responsible for their actions, especially considering long-term decisions, since the local public needs to be well-informed in every step of the process and needs to agree with decisions for the most part.

In general, it was stated in the interviews that creating positions that are occupied by the **most suitable applicant** instead of internal shifting of staff or personal contacts needs to be addressed more carefully in Korat. Expertise is urgently needed in the municipality and therefore, well-educated and experienced staff is needed. Especially in light of the downside of the shift of responsibilities to the municipal level, which is oftentimes not accompanied with the necessary budget allocation to train staff and create additional positions, innovative forms of training as well as financing have to be identified and tested in Korat. Missing positions could be replaced by e.g. using

university semester projects or offering internships to support the collection of statistical data or developing an outline for sustainability workshops or strategies in certain fields of application. Besides this, **regular trainings for municipal staff** are recommended, especially in dealing with the quickly changing subjects such as building code or master plan characteristics as well as software courses. Also, it would be important to create a system of **credit points for attending certified trainings** or a **system for training funding,** e.g. by crowd funding or cooperation with businesses in the city. Last but not least, the activation of business actors for supporting the city's sustainability strategy is a measure which could be considered in Korat to improve the chances to activate additional potentials.

In context with the Urban Nexus, these innovative forms of funding need to be tested for their sustainability potential. Furthermore, the increased attention on additional trainings and workshops should be used to implement topics of cross-departmental knowledge-sharing as well as inter-disciplinary workgroups in Korat's municipal structures. According to the national guidelines and laws, they could be organized as informal meetings or institutionalized workgroups. Overall, the increased responsibility the municipal staff is feeling for their urban environment should be made use of by strengthening the interest of the municipal staff for integrated planning.

Including Public Participation Structures for Sustainable Development

In context with the previously described success factor, the inclusion of innovative modern forms of public participation in urban development can be considered helpful in Korat to decrease costs for the municipality in the decision-making as well as the implementation process for urban development projects. The structures and cultural background in Korat enable a wide variety of **innovative forms of public participation**, which has been confirmed by one interview partner in particular. Activating the people's potential to improve their urban environment seems to be a possible and promising solution to be included in urban development in Korat.

To improve the Urban Nexus in Korat at the same time, the public needs not only to be aware of possible synergies that can be expected from integrated resource management and planning as well as short-term and long-term benefits for the city and its inhabitants in general. This will be addressed further in the following paragraph.

Sustainability Awareness and Motivation for Integrated Planning

Due to previous awareness raising campaigns for urban health and clean air, the inhabitants of Korat have already gained an understanding for the importance of these two aspects for their urban environment. Addressing sustainability topics, such as the interlinkage between food, water, and energy, in upcoming awareness raising campaigns will therefore be expected to have a great impact on the people's understanding for sustainability and its inter-disciplinary character. An Urban Nexus project in Korat could additionally provide the content for such an awareness raising campaign, e.g. if school classes make excursions to visit the project site and learn about the theoretical Urban Nexus approach behind the tangible project in Korat. What needs to be focused on in such campaigns is the visibility of concrete short-term benefits for the public. Morally they will understand, accept, and welcome the long-term positive effects of possibly reduced pollution, a cleaner urban environment, stable housing prices or improved living conditions, but to motivate the people to adopt integrated thinking – and this applies to every culture and nationality – the personal and short-term benefits need to be made clear.

Defining a City's Management Model for Strategic Value Creation

Another success factor that Korat can build upon is the corporate strategy to become a »food kitchen« and distribution hub for food products grown in the region. The same strategy has been named by another Urban Nexus partner city named Chiang Mai, which is located some 700km away from Korat. This lets us assume that the »food kitchen« strategy was not developed by the city of Korat itself, but might have emerged from the national level's interest. Nonetheless, it will be seen as focal point for future development in Korat and where the strategy originated from is not truly of importance, as long as it is integrated into Korat's individual vision, strategies and goals. Accepting that the northern region in Thailand shares this strategy, Korat – as well as Chiang Mai – needs to find its distinctiveness amongst other cities in this region and self-responsibly develop this strategy further to create the best value for the city and region surrounding Korat.

Establishing a mobility hub in Korat is part of the »food kitchen« strategy. One the one hand Korat will become an entering point for the North-Eastern region of Thailand in the direction of Laos and Vietnam and on the other hand it will be able to transport large amounts of food as well as passengers and other goods to the capital Bangkok.

The Urban Nexus approach should be incorporated into this already existing strategy. An assessment to identify nexus-relevant synergies within this strategy and criteria for the nexus conformity of planned projects in this context need to be carried out or developed.

5
Conclusion: Insights from the Governance Analysis

The analysis in the three Urban Nexus partner cities UB, Korat, and Da Nang, which was based on the Morgenstadt systems approach, compared the Urban Nexus cities to international frontrunning cities in terms of sustainability and highlighted potentials for more thoroughly addressing integrated thinking within their urban environment. It has shown that besides individual challenges, the three analyzed cities have a number of **deficits and potentials in common** (see page 29 et sqq.). Thus, we can formulate the hypothesis that these challenges and potentials are representative for most – if not all – of the ten Urban Nexus partner cities.

While the motivation for sustainable behavior differs across cities, all cities have the following in common: People need to be motivated to change their habits. If we want to create urban systems in which urban planning is integrated, the city's inhabitants act sustainably in their every day life and good governance is common sense, immediate short-term benefits have to be balanced with long-term benefits and the **additional value** has to be communicated to the people who are involved.

As demonstrated within the study, it can be stated that the field of urban governance is complex in terms of relevant actors, boundary conditions, and action fields. City-specific success factors that offer a high potential for improvement in sustainable urban governance have been identified for the three analyzed cities. There is not one single recipe for sustainable urban governance, not one single success factor or measure to prepare the cities for a resilient future, but a toolbox from which different ideas and approaches can be chosen and a customized mix can be developed for each city. In order to succeed in a long-term transition towards urban integration an approach is needed which highlights a **combination of success factors and measures** forming a comprehensive strategy. To enable self-evaluation for the Urban Nexus partner cities, Annex A4 holds a manual for the expert evaluation that can be carried out once to identify a current status of an Urban Nexus partner city or frequently to track changes over time. The generated knowledge in this context, combined with the target states defined for each success factor, can be used to define a strategy strengthening the Urban Nexus within each city.

It is clear at hand that the term sustainability has developed much since it was first mentioned in context with urban development. On the one hand public stakeholders are seeking for new inspiring terms every couple of years. On the other hand the scientific community continually discusses new challenges for sustainable development and how to solve them, and therefore, new terms seem appropriate for certain branches or in certain times. One of those terms is »resilience«, which was initially solely used in connection with natural disasters and their effects on built infrastructures, but has been broadened to describe **adaptability** in a wider spectrum, e.g. including political, societal or technological developments in an urban system. Flexible structures, whether built infrastructures, organizational, or process-wise have proven of avail in long-term urban development to prepare cities for future disruptions.

It can be concluded that there is a common demand in the three analyzed cities which has to be answered with a connected strategy addressing measurable data, specialized expertise, and cross-over communication.

6
Project Idea: »Sensing Nexus« – Low-cost Innovation Framework for Future Cities in Asia

This final chapter transfers insights which were gained throughout the analysis into a project idea and framework named »Sensing Nexus«, which can be considered and developed further by the Urban Nexus partner cities. We strongly recommend to conceptualize and realize a systems innovation approach combining innovation projects on different levels.

6.1 Requirements for Urban Governance Innovation

Why is a **reference project** *important for the Urban Nexus partner cities?* The currently experienced challenges ask for solutions which are low-cost, easy to implement and maintain, show long-term effects, unfold local potential, and take pressure from the municipalities and the urban systems. The following points highlight facts and current developments which make the Urban Nexus partner cities ideal for a reference project addressing measurable data, specialized expertise, and cross-over communication:

- **Challenges.** The current situation in Asian cities of medium and larger size is critical in terms of the provision of food, water, and energy security for the city's inhabitants on the long run. This is the basis on which the Urban Nexus project is built and leads to the need for new solutions. One major challenge is the lack of reliable data for stating sustainability performance and to monitor urban transformation.
- **Costs.** Technological innovation has improved the possibilities for sensor systems over the past years. Technical as well as financial efforts for installing stationary sensor systems within and around the cities are comparably low. The combination of different sensors and their integration into a city-wide system has to be developed according to local needs.
- **Citizen enabling.** Including the citizens more actively into urban planning and decision-making processes will increase the city's inhabitants' sense of responsibility for their urban environment and thus, take pressure from the municipalities on the long run. Innovative formats for citizen inclusion are available on the market.
- **Transparency.** Open information systems offer chances for improvements and business development apart from municipal responsibilities. Urban leadership needs hard facts and reliable data to manage urban transformation together with all stakeholders.
- **Using existing technology.** Smartphone-apps offer an easy, intuitive and fun way to integrate citizens into urban development decisions. The smartphone penetration in South East Asia and the Pacific region varies widely amongst countries, e.g. Singapore 87%, Thailand 49%, Indonesia 23%, the Philippines 15% (The Nielsen Company 2014), but mobile traffic is prognosed to increase exponentially until 2020 (Ericsson 2014) and due to the the influencing factors »youth culture« and »urbanization« (ibid.) smartphone penetration will generally grow in this region.
- **Local knowledge cycle.** Even though we can look elsewhere for inspiration and new ideas – which we should always do – it is our belief that systemic innovation comes from within the local society and economy. Therefore a showcase project should be designed to integrate as many locals as possible.

6.2 The Framework Components

If we want to live the Urban Nexus, we first need to sense it! Taking the need for a comprehensive strategy, which combines data, specialized expertise, and cross-over communication as given, different modules need to be addressed in a »Sensing Nexus« project: actors, tools, processes, and implementation.

Which **actors** *are relevant for urban development, urban fitness and adaptability?* It is quite obvious that the municipalities and urban leaders should be involved in urban development activities. Examples from cities across the world have shown us how important the **cities' leaders** are to push new topics and break open structures which have been in place for a long time. Their enthusiasm is a great driver of change and needs to be considered in new projects. To be able to support the city's direction, the **municipal staff** needs to be confident that the city's approach is worth following and needs to understand it fully to integrate it in their daily work. Furthermore, including citizens as well as research institutions, such as local universities, and business representatives into the group of people making the Urban Nexus senseable is highly recommendable. **Citizens** are more and more interested in contributing their ideas to urban development. One such practice example is the project »nextHAMBURG« in Germany. In a city quarter where new living and working space is currently being planned, Hamburg's inhabitants are asked to share their ideas and comment the development plans (nexthamburg e.V. 2014). **Universities** in general offer the possibilities to reach a large amount of young people who are ready to engage in work, even more if they are convinced that their hard work can change their living environment to the better. Including new ways of creative thinking into schooling will enable this group to be innovative in their future life. Moreover, the **younger generations** will probably live in the city much longer than the older inhabitants which can be found in decision-making positions and are therefore entitled to be included. Considering their expertise in urban development decisions will open the discussion up to new topics, such as modern technologies or trends that the older generations might not have on their radar. Other **research institutions** which are settled in the cities as well as **private businesses** need to be included as well to form alliances that enable a transfer of theoretical thoughts and solutions into real-life and real-work situations and test them in the field. In terms of resilient urban development this means **connecting all stakeholders** so they can share their knowledge and opinions and opening up the planning and decision-making process to everyone involved in and affected by urban development.

Which **tools** *can be used to sense the Urban Nexus?* According to the success factor »Usage of Statistical Data for Informed Municipal Decision-Making«, the tools we are addressing in this context are technologies which help us gain information about the city. How a city's systems (e.g. water distribution, traffic) function and how well they perform can be assessed by certain values. **Statistical data** for example offers information about inhabitant development, purchasing prices for plots, economic development, etc. They are oftentimes tracked by specialized departments within the cities, e.g. the registration office or the land-registry. With technical devices and sensors being quickly developed further and appearing in our every day lives, these offer great potentials to gain additional information about the city's systems' performance. These sensors can be classified in **stationary and mobile sensors**: While stationary sensors measuring meteorological factors or water quality have been in use in cities for many years, mobile data is becoming more interesting due to the development and quickly rising increase in the usage of smartphones. Cities can make use of the interconnectedness of people as the project »alarm-system-app« in the German city Gütersloh demonstrates (Kreisverwaltung Gütersloh 2014). Since ambulances oftentimes take too much time to reach a person in need, the app contacts every first-aid professional in the city via mobile phone. The first-aider closest

to the diseased person drops their current business and rushes to help the person in need. The project has proven that the mobile rescuers are able to provide help much quicker and can prevent from the worst until the ambulance arrives. Besides the sheer connectedness, the **inhabitants' active input** can be useful for urban development issues. A practice example for one such project is »Citizen Connect« in Boston, USA. The project is installed to »empower residents to be the City's 'eyes and ears'« (City of Boston 2014) by reporting missing or damaged street signs, graffiti, or barriers within the city.
Combining the three possible sources of information – statistical data, stationary and mobile real-time sensor data, active citizen feedback – into an information framework will offer great potential to improve the possibilities for inclusive informed municipal decision-making.

How do **processes and structures** *in the cities of the future need to be designed to guarantee resilience?* Adaptability implies flexibility. This does not mean that structures and processes need not be stipulated, but that the city as an organism needs to be self-reflective and able to change, if change seems appropriate. **Learning organizations** are a key word in this context describing a process of constant reflection and adjustment.

How can this idea be put into **implementation***?* In the following sub-chapter these ideas will be transferred into a first outline of a project recommendation, which could be considered by the Urban Nexus partner cities and discussed and developed further, e.g. in a workshop.

6.3 Reference Project »Sensing Nexus«

Previously, a number of practice examples have been named to highlight possible effects of including new, innovative ideas into urban planning structures and serving as inspiration for the Urban Nexus partner cities. One might think at first sight, »these solutions might work over there, but not in my city«, but they are adjustable. Creating a reference project »Sensing Nexus« on a cross-sector governance level in one or more of the Urban Nexus partner cities will become a Unique Selling Point (USP) for the whole Urban Nexus approach and a reference for integrated urban planning in Asian cities. It will also be able to integrate all of this study's insights and recommendations in one project approach. The following text describes the different modules which should be addressed together:

Module 1: »Open Data Platform«
A central platform including different types of information from **statistical, stationary and mobile data** is the brain of the project. Which data shall be included in detail needs to be decided upon by the reference city. Transparency about the city's performance and identifying potentials for business development within the city are the two major goals of this platform. Preparing data to be displayed on this platform is the first step and should be managed by a **neutral agency**, which may be connected to the city's statistical department office, but should not be a sub-division of any subject-specific task (e.g. environment, traffic, economy). To which extent or to whom this database is open needs to be discussed within a project team. There are several reference projects showing positive effects of opening the information up to the broad public (e.g. »Open Data Platform Berlin«) specialists (e.g. »infrest« Berlin), or paying customers. The users should not only be able to look into values, but run analyses and inquiries to connect different indicators.
In a second step the database can and should be fed with information from an **interactive citizen app** (e.g. »Citizen Connect«) through which the city's inhabitants are not solely kept informed about new development activities in the city, but are able

to share ideas and wishes for their city quarter or whole city. »Augmented reality« modules could be incorporated into this app, e.g. showing the citizens additional information about buildings and places, mapping planned projects, or tracking past developments. First ideas for such an app could be developed inexpensively via an »**appathon**« **event**.

Module 2: Knowledge Creation and Know-How Exchange: »Nexus Leadership Academy«

A brain cannot function without its heart. Therefore the staff creating, filling, and maintaining the platform are the most important to this project. To keep costs low, guarantee that the knowledge created within the project stays in the region and strengthens the **local knowledge cycle**, a realization model for the project could be used which mainly consists of regional personnel and local university students. By marketing a one-of-a-kind highly innovative large-scale and city-wide project as reference in one of the Urban Nexus partner cities, highly-skilled personnel might be won over as mentors and trainers for different student teams. Cooperatively designing this new approach is necessary to match it with the Urban Nexus partner cities' needs. To keep coordination and inefficiency costs throughout the initial phase of the platform as low as possible, a well-planned project plan needs to be in place.
Knowledge exchange across the partner cities can on the long run be managed by a »**Nexus Leadership Academy«** bringing together urban leaders from different nations and cities of differing sizes and letting them workshop, get creative and exchange their views and challenges they face. Making them understand the benefits of the approach of integrated planning and promoting it within their cities and countries, is the goal of this format.

Module 3: Awareness Raising Campaign and Citizen Participation

A goal which is reflected in a number of success factors in the Morgenstadt model, is improving sustainability awareness throughout the cities' public as well as the municipalities' administrations. In this context, local leaders have been identified as crucial to the introduction of new approaches in urban development. This insight can be translated directly into the Urban Nexus context: Awareness raising for the shared benefits of integrated planning and resource management has to be created within the Urban Nexus partner cities – and beyond. Having the urban leaders' support for an integrated approach will **motivate** the municipal staff members and locals to join in on the project and gain their acceptance for new tasks quicker. The leaders' charisma, personal belief in, and contribution to the project is not only useful for **communicating** the project across all levels of the city, but to acquire funding as well. Once citizens have an understanding for the integrated Nexus approach, they will identify themselves more with their urban environment and will thus, be willing to contribute to its livability and feel responsible for their surroundings.

Module 4: Financing Models and Feasibility Opportunities

Besides generating initial funds via acquisition, e.g. from a development bank, **business models** need to be developed, which will be able to finance the maintenance of the database and app as well as the staff involved on the long run. This could be organized in a **competition** for student work groups and start-up businesses within the Urban Nexus partner cities. It should be clear that a Sensing Nexus project should have a strong economic focus instead of seeing it as a funding-dependent approach. Also, international companies like SAP, IBM, Bosch, or Cisco could be interested in supporting such measures in an early stage.

6.4 Recommendations for Next Steps

Besides improving single performance factors as identified in the governance analysis, we strongly recommend to conceptualize and realize a systems innovation approach combining innovation projects on different levels (»Sensing Nexus«):

- A first step in the »Sensing Nexus« project will be **detailing the project proposal** further with Nexus stakeholders, possible funding agencies, and technology experts as well as socio-cultural experts for the countries participating in the Urban Nexus project. This will serve to define a project framework on which a reasonable decision can be made about which city or cities shall be defined to host the demonstration project.

- In a second step, a **business plan** for the development, realization, and servicing of the different implementation steps of the project will be prepared, taking into consideration city-specific characteristics, e.g. a stronger focus on one of the modules. This step is probably the most time-consuming and complex one, but if carried-out well, it will enable best possible outcomes for the implementation of the project itself.

- An **acquisition phase** will follow in a third step to gather initial funding for the pilot project. The investors' intentions need to be checked for Nexus-conformity, their role within the project needs to be clear, and their investment either related to money or tangible means. In this context, the large-scale awareness raising campaign in module 3 could be used additionally for marketing purposes, which might be interesting for potential investors and their need to create reference projects to improve their own image.

- A fourth step foresees the actual **implementation** of the project. The implementation steps foresee a *pilot phase* in which the framework (including all modules) is tested within the specific city context, possibly only servicing a certain urban quarter. This phase needs initial financing, even though the project is laid out to carry itself over time. A comprehensive feedback cycle for this first phase is needed to adjust the project outline after a first review is completed. A second phase will follow, including a *large-scale implementation* of a reviewed pilot solution in a larger number of city quarters or across the whole city. Continuous monitoring is needed throughout the project to be able to adjust to changes within the urban context and thus, creating a resilient project design. Monitoring the project's development and transparently reflecting outcomes, problems, and changes towards the stakeholders and users of the project platform is part of this implementation step.

- A fifth and last step creates options for the project to be **transferred to other cities** and enabling a roll-out for a pilot phase there. Pilot cities could act as project provider and experts to give knowledge to other cities.

7
References

ADB – ASIAN DEVELOPMENT BANK (2014): Demand in the Desert: Mongolia's Water-Energy-Mining Nexus. URL: http://www.adb.org/vi/node/42820, call date 11/4/2014

ADB – ASIAN DEVELOPMENT BANK (2008): Mongolia: Urban Development Sector. Evaluation Study. URL: http://www.oecd.org/countries/mongolia/42227806.pdf, call date 3/28/2014.

ASEAN-GERMAN TECHNICAL COOPERATION (2013): Clean Air for Smaller Cities in the ASEAN Region. URL: http://www.citiesforcleanair.org/?page_id=82, call date 4/2/2014.

THE ASIA FOUNDATION (2011): Loval Governance Programs in Mongolia. URL: http://asiafoundation.org/resources/pdfs/MGLocalGovernancev2.pdf, call date 4/7/2014.

AUICK – ASIAN URBAN INFORMATION CENTER OF KOBE (2014): City Report and Action Plan of Da Nang. URL: http://www.auick.org/database/apc/apc047/apc04702_09.html, call date 3/31/2014.

BBC NEWS INDIA (2013): Why has India's Calcutta city banned cycling? URL: http://www.bbc.com/news/world-asia-india-24237390, call date 9/15/2014.

BERTAUD; ALAIN (2011): Da Nang urban structure: the motorcycle, provides a significant advantage for mobility and housing affordability. URL: http://alainbertaud.com/wp-content/uploads/2013/07/AB_report_Danang_Graphs_rev.pdf, call date 3/21/2014.

BERTELSMANN STIFTUNG (2013): Bertelsmann Transformationsindex (BTI). URL: http://www.bti-project.de/, call date 3/27/2014.

BETTERVEST GMBH (2014): bettervest. Nachhaltig. Effizient. Rentabel. URL: https://bettervest.de/, call date 11/03/2014.

BMZ – BUNDESMINISTERIUM FÜR WIRTSCHAFTLICHE ZUSAMMENARBEIT UND ENTWICKLUNG (2014): Gute Regierungsführung – Rahmenbedingungen für Entwicklung. URL: http://www.bmz.de/de/was_wir_machen/themen/goodgovernance/guteregierung/index.html, call date 3/27/2014.

BOONYABANCHA, SAMSOOK; CHALITANON, NATVIPA (1996): Case Study of Nakhon Ratchasima, Thailand. In: United Nations Centre for Human Settlements (Habitat) (1996): The Management of Secondary Southeast Asian Cities, pp. 87-106.

BRANDI, CLARA; RICHERZHAGEN, CARMEN; STEPPING, KATHARINA (2013): Post 2015: Why is the Water-Energy-Land Nexus Important for the Future Development Agenda? Briefing Paper 3/ 2013. German Development Institute / Deutsches Institut für Entwicklungspolitik (DIE). URL: http://www.die-gdi.de/uploads/media/BP_3.2013.pdf, call date 07/14/2014.

BRAUN, JOACHIM VON (2013): Nexus Governance and Institutional Arrangements for Inclusive Planning and Management – water, soil, waste. International Kick-Off Workshop: Advancing a Nexus Approach to the Sustainable Management of Water, Soil and Waste. 11-12 November 2013, Dresden, Germany.

BULLINGER, HANS-JÖRG; RÖTHLEIN, BRIGITTE (2012): Morgenstadt. Wie wir morgen leben: Lösungen für das urbane Leben der Zukunft. Carl Hanser Verlag, Munich.

CHAISOMPHOB, TAWEEP; SA-NGUANMANASAK, JATURONG; SWANGJANG, KANOKPORN (2004): Role of Public Participation in Planning Power Plant Projects in Thailand. In: Thammasat International Journal for Science and Technology (2004): Vol.9; No.1; January-March 2004.

CHENG, JUNE; SCHUSTER-WALLACE, CORINNE; WATT, SUSAN; NEWBOLD, K. BRUCE; MENTE, ANDREW (2013): Quantifying Water Supply, Sanitation and the Millennium Development Goals. Summary Analysis. URL: http://inweh.unu.edu/wp-content/uploads/2013/06/WASHandtheMDGsresultssummarySept16_000.pdf, call date 11/03/2014.

CHETTHAMRANGCHAI, PAITOON; ANAUSAKUL, AROON; SUPAWAN, DECHA (2001): Assessing the Transportation Problems of the Sugar Cane Industry in Thailand. In: United Nations (2001): Transport and Communications Bulletin for Asia and the Pacific. No 70. Logistics for the Efficient Transportation of Domestic Goods, pp. 39-50.

CHOMPUNTH, CHUTURAT; CHOMPHAN, SUPHATTHARACHAI (2012): Evaluating Public Participation Process in Development Projects in Thailand: A Case Study of the Hin Krut Power Plant Project. In: American Journal of Applied Sciences (2012): 9 (6), pp. 865-873.

CITIES TODAY (2013): Da Nang Opens Smart Control Center. URL: http://cities-today.com/2013/08/vietnam-city-ibm-launches-smart-water-and-transport-initiative/, call date 4/22/2014.

CITY OF BOSTON (2014): Citizens Connect: Making Boston Beautiful. URL: http://www.cityofboston.gov/doit/apps/citizensconnect.asp, call date 11/4/2014.

DEPARTMENT OF INDUSTRY AND AGRICULTURE (n.y.): The Department of Industry and Agriculture, The Implementing Agency oft he Capital City Mayor. Flyer.

DIE – DEUTSCHES INSTITUT FÜR ENTWICKLUNGSPOLITIK (2013): Post 2015: Reconsidering Sustainable Development Goals: Is the Environment Merely a Dimension? Briefing Paper. URL: http://sustainabledevelopment.un.org/content/documents/839Post-2015_DIE_BP%204.2013.pdf, call date 11/03/2014.

DISED – DA NANG INSTITUTE FOR SOCIO-ECONOMIC DEVELOPMENT (2014): URL: http://dised.vn/62-70-21/DISED-staffs-attended-the-Outreach-works.aspx, call date 4/22/2014.

DRAGOLEA, LARISA; COTÎRLEA, DENISA (2009): Benchmarking – A valid strategy for the long term? URL: http://www.oeconomica.uab.ro/upload/lucrari/1120092/23.pdf, call date 3/31/2014.

ENCYCLOPEDIA BRITANNICA (2014a): Ulaanbaatar. URL: http://www.britannica.com/EBchecked/topic/613112/Ulaanbaatar, call date 3/28/2014.

ENCYCLOPEDIA BRITANNICA (2014b): Mongolia. URL: http://www.britannica.com/EBchecked/topic/389335/Mongolia, call date 3/28/2014.

ERICSSON AB (2014): South East Asia and Oceania. Ericsson Mobility Report Appendix. URL: http://www.ericsson.com/res/docs/2014/regional-appendices-sea-final-screen.pdf, call date 11/4/2014.

EU – EUROPEAN UNION (2012): Confronting Scarcity: Managing water, energy and land for inclusive and sustainable growth. European Report on Development, Belgium.

FAO – FOOD AND AGRICULTURE ORGANIZATION OF THE UNITED NATIONS (2014): Pressure-State-Response Framework and Environmental Indicators. URL: http://www.fao.org/ag/againfo/programmes/en/lead/toolbox/Refer/EnvIndi.htm, call date 3/28/2014.

FRAUNHOFER-GESELLSCHAFT (2014): Innovation Network Morgenstadt:City Insights Executive Summary Phase I. URL: http://www.morgenstadt.de/content/dam/morgenstadt/en/documents/Executive_Summary_m-ci_Phase%201_digital%20(2).pdf, call date 3/28/2014.

FRAUNHOFER-GESELLSCHAFT (2013a): City Report New York City. Internal project document.

FRAUNHOFER-GESELLSCHAFT (2013b): Morgenstadt: City Insights Final Report. Internal project document.

FRAUNHOFER-GESELLSCHAFT (2013c): City Report Berlin. Internal project document.

FROGIER DE PONLEVOY, DAVID (2013): Vietnam 151. Portrait eines Landes in ständiger Bewegung in 151 Momentaufnahmen.

GABLER WIRTSCHAFSLEXIKON (2014): Benchmarking. URL: http://wirtschaftslexikon.gabler.de/Definition/benchmarking.html, call date 3/31/2014.

GIMA CONSULT – GESELLSCHAFT FÜR INTEGRIERTES MANAGEMENT MBH (2014): Definition des Benchmarking. URL: http://www.benchmarking.de/info/definition-des-benchmarking/, call date 3/31/2014.

GIZ – GESELLSCHAFT FÜR TECHNOLOGISCHE ZUSAMMENARBEIT (2013a): Baseline Study Korat.

GIZ – GESELLSCHAFT FÜR TECHNOLOGISCHE ZUSAMMENARBEIT (2013b): Baseline Study Da Nang.

GIZ – GESELLSCHAFT FÜR TECHNOLOGISCHE ZUSAMMENARBEIT (2013c): Baseline Study Ulaanbaatar.

GIZ – GESELLSCHAFT FÜR TECHNOLOGISCHE ZUSAMMENARBEIT (2013d): Critical Thinking on the "New Security Convergence" in Energy, Food, Climate and Water: Is the Nexus Secure... and for Whom? URL: http://www.water-energy-food.org/en/news/view__1279/critical-thinking-on-the-new-security-convergence-in-energy-food-climate-and-water-is-the-nexus-secure-and-for-whom.html, call date 07/14/2014.

GIZ – GESELLSCHAFT FÜR TECHNOLOGISCHE ZUSAMMENARBEIT (2013e): Resource Efficiency in Asian Cities: The Urban Nexus", Bangkok/Thailand. Regional Workshop. URL: http://www.water-energy-food.org/en/calendar/view__1354/resource-efficiency-in-asian-cities-the-urban-nexus-bangkok_thailand.html, call date 9/16/2014.

GIZ – GESELLSCHAFT FÜR TECHNOLOGISCHE ZUSAMMENARBEIT (2011a): Understanding the Nexus. URL: http://www.water-energy-food.org/en/news/view__255/understanding-the-nexus.html, call date 07/14/2014.

GIZ – GESELLSCHAFT FÜR TECHNOLOGISCHE ZUSAMMENARBEIT (2011b): Capacity Development.

GOLDHIRSH FOUNDATION (2013): LA2030. URL: http://www.la2050.org/challenge/, call date 07/23/2014.

IBM (2013): Da Nang, Vietnam Turns to IBM to Transform City Systems URL: http://www-03.ibm.com/press/us/en/pressrelease/41754.wss, call date 4/22/2014.

IDS – INSTITUTE OF DEVELOPMENT STUDIES (2007): Governance Screening for Urban Climate Change Reslience-building and Adaption Strategies in Asia: Assessment of Da Nang, Vietnam.

IFAD – INTERNATIONAL FUND FOR AGRICULTURAL DEVELOPMENT (n.y.): Leveraging the rural-urban nexus for development. URL: http://www.ifad.org/pub/post2015/english/1.pdf, call date 07/11/2014.

INFREST – INFRASTRUKTUR E-STRASSE (2014): Startseite. URL: http://www.infrest.de/Seiten/startseite.aspx, call date 11/10/2014.

INSTITUTE FOR SOCIAL AND ENVIRONMENTAL TRANSITION-INTERNATIONAL (2013): Climate Reslience Case Study. Da Nang, Vietnam.

IOBY - In Our Back Yard (2014): ioby brings neighborhood projects to life, block by block. URL: http://www.ioby.org/about, call date 11/03/2014.

JSC – VIETNAM'S INTERNET AND TELECOMMUNICATIONS (2010): Da Nang hike up price of treated water. URL: http://news.com.vn/science-and-education/more-education/141159.html, call date 3/28/2014.

KAS – KONRAD-ADENAUER-STIFTUNG (2014): EU CO-FUNDED PROJECT: "PROMOTING PEOPLE'S PARTICIPATION AND GOVERNANCE IN VIETNAMESE CITIES THROUGH THE ASSOCIATION OF CITIES OF VIETNAM (ACVN)". URL: https://www.kas.de/vietnam/de/pages/6867/, call date 4/22/2014.

KREISVERWALTUNG GÜTERSLOH (2014): Kreis Gütersloh führ Alarmierungssystem per Smartphone ein: Mobile Retter sind im Notfall schneller vor Ort. URL: http://www.kreis-guetersloh.de/buergerservice/110/sr_seiten/artikel/112180100000052235.php, call date 4/11/2014.

LOEWE, MARCUS (2012): Post 2015: How to Reconcile the Millennium Development Goals (MDGs) and the Sustainable Development Goals (SDGs)? Briefing Paper 18/ 2012. German Development Institute / Deutsches Institut für Entwicklungspolitik (DIE). URL: http://www.die-gdi.de/uploads/media/BP_18.2012.pdf, call date 07/14/2014.

MATTHEW, RICHARD A. (2014): Beyond the Water-Food-Energy-Climate Nexus. URL: http://www.water-energy-food.org/en/news/view__1696/beyond-the-water-food-energy-climate-nexus.html, call date 07/14/2014.

MEIKLE, JIM (2011): Note on: Informal Construction. International Comparison Program, Washington D.C. URL: http://siteresources.worldbank.org/ICPINT/Resources/270056-1255977007108/6483550-1257349667891/01.02_ICP-TAG04_ConstructionNote.pdf; call date 4/28/2014.

MEISTERHANS, NADJA (2014): An alternative model of governance. URL: http://post2015.org/2014/07/09/an-alternative-model-of-governance/, call date 07/17/2014.

MINISTRY OF TRANSPORT; VIETNAM EXPRESSWAY CORPORATION (2011): Da Nang – Quang Ngai Expressway Project. Resettlement Plan.

MOHR, MARIUS (2014a): Wastewater Management and Organic Waste Management in Korat/Thailand. Report. Fraunhofer Institute for Interfacial Engineering and Biotechnology (IGB), Stuttgart.

MOHR, MARIUS (2014b): Concept for Wastewater treatment on Son Tra Peninsula (Da Nang, Vietnam). Fraunhofer Institute for Interfacial Engineering and Biotechnology (IGB), Stuttgart.

MOHR, MARIUS (2014c): Presentation at Third Regional Workshop on Integrated Resource Management in Asian Cities: The Urban Nexus at Da Nang, June 25-27, 2014.

NAGAI, FUMIO; FANATSU, TSURUYO; KAGOYA, KAZUHIRO (2008): Central-Local Government Relationship in Thailand. In: NAGAI, FUMIO; NAKHARIN; MEKTRAIRAT (2008): Local Government in Thailand—Analysis of the Local Administrative Organization Survey. No. 147. URL: http://www.ide.go.jp/English/Publish/Download/Jrp/pdf/147_2.pdf, call date 4/8/2014.

NARAPINIT, BUNLEU (n.y.): Clean Air for smaller cities in ASEAN Region. Nakhon Ratchasima city (Korat). URL: http://www.hls-esc.org/documents/4hlsesc/1C%20-%20Korat.pdf, call date 5/9/2014.

NATIONAL STATISTICAL OFFICE (2010): The 2010 population and housing census. Table 1 Population by sex, household by type of household, changwat and area (Contd.). URL: http://web.nso.go.th/en/census/poph/data/090913_StatisticalTables_10.pdf, call date 4/2/2014.

NATIONAL STATISTICAL OFFICE (2000): The 2000 population and housing census. Table 1 Number of population by sex, region, province and area. URL: http://web.nso.go.th/eng/en/pop2000/table/tab1.pdf, call date 4/2/2014.

NEXTHAMBURG E.V. (2014): Gemeinsam die Stadt verändern. URL: http://www.nexthamburg.de/en/, call date 11/03/2014.

NGO, HUNG VIET (2013): Danang CDS Addressing Climate Change Within Urban Planning System in Vietnam: Innovations and Challenges. Proceedings oft he Resilient Cities 2013 Congress. Session: E6 Incorporating Climate Change Concerns into City Development Strategies.

NGUYEN, THI CANH; NGUYEN, NGOC DIEN; DO, PHU TRAN TINH; NGUYEN, TAN PHAT; HOANG, THO PHU; PHAM, CHI KHOA; CHAU, WUOC AN; HUYNH, HONG HIEU; NGUYEN, MINH TR; HO, THI HONG MINH; NGUYEN, QUOC TUAN (2013): Municipal Government in Vietnam: Case studies of Ho Chi Minh City and Da Nang. URL: http://asiafoundation.org/resources/pdfs/MunicipalGovermentinVN.pdf, call date 4/8/2014.

NO AUTHOR (2007): 2007 Environmental Outlook of the Ulaanbaatar City. URL: http://geodata.rrcap.unep.org/envt_outlook_reports/UB_EnvironmentOutlookReport2007.pdf, call date 3/31/2014.

OECD – ORGANISATION FOR ECONOMIC CO-OPERATION AND DEVELOPMENT (1993): OECD core set of indicators for environmental performance reviews. A synthesis report by the Group on the State oft he Environment. URL: http://www.fao.org/ag/againfo/programmes/en/lead/toolbox/Refer/gd93179.pdf, call date 3/28/2014.

OFFICE OF THE COUNCIL OF STATE (1997): Constitution of the Kingdom of Thailand, Government Gazette Press, Vol.l14, part 55a, 1997.

ONGSOMWANG, SUWIT; SARAVISUTRA, APIRADEE (2010): Optimum predictive model for urban growth prediction. URL: http://ird.sut.ac.th/e-journal/document/contents/Journal18(2)/vol.%2018%20no.2%20part%205.pdf, call date 4/2/2014.

PFRIEM, REINHARD (2012): Strategisches Management. Berufsbegleitender internetgestützter Bachelor-Studiengang Business Administration in mittelständischen Unternehmen – Carl von Ossietzky Universität Oldenburg. URL: http://www.bba.uni-oldenburg.de/download/leseprobe_strategisches_management.pdf; call date 4/3/2014.

RAT FÜR NACHHALTIGE ENTWICKLUNG (2014): Was ist Nachhaltigkeit? URL: http://www.nachhaltigkeitsrat.de/nachhaltigkeit/, call date 07/11/2014.

ROGERS, EVERETT (2002): History of Communication Study. URL: http://www.ask-force.org/web/Peer-Review/Rogers-Excerpt-History-2002.pdf, call date 5/9/2014.

ROTHBAUM, RANDI; DURONGDEJ, SOMCHAI; KEIWKARNKA, BOONYONG; ISLAM KHAN, MANIRUL (2004): An Assessment of the Healthy Cities Program in Nakhon Ratchasima Municipality, Thailand. In: Journal of Public Health and Development (2004), Vol.2, No.1, pp. 67-80.

SEI – STOCKHOLM ENVIRONMENT INSITITUTE (2011): Understanding the Nexus. Background Paper for the Bonn2011 Nexus Conference. URL: http://www.water-energy-food.org/en/whats_the_nexus/background.html, call date 07/11/2014.

SELLE, KLAUS; WACHTEN, KUNIBERT (n.y.): Instrumente der Stadtplanung. RWTH Aachen. URL: http://services.arch.rwth-aachen.de/studium/bachelor/b8-instrumente-der-stadtplanung.pdf; call date 5/9/2014.

SENATSVERWALTUNG FÜR WIRTSCHAFT, TECHNOLOGIE UND FORSCHUNG (2014): Berlin Open Data. URL: http://daten.berlin.de/, call date 11/10/2014.

SMART CITIES COUNCIL (2013): Da Nang's Bold Smart City Next Steps. URL: http://smartcitiescouncil.com/article/da-nangs-bold-smart-city-next-steps, call date 3/24/2013.

SOROKINA, O. I.; ENKH-AMGALAN, S. (2012): Lead in the Landscapes of Ulaanbaatar City (Mongolia). Aridnye Ekosistemy, 2012, Vol.2, No. 1, pp. 61-67, Pleiodes Publishing Ltd. URL: http://link.springer.com/article/10.1134%2FS2079096112010088, call date 3/31/2014.

STATISTICS OFFICE UB (2012): Population and Economic Activities of Ulaanbaatar.

SWP – STIFTUNG WISSENSCHAFT UND POLITIK (2013a): Der »Nexus« Wasser-Energie-Nahrung, Berlin.

SWP – STIFTUNG WISSENSCHAFT UND POLITIK (2013b): The Water, Energy & Food Security Nexus. How to Govern Complex Risks to Sustainable Supply? SWP Comments, Berlin.

THEPPHAJORN, KHANITTHA (2013): More Public Participation Needed. URL: http://www.nationmultimedia.com/politics/More-public-participation-needed-30209989.html, call date 4/22/2014.

TRANSPARENCY INTERNATIONAL (2013): Corruption Perceptions Index 2013. URL: http://cpi.transparency.org/cpi2013/results/, call date 3/27/2014.

ULAANBAATAR CITY ADMINISTRATION (2013): Ulaanbaatar Capital City of Monoglia, Ulaanbaatar.

UN – UNITED NATIONS (2014): United Nations Global Compact. URL: http://www.unglobalcompact.org/participant/5875-Korat-Community-foundation, call date 5/9/2014.

UN – UNITED NATIONS (2013): The Millennium Development Goals Report. 2013, New York. URL: http://www.un.org/millenniumgoals/pdf/report-2013/mdg-report-2013-english.pdf, call date 11/03/2014.

UN – UNITED NATIONS (2011): About Rio+20. URL: http://www.uncsd2012.org/about.html, call date 07/11/2014.

UNCRD – UNITED NATIONS CENTRE FOR REGIONAL DEVELOPMENT (2006): Waste Water Onsite Treatment Construction Lamtaklong River Conservation Project. Nakhon Ratchasima Municipality, Nakhon Ratchasima, Thailand. URL: http://www.uncrd.or.jp/env/docs/Final-Khorat-Project-Report-15May06.pdf, call date 4/2/2014.

UN DESA – UNITED NATIONS DEPARTMENT OF ECONOMIC AND SOCIAL AFFAIRS (2014): The future we want – Outcome document. URL: http://sustainabledevelopment.un.org/futurewewant.html, call date 11/03/2014.

UN HABITAT – UNITED NATIONS HUMAN SETTLEMENTS PROGRAMME (2008): State of the World's Cities 2008/9. URL: http://www.unhabitat.org.jo/en/inp/Upload/1052216_Data%20tables.pdf, call date 3/31/2014.

UNESCAP ORG 2014: Integrated Resource Management in Asian Cities: The Urban Nexus. Presentation from 5/28/2014. URL: http://www.unescap.org/sites/default/files/Presentation_GIZ_NEXUS%20CED3.pdf, call date 9/16/2014.

USAID (2013): Sustainable Service Delivery in an Increasingly Urbanized World. USAID Policy. URL: http://www.usaid.gov/sites/default/files/documents/1870/USAIDSustainableUrbanServicesPolicy.pdf, call date 5/7/2014.

VALIEVA, SVETLANA *(2013)*: The Climate-Water-Energy Security Nexus in Central Asia. Center for Climate and Security. URL: http://climateandsecurity.org/2013/03/28/the-climate-water-energy-security-nexus-in-central-asia/, call date 07/14/2014.

VARGESE, N.V.; MARTIN, MICHAELA (2013): Governance Reforms and University Autonomy in Asia. URL: http://www.iiep.unesco.org/fileadmin/user_upload/News_And_Events/pdf/2013/NVV_Gov_reforms-Univ_autonomy_in_Asia_secured.pdf, call date 4/7/2014.

WCED – WORLD COMMISSION ON ENVIRONMENT AND DEVELOPMENT (1987): Our common future, London University Press.

WORLD ECONOMIC FORUM (2014): A Multi-stakeholder Message: Key principles in the formulation of Sustainable Development Goals. URL: http://sustainabledevelopment.un.org/getWSDoc.php?id=3593, call date 07/23/14.

THE CIVIC FEDERATION (2013): Indicators of Financial Condition: A comparison oft he City of Chicago to 12 other U.S. Cities. URL: http://www.civicfed.org/sites/default/files/Civic%20Federation%20Analysis_Indicators%20of%20Financial%20Condition.pdf, call date 4/4/2014.

THE GOVERNMENT OF MONGOLIA; UNDP MONGOLIA (2013): Mongolia's Sustainable Development Agenda: Progresses, Bottlenecks and Vision for the Future. URL: http://www.mn.undp.org/content/dam/mongolia/Publications/Environment/rio_report_mongolia_eng.pdf, call date 4/22/2014.

THE GUARDIAN (2014): We built this city: the smartest urban crowdfunding projects – in pictures. URL: http://www.theguardian.com/cities/gallery/2014/apr/28/crowdfunding-we-built-this-city-the-smartest-urban-projects-in-pictures, call date 11/03/2014.

THE MONGOL MESSENGER (2014): Energy Minister Reports on Construction Projects. No 05 (1178), Friday February 07, 2014, Montsame News Agency.

THE NIELSEN COMPANY (2014): The Asian Mobile Consumer Decoded. URL: http://www.nielsen.com/ph/en/insights/news/2014/asian-mobile-consumers.html, call date 11/4/2014.

THE WORLD BANK GROUP (2013): What is Governance? URL: http://web.worldbank.org/WBSITE/EXTERNAL/COUNTRIES/MENAEXT/EXTMNAREGTOPGOVERNANCE/0,,contentMDK:20513159~pagePK:34004173~piPK:34003707~theSitePK:497024,00.html, call date 3/27/2014.

THE WORLD BANK (2014): Worldwide Governance Indicators. URL: http://info.worldbank.org/governance/wgi/index.aspx#home, call date 3/27/2014.

THE WORLD BANK (2013a): Project Appraisal Doument on a Proposed Credit in the Amount of SDR 133.7 Million to the Socialis Republic of Vietnam fort he Da Nang Sustainable City Development Projekt. URL: http://www.worldbank.org/projects/P123384/danang-sustainable-city-development-project-scdp?lang=en, call date 3/31/2014.

THE WORLD BANK (2013b): City Finances of Ulaanbaatar Mongolia. URL: http://www-wds.worldbank.org/external/default/WDSContentServer/WDSP/IB/2013/09/20/000356161_20130920164914/Rendered/PDF/725140REVISED00UBLIC00U0FINAL0Web0A.pdf, call date 4/7/2014.

THE WORLD BANK (2009): Mongolia. Heating in Poor, Peri-urban Ger Areas of Ulaanbaatar. Asia Sustianable and Alternative Energy Program. URL: http://www-wds.worldbank.org/external/default/WDSContentServer/WDSP/IB/2012/06/13/000425962_20120613144701/Rendered/PDF/696620ESW0P1010taar0ASTAE0October09.pdf, call date 3/28/2014.

WWF MONGOLIA PROGRAMME OFFICE (2007): 09.Feb.2007. „Public Participation in Mining Activity" Training Workshop. URL: www.wwf.mn, call date 04/22/2014.

ZEF – ZENTRUM FÜR ENTWICKLUNGSFORSCHUNG (2014): Bioenergy, Food Security and Poverty Reduction: Mitigating tradeoffs and promoting synergies along the Water-Energy-Food Security Nexus. Working Paper 135, Bonn.

ZEIT ONLINE GMBH (2009): Flotter mit Strom. Günstige Elektroroller lösen das Fahrrad ab, jetzt in China, bald in den Entwicklungsländern – teilweise auch in Deutschland. URL: http://www.zeit.de/2009/47/T-Elektroroller, call date 9/15/2014.

8
Annex

A1: Success Factors Related to Urban Governance in the Morgenstadt Model

These are the 83 success factors for sustainable urban development as identified in m:ci phase I, which brought the six analyzed cities in the frontrunner position they are in today. They are categorized into three levels of governance: Strategy & Planning, Organization & Structure and Methods & Levers.

Strategy & Planning

1	Long-term political stability through planning and management approaches that exceed a single election period
2	Definition of indicators, creation of a performance measurement system for sustainability and climate change
3	Establishment of sustainability advisory boards
4	Development of Visions / goals together with civil society
5	Alignment of budgetary policy with sustainability goals
6	Targeted management of climate change protection & sustainability within the administration with modern tools for management and planning
7	Negotiated / Voluntary agreements to higher social and environmental standards
8	Communal climate change management
9	Control of city over capital assets by shareholding of infrastructure providers etc.
10	Collaboration between city and region for environmental protection and sustainability
11	Establishment of semi-formal and informal networks
12	Development & implementation of communal innovation strategy

Organization & Structure

13	Creation of flat hierarchies within city administration
14	Establishment of a learning organization within the city administration
15	Creation of administrative structures for communal sustainability management
16	Creation and administration of platforms for citizen participation
17	Training of administrative staff in sustainability issues

Methods & Levers

18	Regulation of building processes

19	Creating and maintaining a socially equitable rent level
20	Enforcement of sustainable behavior and investments by regulation (e.g. thresholds)
21	Modal shift of traffic flows towards foot, bike and public transport through regulations
22	Creation of an atmosphere open to innovation and transformation regarding sustainability
23	Awareness / Education: Creating awareness of sustainability through the integration of sustainability issues in education and information campaigns
24	Awareness raising campaigns for saving resources (e.g. water)
25	Education for sustainable development
26	Systemic long-term planning of the city structure
27	Development of goals and guidelines for sustainable district development
28	Development and implementation of market- and center concepts
29	Innovative bottom-up housing concepts
30	Deployment of alternative concepts for re-using existing infrastructure
31	Alternative criteria and procurement procedures for real-estate property
32	District Management – small-scale use-mix in local districts
33	Transport oriented development
34	Urban development planning for a city of short distances
35	Development of green inner city industry parks
36	Cluster management (support of specialized and small businesses through networking, promotion and marketing, communication, and enabling market access)
37	Creation of a green, attractive urban environment for creating a green image
38	Offers and services by the city for raising attractiveness for qualified personnel
39	Business Environment / Identity management
40	Professional city marketing / Creating an international image for / by the city
41	Joint research institutions between industry and science for sustainability issues
42	Creation of „city labs“ (experimental areas) for deploying innovative technologies
43	Attracting and supporting institutions of science and research as incubators for sustainable development
44	Financing of innovative technologies and projects in PPP / partnerships between cities & industry
45	Assignment of urban development tasks to large private companies
46	Elimination of barriers for attracting skilled personnel, investors and businesses

47	Activation of business actors for supporting the sustainability strategy of the city
48	Contractual obligation of energy service provider to reduce CO_2 emissions
49	Active partnership between city & private sector for pushing sustainability topics (PPPs)
50	Development and implementation of services for supporting sustainability solutions
51	Sponsorship / Subsidies by the city for sustainable technologies and solutions
52	Creation of markets for sustainable products and solutions
53	Financial incentive schemes for implementing sustainable technologies at city level
54	Creation of incentives and opportunities for investing in innovative technologies (experimental clauses)
55	Non-monetary incentive schemes for implementing sustainable technologies at city level

A2: List of Indicators Selected for the Urban Nexus Project and Partner Cities

State Indicators
S8 cost for electricity
S9 cost for heat
S30 mobility sector sustainability strategy in place
S38 existence of waste collection/sorting system and their implementation level
S46 percentage of water supplied from storm water harvesting, reuse of treated water
S48 water price
S49 degree of participation
S60 city's GDP per capita
S61/S46/S47 size of sectors in %

Pressure Indicators
P3 municipal water consumption
P5 total energy demand per capita
P6 total electricity demand per capita
P8 population dynamics
P11 systemic dependence on industrial players
P14 size of city administration
P16/P19/P20/P23 Exposure to natural hazards
P21 modal split
P26/27 energy demand of potable water supply

Impact Indicators
I2 CO_2 emissions total
I4 CO_2 emissions per capita
I5 Airborne pollutants NO_2, PM10
I7 Amount of Waste Produced
I10/I11/I12 Rate of new construction
I13 GDP growth rate p.a.

A3: Interview Questionnaire

Introduction: City Data Collection & Sustainability Indicators

Does your city frequently collect and analyze data on the city structure, e.g. number of buildings; lots for development?	❑ yes ❑ no
Please state the annual population development over the past ten years	% p.a.
Does your city forecast population dynamics and is thus, able to forecast living space demands, mobility and traffic development?	❑ yes ❑ no
Does your city have a communal indicator set for sustainability?	❑ yes ❑ no
Is the data for the indicator set retreived on a regular basis?	❑ yes ❑ no
Is the data analyzed in a report on a regular basis?	❑ yes ❑ no
Is there a link between the indicator set and the city's development goals?	❑ yes ❑ no
What happens if the goals are not reached?	
Please describe, what does sustainability/sustainable urban development mean?	

Governance & Awareness

How would you characterize your city's business or management model?	
Where do you see the greatest return possibilities in your city?	
Where do you see the greatest income possibilities?	
Is sustainability institutionalized in your city?	❑ yes ❑ no
How is it included in your city's organization?	
Is there a budget for sustainability measures available in your city?	❑ yes ❑ no
Does your city have sustainability advisory boards consisting of sustainability experts?	❑ yes ❑ no
How high are your city's expenditures for educational measures / informational campaigns dealing with sustainability?	€
Are there training programs for all government employees across all departments dealing with sustainability?	❑ yes, once ❑ yes, frequently ❑ no
Which are the three city organizations you are mainly cooperating with in your daily routines?	
How does the communication process take place in your department and across departments? Please explain briefly	

How high do you estimate your department's authorizational power to introduce sustainability topics into your city?

❑ 1 Very low	❑ 2	❑ 3	❑ 4	❑ 5 Very high

In your daily routines and decision processes concerning city development, how dependent do you feel from your national level?				
❑ 1 Very dependent	❑ 2	❑ 3	❑ 4	❑ 5 Not dependent

Please rate the transparency level in your city for regulations concerning urban development, e.g. when building a building.				
❑ 1 Very low	❑ 2	❑ 3	❑ 4	❑ 5 Very high

Please rate the level of accountability for regulations and/or fines in terms of city development in your city, e.g. when building a building.				
❑ 1 Not consistent	❑ 2	❑ 3	❑ 4	❑ 5 Very consistent

Please rate the accounting, reporting, and recording process concerning urban development measures, e.g. for infrastructure projects, in your city.				
❑ 1 Process needs to be improved	❑ 2	❑ 3	❑ 4	❑ 5 Process is very good

Where do you feel, your city needs more autonomy from the national level?	
How do your city's inhabitants participate in urban development decisions? Please name examples	
What is the size of your city's administration? How many employees do you have?	

Urban Sector – Buildings & Security

In % of the total building stock in your city, what is the rate of… ?	
New construction (% p.a.)/	
Refurbishment (% p.a)	
Demolition (% p.a.)	
Does your city have a certification system for buildings? If yes, what does it look like?	❑ yes ❑ no
Are you happy with the situation of how building licenses are given out in your city?	❑ yes ❑ no
Is your city exposed to natural hazards? Please name examples (e.g. tsunami, hurricane, mud floods, earthquakes)	
Do you use scenario-based simulation data to identify highly valuable areas in your city?	❑ yes ❑ no
Do you have a central risk management for your city, in case of a natural hazard emergency?	❑ yes ❑ no

Urban Sector – Economy & Food

Who are the top five largest employers in your city? Please name	
What is the share of tax income from top five tax payers on overall income?	%
What is the city's GDP per capita?	
What is the city's GDP growth rate?	% p.a.

Do companies have to report environmental data to the city?	❑ yes ❑ no
What is the share of employment per sector in your city? Primary Sector / Secondary Sector / Tertiary Sector	%
What is the share of food self-supply in your city?	%
Is there a weekly market in your city distributing (solely) regional products?	❑ yes ❑ no
Please state the number of inner city farms (agricultural or animal) and their number of employees	

Urban Sector – Waste & Water

What's the amount of waste produced per capita and year in your city?	kg/a/cap.
Is there a waste collection and sorting system existing in your city? What does it look like? Which types of waste are being sorted and re-used?	
Does your city have an existing waste sector sustainability strategy?	❑ yes ❑ no
Please name one measure taken, in context with this strategy	
Please name the key factors, that measure the strategy's success	
How high is the water consumption in your city?	l/d/cap.
How is water consumption measured in your city? E.g. fixed price per apartment, measured by metering system per building	
What is the water price in your city's grid?	m³
How much water is lost in your system?	%
What share of wastewater is being collected?	%
How much energy is needed for water treatment (incl. energy recovery)?	
How much energy is needed for wastewater treatment (incl. energy recovery)?	
Does your city have an existing water sector sustainability strategy?	❑ yes ❑ no
Please name one measure taken, in context with this strategy	
Please name the key factors, that measure the strategy's success	

Urban Sector – Environment & Transport

Does your city have a collaboration with its surrounding region for environmental protection?	❑ yes ❑ no
Does your city have a mobility sector sustainability strategy?	❑ yes ❑ no
Please name one measure taken, in context with this strategy	
Please name the key factors, that measure the strategy's success	
What is the modal split in your city in % of total traffic? MIV, Public Transport, Bicycles, Foot, Other	
Does your city have an existing traffic management system and intelligent traffic control system? If yes, what does it look like?	❑ yes ❑ no
What is the overall CO_2 emissions of your city?	tons/a/cap.
What is the CO_2 share from sectors in your city? Residential / Industrial / Traffic / Energy	%
Please state the amount of airborne pollutants (NOX; PM10) in your city	µg/m³

Urban Sector – Energy

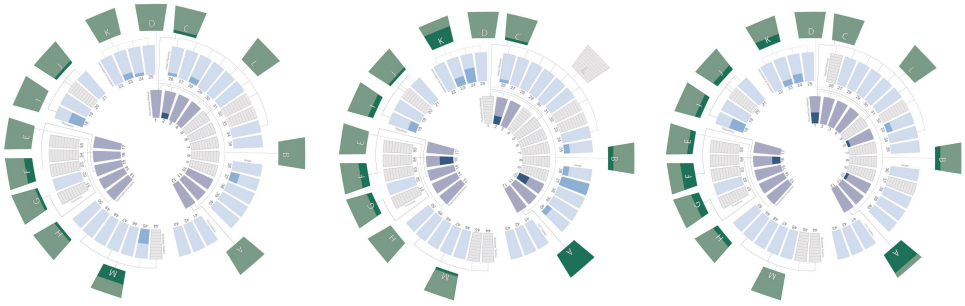
What is the total energy demand per capita in your city?	kWh/a/ cap.
What is the share of electricity demand of private customers in your city?	%
What is the average electricity price for private customers in your city?	€/kWh
What is the price for heat for private customers in your city?	€/kWh
Does your city have a collaboration with its surrounding region to boost renewable energies?	❑ yes ❑ no
Does your city have a an energy sector sustainability strategy?	❑ yes ❑ no
Please name one measure taken, in context with this strategy	
Please name the key factors, that measure the strategy's success	

Practice Examples for Sustainable Urban Development

Please name two practice examples for sustainable urban development in your city and describe them briefly. For each example, please name impact factors that have either negatively (challenged) or positively (supported) influenced the success of each practice example.	
Name of Practice Example 1 and Content	
Positive Impact Factors	
Negative Impact Factors	
Name of Practice Example 2 and Content	
Positive Impact Factors	
Negative Impact Factors	

A4: Manual for Expert Evaluation – Impact Factors and Success Factors and their Influence on Each Other

The expert evaluation is based on a rating of the importance of each success factor in a certain city. Therefore, the explanation of each success factor has to be distributed and understood by the experts before the rating according to one's expertise. The rating only focuses on the current status of the situation on a scale from 0-10 in each city. An individual city profile can be developed in context with this first basic analysis step, which can be depicted in the circle graphic shown below.



To find out, which impact factors have the greatest influence on the improvement of certain success factors, and thus to hint towards possible points of action for improvement, the experts then are asked to do a matrix-analysis which assesses the influence of each impact factor on each success factor. The rating is done according to the following list:

+5 = very strong increasing impact (positive impact)
+4 = strong increasing impact (positive impact)
+3 = increasing impact (positive impact)
+2 = weak increasing impact (positive impact)
+1 = very weak increasing impact (positive impact)
0 = No Impact
-1 = very weak decreasing impact (negative impact)
-2 = weak decreasing impact (negative impact)
-3 = decreasing impact (negative impact)
-4 = strong decreasing impact (negative impact)
- 5 = very strong decreasing impact (negative impact)

The following graphic shows the content of the excel file which is used for the expert evaluation. In this context, the rows show impact factors that have been identified in the conducted interviews to affect urban development across all three cities UB, Da Nang, and Korat. The columns show success factors for sustainable urban development which have been identified to be of importance for the three cities' development.

There are two ways to conduct the expert analysis information: The first approach is planning a meeting with a number of experts in your city and discussing the influence of every impact factor on every sector as well as deciding on the values to put in every field of the table. This first process is very promising considering the knowledge exchange between the different experts, which can be seen as inter-sectoral cooperation. Second is sending the table out to a number of experts and letting each one of them decide on a value according to their background and later on integrating all of the information into one table. The integration process holds some problems for us, e.g. when different experts chose an opposite value for certain for the same box. In this case, a higher number of experts need to be asked to take the most common given

answer as a result of the assessment. In the end, the actual values are not important – the direction on the other hand is quite significant. This means, in the end the boxes are not rated by a certain value, but by the color green for a positive impact, yellow for a not-existing impact and orange for a negative impact. The table can then be read as follows:

If the impact factor X is addressed in the exact same way as it is today, it will be hindering/supporting/not have an impact on the success factor Y.

impact factors \ **success factors**	Defining a City's Management Model for Strategic Value Creation	Comprehensive Sector Strategies for Strategic Urban Development	Good Financial Condition as Door Opener to Urban Development	Usage of Statistical Data for Informed Municipal Decision-Making	Usage of Flat Hierarchies and Cross-Sectoral Communication Models	Municipal Authority as Motivation for Responsible Urban Development	Including Civil Participation Structures for Sustainable Urban Development	Improvement in General Education and Specialized Expertise	Accomplishing successful law enforcement	Urban Services: Regulation and Incentives creating municipal income	Sustainability awareness and Motivation for Sustainable Actions	Establishing Successful urban planning tools	Acknowledging Private Sector Inclusion in Urban Planning
National level politics													
Collective understanding in the local urban culture													
Occupation of positions in municipal administration not according to expertise													
Knowledge and capacity building for citizens in terms of urban planning													
Specialized expertise in municipal administration, e.g. trainings													
Cross-departmental knowledge sharing													
Rural to urban migration													
Poverty and low living standards													
Short-term thinking/Continuity of actions													
Acceptance for other department's tasks													
External and internal transparency of municipal administration													
International attention for municipality													
Integrity & Corruption													
Delay of budget allocation													
Bureaucratic and long processes													
Fast city growth													
Outdated infrastructure, hard-/software in use													

Once the assessment has been finished and analyzed, not only the connections between impact factors are made clear, but also information on which impact factors have the strongest influence on a number of success factors. The answers will differ for every city; therefore, city-specific experts have to participate in this assessment. If possible, the experts are from different backgrounds, disciplines, positions in the municipality, but related to urban planning and the sectors involved in the decisions made in urban planning.

Once the assessment is over, a strategy process can start to be defined, such as which concrete measures the city wants to take to A) choose certain success factors the city wants to make improvements on; and B) decide which impact factors need to be addressed to manage the goals defined under A.

In the analysis at hand, only the 13 Urban Nexus success factors were being assessed in context with the impact factors and the rating of the importance displayed in the city

profiles was taken from the interviews conducted in the three Urban Nexus partner cities. In the future, the Urban Nexus partner cities can add any success factor or impact factor to the list which they would like to assess in context with defining their city development strategy for taking action towards sustainable urban development. It has to be mentioned in this context, that not every single success factor or impact factor actually needs to be addressed in every city. As stated earlier, each city deals with an individual set of challenges and potentials that also need to be addressed by differing solutions and measures.

Contact
Competence Team
Urban Systems Engineering

Fraunhofer Institute for
Industrial Engineering IAO
Nobelstrasse 12
70569 Stuttgart
Germany