Accompanying study of the development process towards a smart city strategy-with a particular focus on social change

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Abstract
The development of a smart city strategy will take place in 73 selected cities in Germany as the result of a participation competition. The systematics of the requirements of the state as a funding provider and the approach of local actors will be examined in more detail in this study. The Objectives of the work are a supervised process of a model facility, on the basis of which observations for a process model are to be derived. This model is intended to enable various aspects as a starting point for non-subsidized institutions as well. A particular focus lies on the area of social change, which is difficult to quantify, in terms of social aspects. The Prior work shows that there are three different dimensions of strategy elements to be decided on in order to start subsidy-compliant design projects. On one hand, a team must be required that takes care of the smart city projects next to their regular tasks. Their composition and purpose in doing represent the first dimension. Secondly, the question of setting targets and the associated monitoring of results must be determined. Finally, the path of involving citizens and companies lead to the social legitimacy of the project team. The approach is based on a semi-structured participant observation by the authors. Qualitative insights into practical doing and abstracted findings based on an example case serve as practical recommendations for further and thus complementary consolidation and expansion of the findings. The first Results show that defining key performance indicators and objective key results is quite a new system of performance measurement for public institutions. In particular, the social aspects of living together in cities are difficult to put into key figures due to the diverse composition of society. Local differences with incentives and channels in different forms need to be translated into general insights. The Implications include enabling government leaders to initiate and manage transformative approaches to the digitization of public space. Social change as a field of action for the design of digital solutions will be opened up and brought closer by means of best-practice implementations. The value of the work lies in getting an example of steps towards a planning basis for comprehensive smart city agendas. Furthermore, management tools for digital projects are addressed and methods for the participation of service recipients of public authorities are presented. Through the classified experiences of the prime example, challenges, opportunities, risks but also weaknesses of the path to a smart city emerge, which can be a point of orientation for non-subsidized cities in their own roadmap.

Keywords: Smart City Strategy, Digital Agenda, Social Change in Society, Governance Indicators, problem based learning, process orientation model.

1. Introduction
The smart city model projects in Germany are based on the "Smart City Charter" of the Federal Institute for Research on Building, Urban Affairs and Spatial Development (BBSR) from 2017 when designing national objectives. This pursues the goal of putting new technologies at the service of citizens and using digitization to contribute to solutions to social, ecological and economic challenges [1].

The Smart City program is divided into two project phases and has a project duration of five years per location for planning and implementation. First of all, in the strategy phase, with the involvement of citizens and relevant stakeholders from administration, business

and science, a smart city strategy tailored to the funded cities is developed and coherent. This takes into account the initial situation on the ground and builds on existing municipal strategy papers as well as local conditions, special features and challenges. On this basis, target images are developed that show the direction in which the digital transformation will move. In addition, the digitization strategy includes the results of decisions on how to deal with data and infrastructures [2]. In addition, there is an evaluation concept and the answer to the question of how the smart city can be made permanent and how the findings and results from the project can be transferred to other municipalities and regions, so that the knowledge generated is sustainable and reusable. Parallel to the development of the Smart City Strategy, the first short-term measures have already been implemented.

Building on the existing and politically adopted digitization strategy, the implementation phase is starting. The aim of this is to implement the measures and projects that have been decided upon and to document them in a comprehensible way. The institutions selected as winning cities from the first tender stage in 2019 to the third tender stage in 2021 will run for five years, i.e. the overall funding program will be completed by 2026.

The development into a smart city builds on the existing challenges and opportunities of a city. In order to determine the status quo, existing structures, special features and development potentials are therefore described [3]. This is also how this article is structured. In addition, a document analysis is carried out to ensure that the Smart City Strategy is compatible with the urban development that has already been developed. Based on this, the analysis of SWOT is determined by a participant observation of a real example. Finally, a summary of the challenges and future tasks is given based on the perspectives of social change and citizen participation.

2. The Preconditions

The digitalization of infrastructure has been a topic of discussion in Germany for about a decade. A comprehensive and integrated digital agenda under the umbrella of the relevant cross-sectional areas exists in very few administrative institutions. The first thing for city administrations to do is to establish a Smart City team, which typically consists of the Office of IcT, the Geodata Department in the Urban Planning Department, and the EGovernment Team from the Organization Department. A particular challenge for the city is to strengthen digital resilience, which can also be achieved by involving local energy producers, universities or the urban start-up center.

A holistic smart city strategy should aim to refer to existing concepts and programs. This integrative effect is intended to support the existing goals through digital projects. Since it also enables comparability with national and international smart city strategies, the Smart City Charter and the UN Sustainable Development Goals serve as the basis for the existing strategies [4].

In Germany, an Integrated Urban Development Concept (ISEK) is typically already in place for centres as a flexible planning instrument for an overall perspective of urban development for ten to 15 years. This includes inner-urban development, the entire cityscape and local amenities as well as economic development.

With regard to the social goals of the SDGs, local initiatives for active coexistence must be designed. This means, among other things, translating topics such as the promotion of youth and inclusion, integration with an overall senior policy concept and volunteering into concrete projects. Culture and tourism, as well as museum development and cultural development concepts, can also be listed.

3. Challenges and Future Tasks

Due to the holistic nature of the digital transformation of cities, the consideration must be limited for capacity reasons. In the following, we will focus on two main areas of consideration:

3.1. Social Factors and Community relations

Many cities have a long-grown community organization, but this is significantly influenced by influxes and departures. The question of local identity is reflected in an engaged citizenry and urban society. A major challenge is coping with demographic change and the increase in the number of people in need of care in relation to the working population. For some years now, the proportion of younger people has been rising again, so that securing childcare and school-based care services plays an important role. Promoting inclusion and the creation of affordable housing complement the portfolio of social challenges.

3.2. Social Factors of Culture development

Large-scale cultural events, concerts and events contribute to the city's cultural promotion through the creation of a diverse cultural landscape as well as a distinctive cabaret scene. The challenge is to strengthen this cultural participation and diversity, so that participating in cultural events can be opened up to everyone and can be co-shaped by everyone. Promoting and supporting the attractiveness and visibility of the cultural landscape is an important task for the future in digital platform solutions.

4. Methodical collection of qualitative feedback

The main results of the previous analysis of the initial situation of an example facility and existing concept are presented in the following overview. It is categorized in the form of Strengths, Weaknesses, Opportunities and Threats and is transferred in the form of a SWOT representation in relation to the above use cases of the social aspects of urban coexistence.

4.1. The method of ethnographic field research

With participant observation as a method of ethnographic field research, it is possible to ensure that the context of individual life situations is taken into account by personally observing living environments and places of interaction (cf. Schütze 1994, p. 285 ff.). This enables to partially overcome the limits that a survey places on false statements about actual behaviour. Participant observation locates the individual in their social environment in which their biography is embedded. In this way, life-biographies can be categorised and offers can be derived from them.

Even if a separation of looking and listening would be artificial, a distinction must be made between interview and observation. During participant observation, the field researcher

takes part in events that "largely take place in the field without his or her intervention, which are part of the everyday life of those observed and in which the observer is more or less involved" [5].

Based on the methodology of the individual case study, which is structurally similar to the ethnographic methods of qualitative research methods, a flexible and open field-dependent procedure is created [5]. Due to the dependence of participant observation on the life forms and everyday conditions of the subjects involved (cf. Lüders 2004, p. 393 ff.), a standardised concept would contradict the ethnographic peculiarities and capabilities of participant observation.

Central to the application of the method is the creation of analysable records in the form of observation protocols that can be analysed with computer support [6]. The participant observation in this study was carried out using the following steps:

In the preparatory phase, a decision was made as to which observation method would be suitable based on the level of knowledge, research question and field characteristics [7]. In order to get to know the behaviour of those observed in social situations and to gain the information from the field according to qualitative text analysis, participant observation was carried out in a structured manner in the form of outreach participation in the present study [8]. This narrowed down the field of observation. The observation also serves to develop theory, although care must be taken here not to jump too quickly into hypothesising when defining the observation dimensions. Finally, it must be recognised that participant observation is limited by the range and selection of human sensory organs and the media used and is therefore only partial. Participant observation thus focuses on behaviour that must be interpreted as social action and cannot be observed completely [9]. The next step, access to the field takes place in a planned and structured manner through the outreach participation of citizens during various public events in the city of Kempten.

Rules of conduct such as respect for those to be observed and empathy, disclosure of the research intention, detachment from one's own socialisation and position in order to encounter the field of observation openly, tolerance and respect for the field in the form of restraint of criticism and sanctions, identification of key persons, opinion leaders and critics, openness towards the findings, the consent of those observed (in a written and signed form), form the basis of participant observation. The observation step is about determining the observation field and taking into account the dependence of the observation results on the person and the role of the observer and observing behaviour accordingly. Even within an observation field with a medium degree of openness and complexity, e.g. in an innovation laboratory as a social and spatial area, structures such as contact with other fields and many people acting in different situations influence what happens in the setting. The advantage of relatively closed fields is therefore the low-threshold access and observation units, the relevance of which was previously worked out in this case [9]. At the beginning and for orientation in the field of investigation, descriptive observation provides unspecific descriptions that help to grasp the complexity of the field and to develop more concrete perspectives. The focussed observation that follows can concentrate on particularly relevant processes and problems. At the end of the observation, selective

observation helps to find evidence and examples of categories and types of behaviour [5]. In this study, the observers act as participants in the observed events, whereby the dominance of the observer role must be recognised and identification with the field must be achieved [9].

The interactions between the participants in the social situations and the implicit rules of everyday action, the everyday knowledge, from the perspective of the observed are the essential contents of the protocol, which were structured on the basis of the aspects of participants, goals and strategies of the social situation of outreach participation on the topic of the Smart City, the influence of the locality, behaviour-determining norms, regularity of the situation, reactions and sanctions of deviant behaviour and contradictions between what is claimed and what is done. The observation notes answer the questions 'where, what, when, who, how' in sequences of events, theoretical notes as memos contain hypotheses, interpretations and conclusions, methodological notes record subsequent observations of the observer in relation to the field [5].

As part of the evaluation, what was observed was thematically structured and theoretically summarised according to the questions identified in advance. Using in-vivo-codes discovered in the observation material as terms or parts of theories used by the observed themselves, access to the views of the observed was made possible.

The observation report is coded according to text passages that contain methods or patterns with which the observed persons orientate their everyday actions and represent the prerequisites for successful participation in the interactions of a social setting [5].

The integration of data-related theory in the sense of qualitative text analysis was achieved through a saturated category system that is organised according to similarities and connections between the observations. The results of the participant observation can be contrasted with statements obtained with help of interviews and group discussions within the same field section (method triangulation) [5].

The final ethnographic report contains the observed data and theoretical and methodological notes, so that it can be referred to at any time in order to develop new dimensions and interpretations [10].

4.2. Findings from case analysis

The main results of the previous analysis of the initial situation of an example facility and existing concept are presented in the following SWOT chart to give an overview.

It is categorized in the form of Strengths, Weaknesses, Opportunities and Threats and is transferred in the form of a SWOT representation in relation to the above use cases of the social aspects of urban coexistence.

Strengths	Weaknesses
• long-grown neighborhoods • prosperous and highly diversified economic structure with numerous SMEs as well as industry • growing urban population • urban centre in a rural setting • strong location for education and research	• low availability of residential and commercial space and pressure on the low-cost housing market • high traffic congestion, especially commuter rush hours • lack of attractiveness of public transport services • demographic development, increase in the elderly population
Opportunities	**Threats**
• growing city offers opportunities for the sustainable development of new urban districts • diversified economic structure provides a good basis for further digital development markets • positioning as a highly integrated research and development location as an interaction between university and industry • adopted strategic goals as guidelines for the future direction of the city	• close integration of companies into international value chains • securing housing supply for a growing population against the backdrop of rising construction prices and interest rates • customer perception of the attractiveness of public transport with unclear digital service structures • increasing proportion of the elderly population necessitates extensive adaptations

Fig. 1. SWOT-Analysis Fallbetrachtung des Sozialen Wandels.
Source: Own Diagram

5. The path to a smart city strategy

After an in-depth analysis of the initial situation, the foundation of the Smart City, observation results on the way to the Smart City followed the example consideration. On the one hand, the question of how the city has organized itself and which roles have been assigned for the smart change will be clarified. On the other hand, the procedural process for the development of the strategy and the selection of measures is explained. Finally, the citizen-centered approach is described by participation and communication during strategy development. In order to keep an eye on the various stakeholder groups at all times, the governance method of KPIs combined with OKRs was used.

5.1. Actors of municipal smart city initiatives

The strategic management level is taken over by the steering group as the highest authority for decisions within the administration and consists of department heads of central services such as ICT and human resources as well as urban development and construction. In addition, central heads of offices as well as heads of staff with digitization tasks as well as the Chief Digital Officer are integrated, possibly expanded to include corresponding functionaries of the city's holdings which have a substantive connection to the Smart City. The Steering Group is regularly informed about the status and progress of strategy development and implementation measures and makes decisions on the direction of the strategy.

In addition, an advisory board consisting of regional and national experts related to digital urban development must be established at the strategic level. The advisory board does not make any formal decisions, but provides impetus, contributes expertise, and creates visibility for the topics of the Smart City. The interdisciplinary team of the Smart City staff unit covers different thematic focal points and has a wide range of competencies to do justice to the cross-cutting topic of digital urban development. At the centered level of responsibility for implementation, a Chief Digital Officer (CDO) has the role to coordinate digital transformation in all public affairs. He has overall responsibility for digital projects, including all network partners to be found, plus information. Further acquisition of funding for cross-financing as well as a scientific evaluation of project results and initiation of accompanying research also appears to be important with regard to the overall program.

In addition, a Smart City project manager is to be appointed for the management and monitoring of the overall project, someone to moderate the steering round and to coordinate the various Smart City committees as well as the management of project managers from the operational level is to be appointed. A number of full-time positions of between 2 and 5 seems to be necessary to support the project management and the operational implementation of the individual (sub-) projects. Since this is where the documentation obligations as well as the financial processing of KfW funding plus information and networking events lie, it may make sense to have several heads for substitution situations. Especially in the implementation phase, thematic project teams are required in addition to these responsible persons in order to bring together the different perspectives and experiences across departments. Thus, the Smart City project places high demands on the cooperation and flexibility of the actors involved in order to implement management-related approaches locally in the field of tension between communication, control logics and data literacy:

Fig. 2. Integrated Model based on requirements for Smart City Projects.
Source: Author own work

5.2. Development process

The development process of the strategy is scheduled to take one year and includes various levels of action in the development of models for phases, the culture of participation, and the development of indicators. All three levels are closely interwoven and necessary so that at the end of the process is a Smart City strategy in which a wide variety of actors are involved and in the course of which implementation measures are adjusted.

5.2.1. Developing a phase model

The process of model development for the Smart City Agenda is divided into three phases:

- Phase 1: Analysis and preparation of the status quo on the basis of a document analysis as well as surveys on challenges, local peculiarities and strategic objectives in the sense of the overall program.
- Phase 2: Development of target images in the participation process and evaluation of project ideas under the development of an initial organizational structure using formats according to award criteria and goal achievement.
- Phase 3: Consolidation of the selection of ideas after bundling and concretization by means of a steering group resolution and finalizing an evaluation concept of committee- and stakeholder communication.

5.2.2. Participation and communication

The participation of the urban society should be transferred into a communication and participation concept in order to identify the target groups by means of stakeholder analysis. The aim is to gather perspectives from administration, politics, specialist sectors and civil society. In interactive formats accompanied by empirical surveys, design sprints will be reflected for the development process via the feedback on the initial drafts. In addition to marketing measures, social media and meeting events, places of encounter are to be created with results from the participation formats so that permanent access to the Smart City development process can be guaranteed.

Fears and concerns about measures associated with digitization must also be regularly taken up internally in the town hall administration and refuted in suitable formats. The events to present goals and concrete measures to external stakeholders to a broad public can also be used to motivate interested actors from the internal departments in the sense of an open innovation culture.

5.2.3. Indicator concept

In order to monitor and evaluate aspects of the smart city strategy, qualitative and quantitative key performance indicators (KPIs) must be developed. A continuous inventory (monitoring) of the measures is compared with the target images from collected data and information about the measures.

On the other hand, an impact measurement of target states based on Objective Key Results (OKR) should create transparency. In particular, innovative and experimental potentials of strategy modules need to be formulated in the context of vision and implementation modules in an impact-oriented manner with regard to the target group.

6. Conclusions

This article examines the development of Smart City strategies in 73 selected cities in Germany as part of a competition. A central focus lies on the systematics of the requirements on the part of the state as the funding provider and the approach of the local actors. The derivation of a process model based on a model facility as a subsidized Smart City was investigated with regard to social aspects of the smart strategies.

The previous research identifies three dimensions of strategy elements that are crucial for eligible projects: the composition and objectives of the team, the setting and monitoring of objectives, and the involvement of citizens and businesses for social legitimacy. The chosen approach is based on semi-structured, participatory observation and aims to condense and expand qualitative insights about practical action and abstracted findings using an example case.

The definition of KPIs and objective key outcomes as a new system of performance measurement for public institutions has the potential to quantify a system across local differences and diverse stakeholder compositions.

However, providing steps to develop a planning basis for comprehensive Smart City measures also means transferring methods for the participation of citizens and companies into a permanent cycle of legitimation and adjustment. The classified experiences of the sample provide valuable insights into the challenges, opportunities, risks and weaknesses of the path to the Smart city as a role model. In this way, after the end of the funding project in 2026, the idea of a permanent benchmarking competition between the regions shall be stimulated.

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