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## City of the Future Ludwigsburg: Co-Creation in Urban Development Processes

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### 1 ABSTRACT

In the face of the trend towards digitization, the consensus that successful urban solutions shall collectively be conceived and developed as a societal task is becoming increasingly present (Sørensen & Torfing, 2016). As we cannot elude the digitization of our built surroundings and everyday lives, we can make use of technology in a way that cities become more livable for the individual and address overarching goals such as sustainability and resilience. In addition to a variety of conventional and innovative participation methods, digital tools create options for integrating local actors into decision-making and implementation processes relevant to urban development. But what do new integrated approaches look like? How is it ensured that the impulses of a heterogeneous stakeholder landscape are equally respected? And how can cities commit to incorporating the results created in open ideation processes within traditional urban planning?

In order to develop new and successful solutions to existing problems, co-creation focuses on the cooperation of transdisciplinary actors who jointly address challenges in a "process of creation" (Dörk & Monteye, 2011). In this context, practical experience is considered as equally valuable as expertise knowledge and specialized skills. Thus, regardless of professional backgrounds, in such a co-creation process solutions are developed at eye level, from the initial idea to the (prototype) implementation. In relation to the wide variety of urban challenges we are currently facing, co-creation approaches offer a new format for stakeholder participation in urban development processes. Moreover, they promise the creation of holistic and sustainable (systems') solutions with a great innovative potential (Mulder, 2014).

This paper is based on the project »City of the Future Ludwigsburg« which is funded by the German Ministry of Research and Education (BMBF) as part of the »Flagship Initiative City of the Future«. Within this initiative, local stakeholders, communities, businesses, the creative industries, civil society representatives and the scientific community cooperate in Ludwigsburg in order to implement processes and recommendations for action in Germany's future cities.

As part of the three-phase tendering, in the city of Ludwigsburg the first phase focused on the joint development of a comprehensive concept for the planning and implementation of a sustainable and holistic vision 2030+. Against this background, currently phase two addresses digitization and urban space amongst others by hosting three consecutive events in the so-called »Makeathon« format. They address the future of urban space and urban development with a focus on digital solutions. To carry out these events, a workshop space was implemented which is called »urban laboratory« (Stadtlabor). Within this lab innovative ideas and possible measures for "upgrading" public space are identified and evaluated with regard to their overall benefits and their potential to improve their quality (Stadtverwaltung Ludwigsburg, 2018).

The aim of the joint research project between Fraunhofer IAO and the city of Ludwigsburg is to test the structured co-creation process as a new governance format. Thus, impulses with regards to content and processes can be given for the city administration and politics, that flow into strategies as well as plans.

Keywords: makeathon, public space, digitisation, urban planning, co-creation

### 2 INTRODUCTION

With the trend of growing challenges on the one hand and digitization on the other, the consensus that collective designing and developing of urban solutions should become a societal task is getting increasingly relevant (Sørensen & Torfing, 2016). Even though we cannot elude the digitization of our built surroundings and everyday lives, Smart City solutions should not primarily be developed by IT companies. Instead, Smart Cities shall be a place for people by people that make use of technology in a way that cities become more livable for the individual and also address overarching societal goals such as sustainability and resilience (Mulder, 2014). For example, digital tools enable new options for integrating local actors into decision-making and implementation processes relevant to urban development. But what do corresponding

governance formats look like? And how can it be ensured that the impulses of heterogeneous stakeholders are equally considered?

### 3 OPEN INNOVATION FOR URBAN DEVELOPMENT

Inspired by the opening up of former companies and research internal processes in the context of open innovation, the demands of citizens for a stronger participation in decision-making processes concerning urban development rise against the background of NIMBY (not-in-my-backyard) and DIY (do-it-yourself). At the same time, the issues which cities are facing are becoming more complex and can only be dealt with together with users, providers, planners and decision-makers. In particular, the process of digitizing our cities, which describes a highly abstract process for many people, will change our lives so drastically that it requires the involvement of urban actors in making significant decisions. At the same time, we cannot elude digitization.

While the Smart City is still under criticism of being heavily driven by IT companies (Hollands 2015), there has been a general consensus that new urban solutions need to be developed collectively as a societal task to ensure better results (Sørensen & Torfing, 2016). The term “better” in this context not only describes the potentials a solution holds for a certain problem – a side that tech companies usually focus on – but also the assessment of environmental and societal impacts – aspects that improve the quality of life, when respected in the design of solutions. As of today, such effects are hardly considered at all and secondly, if they are assessed, it is done by “experts” by profession. The discourse about open innovation offers a new possibility: Integrating a variety of stakeholders in innovation processes and giving them a larger influence on the actual outcome. In this regard, digitization enables new forms of governance in urban development that take into account the knowledge, needs and competencies of citizens as well as the local economy, science and social initiatives. Through transdisciplinarity, new application and research relevant impulses can be implemented in urban development that originate from the urban administration practices as well as the living environment. Such impetuses are crucial for developing innovative solutions that meet today's and tomorrow's user requirements.

### 4 CO-CREATION - CREATING SOMETHING TOGETHER

The staged model of involvement by Sherry Arnstein, the “Ladder of Citizen Participation”, which defines eight intensity levels of participation, clearly shows the difference between information provision as least form of participation and the complete submission of decision-making authority (Arnstein, 1969). According to the understanding of the authors of this paper, participation is more likely to be interpreted as a mix and match logic: for each issue, an individual combination of participation intensities is necessary in order to gain a successful outcome. The central aspects of “co-creation” – the term for creating something together as a team – are therefore idea generation and cooperation.

In order to develop new solutions in accordance with urban challenges, the co-creation approach focuses on the cooperation of transdisciplinary actors who jointly address challenges in a "process of creation" (Dörk & Monteye, 2011). Regardless of the professional background, something is going to be created, from the initial concept suggestions to the (prototype) implementation. The following three basic rules are considered by the authors of this article as essential for co-creation:

(1) **CREATIVITY:** Finding answers to complex questions and challenges requires a complex set of skills, (everyday) knowledge and expertise. Co-creation formats encourage creativity in the development of innovative and multi-demand solutions through the integration of heterogenous actors.

(2) **IDENTITY:** In the design of the direct living environment, the identification of the users with the public urban space is relevant. By addressing needs and developing solutions collaboratively, the identification potential can be maximized, which in turn leads to a sense of responsibility for what has been created and its context, and is accordingly relevant for the acceptance and stabilization of new solutions.

(3) **SOLIDARITY:** The integration of heterogenous skills, expertise and knowledge requires the cooperation of different actors on an equal footing. The focus in the creative process is on 'learning from each other' and refers to the everyday knowledge of residents and users, the knowledge about formal urban development processes (such as legal restrictions or process flows) as well as technology expertise.

## 5 CASE STUDY LUDWIGSBURG: THREE MAKEATHONS BETWEEN ANALOG AND DIGITAL REALITY

The city of Ludwigsburg is playing a pioneering role in the German state Baden-Wuerttemberg in the sense of sustainable and integrated urban development and at the same time keeping track of the future (Neuens et al., 2013). The digitization of urban space therefore plays an equally important role in terms of the content of local projects and in terms of methodological approaches to digitize urban space by involving different stakeholders in urban development processes. This fundamental idea is also reflected in a research project, which is being carried out as part of the second phase of the City of the Future competition in Ludwigsburg. The funding agency's major objective, the German Ministry for Education and Research (BMBF), is that the participating municipalities develop a comprehensive concept for the planning and implementation of a sustainable and holistic vision 2030+, which was developed jointly with the cities' citizens in the first phase of the research project. Perspectively, the third phase, which is expected to follow in 2018, is dedicated to the concrete implementation of the vision in so-called "real labs".

Against this backdrop, Ludwigsburg will host three consecutive events in a Makeathon format in the second funding phase of the competition, which will address the future of urban space as well as urban development of the future with a focus on new digital solutions. It is important, on the one hand, to gain new insights and approaches through transdisciplinary cooperation. On the other hand, innovative ideas and possible measures for "upgrading" public space shall be identified and evaluated with regard to their usefulness and potential. The aim of the research project is to test the structured co-creation process as a new governance format which creates better solutions for the digitization of public urban space. Impulses will mainly be generated for the city administration and politics.

While the first Makeathon in July 2017 dealt with the design and construction of the so-called city lab, the second and third events focus on the urban environment and the city quarter surrounding the lab. Together with a heterogenous mix of local actors, city-relevant issues are worked on and solution ideas are prototypically transferred into urban space. The digital level in the context of expanded reality is understood as an integral part of the developed solutions. According to the objective of the Makeathons the following building blocks are considered as central for the conception and execution:

**Enabler:** Initiated by the City of Ludwigsburg, the Makeathons are jointly designed and implemented by the applied research institute Fraunhofer IAO and the local creativity incubator Tinkertank.

**Problem:** The thematic basis is a challenge or problem formulated as openly as possible by the city, thus providing sufficient space for the creative solution development process. The reference for application in the urban context will be defined in the Makeathons through the spatial and thematic localization in "Weststadt", an urban quarter, which has a high development dynamics.

**Actors:** Participants are to be selected according to their expertise and their relationship to the local context in order to develop solutions for the urban needs. They represent the local creative industries, local companies, different departments of city administration as well as citizens of the neighborhood. Accordingly, they cover a differentiated set of skills and knowledge. It is important that in the co-creation process practical experience, e.g. from citizens, is considered as equally valuable as expertise knowledge and specialized skills in the fields of programming or urban development.

**Process:** In order to develop targeted solutions within the 15-hour open innovation process, the course of the Makeathons is divided into three phases: Idea generation, experimentation and prototype development. Each phase is preceded by a group-finding phase during which participants find a suiting team according to their interest. The integration of the results is ensured by the continuous dialogue between the working groups and the exchange between the assigned mentors.

**City lab:** The venue of the Makeathon series fulfills not only a workshop function but also serves exhibition and information. The space designed in the first Makeathon offers the infrastructure and equipment for further co-creation processes and alters with every event. It is the goal to open up the location in order to enable participation in ongoing urban development processes and to consolidate it in this space.

**Materials:** Digital and analog materials are the basis for the creative process and are introduced at the beginning of the Makeathon. They are mostly donated by local companies expressing their support for this

new format. In the process, the participants will be supported in the use and processing of the materials by the mentors. Thus, the participants can also familiarize with formerly unknown (digital) materials.

## 6 DIGITAL METHODS OPEN UP A NEW DESIGN SPACE

Cities are always more than what is caught at first sight. Therefore, it is obvious to extend the digitization of urban space with an appropriate dimension of visualization and communication. This approach is pursued through the integration of augmented and virtual reality with its diverse application possibilities in the Makeathon format and will be used in two ways: as a process-accompanying tool for prototype development and testing on the one hand, but also as a tool for the design representation in constructed urban space on the other hand.

Using augmented reality visualizations, which expand the real world by adding virtual aspects (Zeile, 2017) ideas and design proposals from the Makeathon will be integrated into an actual urban space and visualized to evaluate their suitability and potential in the real environment. Possible future developments such as the integration of trees or a bench in a concrete urban setting as well as historical views of a street can also be projected into real urban space. This offers the chance to inform and visualize plans before they are realized. In addition, the Makeathon may also produce analogue prototypes, such as temporary architectural interventions on parking areas or so-called pop-up furniture for public spaces, which in turn can be supplemented by digital elements, such as additional information on locally recorded weather data or used building material to generate value for users.

Virtual reality, on the other hand, describes the interactive presentation and perception of a computer-generated reality (Zeile, 2017). For example, 360° camera shots can be brought to life for users using a suitable output device (such as a head-mounted display) and enriched with additional content without being at the point of capture.

Last, but not least, an interactive platform in the project brings together these two approaches and provides space for the discussion of the ideas developed in the Makeathons as well as stimulates the further analogue and digital development of these ideas based on particular demands and skills, even outside the city lab and apart from the Makeathons (Stadtverwaltung Ludwigsburg, 2018).

## 7 PROTOTYPES SHOW DEVELOPMENT PATHS

The Makeathon results in prototypes, that are physical representations of the ideas generated and developed during the process, functional but simplified. The prototypes represent an approach to a system, an application or a product and help to get a first impression about the form or functionality, to test, to reflect and to develop further. Quickly developed prototypes are seen as a cost-effective and useful tool to test ideas early on and adapt according to feedback from potential users and affected people (Kujala, 2003).

The prototypes created in the Makeathons in Ludwigsburg address different topics and differ in their technological design as well as in their functionality:

An interactive city model, which emerged from the first Makeathon as part of the inventory of the city lab, intends to stimulate public discourse within and about the city quarter in focus (Fig. 1). It is designed as an interactive table where different information levels are projected onto a physical 3D city model. For example, an emotional mapping heatmap visualizing spots where stressful situations during cycling and pedelec rides in Ludwigsburg occur, was added to the city model in the second Makeathon (Fig. 2). For the development of the heatmap, the participants were equipped with sensors that can detect stress on the basis of temperature fluctuations and skin conductivity as well as a camera and a GPS tracker. Several rides on bicycle and pedelec were carried out in the Weststadt and the obtained data visualized, indicating the need for action. The expansion of the physical city model through additional virtual layers is to be realized in further Makeathons. In addition to projected maps (e.g. a traffic simulation), information about particular buildings can be displayed via a movable marker whose location is tracked by a webcam. The user can move the marker over the model to retrieve extra information, e.g. about the buildings' names. Furthermore, the whiteboard-like materials used to build the city model enable users to write ideas and suggestions directly on the model, which can later be erased.



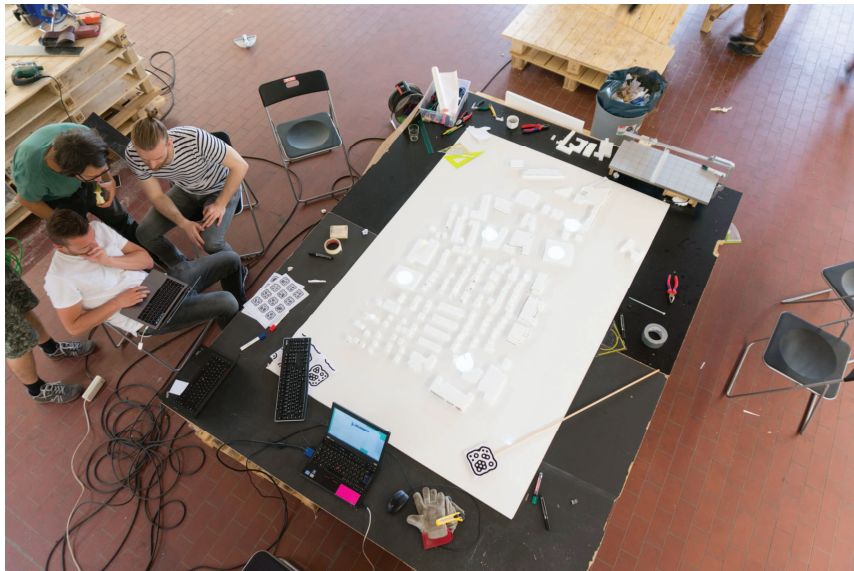


Fig. 1: Prototype for an interactive augmented reality city model displaying different layers of information as result of Makeathon 1 (Fraunhofer IAO 2017).



Fig. 2: Heatmap displaying stress during bicycle rides in the project area in the morning (left) and in the afternoon (right) as result of Makeathon 2 (Fraunhofer IAO 2017).



Fig. 3: Virtual city tour prototype enabling citizens to participate in past, present and future urban developments in Ludwigsburg as one of the results of Makeathon 2 (Fraunhofer IAO 2017).

A second prototype solution addressing the discovering the city track of the Makeathon, is a virtual city tour (Fig. 3): Augmented reality representations can be displayed in Ludwigsburg's urban space using a smartphone and QR codes. The content ranges from so-called video walks with residents and experts through the city quarter Weststadt speaking about historical as well as future developments to interactive collages augmented with additional information and 360°-visualizations. The system can easily be added on and be widely used in the future for multiple purposes, such as the city's 300 year anniversary in 2018. Moreover, it addresses new levels of knowledge transfer and networking in urban areas.

## 8 CONCLUSION

It is the authors' understanding that quality of life will be improved by technological innovations in Smart Cities, only if solutions are co-created and responsibilities are shared by different stakeholders participating in urban development processes on eye level. Therefore, it is the research project's goal to test Makeathons as new co-creative governance format in urban development processes aiming at better, more liveable cities. It has to be mentioned, that new governance formats shall not replace traditional and approved ones. It is their combination which shall create value. In accordance with the mix and match logic of participation intensities, the right mixture has to be chosen dependent on the pursued goals. Also, in this research project Makeathons are not tested against a variety of other formats, but they are tested qualitatively in which ways different stakeholders can benefit from this format in the context of urban development. This format's major challenge is reflected in securing that the results from the co-creation process, which are mainly stimulated by local stakeholders' demands and needs, actually find their way into the official urban development processes; from concept to action. In analogy to Roger's innovation theory, the critical step is the transition from an invention to an innovation (Rogers 2010). The collective development of a solution with provider (city) and user (citizens, industry, etc.) in a co-creation process is crucial for its applicability, which can be used synonymous for the diffusion of a newly invented solutions in space and society. Even though the final Makeathon has to be carried out and evaluated before results can be summarized, it can be concluded that this format enables participating in urban development processes for groups which do not necessarily participate in other existing formats. The two carried out Makeathons have brought a variety of stakeholders together in a positive and constructive participation process and have created valuable results for the city. The different results are picked up by the city administration in various projects, which can be understood as the main outcome of the project and which proves the beneficial impacts of this format, e.g. using emotional mapping for traffic planning will be extended from this prototype to other city quarters and the necessity of better orientation in the project area will be incorporated in a number of internal projects.

Is the understanding shared that collectively developed solutions will be better applicable and the framing conditions respected, Makeathons as a new governance format could enable future Smart City projects to create solutions as an answer to true urban demand between the individual and society and at the same time reduce skepticism towards new solutions and ensure usability and comprehension.

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