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Co-Creation in Urban Station Communities

Summary of three lectures with a presentation of findings from the Project 2017-2019

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Mistra Urban Futures is an international Centre for sustainable urban development. We believe that the coproduction of knowledge is a winning concept for achieving sustainable urban futures and creating accessible, green and fair cities. The Centre is hosted by Chalmers University of Technology and has five platforms in Cape Town, Kisumu, Gothenburg, Skåne and Sheffield-Manchester as well as a node in Stockholm.

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Co-creation in urban stations communities

Brief presentation of a theoretical framework, the tool-box, applications and key lessons
Summary of Lectures at Chalmers, K2 Lund University and Dalarna University 2019

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In Mistra Urban Futures knowledge process "urban station communities" different forms of co-creation have been a common denominator for transdisciplinary collaboration between a wide range of stakeholders from public sector, academia and the civil sector since the starting years in 2012 – 2014. The core process of urban stations communities encompasses a number of planning cases on different levels: regional and sub-regional planning, comprehensive and profound comprehensive planning as well as master planning and programs for urban station areas close to urban centers or in more rural areas as well.

The aim of this lecture is to present and analyze co-creation activities within the urban station communities general process as well as some activities being organized within the associated R&D project "Co-creative urban planning for energy-efficient and sustainable urban station communities" [1] (the SamSam project in Swedish).The activities are based on challenges for achieving green, just and accessible communities in different local contexts, defined by practitioners within municipalities in collaboration with researchers. By applying *a number of both qualitative and quantitative tools* introduced by the researchers, including tools for stakeholder analysis, site analysis, scenario development, evaluation of scenarios and formulation of implementation strategies new knowledge and insights have been generated among the participants. The *key role of the urban planner/architect as a process leader* with the capacity to promote transdisciplinary co-creation in planning and design activities has been observed in these processes.

The importance of *using a sequence of tools bridging the usual gap between analysis and synthesis will be discussed in the paper with case examples.* The use of participative backcasting as a method for strengthening the long term visionary thinking as well as the generation of different scenarios will be exemplified and discussed with references to planning cases for example in Borås, Härryda and Varberg. *Possible future development of the theoretical foundation for a planning and design-oriented participative approach* related to urban station communities will be proposed referring to three types of institutional settings for planning and design: forums, arenas and courts. Finally, possible objections towards an action-oriented research will be addressed.

Key words: co-creation, transdisciplinary collaboration, participative back-casting, design-oriented participative approach

INTRODUCTION

As an international research center, Mistra Urban Futures shall develop and apply knowledge for sustainable urban development. The aim is to accommodate continued rapid urbanization and the worldwide need for better urban environments. To meet this challenge and capitalize on the knowledge and experience of practitioners and researchers, Mistra Urban Futures has decided to use a combined co-production and co-creation approach. This involves jointly defining challenges and developing and applying knowledge across various relevant disciplines and subject areas. New and vital insights develop when researchers and practitioners work together on various projects. Mistra Urban Futures' starting point for urban development is the guiding concept of "just, green and accessible communities". [2]

Railways and railway stations have historically had an important role for the societal, not at least the urban and rural development, both in Sweden and globally. Stations and public transportation nodes in general have also a future potential to become a driving force for a sustainable development in regions, cities, towns and small urban centers.[3] [4] A condition for a positive development is that a transit oriented development (TOD) is promoted, including mixed-use densification close to the stations combined with the development of

continuous paths for local public transportation, bicycling and walking to surrounding urban and rural areas.[5] However, there are many challenges to address due to the complexity of the task to densify the built environment around stations, involving stakeholders from both public sector, academia, civil society and business sector.

In order to be able to address these challenges and opportunities to release and develop the potential for sustainable development around stations within the format of the research center a so called knowledge process for urban station communities was initiated in 2012. Based on a workshop involving the primary stakeholders and focusing on sustainable densification around railway stations a knowledge overview regarding R&D within the field was compiled.[6] The overall aim of the process is to increase the knowledge about the complexity of integrated spatial planning for sustainable mobility related to stations and other types of public transportation nodes. It is also to analyze and investigate the prerequisites for further development of station communities in urban, rural and so called "rurban" settings. Seven focus areas were identified in collaboration between researchers and regional and municipal representatives in 2014: 1) noise, vibration and risks, 2) dialogues and collaboration, 3) lifestyle values, place identity and place making, 4) structure and design of sustainable communities, 5) land use and land values, 6) flexible and sustainable transportation and mobility, 7) the station´s role in its catchment area.[7]

The core process for co-creation is based on the interest and needs for spatial planning and design within the network of municipalities in the Gothenburg region. Workshops are organized directly linked to urgent planning tasks, mostly addressing a combination of the focus areas mentioned above. The emphasis is on experimental, transdisciplinary planning, not the formal planning procedure according to PBA (The Swedish Planning and Building Act). A flexible tool-box, is used to facilitate and inspire both for analysis and synthesis.

THEORETICAL FOUNDATION FOR THE KNOWLEDGE PROCESS

The urban station communities (USC) knowledge process ties into, and in its practical work, is supported by the overall orientation of Mistra Urban Futures platform – co-production in action, towards realizing just cities.[8] According to Professor Merrit Polk co-production include references to insight, learning and building in depth, inter- organizational and cross-sector relationships and partnerships. In the USC knowledge process co-creation is used as the main conception to describe and label the transdisciplinary collaboration which is essential for there to be co-production.[9] However, the concept of co-creation has according to researcher Dorthe Hedensted Lund no general or clear definition. She argues that *"*the concept of co-creation is a bricolage of ideas and norms coming from varied research traditions and practices, including marketing, public service management, urban planning, design and innovation…….what can be deduced is that co-creation refers mainly to innovation and value creation taking places as a collaborative process involving different types of actors".[10]

Dorthe Hedenstedt Lund also underlines that co-creation in urban development partly builds on the development following the `communicative turn´ in planning theory, in which scholars as Healy, Forester, Innes and Booher argued for more genuine and inclusive public participation, building on Habermas norms of communicative action.[11]

Co-creation may include different specific activites/phases such as co-initiation, co-design and co-implementation. Some researchers use these three conceptions to distinguish between very different approaches to citizen involvements in various case studies. In the USC knowledge process multiple stakeholders from public sector on regional and local level as well as from academia and at some occasions representatives from business sector and civil society participate but not citizens without any formal connection to a NGO. [12]

The ambition of the USC knowledge process is to involve stakeholders at multiple stages throughout a planning and design process and not an involvement only at specific occasions for which the terms collaborative design, participatory design or co-design often are used.[13]

In order to further characterize the USC knowledge process it is valuable to refer to research focusing on co-creation dynamics in urban living labs, its associated learning and knowledge generation, and how these possibly contribute to urban sustainability transitions.[14] There are interesting experiences from the Basel Pilot Region laboratory urban living lab that academia and practitioners from local government may represent opposing professional cultures. Thus there is a need to try to get co-designing projects to fall in the "middle ground" between research agendas with extremely long-term focus and the world of implementation related to short term budgets and political cycles.[15]

Given the diversity of application contexts indicated above, there is a need to find appropriate ways to study their dynamics in practice. Five interacting, common elements of co-creation are identified in the article of Puerari et.al referred to above, based on a review of comprehensive literature on the subject. These elements are summarized briefly below and related to our way of applying these elements in the USC knowledge process.

1) **The purpose of co-creation**. In urban planning domain participation (or co-creation) and empowerment are goals to be attained, rather than methods to be used. According to the communicative planning perspective participation is at the roots of planning including activities as to communicate, argue, debate and engage in discourse for the purpose of aligning attention and defining possibilities for action. Co-creation can have the purpose of *making (including analyzing, planning and designing) together* i.e. a situation where people work together towards a goal or output of a product, service or process innovation, in the case of the USC knowledge process a green, just and accessible urban station community. It can also be *learning together*, a situation where people collaborate towards building knowledge, learn from one another and create networks and social capital.[16] In the case of USC knowledge process both these goals are sought for simultaneously.

2) **Formal and informal co-creation, including power dynamics.** With formal co-creation the participants are often selected, since it considers specific people valuable for co-creation activities. On the other hand, informal co-creation refers to processes of collaboration that emerge out of shared goals of the necessity to work together.[17] In the case of USC knowledge process the co-creation is informal in the sense that the co-creative activities are not directly related to the formal planning and design procedures within the municipalities according to the PBA. On the contrary the co-creation activities are performed as experimental planning and design activities which allow the participants to freely propose and test different alternatives without being stuck to the limitations of the formal PBA procedure, which is labelled as "court". Inspiration is taken from the process model forum-arena-court [18]and we have applied this model by defining "forums" as activities involving a wide range of stakeholders from all four quadruple helix fields (academia, public sector, business sector and civil society)[19] for learning activities, analysis and experimental planning. "Arenas" have been used as a conception for transdisciplinary analysis, planning and design involving the stakeholders which have the primary responsibility for policies, programs and plans.[20]

3) **The ownership of the co-creation process.** As the set-up of co-creation activities will differ it will have consequences for the practices. If there is a clear initiator group, this group will probably dominate the practices and rules for the co-creation process. Conducting processes of co-creation requires skills, such as defining different roles, stepping in and out of these roles and processes, and providing the right tools at the right moment for the right people.[21]In the USC knowledge process two process leaders with experiences from both practice and research have been given the task to organize the co-creation processes in collaboration with the regional and municipal stakeholders who propose relevant cases for analysis and synthesis. An important role is also to agree upon relevant tools for co-creation and case-specific ways of combining them.

4) **The motivation and incentives for co-creation.** One common distinction in motivations for co-creation is between intrinsic and extrinsic motivation**.** Intrinsic motivation refers to the motivation to engage in an activity primarily for people´s own sake, without obvious external stimuli. In contrast, extrinsic motivation is activated by the intention of obtaining a desired outcome or avoiding an undesired one. It may be associated with external incentives such as monetary compensation and, or recognition by others etc. [22] In the USC knowledge process, as for intrinsic motivation, the ambition has been to introduce planning tools which can contribute to the participants own competence development and inspiration to go beyond traditional working routines. The extrinsic motivation may in the case of the USC knowledge process be related to the options for the development of programs and plans with higher probability for achieving sustainability objectives.

5) **The places/spaces of co-creation.** Co-creation does not take place in a vacuum, but always occurs within socio-spatial contexts. Spaces and places are the catalysts of interactive learning and innovation. Creating the physical and mental space for learning and experimenting is a necessary condition for fundamental change.[23] In the USC knowledge process, there is an ambition to organize and implement workshops and activities related to real cases in the municipalities and to locate the activities close to or within the concerned urban station communities. This may contribute to a deeper relation to the process and to a deeper sense of place identity.

In the theoretical reference frame presented in figure 1 co-creation is seen as a collaborative process of initiation, design and implementation related to the above presented five elements but also to three different types of research – **interactive action research, research by design and research focusing on the past and the present.** The term "action research" was originally launched by *Kurt Lewin* and in a paper he argues for research designed to help the practitioner which would entail addressing real-life problems and solving them in a more grounded way than is possible within the framework of current practice. [24] Except from the practical benefits that this type of research may contribute to, it should also contribute to the generation of

applicable and more widely usable knowledge. Action research thus starts from practical challenges and issues and it develops through interactive collaboration between researchers and practitioners. It can be labelled as a "praxis-oriented knowledge strategy".[25]

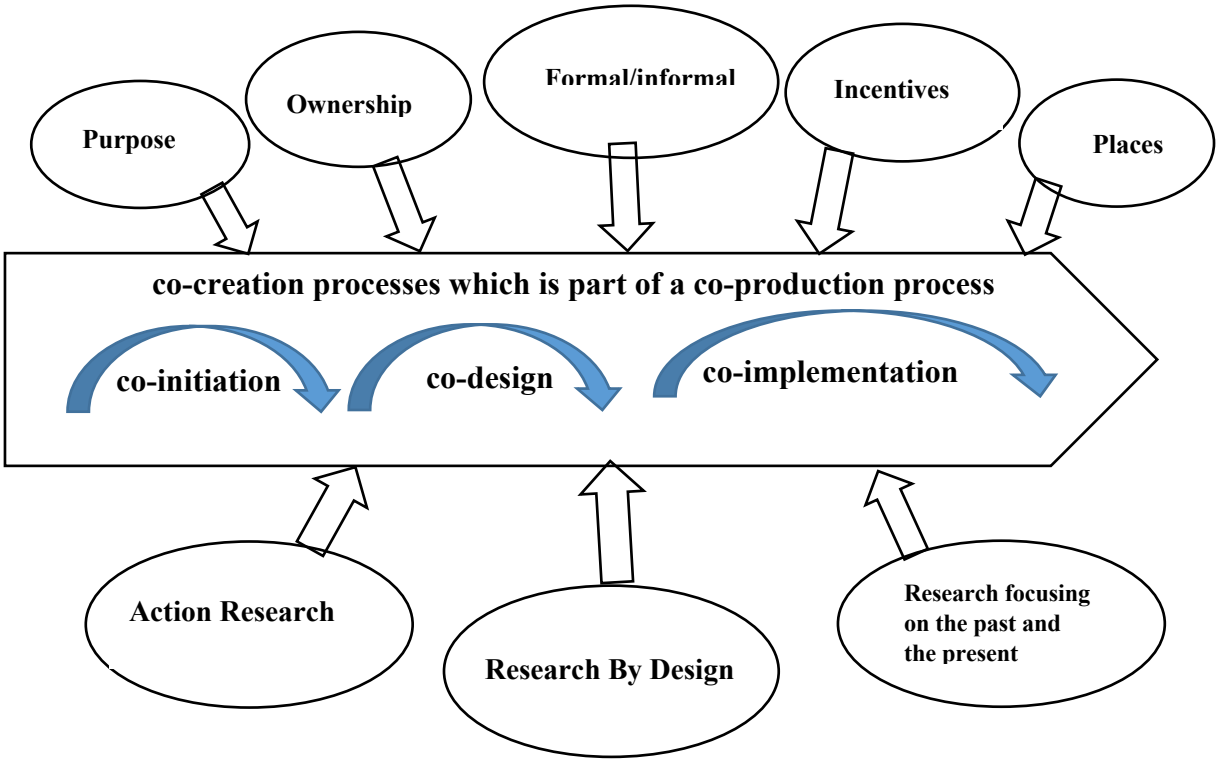
In **design-and planning oriented research**, it is the knowledge generated by experimental design and planning that is the result and not primarily the design artefact and the design process itself. This type of research takes its inspiration from among others Donald Schön who asserts that, in general, professional practitioners know more than they can express in words ("tacit knowledge") and demonstrate what he calls "knowing in practice". [26]In traditional academic research the search for empirical and critical knowledge dominates i.e. knowledge based on data from reality and knowledge about reality´s relationship to values. In design- and planning oriented research the creative component is as important as the analytical component, or many times more important.

Constructive knowledge implies the investigation of desired or possible realities based on certain values, theories and methods. Traditional academic research focus mainly on analysis of the past and the present. On the contrary, in design- and planning oriented research there is an increasing interest to explore, discuss and analyze possible future options. Methods for design- and planning oriented research and practice may be divided in design dialogues, design-driven dialogues and participative design. One reason for the rapid growth of these methods are the need of address so called "wicked problems" in society as well as to handle complex problems in planning and design.[27]

The most common research approach, in general but also within the fields of planning and architecture is on **research focusing on the description, analysis and explanation of phenomenon in the past and present.** It is often necessary to utilize and integrate results from these types of studies when organizing and implementing co-creation processes.[28]

In the USC knowledge process there is an ambition of combining these three types of research shown in figure 1 related to the five elements presented above. Planning and design cases which are relevant for the network of municipalities are the basis for processes in transdisciplinary quadruple helix processes. Based on experiences from earlier projects the systematic use of different kinds of tools in different phases of planning and design process has generally contributed to an intensified collaboration between the stakeholders and to a creativity when it comes to generate, explore and visualize alternatives/solutions as well as to analyze prerequisites and impacts. [29]

Five elements influencing the overall dynamics associated with co-creation[30]



Three types of research which inspires co-creation

Figure 1 Theoretical frame of reference for co-creation activities in urban station communities

A TOOL BOX FOR PARTICIPATIVE CO-CREATIVE PLANNING AND DESIGN

A systematic and flexible working methodology serves as the starting-point for the development and applications of tools for co-creation in the USC knowledge process. The basic tools are related to a larger toolbox/model (4/20 methodology and Symbio City Approach).[31] The co-creative methods and tools are used in transdisciplinary processes inspired by action research, where practitioners from different departments in the municipalities investigate relevant case studies which represent typical planning situations in the region. The tools can be combined, modified and adapted due to the needs in every, unique planning case, as principally shown in figure 2. The tool-box can successively be extended due to the specific demands in different planning situations. The tool-box is also a part of a structured working procedure with a number of steps and which preferably can be performed in a cyclical and dynamic, and not a linear way.

Important **tools for analysis** of the prerequisites in the chosen planning cases are:

Tool 1 Stakeholder analysis based on mind-mapping.

In order to identify stakeholders who are of key and secondary importance for a certain planning task a working sheet has been developed to facilitate the generation of ideas. The working sheet is divided in four sectors according to quadruple helix as well as different planning and institutional levels for example municipal, regional, national and international level.

Tool 2 Mind-mapping combined with inspiration images

In order to get ideas regarding 1) what an urban station community is or represent today 2) visions of a future station community 3) what an area without any intention to develop an urban station community look like - 30-50 associations images with photos from different types of urban and rural environments are produced and exposed for a mixed group of participants. Each participant is asked to select 3-5 pictures that illustrate the three above mentioned issues as a basis for common reflections and conclusions. The same type of tool can be applied in order to get ideas and reflections on experienced and possible future place identity.

Tool 3 Walking tours for place and path analysis

As a supplement to quantitative analysis of the urban structure of a station community, experience-based methods can be applied for qualitative analysis of the spatial structure including different kinds of urban areas, parks, street, paths and public places of importance for livability, sustainable transportation and safety/security etc. Routes and stops on these routes are prepared on maps as well as in path protocols in order to facilitate for the teams and for the participants to take notes on strengths/positive impressions, weaknesses/negative impressions and ideas for improvement. [32]After the walking tour the participants compile their impressions on maps and aerial photos using post-its and stickers.

Tool 4 Map- and indicator based SWOT analysis

Indicators related to the urban structure, which has been discerned as important for sustainable mobility according to earlier research, are used as a starting point. [33] The indicators are arranged as a spider chart divided in four groups: urban form, urban functions, urban connectivity and urban public spaces. The stakeholders use the spider chart for proposing indicator weights, related to their importance for the station proximity effect on different distances from the actual station. The most important indicators are chosen as a basis for a map -based SWOT-analysis which result in an overview of strengths and weaknesses in areas on different distances from the railway stations. This experience based and co-creative methods can be used as a supplement to technical tools as space syntax and time isochrones.

Tool 5 Structured brainstorming

The structured brainstorming tool has been used in order to define key issues regarding a certain planning task for an urban station community.[34] The participants are recommended to start the process by individually reflecting on what they view as key issues in the current planning task. The key issues are written down on post-its and are then placed on a notice board and are finally structured in various main thematic groups of issues (clustering). The individuals in the groups may then prioritize the key issues by distributing a number of stickers between the various key issues. The five key issues with the highest priority can be further used as basis for the formulation of a common vision for the planning area. The result may be used as a basis for comparing and linking the most important key issues according to a certain stakeholder group to official objectives expressed on an international, national, regional or local level.

Important tools for **synthesis and research by planning and design** are:

Tool 6 Backcasting combined with scenario-analysis

Instead of making projections into the future from a present position, back-casting starts by sketching out images for the future that depict possible long-term solutions to a societal challenge in this case a future urban station community. After delimiting interesting long term images for the future, possible alternative paths from the present situation to a future situation can be sketched out. In co-creation participation-oriented and action-oriented back-casting methods are of specific relevance.[35] In the practical applications in the urban station communities knowledge process different kinds of scenario-matrices have been used as tools for back-casting. Two important structural aspects are chosen as axes in the matrix which facilitates the overall design of extreme case options by combining extreme positions for each aspect. Examples of axes in the matrices are: regional or urban structure – polycentric versus monocentric, paths/nodes - dense paths

versus strong nodes along paths. One way of working with back-casting in transdisciplinary, participative co-creation is to try to conceptualize two extremely different alternatives/scenarios diagonally in the scenario matrix and then supplement with the other two scenarios.

Tool 7 Design tool with templates including the density jigsaw-puzzle

Density in combination with diversity, distance to station, destination accessibility, demographics design and demand management is identified as the most important urban form factors for transport efficiency and attraction in urban areas.[36] However, to exclusively use quantitative density figures in planning is doubtful as it may be difficult for stakeholders to grasp the consequences and impacts of different densities. In the density jigsaw-puzzle different urban typologies are visualized as square shaped pieces, each representing a certain number of housing, workplace and service units as well as a certain share of green areas and traffic areas. In each case a number of puzzle pieces are produced due to the size of the planning area and expected number of inhabitants, workplaces or apartments. The participants can use the jigsaw puzzle creatively by testing and experimenting with different ways of locating and organizing the pieces on a map of the planning area. The different spatial implications between the typologies with very high density respectively low density will be apparent during the co-creative and experimental planning/design process. [37]

Tool 8 Evaluation and assessment of scenarios by evaluation tools such as multi-criteria analysis, effect profiles and radar charts

Although evaluation of scenarios is only one part of planning, it is such a central activity that it permeates all parts of the planning process. It is thus important to perform evaluations successively in such a way that overall and general scenarios will be assessed and that a limited number of alternatives then will be reassessed using more and more specific criteria and indicators. In the USC knowledge process at least three tools have been introduced, tested and evaluated by the municipalities [38]

- Effect profiles for ranking alternatives
- Spider diagram for qualitative evaluations
- Multi-criteria analysis for more streamlined and specific comparisons of alternatives (MCA)

MCA has been the most widely used method as it includes both 1) ranking of alternatives for each chosen evaluation criteria or indicator and 2) weighing of the chosen criteria/indicators in relation to each other by distributing 100 points. [39] By using an excel chart for the MCA-process it is easy for the participants and the working group as a whole to put in numbers for 1) and 2) and also to make a robustness analysis (RA). By performing a RA it is possible to test if a certain alternative keeps its position even if the weights of the criteria/indicators are changed. This is an important remark as the numbers should be seen as not absolute but more as representing relative judgments of how well the alternatives fulfill the chosen objectives.

Tool 9 Application of a decision scheme for analysis of strategic choices

The complexity of the planning task related to the location of stations and also the planning of surrounding areas are usually very high. Of that reason, a useful tool is a decision tree for analysis of strategic choices for example when there are two options for the location of a station and each location will mean different options for future development. [40]Starting from the present situation a decision tree presented on a working sheet admits a first decision between two options in short term, four new options midterm and finally eight different decisions in a long term perspective. Finally different choices can be compared by discussing pros and cons or alternatively using ranking or MCA.

Tool 10 Documentation of hard and soft means of control for implementing planning measures – planning strategy for urban station communities

As part of the planning process for an urban station community it is important to analyze and propose possible implementation strategies as these also may depend on the regional and urban form itself. Different types of means of control may be required when establishing a new station compared to the situation where an existing station is renovated and the surrounding areas are subject to urban renewal. In order to develop

and propose a site specific mix of means of control a tool is developed – as a working sheet – with different examples of categories for control measures vertically and different phases for planning, implementation and operation on the horizontal axis. [41]

By systematically and creatively discuss each square in the sheet and also the linkages between different squares a place specific proposal for relevant means of control can be developed as basis for an implementation strategy with related means of control. Certain means of control are sharp and "hard" instrument as legislation and threshold values for noise and air pollution. "Soft" instruments are more difficult to quantify, such as education, information and different forms of cooperation.

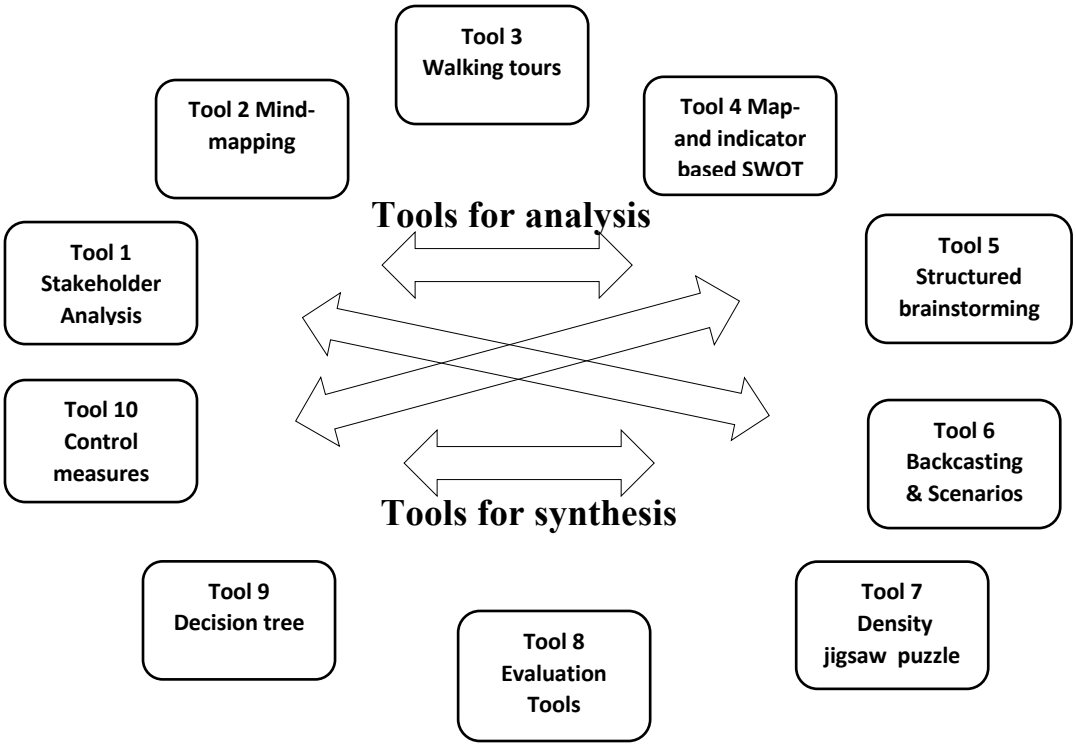


Figure 2 Overview of tools developed and applied within the urban station communities knowledge process

CASES REFLECTING EXPERIMENTAL PLANNING AND DESIGN USING TOOLS

The Tool-box has been applied and at the same continuously developed and revised since 2015 within the USC knowledge process. The experiences from 2015 and 2016 have been documented as part of Mistra Urban Futures efforts.[42] [43] Since 2017 seven case studies have been subject to applications and tests of the tool-box. The cases represent different planning situations related to urban station communities.

Case study 1 Borås Urban Center has been subject to co-creation processes in the project climate smart and attractive transportation nodes during 2014-2015 and a follow-up workshop was organized within the USC knowledge process in May 2017 with about 20 participants from the municipality and 10 from the USC network. The station proximity principle[44] were investigated by analyzing the urban structure surrounding the existing railway station by tools for analysis. Tools for synthesis were used to generate and evaluate scenarios and finally design dialogue tools were used to look on the options for developing more attractive and continuous paths close to the station (<600m) but also on longer distances (600m-3000m). [45]

Case study 2 Väröbacka in Varberg and **Case 3 Northern Halmstad** represent similar types of planning situations related to possible new railway stations in the peripheral parts of the municipalities but both along the regional railway line between Gothenburg and Malmö. Varberg is expected to grow from 63 000 inhabitants in 2017 to 80 000 inhabitants in 2030 and in the profound comprehensive plan for the northern coast about 2800 housing units (about 5600 inhabitants) will be planned for related to a small community Väröbacka/Limabacka with 800 inhabitants at present. In one day workshop in March 2018 with about 5 participants from the municipality and 10 from the USC network applied tools for analysis including mind-mapping for place identity, walking tour and structured brainstorming. A second workshop was performed in April 2018 with focus on the development and evaluation of scenarios for the expanded urban station community as well as on a density jigsaw-puzzle to investigate the spatial impacts of different urban typologies.

Halmstad is also a rapidly growing municipality with about 100 000 inhabitants 2018 and plans for 150 000 inhabitants in the year 2050. The intention of the location of a new station in the northern part of the municipality is to improve the regional and local accessibility for people in a number of small communities, including a calculated possible expansion of about 2500 housing units (5000 inhabitants) until 2050. Two workshops, partly using the same methodology as in the Varberg case, were performed in February 2019 respectively in April 2019.

Case study 4 S Landvetter South. The planning of a new railway between the City of Gothenburg and the City of Borås opens up new regional development possibilities as this railway stretch is one of the largest commuter lines in Sweden with approximately 9,5 million commuters every year, and also is part of the planned high speed railway line between Stockholm and Gothenburg.[46] The municipality has acquired a land area in its strategic long term planning close to Landvetter airport and also started the profound comprehensive planning in 2016 for the area which has a capacity for at least 25000 new inhabitants apart from work places and service functions. During 2017-2019 five workshops have been performed with stakeholders form the municipality and researchers including co-creation for analysis and synthesis. The full result of these activities will be presented in a separate research report in 2020 [47].

Case study 5 Mölnlycke. In the urban center of Härryda an urban densification is planned in order to make place for more housing, work places and service functions in order to utilize the location when a new railway line is established between Gothenburg and Borås. Strategic studies have been made for the urban center and in the USC knowledge process one day workshop was organized in October 2018 including a walking-tour, application of the density jigsaw puzzle as well as the development and evaluation of scenarios.[48]

Case study 6 Partille. As part of the comprehensive urban planning 2035 with the intention to increase the population (target 40 000 year 2020) a workshop was organized within the USC knowledge process in September 2017 in order to illuminate key issues for the development of the station community as well as to develop and evaluate scenarios reflecting few centric and polycentric urban structures related to housing concentrated close to the station respectively in radial paths from the station.

Case study 7 Kungälv Ytterby. A walking tour day was organized by USC in December 2017 in collaboration with SMART-MR EU project [49] which made it possible to involve representatives from ten European partners to give their perspectives on the densification of areas around Ytterby station in Kungälv by using a walking tour tool for observation and documentation of impressions.

Figure 7 illustrates the scope of the application of the tools in the seven planning cases. The figure shows that all tools have not been applied in any of the cases, due to the fact that there is always a certain focus in each case due to what the stakeholders in the municipalities find most relevant. The tools for design and evaluation (tool 6-9) have been the most frequently used tools which reflects the planners and architects need of external support in their own internal planning and design process. There has not been any opportunity to test tool 10 among the cases, but earlier experiences from application of that tool can be found in the sustainable municipality project.[50]

Cases	Tools									
	Tool 1	Tool 2	Tool 3	Tool 4	Tool 5	Tool 6	Tool 7	Tool 8	Tool 9	Tool 10
Case 1	●		●	●	●	●	●	●		
Case 2		●	●	●	●	●	●	●		
Case 3		●	●	●	●	●	●	●		
Case 4						●	●	●	●	
Case 5			●	●		●	●	●		
Case 6					●	●		●		
Case 7			●	●						

Figure 3 Overview of the application of the tools in the toolbox during the period 2017-2019

KEY LESSONS FROM THE APPLICATION OF TOOLS IN PARTICIPATORY PROCESSES

The tool-box presented above has its roots in interactive action research and research by planning and design but the applications discussed are related to the spatial planning of urban station communities in a wide sense.

The activities which have been carried out in the core knowledge transdisciplinary process have been evaluated via questionnaires and questions to the participants after each activity. Some of the activities have also been followed-up by empirical studies based on semi-structured interviews with participants. General perceptions from the participants during the period 2015 – 2016 have been documented by Mistra Urban Futures [51] [52]

The processes initiated in the USC knowledge process supplement the ordinary formal planning processes in the municipalities by contributing with new perspectives on the planning tasks. The performed activities do not only relate to the formal planning procedures but also to more informal and experimental activities aiming at encouraging the creativity and the capacity for collaborative analysis and design between different stakeholders. The intention behind the knowledge processes is also to strengthen the networks between stakeholders on national, regional and local level contributing to mutual understanding of different planning situations and transfer of experiences.

During February - March 2019 a limited inquiry was sent out to seventeen professional urban planners and planning architects representing five of seven case studies being involved in the activities between January 2017 – February 2019. Nine professionals sent in answers on the questions which is a response rate of 53%. Some of the planners had finished their employment and was difficult to reach. The scope of participation in co-creative workshops among the respondents varied from two one-day workshops to seven one-day workshops. The methods and tools were not well-known for any of the participants but partly new for seven persons and completely new for two persons. In figure 4 the answers on six key questions of the limited inquiry are presented. It is apparent that most answers regarding ways of collaboration and analysis of prerequisites and objectives, development and evaluation proposals indicate that the co-creative processes have had a certain influence except from a few answers. At the same time three to four persons answer that formal policies, programs and plans as well as the physical reality had been influenced to large extent in their planning cases.

The inquiry also embraced the participants view on the usefulness of the tools included in the tool-box of the USC knowledge process. The result is shown in figure 5. All participants have not used all tools, which makes it impossible to directly compare the answers. No participant has indicated that any method is less

useful but all evaluations are distributed between either “very useful” or “useful”. The tools “walking tour” and “density jigsaw puzzle” stand out as the absolute majority of the respondents judge these tools as very useful. The walking tour is seen as a quick and flexible way to get information from the site and get a common view (reference frame) among the participants due to the option to experience the site with all your senses. By performing the walking tour in a team the result seems to become more diverse and subtle. The density jigsaw puzzle is considered as very useful in dialogues with politicians, civil society and the business sector as it visualizes the spatial implications of different urban typologies in a very apparent and understandable way. Structured brainstorming is also seen as useful and partly as very useful tool when many different ideas need to be generated, systematized and prioritized. It is judged as very simple and clear.

Backcasting and the scenario matrix is also looked upon as a way to define and explain a number of different future directions for politicians. However, it may be complicated to use it properly when there is a shortage of time and the extreme scenarios can be seen as too unrealistic. The multi-criteria analysis (MCA) is considered as a very useful or useful tool by a majority of the participants. One of its strength is the option use your own local objectives as a basis for the evaluation and that the results after a combination of ranking and weighting can be illustrated in a clear way. However, it may be difficult to use this tool if you don´t find the relevant indicators and parameters and the different steps in the method/tool can be experienced as too complicated.

This very brief evaluation of methods and tools need to be refined in the future research but it gives anyway interesting hints on both strengths and weaknesses of the methods and tools as a basis for further development and more thorough evaluation including both urban planning professionals and architects and other stakeholders.

Direct influences from the application of the tool-box in co-creative transdisciplinary processes on the result of planning and design can already be discerned in the following cases, based on co-creative processes mainly 2015-2016, but to a certain extent also 2017-2018.

- New development of urban paths from the central station in Borås (0-3000m) was identified instead of an one-sided focus on a concentric development around the station. The comprehensive plan for the urban center has been directly based on the results from application of a number of tools for both analysis and synthesis (Case 1) [53]
- The choice decision of the location of the station in the urban centre of Stenungsund was facilitated (case in processes 2015-2016)[54]
- The densification strategies for the urban center around Mölnlycke was modified and made more diversified by the application of a number of tools (Case 5)[55]
- New options for regional development and place identity related to the planning of new stations in the periphery of towns have been investigated in Varberg and Halmstad (Case 2 and case 3)
- New insights have been gained in the planning of larger development in a municipality outside the existing urban centers –Landvetter Södra. Important result in the process until present are common formulated and evaluated future images which goes beyond the traditional conceptions of an urban station community as a circular development around a station. The institutional capacity has been strengthened as for knowledge resources for example creative learning and relational resources for example networks and coalitions. The stakeholders have also increased their capacity to mobilize these types of resources in order to challenge existing planning routines and practices [56] (Case 4)

CONCLUDING REFLECTIONS AND REMARKS

In this paper the USC knowledge process and its theoretical foundations have been presented as a basis for the practice-oriented tool-box for analysis and synthesis. The cases in the knowledge process which have been part of the process during the period 2017-2019 have also been presented briefly.The cases represent very different as well as similar types of planning situations. Some initial evaluations of the process have

been made but deeper evaluations of one of the cases (Landvetter Södra) will be performed in the SamSam project[57] As can be observed from the initial evaluations of the actual process and from evaluation of the earlier knowledge process during 2015-2016 there is mainly a positive basic reception of the applied methods and tools by the practitioners from the municipalities At the same time it is important to be cautious when interpreting the results from evaluations as planning and design also has to be looked upon in a long-term perspective as action-oriented research and research by design may have long term practical implications. The respondents of the inquiry are too few to draw general conclusions so there is a need to include the reflections from wider groups of stakeholders and also include more planning cases.

However, an assumption is that the five elements influencing the overall dynamics associated with co-creation described in the theoretical foundation are active and supported by governance processes within and outside the municipal organization.[58] The creative results produced in the experimental planning and design and the informal forums and arenas touched upon in the theoretical framework (element 2) have to "move" into the formal processes in order to be part of practical realization as there is a need to produce formal planning documents as a basis for political decisions before full scale implementation. If new ideas generated in the informal processes are to have effects, "they will need to penetrate into the discourses and practices of those who have the authority over resources and regulatory power to realize ideas"[59] ."There is furthermore a pertinent need to further investigate, both in theory and practice, what sort of institutionalization co-creation requires in order to incorporate issues of power, democratic legitimacy, and inclusive deliberation in the debate". [60] These two statements indicate the need of further R&D related to how co-creation can have influence on power relations and strengthen democratic legitimacy.

Ideally the experimental forum and arena processes should be performed continuously in the municipalities and regularly be linked to the formal decision processes. An important task for researchers involved in action oriented research and research by design is to inspire and discuss and contribute to such continuity in the experimental planning and design processes. Thereby it can be avoided that the application of the above introduced types of methods and tools become isolated "events" without any impact on future professional practice and implementation. It is also important that architectural and planning practices can be involved in processes empowering non-experts. The act of empowerment implies that the architect is not only a service provider, but that architecture could enable certain social processes.[61]

One option for facilitating an interaction between informal and formal planning and design is to inspire the development of physical or virtual spaces of co-creation (element 5) as urban living labs. Such spaces may be very important for the further planning, design and development of sustainable and innovative urban station communities on many planning levels (regional, municipal, local). However, it is very important to raise issues of democratic norms and power inequalities as well as to study the democratic potential of urban living lab and not only their capacity for enhanced innovation in planning and architecture.[62] The Value Network Analysis (VNA) is one tool by which power dynamics and relationships can be analyzed in further research regarding co-creation in urban station communities. In other applications it has indicated positive results for all parties involved, but also that the authority of traditional decision makers can be undermined in the role of both "client" and "designer".[63] Research has also shown the potential of network governance combined with planning tools for improved sustainability and change.[64] Also the role of trust, both within the collaboration network and in its institutional setting has been identified.[65]

By providing both manual and digital tools in an easily accessible space for the stakeholders a creative, transdisciplinary collaboration between planners/architects and other professions as well as between practice, academia, business sector and civil society can be strengthened. There is a need to continue the action oriented research by planning and design efforts for example by developing urban living labs related to urban station communities and other topics. Thus there is a need to successively introduce, test and follow-up different kinds of methods and tools for co-creation towards just, green and accessible societies and also in parallel refine and deepen the theoretical foundations for the collaborative research, including aspects of power dynamics and democratic legitimacy as underlined above: "There´s nothing so practical as good theory – because good theory guides effective action by turning knowledge into wisdom".[66]

Questions	*Distribution of nine answers. To which extent have the processes been influenced:* *large extent* *certain extent* *limited extent* *no extent*
Have the co-creative processes influenced the working procedures in the ordinary planning department?	
Have the forms of collaboration with external and internal stakeholders been influenced?	*Three persons have not answered on this question*
Have your way of analyzing prerequisites and formulation of goals been influenced?	
Have your way of developing, evaluating and refining planning and design proposal been influenced?	
Have your formal policies, program, and plans been influenced?	
Is there any influence on the physical reality in the municipalities due to the processes?	

Figure 4 Compilation of answers regarding six key questions related to the co-creative processes

Methods and Tools	*Distribution of nine answers. To which extent have the methods/tools been influenced:* *Very useful* *Useful* *Less useful* *I have not used the method/tool*
Tool 1 Stakeholder analysis (mindmapping)	
Tool 2 Analysis of place identity (mindmapping)	
Tool 3 Walking Tour with path analysis	
Tool 4 Map- and indicator based SWOT-analysis	
Tool 5 Structured brainstorming	
Tool 6 Backcasting and scenario matrix	
Tool 7 Density puzzle	
Tool 8 Evaluation with MCA	
Tool 9 Strategic choices – decision tree	
Tool 10 Hard and soft control measures	

Figure 5 Compilation of answers regarding the usefulness of different methods and tools

NOTES

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Mistra Urban Futures strives towards Realising Just Cities which are Accessible, Green and Fair.
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