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ID 1571 | SYSTEMATIC SHARING OF EXPERIENCES AND KNOWLEDGE OBTAINED IN PILOT PROJECTS

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ABSTRACT: Pilot projects are implemented in order to obtain knowledge and experiences that can be reused lateron – either in other pilot projects, in large-scale projects or even in the legislature. In this paper, we address the question of efficient and effective distribution of insights between pilot projects. We present detailed considerations on the required structures to share the experiences and knowledge obtained by evaluations of the stages of a pilot project. Foremost, a systematic interaction between project participants and a central collection of experience is required. The collection should be publicly and freely available. By establishing such structures, the reuse of existing knowledge and experiences is significantly simplified. A common structure for pilot projects, for example, allows for information sharing between equal stages of pilot projects. Given that the obtained knowledge and experiences of these individual stages are easily accessible, the hampering need to review a comprehensive final project report is eliminated. For future pilot projects as well as large-scale projects, the cost associated with reusing existing experiences and knowledge is reduced and the cost-benefit ratio improves. We exemplify this by investigating systematic information sharing between equally structured pilot projects. To that end, we present the relevant background on knowledge management as well as project structuring – two complementary parts for the success of pilot projects – and contribute their systematic linkage for an efficient and effective reuse of knowledge and experiences.

1 INTRODUCTION

Spatial planning often has to deal with novel challenges where no experiences or knowledge pre-exist – neither specific nor general. In such scenarios, it is common scientific practice to create a model and test a hypothesis on it. Models reduce the complexity of reality and are simplified projections of real systems or issues they help to understand. Simplification is characterized by illustration, reduction and pragmatism. If a developed model turns out to be too simplistic with respect to a specific aspect, e.g. because it abstracts certain aspects too much, it is usually refined. Afterwards, examination is repeated on the more elaborate model that, in turn, might reveal decisive weaknesses in a different aspect. Then, the process is repeated. After the model's accuracy was assessed positively and if obtained results are promising, real-world tests are conducted.

In spatial planning, however, this approach is usually destined to fail as the model cannot be refined to a level that allows for sufficient certainty. Spatial planning activities are always embedded into a socio-cultural environment. They involve many participants that are linked by complex structures. Neither the participants nor the structures can be captured appropriately in a simplifying model. Therefore, spatial planning implements pilot projects – small-scale, short-term real-world studies. They constitute the preferred instrument approach for novel challenges in spatial planning.

Pilot projects are an important research tool in urban and regional planning in particular. For these planning activities, the objective is to reproducibly obtain novel, reusable knowledge and experiences. Within a single pilot project, various regions or municipalities carry out different, individual (sub-)projects in a definite period of time. Academic and/or private institutions scientifically monitor pilot (sub-)projects in order to identify the generally valid results that highly qualify for reuse [Gilcher and Steinebach, 2016a].

The importance of monitoring already indicates the significance of its result: project evaluations. In previous work, these evaluations were presented in a final report that focused on determining the following two aspects:

i. Were the initial (sub-)project goals achieved?
ii. Are there results that can be reused on a larger-scale?

However, our monitoring experience [Gilcher and Steinebach, 2016b] revealed that this overall evaluation of an entire pilot project does not necessarily cause reuse of knowledge and experiences in subsequent (pilot) projects. The final report is a too large unit to share knowledge efficiently. Among the main reasons, we noticed that a comparison of existing final reports with an ongoing (pilot) project is associated with too much effort. I.e. the cost-benefit ratio becomes negative. Therefore, we established a common structure for pilot projects in previous work [Gilcher and Steinebach, 2016a]. This work introduces six stages every pilot project will experience. The common structure already reduces the cost of sharing knowledge. To that end, we aim at intermediate evaluations of projects at the end of each stage.

In this paper, we contribute detailed considerations on the required structures to efficiently and effectively share the experiences obtained by these intermediate project evaluations. Foremost, a systematic interaction between project participants and a central collection of experience is required and the collection should be publicly and freely available.

By establishing such structures, reusing existing knowledge and experiences is significantly simplified – the complete final report need not be reviewed. For future pilot projects as well as large-scale projects, the cost associated with reusing existing experiences and knowledge is reduced causing the cost-benefit ratio to improve. We show that structuring pilot projects into stages and systematically linking them to knowledge management activities is decisive for pilot projects' success to achieve efficient and effective distribution of knowledge and experiences.

2 BACKGROUND

2.1 PILOT PROJECTS IN GERMAN SPATIAL PLANNING

Experimental research in the form of pilot projects is particularly useful if current or potentially future research questions cannot be adequately clarified in a different way. Furthermore, pilot projects are initiated for urgent current challenges in order to develop transferable solutions for other regions or municipalities facing the same issues. They are specifically designed for such a challenge and evaluated with respect to it. In order to do so, a detailed evaluation is carried out to determine whether the originally defined objectives have been achieved and whether the results can be reused on a larger scale. Pilot projects differ from classic product- and result-oriented research assignments that primarily include a reflected conception and systematic preparation as well as evaluation of existing experience knowledge. In contrast, pilot projects support the process-accompanying analysis of research questions and objectives, implementation strategies as well as the realization of measures. Thus, pilot projects are rather process- than product-oriented.

Within a single pilot project, various regions or municipalities carry out different (sub-)projects in a definite period of time. During this period, the exchange of experiences and knowledge between the participants of the pilot project as well as a reporting of current pilot projects is organised. In this way, the process orientation is evident. The selection of pilot projects aims to ensure a preferably safe generalizability and transferability of the obtained results to other regions and municipalities with similar challenges [Steinebach, 1992; Wiechmann et al., 2012; Gatzweiler and Runkel, 1997].

Academic or private institutions scientifically monitor pilot projects in order to identify these generally valid and thus reusable results [Gilcher and Steinebach, 2016a]. Continuous evaluation of the activities implemented in the (sub-)projects is most important. Therefore, cooperation between science and the executing local stakeholders is a priority task. The role of academia is strengthened compared to established conception processes of the federal government and the federal states of Germany [Einig, 2011].

In previous work, we identified a common structure for pilot projects to efficiently share knowledge [Gilcher and Steinebach, 2016a]: identification of a novel challenge, project initiation and public bidding, applications of potential participants, evaluation of applications by the initiator, execution, final evaluation.

Each stage of a pilot project is briefly described in the following in order to conclude a first contribution of this paper: a pilot project's lifecycle resemble the non-iterative waterfall model.

1. (Identification of a new challenge) The federal government or states apply pilot projects if a novel challenge of spatial planning is identified and its research questions cannot be answered in a different way. Such a kind of challenge is characterized by a significant impact on spatial planning, e.g. demographic change, economic structural change, sustainable development, climate change and climate protection as well as environment protection. These challenges have several consequences at federal, federal state, regional as well as municipal level and solutions to rise to them have to be found [Gilcher and Steinebach, 2016a].

2. (Project initiation and public bidding) The application process consists of two stages. In the first stage, meaningful project outlines have to be submitted for each project proposal. The received project proposals are evaluated according to various criteria – e.g. quality of the approach, innovativeness, qualification of the partners, application potential, applicability of the results for other German municipalities as well as transferability. The received and peer review-enabled project proposals are evaluated according to the listed criteria, potentially with the help of external reviewers. Based on the reviews, the project ideas deemed appropriate for funding are selected. In the second stage of the application process, the promoter asks the applicants of positively evaluated project proposals, to submit an official application for funding. In a final evaluation, it will be decided if the project is to be funded [Gilcher and Steinebach, 2016a].

3. (Applications of potential participants) A pilot project public bidding attracts many applicants from the various stakeholders that are envisioned to take part. Depending on the public bidding, it is possible that stakeholders apply individually or in groups [Gilcher and Steinebach, 2016a].

4. (Evaluation of the applications by the initiator) The initiator evaluates the received applications on the basis of various criteria. Most important among them are an application's innovativeness in the proposals to cope with the novel challenges researched in the project. Furthermore, if the municipality can serve as a comprehensive example [Gilcher and Steinebach, 2016a].

5. (Execution) During the execution of the pilot project in the selected municipalities, research questions are examined and strategies as well as measures are implemented. To ensure the process-orientation, a collaboration of the participants, an exchange of experiences between collateral pilot projects, and a continuous communication of running pilot projects to an expert audience take place [Gilcher and Steinebach, 2016a].

6. (Final Evaluation) A pilot project is completed by a final presentation and a final report written by the academic or private institution entrusted with the scientific monitoring. Furthermore, generally applicable criteria have to be identified and transferred to large-scale problem solutions.

These stages are in a sequence and each stage is executed only once during the life of a pilot project. I.e. unlike the refinement of a model in other scientific fields, no iteration takes place within a single pilot project. Thus, the lifecycle of a pilot project resembles a waterfall-model. The waterfall model was first defined by Dr. Winston Royce in 1970 in the context of software development [Royce, 1970]. However, it is more generally applicable and its fundamental insights on sequential, non-iterative processes are transferable to other scientific disciplines such as the urban and regional planning context of this paper. The model takes its name as the progress is seen as flowing steadily downwards (like a waterfall) through the different stages (figure 1). The number of stages varies depending on the project, but there is a clear

transition from one stage to the next that appears if a stage is finished. Thus, requirements for the next stage are known before entering it. Each stage has a predefined start and end point and proceeds in order without any overlapping. Originally, feedback to previous stages of the process may only be applied to the immediately preceding stage, yet, in spatial planning's pilot projects this is not the case. As this is a linear model, it is easy to implement and thus many projects besides software development and spatial planning contexts follow this waterfall lifecycle model. A further benefit is the minimal amount of resources required for its implementation as it is neither iterative nor has overlapping stages. For pilot projects, this also allows for different stages to be executed by different stakeholders as outlined in the brief descriptions above. However, these two properties also impose weaknesses. Foremost, the waterfall model is unsuitable for projects with many unpredictable factors that require more flexible adaptations. Furthermore, errors in early stages are oftentimes only visible at the end of a project – another fundamental similarity between pilot projects and the development of systems that we utilize for this contribution.

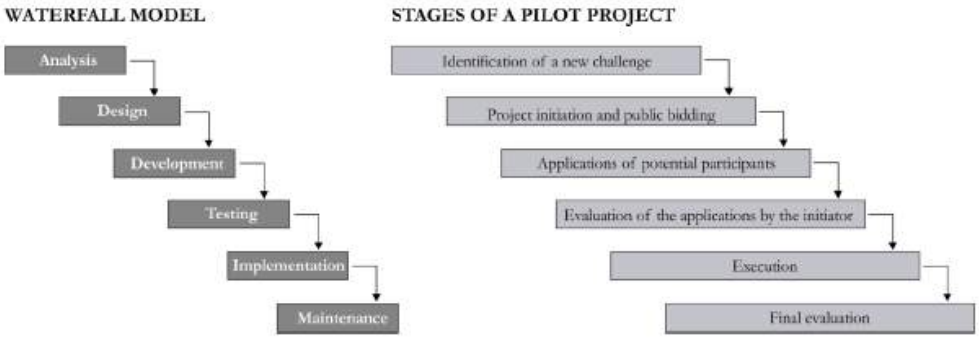

Figure 1: Waterfall lifecycle model. Its original context is the development of software systems, yet, the lifecycle model's properties also hold in pilot projects that are structured into self-contained stages, too.
Source: Own illustration, based on [Royce, 1970].

3 KNOWLEDGE MANAGEMENT

The main aim of pilot projects is the reusability of previously obtained experiences and knowledge in future (pilot) projects as well as spatial planning practice and potentially even legislation. However, so far the existing experiences and knowledge are not saved in a format or a central place that allows for efficient and effective sharing. The final report is a too large unit to efficiently share knowledge. Comparison of existing final reports with an ongoing pilot project's setting is associated with too much effort. I.e. the cost-benefit ratio becomes negative. Therefore, the reutilisation of the experiences and knowledge is not guaranteed. Therefore, we aim to develop a structure to store knowledge and experiences centrally and to make it easier available. The established stages of a pilot project process are one part of the foundation to achieve this goal. In the following, we turn to the second part that is crucial in our context: knowledge management. It consists of the three fundamental aspects (a) knowledge, (b) knowledge management, and (c) the knowledge management process. We first define these and then contribute their integration into the waterfall lifecycle model of pilot projects in Section 4.

a) Knowledge is defined as facts, information, and skills acquired through experience or education. Furthermore, knowledge is the theoretical or practical understanding of a subject. It is an immaterial good, whose value is increased through use and sharing. Thus, it can only be assessed in retrospect. It is more complex than unvalued information and cannot be easily stored and processed due to these factors defining its value.

Various kinds of knowledge can be differentiated. They are designated by contrasting conceptual pairs. These are e.g. implicit and explicit, demonstrative and intuitive, individual and organisational. In the case of knowledge management, the differentiation in implicit and explicit knowledge is the most significant. Implicit knowledge is not publicly accessible individual knowledge that it is only accessible to the organisation. Generally, accessible knowledge is referred to as explicit knowledge.

b) Knowledge management tries to turn implicit knowledge into explicit knowledge and vice versa. Hence, we share this goal with knowledge management. It demands structured dealing with the development, distribution and utilisation of knowledge. In current times, efficient and effective processes implementing these management tasks are ever more important as the amount of knowledge increases rapidly but also

becomes obsolete faster. Furthermore, a stronger trend towards specialization in professional environments requires adaptable and convertible knowledge. Basically, the resource knowledge should be consciously used as a capital to realize competitive advantages.

Theoretically, the implementation of knowledge management promises various advantages that we also aim to achieve for pilot projects: less effort for searching knowledge; better application of existing knowledge; more time for generating novel ideas and innovations as reliable foundations are reused; better internal and external communication; quicker project activities and better collaboration with partners by transparency of structured and current knowledge. The actively pursued tasks of knowledge management are the expansion, utilisation as well as protection of knowledge in an organisational unit. These processes take place on a superior meta-level. In spatial planning these levels are nationwide, regional, municipal or – as in our forthcoming example of sharing between two consecutive pilot projects – project-based.

c) As in every planning and implementation process, four fundamental aspects have to be observed in knowledge management: purpose definition, situation analysis, deduction of measures based on a nominal-actual-comparison, and a success monitoring Note, that we can find these four aspects reflected in our six stages of a pilot project as well. Probst, Raub and Romhardt differentiated these four aspects in order to implement phases of knowledge management [Probst et al., 1999]. Their method of knowledge management includes eight phases, six of them form the key process of knowledge management. Two phases build an orienting and coordinating frame of this key process. The division of the key process of knowledge management is briefly explained in the following as well as depicted in figure 2 (cf. denotation in parentheses). This is the foundation to integrate the phases of knowledge management into the pilot project lifecycle.

(knowledge objective) The first step is the definition of knowledge goals. They state, which abilities should be established on which level. Normative (influencing the business culture), strategic (aim for future competence requirements) and operative (target on specific implementation) knowledge goals can be differentiated.

(knowledge identification) The identification of knowledge aims on getting an overview of internal and external data, information and skills.

(knowledge acquisition) Knowledge acquisition means the acquisition of external knowledge carrier or even the acquisition of knowledge products like e.g. software or patents. In this way, the own body of knowledge can be extended. Thus, existing knowledge gaps can be closed and the setup of future or current required competencies accelerated.

(knowledge development) Knowledge development is an additional phase to knowledge acquisition. The knowledge that cannot be covered by the acquisition of knowledge has to be developed internally.

(knowledge sharing) Knowledge has to be divided and distributed, if it should be used consciously or unconsciously. But knowledge should not be distributed randomly. Groups or individuals should rather have an access to that knowledge relevant to their specific task.

(knowledge utilisation) Knowledge utilisation is the productive application of organisational knowledge.

(knowledge preservation) To obtain valuable experiences, a process of selection has to be created as well as appropriately saved and updated afterwards.

(knowledge evaluation) The evaluation of the achievement of the knowledge goals is the focus of the last step.

It is suggested in [Probst et al., 1999] that these phases are processed in a circular flow, starting with the definition of the knowledge goals. The results of the knowledge evaluation are then feed back into the knowledge objectives. In reality, the individual phases are strongly interconnected (see figure 2), i.e. a multitude of different orders of these phases is possible. We will use this degree of freedom when we incorporate knowledge management into the phases of pilot projects. This is in particular necessary as the waterfall lifecycle model is non-iterative. I.e. we cannot feed back into the objectives of the same project. Thus, we will focus our illustration on the sharing of knowledge between two consecutive pilot projects.

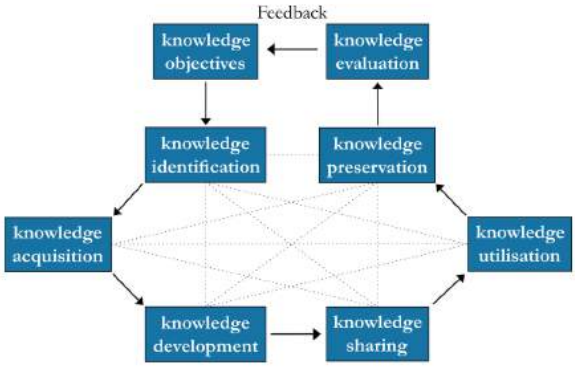

Figure 2: Phases of the knowledge management process. Source: Own illustration, based on [Probst et al., 1999].

4 STRUCTURE TO EFFICIENTLY SHARE EXPERIENCES AND KNOWLEDGE OBTAINED IN PILOT PROJECTS

The goal of our work is to provide means to centrally store (preserve) and efficiently share experiences and knowledge obtained in a pilot project. To achieve this, we aim to create a novel structured approach, derived from the stages of pilot projects' common waterfall lifecycle and the phases of knowledge management. To that end, we also identify the parts of knowledge management that need to be transferred into a central, external and independent infrastructure being accessible to any pilot project. We start with an analysis of the management process that is targeted towards the requirements of pilot projects.

The definition of the knowledge management process has various strengths. It structures this management process into logical phases that can be taken within the stages of a pilot project. Moreover, it offers approaches for interventions and it provides a proven search grid for the causes of so-called knowledge problems – two further features that can be used by pilot projects. At the same time, it is emphasized that the individual phases interact with one another and that phases of the process may not necessarily be considered isolated. As pilot projects are non-iterative and have a definite end, we will investigate this last aspect in order to preserve knowledge beyond a pilot project's life. In this context, the planning principles and processual method in spatial development processes have to be the focus. Therefore, the stages of a pilot project are the guiding principle for the integration of the lifecycle of knowledge management.

Knowledge management is a cross-sectional task that undergoes all stages of a development process – in our context, this is the development and execution of a pilot project captured in the waterfall model. The organisational structure of the development process has to support activities that identify, share, use as well as preserve and evaluate relevant knowledge and experiences. In a pilot project, these tasks may be split between the different participants, depending on the current phase. For example, all the tasks need to be executed by the project initiator in stage 4 (Evaluation of the application by the initiator). Yet, in stage 5 (Execution), the scientific monitoring should be responsible for identification and evaluation and the pilot municipality should accomplish use of existing knowledge. We propose that preservation and sharing are to be provided by a central, external and independent infrastructure.

To achieve this in an efficient and effective way, several aspects have to be considered. Identification of knowledge is currently the most time-consuming task. A structured and consequent approach to this challenge, pursued from the start, may extend the initial phase of the project implementation. Holistic approaches are necessary, if knowledge should be handled in a structured way. Punctual activities are not effective. The organisational structures – planning and project implementation processes – must allow a structured handling of knowledge. If knowledge and information are easily accessible for the planning and project implementation, this potential drawback can be mitigated.

Until now, the elements of knowledge management were only deployed in the final stage of pilot projects when the projects lifecycle reached its end. I.e. its unit of operation was the project's final evaluation report. It is the final evaluation report's purpose to identify, distribute and preserve the knowledge and

experiences gained in the pilot project. This procedure was supposed to ensure that these have after-effects on planning practice and were transferred to municipalities that strongly resemble the pilot municipality. However, observations of current pilot projects [Gilcher and Steinebach, 2016b] reveal that existing knowledge and experiences are not necessarily used effectively and efficiently. Comparison if the extensive evaluation report of a previous pilot project with a current one corresponds to the time-consuming knowledge management phase aiming to identify internally or externally available knowledge. Given the definite duration of a pilot project that causes time restrictions and the lack of automation to assist with this task, this phase cannot be executed exhaustively. Knowledge and experiences remain unrecognized and are often just taken into account later, e.g. in the final evaluation of the current pilot project. Therefore, we propose that each stage of a pilot project undergoes its individual knowledge management process. This is possible, as the stages of a pilot project are strictly separated from each other and proceed in one direction of succession – i.e. we make use of the properties of the waterfall lifecycle model and the fact that each phase ends with an evaluation. The advantage of our proposition is that only small parts of the pilot project lifecycle have to be completed before the obtained knowledge and experiences can be stored and shared. When smaller units of a pilot project undergo the process of knowledge management, knowledge and experiences gained in a single stage can be collected, stored and shared. These smaller units of information are also easier to compare and thus the knowledge identification, acquisition, and utilisation become a less time-consuming task. Therefore, their potential to be reused in future pilot projects as well as further planning practice is improved as the cost-benefit ratio improves significantly. This also allows reuse of current insights as the pilot project providing them need not be terminated yet.

The development of this structure, integrating the phases of a knowledge management process into the individual stages of a pilot project, is key to achieve this goal. Figure 3 illustrates the structure on the example of two consecutive pilot projects. Pilot project 1 integrates parts of a knowledge management process (blue) into its project stages. Relevant phases to be executed are knowledge objectives, knowledge identification knowledge acquisition (for the purpose of presentation this is assumed to be internal only), knowledge development, and knowledge evaluation. These phases have been rearranged to suit the pilot project's stage. Most importantly, the two phases knowledge preservation and knowledge sharing have been moved into a novel sharing infrastructure that exists outside of and thus independently from the pilot project's lifecycle. It is supposed to persistently store the results of knowledge evaluation and potentially knowledge development, too. This central infrastructure should be used by all pilot projects for knowledge preservation and knowledge sharing. This is illustrated by the consecutive pilot project 2. It has its own knowledge management process (green), uses the central infrastructure. Most importantly, the knowledge utilisation if pilot project 2 should use results from pilot project 1. Moreover, knowledge identification and acquisition can make use of the centrally available source for knowledge and experiences for this stage of a pilot project. This scheme repeats in every phase of the waterfall lifecycle (not depicted).

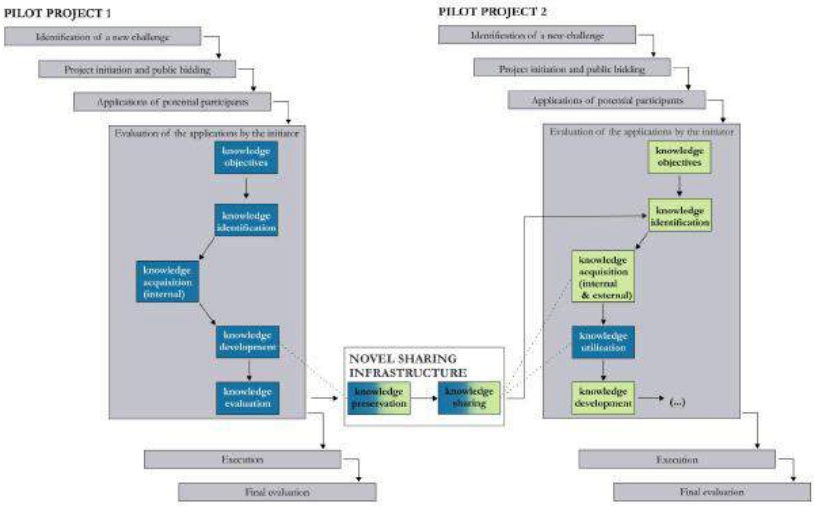

Figure 3: Integration of knowledge management into the waterfall lifecycle of pilot projects.
Source: Elena Gilcher.

5 CONCLUSION

In this paper, we identified the lifecycle of a pilot project to correspond to the waterfall lifecycle model of development projects. This categorisation of the proceedings of pilot projects allows for reuse of known properties of a waterfall lifecycle. Most notable is the non-iterative nature of these projects that manifests in non-overlapping subsequent stages that do not incorporate feedback. As we aim for the efficient and effective sharing of knowledge and experiences, the latter property is very important. It contrasts to the fundamental feedback step of the knowledge management process we propose to integrate into pilot project stages. To that end, we present the concepts to overcome this mismatch and to integrate knowledge management into the lifecycle of pilot projects. As mentioned, this integration repeats for every stage in order to reduce the unit of sharing from a comprehensive final project evaluation report to smaller pieces of information. This should reduce the effort of knowledge identification, acquisition and utilisation. I.e. it improves the cost-benefit ratio of these steps of knowledge management and makes them attractive for pilot projects. In this paper, we presented the required background and contributed a theoretical solution for this integration of knowledge management into pilot project stages. Moreover, we exemplified the knowledge preservation and sharing via a novel, external sharing infrastructure on the example of two consecutive pilot projects. In the future, we aim for investigation of benefits of digitalisation and automatization to further simplify the tasks knowledge identification and acquisition. We plan to implement our concepts in a small scale and test it on data from pilot projects we monitored in the past.

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ID 1598 | PLANNING ETHICS IN MAJOR TRANSPORT SCHEMES: REFRAMING THE CHALLENGE

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1 INTRODUCTION

This paper revisits the various visions of justice in transport planning, with a focus on major schemes, and the role played by transport planners. Whereas extensive discussion has taken place in the case of urban schemes affecting particular communities, less attention has been paid to major planning concepts at the