Exploring the Alpine SUMP with the PUMAS ASC: An Online Community of Practice for Combining Planning and Learning in Urban Mobility Planning

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1 INTRODUCTION

Sustainable urban mobility planning (SUMP) is an approach for empowering all stakeholders in mobility planning (WEFERING et al., 2014). By involving a large group of stakeholders and structuring the interaction between stakeholders and planners in a way that the citizens' needs are met, new responsibilities for the shared environment, i.e., the planned city are built up and good practice develops. Many cities have by now established sustainable urban mobility plans (SUMPs). In some countries, e. g. in France, the creation of such a plan is mandatory (in France, the SUMP is called PDU). However, the people in charge of creating and establishing a local SUMP often lack experience in SUMP. Good practice repositories approach this problem by collecting experiences and explaining how a SUMP has been established in a specific city (cf. Section 2). Interaction is, however, still limited in these communities. On the other hand, shared workspaces for planning often lack a connection to existing planning knowledge. Planners do not have knowledge awareness and thus redesign SUMPs from scratch.

In this paper, we will first summarize a small part of theory relevant for knowledge-aware workspaces for SUMP and relate this to good practice repositories for planning knowledge. Our analysis shows that existing knowledge sharing environments are very well addressing the needs of planners who actively seek information and inspiration. However, in current working settings, planners and to-be-involved stakeholders often do not know what they could learn from other cities. They do not even look for this information. To overcome this problem, we present the PUMAS ASC platform and elaborate on the platform's mechanisms towards knowledge awareness. The platform is complemented with a set of tools that help planners and other stakeholders to engage in a conversation on planning issues. We will describe how we design planning workspaces and processes that support mobility planners and stakeholders in SUMP-related planning activities.

2 PARTICIPATIVE PLANNING AND GOOD PRACTICE REPOSITORIES FOR SUMP

Participation can be considered as one core pillar of the SUMP approach. The SUMP guidelines request the participation of citizens and stakeholders in all phases of the decision making process but also in the planning and the implementation of concrete measures (WEFERING et al., 2014). Regarding urban planning, this approach is not new. The Oregon Experiment (ALEXANDER et al., 1975) was a pioneering work towards a participative planning process. Participation was defined there as a "process by which the users of an environment help to shape it. The most modest kind of participation is the kind where the user helps to shape a building by acting as a client for an architect. The fullest kind of participation is the kind where users actually build their buildings for themselves." (ibid., p. 39) In later works, especially in his latest writing, Alexander became clearer about the underlying principles (ALEXANDER, 2012): The ultimate goal for his participative approach was to enable inhabitants and citizens to shape their environment towards a high level of wholeness. Wholeness speaks of the oneness of all things." (ibid., p. 87). Instead of separating the ownership of processes and measures from the people affected by the process and the measures, construction should be done in a way that it reconnects the inhabitants with the space. Instead of separating roads and buildings from the environment, it should be adapted to the environment so that it creates an organic whole. We can even extend this notion to the level of meta-physics: Instead of separating inhabitants' utopia (the non-being, the non-physical, the sense for infinity) from what most people call reality

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(the being, the physical, the objective truth, the world of engineering), inhabitants should recover a mode of communication where the potential to be has its space again.[1]

Looking at the SUMP guidelines with such a perspective in mind, we can discover multiple commonalities between SUMP participation and Alexander's vision for participation. SUMP, e.g., calls for the development of a common vision. The public is to be involved in this process through a Vision Board (WEFERING, 2014, p. 49). The board, however, already increases the distance between citizens and planners. Direct participation is reduced. When it comes to the selection of measures, planners "should build on discussion with key stakeholders, consider experience from other places with similar policies, ensure value for money and exploit as much as possible synergies between measures." (ibid., p. 58). Notably, the selection and evaluation of measures becomes a task for the planners again. They should take into consideration the results of the stakeholder meetings but do a first selection of suitable measures and only when these are evaluated move back to the stakeholder group to check the suitability of the measures. Again, we can observe a reduction of direct influence or wholeness in this process.

We thus argue that, although SUMP is much closer to a planning in wholeness, decision strategies in SUMP still have the danger of a separation between planners and citizens. Citizens should get the chance to involve more intensively in order to take responsibility for their environment.

This requires that two prerequisites for participation are met: (1) There needs to be an efficient communication and interaction space where a discourse on visions can take place and (2) citizens and other stakeholders who are not trained in planning should be empowered to act like experts (but still keep their connection with the environment).

For the focus of this paper, we will investigate how these two dimensions can be supported with electronic media. EFFING et al. (2011) make the following mapping between technology and the level of involvement supported by the technology:

- e-Enabling mainly focuses on informing stakeholders and citizens. This is the weakest form of participation. Electronic support includes Web pages or newsletters.
- e-Engaging has the goal of involving stakeholders in a dialogue. They do no longer only consume information about the planning process but also contribute their opinions. They comment plans and provide background information from their specific perspective. In some cases, decisions are made through online polls. The term Web 2.0 stands for such interaction, where ideas are shared, commented and connected in an online information space.
- e-Empowering describes the highest level of participation. Stakeholders are empowered to co-design their own solutions. The main focus is on the collaboration towards a plan that is supported by all stakeholders. Effing et al. connect this participation level with the concept of social media. To a large extent, this connotation makes sense: In social media, stakeholders can organize themselves, form interest groups, initiate discussions and share ideas. However, besides social media, one should also consider tools for online collaboration. Empowered stakeholders should be able to develop their own plans and play a leading role in the coordination towards a consensus.

Current good practices in SUMP participation often focus on e-Engaging. Web technologies are used for enabling online communication and providing consumer access to a shared information space (i.e. on a web site). In fewer cases, social network technology is used for raising awareness on the current planning activities. We argue that future IT solutions for participation in SUMP should focus on e-Empowering. The proposed solution in Chapter 3 of this paper will show how participation in the sense of e-Empowering can be reached through the mechanisms of the PUMAS ASC.

But before we go into details of our solution, we will briefly summarize some examples for communication and interaction spaces in planning and for good practice repositories, i.e., tools helping practitioners to gain planning knowledge and derive requirements for a participative planning environment for SUMP.

[1] This last statement shows that the underlying problem is much larger than the pragmatic dimension of planning. The point is that participatory planning should not limit itself to the dimension of pragmatics. However, this requires a fundamental change in planning attitudes. The same challenge is currently discussed in other fields as well (e.g., in computer science, cf. SCHÜMMER et al., 2014).

2.1 Interaction Spaces in Planning – Theory and Practice

Participatory planning requires that stakeholders have access to a shared information space in which the plans are stored and manipulated. In times before the computer, such a space would be a common planning office. The office should be open to the public and inhabitants of the environment should be welcome to contribute to plans, e.g., by creating their own sketches, collaborating on health maps, or co-designing mock objects. The Oregon Experiment that was mentioned above provided such an interaction space as part of the process. A more recent example is the Bergamo 2.035 exhibition lab (a part of the project Bergamo 2.035, http://www.bergamo2035.it).

When it comes to online interaction, many planning initiatives build on the use of existing social networks. As the physical planning offices move into the centres of the city and open up for the public to be involved (that is the case with the Bergamo lab), projects use existing social networks such as Facebook to inform the public about current planning activities. The PUMAS pilot activity of the City of Venice, e.g., created a Facebook page to inform the public about current activities for a safe school travel.[2] The interaction in such networks typically ranges from e-enabling to e-engaging.

When it comes to the development of the concrete measures, tools for closer collaboration are needed. Examples include a SHARED FILE REPOSITORY to exchange planning documents, a communication space such as a FORUM or a synchronous multi-user editor to support SHARED EDITING (an overview of current approaches to remote collaboration is provided by SCHÜMMER and LUKOSCH (2007)). In theory, online interaction spaces can become a rich space for exchanging future visions and developing shared ideas and measures together with the stakeholders.

However, most current practice does not involve such interaction. A survey among the project partners of the PUMAS project, although not representative, showed that most interaction takes place in face-to-face settings or by the exchange of office documents via e-mail. This means that interaction structures need to be planned beforehand and that they require a high level of commitment. Collaborating with stakeholders is often considered as demanding and time consuming.

At the same time, stakeholders are still not used to enter virtual collaboration spaces. They can be convinced to join stakeholder meetings but to our experience will not be able to invest much time between the meetings, especially when they do not see a direct outcome of their engagement.

Both aspects indicate that there is a barrier towards a close interaction in stakeholder-driven planning. At the same time, we observed in selected pilot settings (especially in the PUMAS Voyage project, SCHÜMMER et al., 2015) that even children can stay motivated to share their visions in a participatory planning project, once the project manages to speak in their language (i.e., visual sketches of their utopian shape of the environment). We thus recommend that a shared space for participation in SUMP should be open to visions and allow participants to talk about these visions. It should also constantly provide new inspirations on how the city could be.

2.2 Knowledge Repositories and Sharing of Practical Knowledge

Good practice repositories, such as the Eltis (http://eltis.eu) platform, the CiViTaS Wiki (http://civitas.eu), or the EPOMM network (http://www.epomm.eu) aim at making good practice in urban planning accessible. The platforms collect case studies where cities document their experience with new mobility concepts or other aspects of planning.

Although the case studies differ in structure from platform to platform, they can be considered as modern variants of pattern collections in the sense of ALEXANDER et al. (1979). This collection includes 253 so-called patterns, guidelines for good design of towns, buildings and construction. Frequent critiques have considered this book as a collection of authoritarian and deterministic imperatives. This reception is due to the structure of the patterns: Each pattern starts with a description of a situation that ends with a problem statement. Then it describes a solution ending with a summary that always starts with the word „Therefore“ and then adds an imperative description of the solution. ALEXANDER et al. claim to have at least some patterns „stating a true invariant: in short, that the solution we have stated summarizes a property common to

[2] https://www.facebook.com/lamiascuolavainclassea; More information about the pilot activities of the City of Venice can be found in (SCHÜMMER et al., 2015).

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all possible ways of solving the stated problem.“ (ibid., p. xiv). The same critique has been made to other good practice collections: they would limit creativity and lead to a uniform style of planning and design.

A closer look at A Pattern Language, however, shows that this interpretation was not intended by the authors: „The fact is, that written this book as a first step in the society-wide process by which people will gradually become conscious of their own pattern languages, and work to improve them.“ (ibid., p. xvi).

We think that this point is of great importance for good practice collections in general. Good practices, considered as externalized representations of individual tacit knowledge (POLANYI, 1966) initially only reflect personal knowledge, values and feelings. Through a communication process, they may become part of the organizational knowledge (NONAKA & TAKEUCHI, 1995). Individual practice is combined and in some cases also repurposed to a specific context. The communication process leading to the combination of knowledge is often as important as the knowledge artefact itself. From this perspective, it is clear that the creation of a pattern language is the first step towards a participatory design. This is why ALEXANDER et al. (1975) placed the process of creating an own pattern language for the specific design project at the beginning of the process.

SUMP follows the same spirit but with slightly modified orders of steps: In phase 4 of the SUMP, stakeholders are asked to create a shared vision (WEFERING et al., p. 48). This vision is from then on used as a basis for future planning. In phase 6.2 „Learn from others experience“ (ibid., p. 63), current good practice shall be investigated and collected as inputs for the own planning process. We argue for a more iterative approach where vision building and the reference to existing good practice are intertwined in a way that existing practice can inspire the vision building process and modified visions change the relevance of good practice guidelines so that other good practice may move into the focus of the participants.

In addition, participants should be encouraged to contribute their good practice knowledge. The fact that this knowledge is in most cases tacit knowledge, in other words knowledge that people show in their performance but cannot easily express, calls for a carefully crafted support process in which indications of knowledge are taken up and refined together with the knowledge owner.

One example for such a process is called shepherding (HARRISON, 2006). It is a structured review process often used among design pattern authors. The basic idea is that an experienced author, a so-called shepherd, collaborates with an author, the so-called sheep, and helps the author to improve his or her text. At the beginning of the shepherding process, the future sheep is assigned to a shepherd or selects a shepherd on his own. Once the shepherd accepted the invitation, he reads the text and starts to ask questions or makes recommendations for improvement. Typically, the shepherd starts with his first impression of the text. Then he looks at the core elements of the text and checks if both are well aligned. The shepherd adds comments to the document and sends the document back to the sheep.

Instead of starting a discussion with the shepherd, the sheep reads the annotations and tries to reformulate the text. The sheep then adds another comment to the shepherd’s comment explaining how the text was changed so that the shepherd’s comment is resolved. Once all comments are worked through, the sheep sends the document back to the shepherd and awaits new comments. Through this dialogue, the sheep learns how to express experiences in a way that they can be combined in the project’s pattern language.

From other contexts (MATSCHKE et al., 2014), we know that knowledge intensive group interaction often faces the problem of knowledge sharing barriers. One important factor is the lack of knowledge awareness. Knowledge awareness means that potential receivers of knowledge become aware of the existence of the knowledge. „When users [are] aware of various aspects of knowledge existence, this awareness provides rich cues for possible interactions.“ (YAMAKAMI, 1993) Knowledge awareness may help to solve the knowledge sharing paradox, because: Without knowing what others know, practitioners will not know what knowledge they can expect from others. And without knowing what others need to know, practitioners will not provide this knowledge. For the implementation of a SUMP knowledge repository, it means that the awareness of existing approaches is as important as the awareness of required approaches as well as the awareness of own tacit knowledge.

One final issue extends the notion of tacit knowledge: Polanyi’s definition of tacit knowledge focuses on the individual. In the context of a SUMP, we should in addition consider tacit knowledge from people who are

not yet participating in the process. These are stakeholders that do not yet know that they have a stake in the project. They are not aware of the need of their participation.

2.3 Requirements for a participative planning environment for SUMP

From the above observations, we can summarize a set of requirements for a participative planning environment for SUMP:

- R1: Shared Space. Planners and stakeholders need a shared space for exchanging ideas and visions on the future of the city.
- R2: Communication. Ideas and planning material should be discussed by the members. Facilitation should encourage the discussion with a focus on the joint project. The communication should avoid language barriers. This means that participants should talk in their local language and that they should also try to prevent language barriers caused by planning specific language.
- R3: Knowledge awareness. This is probably one of the most important requirements. An environment for participative SUMP has to establish awareness on existing knowledge within the project and from other projects. It has to make people aware of knowledge needs and it should raise the awareness of tacit knowledge.
- R4: Knowledge mining. Participants should be engaged in a communication process where they express their experience with similar planning situations. They should get support in structuring their knowledge.
- R5: Knowledge evolution. Shepherds should support practitioners in the evolution of early knowledge.

3 THE PUMAS ASC APPROACH

The Alpine Space Community (ASC) developed in the INTERREG “Alpine space 2007-2013” project PUMAS focuses on the interplay between concrete planning activities and learning as a pre-requisite for efficient actions. The basic idea is to provide protected workspaces for stakeholders in a planning project, capture tacit planning knowledge and augment this knowledge with knowledge obtained from other work groups or knowledge repositories. The platform is currently opening up for participants outside the PUMAS project consortium. More information on how to access the PUMAS ASC and use it can be found at the project homepage (http://www.pumasproject.eu). The system is also available for commercial use, distributed by a spin-off company of the FernUniversität in Hagen (cf. http://www.patongo.de for details).

If a city, e.g., aims at improving bicycle traffic, they will typically set up a workgroup at the PUMAS ASC. They start working by sharing a first draft of the SUMP goals as a wiki page. By a semantic analysis of the wiki document, the PUMAS ASC system identifies experiences from other projects that also addressed bicycle traffic. It reminds the planners and other stakeholders of the new project on these experiences and thereby establishes knowledge awareness.

In the following sections, we will show in detail how this approach helps to satisfy the requirements presented in the previous chapter.

3.1 A shared workspace at the PUMAS ASC

For the development of SUMP measures, the PUMAS ASC provides protected group spaces. Alternatively, groups can be open to the public. When initiating a project, the facilitator invites members he or she is already aware of. These members can be granted facilitation rights as well so that they can invite additional members. In addition, the address for the group can be shared in the physical space by means of flyers with QR codes so that inhabitants can easily find the group. Facilitators can decide whether or not these inhabitants are asked to only contribute visions and ideas or become full members.

As contributors, they will find a form in which they can submit content even without a prior registration but they will not be able to see or discuss the content unless it is publically released by the facilitator. As full members, they get access to discussion boards as well as document spaces of the group.

The PUMAS ASC distinguishes four main document types to be worked on in the group at an early stage:

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(1) A SWOT document can be used to carry out an online SWOT analysis. Stakeholders could be invited to the online SWOT and contribute their experience with SUMP-related planning aspects. Unlike in traditional workshops for analysis, a much higher number of participants can be part of an online SWOT. They do not have to contribute at the same time and can take some time for reflecting on their experience and the experience of others. In addition, the online SWOT place can become a SWOT discussion space in which stakeholders not only share their understandings of strengths, weaknesses, opportunities and threats but also discuss underlying reasons.

(2) Ideas can be used to describe visions of the future mobility in the city. They do not have a detailed structure. Basically, they consist of a name, a summary and a detailed description as well as an illustrating picture and user-defined tags.

(3) Challenges document mobility aspects that are considered as problems by the contributing stakeholder. They have the same structure as ideas.

(4) Generic Wiki pages are meant to be structured by the participants. They can be used to document the plan and create detailed descriptions of the measures to be implemented.

Each document can have attachments and thus collect additional planning specific material (such as topographic maps, spread sheets, etc.). However, the participants should avoid using document types that create new barriers (by requiring planning specific software).

Documents are language specific and can be translated to other languages. This was especially relevant in cross-border teams working on cross-border SUMPs. The translation can be done by all group members. Members of the group can be notified on new activities by e-mail or by periodic reports. All documents have a discussion space. Contributions to the discussion can either be received by mail or in a periodic report. This ensures that group members stay aware of relevant discussions without being flooded by too many e-mails.

Except the explicit distinction of ideas, challenges, and generic pages, and the document-centric forums the group space has no major differences to other shared workspace systems (such as BSCW, http://bscw.de, or Microsoft SharePoint). The main innovations will thus be presented in the next sections.

3.2 Establishing Knowledge Awareness at the PUMAS ASC

The core idea of the knowledge awareness in the Pumas ASC is to analyse contributions and propose related content in the workspace. When participants contribute a document (i.e., a SWOT analysis, a challenge, an idea, or a wiki page), the system analyses the content of the document and finds other documents that address a comparable content. The analysis uses an adapted version of Apache Lucene's "MoreLikeThis" search filter (cf. http://wiki.apache.org/solr/MoreLikeThis). Relevant terms of the submitted document are extracted and other documents are searched that use the same terms.

Retrieved related documents are shown together with the document. This has the positive effect that a contributing user will immediately see related documents when saving the own document the first time. The intended workflow for getting aware of relevant existing knowledge thus does not start with a an explicit search for content but with a description of the first set of ideas and challenges. Note that the existing knowledge is taken from other groups' documents that are shared with the PUMAS ASC community.

In a next phase, participants or facilitators will explore the related content and add relevant content to the group's set of favourites. This way, the group incrementally builds a group specific repository of background material, similar to the project specific pattern language proposed by Alexander. Additional related documents will still be shown together with the group document, but they move out of focus as soon as explicit links and favourites are selected.

One special challenge in the Alpine Space is the combination of different languages (Italian, Slovenian, French, and German in the case of the PUMAS project). Language-oriented recommendation mechanisms would lead to language-specific sub-communities. Each document can thus be translated to any of the project languages (a similar approach is followed by the Eltis platform). However, it became clear as well that the effort for translating all documents exceeded the project's capabilities. Thus, it was decided to put special attention on the translation of keywords. The semantic network of keywords and documents was then used to recommend content from other languages. Whenever interesting content was found this way, the group could decide to translate the content for internal use or share this translation again.

3.3 Unveiling tacit knowledge with PUMAS Storm

The recommendation mechanisms are one way to establish knowledge awareness. For setting up a planning community, it still has the cold start problem. Unless there is a base set of good practice knowledge, participants fear the investment of contributing.

In other projects, e.g. when setting up a participation process among planners in churches or planners in sports organizations, we were able to reach very positive effects with a methodology called PATONGO Storm (SCHÜMMER & MÜHLPFORDT, 2012). The idea of this method is that participation requires communication in face-to-face interaction as a starting point. During a stakeholder meeting, participants are placed randomly on group tables. The workshop begins with simple story telling: In groups of three, one participant starts to report on his or her most successful action during the last 12 months. The other two group members listen and ask if they want to know more details. After 2-3 minutes of conversation, the group summarizes the report in one paragraph and identifies main topics addressed in this experience as tags.

After all group members have acted as storyteller, the group starts the next phase, where challenges are reported. Again, these are captured in short summaries and afterwards they are tagged. Since all groups talk in parallel, this phase will generate a large number of knowledge stubs in a very short time.

At the end of this phase, the PATONGO Storm system analyses the content and matches problems with experiences. As a result, it initiates conversations across groups where people with experiences in a specific area are connected with others who have ideas or visions for this area. These new pairings begin to formulate a possible future scenario that can be commented by others again. Finally, there will be a collection of contributions as well as an initial network among the participants. These connections can continue after the workshop and jointly work on the concrete parts of the SUMP (or concrete measures).

The main benefit of this approach is that initial knowledge awareness is achieved in a face-to-face setting. Knowledge is connected with people. And people motivate one another to start talking about their ideas. In the conversation, participants start reflecting on their practice and explicating tacit knowledge. Even though only small chunks of knowledge are explicated, the value of these chunks becomes clear instantaneously.

3.4 Evolution of knowledge

Once knowledge was identified and connected in the PATONGO Storm or in the first working phase of the group space, quality assurance can begin. The PUMAS ASC supports shared annotations on documents and models a workflow for shepherding.

Authors can invite a shepherd who will then find the document under review in his personal dashboard. The dashboard contains all documents for which action is required. The PUMAS ASC supports the shepherding process by keeping track of comments, roles and tasks.

Documents can be annotated and passed back to the author. Whenever a document changes its status, the author and the shepherd are informed about required actions. Annotations can be tagged as to-dos that the author has to take care of. This process is repeated until the author and the shepherd are satisfied with the document's quality.

Shepherding is especially relevant for reflective writing. As in PATONGO Storm, where the small group helped the reporting group member to enter a mode of conversation, the shepherd can ask relevant questions and thereby help the author to better understand what the core of the experience was or what parts of the experience could be of general interest for other contexts.

The PUMAS ASC offers two additional document types for capturing reflection knowledge. Experience reports are thought as knowledge structures to report on a project or measure. They have a pattern-like structure, i.e. a context description, the description of the problem and the challenges, and a description of the performed activity together with some sections focussing on the effect of the action. Unlike patterns, they should keep the link to the concrete experience. Consequently the author who made the experience is the only person who can modify the page (with the help of the shepherd). When an experience is more abstract and thus applicable in wider contexts, it can be described as a method. Methods have a comparable structure but combine experiences from different projects. Typically this is the knowledge structure that is hardest to write but on the other hand has the widest applicability. Again, shepherds can support the team of authors in writing the methods.

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Experience reports and methods are intended to be shared across group boundaries. They will be considered as recommendations when a new planning process starts.

4 SUMMARY

SUMP aims at participatory planning of urban mobility so that cities improve their wholeness. Transport should become healthier, environment-friendlier, and more oriented on people. To reach this goal, participation is a key issue. Giving inhabitants of the city a new responsibility and empowering them to steer mobility measures can transform cities to a place where citizens can live more connected to the city.

Successful participation however requires a shift in processes and knowledge sharing. In this paper, we proposed the PUMAS ASC approach as a means for generating new visions and turning these visions into reality. The PUMAS ASC approach heavily builds on the idea of a living pattern language, i.e. a collection of good practice knowledge that is selected and adapted to the concrete planning project. This pattern language interacts with visions and challenges contributed by the stakeholders and is stepwise refined to the concrete project's needs. Semantic computer technology is used to relate knowledge and thereby inspire the project members with alternative solutions to their habitual way of approaching the challenges in the city. A workshop model, the PATONGO Storm approach, can further be used to initiate conversations.

Once a project is on track, constant reflection of practices shall help to capture knowledge. Special document types (experience reports and methods) support the reflection. Shepherding is intended as additional means for improving captured knowledge.

Within the PUMAS project, we have gained first experiences with the process and the tools. Both were discussed and tested in site workshops at the project partners' locations. Especially the semantic recommendation approach was considered as helpful for the project work. Few project partners have also gained experiences with shepherding. They appreciated the interaction with the shepherd and were positively evaluating the improvements of the content.

The PATONGO Storm format has been evaluated in one concrete planning setting of the City of Vienna. Although external factors limited the time of the workshop, first connections could be established in the workshop and an exchange of visions took place. As expected, all participants had the chance to contribute in a way that their vision was heard. In another workshop on institutional cooperation, we varied the process in a way that good practice scouts monitored small group discussions (that were run without computers) and contributed their observations as experience reports directly to the PUMAS ASC. Again, we could observe that valuable practical knowledge was captured and communicated in the community.

However, we are also facing challenges. In daily practice, some partners see the difficulty of integrating the reflection phases demanded by the PUMAS ASC in their job schedule. When working under time pressure to reach project deadlines, reflection phases that do not directly contribute to the next deadline are hard to justify. Future work should place special attention on the integration of reflective work modes and project-related activities. However, such a change typically requires changes in the organizations and thereby months or years before it can show effects.

Another challenge is the cold start problem. Although a first collection of contributions has been collected at the PUMAS ASC, it is still relatively small compared to other good practice collections that are developed top down with an editorial board (e.g., the Eltis repository or the CiViTaS Wiki). Future work should continue to forge links between the PUMAS ASC and these repositories.

Last but not least, we were approached with the question, whether such a system could be used on a smaller scale inside an organization. Building on experiences made by a commercial partner of the FernUniversität (www.patongo.de) who transferred the PATONGO technology, the core of the ASC, to other domains, it is very likely that an in-house ASC installation can reach the required momentum. It is, however, a challenge for future work to investigate means for exchanging practical knowledge across different ASC communities taking privacy and intellectual property rights into account.

Finally, we invite you to become a member of the PUMAS ASC, use it for your project work and share your knowledge with the community. Finally, it will not be the technology that defines knowledge exchange but it will be the community members with their visions and experiences that make the difference towards a sustainable human-centred planning culture.

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