Spaces for participatory creativity

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This article compares participatory workshops with novel mixed-reality tabletop tools in three different urban projects. It discusses differences of site and project, the role of representations, and the role of the participating stakeholders as factors that are crucial in shaping the space for design ideas. The article then draws conclusions as to the salient aspects of creative, explorative and imaginative exploration.

Keywords: participatory design; urban planning; stakeholders; representation; design ideas; creativity

Introduction

Participatory design (PD) aims to involve the future users in all parts of the design process (Greenbaum and Kyng 1991, Simonsen and Robertson 2012) in order to provide design ideas based on use practices; hence, the space for design ideas is expanded to include more than technological possibilities. A wider basis for design ideas can help the design project to arrive at a functionally better and also a more ‘creative’ solution. PD originated as a strategy for increasing workers’ understanding and mastery of the tools they use in their work (Nygaard 1996). PD methods emphasise mutual learning and iterative development involving concrete prototypes, traditionally within a workplace and involving committed users.

This paper examines the conditions for ‘participatory creativity’, presenting experiences with PD in public spaces. The project on which this article is based was a PD project developing a participatory mixed-reality tool with a tangible user interface in support of new ways of experiencing and contributing to urban design (Wagner et al. 2009). The mixed-reality tool, which will be discussed later in this article, is a mobile urban design laboratory which can be transported to a site of design and where real city scenes can be interactively augmented with computer-generated visualisations to illustrate, debate and experiment with different design possibilities among various stakeholders of design. We compare three participatory workshops in which the same participatory tool was used: a tool suited for co-developing ideas for the design of physical spaces. The workshops turned out differently and our analysis identifies some of the elements that seemed to affect the
processes and outcomes of the workshops: the larger project and the site, the role of the representations, and the participating stakeholders with different interests and commitments in the project and the workshop. Comparing the workshops shows that PD can take very different forms. It also demonstrates how the coming together of different voices shapes the dynamics of participation in a project, resulting in different outcomes. The article looks at these outcomes from the perspective of creativity, asking:

(1) What are the ‘parameters’ and conditions that shape the space for design ideas with groups of potentially future users?
(2) What are the salient aspects of creative and imaginative explorations in different workshop processes with the mixed-reality tools?

Participatory design and creativity

Mörting et al. (2010) argue:

PD has always worked with users in imaginative ways. . . . [T]he interest in embodied interactions, tangible, personal and gestural interfaces, ambient media and the like, has spurred the use of creative and experimental approaches to design. Many of these methods have a playful component; engaging users and designers in joint explorations of the design space, and helping designers to better understand user needs (p. 124).

Creativity as the making of something new is basic to design. We view design as a process of framing the design problem rather than solving a given problem (Schön 1983). In their analysis of the nature of creativity in design, Dorst and Cross (2001) identify the co-evolution of the problem space and the solution space throughout the design process as an important factor for designing a creative product (p. 11). Even if creativity is often linked to individuals, several studies of creative processes conclude that individual creativity is a socio-cultural activity (e.g. Amabile 1998). Also, Fischer (2004) stresses that creative design is a social process, resulting from interaction and collaboration with other individuals. Arias et al. (2000) point to the importance of design artefacts or ‘externalizations’ in collaborative design. Moreover, in the tradition of Dewey (1934/1980), we can say that a creative product achieves aesthetic qualities and experiential values. An aesthetic quality is something that we experience; it is anchored by the body and the senses. Aesthetic experiences develop in the creative process over time and are both intellectual and emotional. Jacucci and Wagner (2007) have taken up this notion by analysing the role of materiality and performativity in creative design. In this article we focus on creativity as a collective process, analysing how the different features of the complex set-up of participants, tools, urban issues to address and representations to work with stimulate or constrain participatory creativity. We show how haptic engagement and aesthetic experience are conducive to creativity.

Participation in support of urban planning

Urban planning today needs to explore a wide range of aspects of the built and social environment. Hence, projects are vastly complex; they affect investors, technical specialists and citizens, and they play an increasing role in community politics.
To avoid planning mistakes, it is very desirable to involve the stakeholders from an early stage onwards. Al-Kodmany (1999) summarises the benefits of public participation in planning: ‘they include enhancing the capacity of citizens to cultivate a stronger sense of commitment, increasing user satisfaction, creating realistic expectations of outcomes, and building trust’ (p. 37).

Stakeholders bring their different interests, perspectives and competencies into the urban planning process and it is essential that these are successfully expressed and apprehended. Involving ordinary citizens, usually non-experts, poses particular challenges. Traditionally, urban planning is facilitated through the use of non-participatory media: architects employ different types of plans, models, and more and more also simulation tools, animated three-dimensional (3D) renderings and so forth to present concepts to the stakeholders. While plans are often difficult to read for non-experts, planners and architects, who master the techniques of graphical representation, often produce seducing images, which aim at convincing stakeholders rather than supporting their understanding and inviting them into a dialogue. Some urban planners have therefore made use of low-tech, hands-on visualisation techniques, like for example ‘Citizen murals’, ‘Color the map’ and ‘Photo portfolios’ (McClure and Hurand 2001), drawing on resources that ordinary people are likely to have. More recently, we can observe a trend towards interactive, often tangible interfaces, as well as the use of the Internet for citizen participation in urban planning. Tabletop interfaces are popular as they easily accommodate architectural scale maps and models and facilitate tangible interfaces. Many of them use projections and multiple screens to visualise the scenes that are created (Arias et al. 2000, Ishii et al., 2002, Aish et al. 2004).

The MR-Tent

The mixed-reality (MR) application we used in the three workshops was evaluated and redesigned in six cycles of design–evaluation–redesign in the context of real (ongoing) urban planning projects with urban planners and a variety of interested participants as users. We chose the format of participatory workshops for evaluating the successive prototypes, as it allowed us to come as close as possible to the ‘real-life’ situation of participatory urban planning. All sessions were video-recorded using two cameras: a fixed camera covering action on and around the ColorTable workspace (the tangible user interface) and a manually operated camera, which followed participants’ switch of attention to the projection screen and their use of space beyond the table. The soundtrack captured by an additional powerful microphone mounted above the table was used for producing a verbatim transcript of participants’ conversations. The research team watched the video material many times, selecting significant scenes, based on their research questions and the conceptual framework developed within the project (Maquil et al. 2010).

The MR-Tent (Figure 1) provides a very specific collaborative setting. As mentioned above, it is a mobile urban design laboratory, which can be transported to an urban planning site, and where real city scenes can be interactively augmented with audiovisual scenes to illustrate, debate and experiment with different design possibilities among various stakeholders of design. It provides users with the possibility to arrange and position tokens on physical maps of different scales, representing interventions in urban space. A vertical projection renders the scene against different representations of the physical site.
Objects of the mixed-reality world can be modified and adapted in scale, transparency, colour and offset to the ground. Users can work with different types of visual objects (3D and 2D objects), visualising buildings, bridges, activities, ambience and sound. The participants can place different types of paths animated by flows of pedestrians, cyclists, cars, a train, and so forth, to a scene. They can also define areas, marking them with textures. In addition, the participants can create and explore the soundscape connected with the visual scene. These mixed-reality scenes are viewed against different representations of the site: different photographic panoramas that have been edited so as to provide views and space for interventions; an aerial view of the whole site; a real-time video stream produced by a fixed as well as a mobile camera; and a see-through installation, in which the mixed-reality scene is directly projected onto the site as seen through a window.

Three participatory workshops
The three projects, on which our analysis is based, were originally not planned as participatory workshops, but the interest of planners and local authorities in the mixed-reality tools made it possible for us to make an intervention, albeit within a limited scope. For each of the workshops we studied the site, selected participants, and prepared scenarios and content cards, as will be explained in the forthcoming sections. We produced photographic panoramas of the site, which were taken from different viewpoints. The content included architectural models, 3D objects, 2D images and sound. We also provided physical maps of different scales to be put on the ColorTable (Figure 2). For each participatory workshop we developed an experimentation protocol.

Each of the three workshops involved different participants depending on the situated nature of the projects. These participants were invited based on their relationship to the sites, and they were encouraged to be creative without any prescription for how they should make use of the resources at hand. However, participatory creativity needs preparation. Participants were given cultural probes...
Selecting content, placing a content card on selected coloured RFID field, which associates content with colour blue, and placing blue triangle on physical map.

Manipulating content by placing a ‘command card’ (e.g. ‘scale decrease’) on colour zone of the single object to be manipulated.

Setting connections requires two rectangular tokens that define end points and angles defining curvature. Content card defines type of flow (e.g. pedestrian, high traffic) visible as moving dots on map.

Areas that are enclosed by connections can be filled with ground textures (grass, stone, water, etc.) by simply placing a circular token, the colour of which has been associated with a particular texture in the area on the map.

Turning the wooden wheel to rotate view or zoom while checking with gaze at projection.

Freeze scene, upload previous scene with barcode interface.

Figure 2. Overview of basic interactions with ColorTable interface.
(Gaver et al. 1999) about two months before each workshop, with the request to go to the site, study the urban issues surrounding the site, and collect visual material and sound that expressed ideas for the future of the site. In preparation for the workshops in Cergy (F) and Oslo (N), we conducted individual interviews with each of the participants to help them to develop further their individual visions; in the case of the workshop in Pontoise (F) we invited them to work in small groups on their ideas (with traditional methods) before engaging with technologies. In all cases, participants explored the site using maps, stories (from the past), images, small objects, crayons, and so forth. In each project we arranged two full-day workshops lasting between five and six hours. In total, we had 45 active participants in the six workshops. For reasons of space we selected one workshop from each project for analysis here.

**Workshop 1: Caserne Bossut, Cergy**

The barracks of the *Caserne Bossut* are now a wasteland situated at the borders of highway A15 which crosses Cergy-Pontoise, one of the new towns created 40 km away from Paris in the 1960s (Figure 3). Since the facilities are no longer used for military functions, the 13-hectare site was sold to the local authorities in the 1990s. During the period from 1999 to 2004 the site was handed over to the artistic association *Usines Éphémères*, which transformed the original military buildings, architecturally speaking, into artists’ studios, which turned into a centre of activities. The buildings were closed in 2004, when the decision was taken to develop the whole area. Since 2005 the area has housed a police department and is used as a training field by the fire brigade.

A development plan was prepared for the area under the guidance of the Agglomeration Community. It anticipates the construction of 2000 housing units and the development of a commercial zone including a convention and exposition

![Figure 3. The site of the Caserne Bossut workshop.](image-url)
centre. The future district *Bossut* will also be equipped with a school and a childcare centre. The *Place d’Armes*, the central open space, is to become a major public space and is imagined as a place of lively community interaction. An important urban issue concerns the overall identity and potential uses of the site: will it be a transit space with lively activities or a place for rest and leisure? Therefore, connections and public transportation are very important elements.

Participants were selected by the French project team in co-operation with the director of urban planning and members of the local administration of Cergy-Pontoise aiming to cover a broad range of competencies and interests. While the local authorities sought to avoid inclusion of ‘critical voices’, the research team was able to reach a difficult political agreement by including ‘non-experts’. Participants in the workshop we report on were: two urban specialists with a connection to the city, one of whom brought a special interest in environmental building technologies to the table; a representative of the municipality; a policeman working on the site; a university student whose room overlooks the site; and a representative of local commerce.

The participants first discussed different possibilities to make connections between the site and its environment (the two towns, the river Oise). Maps of two scales allowed them first to see the grand picture and then to focus on the site itself and see how different types of paths affected it. They discussed ‘crazy ideas’ such as having a canal connect the site with the river Oise. The participants agreed to set different connecting walkways and bicycle paths across the area; they placed the image of a bus stop to indicate their preference for public transport, discussing the possibility of a traffic-free zone; they used the image of a bridge across a cascade as a.

Figure 4. Imagining connections.
symbol for the noisy stream of cars on the highway cutting the Caserne Bossut area off from Cergy (Figure 4).

Participants discussed the housing types represented by highly abstract 3D objects on the site and then placed 2D images to denote specific uses, such as social housing, as well as indicating façades of buildings such as a movie theatre and a library (Figure 5).

They also used 2D images to express their ideas about activities that could take place on the site. With these collages of 3D building blocks, activities and other objects they arrived at rather complex urban compositions (Figure 6).

Figure 5. Expressive definitions of use: image of library placed in front of a 3D building.

Figure 6. Mixed-reality scene (above); activities included in the scene (below).
Understanding and evaluating the mixed-reality scenes was facilitated by the possibility of looking at them from different viewpoints. For example, the participants shifted their perspectives by examining the scene they had constructed from a high tower (Figure 7), then shifting focus to the roof of the nearby university building, then moving to a video-augmented view. This created a sequence of changing images, with the constant sound of pedestrians (sound which is associated with the ‘flow’) walking on the street evoking the impression of physically travelling between those viewpoints.

Remarkably, participants made all their decisions together, with an emphasis on enacting their ideas rather than on just talking, and with the urban experts meshing well into the group. One of the urban experts pointed out that the table acted as a mediator, enabling the participants to discuss in a non-confrontational way but by gesturing, setting interventions, commenting and visually modifying what was on the table. In this case, the table encouraged an inclusive mode of collaboration, which did not favour the expert.

Workshop 2: Jardin des Lavandières and CCI, Pontoise

The original motivation for selecting the site had been the ‘CCI building’, which is located near the city centre of the medieval city of Pontoise. It is a modern building and houses the administration of the Chamber of Commerce of Versailles. It is located between one of the main axes of circulation in the city and the public garden of Lavandières, and is surrounded by a garden and a parking area (Figure 8). The CCI will soon be dislocated and its future use has been one of the questions that have been occupying the public authorities during the past few years. Other questions concern its relation with the garden of Lavandières and the city centre, as well as the role it may play as an element connecting the two places. The site is also interesting owing to the old watermill (Moulin de Coulève), which was painted by Cézanne and today houses the regional centre for architecture and planning (CAUE), the old creek and the presence of artists-in-residence (Ateliers Cézanne).

Participants in the workshop we describe here (on the second day) were: a young urban planner, who knew the context of the agglomeration area from other urban workshops; an employee of the CCI, who acted as a link between shopkeepers and the municipality; an inhabitant of Pontoise and tenant of one of the Patis family gardens on the site; the head of the green spaces service of the City of Pontoise; an artist living in the Ateliers Cézanne; and a resident.

Most of this site is green and there are lots of trees. This and the complex topology made it difficult for participants to envision ‘big’ spatial interventions. From the
beginning the participants agreed to think about how to make the site more accessible from the surrounding ‘quartiers’ but to preserve its greenness and turn it into a place where people would want to stay. There was much talk about preserving the smells of the place, the old walls and all the memories connected to it. But there was also controversy among participants about a series of issues. For example, the participating artist liked the feeling of being in an enclosed place, while a resident mentioned the many old people who live in the area, including people with reduced mobility. Accessibility was a recurrent topic. Using an aerial view, participants placed different connecting paths on the ColorTable: a high traffic route, as well as a car park and a parking area for bicycles. The panoramic view in Figure 9 (left) shows two gigantic objects: parking for cars and bikes; the participants were surprised, but satisfied. They were not interested in ‘realism’ but in making a clear visual statement.

Figure 8. The site of the Pontoise workshop.

Figure 9. Left: parts of pathways with huge symbolic representations of the need for parking space; right: row of seats as seen against real-time video.
Much later, the director of green spaces pointed at the parking spaces close to the CCI building, arguing that they should be decreased and instead more green space should be added. The ‘local expert’, however, thought the parking a necessity for the people living here.

Participants were more in agreement on how to make the place more inviting. They positioned an image of a footbridge across the creek, as well as football players, and a series of ‘grass chairs’ for people to use as benches (Figure 9, right). They added a staircase symbolising easy access for older and/or handicapped people from the upper part of town to the park. They then focused on sound, associating sounds to the 2D images they had placed. One could hear the sound of football players, children playing, people talking and birds singing, mixing with the ‘real’ soundscape from outside the tent.

The artist among the participants pursued two of his own ‘personal projects’ he had developed in the preparatory workshop. He insisted on ‘painting’ a wall of green and flowers on the viaduct, which can be seen from the site (Figure 10, left). He intended the viaduct to become an artwork which will attract people and which will contribute to the centrality of the place. He also insisted on another idea, a multifunctional centre in ‘bleu (Yves) Klein’, which should replace the old CCI building. At the end of the workshop, however, a common project was implemented. The new CCI building in ‘bleu Klein’ was given an entrance for pedestrians to pass through. A hole was cut into the façade of the semi-transparent blue building with a grey entrance (Figure 10, right).

**Workshop 3: Blindern station, Oslo**

In preparing for its 200th anniversary in 2011, the University of Oslo planned to upgrade the university campus, including the closest and most frequently used metro station: Blindern station (Figure 11). Together with the metro company, the university applied to the city council for funding the rebuilding of the station, and as a basis for the application the university arranged an architectural competition for the new station. Even though the city council has not (yet) prioritised funding the new Blindern station, the university maintains that the winning architect’s drawings constitute the basis for rebuilding the station, but within an uncertain time-frame.
Blindern station was originally built in 1934 as an above-ground metro station, crossing one of the main roads to the university. In 1993, the station was rebuilt into an outdoor metro station with electric tracks and long platforms. A bridge for non-motorised traffic (pedestrians and bicyclists) was built over the tracks, meant to be temporary as the city borders and toll roads still were unsettled. Today, the bridge is still there, representing a problem, not only because it looks and feels temporary. The bridge is a bottleneck in rush hour because it is narrow and there is not enough space for a two-way flow of pedestrians and bicyclists. Autumn and winter bring additional problems with rain and falling leaves, ice and snow, making the bridge and stairs slippery.

Here, we report from the second workshop, in which the participants were all stakeholders in the project of rebuilding Blindern station. The participants included the winning architect; a university architect (representing the university management); two students also working for the traffic information company; and students and faculty who used the station daily, representing various interests: a universal design and accessibility researcher, a bicyclist, a sound and music researcher, and a frequent user of the bridge working in a department with units located on both sides of the station.

The discussion in the workshop almost immediately came to concern ‘the bridge’ (see Figure 12, left) and how to address current problems at the station. The most obvious problem was the traffic flow bottleneck. The bicyclist and the accessibility researcher challenged the new bridge design as to whether it would improve the traffic flow for all (Figure 12, right). Accessibility and safety for pedestrians remained an issue throughout the workshop. The accessibility researcher was very active in discussing the bridge as well as the station with respect to how difficult it is for people with disabilities, for example those in a wheelchair, to navigate the area.
A second problem introduced (by the university architect) was the lack of identity and welcoming signs at the station. In the cultural probes interviews all participants had addressed the ugliness of the nearby buildings, creating an atmosphere of unfriendliness and a feeling of neglect and disrepair. Instead of exploring the impressions created by other types of buildings available as content for the mixed-reality table, participants suggested transforming the convenience store currently located next to the station. Their idea was to turn it into a café and they later placed a ‘dancing floor’ on the MR table, indicating entertainment and activity close to the bridge (Figure 13), to make it more inviting.

Several times during the workshop the university architect took on the role of explaining the history of the buildings and focused on the practicalities of every suggestion raised by other participants. For example, he felt that elevators from the platform onto the bridge would not be feasible owing to the long winters in Oslo – and it would be his job to maintain the elevators. He tried to put realistic limits on the design space from the beginning of the workshop, attempting to point out practical problems associated with unusual solutions.

The most striking aspect of the workshop was, however, how a different participant, the winning architect, explained the bridge to the other participants and
used their challenges and points as input in improving the design. In the heated discussion about accessibility and safety he designed and produced a sketch of a ‘solution’ on (traditional) transparent paper and placed it on the physical map, continuing his explanations with a pen in his hand (Figure 14).

The two architects dominated and framed the discussion with practicalities, orienting the other participants towards problem-solving at the station. All new suggestions and challenges were translated into a part of the new bridge or met with facts and design rationale. The other participants accepted this framing of the discussion and actively contributed to resolving the practical issues. Towards the end of the workshop, when the station itself was discussed, the winning architect made sketches of some of the new ideas that had emerged in the discussions, such as a signpost, a poster wall and a 3D map of the area, placing them in the mixed-reality scene, even though there were over 100 content cards to choose from (Figure 15).

Figure 14. Architect explaining his solution.

Figure 15. Architect explaining solution with sketches.
Comparing three stories of use

While the three cases demonstrated that the mixed-reality tool can be the basis for very different types of design ideas and creative interventions, this section discusses some of the differences between the three cases that influenced the design results. We discuss differences of site and task (the project), the participants, and the role of the mixed-reality tools, more specifically the representations of the site and of design ideas. This discussion also illustrates how participatory designing is affected by the context and who is involved in the process.

The sites and projects

The sites discussed in the three cases were quite different. The Caserne Bossut area is a wide and open urban space with room for a large array of interventions, from large-scale buildings to many different activities representing uses and ambiences. Participants had ample space for imagining and exploring from different viewpoints. Hence, the mixed-reality scenes they co-constructed were highly complex and visually appealing. On the other hand, the city had already developed a ‘master plan’, which set some of the agenda for the participants to discuss.

The area of planning in Pontoise consists of green spaces with old trees and a building open to replacement and conversions. The complete openness of the project encouraged discussion of a great variety of design ideas, from parking issues to how to attract commerce, and how to make the presence of artists more visible and preserve the calmness of the place. Participants reminded each other at times, ‘we are in utopia’. Although the project itself had not yet been defined by the authorities, the existence of a green space as such restricted participants’ explorations to small interventions that tried to preserve the spirit of the place while making it more inviting.

The Blindern station workshop focused on a very small and a partially enclosed space. The station is located in a narrow valley. The discussions concerned replacing the bridge and adding features to the station, in exactly the same place as the station and the bridge occupy today. Although we had prepared a panorama inviting participants to work on other areas with roads and bridges connecting the two campus parts, they turned most of their attention to the bridge at the station, mainly owing to the interventions of the two architects.

The participants

All three workshops included people with interests in the future of the site, but the nature of these interests differed considerably. In the Caserne Bossut case none of the participants felt immediately concerned, although they were excited to be able to contribute to a project that was to turn a wasteland into a point of attraction and a place to live. They built a team spirit, with each person assuming a specific ‘expert role’, including the policeman who contributed his intimate knowledge of the site.

In the Pontoise case the presence of residents gave space to controversy and to individual ‘projects’, such as the ones by the artist-in-residence. The ‘local experts’ who felt rather attached to the site were very active in bringing their ‘stakes’ into the discussion. In both cases the urban experts in the group contributed without dominating the workshop.
The Blindern station workshop took place in the midst of an ongoing project and included stakeholders responsible for the bridge, resulting in a fact-based and solution-oriented discussion. In addition, the accessibility researcher provided important and specific details in discussing solutions.

**The role of technology: working with multiple representations of the site**

The openness of the Caserne Bossut site – most of the old barracks had been removed from the panoramas since the plan was to demolish them – and the possibility of looking at the constructed mixed-reality scenes from different viewpoints and heights (including the roofs of the adjacent university building and of a nearby tower) spurred participants’ imaginations.

In the case of Pontoise it turned out to be difficult to represent the site. Hence, the photographic panoramas needed substantial editing so as to offer vistas and space for interventions (Figure 16). Here, it was more the existence of an immense green space that participants wanted to preserve that posed constraints to their interventions. In this workshop participants worked extensively with representations that provided an overview, such as a large-scale map and an aerial view, discussing how they could attract more people from the adjacent districts into the ‘green oasis’.

The topology of Blindern station posed severe restrictions to the production of panoramas, and hence to the ways that participants perceived the space. There is a steep hill down to the station limiting the vistas of the panoramas, a fact that may have discouraged the participants from thinking beyond the visibly existing constraints or finding different approaches to designing the new station. However, we assume that the presence of the winning architect acted as an even stronger constraint to participants’ willingness to embark on a different perspective.

The possibility of removing existing buildings from a panorama in order to think freshly was very successful in the case of Caserne Bossut, while in the Blindern station workshop participants insisted on keeping the convenience store building to make the discussion more realistic. In the Pontoise case, erasing the existing CCI building met with some resistance, which points to a tension in urban projects between preserving and innovating, but also allowed the artist to realise his idea of painting the building in ‘bleu Klein’ and lend it transparency.

**The role of technology: visual content for ideas**

Many of the objects we had represented as content cards were based on ideas that participants had put forward in the cultural probes interviews. While some were
quite realistic, others were kept ‘abstract’ or ‘symbolic’ in order to act as placeholders for ideas rather than concrete solutions.

In the case of the Caserne-Bossut, participants ended up with a rich composition (Figure 17). A mosaic texture covers the ground. To counterbalance the main road that cuts through the site, they have placed an image in the centre of the scene that shows an elevated road, making place for lots of green, water and people passing underneath. To the right we can see the rows of building volumes, which have been placed in parallel to the main axis. In the right corner of the site, where cars pass by, there is a round building with a cupola (theatre), as well as a wide circular space made from stone (which stands for a forum, a public place for encounters and debate).

In the Pontoise case, use of content was more directed towards small interventions as represented by 2D images of bridges, kiosks, ducks, boats and leisure activities, including sound that emphasised the ‘green’ atmosphere of the place (Figure 18).

Figure 17. Caserne Bossut: rich composition.

Figure 18. Pontoise: blossoming trees and rowing boats.
In the Blindern station workshop the realistic discussion seemed to restrict the use of content cards. Participants were not inspired by the collection of fantasy bridges, nor were they interested in the many 2D images of leisure activities, shelters and art installations. Instead, the participants used the sketch of the winning bridge (provided by the artist in the research team since no 3D visualisation of this bridge was available; see Figure 11). In discussing the station itself, the winning architect produced several sketches of his ideas instead of one of the many content cards. The discussions were built on practical, realistic objects and characteristics of the local context, including images and recordings from the station made during the preparation phase (Figure 19 right). This did not restrict participation, as such, but it limited the design space.

Supporting creative participatory design

Lave considers practice as the situated doing and undergoing, experiencing and expressing of people as they engage in practical action, often together with others, as ‘inventive’ in the sense that they are ‘open-ended processes of improvisation with the social, material, and experiential resources at hand’ (1993, p. 13). One of the main insights from extensive ethnographic fieldwork studying design practice (Lainer and Wagner 1998, Wagner 2004) is that creativity in design rests on four main premises: the multiplicity of perspectives, openness, the ability to mobilise a diversity of resources and the desire to enrich the space of design ideas.

Multiplicity of perspectives

The workshops shed light on how creativity emerges from a multiplicity of contributing actors. One of our key observations is that participants with ‘real stakes’ steered the discussion into solving problems, while those with more (professional or emotional) distance were more explorative. This was most obvious in the Blindern station workshop where the participating architects moved the detailed planning of the winning bridge into the foreground of the discussion. But it was also evident in the Pontoise workshop where those who had ‘real stakes’, such as the residents among the participants, raised a series of practical issues concerning parking or how to make the presence of artists-in-residence more visible.

Terrin (2006) sees three types of actors in complex projects, such as urban planning: those whose perspectives and competences are oriented towards the ‘long
term’ – social, political and also environmental issues; those who have more short-
term interests, such as the design idea, its implementation and financing; and a third
group which is more focused on issues of use, ways of living, comfort, ambience, and
so forth. These descriptions of three types of perspectives are also useful for viewing
levels and intensity of participation.

Participants in the three workshops represented different mixes of these
perspectives. The *Caserne Bossut* workshop had a clear design perspective on
housing types and connectivity while also playing with issues of use, in particular
with how to fill the area with cultural and social activities. The presence of an urban
specialist also moved environmentally friendly building technologies into the
foreground. Also in the *Pontoise* workshop we could observe the interplay of
more long-term issues, such as how to preserve the green area, with a concern for the
ambience of the place, as well as the logistics of access and parking. The *Blindern
station* workshop was mainly focused on design issues and details of implementation,
including usability (access). We can say that having a multiplicity of voices present is
a critical issue and who to invite may become a problem in complex settings, which
require addressing multiple and diverse perspectives. These perspectives are
influenced by: the status of a project – is there already a design or is the project
still open; the level of commitment – are there immediate responsibilities and
interests involved; and the type and time horizon of issues – are there long-term
agenda, are the issues more technical, are they concerned with rather personal values
and visions of ‘good living’?

**Openness**

There are some good reasons for maintaining openness in a design project (Bratteteig
and Stolterman 1997). First, openness is needed in order to handle the complexity
that ‘arises from the need to synthesise different perspectives of a problem, manage
large amounts of information relevant to a design task, and to understand the design
decisions that have determined the long-term evolution of a designed artifact’ (Arias
*et al.* 2000, p. 87). Secondly, designers usually are strongly committed to expanding
the solution space so as to see things differently and to keep a design open to novel
and surprising solutions. The mixed-reality tool seems to support openness. No
‘rules’ or ‘constraints’ beyond the technical limitations of the tools are introduced.
This moved the design decisions away from the technology into the responsibility of
the participants. The *ColorTable* offered them the possibility to engage with different
levels of complexity and to select the topics they wanted to address. Participants had
the opportunity to construct and deal with different possible worlds. The possibility
for co-constructing the focus of the discussion made possible collaboration on equal
terms (Bråten 1973).

Openness is, however, risky. In a recent book from the Atelier research project, it
is argued that, ‘Most observers see a positive relationship between creativity and
innovation but how do we address the conflict that arises when users and
stakeholders reject the outcome of a design practice even if it is innovative or,
worst case, because it is (too) innovative?’ (Atelier 2011, p. 3). The long-term
debate about power in the PD tradition is useful for understanding and
addressing resistance and how ideas are closed out before they can be incorporated
into new designs (e.g. Nygaard 1996, Bjerknes *et al.* 1987, Bjerknes and Bratteteig
1995).
Mobilising resources

The ColorTable provides different types of resources: a space, technical functionalities and objects for creating mixed-reality scenes. Our analysis points to the importance of representations of the site itself that are not independent of its topology but can be ‘edited’ so as to invite participants’ imaginations and entice ‘unreal’ interventions. This possibility of ‘manipulating’ participants’ perception of a site can be very powerful; hence, it raises ethical issues. In the French workshops we were able to offer a greater variety of representations (including a static and a mobile real-time video view of the site and vistas from ‘above’), which also spurred participants’ explorations. The narrow landscape spanned by the bridge at Blindern station left very little space for thinking of solutions other than a bridge.

Another critical issue is the nature of the content for visualising design ideas. One of the values of the mixed-reality technology is that it opens up for novel forms of representation beyond widely accepted representational techniques, such as sketching, 3D modelling and simulation. The composed scenes are rather different from what the material architects and urban specialists are used to working with, in terms of perspective as well as the mixture of real elements with 3D objects and 2D images. Although all the objects we created reflected ideas and themes evoked by the participants themselves, some situations were more conducive to exploring and actually using this content than others. For example, much of the discussion in the Blindern station workshop focused on the physical map, which lends itself better to the kind of abstract planning architectures are used to: with his sketch of the flows across the bridge the architect succeeded in turning all the attention onto the map and away from the mixed-reality scene (Figures 2 and 14). The discussion did not concern the experience of the bridge, which may have been better represented by the available expressive content: it concerned the planned solution on the map engaging all the participants. In the French cases participants were more ready to express their ideas on a more symbolic and less realistic level and they used more objects. We have already mentioned the effect of ‘real stakes’. We also think that in situations that offer more freedom to explore and imagine, the expressive medium of mixed-reality compositions is more effective.

Looking at these different strategies for using the resources provided by the ColorTable, we conclude that problem setting and problem solving involve different types of creativity and may need different types of support: the richness and multimodality of resources were more important for those interested in expanding the design space than for those who focused on solving the practical details of a problem.

Space for design ideas

The three workshops ended up differently owing to a number of differences between them. The Caserne Bossut workshop demonstrated how the large space was used for imagining the future. The Pontoise workshop turned the area into a place to stay, while the Blindern station solved a traffic flow bottleneck problem. It is easy to conclude that the Blindern station workshop ended up with fewer creative solutions and explain it by saying that the participants were bound by the existing project, but we think there is more to it. We were struck by how the workshops created very different idea spaces, and particularly how the technology was used differently in these processes.
We could say that the ColorTable, with its functionalities, the content cards and the sketching function, is the idea space. It is the place where design ideas are enacted. It clearly supports the co-evolution of the problem and the solution space. The invitation not just to address problems but to simultaneously visualise ideas strengthened this. The possibility to add, subtract, revisit and even undo design suggestions enabled multiple voices to be present in the discussion, hence supporting the collaborative process as a (mutual) learning process for all the participants as well as for the group as a whole.

Concluding remarks
We conclude from our observations that the ColorTable offers participants a ‘language’ of participatory creativity, which enables them to address relatively complex (urban) issues. We have identified some of the ‘parameters’ and conditions that shape the space for design ideas; however, a key insight is that the mixed-reality tools were used differently, depending on participants’ interests or stakes and the nature of the project. We also learned how critical issues of representation (of the site, of possible interventions) are. We could see how creativity in design is stimulated by the presence of inspirational resources, which provide an element of surprise and discovery and help participants to see things differently. However, this is more effective in the case of problem setting than in problem solving.

There are salient aspects of the ColorTable set-up that can spur participatory creativity. One is the round table, which encourages participants to build on each others’ arguments rather than opposing them. Moreover, haptic engagement and the possibility to enact ideas, producing an aesthetic experience, seem to be conducive to creativity. Also crucial was the openness of the tools that gave space to participants to decide on their own topics and find their own ways of building and exploring different options.

The fact that the three workshops were ‘just’ a single intervention in otherwise non-participatory projects did not allow us to explore the relationship between creativity and innovation. What we could see, however, is how the presence of a multiplicity of perspectives, representing different time horizons, issues, experiences and levels of ‘affectedness’ by a solution, makes innovation extremely complex. Complex projects are full of contradictions and compromises. Seen in this light, the participants’ success in expanding the solution space for a design by imagining and co-constructing has to be seen as a considerable achievement.

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