Large-Scale Participation: A Case Study of a Participatory Approach to Developing a New Public Library

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ABSTRACT

In this paper, we present a case study of a participatory project that focuses on interaction in large-scale design, namely, the development of the new Urban Mediaspace Aarhus. This project, which has been under way for ten years, embodies a series of issues that arise when participatory design approaches are applied to large-scale, IT-oriented projects. At the same time, it highlights the issues public knowledge institutions face, when interactive technologies challenge their fundamental roles and practices; by extension, this case offers examples of how these challenges may be explored and addressed through IT-based participatory initiatives. We present a range of such activities carried out during the past ten years, and present the main lessons from the project, based on interviews with three key stakeholders. These lessons focus on how to make participation work in practice, how to align different paradigms of inquiry and practice in a project of this scale, and how to capture and anchor the insights from participatory events to inform the ongoing design process.

Author Keywords

Participatory Design; Interaction Design; Large-Scale Projects; Design Methods; Citizen Involvement

ACM Classification Keywords

H5.2. Information interfaces and presentation: User Interfaces – Theory and Methods, User-Centered Design

General Terms

Human Factors; Design.

INTRODUCTION AND BACKGROUND

Architect Christopher Alexander once said that perhaps the most difficult thing about big public buildings is the fact that the design and building processes really have to be remarkable, and that people must be the core of the building, that inspiration comes from the deep feeling of the users [1]. In our research, we have worked for a number of

years at the intersection of interaction design and the built environment, exploring the potential of methods and techniques from participatory design in this field. This includes research in large-scale projects, which are typically characterized by one or more of the following factors: long time spans, large or diverse groups of users, and result in products and systems that are complex or extensive in scope. In the case reported on in this paper, all of the above factors were in play - a decade long project addressing a large and diverse group of stakeholders and users, resulting in a multi-use media library. While Alexander's proposition that people should be at the core of the development process resonates with the widespread adoption of user-centered design approaches, user involvement in large-scale projects is far from common today. There are few indications of change, such as Sanders participatory prototyping of the physical environment in the development of a new hospital [19]. Although researchers such as Shapiro [21] have prompted the interaction design community to change and engage in the development of large-scale systems, the fact remains that participatory design projects have a history of being small-scale and stand-alone, as found by Oostveen and van den Besselaar [17], and Simonsen and Hertzum [20]. Our response is to offer a case study that resonates with the theme of design at CHI, in that it explores how participatory activities, scaffolded by interactive systems, can play a major part in the development of large-scale projects.

The case in question concerns the development of a new public library, called The Urban Mediaspace Aarhus. The construction of the new library represents a significant investment of the municipality's resources, and is intended to be an icon for the city. Traditionally, projects of this nature have been developed "top-down", and in many cases, without much emphasis on participation. A prime example of this is the Bibliothèque Nationale in Paris, which was reportedly developed without consulting librarians [16], and which imposes a hierarchical system of access to the media it houses [9]. In many ways, The Urban Mediaspace Aarhus case is a counterexample to such approaches, in that it is permeated by a participatory agenda. Our involvement in the project initially focused on using participatory design approaches to develop interactive installations for the future library, but over the course of time we came to realize that the overarching project of

developing the new library is of interest to the wider CHI community, because it represents a pioneering attempt to situate participation and user involvement, often scaffolded by interactive technologies, as the central drivers of a large-scale project.

In this paper, we present a study of how participatory approaches and user involvement activities have been employed in The Urban Mediaspace Aarhus project. The key issues we address in the paper are *how and why participatory approaches and the values of user involvement have been incorporated into the project*, *how participatory activities have been carried out*, *how the knowledge and insights from these activities have informed the project*, and *outcomes of the participatory approach in practice*.

The contribution of this paper is two-fold: First, we offer a detailed study of a large-scale participatory project. As outlined, projects of this scale are rarely explored in our field, and we hope that this work will inspire further studies of user involvement and the use of participatory approaches on a larger scale. Secondly, we present key lessons from adopting the participatory approach, on based on interviews with three key stakeholders in the project. While these lessons spring from this specific project, we believe that they may inform practitioners who engage in large-scale projects akin to The Urban Mediaspace Aarhus case.

The paper is structured as three main sections. First, we offer a detailed description of The Urban Mediaspace Aarhus case, including an overview of the many participatory activities that have been parts of the project. We then outline five key lessons from adopting a participatory approach based on interviews with key stakeholders and project participants. This is followed by a discussion in which we develop a series of design considerations for large-scale participatory projects.

CASE: THE URBAN MEDIASPACE AARHUS
The case described in this paper is called The Urban Mediaspace Aarhus project, and is a large-scale project where a new area of Aarhus and a new public building are under development (see Figure 1). Aarhus is the second largest city in Denmark, with about 300,000 inhabitants, and the the country's principal harbor. This new urban area is a 23,000 m^2 harbor site, which will be transformed from shipping to park space, involving a large-scale restructuring of piers, transport routes, rerouting of trams, and so on. The building will cover about 28,000 m^2, and will house the city's new public library, citizen services, private businesses, and a large automated parking cellar for 1000 cars. This project cost about EUR200 million, and is the largest development project in the history of the municipality. Grand ambitions surround this project, including that it will house the largest automatic car park in Europe, be the most accessible building in Europe, a landmark, and a sustainable icon. The project was ratified in 2001, and will run until 2015.

The project organization is quite complex, but in broad terms, the principal developer is the municipality of Aarhus, as this is a public project. The project board consists of representatives of a large foundation that sponsors the project, as well as the mayor and the city council members. There is also a general steering committee in charge of the entire project, and a sub-committee responsible for the construction. A strategy group consisting of local institutions and organizations contributes to the process on a strategic level, and an idea group contributes to technologies, architecture, communication, and library development. The project management is responsible for the planning, development, and coordination of the project, and refers to the steering committee and the sub-committee.

Figure 1. Rendering of The Urban Mediaspace Aarhus.

The project is not only a large-scale building project, it is also a project using participatory design inspiration for developing the city, the identities of the organization and institution, new services, roles, and use, while developing and building up the new residential and urban area.

Research approach and author involvement
This paper describes a case study, and as such it comes with a series of inherent strengths and weaknesses, when compared to other types of contributions. We will focus on presenting an overview of the project, and outlining the different types of user involvement activities in some detail. From these, we will select a subset of issues within the project that may be of particular interest to the CHI community. While our engagement in this project represents a unique opportunity to study a large-scale participatory project, we must stress that, as per the notion of "wicked problems", first explored by Rittel and Webber [18], and subsequently by many others in the field of interaction design, a case study of this nature presents opportunities which cannot be replicated, and once an event has unfolded, it cannot be undone. Therefore, we do not present specific conclusions regarding best practices for large-scale public projects; rather, we present a series of design considerations regarding topics that have proved to be central to the user involvement in The Urban Mediaspace Aarhus case. In discussing the benefits and drawbacks of case studies in research, Flyvbjerg states that "… the case study is a necessary and sufficient method for

certain important research tasks in the social sciences" [10, p 241]. Among other things, Flyvbjerg argues that case studies are important because they offer what Kuhn [14] has described as *exemplars*, that is, instances or cases that embody salient traits of the field. As pointed out in the introduction, there are very few exemplars when it comes to large-scale user involvement projects, and we hope to demonstrate that The Urban Mediaspace Aarhus serves as an exemplar in this field.

The authors, together with several research colleagues, have been involved in developing directions for interactive services for The Urban Mediaspace Aarhus since 2004, and have been connected with the project in several ways during this time [5, 6, 7, 8, 13, 15]. The research group did not participate in the initial planning process of the project, but has been active in various projects that had The Urban Mediaspace Aarhus project in mind. Coming from interaction design, we have actively participated in design research projects where interactive prototypes have been developed, implemented, and tested at full scale. These projects have been developed in cooperation with various libraries, companies, and individual users as active contributors. We have also moderated participatory design workshops concerning the development of The Urban Mediaspace Aarhus project, primarily with a focus on the integration of interactive technologies in the building. The past year has seen more active participation on almost all levels of the development of The Urban Mediaspace Aarhus project. Thus, our knowledge of the project and the process stem from various sources: first, from the extensive web-based documentation of the project available to the public [24]; secondly, from various research projects, with hands-on experience and learning; thirdly, from meetings, workshops, and interviews with project leaders, architects, users, partners, and so on.

User involvement and participation as cornerstones of The Urban Mediaspace Aarhus project
The Urban Mediaspace Aarhus project is not a participatory design project in the traditional sense, due, for instance, to the size, political frameworks, and execution structure, but is instead a project based on participatory design values and techniques. There is a political vision of establishing Aarhus as a city of knowledge, highly sensitive to changes to institutions such as the library, which are posed by emerging digital technology. Participation and user involvement have been official driving forces behind the project since 2005. When referring to "users" in this paper, it indicates both library employees and the public.

The Urban Mediaspace Aarhus project aims to provide a unique place for cooperation, with many current and future collaborating partners [24]. During winter 2005-2006, a wide range of experts, collaborating partners, networks, and library staff were invited to participate in the development of a series of core values for The Urban Mediaspace Aarhus

project. The seven core values are: *The citizen as key factor*, *Lifelong learning and community*, *Diversity, cooperation, and networks*, *Culture and experiences*, *Bridging citizens, technology, and knowledge*, *A flexible and professional organization*, and finally, *A sustainable icon for Aarhus*.

Subsequently, these core values were matched with the citizens' values through City Voices, a citizen involvement initiative [22]. Its purpose was to gather the voices of citizens regarding the core values they find important for The Urban Mediaspace Aarhus Project. A physical, interactive table was developed, that featured built-in audio scenarios related to different places in the city, and included the option of recording one's comment. Everybody had the opportunity to record messages on the table, and thus express their opinions. In extension of this, ten focus group interviews were completed around the table, and the physical installations were complemented with a website. The citizens' comments were analyzed and incorporated into the results, in the seven core values of The Urban Mediaspace Aarhus, and in the program for the architectural competition, where participation was an important part of the agenda. The brief for the competition even stated that the proposals would be judged on the basis of how these values, combined with methods for user participation, were addressed by the architectural process

To further establish user participation as a cornerstone of the project, and to brand the project, in 2007 the main library in Aarhus initiated a project called Unleash the users, aimed at trying out methods of user involvement and user participation [23]. Through cooperation with external partners with varied experience of user involvement, the project resulted in several publications describing methods and examples of user involvement [23]. The goal of the project was threefold: to try out a model for user driven innovation, where the users are active participants, to make the library more attractive for the user, and finally, to develop models for cooperation between libraries and users, which might be used by other libraries, and inform The Urban Mediaspace Aarhus project. The project results concluded that user involvement is important in the development process, for five different reasons. These are: to test services, to develop new products in cooperation with the users, to show that you are an open minded organization, to foster greater loyalty to the library among the users, and to establish a kind of democracy within the library system. The methodology developed in this project has been incorporated into the library organization, and guided the development process of The Urban Mediaspace Aarhus project.

Project overview and time frame
The approximately forty different participatory design inspired projects that have informed The Urban Mediaspace Aarhus project may be divided into two groups. The first group consists of the projects leading to the architectural competition program, up to 2007. The second group of

projects led to the specific construction, following the architectural competition, as is shown in figure 2. The participatory design inspired activities changed in character and scale over the course of the entire project. In some activities, a large number of the library employees and the general public were active participants and co-designers; in other activities, for instance, when discussing accessibility issues in the new building, specific user groups such as disabled guests participated, to contribute to both interior and exterior design decisions, as well as to discuss software and integrated technologies. A detailed account of all these activities exceeds the scope of this paper; however, several have been described in previous publications, and we will refer to these for further details. An overview of selected projects, divided into two different phases, before and after the architectural competition, follows.
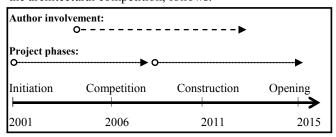

Figure 2. Timeline of the project, from initiation to opening.

The first phase: 2001-2008

During the first years, several new initiatives were launched involving cooperation with both researchers and new partners, and also playing with the possibilities of new resources, for instance IT.

One project initiated during this phase was the Interactive Children's Library [8], see Figure 3. The project presented a new way of thinking about libraries, with a playful approach to pervasive technologies within the physical space. The Interactive Children's Library project vision of developing prototypes of new IT services and physical installations embedded in the challenging physical spaces of the library, supported and promoted an interest in children's play and learning activities. The project generated new knowledge by infusing design thinking into The Urban Mediaspace Aarhus project, in extension of a huge number of new design concepts, and developed two computational prototypes, StorySurfer and BibPhone. StorySurfer is a 5×3.6 meter spatial book browsing installation for children [7], and the BibPhone enables children to annotate physical material such as books with digital recordings [15].

The design process was significantly driven by research and informed by users. The project was the first step toward involving researchers in development projects, and inspired subsequent cooperation. The project has had a great influence in the children's library community, but also more generally, by introducing creative and playful ways of

experimenting, providing means and materials for realizing projected scenarios at public libraries [2].

Figure 3. BibPhone and StorySurfer in use.

Through the experiences gained from these new types of constellations, materials, methods, and projects, the overall attitude shifted to a more experimental mode. A three year project, Transformation Lab, was initiated, which effectively changed the library space several times [25]. Transformation lab recognizes the current digital revolution and sees the library as an interactive interface for accessing both digital and physical resources. The Transformation Lab project explores the interaction between user, space, and material. Several experiments were staged in the adaptable foyer of the main library, from open jam sessions to interactive installations, such as the iFloor, an interactive question and answer floor surface that supports and stimulates community participation and interaction among collocated people at a municipal library, through shared interaction [13]. Library employees were involved as designers of new settings and services, just as users were invited not only as visitors and testers, but as designers. The Transformation Lab project revealed that flexible adaptable spaces are necessary, open events are well received, the physical library needs to be augmented with interactive technology, networking is critical, and finally, users need to more visible roles in the library [25].

Inspired by the possibilities disclosed by the experiments at the library, the development of ideas for the new building and process started to take form. The framework for the architectural competition was established, as were the previously mentioned core values guiding the entire process. This period was highly colored by the need to gather data from the employees and visitors, develop values, and find inspiration. Methods such as Traffic analysis and Focus group meetings were employed, and the visitors and employees were very involved at various levels, and new networks and co-operation were developed. The level of participation intensified during this period, when both employees and visitors were invited as designers. For instance, children's design labs were set up, to design the library of the future [24], user involvement methods were tried out in the previously described project, "Unleash the users" [23], IT artifacts, such as the previously mentioned "The City's voices" were developed to gather data in new ways, about visitors' use of the library and the city [22], and for six weeks employees worked to develop activities and ideas.

During 2008, the project competition was finally launched, tenders were negotiated, and several public information meetings were held [24]. Further development of services and activities took place while the process of developing strategies for involving users, and methods for how to open the organization was in focus [23].

The second phase: 2009-2015

During 2009-2010, the winner of the competition was selected, and the development of the architecture and services could start to take form. Also, the project and process could be designed, and enterprise tenders negotiated. The user involvement took shape in dialogue and critique sessions, vox pop interviews, and in co-design projects aimed at designing new services such as those seen in Digital Trendspotting [24], the results of which were published in a book of future concepts.

New projects were restarted, as a result of the new library prioritizing children and families as user groups, and in order to test new roles for the librarians. Families at Play in the library is a two year project involving public libraries from three different Danish cities, and two research centers [6]. The project investigates shared play culture through innovative new services and family activities at the library, with a focus on play, and also how new play concepts, consisting of different types of installations, services, and settings, support families playing together at public libraries. Examples of relevant concepts are a time music machine, an interactive treasure hunt, a pirate world, a nostalgic playroom, and the interactive installation, U.F.O.scope [6]. U.F.O.scope seeks to stimulate families' desire to explore the unknown together, while also discovering the physical library and its different types of resources, such as text, video, audio, and images, see Fig 4.

Figure 4. U.F.O.scope and the Interactive treasure hunt in use.

Simultaneously, experiments with new partners and networks take place to take the library "out of the box", and new tools for user involvement developed, such as Mobile probes [24]. Mobile Probes was an exploratory project with the purpose of digitizing the Cultural Probes method on a mobile platform, and test the concept in a number of companies and institutions. Aarhus Main Library participated as a test company, implementing the projects Families at Play in the Library and Tweens, as test cases [24]. As a Mobile Probes case, Families at Play in the Library worked with the concept development of the previously mentioned treasure hunt. Technically, the treasure hunt revolves around an interactive table in the lobby of the main library. User involvement via Mobile Probes ensures the relevance of the service to the target group, and qualifies the history/framework, as well as the actual activities of the treasure hunt. In the Tweens case, Mobile Probes has also been used to gather input and inspiration for developing library services for tweens, in the current library as well as for the "tweens lounge" that is being planned for the new library. By asking questions and giving assignments to a group of twelve- and thirteen-year-olds, the library investigated what tweens are focused on, with respect to the services the library already provides, or could establish for them. Focus is on space, media, and culture, as well as forms of learning.

In the final phases of The Urban Medispace project, until the project's completion in 2015, there will be continuous experimentation and refining. This is when the main project will be designed and executed. Users will be involved in the design of details such as the building's name, accessibility for the handicapped and new services, roles, and activities in the new library. A second round of Transformation Lab has been initiated, with the purpose to iteratively develop and test new services, networks, interior, methods, skills, and roles, before the move to the new building. The employees will be included in new ways, for instance, by staging experiments involving their own roles, and where they will co-design their workplace. So far, this has contributed to new, creative physical set-ups, as well as improved flexibility and movement among the employees, and even a break with traditional titles and work tasks. There is also more emphasis on analyzing digital needs and digital support of communication in physical spaces, where employees, members of the public, and partners are active design participants. In this phase, the emphasis is also on raising awareness of the project and on creating new partnerships.

KEY LESSONS FROM CENTRAL PROJECT PARTICIPANTS AND STAKEHOLDERS

It should be clear at this point that the number and types of participatory activities in The Urban Mediaspace Aarhus project are extensive. As a consequence, a large number of lessons from, and experiences of how participatory approaches to large-scale projects work in practice are embedded in the project organization. Some of these lessons have been articulated in reports and official documents, others have been manifested in the project in the form of competition proposals and building blueprints, for example, while other lessons remain tacit among project participants and stakeholders.

In addition to our aforementioned involvement in the project (outlined in the section, *Research approach and the authors' involvement*), we have carried out a series of interviews with key project participants and stakeholders, in order to establish an overview of these lessons. These encompass three structured interviews with 1) the principal architect, 2) the main project manager for The Urban

Mediaspace Aarhus project, 3) the library consultant in charge of the participatory activities related to library services, and also a series of informal interviews with library staff. For the formal interviews, we developed comprehensive interview guidelines to ensure that we obtained different perspectives on central issues such as the main problems/challenges of adopting a participatory approach, the role of participation in the project, how participatory activities have been carried out, and how the results have affected the ongoing process. We then codified and analyzed the interviewees' responses. As part of this analysis, we identified five key themes related to large-scale participatory efforts, namely, aligning different paradigms of practice and inquiry, making participation work, capturing and anchoring insights from participatory activities, key challenges and key benefits of the participatory approach. While we also interviewed a number of users and participants over the course of our involvement in the project, we have chosen to focus on these three principal stakeholders, not because we believe that they hold all the answers, but because they have had to orchestrate many of the user involvement events, and made decisions regarding how insights from these events might inform the ongoing project.

Aligning different paradigms of practice and inquiry
The extent and prominence of participation in The Urban Mediaspace Aarhus project was new to all partners involved. Even The Urban Mediaspace Aarhus project management team, which was initially responsible for the participatory framing, was, by their own account, venturing into unknown territory. The principal architects first encountered the participatory agenda during the competition phase, during which they developed the preliminary proposals for the building, and while they had encountered requests for participation in previous projects, the complexity and the extent to which participation was integrated into the process was unlike that of any previous project. By their accounts, the traditional approach in architectural practice is to work with user involvement in the projecting phase, not in the programming phase, as was the case here.

Involving users in the programming phase is demanding, as it affects more aspects of the project. This was compounded by the scale, complexity, and integration into large-scale urban transformation inherent in The Urban Mediaspace Aarhus project. In their interviews, The Urban Mediaspace Aarhus project manager, the library services consultant, and the principal architect emphasized the challenge of approaching the process from different traditions and finding a common ground. While there is a need for clear division of labor, the project partners must also develop a shared language. The difference in paradigms of practice and inquiry come to light in various phases, for instance, in a joint workshop on dynamic and interactive building services, in which the different partners collaborated on developing concepts for the building. The library services consultant states that this drew attention to "the difficulties in communicating with partners who speak a different language and have a somewhat different agenda or a different set of ideals – all groups want to deliver the best possible product, but they have different conceptions of what that means. The architects may focus on the building in itself as experience, while the library sees the content and activities as experience." (Interview: library consultant).

All parties stress the need for mutual understanding and that, in a large-scale participatory project, it is not enough for practitioners such as architects learn about use practices; for the project to succeed, it is also crucial for librarians, for example, to learn about architectural practices. This latter insight seems particularly interesting from a participatory design perspective, since it echoes discussions on designers "going native" vs. users becoming aspiring designers through a project.

Capture and anchor insight from participatory activities
One of the main issues that The Urban Mediaspace Aarhus project manager, the principal architect, and the library services consultant raise during the interviews was a clear need for an improved and more structured way of capturing insights emerging from participatory activities. As stated by the library consultant: "Insights are scattered across a myriad of documents, much resides as tacit knowledge with people in the project... and much of what has been discovered is integrated into aspects of the process." The project manager mentions that one example of knowledge from participatory events being integrated into the process may be seen in how the seven values developed during the initial project phase subsequently became parts of the architectural program, which in turn will be manifested in the final building. Similarly, the principal architect considers the different milestone subprojects to be condensations of insights.

All partners expressed a desire to look elsewhere for best practice examples. While library representatives went on field trips to examine other new library projects, and hosted international conferences on the future of libraries, they did not uncover such best practice models. First, this indicates the need for the development of new process models and routines that can support the ongoing capture of insights from participatory events; secondly, this underscores the fact that large-scale participatory projects such as Urban Medispace Aarhus are indeed embracing new areas of participation.

Making participation work
The participatory activities in The Urban Mediaspace Aarhus project have been two-fold. Involving the public comprised the first phase, in which issues such as navigation, finding media, arrival areas, areas for children and infants, and so forth, were discussed. The second phase involved library employees. There have been about 20 user

groups, with responsible key representatives, and there have been both individual and joint discussions. While all involved partners state that orchestrating these participatory efforts and bringing the information from them into the ongoing process has been complicated and challenging, they presented us with insights into how they have made participation work in practice.

First, both the principal architect and project manager note that deadlines and deliverables help to make the participation process concrete, as they give direction and purpose. The project manager employs the terms "qualitative time", that is, experienced time, and "last responsible minute", that is, deadlines associated with roles and responsibilities, as parts of the strategy for making the project present and relevant to those involved, by always having constructive milestones and associated deadlines in the near future, even if the project has a very long timeline.

Secondly, the principal architect emphasizes that in order to make participation work, it is important to hold collaborative, working workshops with a constructive purpose, in a language that all the involved parties understand: "It is important to recognize the difference between the parties, for example, the library people prefer words, while the architects are much more visual." Examples of establishing a shared language include the use of collaborative sketching, discussions around models, and the use of reference images in discussions, in order to concretely address spatial issues of the building process.

Thirdly, the library services consultant emphasized that although the project is so expansive that it may be difficult to classify it as a participatory design project in the traditional sense of the word, the use of participatory design methods and techniques, such as cultural and mobile probes, mock-up sessions, and collaborative prototyping may generate very concrete insights into the project. Finally, all partners emphasized that the single most important factor in making participation work was the project's committed and engaged leadership, when it comes to the participatory agenda, and on the levels of concrete project and library management, and the local politicians, who are ultimately the decision-makers behind the project.

Key challenges of the participatory approach
According to all the partners involved, undoubtedly the biggest challenge of adopting a participatory approach in a large-scale project is that it demands a lot of time and resources. This is compounded by the fact that, in many ways, Urban Mediaspace Aarhus is a pioneering project and the involved partners must continuously develop new methods and techniques that match the participatory agenda. Indeed, part of the challenge is to develop the skills to carry out participatory events, as stated by the library services consultant: "It takes a special skill set to conduct participatory events, and you have to develop these skills in the project organization. It is also important to establish

knowledge about what you can use participatory input for." (Interview: library services consultant).

According to the project manager, another challenge in a project of this scale is to understand the decision-making structure. The library services consultant expresses similar concerns regarding the inherently political nature of the project, and the need to find a fit between political decision structures and participatory events. For the principal architect, some of the main concerns in this vein have been that with so many participatory events at work it is difficult to know when different participating groups have finished their contributions, and how their outcome might affect the process, and force changes to aspects they considered complete. The architect states that: "For designers, it is hard to constantly run into compromises... User involvement can both clarify and obscure and the latter may be avoided by having an overview and a focus on clear architectural principles." (Interview: principal architect).

A third major challenge, according to the library services consultant, is analyzing all the data and input from the participatory events, and making these insights inform the rest of the process. She states that: "Sometimes, the step between information and decision is lacking." (Interview: library services consultant). Analyzing and clarifying the connections between data, analysis, and decisions, and communicating this to the parties involved is something which, in her opinion, could have a bigger focus. A fourth challenge is to engage potential future users and stakeholders in the project, first because of the long timeline of the project and its distant goal, secondly because the project is of such a scale that individual input may seem trivial. As touched on previously, this was a challenge that the involved partners continuously had to address by segmenting the project into smaller parts with specific deliverables, and by working with what project manager denotes "qualitative time".

Key benefits of the participatory approach
While the participatory approach has taxed resources, all project partners agree that that it has been worth it, and each identified a number of benefits during the interviews, pertaining to both the project as a whole, and to their specific areas of practice. One aspect that all partners agreed is a major benefit was that the approach provides a sense of ownership and responsibility among participants, a sense that everyone has been a part of the creative process, not just the designers and decision makers. From the architects' perspective, engaging in the project brought about a change in perspective: "first of all it is a change of attitude, from 'we'll ask the users but we are the experts' toward an appreciative understanding of user insights and inputs." (Interview: principal architect). Participation is also an increasingly important parameter in many architectural projects, so architects will need to further develop skills in this area, and being a partner in The Urban Mediaspace Aarhus project hones these skills. Furthermore, the

principal architect stressed that the dialogue that appears in participatory activities can really move things forward when it is focused on concrete and specific issues related to the building, and that the building has gained much in terms of quality and depth from focused user participation.

From the perspective of the project manager, the key benefit of using a participatory approach is that it provided "ongoing qualification of vision, idea, and product. In some cases, you learn something new that makes the project better and leads to changes, but even if you thought you knew, you get backing and qualified understanding of why something was a good idea." (Interview: The Urban Mediaspace Aarhus project manager). The project manager also emphasized the importance of empowerment and influence among future users, librarians, and the public, as is a primary benefit. This is echoed by the library services consultant, who stated that "Many great ideas and concepts would never have emerged without participatory activities." (Interview: library services consultant). She further stated that while the explicit, overarching argument for using participatory design is to develop something that fits user needs, it also provided political leverage: "It gives you backing for arguments, for instance when presenting proposals, because you can show that they are grounded in more than designers' ideas." (Interview: library consultant).

DISCUSSION AND DESIGN CONSIDERATIONS
Are there limits to how user involvement and participatory approaches can inform large-scale projects? There are a number of differences between traditional design cases and The Urban Mediaspace Aarhus project. These are mainly the scale, the time frame, and the diversity of users. The wide range of services provided by The Urban Mediaspace Aarhus also increases its complexity.

In a CHI context, an important consideration is how the participatory agenda and the user involvement activities of The Urban Mediaspace Aarhus project resonate with participatory design. Although in some contexts it may be valuable to establish clear definitions of what constitutes participatory design, as does Kensing [12], we find that inevitably, such definitions will be challenged or expanded when designers engage in new types of projects, such as The Urban Mediaspace Aarhus case. In order to steer clear of terminological confusion, we have intentionally refrained from labeling The Urban Mediaspace Aarhus project a participatory design project, instead using terms such as "participatory approaches" and "user involvement". We concur with Iversen, Kanstrup, and Petersen [11], who argue that participatory design is more than a set of methods and techniques. They describe it as an approach driven by emancipatory, democratic values, or in other words, the tools and techniques representative of participatory design embody higher layers of concerns and values that can guide, inspire, and focus design. Judging from the findings from The Urban Mediaspace Aarhus project, our position is that both values and methods from

participatory design can certainly be employed in large-scale design projects. We therefore see The Urban Mediaspace Aarhus project as a potential source of the inspiration called for by Shapiro [21], who asks the participatory design community to also engage in such projects. Alexander states that "Even in the biggest building, people must be the core" [1], and participatory design can guide the way.

While we have focused on drawing out special characteristics of large-scale projects in the foregoing discussion of key lessons, some of the issues certainly resonate with previous findings in participatory design. This is not surprising, since some of the approaches and methods employed build directly on insights from this field (e.g. cultural probes and collaborative prototyping). However, it is also clear from our studies that it should be carefully considered how importing existing methods can connect to the special challenges of large-scale projects. This indicates general need for revisiting and reconsidering existing methods and techniques, and examining how they may require revision and/or need to be supplemented with new ones, in light of said challenges.

It is worth mentioning that The Urban Mediaspace Aarhus project was initiated before the spread of Web 2.0 and social media. Web 2.0 technologies clearly encompass elements of participation, which extend the reach of the institution. The idea of "Library 2.0" [3] has been proposed as a model for libraries where the community shapes the library content, and stresses the issue of community participation as a cornerstone for re-establishing the role of the libraries. In Library 2.0, this is significantly framed in terms of web-based services, which is the reason we argue that Web 2.0 technology should be considered only a supplement to the existing library services and development methods.

Promoting and anchoring participation in the project
Various sources have influenced the establishment of participation as a central driver of the project. For instance, there has been influence from participatory design research, since researchers have worked with the library for a number of years, and carried out joint projects based on participatory design. Inspiration also stems from the Seattle Public Library, with regard to both the process leading up to the building project, and the development process, in partnership with architects and users. Aarhus's model of public participation has also had an influence, as has the political desire for extensive public involvement. Other important factors that support the participatory agenda include committed leadership, personal conviction/ideals on the part of involved project members, dependence on key people, and a flexible organization (as opposed to an error finding organization). Altogether, many factors have converged to make participation the preferred choice for the process.

During such a long development process, many discussions and battles will occur. From the start, the focus is more on a conceptual level, especially internally, politically, and with partners, but as the process moves into a more concrete phase, there is increased focus on specifics. Using participation as a major driver affects the entire process, so that nobody knows exactly how it will unfold, and what the results will be. A large-scale project like this cannot be led by participatory design alone, as it would probably lose direction and focus quite quickly, but it is clear that it can contribute to and inform the project along the way. In this project, the participatory activities have been vital, and conducted by all involved partners.

The participatory agenda for the project has had a visible impact on many levels, and there is no hesitation in bringing up issues that might cause problems for other partners, as long as there is a consensus that it will make for a better end product. For instance, when the space program had to be tested by the authorities in order to determine that it met the legislation regarding accessibility, the architects were satisfied with an approval, but the library took this process one step further, as their ambitions regarding accessibility for this project are very high. An expert, a handicapped man with extensive experience in accessibility issues, has been invited several times to come up with suggestions for improvements. The outcome of these workshops was passed on to the architects and engineers for further iterations, and some issues were brought into the program.

Design considerations
If you are a design practitioner about to embark on a large-scale participatory project, the big question is, "what can The Urban Mediaspace Aarhus project teach us?" During our participation in the project, and throughout the analyses presented in this paper, we have formed a series of design considerations. These design considerations incorporate insights from all levels of project partners and stakeholders, and many of them clearly echo the key lessons from the project, as stated by the project manager, principal architect, and library services consultant. As with the discussion of the key lessons above, some of these considerations will resonate with existing findings; this being a case study, our aim has not been to develop entirely novel implications for design, but rather to explore the considerations that spring from this specific case. We have divided the design considerations into four categories: *how and why participatory approaches and values can be incorporated into a large-scale project*, *how participatory activities can be carried out*, *how the knowledge and insights from these activities can inform the project*, and *the outcomes of the participatory approach in practice*.

First, in order to *incorporate participatory approaches and values in a large-scale project*, there should be committed and engaged leadership when it comes to the participatory agenda, also personal conviction among involved project members, and a flexible organization. Establish awareness regarding cooperation, based on different paradigms of inquiry: designer, customer, and user. The dichotomy between user demands and what is technically feasible might lead to conflict. Establish a shared language, in order to achieve a mutual understanding of the agenda and ideals; designers might see the building itself as an experience, while the customers see the services as the experience. A clear focus for the participatory design activities is necessary, since they can both clarify and obscure. Invest time in designing the participatory design process. Reciprocal partnership, good communication, and an understanding of different perspectives between the project partners are essential. For instance, architects should communicate about the architectural process, and the library needs to share its knowledge with architects.

Secondly, there are considerations regarding *how participatory activities may be carried out*: Hold collaborative working workshops with a constructive purpose, and in a language everybody understands. Make use of practical and concrete tools, such as visuals, models, and examples. Participatory events should be orchestrated by different project partners, so that a rich knowledge may be absorbed at all levels of the process. Carefully plan when to involve users and when not; it is difficult to engage people when the goal is too distant. Develop on an appreciative understanding of user insights and input, to create a sense of ownership and responsibility among participants. Reach the mutual understanding that nobody knows exactly how the participatory activity will unfold, or what the result will be. Divide the labor, so that there are clear roles regarding the aim of the participatory activities, for instance between what concerns the building and what concerns the services. Deadlines and deliverables provide direction and purpose, and are crucial to making the participation process concrete.

Thirdly, there are considerations regarding *how the knowledge and insights from these activities may inform the project*: Plan how to capture insights from participatory activities in a structured way, perhaps by best practice examples. Networks and knowledge sharing for inspiration are important. Establish a common plan for the decision-making structure, to establish a connection between data, analysis, and decision. Also establish a plan for how to inform the participatory process, not just the project. Avoid too many compromises, which might indicate a lack of overview.

Fourthly, there are considerations regarding *the outcomes of the participatory approach in practice:* Participatory activities are an ongoing qualification of vision, idea, and product, and gain much in quality and depth, as well as political prestige. Participatory design activities in a large project are expensive, and demand substantial resources, but are worth it. There is a need for a solid program from the start, to prevent the project from slipping when

involving user participation. Stay open to changes, even in the space program, as iterations are necessary in participatory projects. Milestones and deadlines in a foreseeable future are important especially in large-scale projects. See milestones as key condensations of insights.

Finally, we do not consider this list of design considerations exhaustive, but rather a series of rough guidelines for venturing into a new area of participation. However, we hope that they may guide and support others who intend to engage in large-scale projects of this character.

CONCLUSIONS

In this paper, we have sought to enrich the discussion of challenges and benefits associated with a participatory approach to large-scale projects through case studies. Our contributions to this discussion are based on eight years of involvement in The Urban Mediaspace Aarhus project, in which our initial focus was on the design of interactive systems, as we came to realize that the participatory agenda of the project makes it a pioneering project of large-scale user involvement. We have discussed the scale and limitations of participatory approaches and user involvement activities, how to anchor participation in the project, and finally, we have formulated a series of design considerations that may guide practitioners in the field. These considerations fall into four categories: how to establish a participatory agenda, how to carry out user involvement activities, how to capture the results of these activities, and finally, what the outcomes of such an approach may be. We hope that this detailed study of The Urban Mediaspace Aarhus project may serve as an exemplar, by providing insights and inspiration for other designers, researchers, and developers when planning, carrying out, and studying user involvement in large-scale development projects.

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