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Narrative facades of Grainger Street: Design and manufacturing of a physical model for participatory design

Introduction

Participatory design - and related methods and tools - is receiving more and more attention in recent years due to the necessity of creating public places and cities that are closer to citizens' desires and needs[1]. Participatory design can give citizens the opportunity to actively contribute in the design process with their ideas and reflections based on their various daily life experience. Participatory activities, addressed at the production and shaping of the urban life, are also recognized as relevant for an active ageing and the urban environment is the first of the eight domains of an Age-Friendly City[2]. However, there are several issues that can limit people's engagement in these activities. One of the most relevant is the difficult communication between experts and lay people because their different background and ways of reasoning on the urban environment. Moreover, usually lay people miss an awareness of the architectural features of the urban environment that is beneficial in a participatory design project. Besides this lack of awareness there is also another issue, namely lay people's difficulties in understanding architectural drawings and models that constitute the essential visual language of architecture and urban design. Architects and urban designers can reduce these knowledge gaps between experts and lay people, by designing tools that can be used as facilitator in the participatory design process. In Ahn and Park 2007[3] for example, the drawings for citizens presented a more realistic and detailed graphical representation in order to allow lay people to better understand the place and its surroundings. Although there is research around methodologies and

[1] Sanoff, Henry. *Community participation methods in design and planning*. Canada: John Wiley & Sons, Inc. 2000.
[2] http://www.cpa.org.uk/cpa-lga-evidence/Manchester-Age_Friendly_Neighbourhoods/Handler(2014)-An_Alternative_Age-Friendly_Handbook-Large_print_version.pdf (10.11.2015).
[3] Ahn, Hyun-Chan; Park, So-Hyun. "Design Tools and Three Steps in Participatory Design Processes" in: Pro-ceedings of the 6th Pacific Rim Community Design Network and 1st Xiamen-Quanzhou-Zhangzhou-Longyan Cities Alliance Designers Conference. Quanzhou, Fujian, China, June. 2007.

tools that can facilitate lay people's engagement in participatory design, the use of drawings and models are still under explored.

This paper presents the design and manufacturing of a large-scale physical model of a historical street for participatory design purposes. The physical model, grounded in architectural representation and developed using state-of-the-art digital technologies, presents a form of interaction that usually lacks in similar artefacts, and - as far as we can tell - it may be the first of this kind. In fact, the model allows people to write, draw and share their memories and stories directly on the facades; hence the model connects architectural representation and narrative, and stimulates collective conversations.

Common issues in participatory design activities

In (Di Mascio and Dalton 2017)[4], the following five areas and related issues that characterize Participatory Design activities have been identified and described: Communication, Content, Tools, Role and Phase. The issues linked with these 5 categories are the result of the, usually, challenging interaction between experts and lay people. One of the main issues is related to the communication between both of them, because they have different knowledge and way of looking at the urban environment. Lee[5] borrowed the concepts introduced by the French philosopher Henri Lefebvre[6] of "abstract space" – where architects and designers develop their design proposals – and "concrete space" – where people live and experience their everyday life. She suggests that only an overlapping of these two spaces can generate what she called the "realm of collaboration"[7]. However, a constructive communication around an urban design project requires first a shared language and second a shared basic knowledge about the place of the project. Attending a consultation process of a Street in Newcastle upon Tyne[8] - as part of a research workshop - confirmed once again citizens difficulty in reading technical drawings. This can strongly limit the extent to which they can contribute in a participatory design activity because drawings and models are the visual language used by architects and urban designers to analyze and design buildings and places Usually citizens don't have sufficient awareness and knowledge of streets and other public spaces that they use every day because when they move through those spaces they simply see the environment, they don't look at the environment. To see is a spontaneous and passive action that doesn't imply attention or built awareness. On the contrary, to look implies intentionality, namely the desire to recognize and understand

[4] Di Mascio, Danilo; Dalton, Ruth. "Using serious games to establish a dialogue between designers and citizens in participatory design. The architectural portal of people's narratives" in: Ma, Minhua & Oikonomou, Andreas (eds.). *Serious Games and Edutainment Applications 2*. UK: Springer International Publishing AG. 2017. p. 433-454.

[5] Lee, Yanki. *Design Participation Tactics: Redefining User Participation in Design*. In the Proceedings of the Design Research Society International Conference: Wonderground. Lisbon, Portugal, 1-4 November 2006. p. 15.

[6] Lefebvre, Henri. *The production of space*. Oxford, UK: Blackwell Publishers. 1991.

[7] Lee, Yanki. op. cit.

[8] https://www.newcastle.gov.uk/parking-roads-and-transport/re-newcastle-transport-improvements/john-dobson-street-improvements (accessed 28.04.2017)

the observed elements; hence, it is an active action with an aim. There is a reason why one of the first fundamental steps of any architectural and urban design project is the site analysis. Even if architects and urban designers are professionals, they need methods, tools and time to understand a site and its main features. As mentioned before, another difficulty is related to the tools used by experts, namely drawings and models with whom lay people are in general not familiar.

The role of drawings and models in participatory design

For centuries, drawings and models have always constituted the visual language of architectural representation. The wide range of representational techniques and model makings support architects and urban designers in the development of ideas and design solutions during every single stage of a project until its final communication phase[9]. Drawings and models have been used to envision, design and build very different architecture, public spaces and cities, hence becoming familiar with basic elements of this rich visual vocabulary is essential and unavoidable if citizens want to actively participate in those activities in effective ways. There are many different drawings and kinds of models used by architects and urban designers such as two-dimensional drawings (plan views, elevations) and massing models and each of them can be used for specific purposes[10].

Drawings and models have already demonstrated their usefulness in participatory design activities, and their importance is fully recognized[11]. At the same time, it is relevant to highlight that their use in participatory design activities is different compared to the one in architecture and urban design mainly because the audience is different, hence there is another variable to consider. Firstly, drawings and models in a participatory design environment are not limited to the development and presentation of a design idea; they should also foster and facilitate citizens' inclusion in participatory activities. For this reason, for example, in (Ahn and Park 2007)[12] the authors describe how they had to add more details to the drawings– such as human figures, colors, textures and materials – in order to make them easier to understand by lay people; the aim was to improve citizens' engagement in the design activities. It is evident that this first aspect is linked with visualization/representation, and hence communication. Secondly, as a result of different backgrounds and ways of thinking and designing, experts and lay people cannot use drawings and models in the same ways, especially in the early stage of design activities.

Hence, it is possible to summarize that drawings and models made for participatory design activities should always be both understandable and engaging, hence they should assume a role of facilitator.

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[9] Zell, Mo. *The Architectural Drawing Course. Understanding the principles and master the practices.* London, UK: Thames & Hudson. 2008.

[10] Farrelly, Lorraine. *Drawing for urban design*. London, UK: Laurence King Publishing Ltd. 2011.

[11] Wates, Nick. *The Community Planning Handbook. How people can shape their cities, towns & villages in any part of the world*. Abingdon, Oxon, UK: Earthscan. 2000.

[12] Ahn, Hyun-Chan; Park, So-Hyun. op. cit.

Case Study: Narrative Facades of Grainger Street

The main aim of this research is to elaborate and propose a way of improving people's awareness of both the urban environment and the visual language of architectural representation by designing, manufacturing and use of a physical model made by narrative facades. The physical model represents Grainger Street, one of the main historical streets in Newcastle; the street connects Central Station to Monument and it is characterized by remarkable pieces of Georgian and Victorian Architecture.

This project composes part of a case study titled Narrative Urban Environments that is part of a multidisciplinary research project titled MyPlace: Mobility and Place for the Age Friendly City Environment. The project investigates how Newcastle upon Tyne (UK) can become an Age Friendly City through research, planning and design activities that consider or involve citizens in different ways. The World Health Organization (WHO) identifies eight domains of an Age Friendly City[13]. The Narrative Urban Environments case study connects with the Age Friendly City initiative in three key areas, namely: participation, urban life, and the built environment (outdoor space and buildings).

In this project, the role of the architect/urban designer is the one of a facilitator, namely the one of a professional that both participate in an active way at workshops (and similar events) and design methodologies and objects that are used as facilitator themselves.

Main objective: Improving awareness and communication

The main objective of the research is to design and manufacture a physical model that can be used as facilitator for the following purposes:

- To improve lay people's awareness and comprehension of selected aspects of the urban environment;
- To facilitate lay people's awareness and comprehension of the architectural visual language;
- To challenge people's memory and promote the idea to look at the urban environment and not simply to see it;
- To trigger citizens' curiosity and hence stimulate their interest on the street.

Methodology: From conceptual design to manufacturing

The following points summarize the design and manufacturing process of the narrative façades:

1. ***Conceptual design phase:*** the main concept that addressed the design of the physical model was the idea to allow people to interact with it in an innovative and engaging way, namely drawing and writing their thoughts and narratives linked with the street directly on the facades of the buildings. Very often, workshops participants or visitors of an exhibition are allowed to a limited set of actions towards physical models: they can be involved in the making of the model, using for example cardboard, or in moving and arranging pieces that can represent volumes of entire buildings or parts of a single building. The design of the model

[13] Op. cit. For the link please see footnote 2.

(Fig. 01) was developed taking into consideration and merging several concepts related to the following topics: visual architectural language, visual and written narrative, interaction, drawing and sketching, playfulness, communication and flexibility. The model allows people to share their narratives and in doing so, it fosters conversations between lay people themselves (besides conversations between laypeople and experts). In this case, it is possible to talk about the model as an intermediate object.

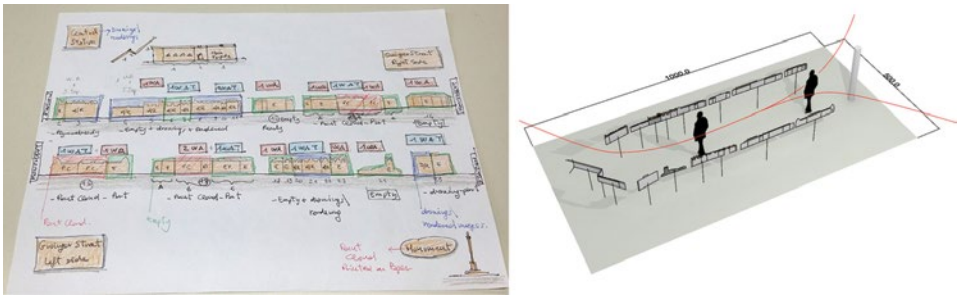

Fig. 01. Drawing (left) and digital 3d model (right) used in the design process.
Source: personal archive of the author.

2. ***Selection of the materials:*** the choice of the materials was addressed by three main needs. Firstly, the surfaces had to be solid enough to allow people to write and draw in a comfortable way and to avoid any bending and dangerous breaking. Secondly, all the facades had to allow visitors to write and draw on them with washable markers in a way similar to whiteboards, and hence to be cleanable at the end of each day (after the facades were documented by photographs) to allow other visitors to use the facades the day after. Thirdly, some of the facades had to be transparent enough to allow people to recognize the images of the point clouds put behind them and at the same time to allow texts and drawings to be noticeable enough from the background. To achieve those three objectives, two different kinds of acrylic were selected - white and with 70% light transmission - and plywood.
3. ***Creation of the digital facades:*** the available time and design choices addressed the design, manufacturing and level of detail of the model. For each facade, two profiles (silhouettes) were created in a CAD software (Rhinoceros), using the point cloud data as a base to trace over the contours. A first profile – in plywood - includes the line of the rooftop, while a second silhouette – in acrylic - represents the facade itself. Also the architectural representation of the elevations of the facades were drawn in vector format using both the point cloud data and 3d models from the 3d digital reconstruction of the street (still in progress). All the files have been then exported in AI format and transferred to the Computer Numerical Control (CNC) Machine.
4. ***Laser cutting of the boards:*** in total, 75 boards were laser cut.
5. ***Representation of the facades:*** the facades of the model were treated in four different ways: the first group presented complete architectural elevations; a

second group of facades displays partially completed drawings; a third group showed printed images of the point clouds superimposed to the plywood and in turn covered by the semi-transparent acrylic surfaces; the fourth type of facades were completely white/empty surfaces. Different representations foster different ways of interacting with the facades and help to create a more varied and interesting experience. In a similar way as in "doodle" books for kids (and even adults[14]), where they are asked to complete drawings or colour them, each representation of the facades encourage people to draw or write in a different way. For example, in the partially completed facades, there are lines, shapes and details that suggest architectural elements, users of the model are encouraged to complete the elevations from memory. The elevations were drawn using the standard architectural representation. To achieve an aesthetic effect similar to a technical drawing on white paper and provide people the feeling of drawing and colouring like on a colouring book, it was decided to engrave the lines directly on the acrylic facades. However, this choice presented a challenge, namely how to create crisp black lines on a white acrylic surface. To achieve the desired effect, several techniques were explored. At the end, the 2d line drawings were engraved and then painted using acrylic artistic ink and two kinds of brushes. Then the facades were cleaned using cleaning paper soaked with an API solution. This process creates permanent crisp black lines that remain also when the facades are being wiped (Fig. 2).

Fig. 02. (Left) Painted façade (before being cleaned); (Right) cleaned façade.
Source: personal archive of the author.

6. ***Assembling of the facades:*** all the facades were assembled on battens, using bolts. Then, the battens were put together on easels.

[14] In this regard, an example is represented by: Bowkett, Steve. *Archi-Doodle: An Architect's Activity Book.*Laurence King Publishing Ltd. 2013.

Reflections and evaluations on a preliminary exhibition

After all the above points, the model was set up in the city library as part of an exhibition (in the City Library in Newcastle upon Tyne, UK) titled Mapping the City[15], organized as part of a bigger event called Juice Festival[16]. This big event was mainly addresses to families and young people under-25s, for this reason it was decided to allow people a higher degree of freedom in interacting with the physical model (Fig. 3). The only instruction that were provided to the visitors of the exhibition was an invitation to write and draw on the model of Grainger Street in order to share their memories and stories about Newcastle. With this freedom, it was possible to observe how people interpreted their ways of interacting with the model. At the end of each day, each façade/group of facades were photographed and afterwards wiped clean. In this way, it was possible to verify if specific facades were used on consecutive days. The fact that at the end of each day all the facades presented some doodles, drawings or texts demonstrates that the model was successfully received by the visitors. A first evaluation of people's interaction with the model was done by observations. The doodles/drawings/texts were organized into 3 main categories (some façade/group of facades was included in more than one category because they presented different kind of contents): (a) context-specific content; (b) general architectural/urban content; (c) unrelated content.

Unsurprisingly, taking into account the kind of event and the freedom provided to the visitors, the unrelated content occurred more frequently than the other two types. Moreover, the context-specific content occurred least frequently. Considering the target audience of the exhibition, it is likely that most of the people that used the model were children/teenagers, and this may also explain the high number of unrelated doodles/drawings and texts.

Fig. 03. (Left) The physical mode in the City Library; (Right) teenager drawing on the model.
Source: personal archive of the author.

[15] The exhibition was organized by other academics from Northumbria University namely: Sebastian Messer, Mike Jeffries and Jon Swords (www.mappingthecity.net).
[16] http://www.newcastlegateshead.com/juice-festival (accessed 25.04.2017).

Conclusions and future developments

In this paper, the design and manufacturing of a physical model useful to improve lay people's awareness about the urban environment and their comprehension and use of drawings has been presented. Citizens can improve those two points - essential to achieve a good and constructive communication between lay people and experts in a participatory design environment - while sharing their memories and stories about a place on the Narrative Facades using drawings, doodles and texts. The model challenges their memory and triggers their interest in a playful way by presenting facades with 4 different kinds of representations (complete elevations, partial elevations, point clouds images, all white). Future developments include: further uses of the physical model with different age groups and in different venues; other investigation of the concept of playfulness; difference between an allocentric and an egocentric experience.

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