ICT-enabled Civic Empowerment and Participation: in Design, through Design

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This paper aims to discuss the potentials of novel modes of participatory design in relation to the latest developments in Information and Communication Technologies (ICT). The first part of the study involves the extraction of the basic principles from the extraordinary cases of the Medical Faculty Housing by Lucien Kroll (1976) and Cedric Price's Fun Place (1965) in which various forms of ICT-enabled participation were conceived. In the second part, we reframe the existing ICT tools and strategies and elaborate their potentials to support the modes of participation performed in these two cases. As a result, by distilling the created knowledge, we introduce a model of ICT-enabled design participation which exploits a set of collective action tools to support sustainable ways of self-organization and bottom-up design.

Keywords: *Participatory architectural design, crowdsourcing, crowdfunding, self-organization*

INTRODUCTION

The concept of bottom-up participation was brought onto the agenda of architectural design prominently after the Second World War and gained traction with the movements of 1968 (Jencks 2011).

Habraken (1961) was one of the first to introduce the idea of spatial self-determination as a citizen right. Habraken's concept of a supporting/enabling megastructure was not novel at that time; it can be traced back to Nieuwenhuys's New Babylon experiments between 1956 and 1978, Friedman's Mobile Architecture in 1958 and Fuller's structural designs (Lobsinger 2000). His ideas also resonated with André Lurçat's ground-breaking participatory design practices for the reconstruction of Maubeuge in 1945 (Kroll 2014), Jane Jacob's (1961) critique of planning practices in the USA as well as Team 10's revolt against CIAM in 1959 and the Situationists (Mathews 2006).

In parallel with these contributions, in 1962, Walter Segal developed a low-cost housing solution suitable for self-build while trying to address his own problem of providing a temporary home for his family. This practice evolved into the development of "The Segal Method" and several participatory design projects in which 27 families worked with architects to design and build their own homes (Broome 1995).

Following these developments, Bernard Rudofsky (1964) organized an influential exhibition in the Museum of Modern Arts (MoMA) with the title "Architecture without Architects". His work was a clear criticism of the discipline and the role of the archi-

tect as an authoritative figure; a recurring theme in Habraken's, Segal's and Team 10's contributions.

In this intellectual climate, director Joan Littlewood commissioned Cedric Price to design an informal and dynamic entertainment center: the Fun Palace. This center has never been realized, but it is still known as one of the most prominent participatory design cases to inspire numerous architects; including Richard Rogers' and Renzo Piano's Pompidou Center (1976).

Around the same time period (1969-1978), Lucien Kroll orchestrated the design of the Medical Faculty of the Catholic University of Louvain (UCL) with the student organization "La Maison Medicale-La MéMé". The result was an ambitious piece of "anarchitecture", challenging every possible aspect of the architectural practices of the time. It became an "icon of democratic architecture" (Poletti 2010) for Kroll's alteration of the usual hierarchical relationship between the architect and the user during the process -and most importantly- the development of novel design interventions to enable bottom-up participation.

In both of the projects referenced above (Fun Palace and La MéMé), the designers attempted to use various technologies and computational methods for augmenting participatory design processes. However, the capacity and potentials of these were limited at the time and Internet was non-existent. Acknowledging this gap, this paper aims at the discussion of potentials of modes of participatory design in Price's and Kroll's projects in relation to the latest developments in Information and Communication Technologies (ICT). In accordance with this aim, the research questions to be explored in this paper are:

1. What are the participatory design principles of the Fun Place and La MéMé?

2. Which forms of ICT use were conceived in these?

3. Can these serve a basis for a novel integrated participation model that incorporates state-of-the-art ICT?

In this context the first part of our study involves the extraction of the basic principles from the two referenced cases. In the second part, building on the findings of our case study, we reframe the existing ICT tools and strategies in terms of space and time and elaborate their potentials for supporting the revealed modes of participation. In conclusion, by distilling our findings, we introduce a model of ICT-enabled design participation which exploits a set of digital and non-digital collective action tools to support sustainable ways of self-organization and bottom-up design.

A CASE STUDY OF KROLL'S LA MÉMÉ AND PRICE'S FUN PALACE

In this section, informed by the introduced background, we will discuss the influential projects of Kroll and Price with a focus on two main aspects: a) the employed participatory design principles and b) the ICT tools and strategies used to enable bottom-up participation. The order of presentation represents the increasing complexity and relevance to ICT-enabled participation.

Case 1: La MéMé

The project was initiated when the Catholic University of Louvain (UCL) decided to move its Medical Faculty to Brussels, Saint-Lambrechts-Woluwe. The university authorities made an exceptional decision and presented the preliminary design of the Medical Faculty Housing to the student committee. The students rejected the project and contacted Kroll for his services (Kroll 1987).

As a close follower of Pierre Bourdieu, Kroll questioned every aspect of the institutionalized practices with the contributions of the spirited students of UCL. He intended to create an open design process, "an action open to new necessities and to decisions that are always provisional and incomplete" (Kroll 1987). He aimed at establishing an intellectual climate through which a kind of friendly organization would emerge

to result in a homeopathic kind of architecture (Kroll 2005).

Kroll organized meetings with the committees and discussion groups. In these meetings he received conflicting ideas. Instead of flattening out all the differences of approach and attitudes he tried to incorporate them into the design process (Kroll 1997). This was a creative refutation of the idea of "consensus".

Throughout the project, the students were empowered to participate in two forms: getting involved in the design process and through the participation opportunities provided by the architectural design per se (Figure 1).

Figure 1
Medical Faculty Student Housing by Lucien Kroll. The users participated in the decision process and the architectural product enabled them to shape and reshape their surroundings.

Kroll developed a flexible structure system which he called "wandering columns" based on a loosely defined grid. He collaborated with a professor of computer engineering to manipulate the grid to support the irregular and heterogeneous shell of the building. He designed the artificial ground around the project to provide raw space for further development (the aspects of wandering columns and his long-term vision for expansion are more evident in the Alma Metro Station which was built as an extension to the project).

The "infill" -inherited from Habraken- is hypothetically removable: demountable window frames, moveable partitions and prefabricated sanitary units. The architect used his own interpretation of the Habraken's SAR module but refuted the idea of functional zones (Kroll 1987). According to the principles of co-habitation, the infill can be torn down by the users, which encourages them to take initiative in planning and re-planning their environments. The plan would always be incomplete.

In La MéMé, Kroll did not see aesthetics as the central point of design. Through this project, he strongly criticized what he called the "easel architecture": aesthetically pleasing but isolated from the people, culture and community.

ICT tools and strategies for participation in Case 1

In his book "Architecture of Complexity", Kroll (1987) reserved a whole chapter to the computers. Instead of computer aided design (CAD), he suggested computer use in design (CUD) as a more appropriate term for describing his vision. He stressed the importance of open-endedness and heavily criticized the inflexible artificial intelligence practices of the time which led to self-contained, closed and repetitive results.

In contrast, Kroll envisioned the drafting software as a potential tool that allows open-endedness through which the architectural product and the social relationships can be involved in the design and manufacturing process. However, the communication technologies were not developed enough to fully realize the social part of the potential.

The computer-based social interactions he foresaw were limited to three dimensional drawings which he found useful for the communication of early ideas to the inhabitants. He suggested that infinite interactions were required to deal with the infinite diversity of the real world.

In close contact with the users, he employed various algorithms to create diversity and differentiation and presented a library of components that can be combined according to user needs (Kroll 1987). He tested a computational method -anthromorphism- to allow a type of architecture with variant building programs and devised the role of the architect as a developer of "types" which can be varied by the inhabitant. The diversity of the outcomes was unmanageable due to the technological limits of the time. As a result he worried that the process would lead to the Taylorist practices that he criticized (Kroll 2013).

In the same chapter relating to the ICT use, Kroll (1987) described another possible role for the computer: evaluation and modification. During the design process, a custom program provided comparisons between the choices of components designed by the architect and enabled rapid updates of these specific components throughout the process. Furthermore, by creating associated representations of the components, Kroll used a computer to generate façade drawings to be revised and detailed by the designer. But he stressed that this process can never be reliant on automation, which Kroll found "an absurd and unhealthy claim".

Case 2: Fun Palace

In the Fun Palace project, Cedric Price, Joan Littlewood and numerous intellectuals from different disciplines collaborated in the design of a flexible theater in London's slums with a dynamic program. The project aimed fusing information and communications technologies and industrial building principles "to produce a machine capable of adapting to the needs of users" (Price, 1965).

In contrast with Kroll's refutation of Le Corbusier's metaphor of architecture as a "machine-to-live-in", Cedric Price adopted and developed it further. The project was an attempt at exploring improvisational architecture with the means of cybernetics and information technologies (Mathews 2005).

Fun Palace did not have a fixed floor plan and intended to "encourage random movement and variable activities" (Lobsinger 2000). Mobile components such as flying escalators, walkways, and activity enclosures were carried by a megastructure

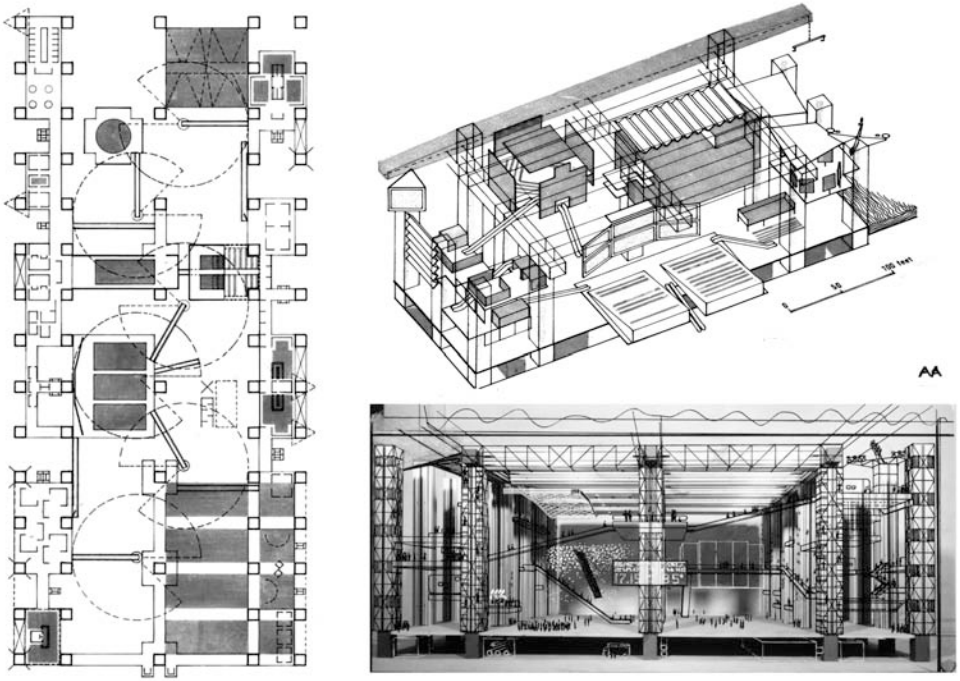

Figure 2
The Fun Palace project by Cedric Price and Joan Littlewood proposed a dynamic program that joins ICT and industrial building principles to produce architecture capable of adapting to the needs of user. Illustrations are from the CCA Library Database [1].

and transported by a crane when necessary [1]. The suggested time and place specific facilities covered jam sessions, dance and science playgrounds, teaching film, drama therapy, modeling and making areas and music stations with instruments on loan (Landau 1984).

Similar to La MéMé, Fun Palace was not primarily an aesthetical exploration. The building was conceived to be super-functional and adapt to the people's needs in a sustainable manner (Figure 2).

ICT tools and strategies for participation in Case 2

As introduced in the previous section, the interdisciplinary design team which Price collaborated with included an English cybernetician and psychologist, Gordon Pask. During the project, several practices were proposed by Pask for the cybernetic regulation of day-to-day activities (Mathews 2006). In this sense, Fun Palace would be an ongoing conversation between the building and its users - "an assemblage of interactive systems of interaction" [2].

Pask (1969) defined a number of domains of interest for cybernetic interventions. Among those were the Fun Palace and environment, visiting patterns, mechanical and architectural considerations, provision of specific participant activities, interactive activities, individual participant situations (teaching machines), controlled group activities, conditioning systems and cybernetic art forms (Mathews 2005).

As a proof of concept, Pask created an apparatus to collect feedback from the users after the realization of the project (Figure 3). The proposed tool was a "physical communication system" which he planned to be used informally in one of the theaters to "accommodate an invited audience" (Pask 1969). The audience would be responding to a variety of activities using this tool and would be able to transform the theater based on their preferences.

Through this exercise, Pask questioned to role of the users and explored novel ways of participation in an open-ended and performative manner.

CONCLUSIONS: DEVELOPING A MODEL OF PARTICIPATION {IN} AND {THROUGH} ARCHITECTURAL DESIGN

Kroll's and Price's works can be considered as prototypes of participatory, bottom-up architectural design. But it is necessary to differentiate between these two projects. First of all, Price and his team failed to realize the Fun Palace. Although it was designed to be built, it can be seen as a proof of concept for a utopic project.

On the other hand, La MéMé was partially realized and served as a semi-functional prototype through which many inspiring ideas were experimented. It still stands in Brussels as a heterotopia between the ideal and the real, frozen in time.

In this context, in both projects, two interconnected modes of participation were evident:

1. Participation {in} the design process

2. Participation {through} the design product

These two modes were significant in the ways they enable the users and architects to co-produce architectural designs in a sustainable and participatory manner. To start with, Participation {in} the design process is similar to today's widely recognized interpretation. It involves practices that "allow various actors to contribute to the overlapping phases of the planning and decision-making" (Horelli and Wallin 2010).

In the case of La MéMé, Kroll has arranged numerous meetings with committees and discussion groups to empower the student groups (although the level of participation and openness were challenged in the following years).

Price, on the other hand, did not believe that the user needs can be precisely forecasted. The user participation model he conceived would take place post-occupancy. However, he shared his authority with several intellectuals such as Littlewood who acted as an essential part of the design team. Instead of pursuing traditional consultation meetings, he asked for the participation of an interdisciplinary commit-

tee to collaboratively design an enabling type of architecture that facilitates participation to the highest known extent.

The second and the most interesting mode observed in the presented cases is participation {through} the design product. This kind of empowerment takes place when various spatial qualities of the architecture enable the inhabitants to shape and reshape their own living environments. In both projects, Kroll and Price aimed at the participatory creation of infinitely flexible interactive spaces which represent the diversity of the needs of the inhabitants. The forms of their designs were intended to be altered to accommodate the changing needs of the users.

In the La MéMé case, the dynamic elements were the "infill": demountable window frames, moveable partitions and prefabricated sanitary units. The Fun Palace project envisioned mobile components such as flying stairs, walkways and modular activity enclosures.

Furthermore, in both of the cases a structure inde-

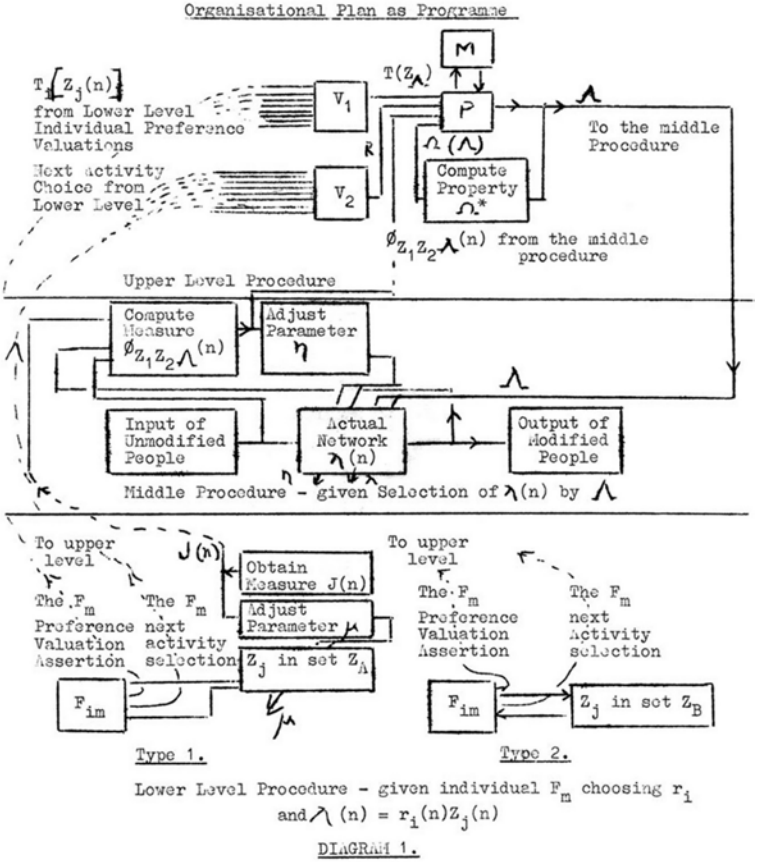

DIAGRAM 1.

Figure 3
Fun Palace; diagram for a cybernetics theatre by Gordon Pask (1965).

pendent from the infill (Kroll's wandering columns and Price's megastructure) was used for facilitating the dynamism of the architectural program.

Besides the participation modes discussed above, the case study enabled the extraction of several common principles conceived in both of the projects. Among these, the most recurrent ones were:

- Orchestrated self-organization
- Intense focus on the impact which architecture can make on the users
- Incorporation of user variety and differences into the architectural design process as well as the product
- Incomplete, dynamic program as an enabler for the continuous representation of the user needs
- Embracing spontaneity and improvisation in the design process
- Development of design rules or systems that "regulate" the building in an open-ended way

Building on the principles and the participation modes introduced above, it is clear that a more innovative approach to participation is possible. In this context, we reframe participation as a reflective self-organization practice which includes interactions {in} the design process as well as {through} the design product.

In this approach, ICT tools fuse two cycles of co-operation in which the output of one process is transformed by a second process and transferred to the other one as input (Figure 4, on the next page). It is important to note that the model does not suggest a completely digitalized mode of operation: rather it involves, augmentation and enhancement of traditional participatory practices through the use of ICT tools and strategies.

The first cycle (Figure 4, on the left) involves a type of social knowledge construction, building social capital. This capital is transferred to the second cycle (Figure 4, on the right) through which the users gather resources, take action, accumulate experience and give feedback to the first cycle.

This open-ended process involves several steps which can be supported by different types of ICT-enabled participation accessible today:

- Crowdsourcing: collection and sharing of lived experiences
- ICT-enabled public meetings: information, ideation and integration
- Crowdfunding: fund-raising, resource collection
- Event-based participation (blended activities): intervention

Operation Principles

First of all, from the perspective of cybernetics, the role of the architect in our model cannot be neutral or observant. It should be one of active participant in the system. According to the second order cybernetics, observers of a system cannot see how it works by standing outside. They are engaged with the system being observed in a cybernetic manner. Thus when observers observe a system, they affect and are affected by it (Foerster 1974).

Second, sustainable and informed participation {through} the design product requires the development of open-ended cybernetic systems which enable user organization, feedback and intervention in a self-regulatory, indeterminate manner and without a limited end-state.

Third, according to the law of requisite variety, for the appropriate regulation of participation, "the variety in the regulator must be equal to or greater than the variety in the system being regulated." (Ashby 1958). Therefore the proposed model should not be closed but open to external input of different actors at various stages.

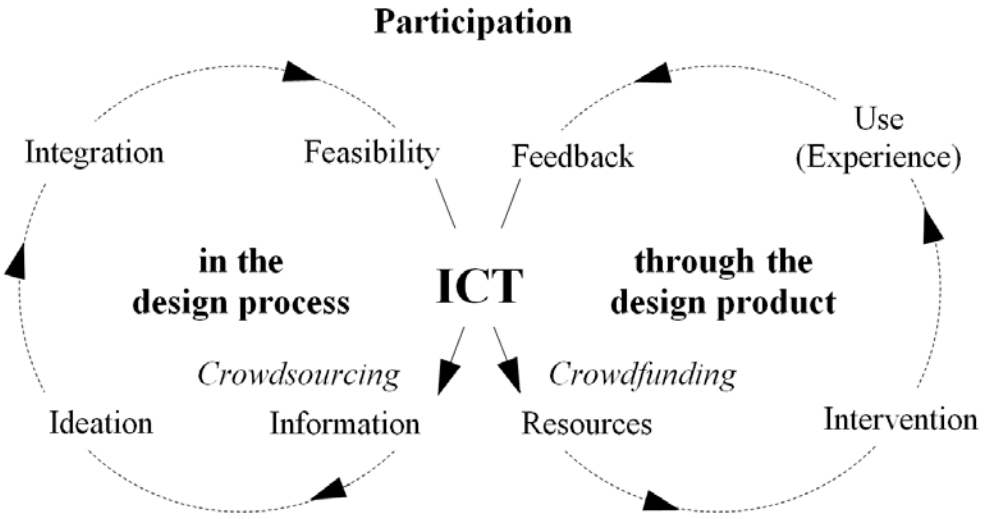

Figure 4
ICT-enabled civic participation in and through design: fusing two cycles of cooperation

Forth, the model should embrace reflexivity in other words, circular relationships between cause and effect.

A Hypothetical Use Case in Practice

Let's we take a large-scale housing project as a hypothetical case for demonstrating the potential of our participation model.

Following the cooperation cycles introduced in Figure 4, the participatory design process starts with crowdsourcing through which the needs and requirements are collected in a structured manner. Then, these are converted into several alternative design ideas and integrated into the context by the architect, with the continuous ICT-enabled feedback of the users.

Afterwards the users are asked to fund the project through crowdfunding. If the process succeeds, the project gets transferred to the second cycle and constructed with the contribution of the users.

If the funding process fails, the design process cycle is repeated: through a new crowdsourcing practice, the user feedback is collected to identify the problems of the design, and to develop new alternative projects, which will then be asked to be crowdfunded by the users.

The contribution of our model becomes more evident after the construction of the architectural project. Following the experiences of the residents, post-occupancy feedback is collected through crowdsourcing.

When necessary, novel ideations on how to improve the architectural design are created with the continuous ICT-enabled feedback of the users and integrated into the existing context. Examples of these ideas can be making interventions regarding the communal or personal spaces, removing/adding partitions or reconfiguring the rules for co-habitation.

In the following stage, the users are again asked to fund the changes through crowdfunding. If there is enough support, the process moves to the second cycle and suggested interventions are made. Following the intervention, the user feedback is collected and the participation continues to take place when necessary. In this context, it becomes possible to de-

velop habitats which can adapt to the users' needs in a sustainable manner.

Future Potentials of the Proposed Model

Reflecting on the latest developments in ICT, it is possible to claim that sensor networks and smart structures can play an important role on the gathering of feedback as well as the support of user interventions.

For the operation of the model, it is necessary to create sustainable multidimensional virtual representations. In this sense, developing participatory and more user-focused building information modeling (BIM) methods is crucial. These can also be used as a basis for advanced visualizations to be displayed during the ICT-enabled public meetings.

Furthermore, integrated with the information model, web-based and mobile social platforms can play a vital role for the collection and sharing of user experiences through crowdsourcing as well as raising funds through crowdfunding.

In the near future, low-cost robotic manufacturing methods have a potential to unlock self-production practices, which can also be integrated into the proposed model after the crowdfunding step.

As suggested by Kroll (2014) in his response to this paper, one the biggest challenges facing the introduced practices will be "helping to organize social groups and supporting the consistency of their discussions in a democratic manner, against the authoritarian business-oriented approaches."

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