Participatory design is not new, various design projects have included public opinions, ideas, and suggestions to help architects to produce designs that fit the desires and needs of the users or community. In the context of mass housing, participation is seldom applied as the primary focus is on efficiency. Designs are generated mainly based on architects' experiences or through data from developers or government sectors that claim to reflect the needs and desires of the occupants. In this workshop a digital platform called 'ModRule' is introduced to provide a means for a participatory process in the connection with a virtual environment software, 'Fuzor'. ModRule plays the role of a collaborative design platform while Fuzor provides real-time visualisation and building information. The aim of this workshop is to explore how a user participatory design set-up allows for an active participation of stakeholders in the initial design phase of mass housing.

Keywords: participatory design, mass housing, digital system
Figure 1

FUZOR
‘Fuzor’ (Figure 2) is a virtual environment BIM software [2] that allows users to simulate, evaluate and collaborate design through real-time a cutting edge visualisation and communication system. Fuzor has the capability of incorporating and linking data that derive from a BIM software (e.g. Autodesk Revit) into its system.

Fuzor offers an open source API for other programs to connect like a plugin. ModRule take this opportunity making use of Fuzor’s strong visualisation and BIM capability to provide the users with a more realistic virtual environment for their design engagements. As ModRule is a prototype that uses WebGL as its source code, the interface is limited to geometric planes. Since the target audiences of users of the above described systems are laypersons without much architecture knowledge, a better visualisation environment is necessary for a more intuitive interaction.

WORKSHOP SET UP
In this workshop, participants shall experience a real-time online design collaboration. The workshop focuses on mass-housing designs. The aim is that every participant engages actively in the design of their apartment within one mass-housing while at the same time negotiating with their neighbours. Obviously a higher number of participants will increase the communication and negotiation possibilities testing both the capability of the system and the design methodology. Every participant has the opportunity to encounter both perspectives, the one of the architect and the one of the end user, allowing participants to understand system setups and the participatory processes.

Performing the role of the architects, the participants will have to set up their overall design and layout within ModRule to establish the overall design framework of the proposed mass housing building. They have to decide how much design freedom they are willing to offer to their end users. They define fix points, such as vertical access, etc. and sub-divide the plan in a meaningful grid for end users to build upon. Since ModRule is developed based on game design logics, the architects may have the impression that they are designing an architectural game for their end users. This process makes them aware of the various issues that are involved in participatory design set ups.

Performing the role of the end-users, participants explore the many folded possibilities the system offers to them reflecting a variety of users' needs. Thus exploring the how mass housing allows for individual and collective design options. They can role-play a certain family type or simply try to design an apartment to their own liking. In this process, the participants will use both ModRule and Fuzor to engage with their design processes. They can experience a virtual simulation of their design within Fuzor and make their design decision based on these experiences.
Figure 2
Top: Screenshot of Fuzor with design model and site environment. Bottom: Screenshot of Fuzor with BIM data and component library for user to choose and design their spaces.
WORKSHOP EXPLORATIONS
The workshop explores and discusses with the participants the follow points:

- **Co-designing living space:** How can laypersons without any knowledge of how to design architectural spaces play a significant role in the design development and to what extent can they insert their own visions into this process?
- **Presence of the architect:** How can an effective communication between architects and laypersons be achieved?
- **Mass-housing:** How can design of mass housing be modified such that participants can be included without much complications?
- **Computational tools:** What are the elements that allow the design of mass-housing to provide high flexibility yet still within the constraints of an architect’s design?
- **Virtual environment:** What are the level of details needed to attain a comprehensive design collaboration process?

The participants are invited to provide constructive feedback to the authors of how to simplify or enhance the participatory design process of mass housing.

ANTICIPATED OUTCOMES
At the end, participants are able to generate a design outcome of a mass housing building that caters for the need for all involved stakeholders. Participants gain a deeper understanding about the preparations required for participatory designs in general and how technology can assist with this process.

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