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**PARTICIPANT INFORMATION SHEET**

Research Project Title Building Quake and People – A Serious Game Platform for Informing

Life-Saving Strategies (Ref. 016763)

Researchers Zhenan Feng, Civil, and Environmental Engineering Department

Supervisor Dr Vicente Gonzalez, Civil and Environmental Engineering Department

Co-Supervisor Prof Robert Amor, Computer Science Department

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**Purpose of this Participant Information Sheet (PIS)**

The purpose of this Participant Information Sheet (PIS) is to invite you to participate in the research data collection for this research project. This project aims to the mitigation of the impact of natural hazards by proposing the development of a computer-based modelling framework using Serious Games (SG), Virtual Reality (VR), Building Information Modelling (BIM) and Agent-Based Models (ABM) able to assess occupants’ behaviour in buildings in the event of an earthquake. You will be exposed to a virtual reality environment within a serious game framework (similar to video games) where you have to make decisions during a quake evacuation process in a building. Your reactions and behavior will be observed, and interviews will be used to characterize your behavior. The objectives of the interviews which will be informal are to gauge the nature of the data collected through your professional feedback. The interviews will be developed in the facilities of the organizations involved in this research.

**Research Background**

This research tries to comprehensively understand and predict human behavior during the evacuation of a building in the event of an earthquake. To do so, this project aims to develop a Serious Game (similar to video games, but with a “serious” purpose) for building owners, designers, regulators and emergency managers to use to model and simulate how occupants will behave during and after an earthquake in a particular building. Thus, the system “people-building-quake” (e.g., people’s behavior and motion throughout a damaged structure in the event of an earthquake) will develop more robust, effective and reliable evacuation strategies. The Serious Game consists of some components to simulate a realistic quake and a building evacuation process: 1) Building Information Model, 2) Agent-Based Model, and 3) Virtual Reality Environment. It is argued that while post-earthquake evacuation can be perceived as a quite controlled process, more research is required in that respect to a) better understand human behaviour in the event of an earthquake, and b) enhance current evacuation practices as earthquake damage in a building can be a very dynamic and unpredictable process, blocking predefined evacuation routes or exits and damaging a wide range of structural and non-structural components in a building, so alternative and adaptive plans (e.g., dynamic signalising) can take place to respond to earthquake damage, representing what may be best practices.

**Participation and withdrawal**

Considering your experience in evacuation matters, you could learn evacuation knowledge and provide some information regarding your experience being exposed to the virtual environment of the serious game, in which a building subject to the effects of a quake is simulated. Participation in this study is entirely voluntary, and you still have the right to whether or not participate. If you decide to participate in this research, you also have the right to withdraw from participation at any time, and without any explanation.

**Data Collection & Data Management**

This stage will be undertaken in three stages. The first stage involves the collection of Building Information Modelling (BIM) data of the participants’ building and a preliminary understanding of evacuation patterns. This will take place between March and October 2018. To collect BIM data, 2D and 3D architectural and engineering drawings from experiment buildings will be collected with the purpose to understand the geometry of non-structural, structural and architectural elements so that the Director Facilities Manager will assist with it. Also, information on the furniture and equipment available in the experiment buildings premises that can prevent an efficient evacuation process will be collected for further modelling as 3D objects.

You are asked to participate in a Serious Game. Thus, you will “play” the Serious Game using a virtual reality head-mounted display and game controller to make decisions and move within the Serious Game environment. The Serious Game development and application will be done between May 2018 and May 2019. The pilot test using the Serious Game will be done between June-October 2019. Your Serious Game session will take something in between 15-30 min. You will take part in one Serious Game session, which involves two stages. The first stage will be a mock round to familiarize with the technology basically. The second stage will be used to play the Serious Game itself. During this session (second stage), you will run through an earthquake scenario. The number of the scenarios will depend on the variables selected for manipulation, but will not exceed six. The location of the observation can be either at The University of Auckland or the specific location of the organization to which the participant belongs. Data will be video recorded and reviewed your virtual evacuation behaviors following the simulated earthquake. A coding scheme will then be iteratively developed from these virtual observations. This research is exploratory, and the codes and categories of behavior will be developed from view the virtual footage. Timing information will be collected on how long participants wait in place before evacuating and how long you engage in the activities identified in the coding scheme. Route selection will also be identified and collected.

Before and after the Serious Game scenario, there will be a questionnaire which is an essential step for the completion of this research. You will be asked about personal information, general questions about your decision making when facing risks in a building during a quake, strategies to avoid risk and other pedestrians and your overall perception and experience playing the serious game.

You are allowed to withdraw the questionnaires at any time during the session, without the need to provide any reason. Answers and data from the questionnaires will be analyzed and transferred to a draft survey information sheet in electronic format. You are allowed to review and withdraw the data provided after undertaking the questionnaire session. The collected data from the questionnaires will be kept for at least six years at the University of Auckland. All data collected will be stored in an electronic file on password protected computers. Data might be used in conferences, academic publications or presentations. However, organizations, individuals or individual responses will not be identified in any of these. All reports/results will be based on the overall results of the research.

You will be able to withdraw your Serious Game observation data should you no longer wish to participate, up to the point of the data analysis. Should a participant wish to withdraw, they will need to notify the researchers before data analysis (one week following the completion of his/her SG session).

There is some chance or motion sickness and vertigo with use of a virtual reality head-mounted display. You can withdraw at any point if you feel unwell. On top of that, all the measures related to an appropriate calibration of the virtual reality head-mounted display and recommendations for its appropriate use will be in place and communicated to the participants.

Upon request, the final results will be made available for you, but only after completion of the entire research report.

**Confidentiality and Anonymity**

Confidentiality is of utmost importance in all stages of this research. All data will be de-identified. This will include the removal of any names or other potentially identifying information you may mention in your interviews. No individual data will be described or released in any form, and only aggregate data will be presented in any reports based on these data. Your employer has given permission for employees to take part but will not be notified of your specific participation and will not be provided with the individual employee data.

**Queries**

Any queries or concerns regarding the research project can be addressed by contacting:

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For any queries regarding ethical concerns please contact: The Chair, University of Auckland Human Participants Ethics Committee Phone: 09 373 7599 ext. 83711. Postal Address: The University of Auckland, Office of the Vice-Chancellor, Private Bag 92019, Auckland 1142. E-Mail: [ro-ethics@auckland.ac.nz](mailto:ro-ethics@auckland.ac.nz)

APPROVED BY THE UNIVERSITY OF AUCKLAND HUMAN PARTICIPANTS ETHICS COMMITTEE ON   
13 /April/2016 FOR (6) YEARS REFERENCE NUMBER 016763