

AicE-Bs2013London  
Asia Pacific International Conference on Environment-Behaviour Studies  
University of Westminster, London, UK, 4-6 September 2013  
*"From Research to Practice"*

## Multi Agent Modeling for the Participatory Planning Process

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### Abstract

Participatory Planning Process (PPP) is a one of high complexity. Complexity Science has lead scientists to understand how complex systems and phenomena work, and how to deduce solutions from natural and biological complexity. Complexity theory is the interaction of its three roots; Cybernetics, System Dynamics and General System's theory (Abraham, 2002). Modeling has been an effective tool used to understand, simplify, predict, explain and control complex phenomena in various fields of science and knowledge. The research presents a Multi agent Model (MAM) for the PPP. MAM has proven to be an effective approach to untangle PPP complexity (information, social and planning complexities), thanks to its high de-compositional capability and its powerful means to surmount the collaboration network among agents.

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Selection and peer-review under responsibility of Centre for Environment-Behaviour Studies (cE-Bs), Faculty of Architecture, Planning & Surveying, Universiti Teknologi MARA, Malaysia.

*Keywords:* Participatory planning; complexity science; cybernetics

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### 1. Introduction

This research is discussing an issue of great relevance to current changes in our environmental, social and political life. It brings hope to our nations generally and Egyptians in specific after our revolution in 2011, that democracy could enable people to take control over their communities planning future. In 2005, an extensive Participatory Planning work had been conducted though out Egypt covering hundreds of villages. Results were far less than expected. A lot of practitioners, even from our department in Ain Shams University, were reluctant to go through such an experience again. The research argues that the reason behind the gap between the aims and objectives of Theoretical Participatory Planning and its applicability are the methods and tools used. These, instead of manifesting the bottom up nature of the

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process, and empowering and enabling the public, lead to high dependency on professionals, poor flexibility, challenged public learning and finally lead to minimized number of participants due to time consuming and non-easy tasks. This in turn, led to another type of top down planning, disguised and hidden behind the name of Participatory Planning. If Participatory Planning is to be taken seriously in both abiding to its principles and delivering its outcomes, solutions developed has to consider two main features of the problem as hand. First; Participatory Planning is a Multi-Disciplinary field (it has a planning, social and informational aspects) and, second; Participatory Planning is a Complex process. The research aims at building an explanatory model for PPP with a great degree of visualization to handle its complexity nature and to offer some solutions to its planning, social and informational problems.

## **2. Research methodology**

The Research methodology is broken down into four phases as follows:

### *2.1. Problem analysis*

This phase presented the literature review of Participatory Planning, its aims, objectives and principles. It also presented a critical analysis of the conventional applicability of the Participatory Planning. The analysis resulted in identifying a set of problems that where further classified under three aspects; planning, social and informational. The conclusion of this phase is that PPP is a complex and a multidisciplinary field.

### *2.2. Investigating solution space*

This phase studied Complexity Science and Cybernetics in search for solutions to PPP complexity and various modeling techniques. Complexity Science has lead scientists to understand how complex systems and phenomena work, and how to deduce solutions from natural and biological complexity. Complexity theory is the interaction of its three roots; Cybernetics, System Dynamics and General Systems theory. (Abraham, 2002). Modeling has been an effective tool used to understand, simplify, predict, explain and control complex phenomena in various fields of science and knowledge. The result of this phase is a set of biologic solutions facing the complex PPP, and the translation of these solutions into a set of model requirements.

### *2.3. Identifying solution*

From the study of a variety of modeling types, Multi agent Modeling MAM has been chosen as the most capable type to contain complexity of PPP, thanks to its high de-compositional capability and its powerful means to surmount the collaboration network among agents. Outcome of the study of MAM resulted in identifying a graphic based language called the “Unified Modeling Language” which has high visualization capabilities helpful in responding to the required explanatory nature of the required PPP model.

### *2.4. Solution design*

Finally with both requirements and specifications already defined, the research reached a level of maturity enabling the detailed design of the PPP model, elaborating on functions, interrelations, internal protocols, components and deployment diagrams of the model.

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