PowerSim: a discussion oriented modelling system

Adam Randle

Vinnie Reid

Patricia Haden

Hamish Smith

Samuel Mann

Information Technology
Otago Polytechnic
Dunedin, NZ
samuel.mann@op.ac.nz

1. CONTRIBUTORY SIMULATION

PowerSim is part of a partnership between Otago Polytechnic and the Dunedin City Council's Community Resilience Forum to better understand and support long-term decision making. Such decision making is beset by uncertainty, contention and ambiguity (Mann 1996). "Serious games" are one way of engaging people in thinking about problems but gameplay and game mechanics are predefined. This is not very useful in policy areas where understanding is lacking. Kreitmayer *et al.* (2012) describe participatory simulations whereby teams are encouraged to collaboratively explore a given model as a means to promote discussion and reflection upon uncertainties. A contributory simulation "also enables critical changes to be made to the underlying mathematical model as well as interacting with the visible dimensions at the user interface".

2. POWERSIM

PowerSim is a structured process for policy development using interactive visualisation and computer simulation. It is foremost a participatory process to engage people in thinking about issues such as those involved in the development of long term strategies. Rather than a static model, the outcome of the process is the modelling process itself – of increasing understanding, uncovering assumptions, and in jointly recognising drivers and implications.

PowerSim was developed to be used in the development of long term strategies such as a 2050 Energy Strategy. In such an initiative, the decisions are not about siting of a particular set of traffic lights or bus-stop but rather higher level considerations of transportation and spatial planning – should the city favour inner city development over remote suburbs? what is the role of public transport? and so on.

Rather than attempting to answer these large scale questions outright, we asked workshop participants to focus on everyday decision making. Hence, in this Energy Strategy, we focussed on personal decisions to travel to a particular event – such as going to the movies. It is important to note that the intention is not to build a definitive model of movie-going characteristics – rather the role of the modelling is to provide a platform for discussion of factors affecting transportation decisions. The insights from this discussion then contribute to a more informed policy discussion.

PowerSim is used to elicit information from workshop participants about the factors that affect their decision making. For example, in the case of a traffic flow problem, the PowerSim process helps group members to articulate what things determine how they make their daily travel choices. Some possible factors might be weather, work responsibilities, motivation, etc., PowerSim helps participants to identify factors and then describe exactly how each factor impacts their travel decisions.

The process is split up into three main parts. The problem set is first introduced and workshop participants are invited to **contribute ideas for factors that affect decision-making**. These are then ranked on an importance board. A separate whiteboard is used to capture insights, assumptions and other ideas.

An **Interactive Visualiser** links the whiteboard interaction with computer simulation. This is built in C#, and communicates via XML output with the third part of the system (see below). Workshop participants are led through the agreed most important factors from the whiteboard importance diagram. For each factor, parameters are identified to quantify the relationships between the determinant and the ultimate decision.

The final part of the PowerSim system – the **simulation tool** – allows participants to see the impact of their estimates on a community. For example, if you have used the Interactive Visualiser to determine the impact of fuel prices, you can use the simulator to illustrate how many people will choose to drive to work when fuel is expensive, based on the group's decision about the impact of high fuel cost. Workshop participants will be able to actually see a simulation of the traffic in their town based on the issues they have identified as important. The simulator is built in Repast, an open source agent-based modeling and simulation platform (repast.sourceforge.net/).

The PowerSim process was used in five workshops held during March and April 2012. From these workshops, positive feedback has been given from both workshop facilitators and workshop participants, as they found it useful for communicating when exploring decision making.

PowerSim has great potential to contribute to improved policy development and decision-making both in Dunedin and further afield. The PowerSim process is an example of participatory engagement in policy development. It brings together spatial thinking, systems thinking and consensus decision making. It is a promising contribution to an effective discussion-oriented modelling system.
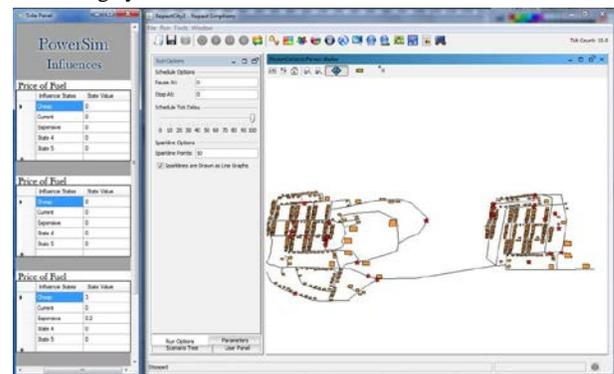
REFERENCES

Kreitmayer, S., Y. Rogers, R. Laney and S. Peake (2012). From participatory to contributory simulations: changing the game in the classroom. Proceedings of the 2012 ACM annual conference on Human Factors in Computing Systems. Austin, Texas, USA, ACM: 49-58.

Mann, S. (1996). Spatial Process Modelling for Regional Environmental Decision Making. SIRC'96: Proceedings of the 8th Annual Colloquium of the Spatial Information Research Centre, University of Otago, University of Otago. 126-135