

## **Using Simulation to Predict Prospective Burglary Rates in Leeds and Vancouver**

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Predicting the effect that new urban developments will have on burglary rates is extremely important, but also extremely difficult. Although crime-reduction plays an integral part in the design and implementation of most modern urban developments (e.g. the “secured by design” standards for new buildings) policy makers and academics still struggle to predict the city- or community-wide effects that such developments will have on burglary. This is partly due to the large number of factors which determine whether or not an area might be subject to high burglary rates. These factors include:

- attributes of the individual houses (e.g. security precautions);
- personal characteristics of the potential offender (e.g. their preferences for particular targets, access to transport or the influence of drugs);
- features of the local community (e.g. the presence of passers-by or neighbourhood watch schemes);
- the physical layout of the neighbourhood (e.g. the presence of alleyways or easy-to-access back gardens);
- the potential offender’s knowledge of the environment (e.g. the areas which they know well and feel comfortable in).

Traditional modelling techniques often use statistical methods which cannot handle such a high degree of complexity and must either ignore important variables or attempt to simplify them. Agent-based modelling (ABM), on the other hand, is a type of computer simulation that can include any number of individual-level factors. ABM can be used to create virtual worlds which mimic a real city and allow simulation experiments to be performed which would be unethical or even impossible in the real world.

This paper will outline ongoing research into the use of ABM to predict rates of residential burglary. The model uses a realistic virtual urban environment, populated with virtual burglar “agents”. As the simulation runs, the agents are able to make decisions about what action they would like to take. The agents are able to move around the virtual city and, if they deem it appropriate, attempt to burgle houses. The model is being developed closely with the Safer Leeds CDRP and eminent criminologists to attempt to include all we know about the residential burglary system from both practical and academic viewpoints.

Early results have shown that the model is able to simulate realistic burglar movements around the city of Vancouver, Canada. Burglar agents are able to use cars, public transport or walk where appropriate and the simulation shows that changing burglars’ access to transport has a strong effect on burglary patterns. Similar work is also currently being undertaken in the UK, simulating the effect that a new urban development will have on burglary rates in the city of Leeds.