E-Bulletin #5
5 March 2015

Building a community understanding of flood risk in Southwell, Nottinghamshire

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System Dynamics

System dynamics covers a suite of techniques that were developed in the 1960s for representing complex systems and exploring their dynamic behaviour. A complex system is one which consists of many different and connected parts. It is only through looking at the system as a whole, as a network, that we can begin to understand, and possibly predict, its behaviour under certain conditions.

The objectives of system dynamics include:

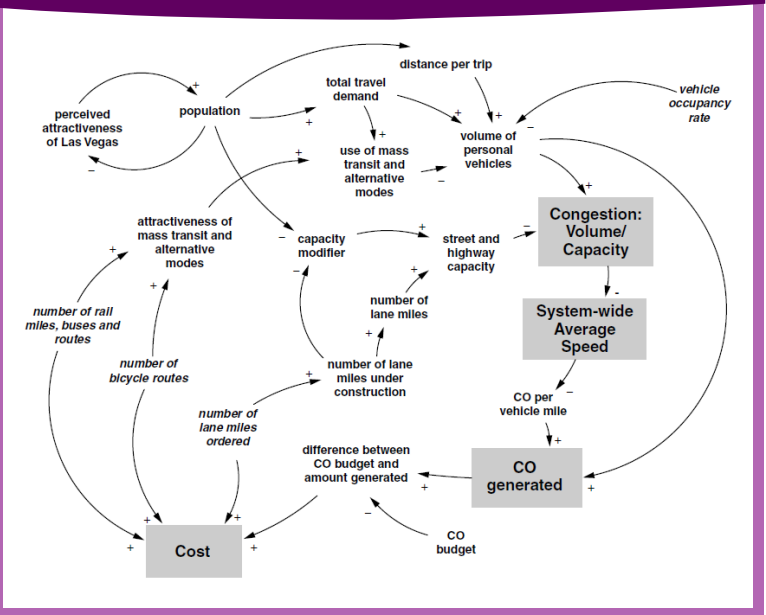
- Identifying system structure
- Seeing how different elements are related
- Simulating the effect of making system changes

The technique is also able to provide an insight into the feedback process that govern these dynamics. This adds a temporal aspect to models and enables us to see how the different variables and their relationships vary over time.

Using system dynamics in a participatory setting usually involves developing a stock and flow diagram, and transforming this into a simulation model in a specialist software programme where it can be run and tested. Modern system dynamics software makes it possible for anyone to participate in the modelling process by providing an accessible graphical interface.

Before you can use a model to test different scenarios (or interventions) each of the variables in the model must be defined in relation to those that are linked to them. These relationships can be estimated using a combination of statistics, data and expert opinion—one of the benefits that makes system dynamics popular in a participatory setting.

The technique is increasingly being used to manage water resources (e.g. catchment planning, long-term water security and reservoir operation), but there are few examples of its employment to explore the complex systems surrounding flood risk.



The 'transportation challenge' example

The diagram above shows an example stock and flow diagram built by a stakeholder group in Las Vegas. The group's task was to develop policy recommendations to address worsening problems of traffic congestion (and the associated air quality) in the city.

System dynamics was used to help the group develop an understanding of the system and issues, and to help identify and compare general options for solving the problem. In their first session running the model, the group discussed and tried out different scenarios—generating lively discussion about how the model could be improved to better represent reality. Over time, through testing different management options, the group arrived at consensus over how the system might be managed.

Next Steps

Workshop Three will take place on Wednesday 25th March from 7:00pm—9:00pm (arrive from 6:45pm). Venue to be confirmed (local to Southwell). This workshop will focus on defining the relationships in the stock and flow diagram, so that we can run it as a model.

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