Modelling to Generate Alternative Policies in Highly Uncertain Environments

ABSTRACT

Julian Scott Yeomans
Operations Management and Information Systems Area
Schulich School of Business, SSB S338
York University
Toronto, ON, M3J 1P3 Canada
Syeomans@schulich.yorku.ca

Public policy formulation often proves to be an extremely complicated endeavour due to the considerable uncertainty within its various system components. The complexity of public sector decision-making is further compounded by competing performance design objectives and requirements that are difficult to specify, quantify and capture at the time ancillary decision models are constructed.

Consequently, there are invariably unmodelled performance design issues, not apparent at the time of model construction, which can greatly impact the acceptability of its solutions. In particular, while a mathematically optimal solution may prove to be the best solution for the modelled problem, it is frequently not the best solution to the real problem. Therefore, in public policy formulation, it is generally preferable to create several quantifiably good alternatives that provide very different structural approaches and perspectives to the problem – an approach referred to as “modelling to generate alternatives”.

The potentially unique performance features with these dissimilar alternatives are expected to result in them performing very differently with respect to the unmodelled issues, thus providing a means for capturing and incorporating the unmodelled issues into the solution process. This presentation reviews recent research in modelling to generate alternatives and shows how it can be used to generate numerous policy alternatives that satisfy required system performance criteria in highly uncertain environments and yet are maximally different in the decision space. Many of these techniques can be adapted to a wide variety of problem types and can be extended in to many different types of operational and strategic planning applications.