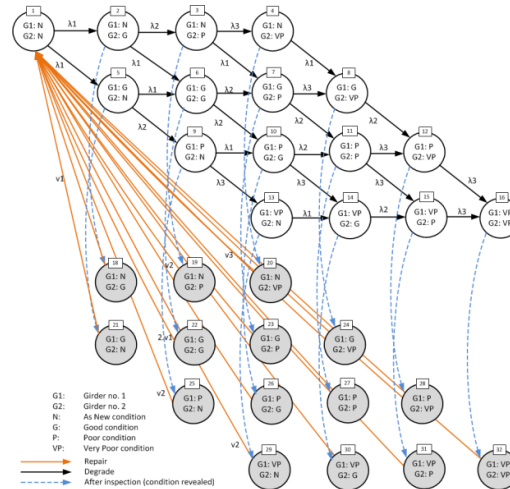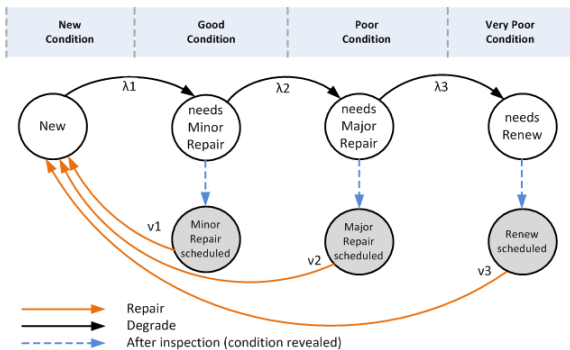# Bridge Condition Markov Model

Background

Bridge condition deteriorates slowly over time. Its state is controlled by the maintenance of its components including: inspection, servicing, repair, replacement and enhancement.

Objective

Predict the Whole Life Costs to maintain the bridge in an acceptable condition using a Markov model.


Number of components modelled	Number of states in the model	Solution time (s)
1	7	0.01
2	31	0.02
3	127	0.20
4	511	0.67
5	2047	2.36
6	8191	4.07
7	32767	7.58
8	131071	42.69
9	524287	313.91
10	2097151	3323.68
20	2.19902E+12	-
50	2.5353E+30	-
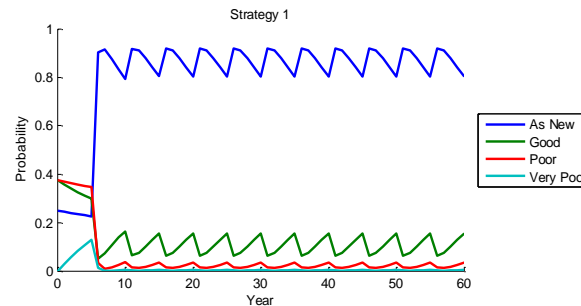
Predicting probabilities of the whole bridge being in different states in the future (average condition state)

Strategy 1 – repair as soon as minor deterioration
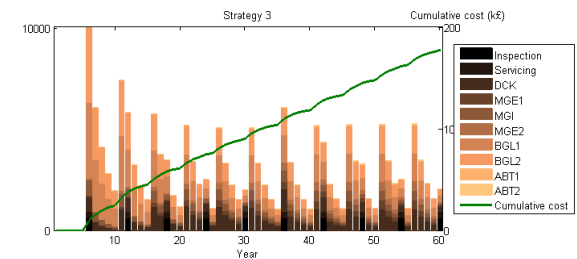
Predicting the future average cost of maintenance

Strategy 3 – repair when major repair needed