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Appendix: Using an Agent Based Model to estimate the avoided costs of the Local Area Coordination scheme

An Agent Based Model was developed for Solent University as part of their contract to conduct a realist evaluation of the Isle of Wight LAC scheme. Following the completion of the project, Risk Solutions has done some limited further work to parameterise the model based on a sample of forty case studies (individuals with differing problems who have been helped in some way by their local LAC). This Appendix summarises the model and the results that have been generated using this parameterisation.

The Agent Based Model

Agent based models (ABMs) are computer simulations that can help us to understand the emergent behaviour and properties of complex systems. They do this by modelling the simpler component entities that make up the system (the 'agents') and defining how the agents interact with each other. It is therefore not necessary to model the behaviour of the system as a whole; this behaviour emerges naturally because of the interactions between the agents. It is also not necessary to assume the system is in equilibrium because agent behaviour can be dynamic and adaptive.

The aim of the model is to address the evaluation question:

> What impact have local area coordinators had on their target populations, and can we estimate the expected net avoided costs over the duration of the LAC programme?

The Theory of Change for the programme suggests interventions facilitated by LACs can help individuals with problems become less reliant on public services and achieve better life outcomes for themselves, whilst simultaneously reducing costs for the local authority.

The ABM models a population of individuals (the 'agents') that are within the catchment area of a single LAC. Over time the agents can experience a number of transitions, as illustrated in Figure 1.

The model keeps track of how many individuals are in each state at any moment in time, and how they move from one state to the next. The model is controlled from a screen that allows the user to change key assumptions such as the number of people affected by each presenting problem. As the simulation runs it displays key statistics such as the size of the active caseload, the number of people successfully helped by the LAC, and the total costs (see Figure 2).

Parameterising the model

By the end of April 2018, just over 1500 people had been introduced to the Isle of Wight scheme. With 9 LACs in post, this represents an average of roughly 170 clients each. This does not take into account future clients, but the rate of introductions does seem to have slowed recently so it is possible that the scheme has nearly reached its maximum penetration. The maximum number of clients was therefore set to **200 per LAC**. The number of introductions per week in the model has been calibrated to approximately match the observed profile of cumulative introductions over three years.

Clients are divided into four groups that represent the four main presenting issues. From the data provided, roughly 25% suffer with some form of social isolation (including that caused by old age, bereavement, and being a carer). Roughly 25% present with a mental health issue. Roughly 15% present with a physical health problem. The remaining 35% present with "other" problems.

We were provided with a random sample of ten clients for each of the above groupings. These cases studies are summarised in the attached table. This data allows us to estimate, for each group:

- The average number of weeks spent in the scheme before the beneficial outcomes are achieved, which is used in the model to calculate a weekly probability of success

- The chance that the outcomes would have been achieved anyway without LAC intervention
- The costs per week that we could reasonably say are being incurred because of the client's presenting problem and that are no longer incurred once the beneficial outcomes are achieved. **This is a conservative assessment of the cost savings, because it only counts the reduction in costs that are currently being incurred. It does not take account of the possibility that future crisis costs have also been avoided, for example the prevention of a future acute mental health admission, because there is no way of knowing whether this would have actually happened or not**.

The results of this analysis are summarised in the table below:

Condition	**Time taken to achieve beneficial outcomes**	**Average weekly cost no longer incurred once beneficial outcomes are achieved**
Physical disabilities (10 case studies)	Min = 1 week Max = 52 weeks Average = 23 weeks	£129
Mental health problems (10 case studies)	Min = 1 week Max = 104 weeks Average = 43 weeks	£57
Social isolation (10 case studies)	Min = 3 weeks Max = 87 weeks Average = 43 weeks	£69
Other problems (10 case studies)	Min = 2 weeks Max = 104 weeks Average = 41 weeks	£76

The average LAC salary is assumed to be around £30k per year, plus modest travel expenses. No additional budget is assumed to be available, so this represents a **LAC salary cost of £600 per LAC per week**.

Results

Because the model is a statistical simulation where events happen by chance, slightly different results are obtained each time it is run. We therefore ran the model ten times with the LAC intervention in place and ten times with no LAC intervention and took the average of the total costs across the ten simulations in each case.

For the case **with the LAC scheme in place**, the total cost over three years for a population of 200 clients for one LAC was **£1.53 million** (made up of £0.09 million for the LAC salary costs and £1.44 million for the additional costs arising from the client's presenting problems).

For the case **with no LAC scheme in place**, the total cost over three years for a population of 200 clients was **£1.97 million**.

The estimated avoided costs over three years are therefore approximately **£0.44 million per LAC**. This should be treated as a ball park estimate only, as the analysis has been done very rapidly using a small sample of case studies. However, it is also a conservative estimate as it does not consider the possibility that future crisis costs have also been avoided, such as acute mental health admissions.

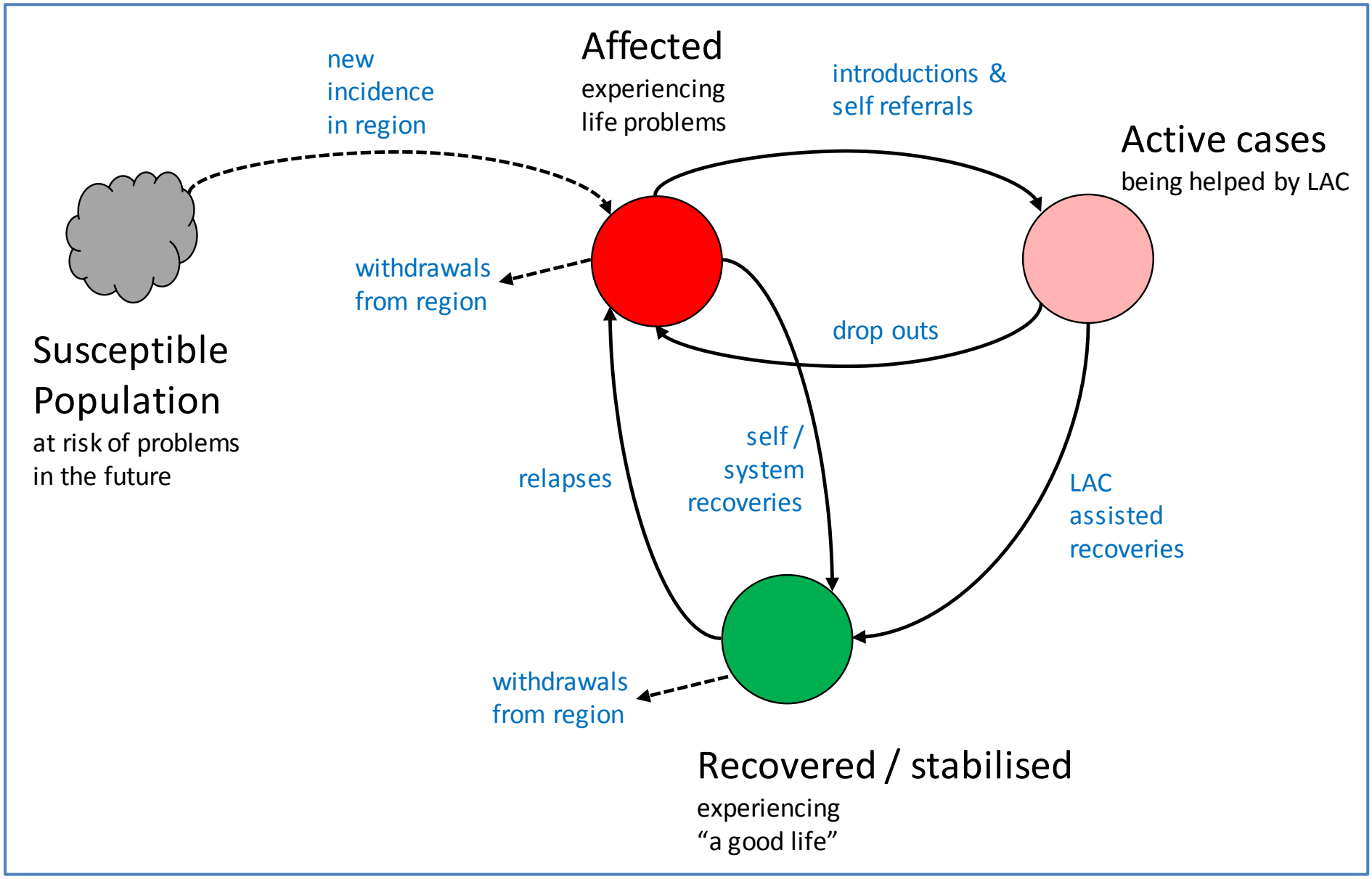

Figure 1: State transitions

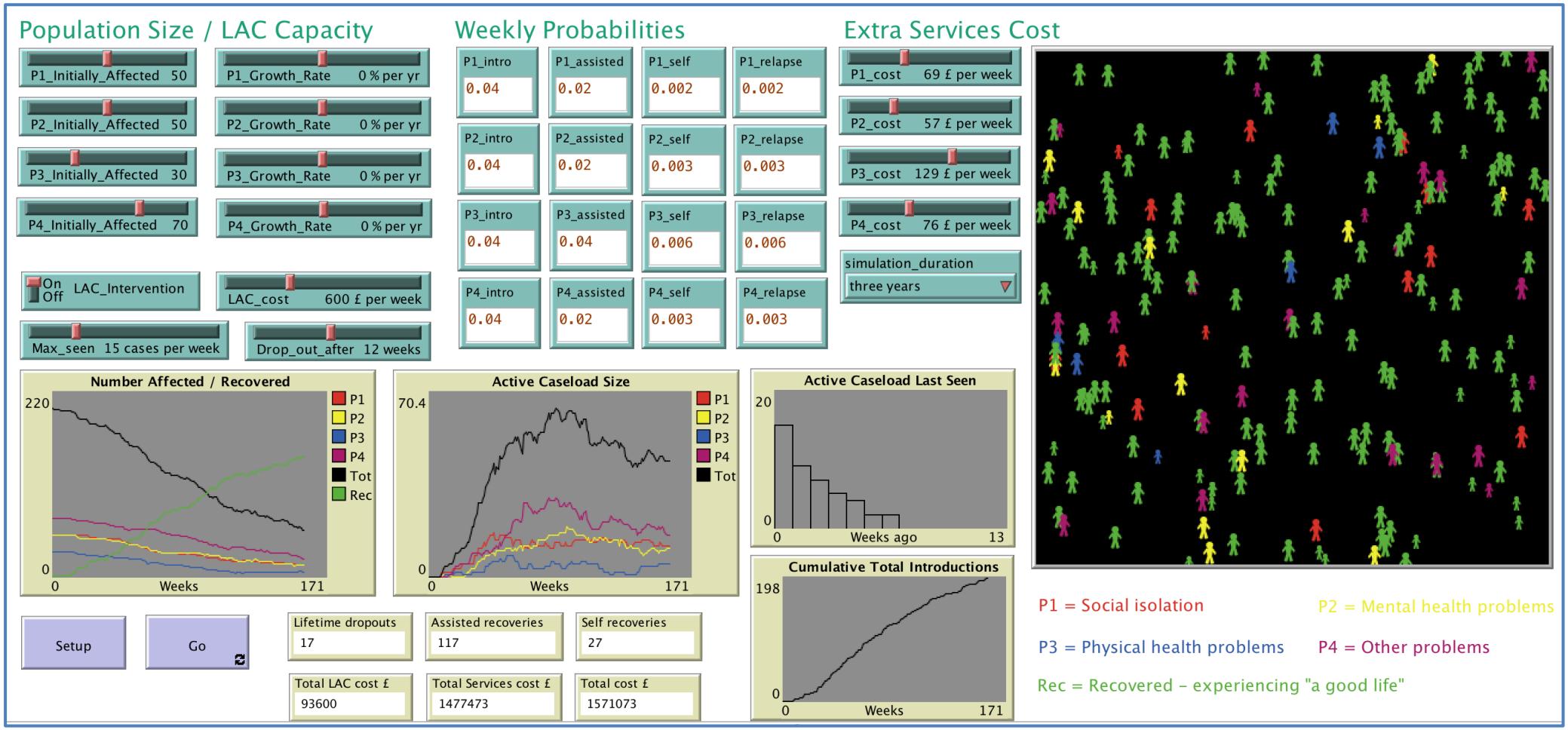

Figure 2: Model input and output screen