SLIE Annual Report - Workpackage 5: Review of Systems for Validation

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Validation

- Integrate the activities and outputs of the other work-packages into the validation of large-scale real-world applications.

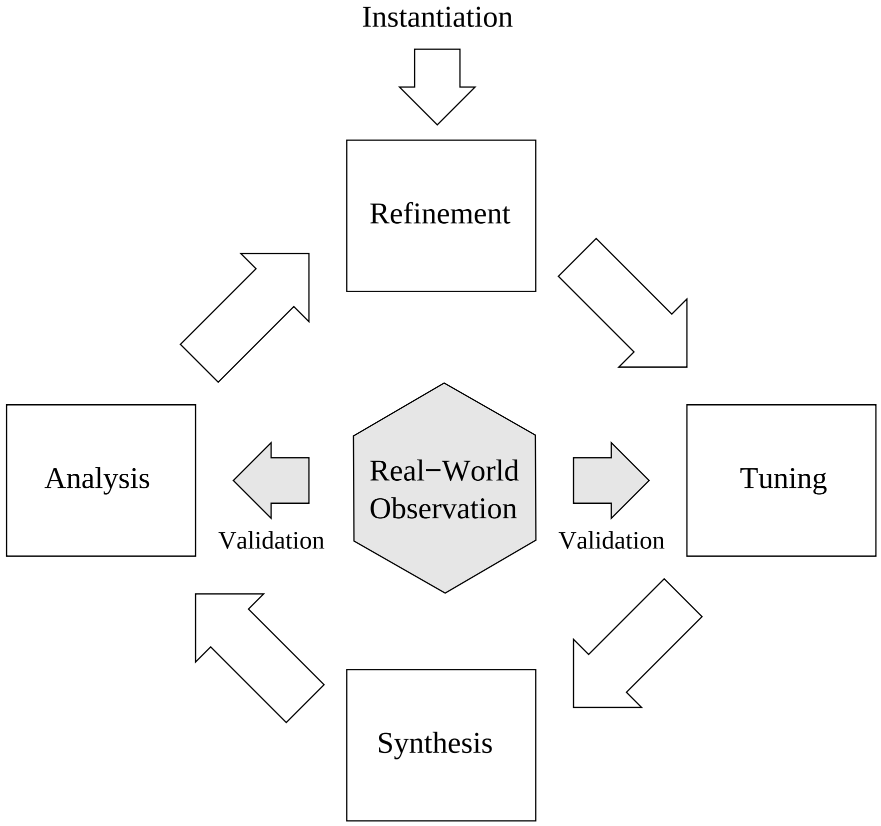
- Validation operates in two directions:

  1. Real-world observations guide the construction of our models.
  2. Our models allow us to hypothesise large-scale real-world behaviours.

- Our validation strategy is founded on *empirical analysis*.

- Our intention is to identify and solve real problems.

Validation Lifecycle



Case Studies

- We will use a number of case studies from a variety of different domains in our validation:

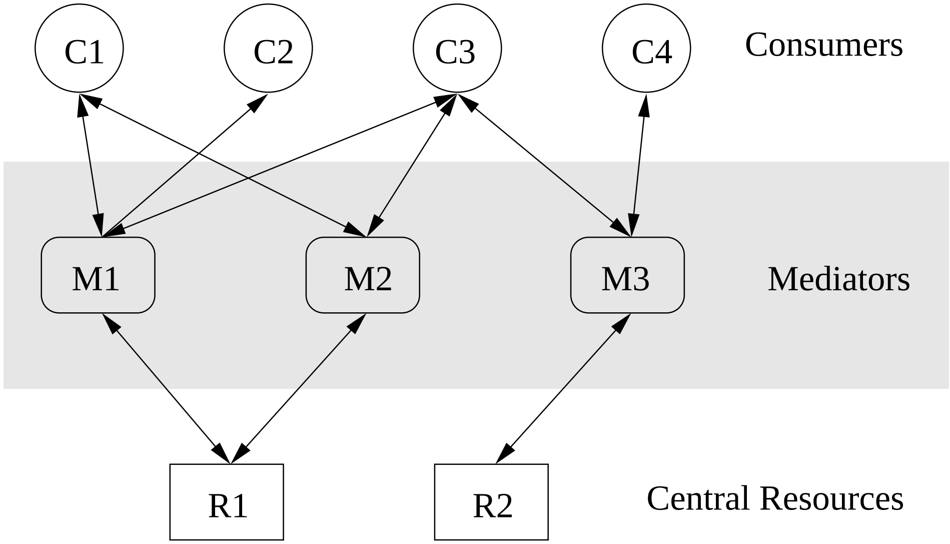
  1. Finance
  2. Tourism
  3. Manufacturing
  4. Open Source Software

- There are many different models which can be exploited in each domain.

- We have focused on particular problems which yield an incremental level of difficulty for our modelling platform.

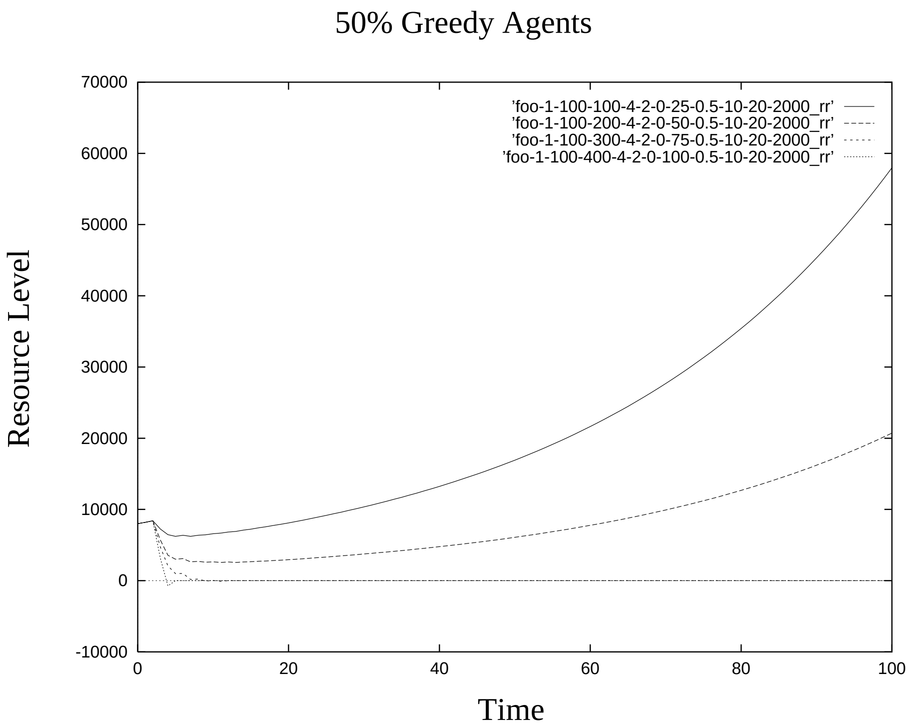
Case Study 1: Finance

- Consumers interact with central resources (e.g. banks). This interaction is performed through mediators (e.g. tellers):



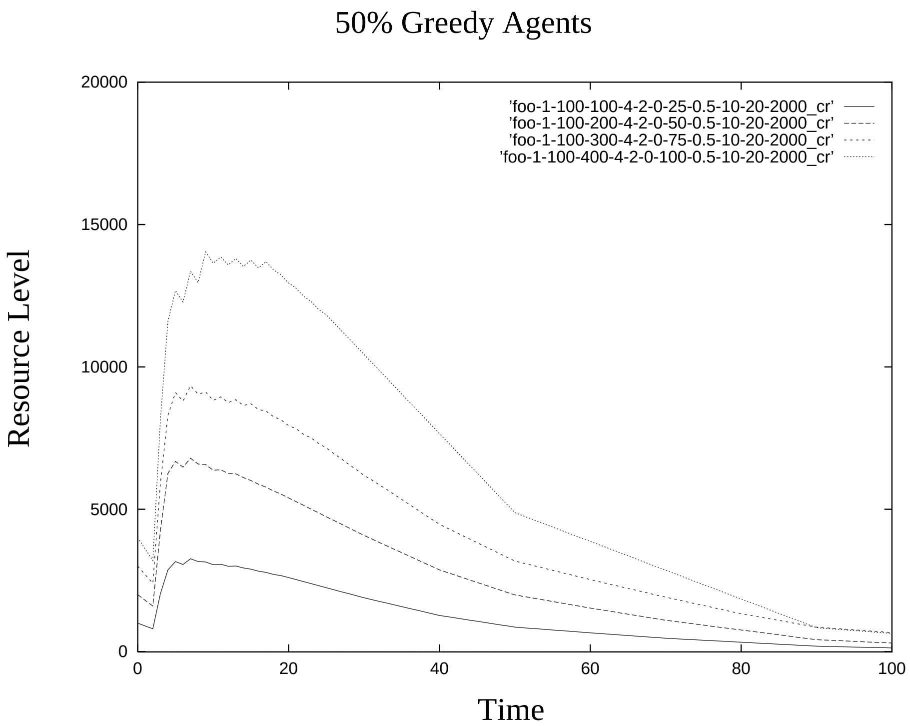
Experiment 1

- Surprisingly, the central resource level can be depleted below zero:



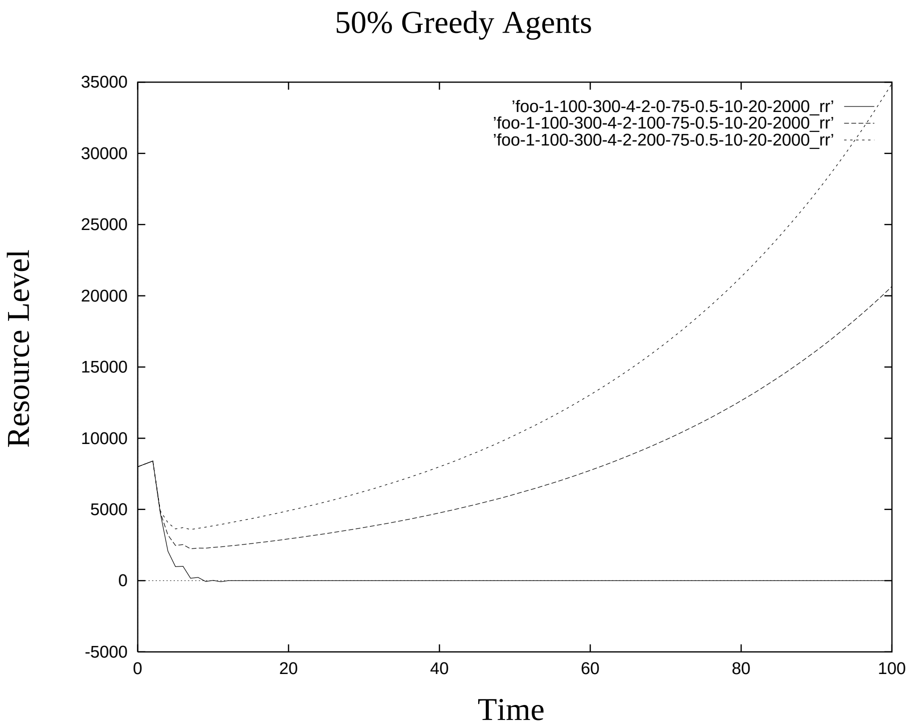
Experiment 2

- Consumers exhaust their resources and then slowly die of starvation:



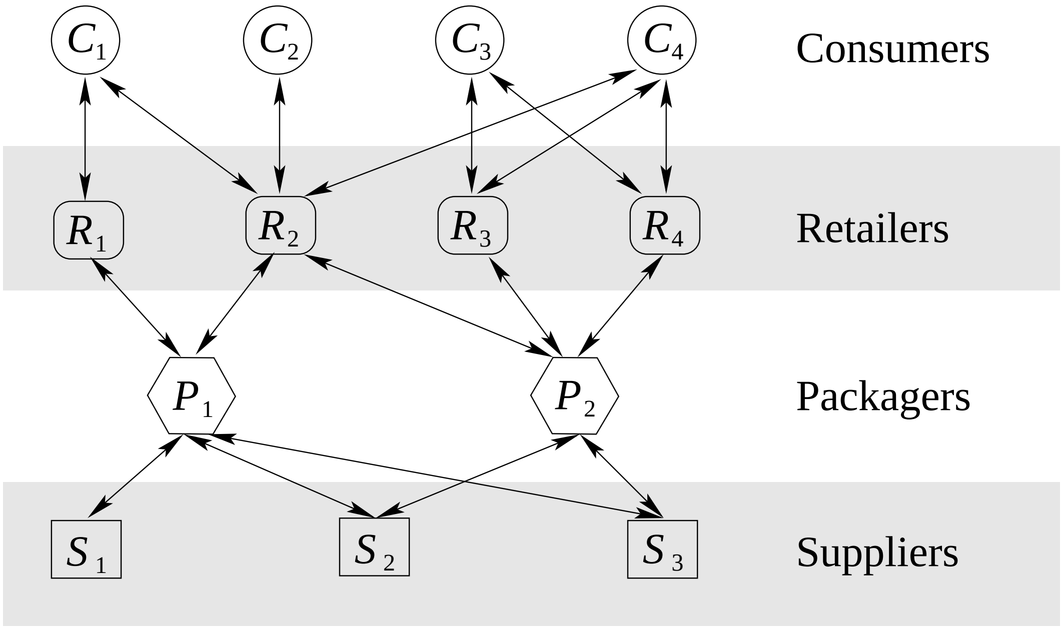
Experiment 3

- Introducing *auditor* agents considerably improves the situation:



Case Study 2: Tourism

- Consumers book holidays with suppliers through a range of different intermediaries:



Tourism Issues

- The problem is to match consumers requirements to seats and rooms booked by travel companies in bulk and in advance.

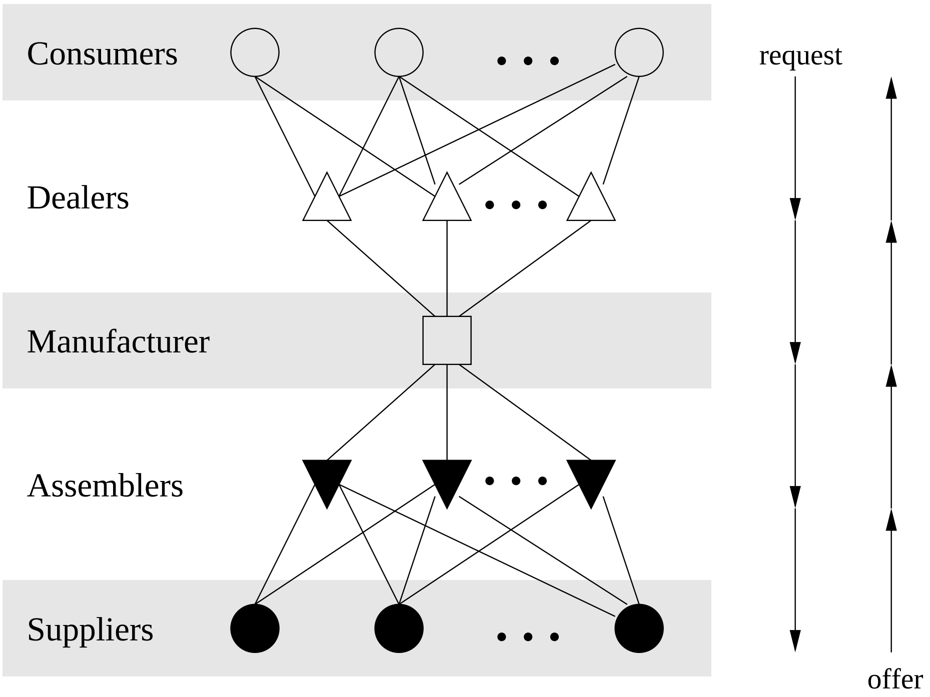
- A range of prediction techniques are used by travel companies - we hope that multi-agent models can do better!

- We have access to real empirical data from First Choice.

- Model involves a degree of *negotiation* and simple *reasoning* by the agents, unlike the previous model.

Case Study 3: Manufacturing

- Manufacturing networks model autonomous an interconnected business units:

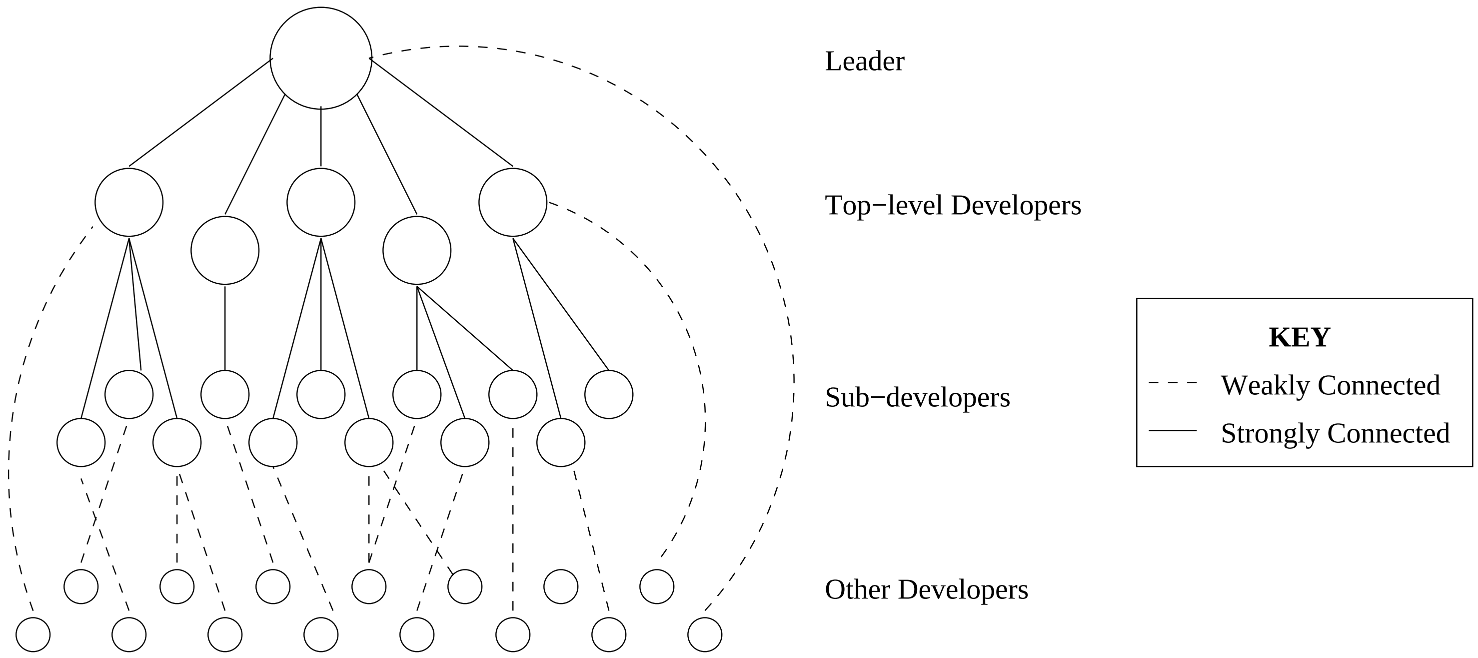


Supply Networks

- Supply networks can be considered a generalisation of the previous case studies.
- Many different variations are possible, e.g. supply rings, supply chains,hour-glass, hierarchies.
- Supply networks are concerned with streamlining the supply of resources to avoid over-stocking (e.g. just-in-time).
- Good potential for modelling as a multi-agent ecosystem - agent behaviours now more complex and multiple interaction protocols required.

Case Study 4: Open Source Software

- Open source development can be viewed as an ecosystem with a rapidly-changing dynamic topology.



Further Case Studies

There are a multitude of real-world systems that can be modelled as multi-agent ecosystems. A few others that we are considering are as follows:

- Modelling populations of electronic devices (Philips Research).
- Modelling the evolution of agent protocols (Imperial Cancer).
- Fitting to the demands of agent platforms (British Telecom).