IESIM: Simulating communities with a game-like approach

pecha kucha "style" presentation

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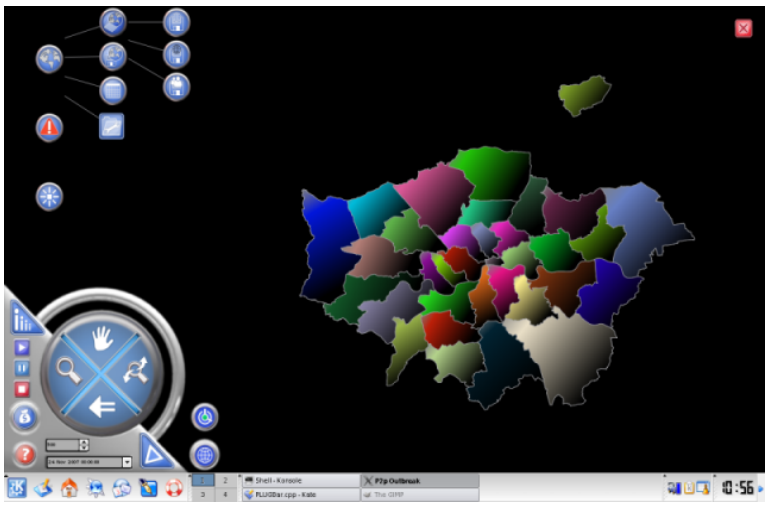
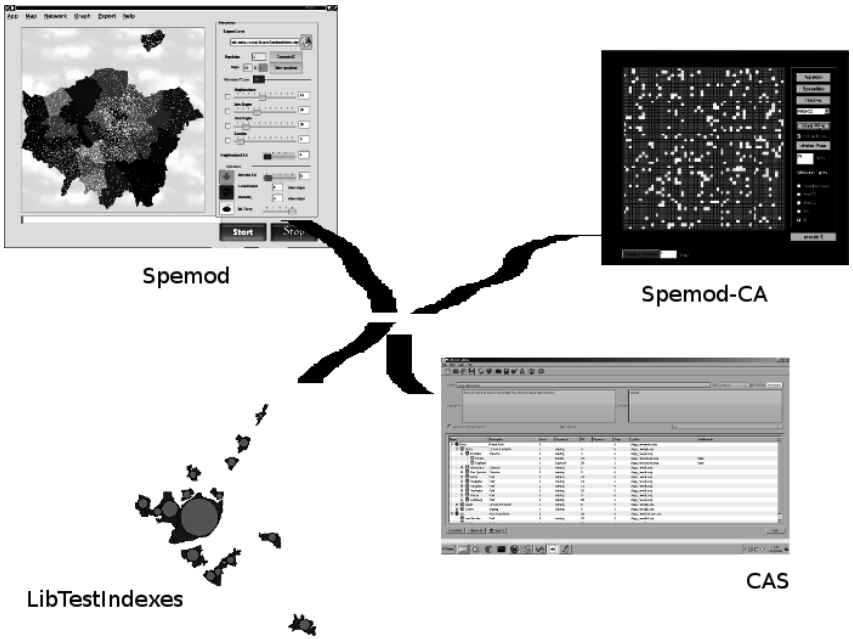


Which project?



IeSIM

IeSIM ADL:

- Modelling Environment, that implements models through a set of plugins.
- Targets: programmers and users.
- Intuitive and easy to use, as a computer game!
- Cope with lack of data, creating fictitious scenarios (as in games!)

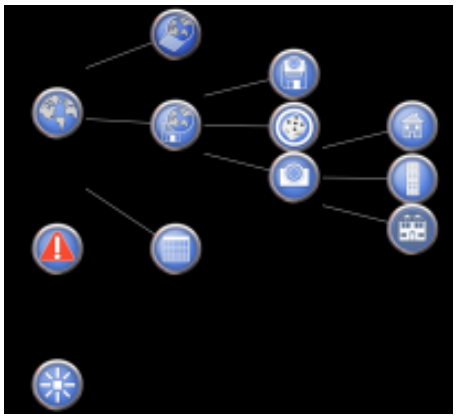
outbreakP2P

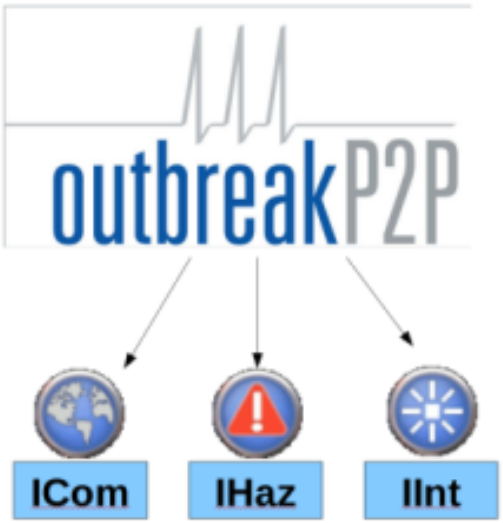
Case Study: outbreakP2P:

- Simulates the spreading of a non-vector infectious disease.
- Split into three sub-models: community, hazard and intervention.
- Each sub-model is implemented in a separate plugin (ICom, IHaz and IInt).

Plugins

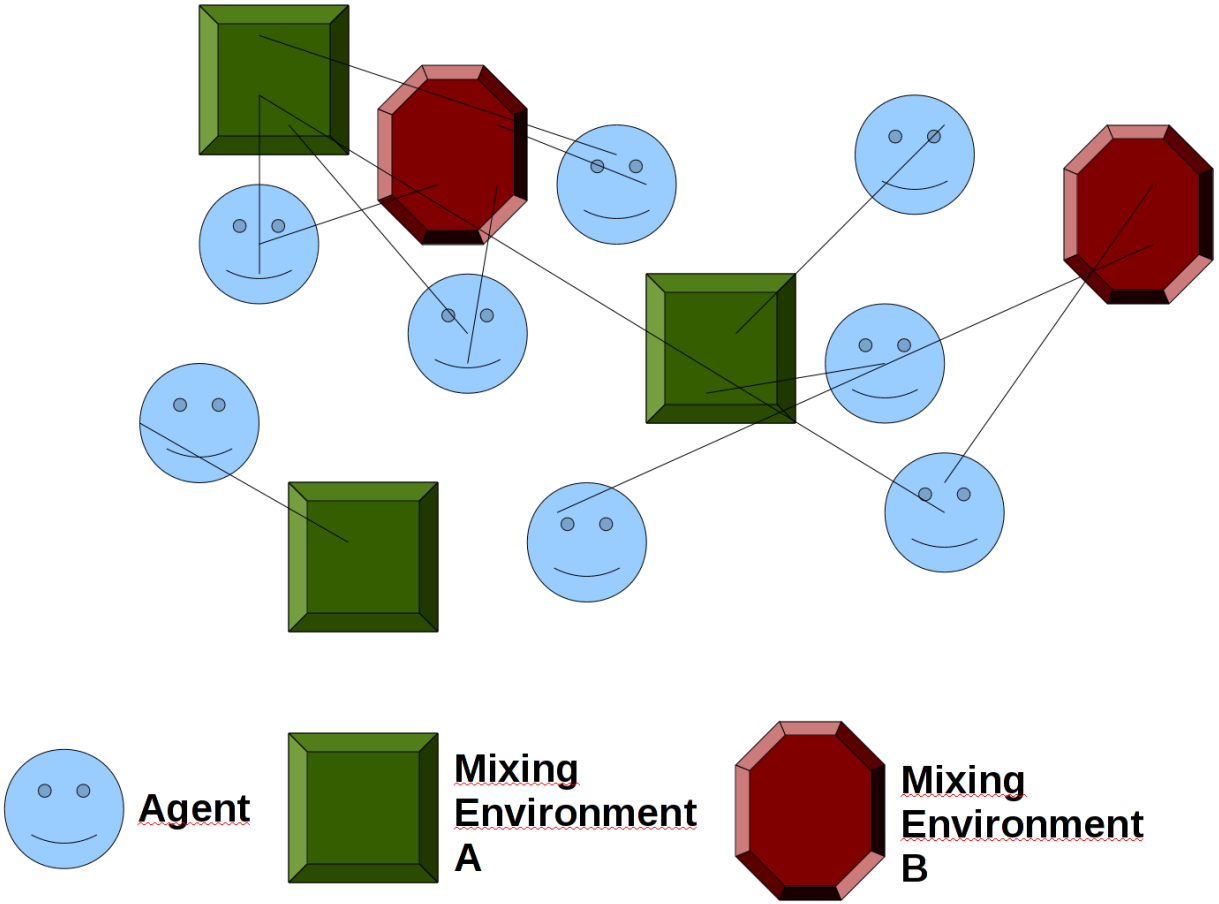
Each plugin is loaded at run-time and appears as an icon, which gives access to a set of sub-menus to configure the different model parameters.





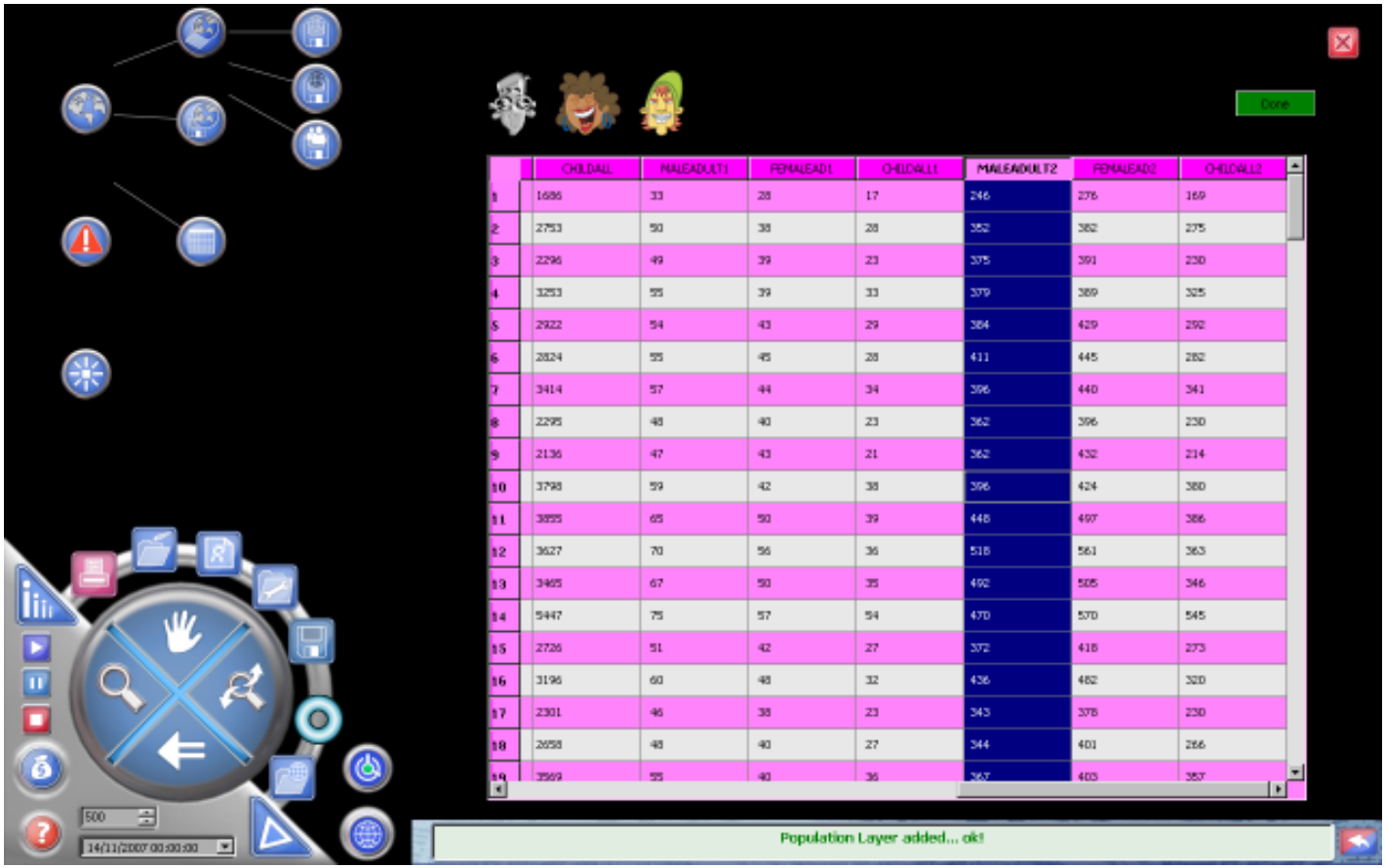
Community

- Agents and *Exposure* or *Mixing environments* (ME).
- Agents: households.
- ME: functional networks that link the households together.



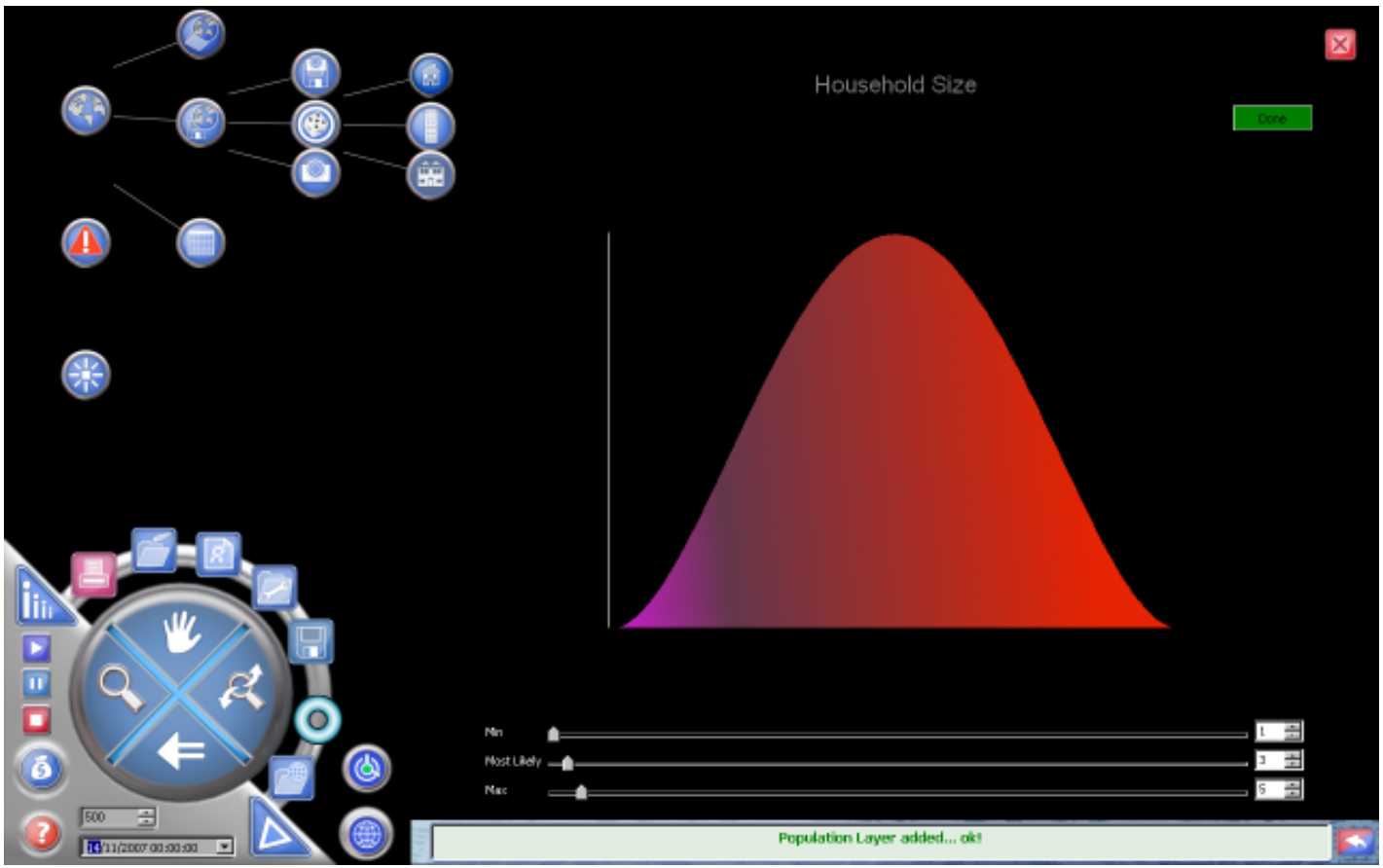
Creating a Community

- Step 1: Load population data (e.g.: from a Shapefile)



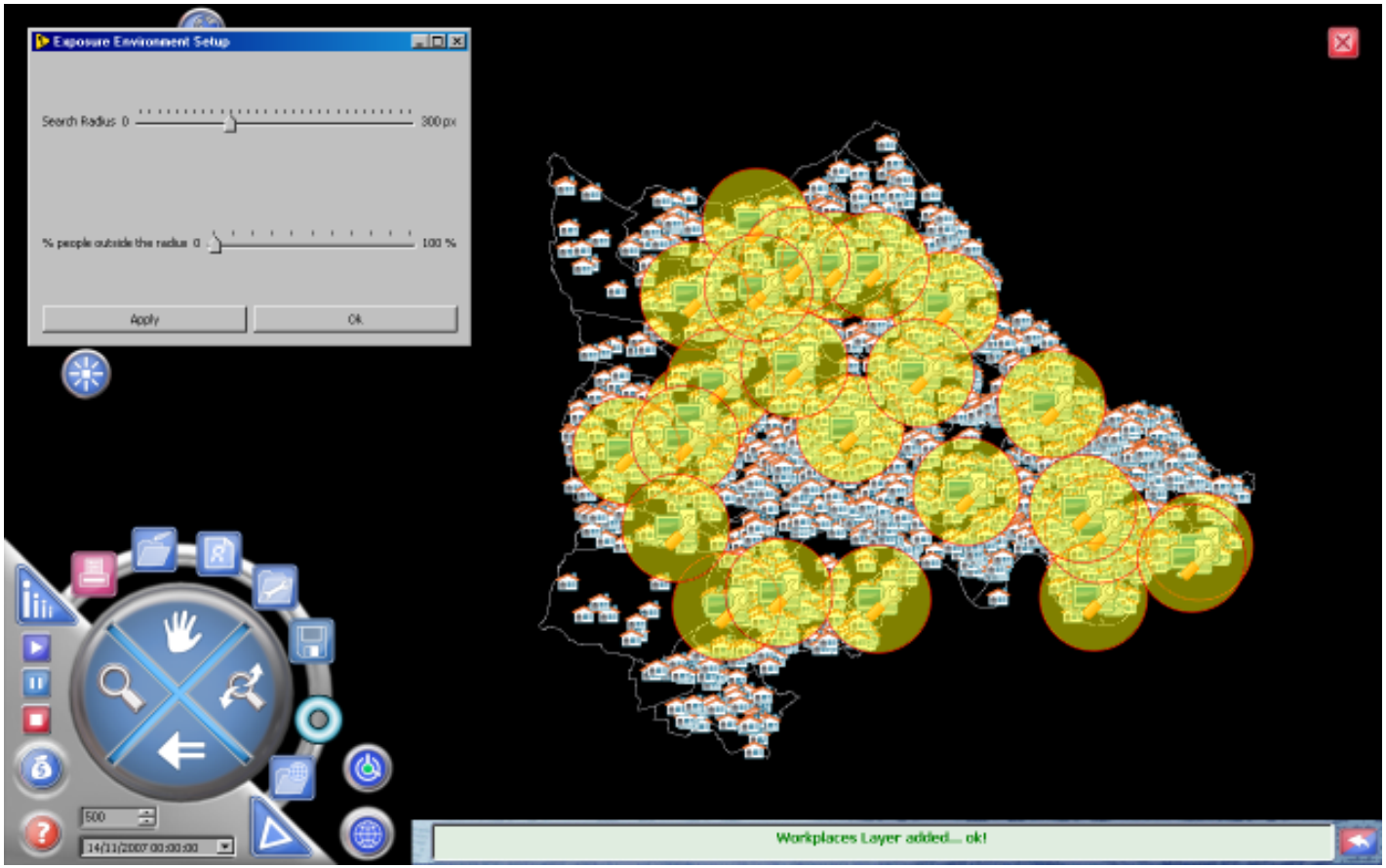
Creating a Community (+)

- Step 2: Define the households "structure" (Pert distribution).



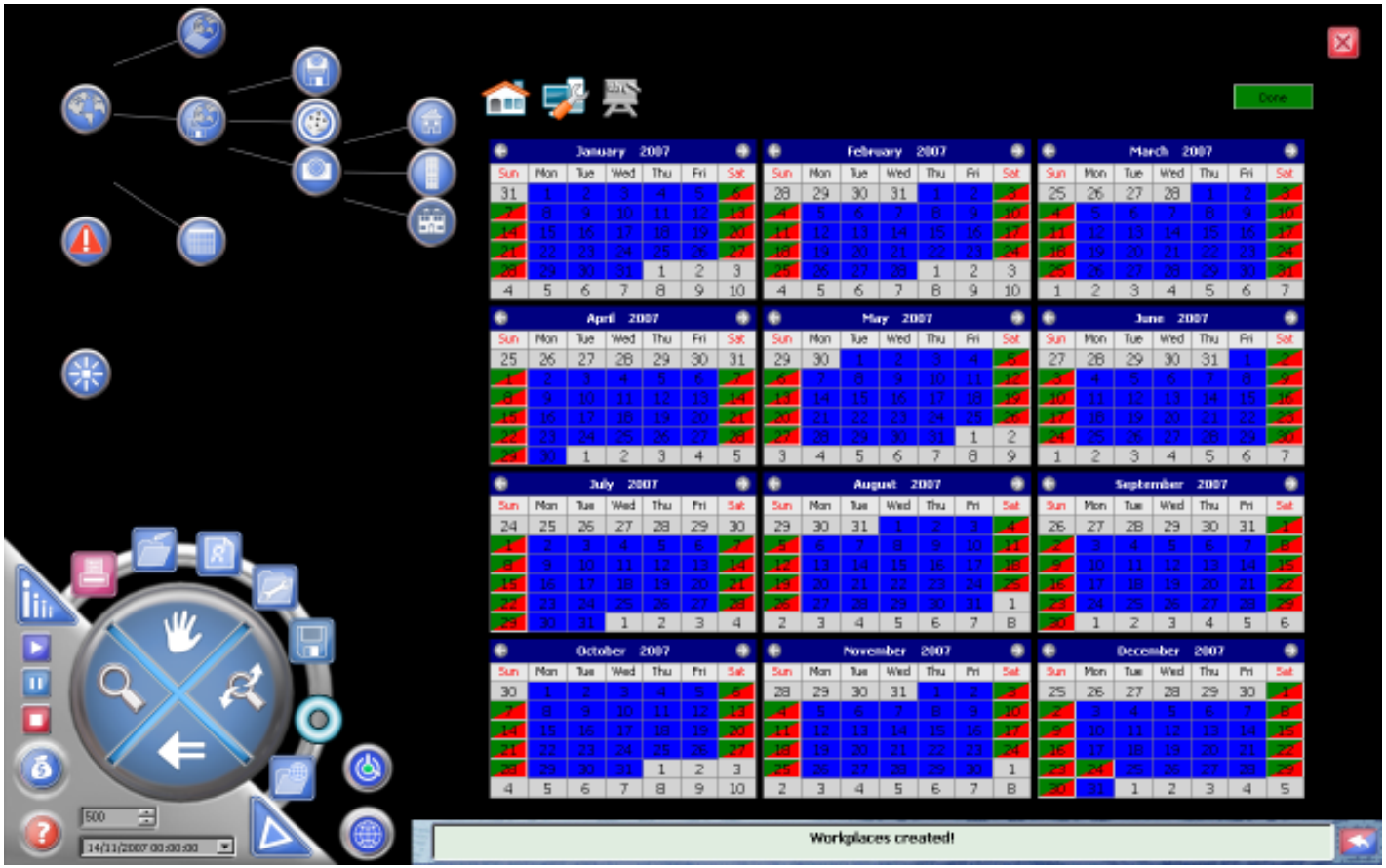
Creating a Community (+)

- Step 3: Create ME (load them, generate them randomly or input them in the map).



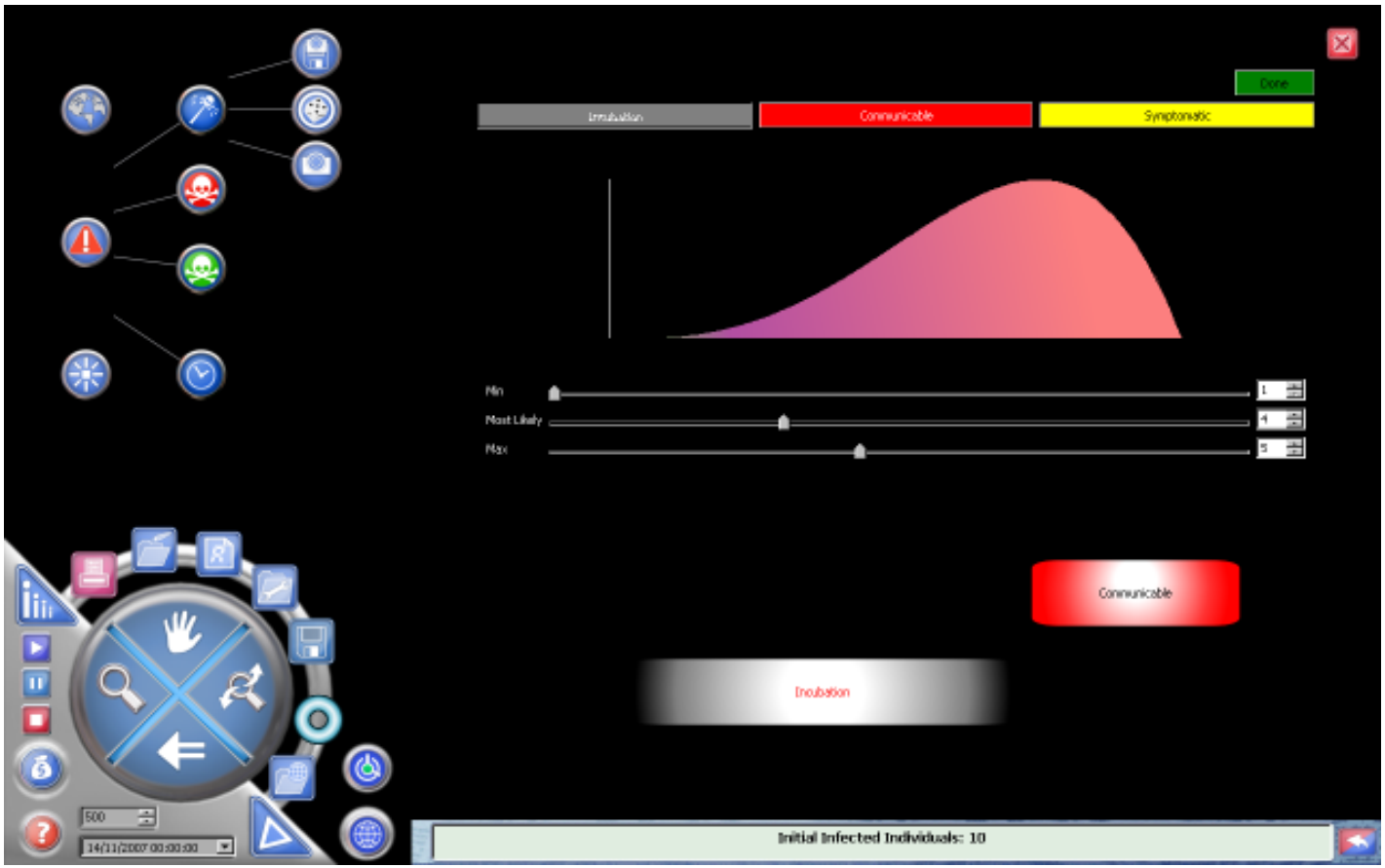
Creating a Community (+)

- Step 4: Setting the time dynamics of the ME.



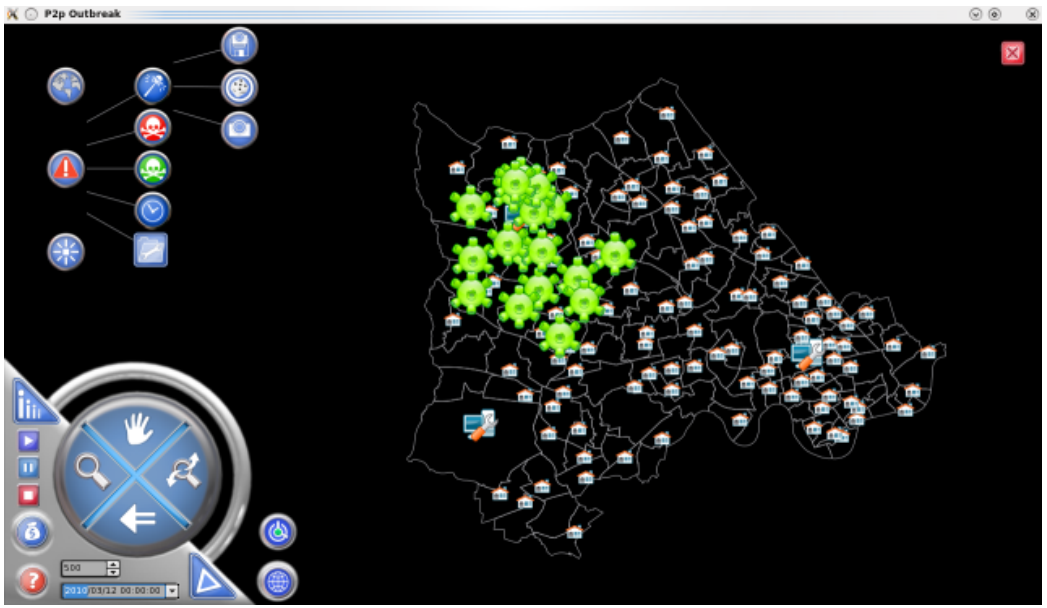
Hazard

- Hazard: infectious disease.
- SEIR model: susceptible, latent, infectious and Removed.



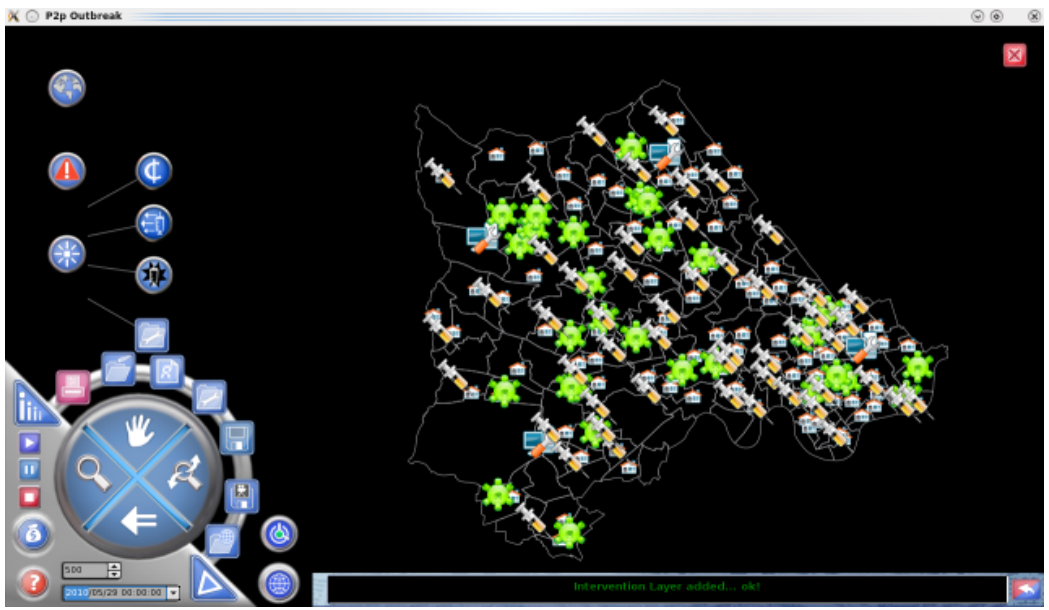
Hazard

- Set Attack rate (β) and Illness/Impact rate.
- Locate the source of the hazard: known locations of infected individuals.



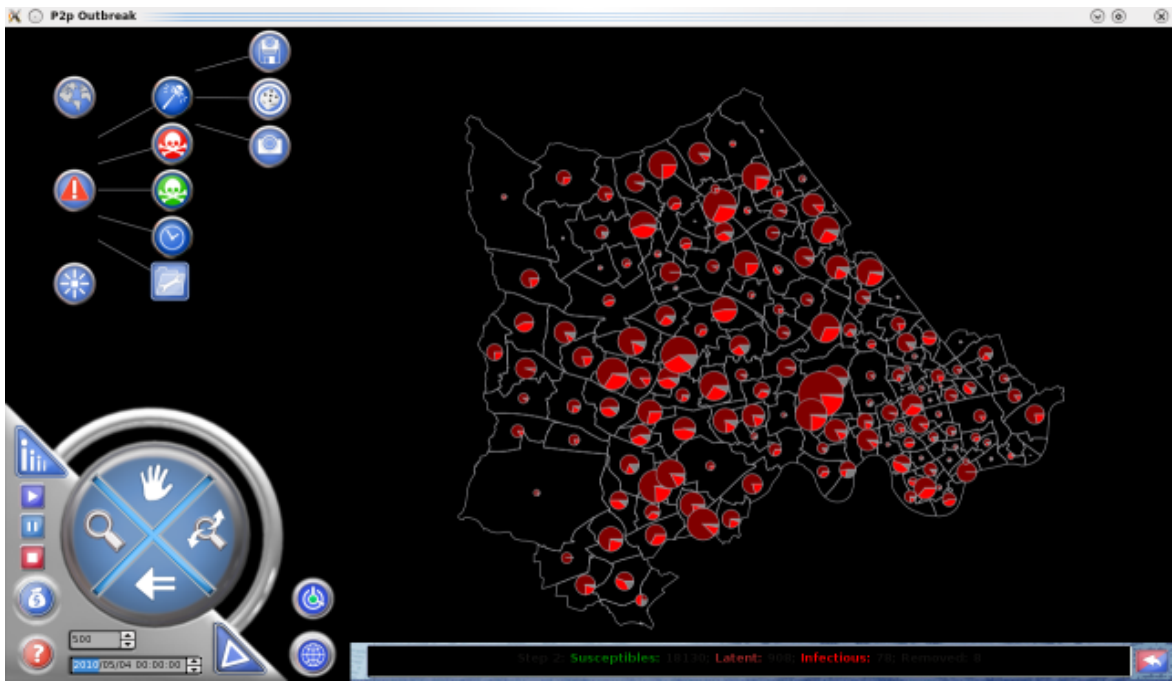
Intervention

- Test strategies for the optimal control of an infection in a spatial complex landscape.
- Vaccination Strategies: proactive and reactive.



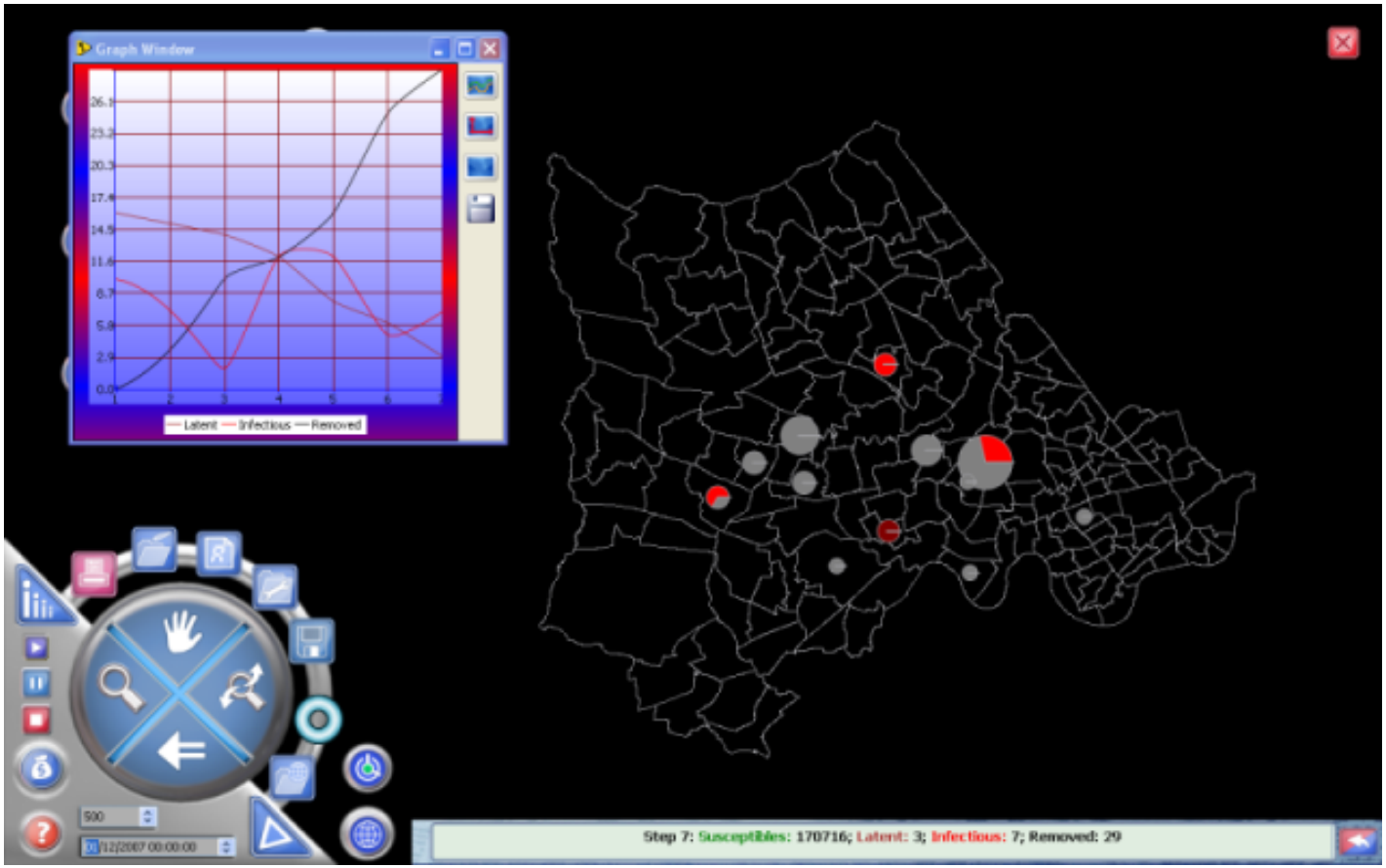
Play: Simulate

- The simulation integrates information from the three sub-models.
- Play, stop and pause.



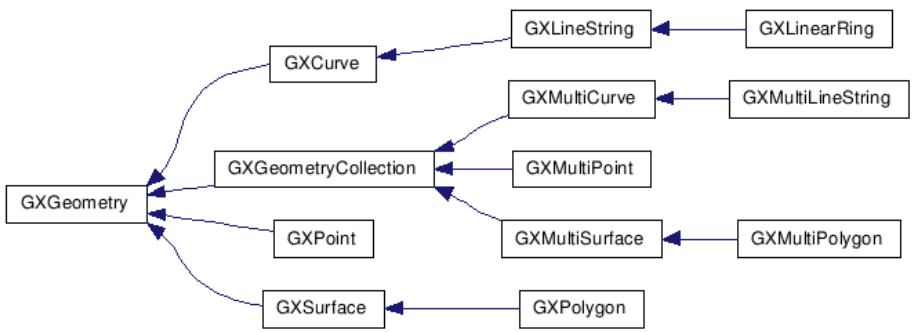
Play: Simulate (+)

The output of each time step is presented in real time.

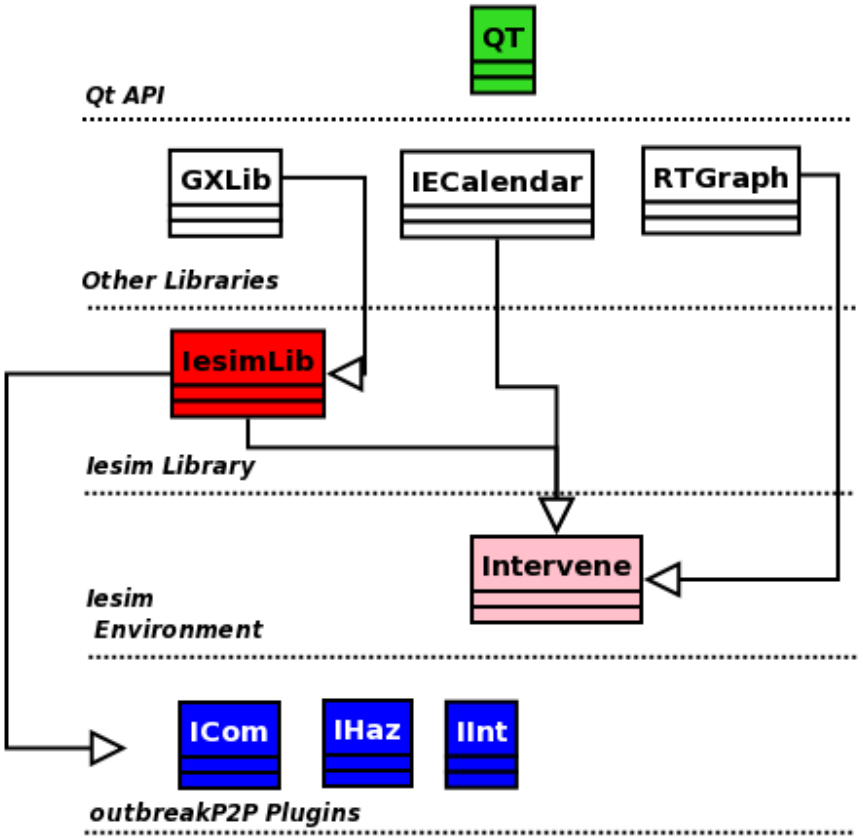


Some Technical Details

- C++ using Qt framework.
- Native Windows and Linux versions (easily portable to Mac OS).
- GIS importance: justified the development of an in-house library (GXLib).



Some Technical Details (+)



Final Remarks

- *Game* approach in scientific modelling.
- Tools to be used by non experts.
- Product needs a lot of testing, and some features still need to be developed.

Final Remarks (+)

- Unfortunately the end of funding before we could reach a release meant, the "freeze" of the project.

- I am open for collaboration opportunities in the future, that could push IeSIM further.

Links

- IeSim at WAMS 2010: `http://tinyurl.com/c7sdeod`
- Qt project: `http://qt-project.org/`
- `http://www.casa.ucl.ac.uk/joanamargarida/`
- `http://www.doublebyte.net`