NetBuilder‘ (Apostrophe)

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http://strc.herts.ac.uk/bio/maria/Apostrophe/

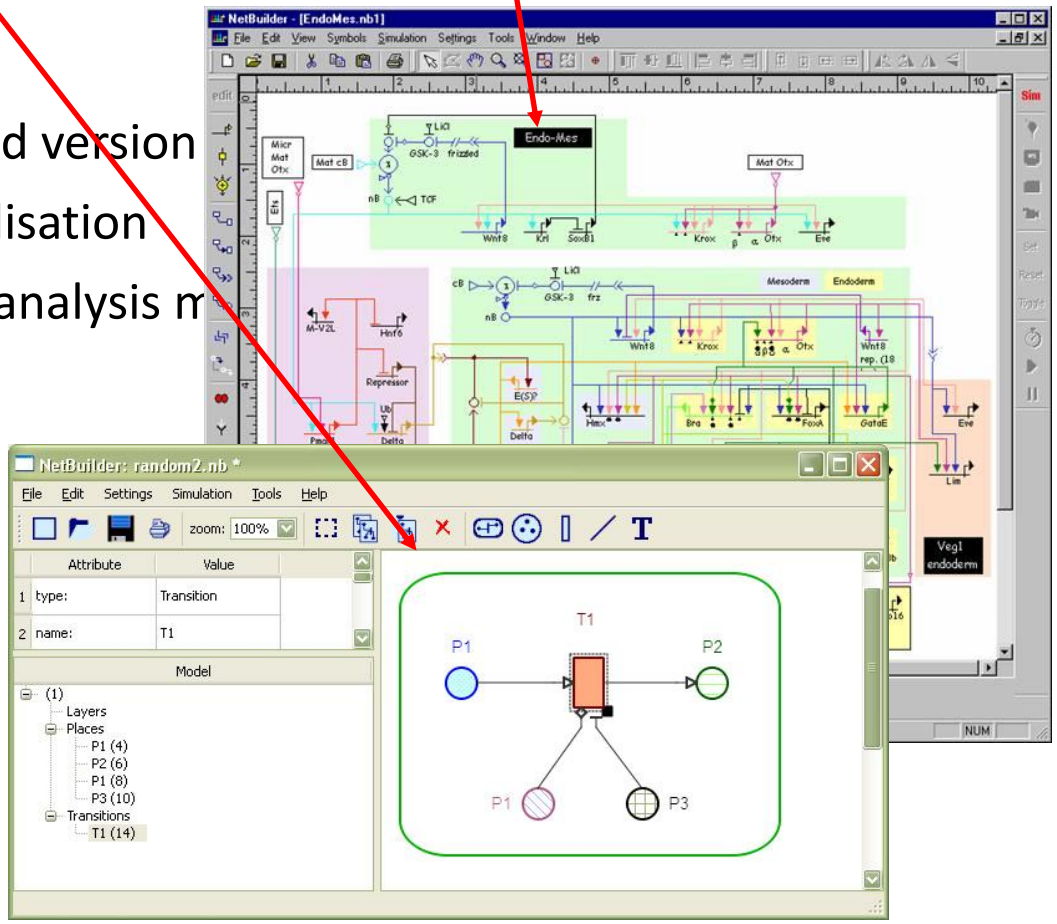
NetBuilder' (Project Apostrophe)

- A tool for biological networks
  - To construct, model, simulate (stochastic, deterministic, hybrid) quantitative **GRNs** and more
  - For researchers with little experience of mathematical modelling
  - OPEN SOURCE

- Further information and download:
  - http://strc.herts.ac.uk/bio/maria/Apostrophe/
  - http://sourceforge.net/projects/apostrophe/

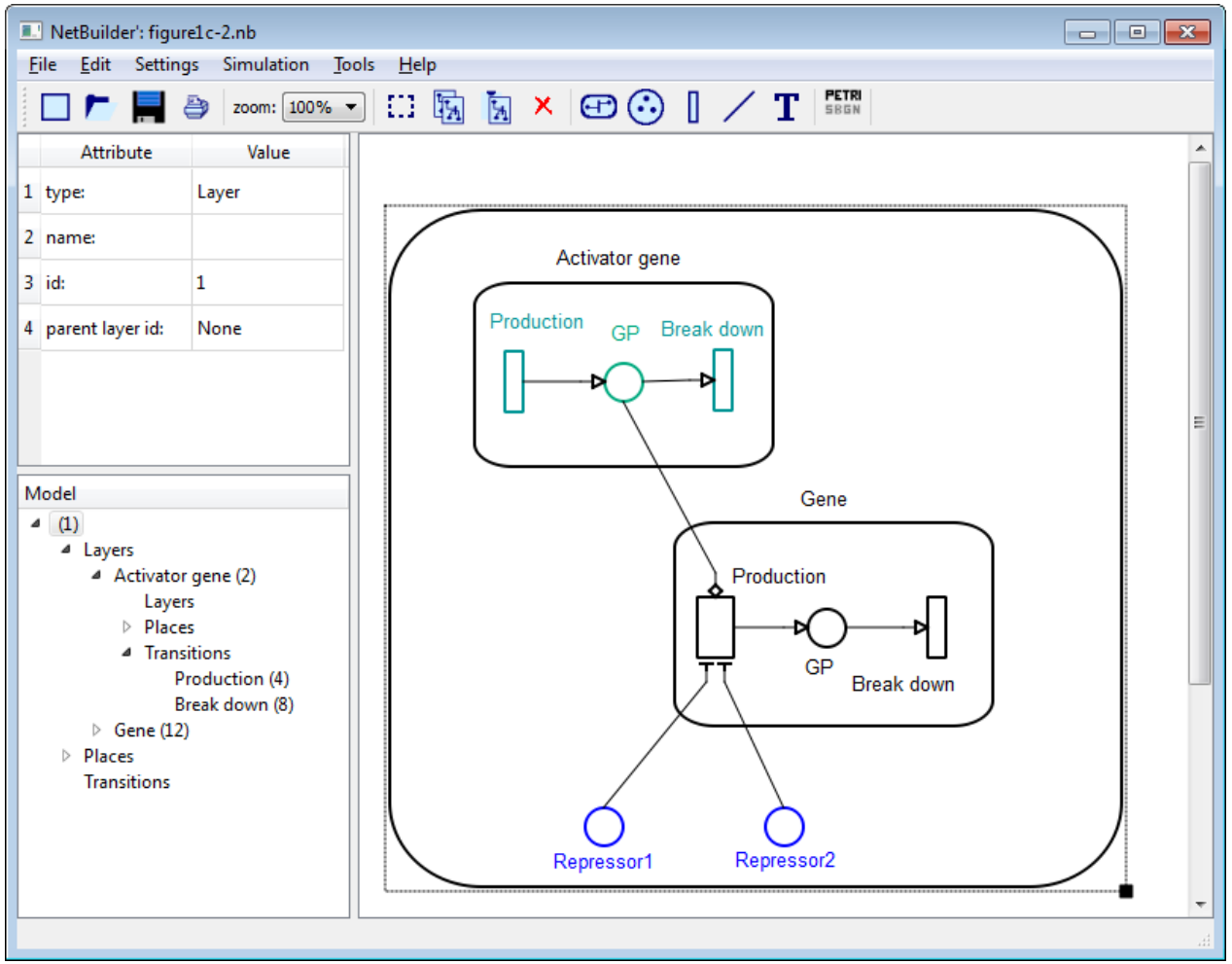
NetBuilder′ ≠ NetBuilder

- NetBuilder′:
  - completely overhauled version
  - different model visualisation
  - more simulation and analysis m



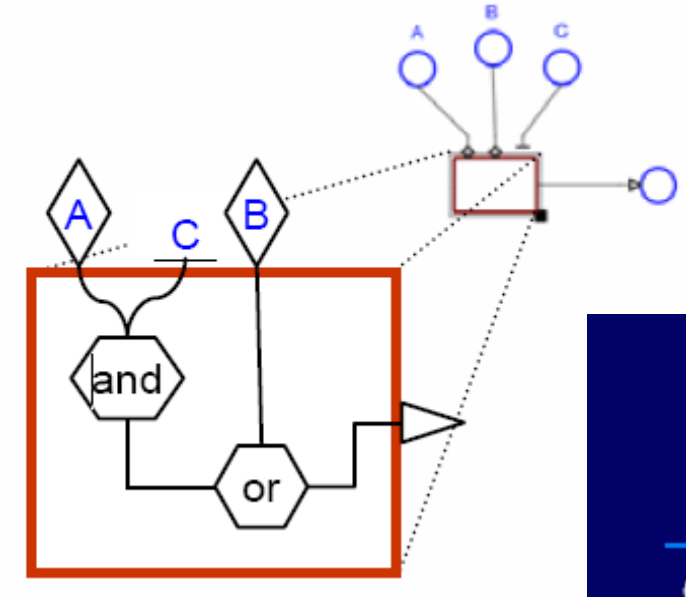
NetBuilder' - Features

- Graphical editor
- Using the **Petri Net** formalism as representation

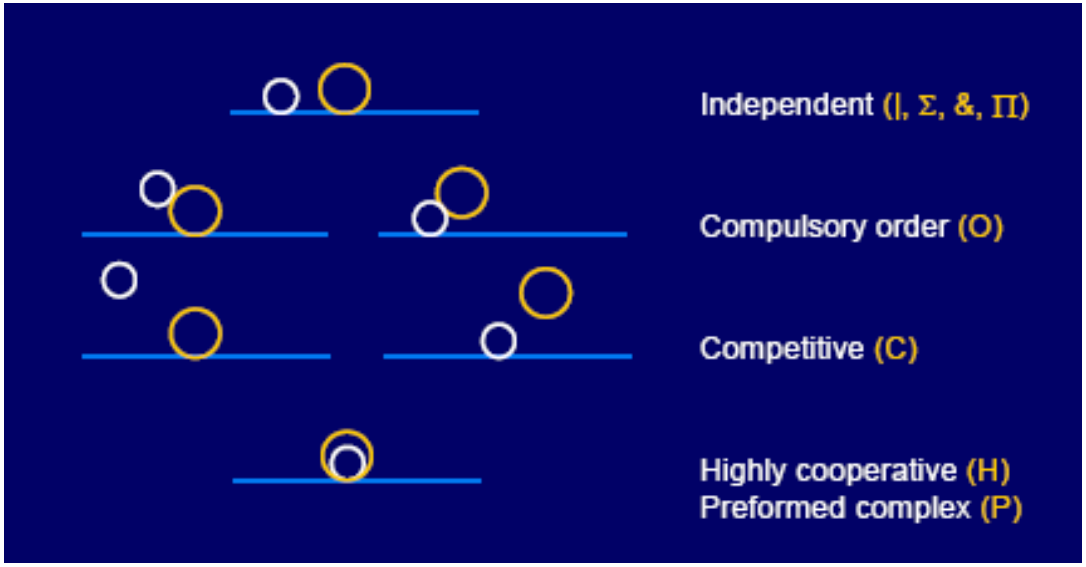


NetBuilder - Features

- Rules for (combined) effects of regulatory interactions



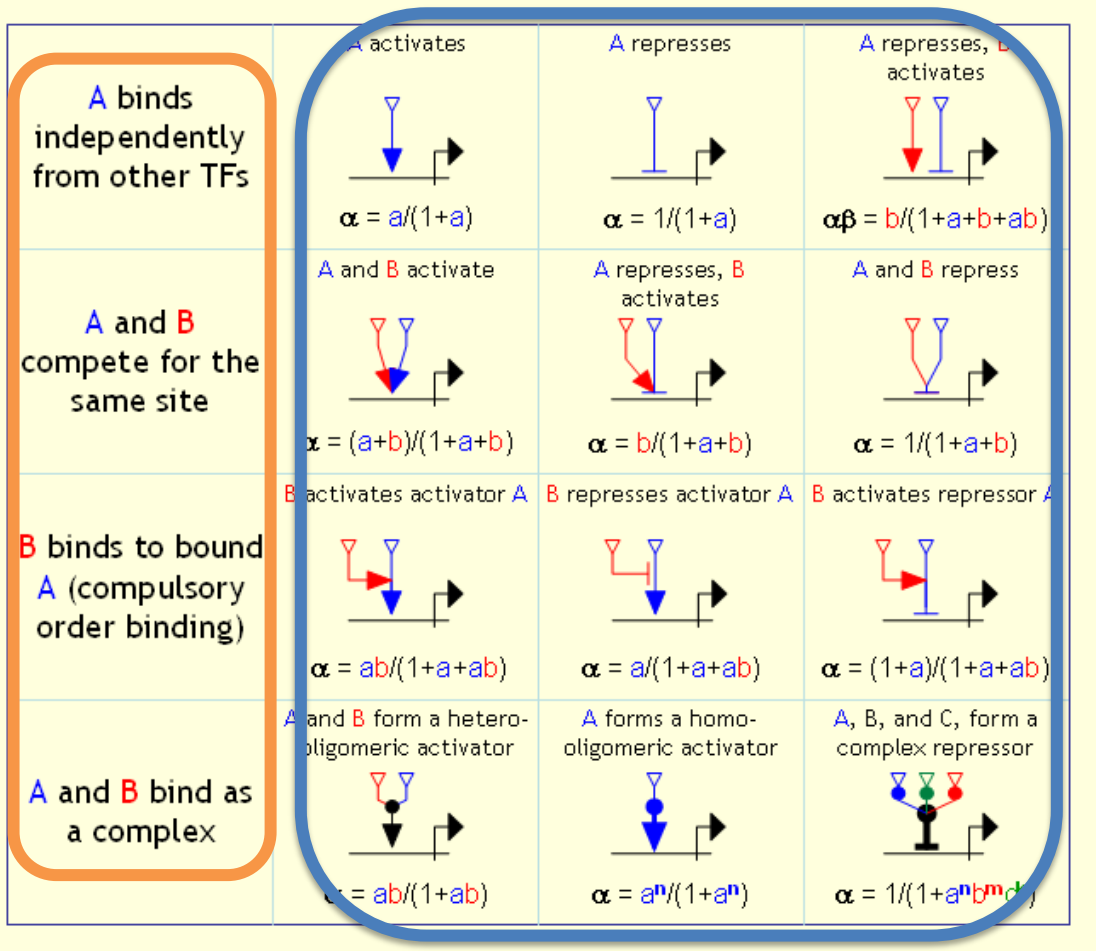
Bio-logic: Gene Expression and the Laws of Combinatorial Logic
Artificial Life 14: 1–13 (2008)



NetBuilder - Features

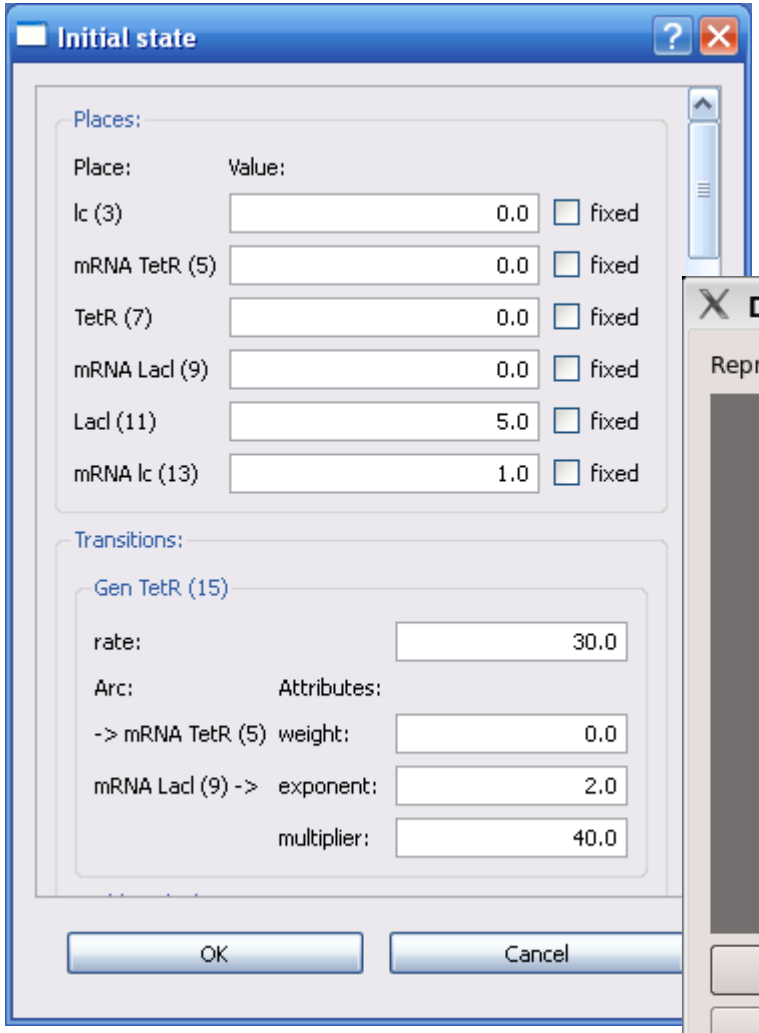
- Rules for (combined) effects of regulatory interactions

Specify interaction in settings

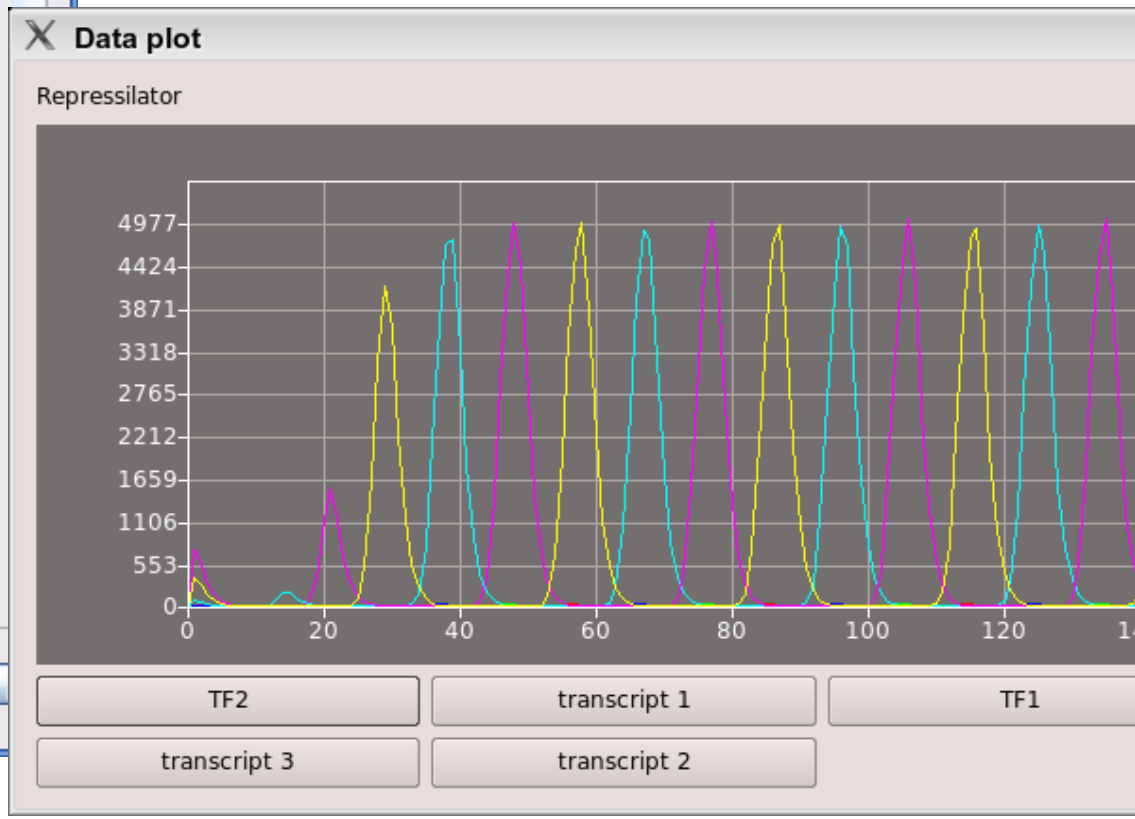


Equations are automatically generated

NetBuilder‘ - Features

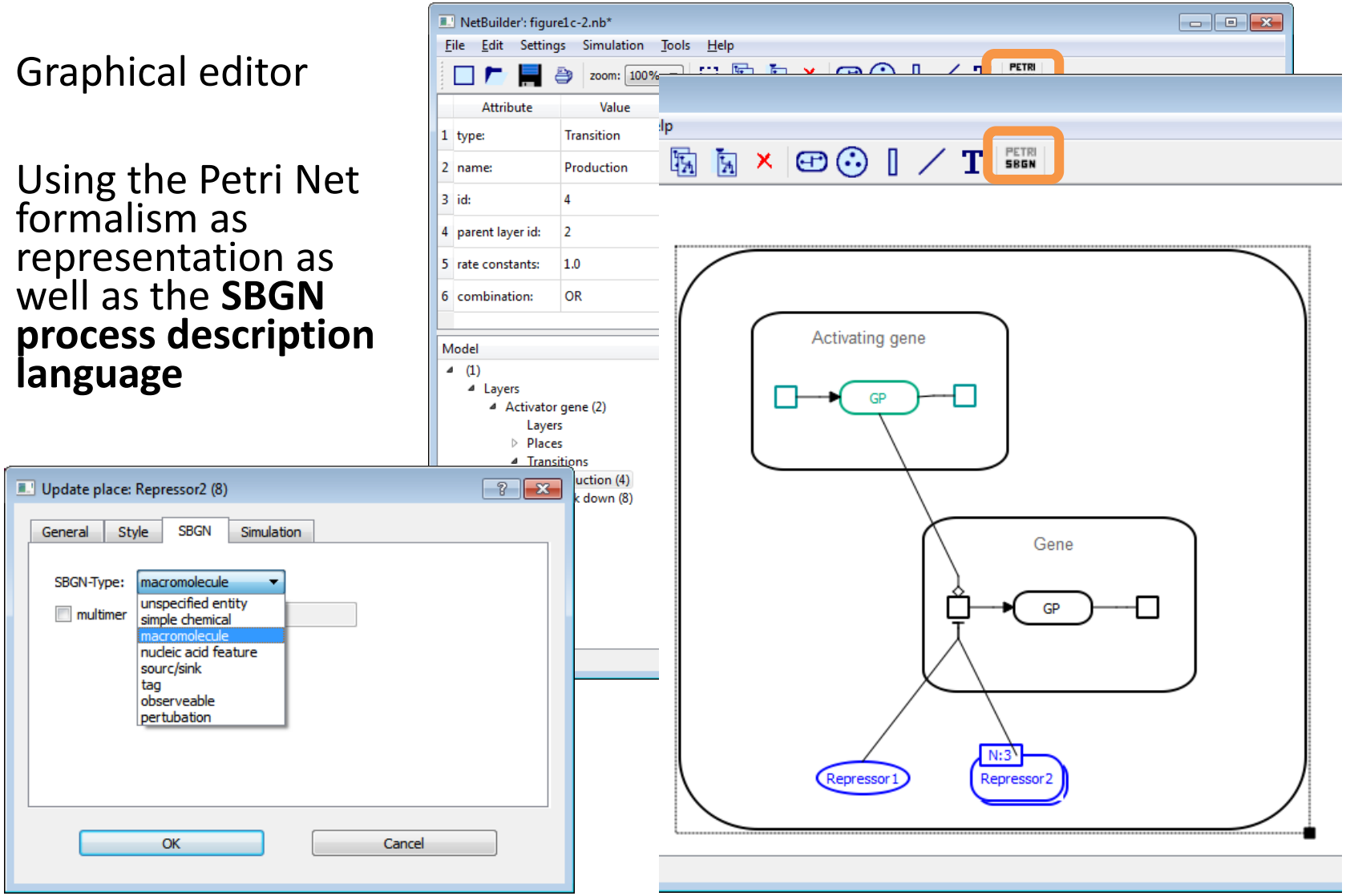


- **Evaluation methods:**
  - Stochastic (based on Gibson & Bruck)
  - Deterministic (LSODA and Euler)
  - **Hybrid**



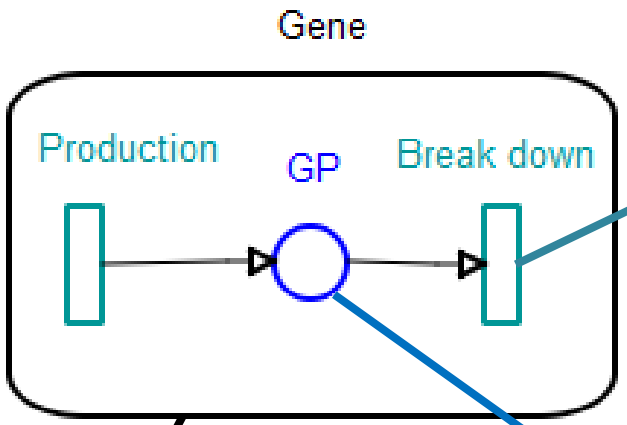
NetBuilder' – Latest features

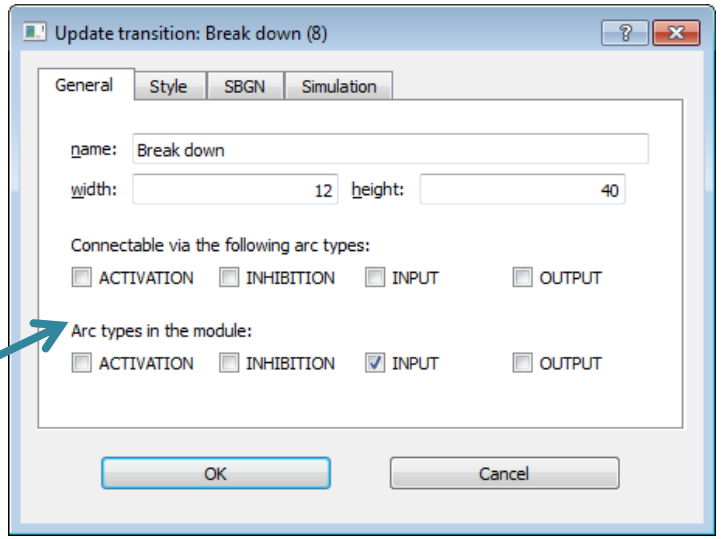
- Graphical editor
- Using the Petri Net formalism as representation as well as the **SBGN process description language**

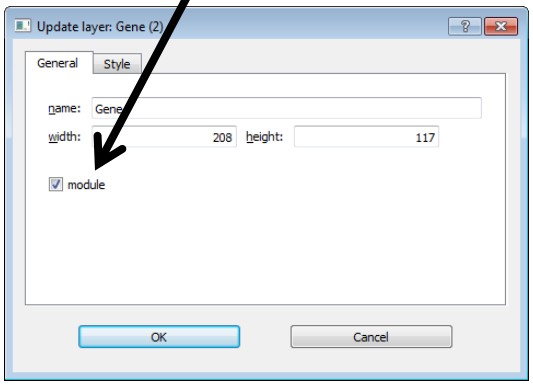


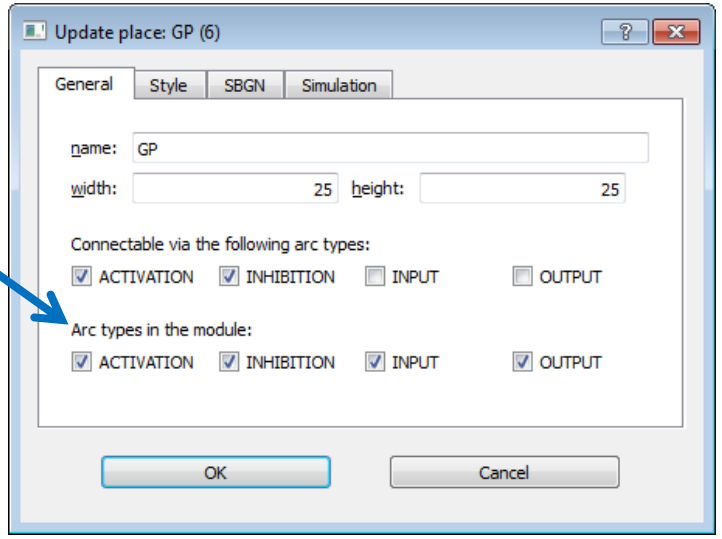
NetBuilder' – Latest features

- Modules



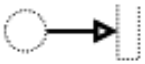
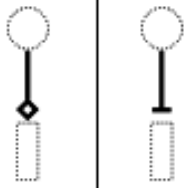
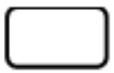






NetBuilder – Exchange

- **Data exchange**: SBML, PNML
- **Representation**: Petri net and SBGN process description language

Component name	Symbol	Role
Place		Container for tokens (SBML: species) (SBGN: entity pool node)
Transition		Represents a process (SBML: reaction) (SBGN: process pode)
Input arc		Associated place is a reactant (SBML: SpeciesReference for reactant) (SBGN: consumption)
Output arc		Associated place is a reaction product (SBML: SpeciesReference for product) (SBGN: production)
Modifier arcs: Activator Inhibitor		Stimulatory (right) or inhibitory (left) effect on reaction rate (SBML: ModifierSpeciesReference) (SBGN: stimulation, inhibition)
Layer		(Sub)model (SBML: model) (SBGN: container node)

NetBuilder’ – technical details

- The latest version (0.5) is based on:
  - Python 2.7
  - PyQt 4.8.5 (GUI)
  - NumPy (1.6.1) and SciPy (0.9.0)
  - libSBML 4.3.1 with the layout extension
  - SBGN support but without libSBGN, yet

NetBuilder' – Summary

- Graphical editor
- Rules for (combined) effects of regulatory interactions
- Equations describing process dynamics
  - Mass-action type rate equations
  - Define kinetics
  - Finally equations are automatically generated
- Numerical representation of component values
  - Continuous and/or discrete places
- Evaluation methods:
  - Stochastic (based on Gibson & Bruck)
  - Deterministic (LSODA and Euler)
  - Hybrid

- **Further contributors:**
  - Marcel Block, Attila Egri-Nagy, Mark Robinson, Johannes Knabe