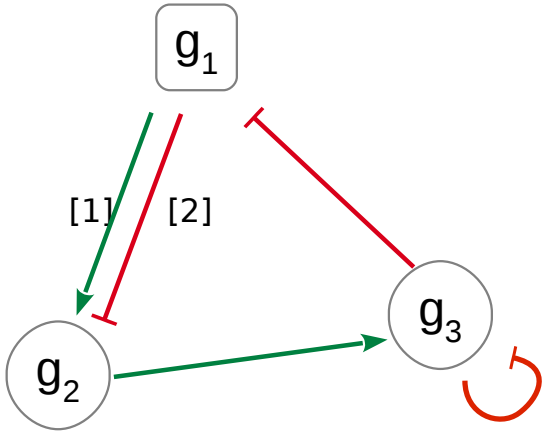
A glance at software tools for Logical modelling

Aurélien Naldi

BC2: Logical modeling tutorial
June 09, 2015

Logical modeling



- Nodes: genes, proteins...

  Activity level (Boolean, MV)

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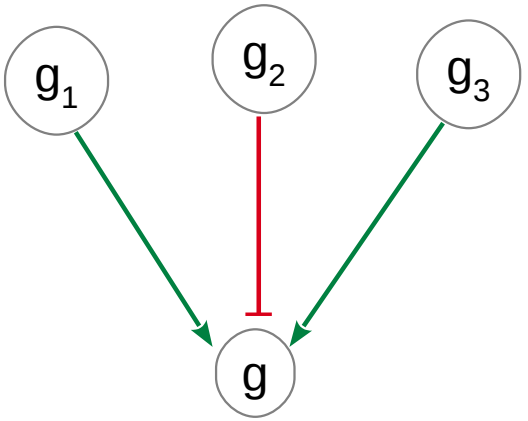
  Threshold for MV source

- Logical rules

  next(G3) = G2 and not G3

Discrete modeling methods



$(g_1 \mid g_3) \,\&\, !\, g_2$

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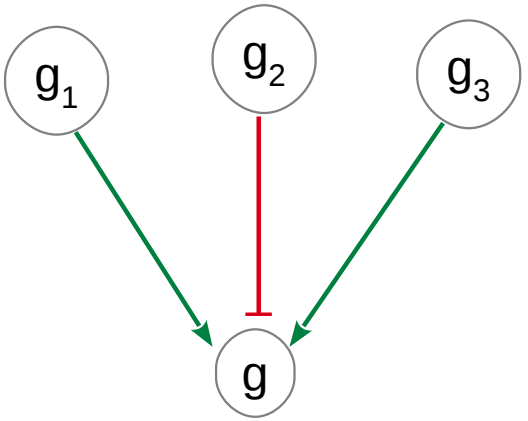

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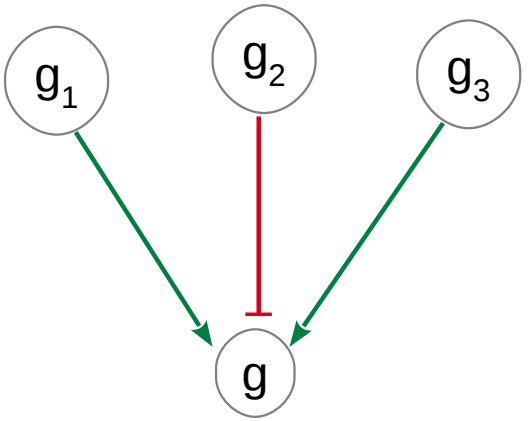

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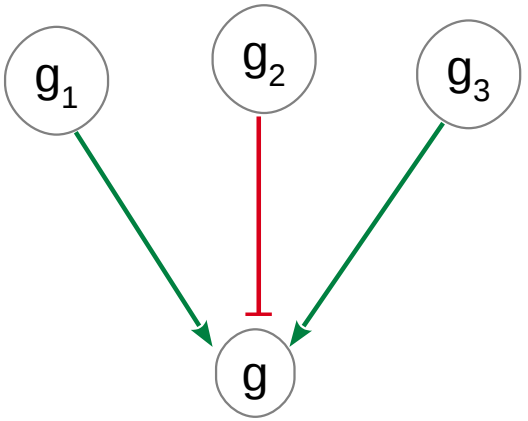

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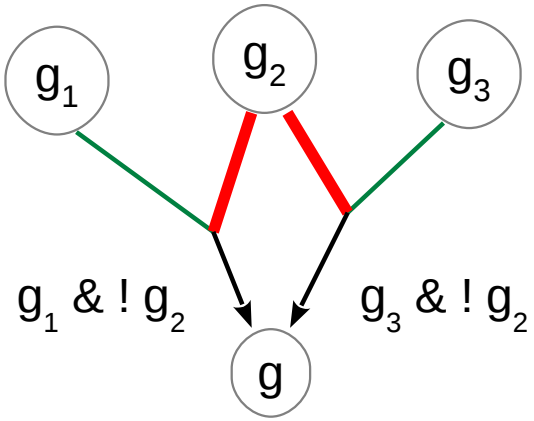

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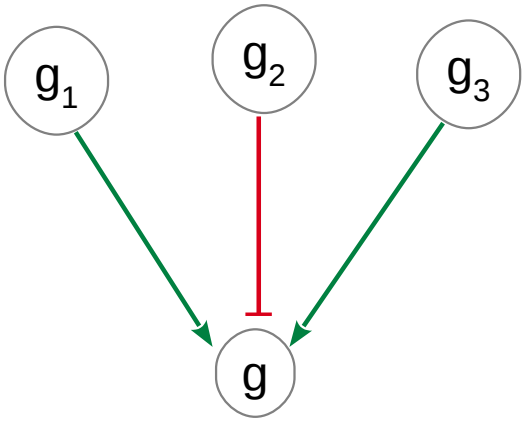

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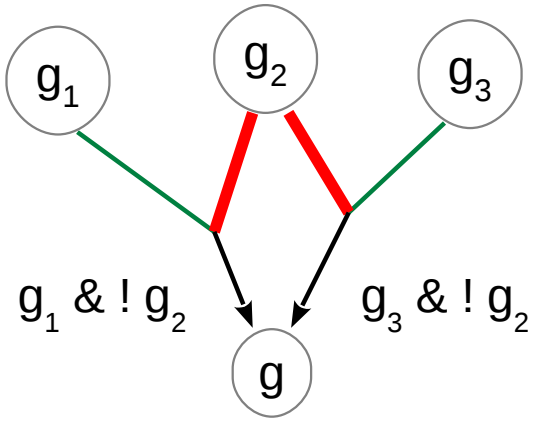

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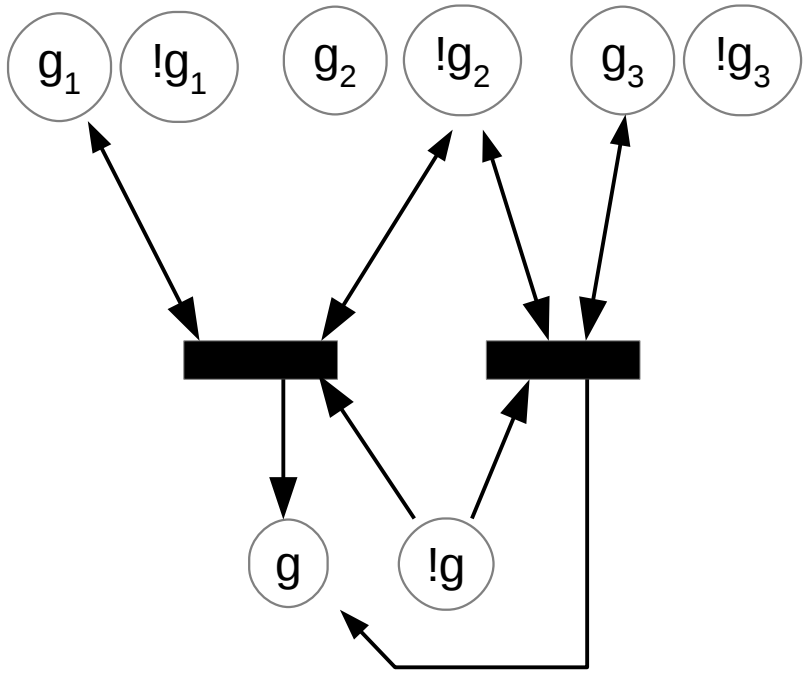

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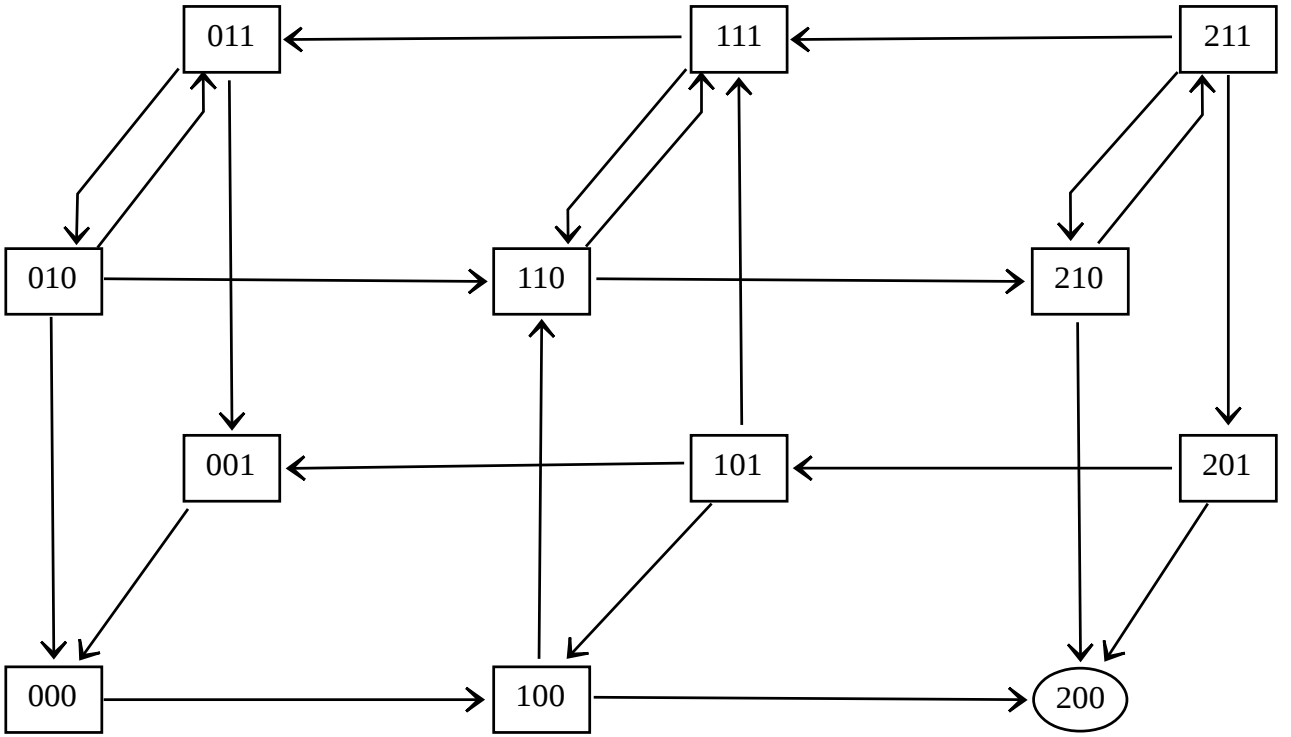

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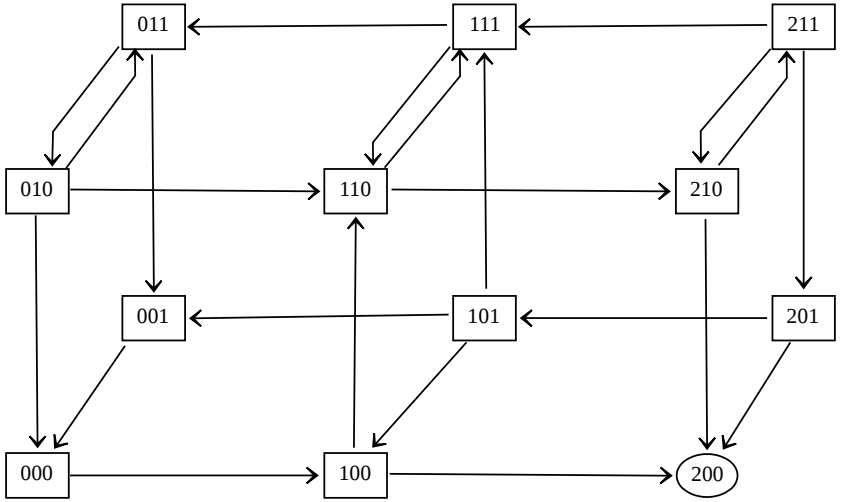

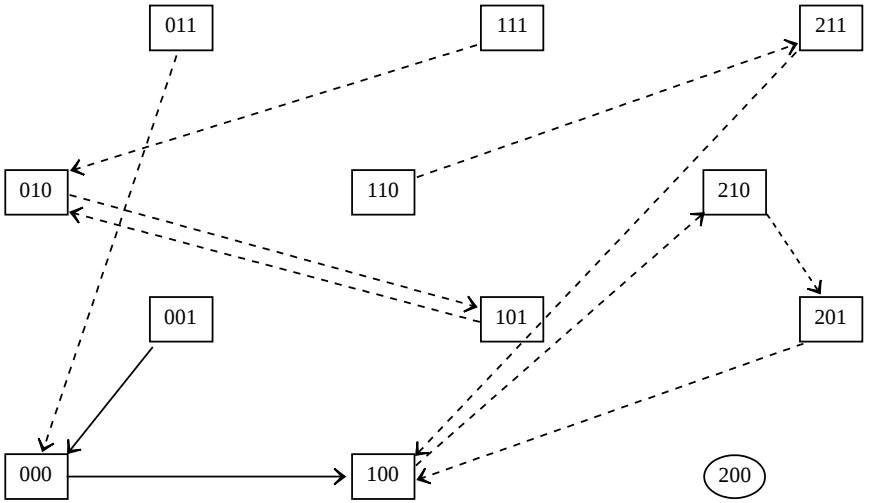

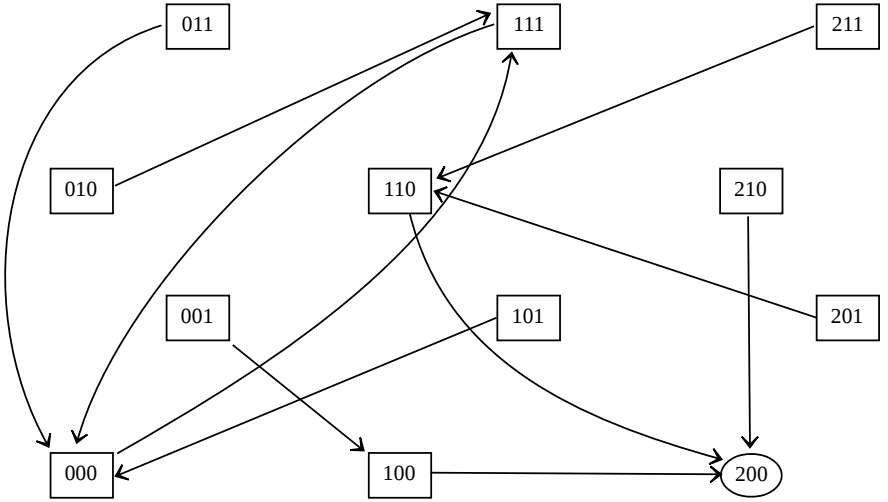

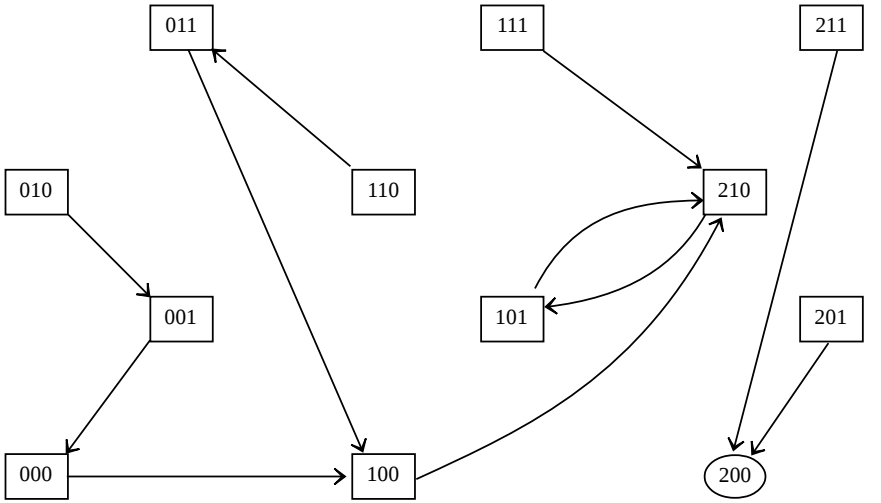

Some tools

- **GINsim**
  - Model definition, simulation and analysis
- **SQUAD** & boolsim
  - Attractor identification and “continuous” dynamics
- Cell Net Analyzer
  - Flux analysis for signaling models
- **CellNOpt** (Cell Net Optimizer)
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Software Tools

Tool	M/B	Updating	Special touch
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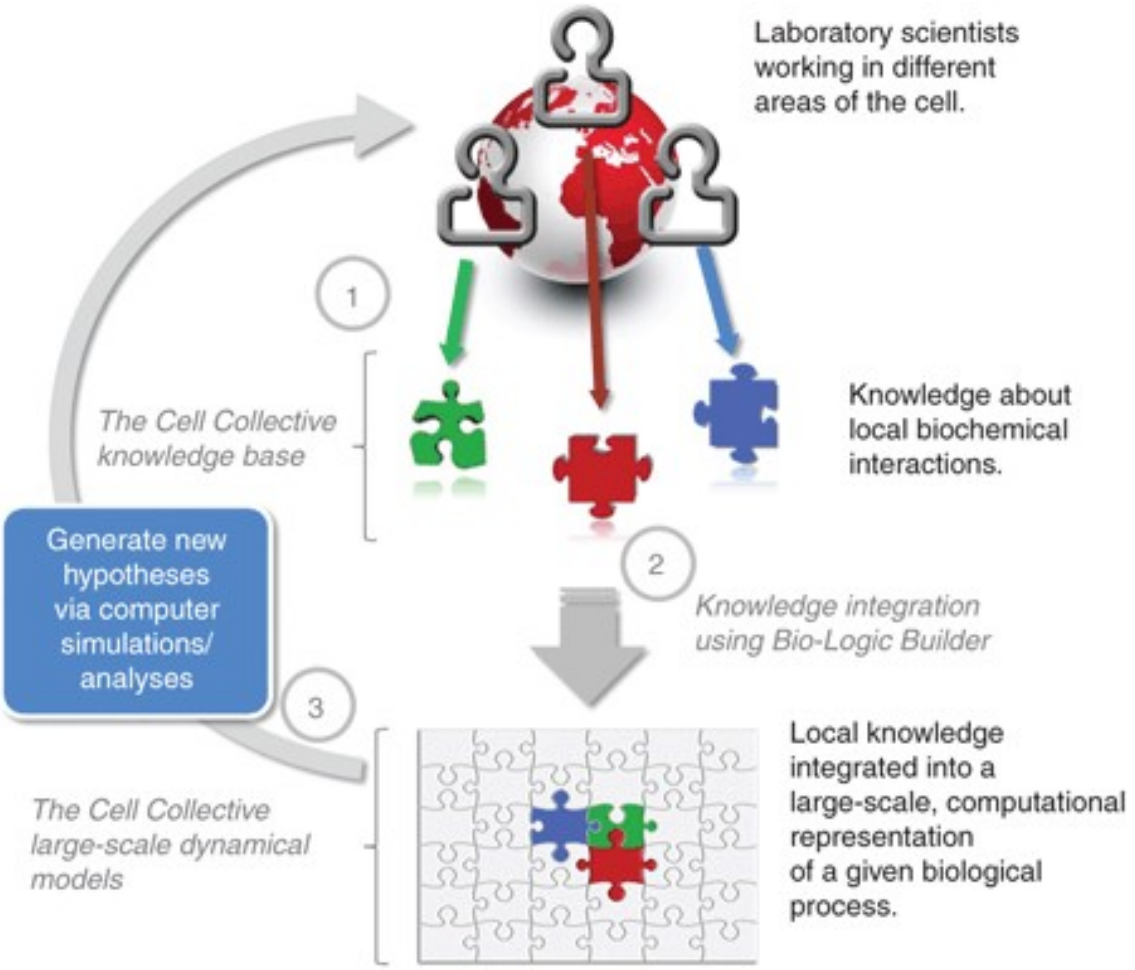
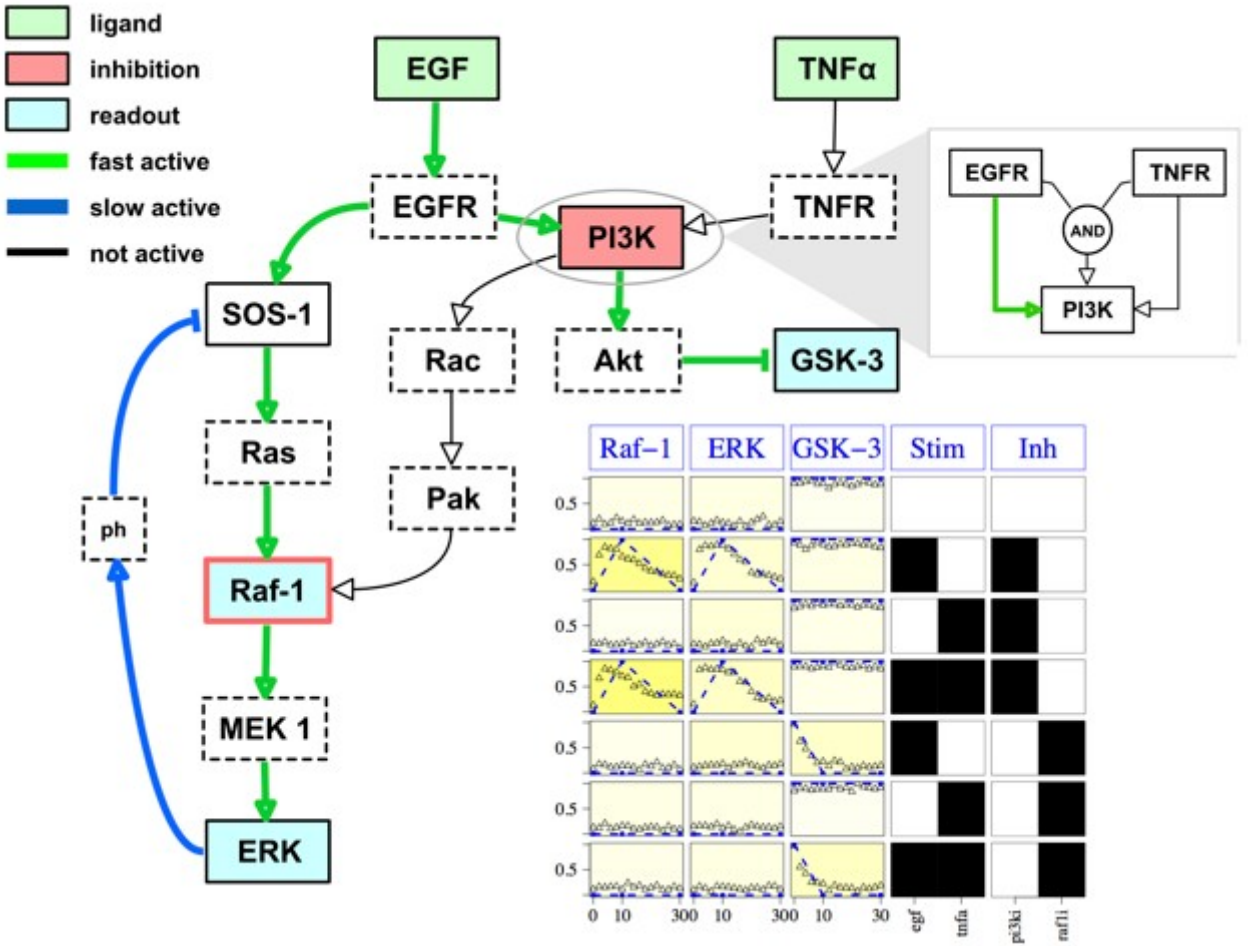
The Cell Collective



T Helikar et al. Clinical Pharmacology & Therapeutics (2013)

CellNOpt



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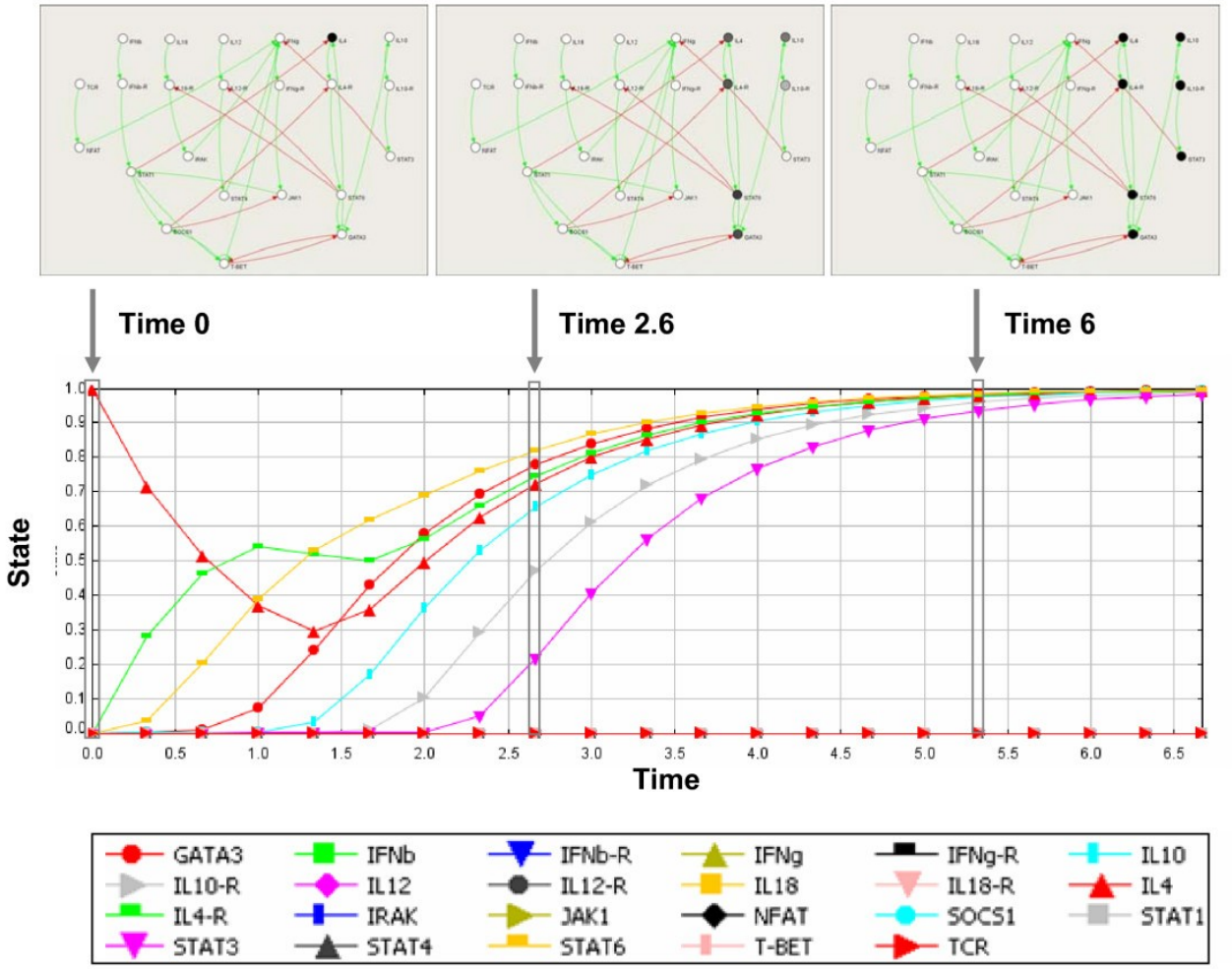

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Continous view (synchronous with speeds)

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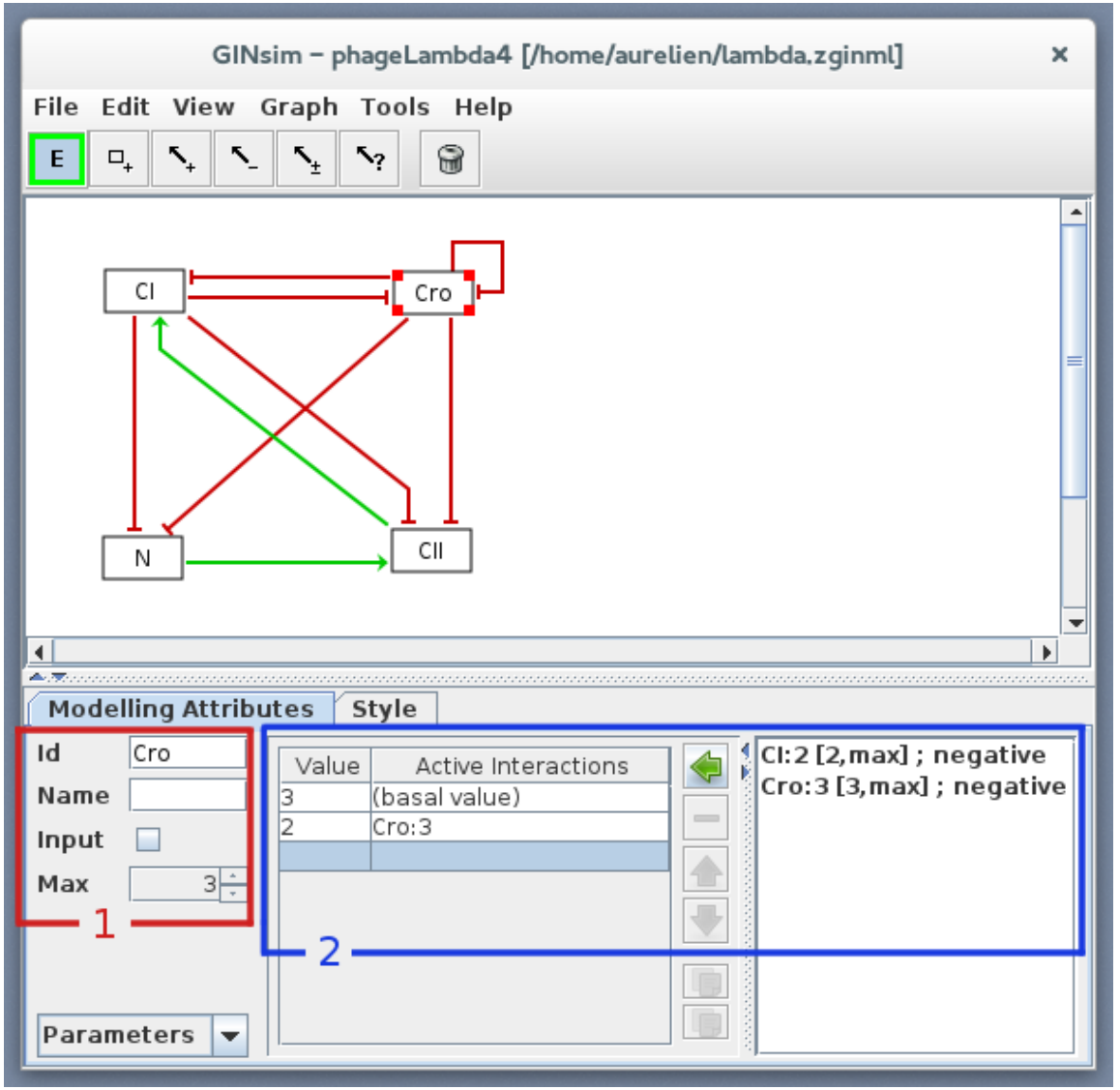

Logical parameters or functions
State transition graphs: (a)synchronous, with priorities

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Improving interoperability

- CoLoMoTo discussion group
- Need an exchange format
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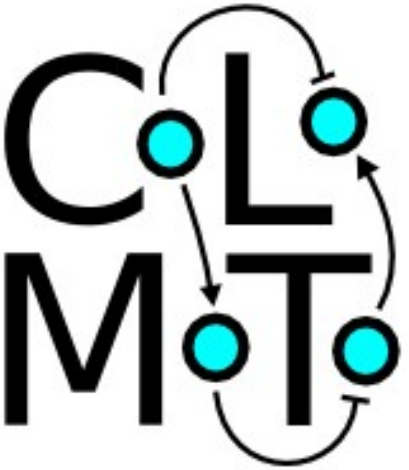

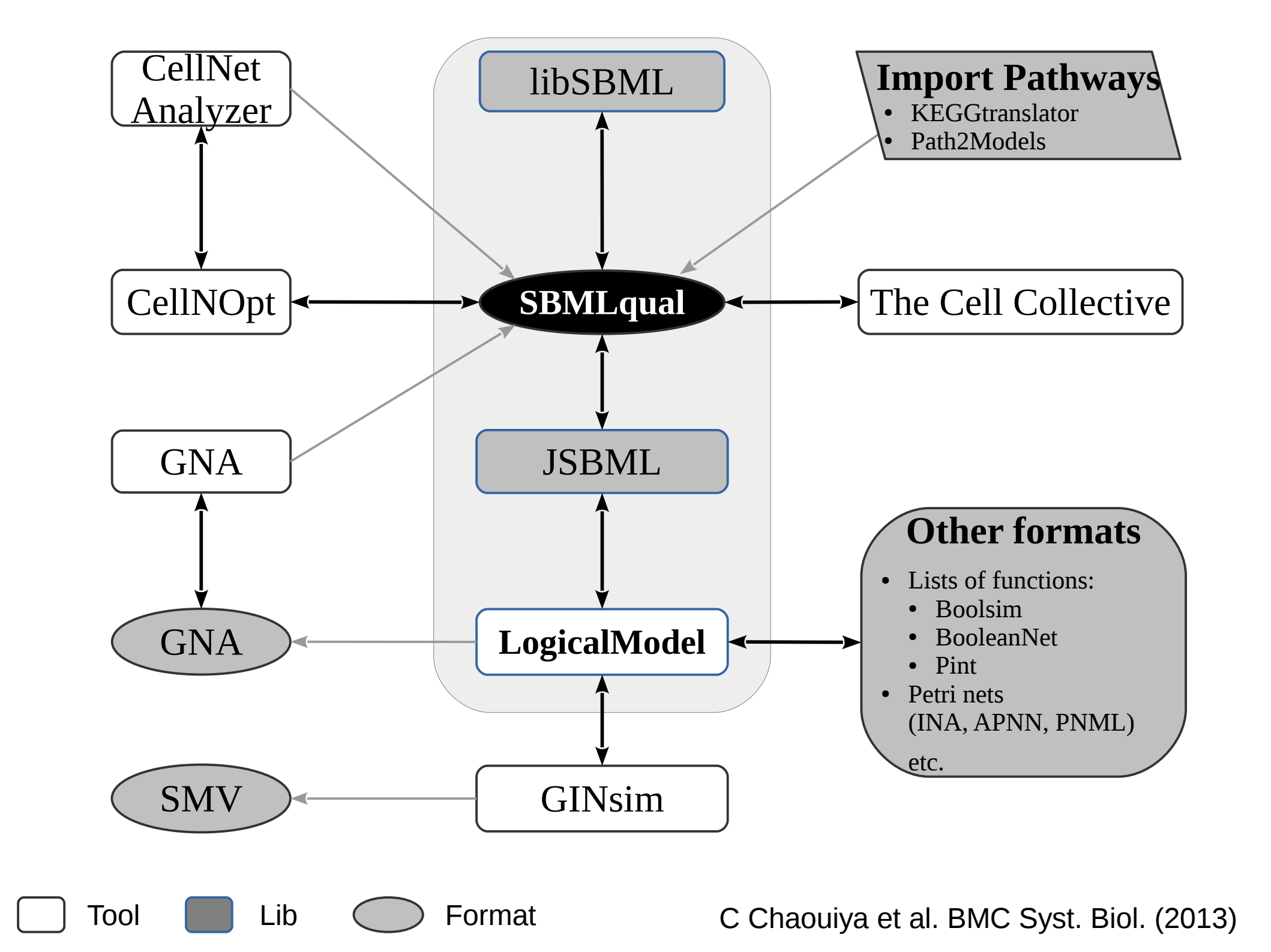
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GNA
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C Chaouiya et al. BMC Syst. Biol. (2013)

From multivalued to Boolean

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- Multivalued models getting more common
- “Boleanize” a multivalued model when needed:
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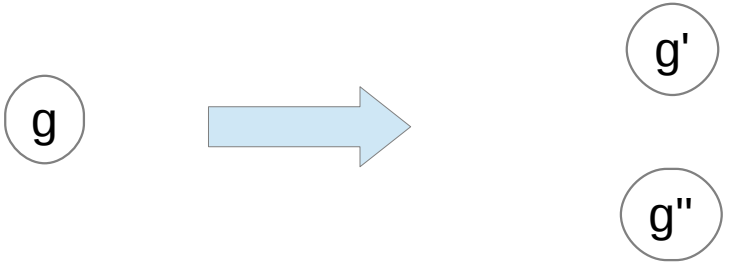
  - Rewrite functions



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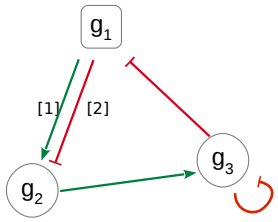

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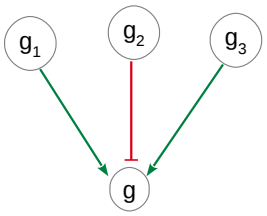

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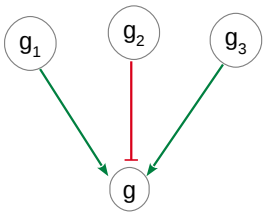

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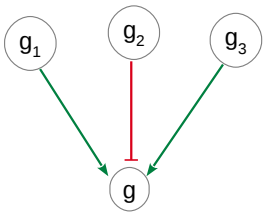

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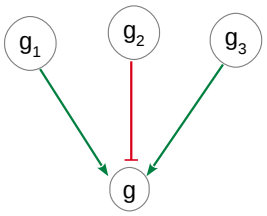

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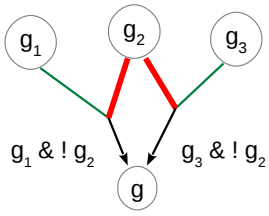

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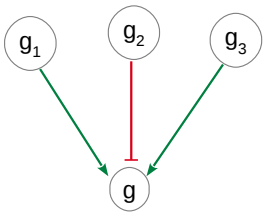

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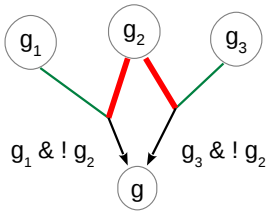

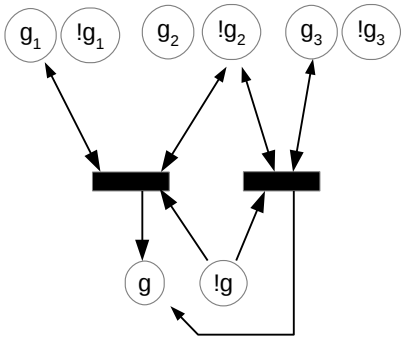

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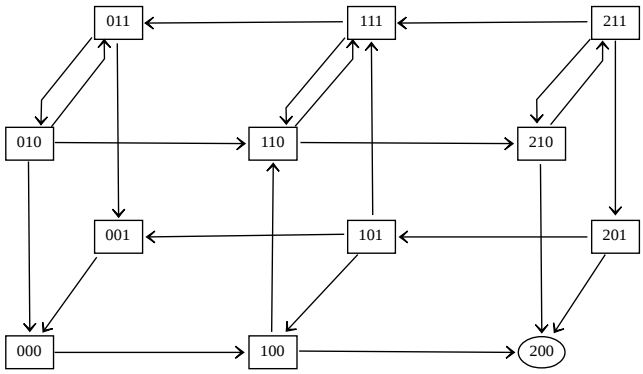

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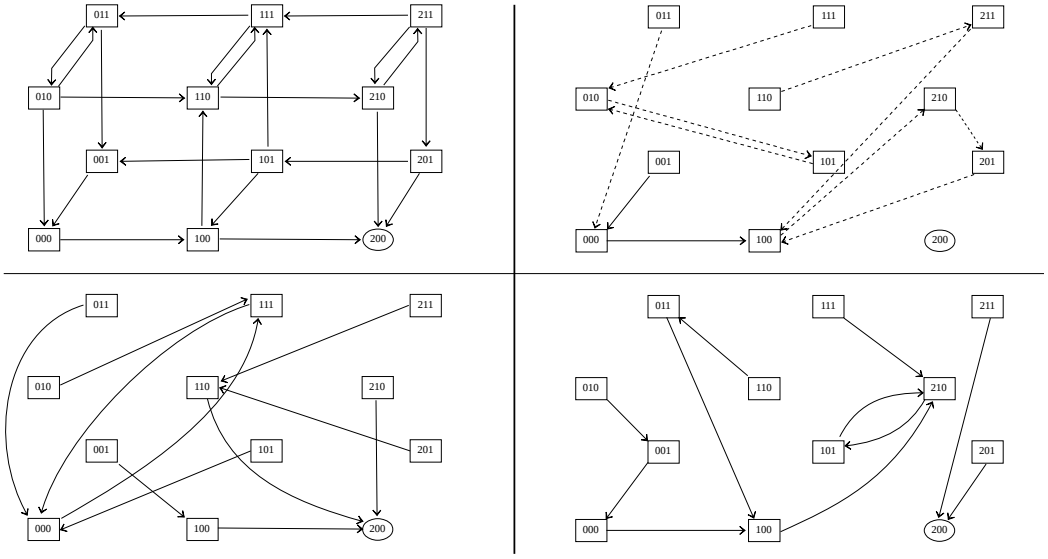

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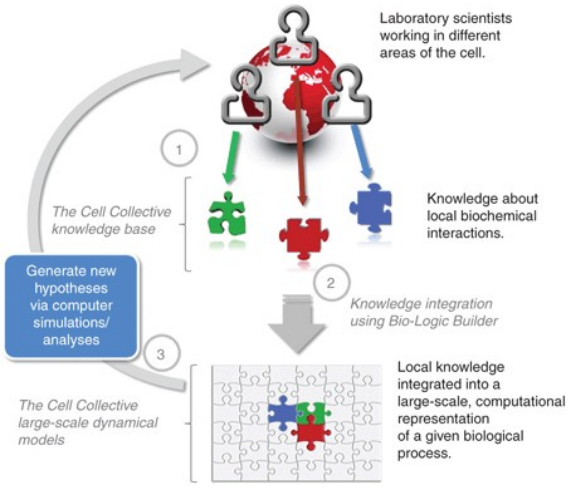

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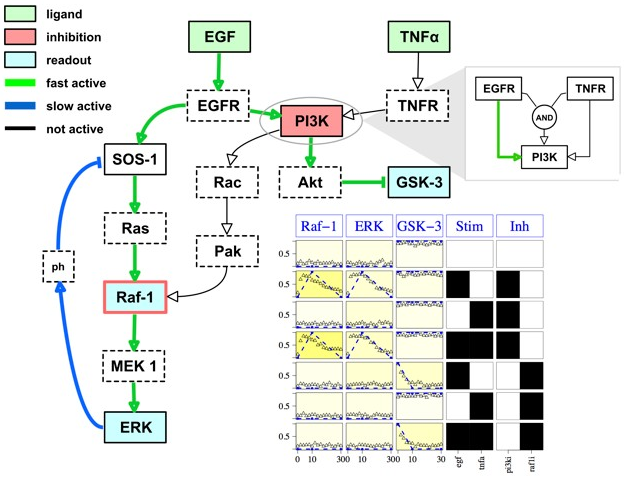

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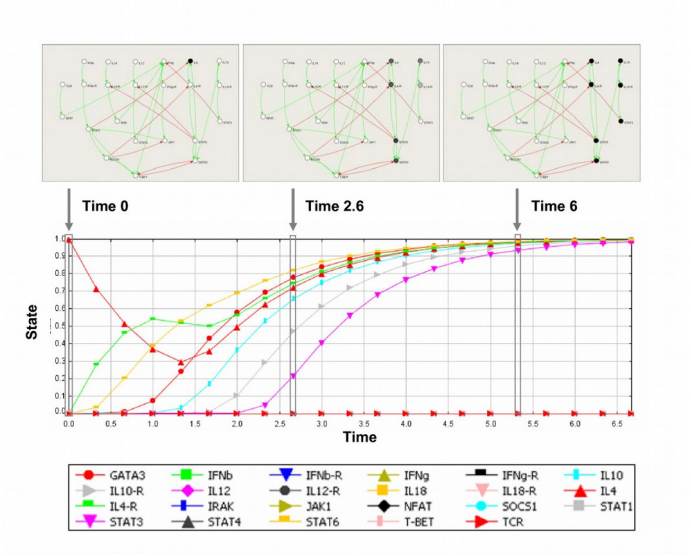

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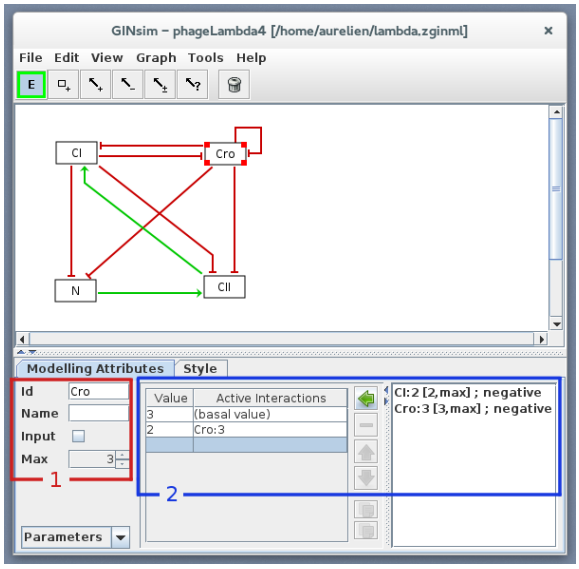

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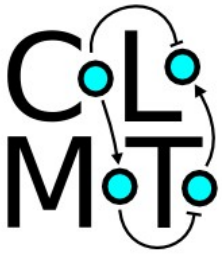

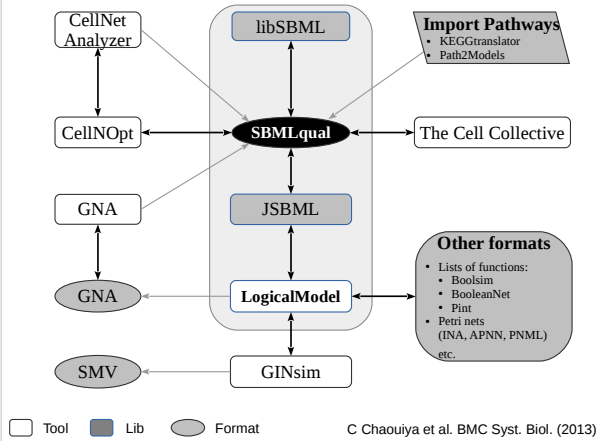
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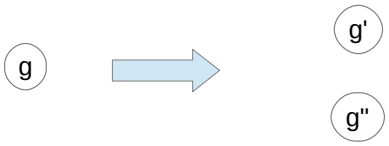

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