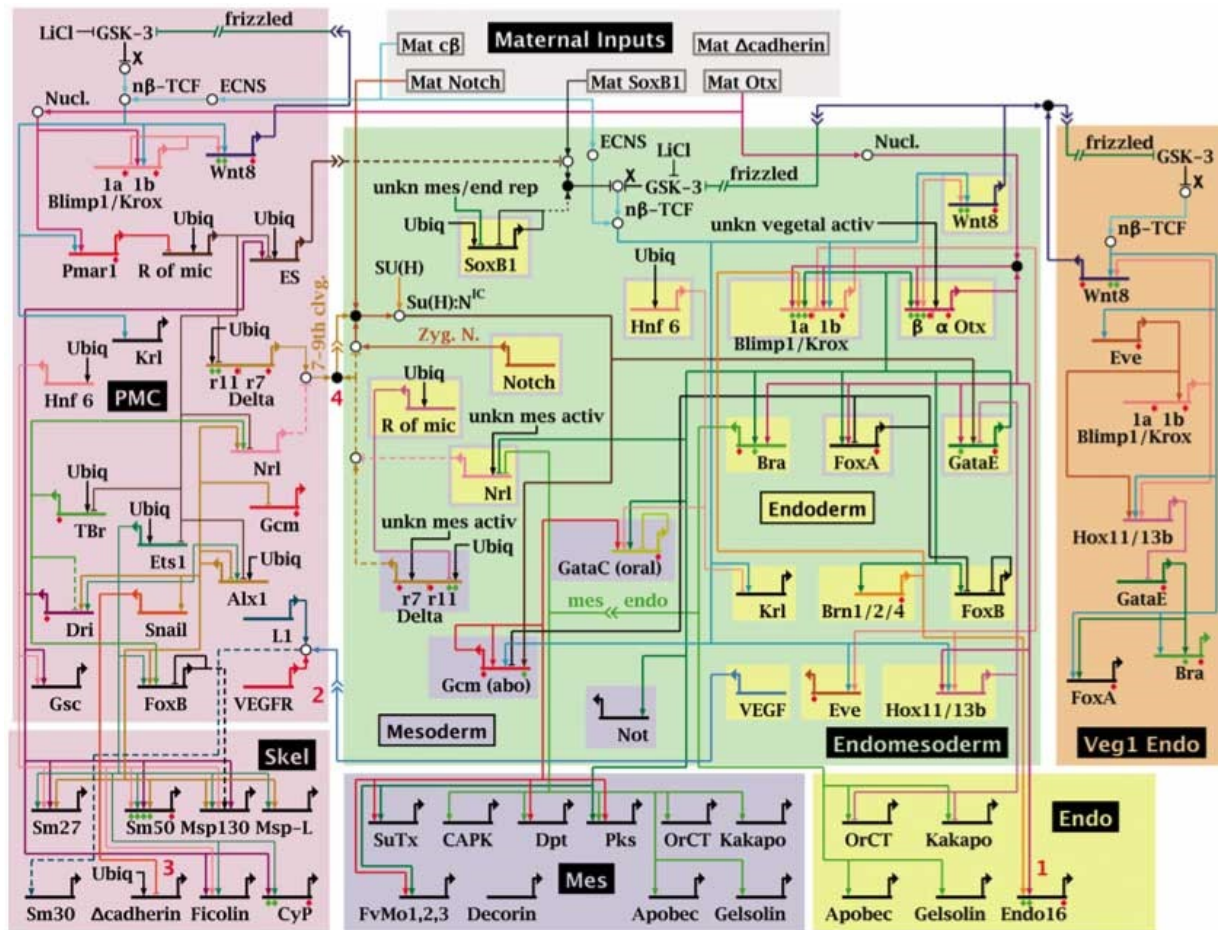


Types of Cellular Networks








Gene Regulatory Networks



Ubiqu=ubiquitous; Mat = maternal; activ = activator; rep = repressor;
 unkn = unknown; Nucl. = nuclearization; X = β-catenin source;
 nβ-TCF = nuclearized β-catenin-Tcf1; ES = early signal;
 ECNS = early cytoplasmic nuclearization system; Zyg. N. = zygotic Notch

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Gene Regulatory Network Basic Operations

	Gene Activation
	Gene Repression
	Multiple Control
	Gene Cascade
	Auto-Regulation
	Regulation by Small Molecule
	Regulation by Phosphorylation

A

Diagram illustrating the NF-κB signaling pathway, showing the activation and regulation of NF-κB complexes. The diagram is divided into two main regions by a horizontal line representing the nuclear envelope.

Key Components and Complexes:

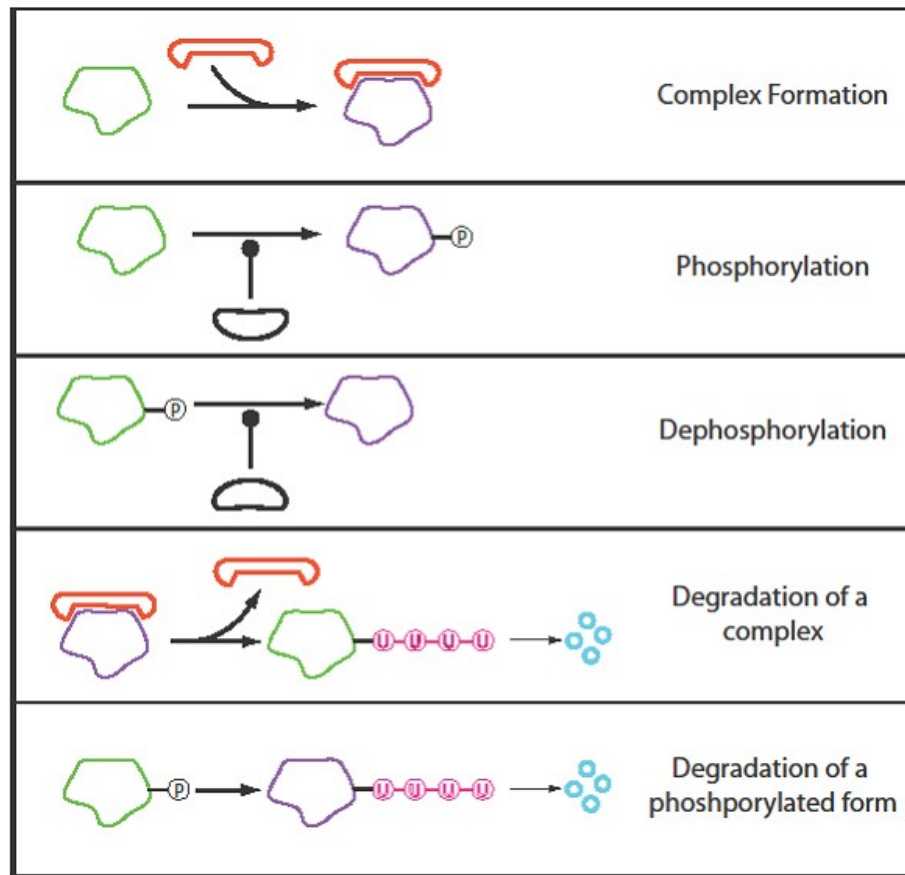
- IKK Complex:** IKKα, IKKβ, IKKγ. Complex (IKK_gamma/IKK_beta/IKK_alpha).
- NIK:** Nucleotide-binding domain.
- PKAα:** Protein Kinase A alpha.
- NF-κB Complexes:** NF-κB (p50/p65) complexed with IκBα or IκBβ. Complex (PKA/NF-κB/IκB).
- CK II:** Casein Kinase II.
- Ubiquitination:** Ubiquitin (Ub) and Ubiquitin-protein ligase (Ubl) complexes.
- UbcH5:** Ubiquitin-conjugating enzyme H5.
- SCFβ-TrCP:** Skp1-Cul1-F-box protein complex.

Pathway Steps (Numbered 1-15):

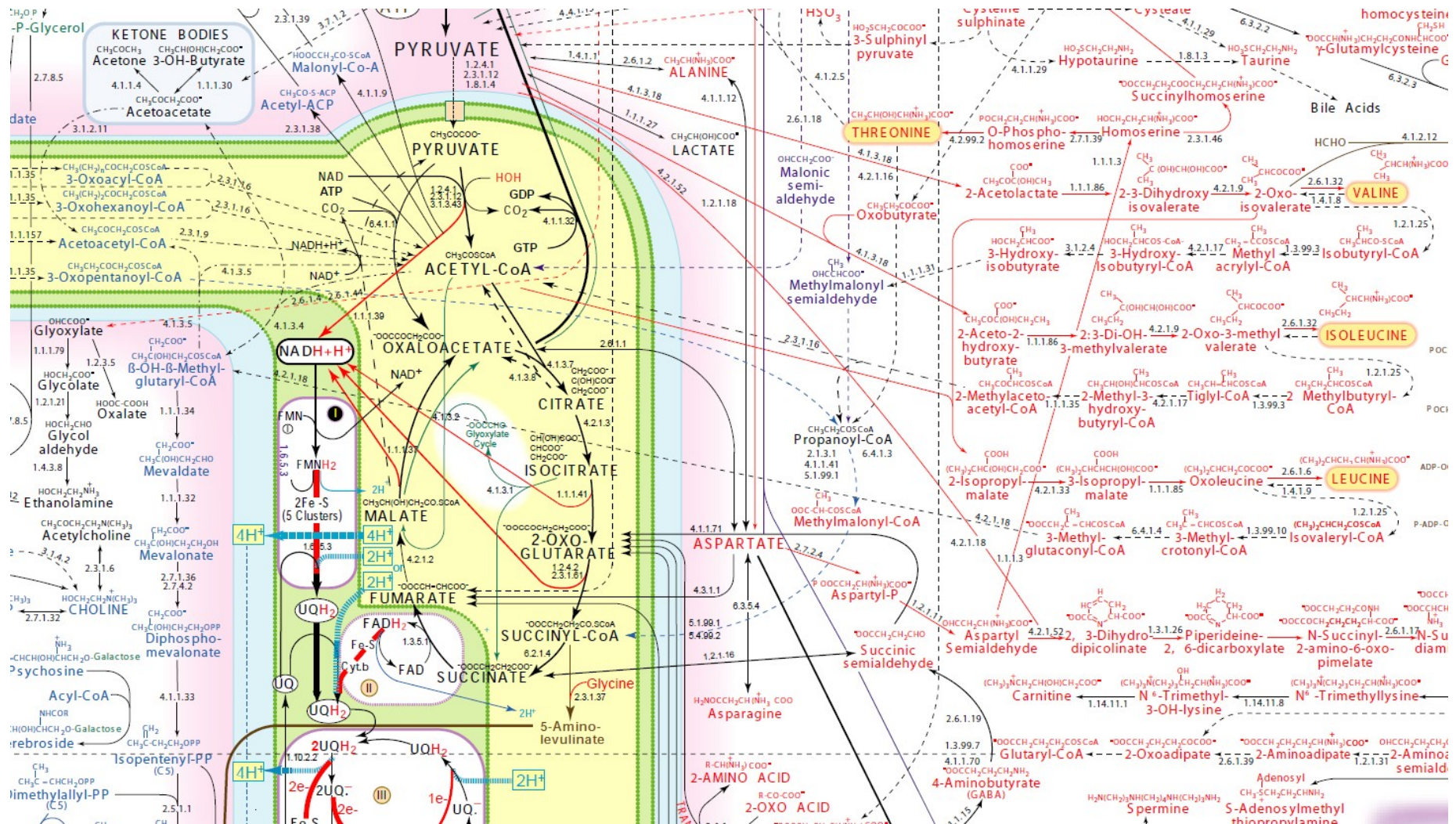
1. Activation of NF-κB (p50/p65) complex.
2. Activation of NF-κB (p50/p65) complex.
3. Activation of NF-κB (p50/p65) complex.
4. Activation of NF-κB (p50/p65) complex.
5. Activation of NF-κB (p50/p65) complex.
6. Activation of NF-κB (p50/p65) complex.
7. Activation of NF-κB (p50/p65) complex.
8. Activation of NF-κB (p50/p65) complex.
9. Activation of NF-κB (p50/p65) complex.
10. Activation of NF-κB (p50/p65) complex.
11. Activation of NF-κB (p50/p65) complex.
12. Activation of NF-κB (p50/p65) complex.
13. Activation of NF-κB (p50/p65) complex.
14. Activation of NF-κB (p50/p65) complex.
15. Activation of NF-κB (p50/p65) complex.

Nucleus: The diagram indicates the nuclear translocation of NF-κB complexes for gene expression.

Protein Signaling Networks Basic Operations



Metabolic Networks



Some Characteristics

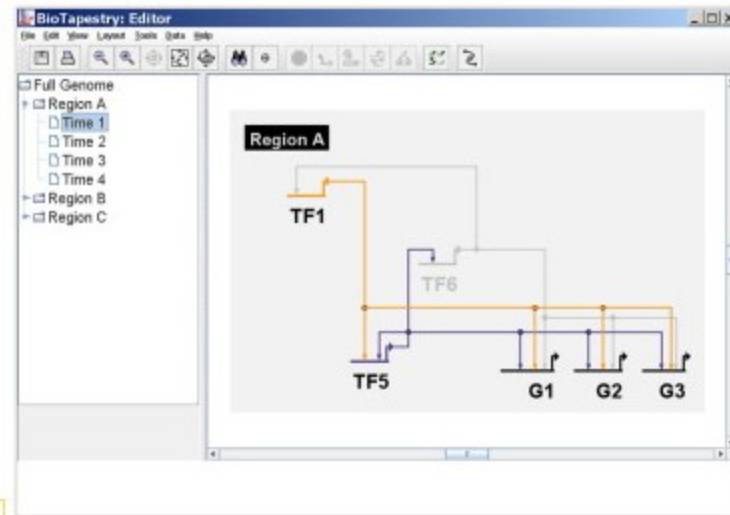
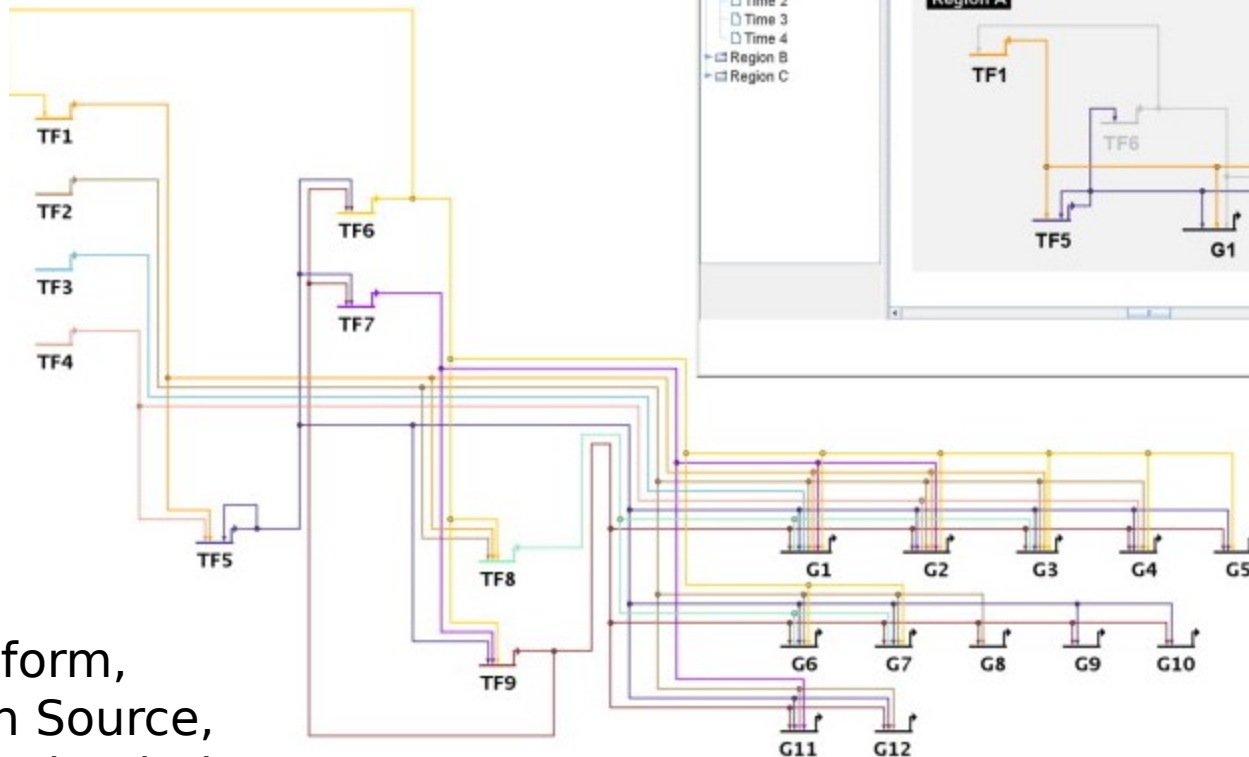
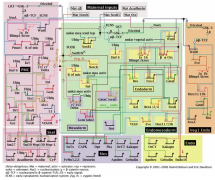
Network	Speed	Purpose	'Technology'
Gene	Slow to medium	Remodeling signaling and metabolic networks	DNA binding to control expression
Protein	Medium to fast	Signal processing	Protein covalent modification and sequestration
Metabolic	Fast	Manufacturing, energy systems	Enzymes, allosteric control

Software for Network Visualization

Does not include ball-stick networks, eg cytoscape

Gene Regulatory Networks

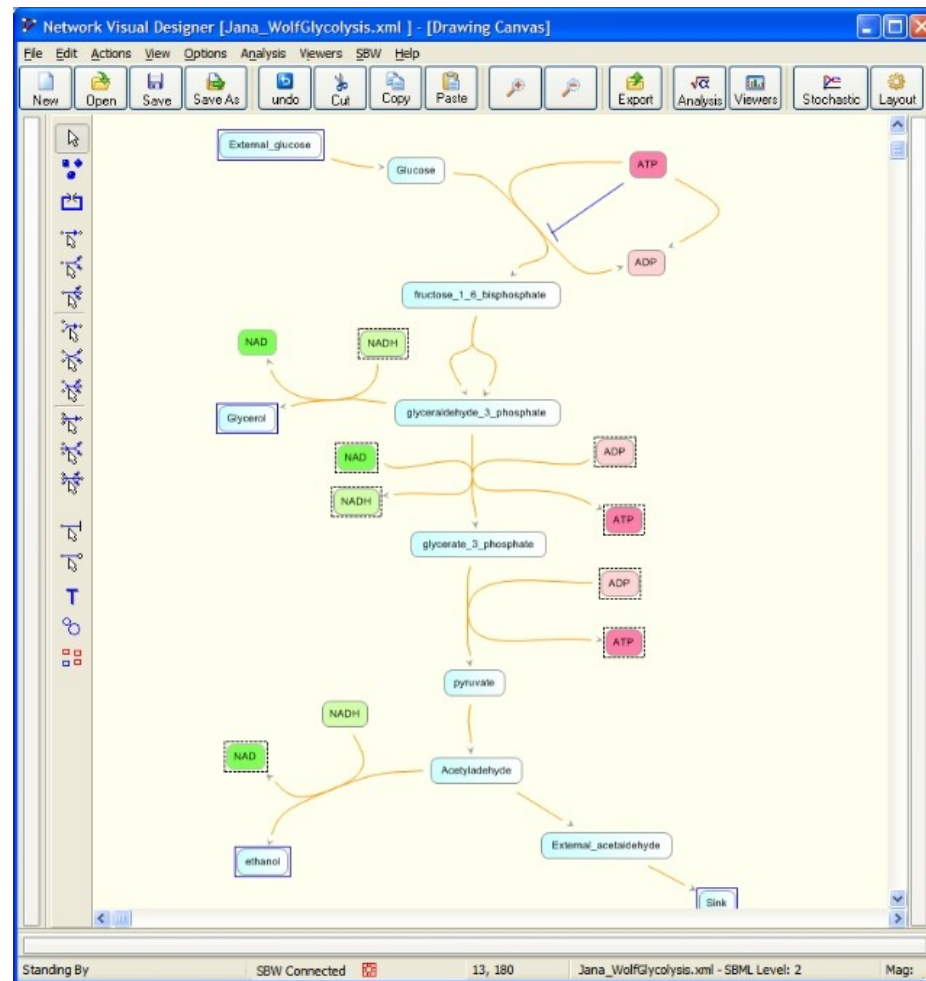
BioTapestry



Cross-platform,
Java, Open Source,
SBML?, no simulation

Biotapestry.org

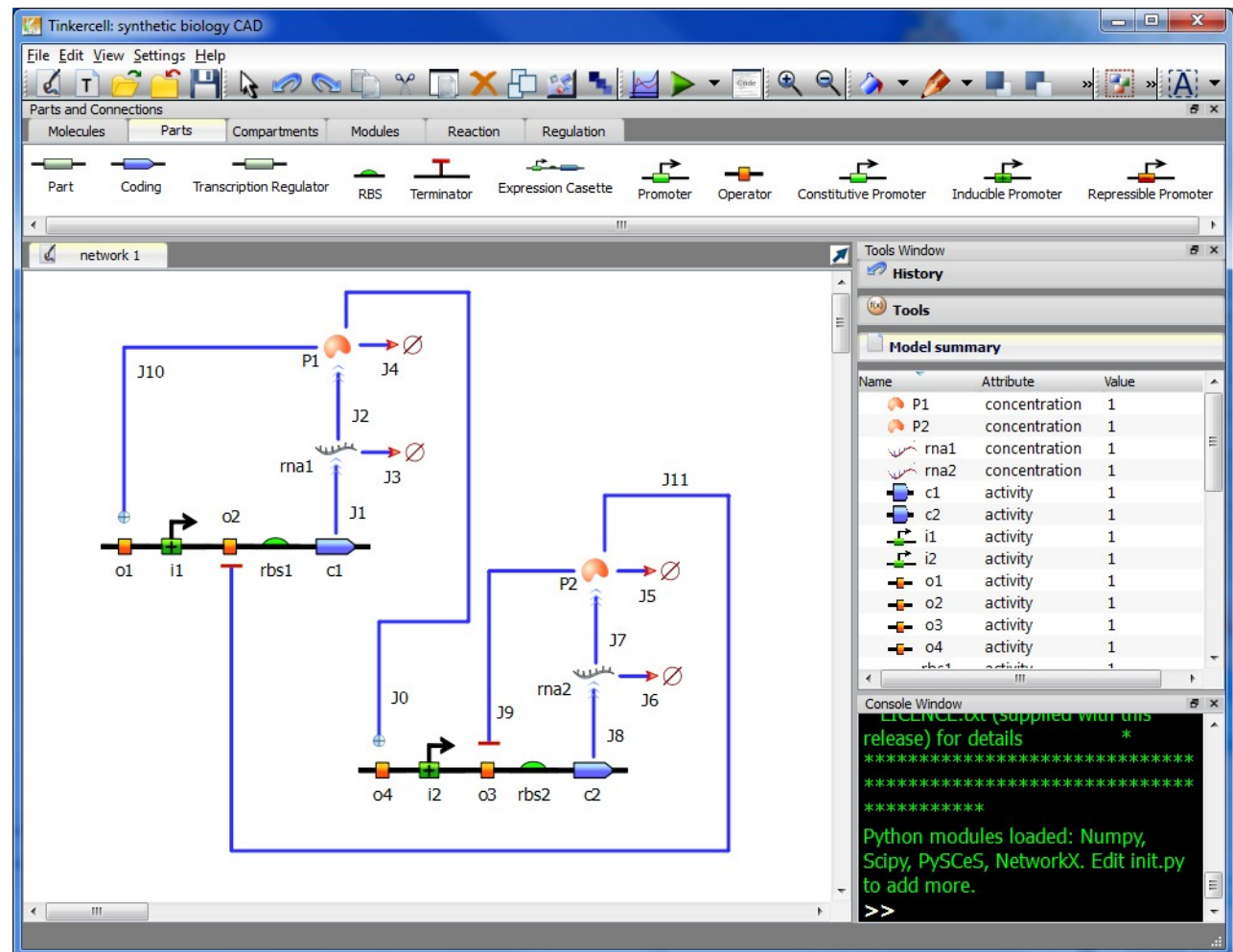
Metabolic and Protein Networks JDesigner



Windows,
Delphi, open source
SBML, Part of SBW

Gene Protein and Metabolic Networks

TinkerCell



Cross-platform,
Open source,
C/C++, Qt, Python,
SBML?

tinkercell.com

Metabolic and Protein Networks CellDesigner

data structure is called **Protein**.

Cross-platform
Works with SBW,
Java, SBML

