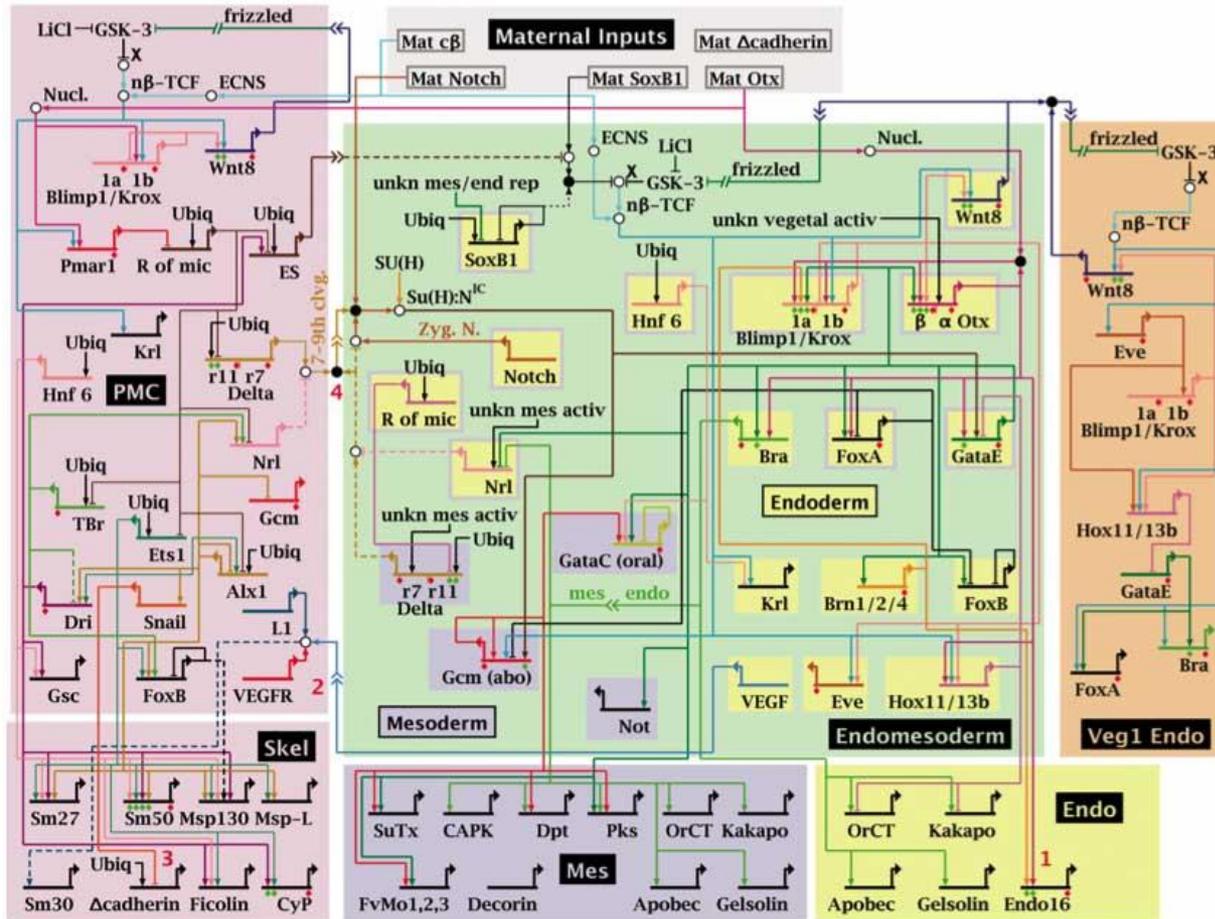


# Types of Cellular Networks

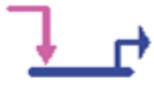
# Gene Regulatory Networks



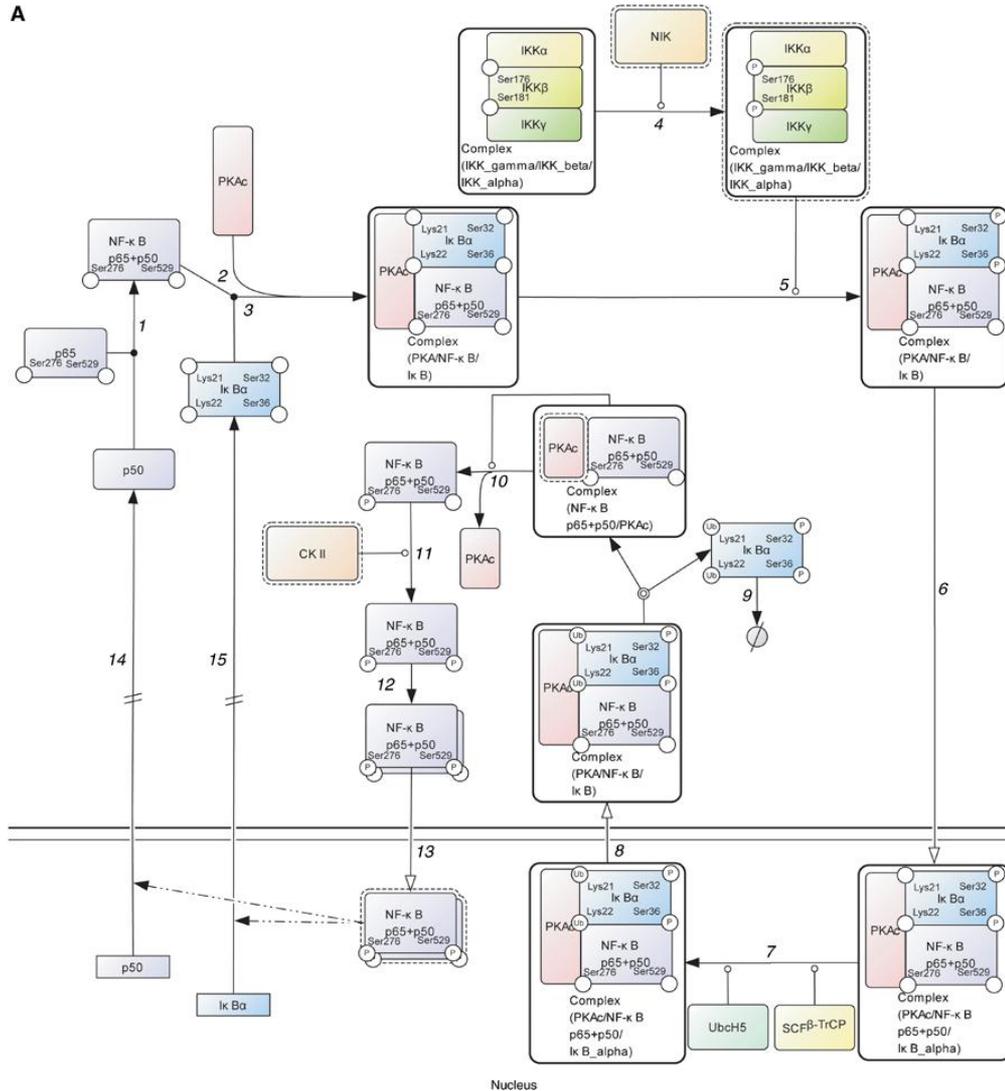
Ubiqu=ubiquitous; Mat = maternal; activ = activator; rep = repressor;  
 unkn = unknown; Nucl. = nuclearization; χ = β-catenin source;  
 nβ-TCF = nuclearized β-catenin-Tcf1; ES = early signal;  
 ECNS = early cytoplasmic nuclearization system; Zyg. N. = zygotic Notch

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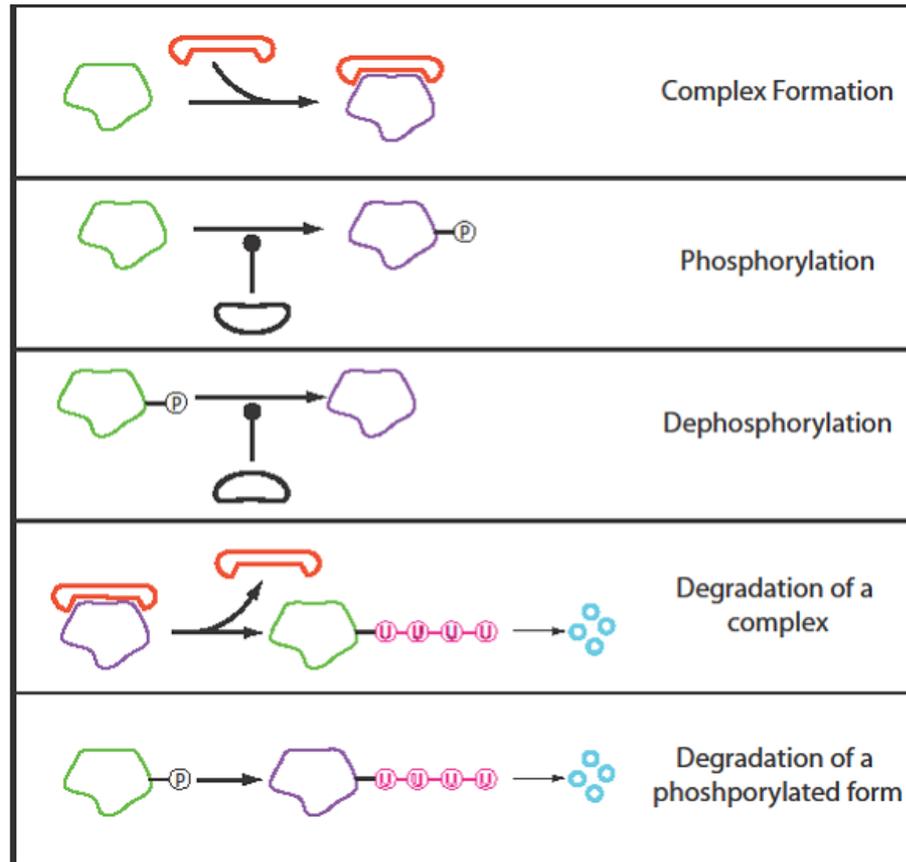
# Gene Regulatory Network Basic Operations

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

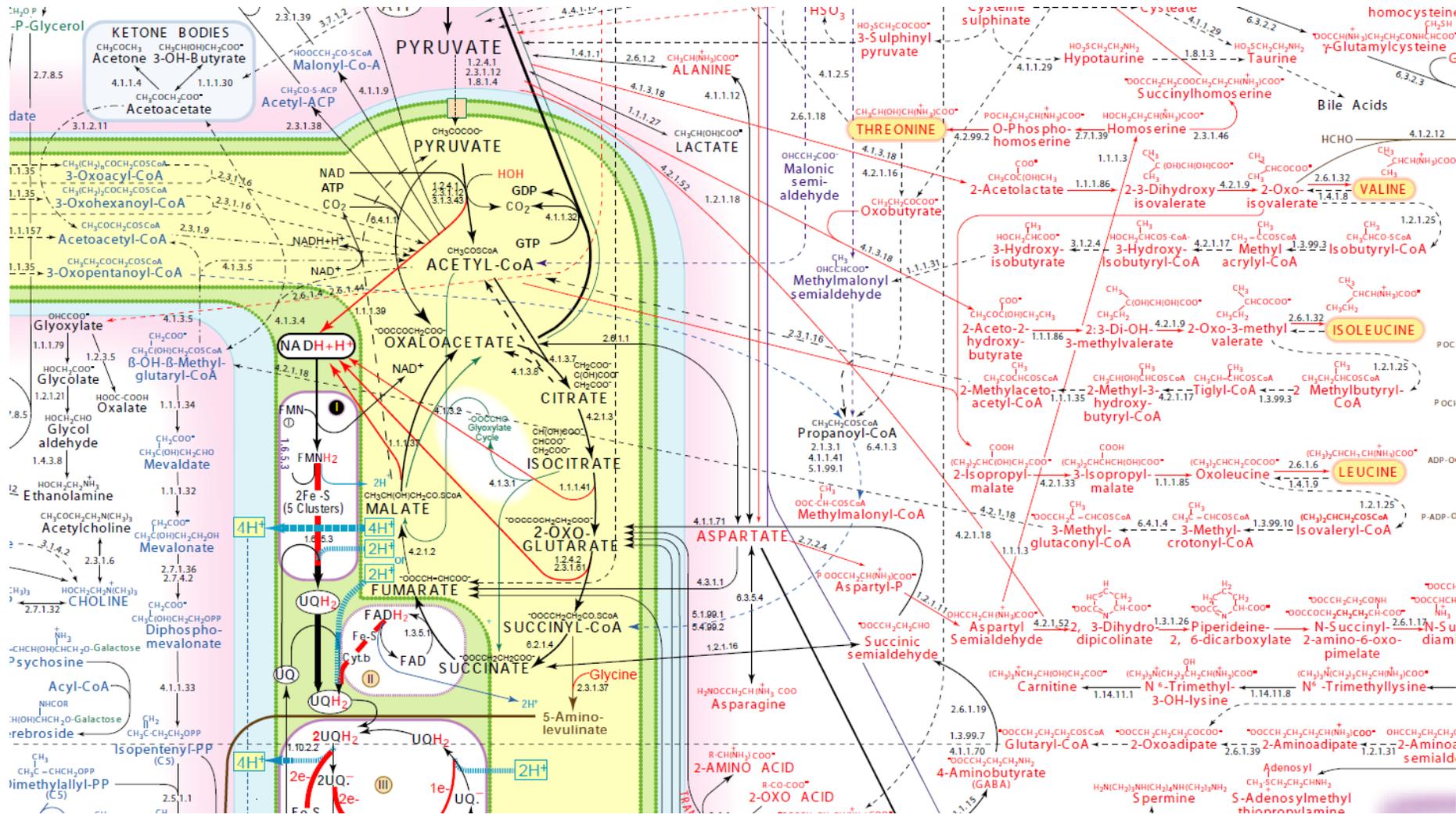
# Protein Signaling Networks



# Protein Signaling Networks Basic Operations



# Metabolic Networks



# Some Characteristics

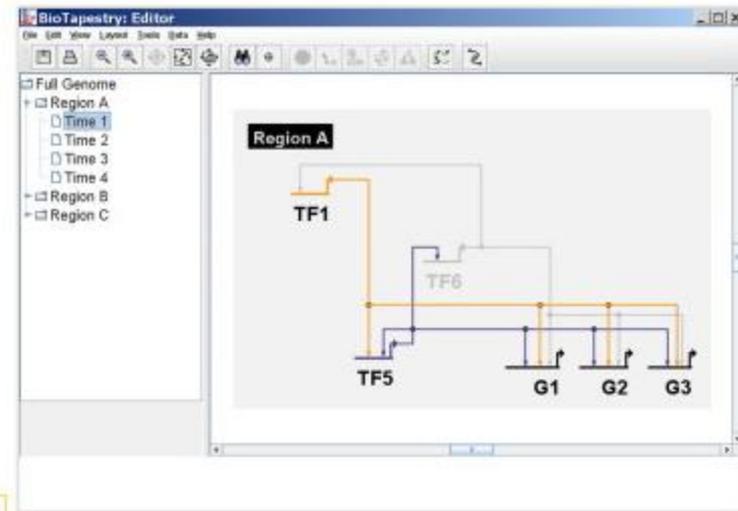
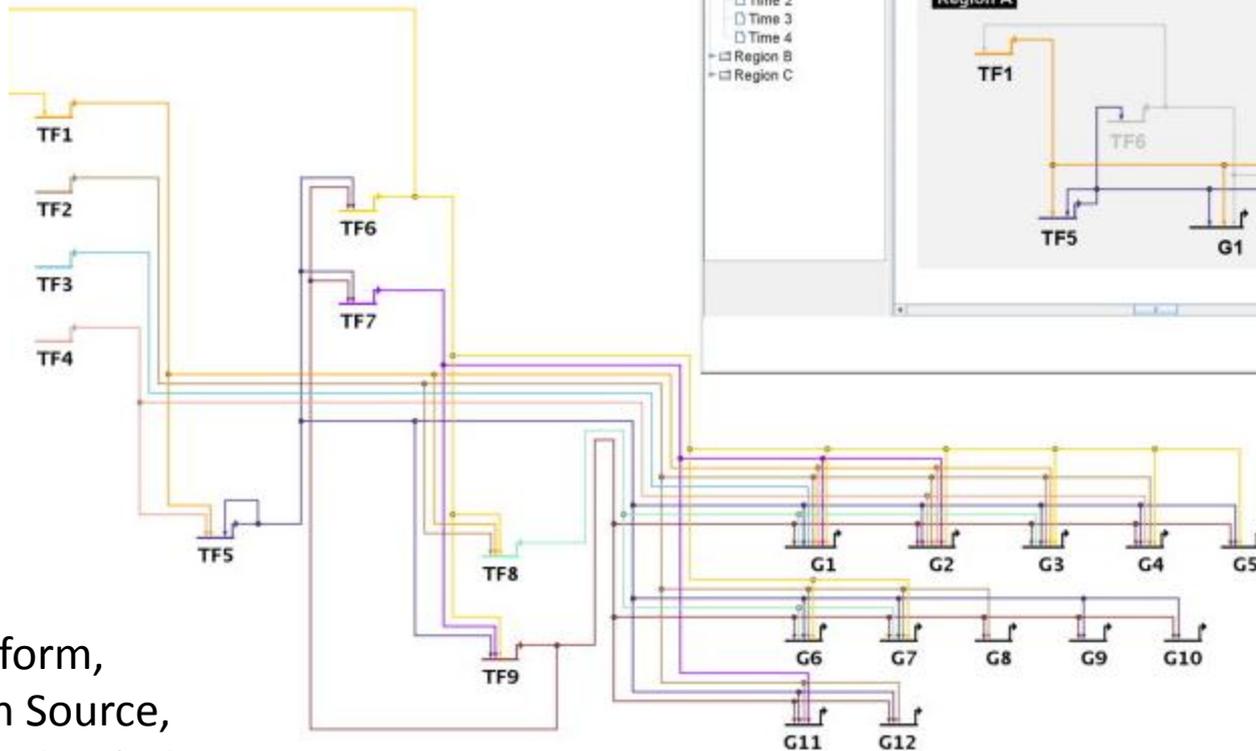
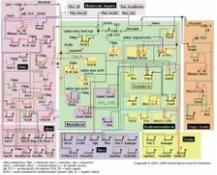
Network	Speed	Purpose	'Technology'
Gene	Slow to medium	Remodeling signaling and metabolic networks	DNA binding to control expression
Protein	Medium to fast	Signal processing	Protein covalent modification and sequestration
Metabolic	Fast	Manufacturing, energy systems	Enzymes, allosteric control

# Software for Network Visualization

Does not include ball-stick networks, eg cytoscape

# Gene Regulatory Networks

## BioTapestry

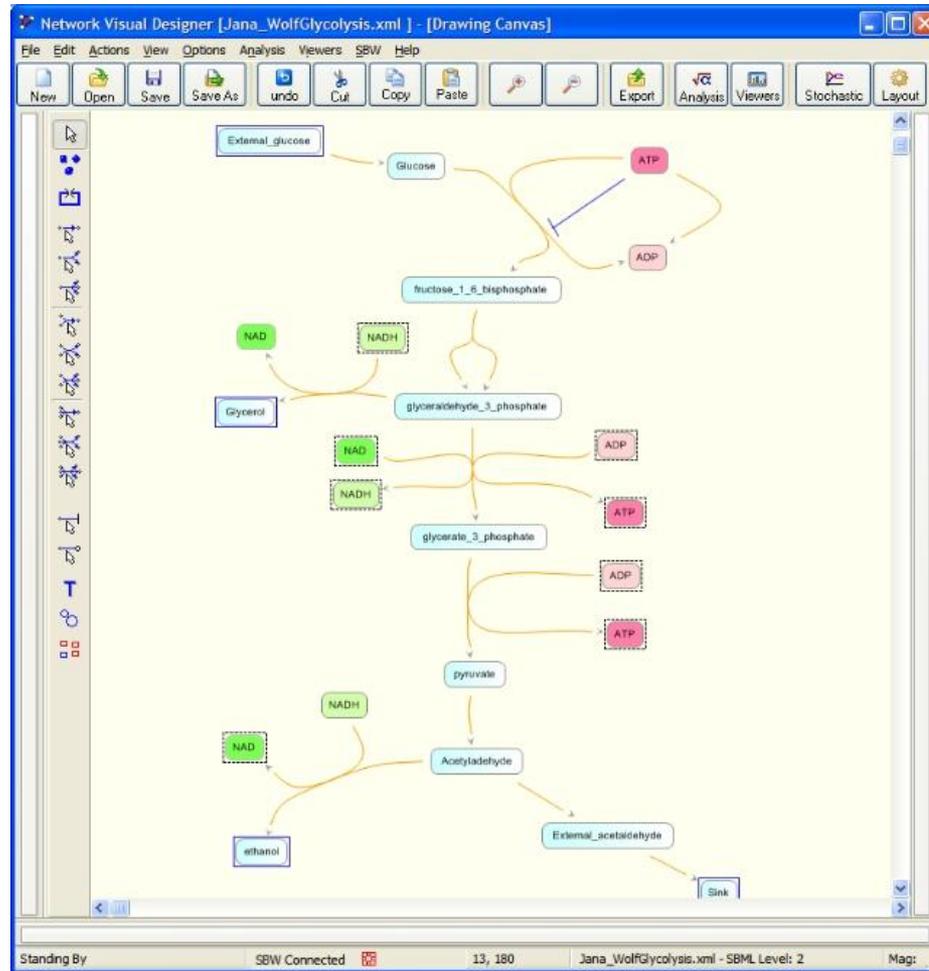


Cross-platform,  
Java, Open Source,  
SBML?, no simulation

[Biotapestry.org](http://Biotapestry.org)

# Metabolic and Protein Networks

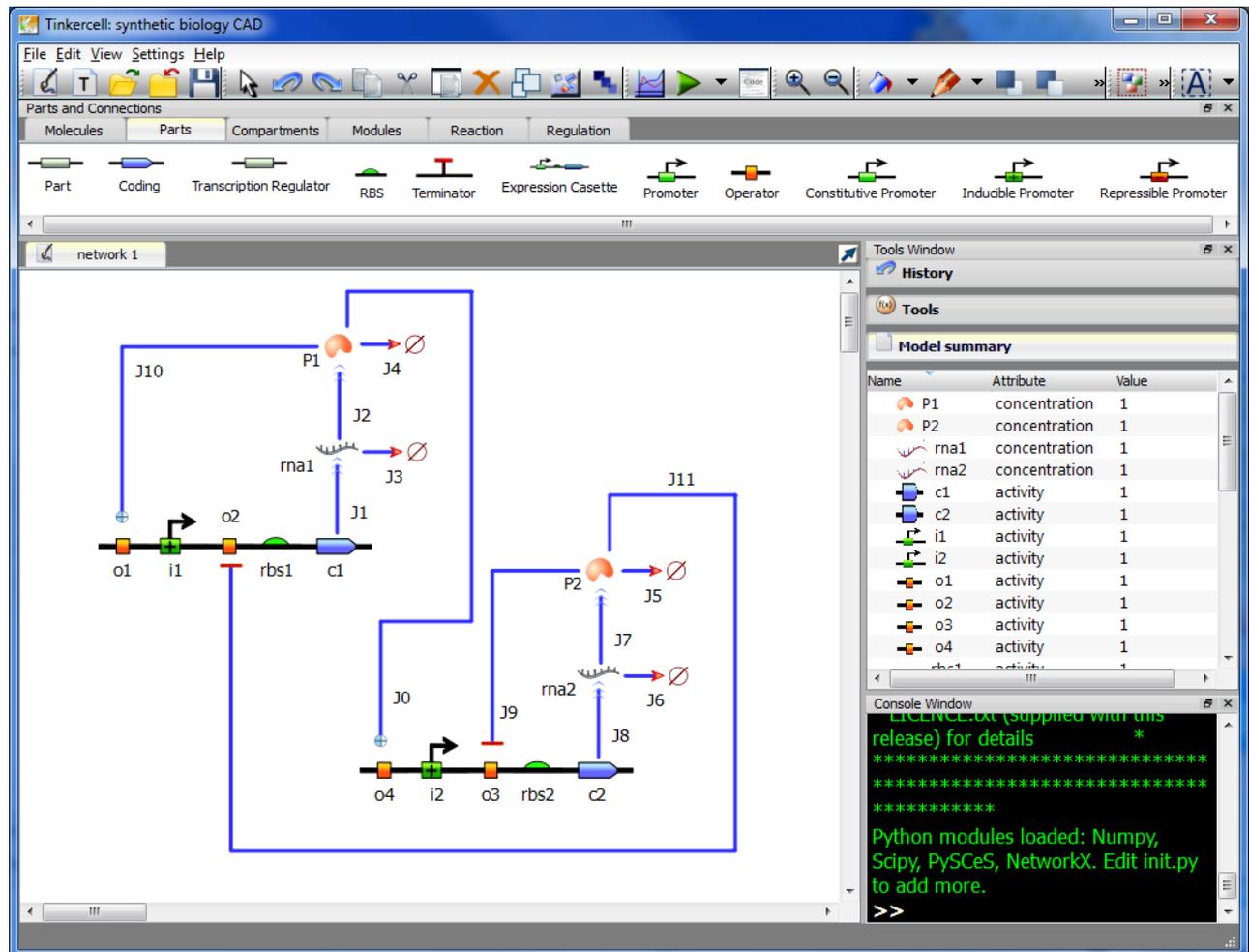
## JDesigner



Windows,  
Delphi, open source  
SBML, Part of SBW

# Gene Protein and Metabolic Networks

## TinkerCell

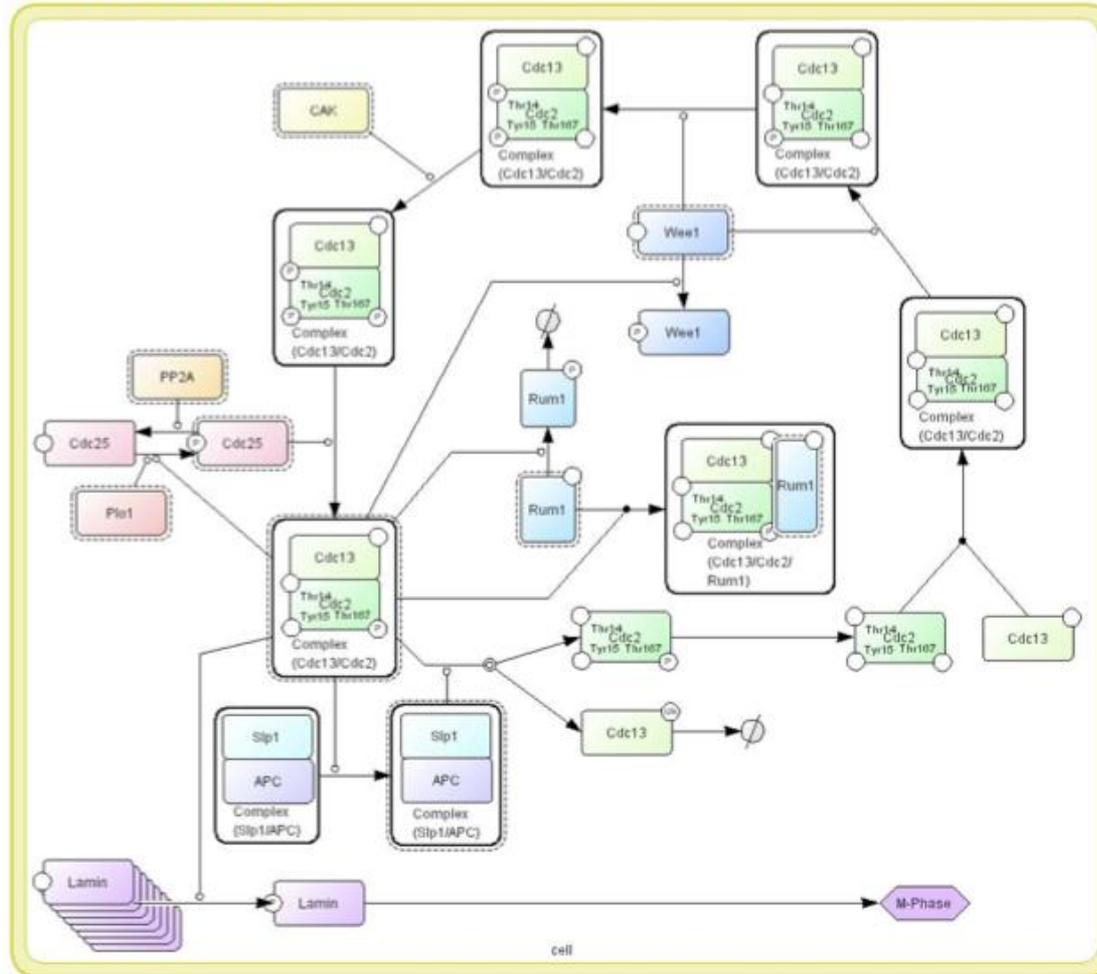


Cross-platform,  
Open source,  
C/C++, Qt, Python,  
SBML?

tinkercell.com

# Metabolic and Protein Networks CellDesigner

data structure is called `Protein` .



Cross-platform  
Works with SBW,  
Java, SBML