

A Brief Review of the State of SBML

Current Publications

- SBML specifications are online at <http://sbml.org>
 - Also have FAQ, community wiki, discussion forums
- Hucka et al., *Bioinformatics* 19(4): 524-531, 2003
- Finney & Hucka, *Biochem. Soc. Trans.* 31, 2003
- Hucka et al., *Systems Biology* 1(1): 41-53, 2004
- Finney, *Lecture Notes in Comp. Sci.*, 3082, 2005
- Hucka & Finney, *Molecular Systems Biology* 1(1), 2005
- Finney et al., in *Systems Modelling in Cellular Biology*, ed. Szallasi, Stelling and Periwai, MIT Press, 2006
- MIME type for SBML (RFC 3823) `application/sbml+xml`

Current Versions

- **SBML Level 2 Version 2**
 - **Pending, to be finalized in 2005**
- **SBML Level 2 version 1**
 - **Finalized June 28, 2003**
- **SBML Level 1 version 2**
 - **Finalized August 28, 2003**

Current SBML Process

- "Editors": Andrew Finney and Mike Hucka
 - Organize & manage activities, meetings, funding
 - Guide (but do not dictate) technical proposals
 - Integrate & edit final proposals into coherent spec.
- *SBML Forum*: informal community of modelers, researchers, software developers
 - Open: no official membership, no dues, etc.
 - Main channels for discussions:
 - Forum meetings
 - sbml-discuss@caltech.edu

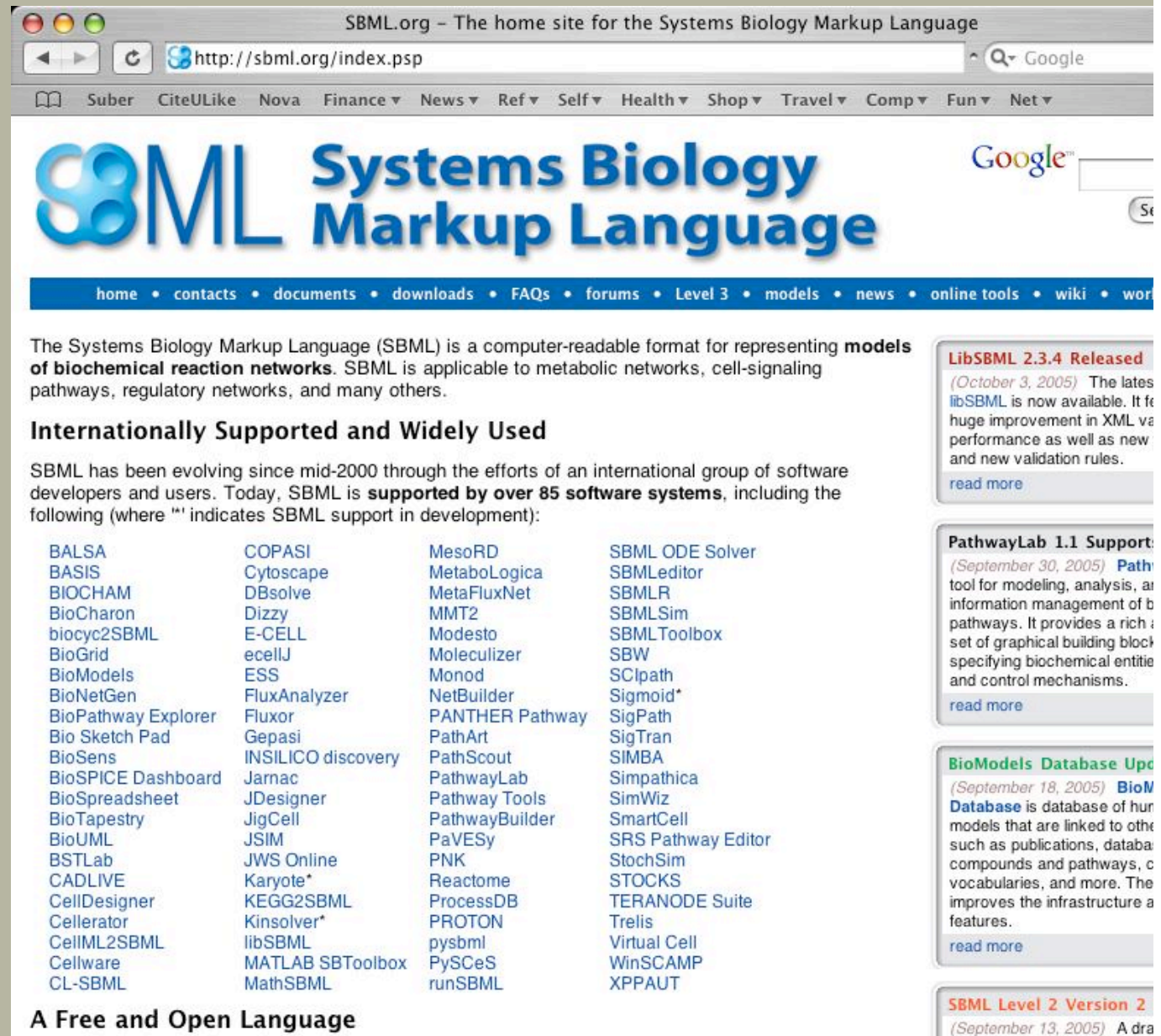
Current SBML Team Members

- *SBML in the beginning:* Andrew Finney, Mike Hucka, Herbert Sauro (now at KGI), Hamid Bolouri
- *SBML Team Today:*
 - *Team leader:* Mike Hucka
 - *Hard-working, dedicated, part-time developers/researchers/architects/modelers:*
 - Ben Bornstein, Akira Funahashi, Sarah Keating, Ben Kovitz, Bruce Shapiro
 - *Assistant/coordinator:* Linda Taddeo
 - *Recent team alumni:* Maria Schilstra, Jo Matthews

Support by Software Systems

- Over 90 software packages world-wide support SBML today

- See sbml.org



SBML.org – The home site for the Systems Biology Markup Language

<http://sbml.org/index.psp> Google

Suber CiteULike Nova Finance News Ref Self Health Shop Travel Comp Fun Net

SBML Systems Biology Markup Language

home • contacts • documents • downloads • FAQs • forums • Level 3 • models • news • online tools • wiki • work

The Systems Biology Markup Language (SBML) is a computer-readable format for representing **models of biochemical reaction networks**. SBML is applicable to metabolic networks, cell-signaling pathways, regulatory networks, and many others.

Internationally Supported and Widely Used

SBML has been evolving since mid-2000 through the efforts of an international group of software developers and users. Today, SBML is **supported by over 85 software systems**, including the following (where "*" indicates SBML support in development):

BALSA	COPASI	MesoRD	SBML ODE Solver
BASIS	Cytoscape	MetaboLogica	SBMLeditor
BIOCHAM	DBsolve	MetaFluxNet	SBMLR
BioCharon	Dizzy	MMT2	SBMLSim
biocyc2SBML	E-CELL	Modesto	SBMLToolbox
BioGrid	ecellJ	Moleculizer	SBW
BioModels	ESS	Monod	SClpath
BioNetGen	FluxAnalyzer	NetBuilder	Sigmoid*
BioPathway Explorer	Fluxor	PANTHER Pathway	SigPath
Bio Sketch Pad	Gepasi	PathArt	SigTran
BioSens	INSILICO discovery	PathScout	SIMBA
BioSPICE Dashboard	Jarnac	PathwayLab	Simpathica
BioSpreadsheet	JDesigner	Pathway Tools	SimWiz
BioTapestry	JigCell	PathwayBuilder	SmartCell
BioUML	JSIM	PaVESy	SRS Pathway Editor
BSTLab	JWS Online	PNK	StochSim
CADLIVE	Karyote*	Reactome	STOCKS
CellDesigner	KEGG2SBML	ProcessDB	TERANODE Suite
Cellerator	Kinsolver*	PROTON	Trelis
CellML2SBML	libSBML	pysbml	Virtual Cell
Cellware	MATLAB SBToolbox	PySCeS	WinSCAMP
CL-SBML	MathSBML	runSBML	XPPAUT

A Free and Open Language

LibSBML 2.3.4 Released

(October 3, 2005) The latest libSBML is now available. It features huge improvement in XML validation performance as well as new and new validation rules.

[read more](#)

PathwayLab 1.1 Support

(September 30, 2005) PathwayLab tool for modeling, analysis, and information management of biochemical pathways. It provides a rich set of graphical building blocks specifying biochemical entities and control mechanisms.

[read more](#)

BioModels Database Update

(September 18, 2005) BioModels Database is a database of hundreds of models that are linked to other such as publications, databases, compounds and pathways, vocabularies, and more. The update improves the infrastructure features.

[read more](#)

SBML Level 2 Version 2

(September 13, 2005) A draft...

Support by Consortia

- **DARPA Bio-SPICE**
- **Alliance for Cellular Signaling**
- **International E. Coli Alliance**

Support by Publications

- **Nature endorses SBML**

- “*Nature journals and Molecular Systems Biology support submissions involving SBML.*” [May 5, 2005]

- **Nature/EMBO Molecular Systems Biology**

- “*Where relevant and possible, authors are encouraged to submit datasets in SBML format. Authors should select 'SBML' from the available list of data file formats when uploading the data set file.*” [instructions to authors]

Support by Educators

- A number of courses include introduction to SBML. Examples (Google for “SBML homework”):
 - University of Newcastle (Darren Wilkinson)
 - KGI (Herbert Sauro)
 - Case Western (Tom Radivoyevitch)
 - Rostock (Olaf Wolkenhauer)
 - University of Utah (Chris Myers)
 - Indiana University School of Informatics
 - UCSB
 - Johns Hopkins
 - Rutgers University

Recent Organizational Developments

- **Biological Network Modeling Center @ Caltech**
 - PI's: John Doyle & Elliot Meyerowitz
 - Co-directors: Mike Hucka & Bruce Shapiro
 - Advisory board: Richard Murray, Eric Mjolsness, Barbara Wold, Mark Stalzer
 - Other notables:
Dan Gillespie



Support by Grants

- **Current grant directly involving SBML work:**
 - NIH R01 GM70923-01 (main, currently year 2 of 3)
 - NIH R01 GM70923-02S1 (supplement for BMDB)
 - NIH R01 GM70923-02S2 (supplement for meeting)
 - DARPA Bio-SPICE (small, for some libSBML work)
 - ARO ICB (small, for integrating SBML and data)

Other Acknowledgments

- **National Human Genome Research Institute (USA)**
- **National Institute of General Medical Sciences (USA)**
- **International Joint Research Program of NEDO (Japan)**
- **ERATO Kitano Symbiotic Systems Project (Japan)**
- **ERATO-SORST Program of the Japan Science and Technology Agency (Japan)**
- **Ministry of Agriculture (Japan)**
- **Ministry of Education, Culture, Sports, Science and Technology (Japan)**
- **BBSRC e-Science Initiative (UK)**
- **DARPA IPTO Bio-Computation Program (USA)**
- **Air Force Office of Scientific Research (USA)**