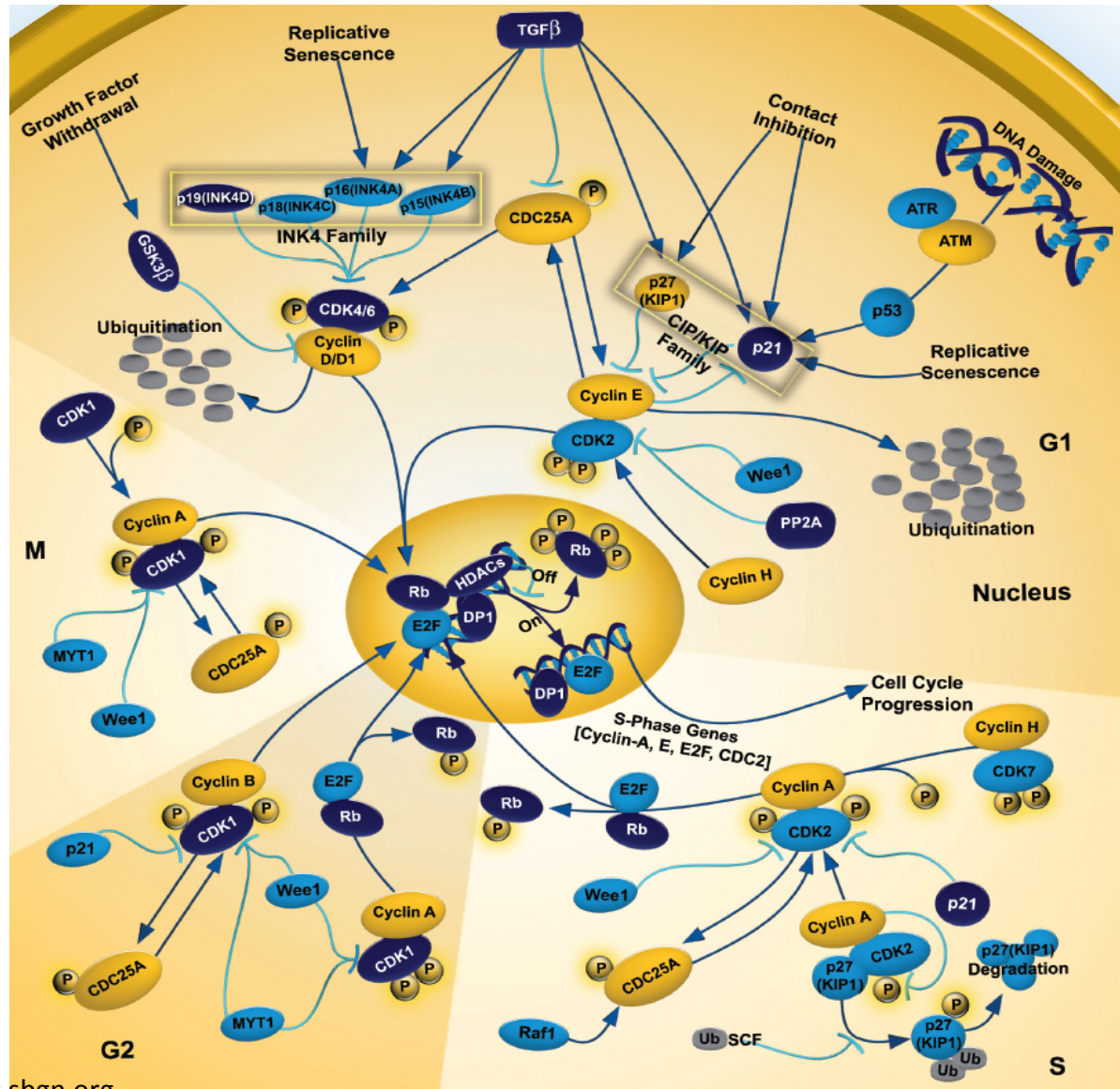


SBGN

Overview and Status



Motivation - Can You Understand This?



Motivation - Can You Understand This?

Stimulates?
but ...
what exactly?

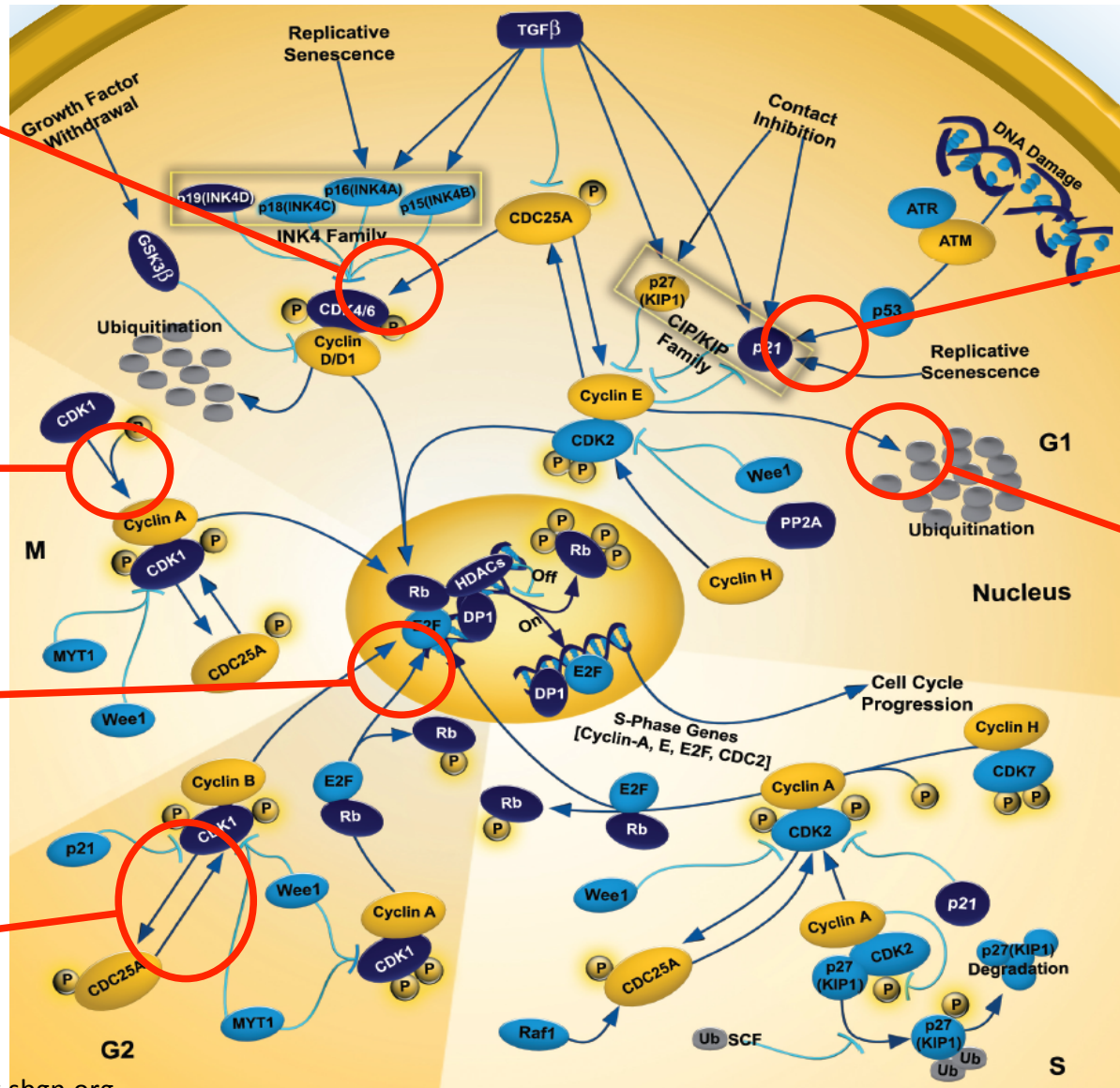
Associates
into?

Translocates?

Reciprocal
stimulation?



www.sbgn.org



Stimulates
gene
Transcription?

Is degraded?

Ambiguity in Conventional Representation



is transformed into

translocates ($X = Y$)

is degraded into

associates into

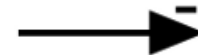
dissociates into

stimulates the activity of

stimulates the expression of

catalyses the formation of

X inhibits Y



Standardised Symbols are Important



Many countries



Quebec



Iran



China



Israel



Singapore



Norway



Poland



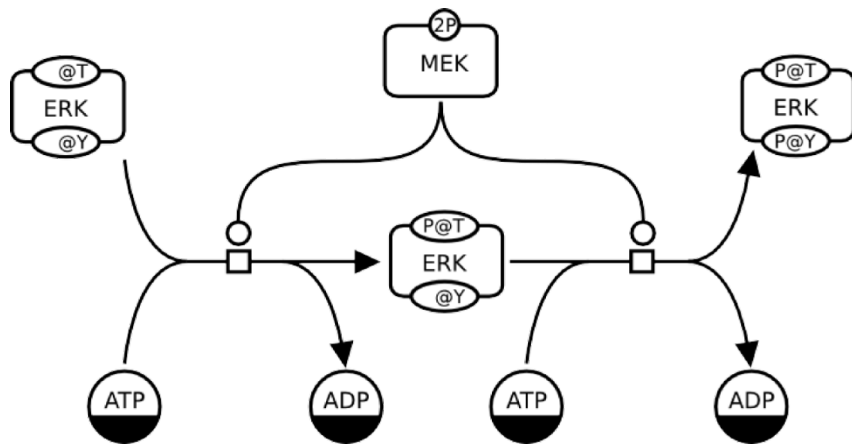
USA and
Canada

What is SBGN?

- A way to unambiguously describe biochemical and cellular events in graphs
- A graphical representation of quantitative models and biochemical pathways, at different levels of granularity
- Limited amount of symbols (~30) → Smooth learning curve
- Can be translated into executable models, can graphically represent models (e.g. SBML, BioPAX), but can also exist independently
- Three languages
 - Process Descriptions → one state = one glyph
 - Entity Relationships → one entity = one glyph
 - Activity Flow → conceptual level

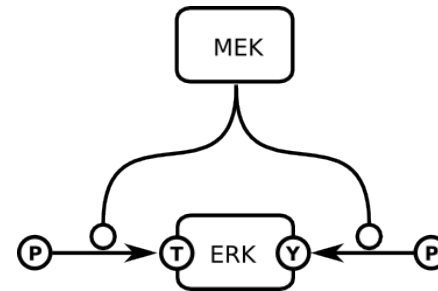
Three Languages in One

Process Description maps



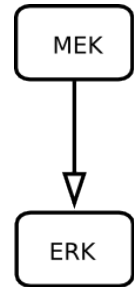
- ▶ Unambiguous
- ▶ Mechanistic
- ▶ Sequential
- ▶ Combinatorial explosion

Entity Relationships maps



- ▶ Unambiguous
- ▶ Mechanistic
- ▶ Non-Sequential

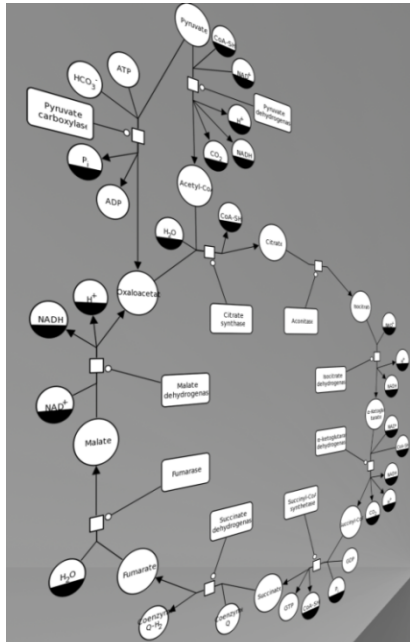
Activity Flow maps



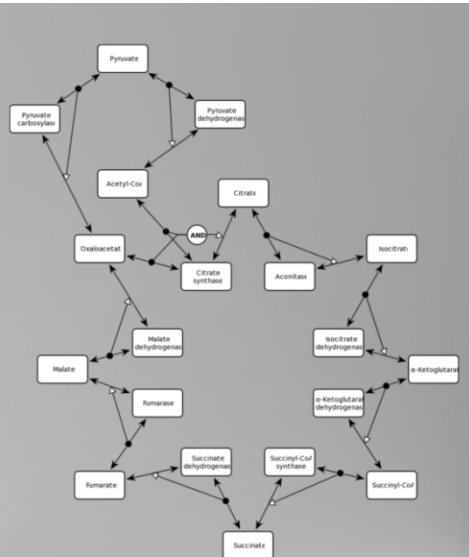
- ▶ Ambiguous
- ▶ Conceptual
- ▶ Sequential

Three Languages in One

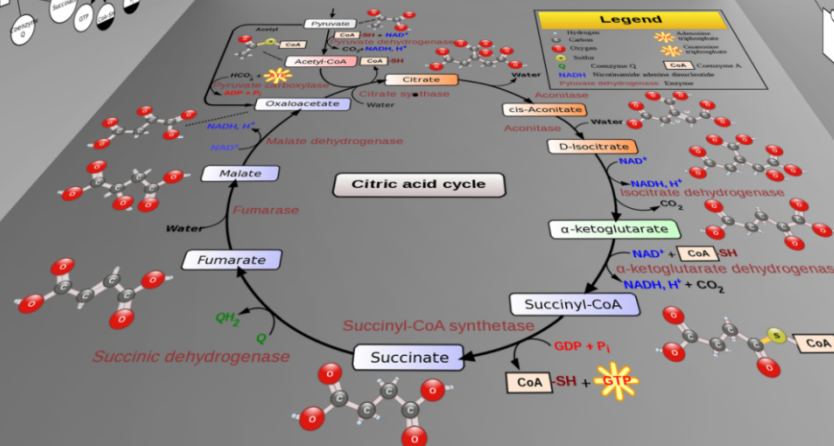
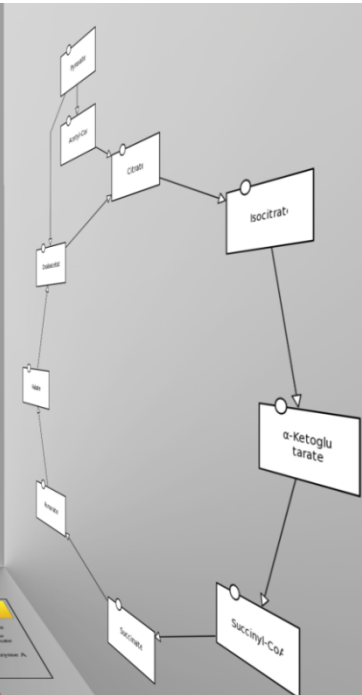
Process Description



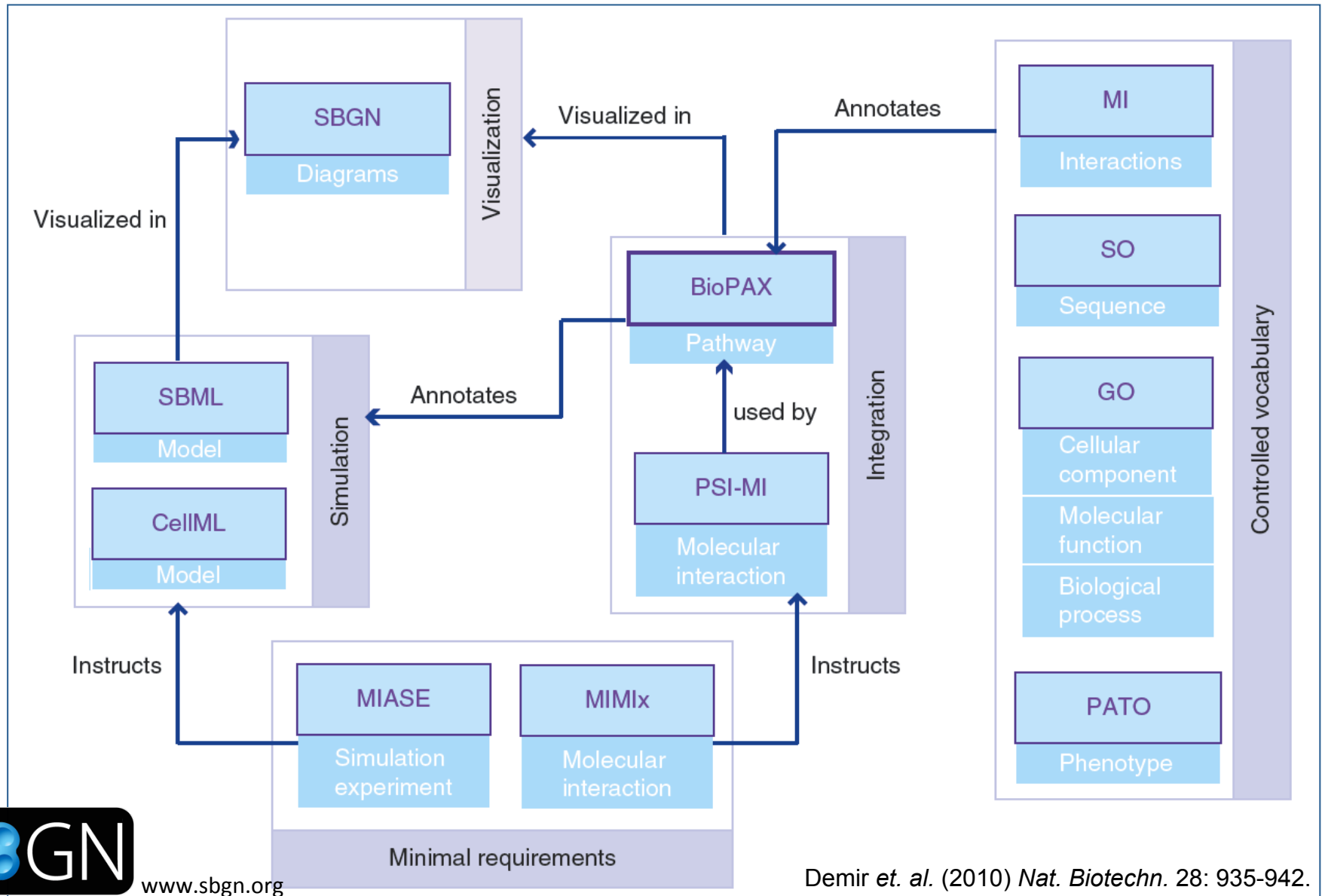
Entity Relationships



Activity Flow

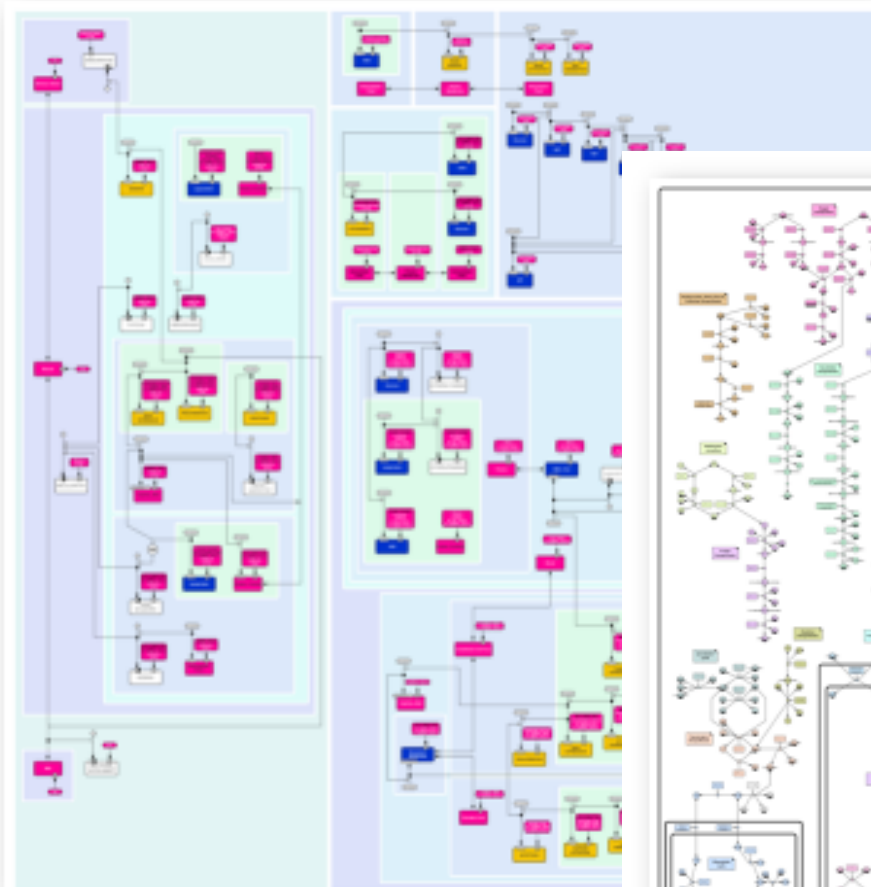


Connection to other Standards

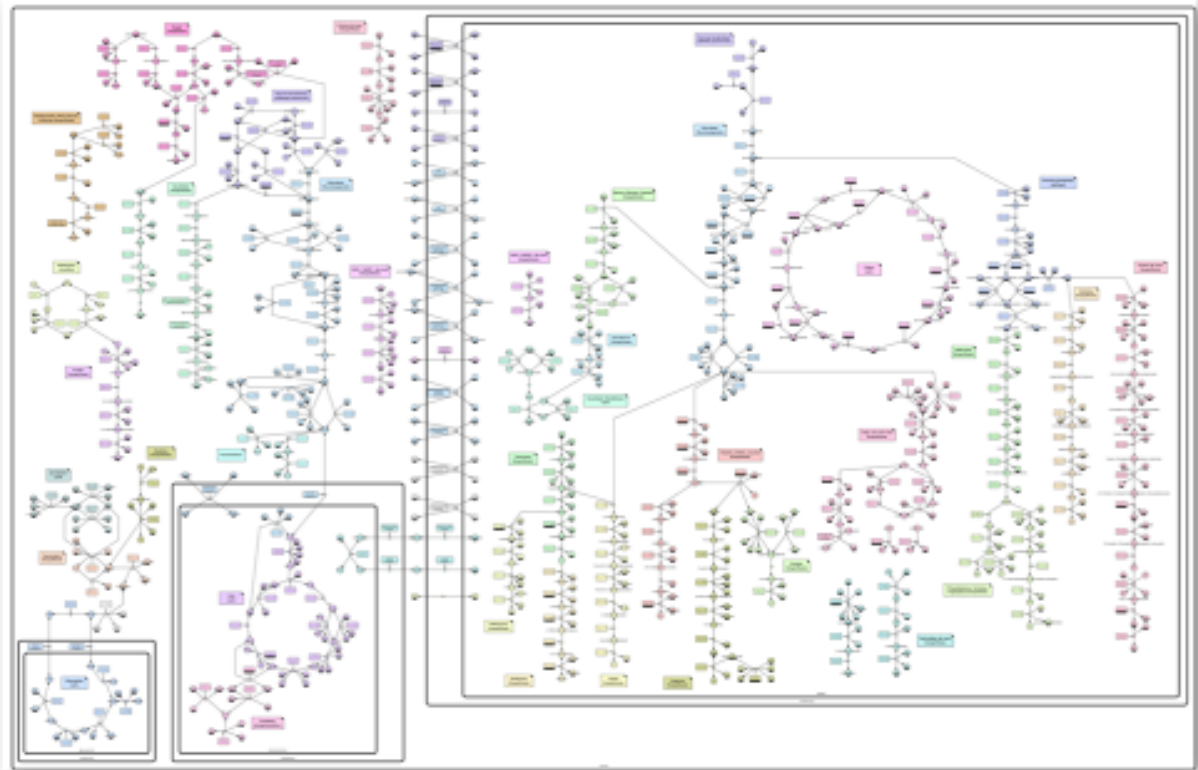


Usage

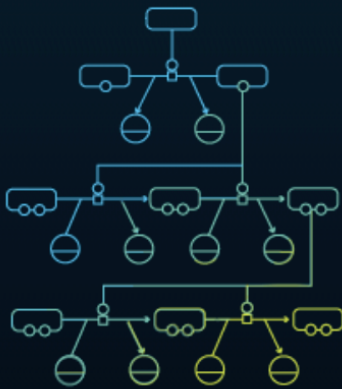
- Databases
 - Reactome, BioModelsDB, Panther pathways, MetaCrop, ...



Maps from SBGN best map contests



Web Page



A Visual Notation for Network Diagrams in Biology

Welcome to the global portal for documentation, news, and other information about the **Systems Biology Graphical Notation** (SBGN) project, an effort to standardize the graphical notation used in maps of biological processes.

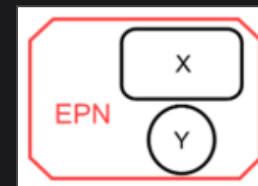
Quick start

[Learn how to use SBGN](#)

[Get involved](#)

Symbol of the month

[Complex \(PD\)](#)



SBGN News

(08 Jul. '14) [SBGN 10](#) will be part of the fifth [COMBINE forum](#), Aug 18-22 in Los Angeles.

Pathway of the month

This month's pathway is an SBGN-PD diagram based on the following paper published in the July issue of the Cell magazine (PubMed ID: [23791384](#)).

Park S., Kukushkin Y., Gupta R., Chen T., Konagai A., Hipp M., Hayer-Hartl M., and Hartl F. (2013) PolyQ Proteins Interfere with Nuclear Degradation of Cytosolic Proteins by Sequestering the Sis1p Chaperone. Cell 154, [134-145](#).

Software

[edit] Software providing support for SBGN

The following is a list of software packages known to provide (or have started to develop) support for SBGN notations. As the list grows, we envision more sophisticated way of recording support, but we hope this will be useful nevertheless. The webpages and e-mail addresses (remove spaces) were correct at the time of recording.

- [Arcadia](#) - Contact: alice.villeger@manchester.ac.uk
- [Athena](#) - Contact: fbergman@u.washington.edu
- [Biological Connection Markup Language \(BCML\)](#) -

Contact: duccio.cavalieri@unifi.it

- [Biographer and jSBGN](#) - Contact: biographer@googlegroups.com
- [BiNoM](#) - Contact: laurence.calzone@curie.fr
- [BIOCHAM](#) - Contact: biocham@inria.fr
- [BioModels Database](#) - Contact: biomodels-net-team@lists.sourceforge.net
- [BioPAX](#) - Contact: demir@cbio.mskcc.org
- [BioUML](#) - Contact: fedor@developmentontheedge.com
- [ByoDyn](#)
- [CellDesigner](#) - Version 4.x supports SBGN Process Diagram Level 1. celldesigner.org
- [CySBGN](#) - A cytoscape plugin. Contact: emanuel@ebi.ac.uk
- [Dunnart](#) - Contact: Sarah.Boyd@infotech.monash.edu.au
- [Edinburgh Pathway Editor](#) - Contact: asorokin@inf.ed.ac.uk or smoodie@ed.ac.uk
- [iPathways](#) - Contact: ghosh@sbi.jp
- [IPAVS](#) - Contact: pradeep@cidms.org
- [JWS Online](#) - Contact: jls@sun.ac.za
- [Mayday](#) - Contact: battke@informatik.uni-tuebingen.de
- [Metacrop](#) - Contact: schreibe@ipk-gatersleben.de
- [Postrophe](#) - Contact: k.wegner@herts.ac.uk
- [Scribble](#) - Contact: mi@ai.sri.com

TABLE 1 | Comparison of pathway visualization tools that support SBGN notation.

Name	Ref.	Access	Availability	SBGN			SBGN validation	Mapping	Website export
				PD	ER	AF			
SBGN-ED	9	http://sbgn-ed.org/	F	✓	✓	✓	✓	✓	✓
BiNoM	7	http://bioinfo-out.curie.fr/projects/binom/	F	✓	—	—	—	—	—
BioUML	—	http://www.biouml.org/	F	✓	—	—	—	—	—
CellDesigner	6	http://www.celldesigner.org/	F	✓	—	—	—	✓	—
Edinburgh Pathway Editor (EPE)	12	http://epe.sourceforge.net/	F	✓	✓	✓	—	—	—
PathVisio	8	http://www.pathvisio.org/	F	✓	—	—	—	✓	✓
PathwayLab	—	http://www.innetics.com/	C	✓	—	—	—	—	✓
Arcadia	21	http://arcadiapathways.sourceforge.net/	F	✓	—	—	—	—	—
Athena	22	http://athena.codeplex.com/	F	✓	—	—	—	—	—
BIOCHAM	23	http://contraintes.inria.fr/BIOCHAM/	F	✓	—	—	—	—	—
JWS Online	24	http://jij.biochem.sun.ac.za/help.html	F	✓	—	—	—	—	—
Mayday	25	http://www-ps.informatik.uni-tuebingen.de/mayday/wp/	F	✓	—	—	—	✓	—
Netbuilder'	26	http://strc.herts.ac.uk/bio/maria/Apostrophe/	F	✓	—	—	—	—	—
SBML Layout Library	27	http://sbmlayout.sf.net/	F	✓	—	—	—	—	—
SubtiPathways	28	http://subtiwiki.uni-goettingen.de/subtipathways.html	F	✓	—	—	—	—	—
Systems Biology Metabolic Modeling assistant	29	http://cath.gisum.uma.es:8080/sbmm/	F	✓	—	—	—	—	—
VISIBIOweb	30	http://www.bilkent.edu.tr/~bcbi/pvs.html	F	✓	—	—	—	—	—



SBGN-ML and libSBGN

- Facilitate development of SBGN supporting tools
- Increase interoperability between these tools
- Electronic implementation of SBGN
 - exchange format for SBGN maps: SBGN-ML
 - XML schema based
 - express semantics, relationships and geometry
 - software library to interact with SBGN maps: LibSBGN
 - object model and API (C++, C#, Java)
 - key features: reading, writing, validation, conversion and layout
- Wiki <http://www.sbgn.org/LibSBGN>
- SourceForge project <http://sourceforge.net/projects/libsbgn/>
- Tools supporting SBGN-ML: <http://www.sbgn.org/LibSBGN/ClientTools>

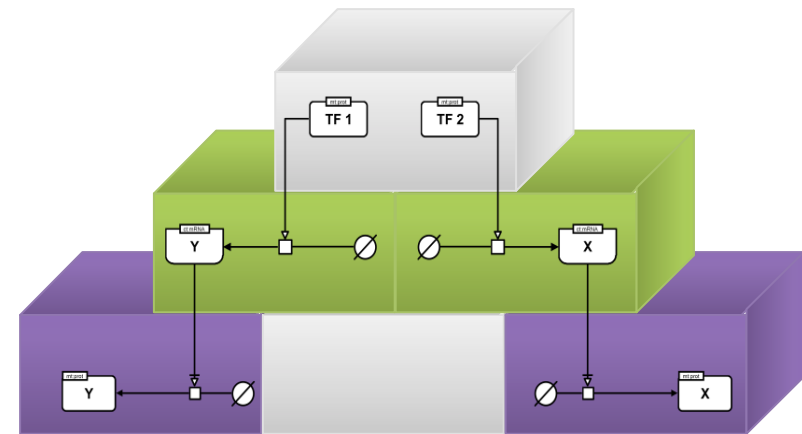
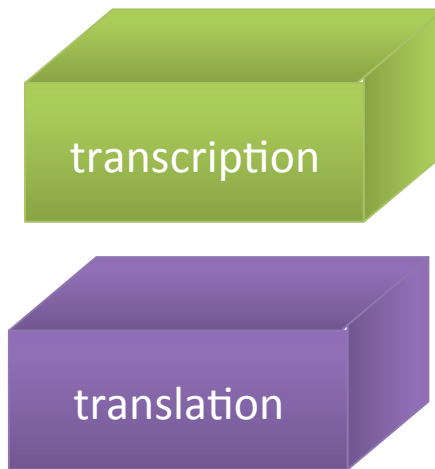
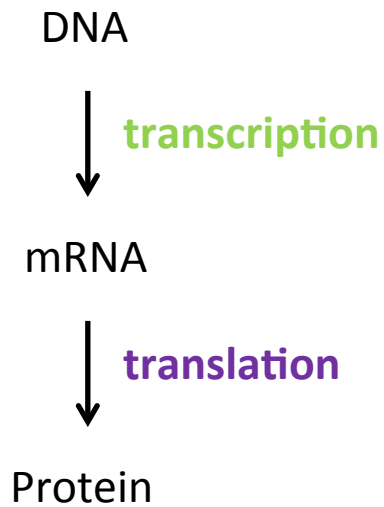


SBGN Bricks

PATTERN

BRICK

NETWORK



- For all three SBGN languages

Governance

- Editors



Tobias
Czauderna



Huaiyu
Mi



Stuart
Moodie



Falk
Scheiber



Anatoly
Sorokin

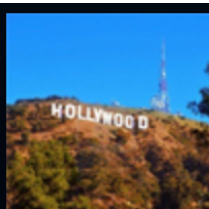
– Elected for 3 years, two new editors to be elected end of this year

- Scientific committee



Last meetings

Additional SBGN editor meetings and TelCos



SBGN 10

Los Angeles, USA

16 – 22 August 2014

SBGN 10 will be part of the fifth [COMBINE forum](#).

HARMONY 2014

Manchester, UK

22–25 April 2014

SBGN will be part of the fourth [HARMONY hackathon](#).



COMBINE 2013

Paris, France

16–20 September 2013

SBGN was part of the fourth [COMBINE forum](#).




HARMONY 2013

Farmington, USA

20–23 May 2013

SBGN was part of the third [HARMONY hackathon](#).

Specification Status Update

	SBGN 10 <i>Los Angeles, USA</i>	16 – 22 August 2014
SBGN 10 will be part of the fifth COMBINE forum .		

- Notes: <https://docs.google.com/document/d/17lo9kuO6chosyCPxoLBJUbXs1I2NuumdZUJ35cGPJUc/edit?pli=1>
- PD Level 1 Version 2
 - Discussed during previous meeting(s)
 - Draft (including user manual) is available for review under https://sourceforge.net/p/sbgn/code/HEAD/tree/ProcessDiagram/trunk/Specification/sbgn_PD-level1.pdf
 - Roadmap: revised draft end of Aug. 2014, release end of Oct. 2014
 - Level 2: making it simpler and easier to implement, supporting generics, etc. (will be discussed during COMBINE)

Specification Status Update

- ER Level 1 Version 2
 - Discussed during previous meeting(s)
 - Draft is available for review under https://sourceforge.net/p/sbgn/code/HEAD/tree/EntityRelationship/trunk/sbgn_ER-level1.pdf
 - Roadmap: revised draft end of Aug. 2014, release end of Oct. 2014
- AF Level 1 Version 1.2
 - Discussed during previous meeting(s)
 - Draft is available for review under https://sourceforge.net/p/sbgn/code/HEAD/tree/ActivityFlow/trunk/sbgn_AF-level1.pdf
 - Roadmap: revised draft end of Aug. 2014, release end of Oct. 2014
- Connection SBGN and SBOL Visual
- Open world vs. closed world

COMBINE 2014

- Talks and presentations
 - Tues. 9:00-10:30 (SBGN)
 - Tues. 11:00-12:30 (SBGN + SBOL Visual)
- Breakouts
 - Tues. 2:00-3:30
 - Tues. 4:00-5:30
 - Wed. 2:00-3:30 (libSBGN)

