

LibSBGN Current Status and Future Plans

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Background Context & Motivation

WHY LIBSBGN?

Many tools support SBGN

- Arcadia
- Athena
- BiNoM
- BioModels Database
- BioPAX
- BioUML
- ByoDyn
- CellDesigner
- Dunnart
- Edinburgh Pathway Editor
- JWS Online
- Mayday
- Netbuilder (Apostrophe)
- PANTHER
- PathVisio
- PathwayLab
- Reactome
- Vanted
- VISIBIOweb
- ... 19 tools (and still counting)

See <http://>

sbgn.org/SBGN_Software

The problem with SBGN tools

- **No interchange of maps**
- **No reuse of code**
 - Useful features (e.g. validation, layout) are scattered across tools, and code is duplicated.

Solution? LibSBGN

– Goals

- Improve Interoperability
- Encourage code re-use
- Help development of SBGN compliant tools

Solution? LibSBGN

LibSBGN consists of 2 parts

– Exchange format: SBGN-ML

- XML Schema based
- express semantics, relationships and geometry

– Software library: LibSBGN

- Java and C++
- key features: reading, writing, validation, conversion and layout

Why SBGN-ML?

PNG / SVG	you lose biological network
BioPAX	you lose the layout
GML / GraphML	not standard
SBML-Layout	you lose SBGN semantics

Development Methods & Infrastructure

HOW IT'S DONE

Community project

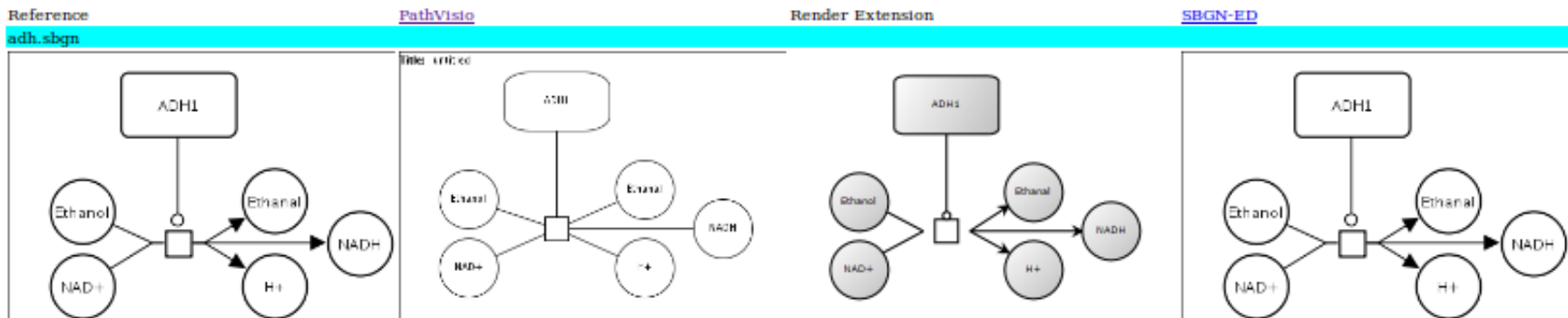
- Mirit Aladjem (MIM)
- Frank Bergmann (SBML Layout)
- Michael Blinov (BioNetGen)
- Sarah Boyd (Dunnart)
- Tobias Czauderna (VANTED)
- Emek Demir (Pathway Commons)
- Ugur Dogrusoz (Patika)
- Akira Funahashi (CellDesigner)
- Hiroaki Kitano (CellDesigner)
- Nicolas Le Novère (BioModels Database)
- Augustin Luna (MIM)
- Yukiko Matsuoka (CellDesigner)
- Huaiyu Mi (PANTHER Pathway)
- Stuart Moodie (EPE)
- Falk Schreiber (VANTED)
- Anatoly Sorokin (EPE)
- Martijn van Iersel (PathVisio)
- Martina Kutmon (PathVisio)
- Alice Villéger (Arcadia)
- Gael Jalowicki (Biomodels)

Organization

- **Mailing list:** sbgn-libsbn@lists.sourceforge.net
- **Monthly online meetings**
 - **minutes** and **announcement** on mailing list
 - on **EVO**: <http://evo.caltech.edu>
- SourceForge project: <http://libsbn.sourceforge.net>
 - **Wiki**: documentation, road map, “how to”, useful links, ...
 - **Tracker**: “to do” list (bugs and missing features)
 - **SVN** repository: test suite, specs, XSD, validation rules
- Quality control
 - **Rendering comparison** pipeline http://libsbn.sourceforge.net/rendering_comparison

Development infrastructure

- **Test suite:** test cases (so far):
 - 25 for PD
 - 17 for ER
 - 8 for AF
- SBGN map in PNG format
- corresponding SBGN-ML file
- Rendering comparison pipeline



Current Status

WHERE WE ARE

SBGN-ML Roadmap

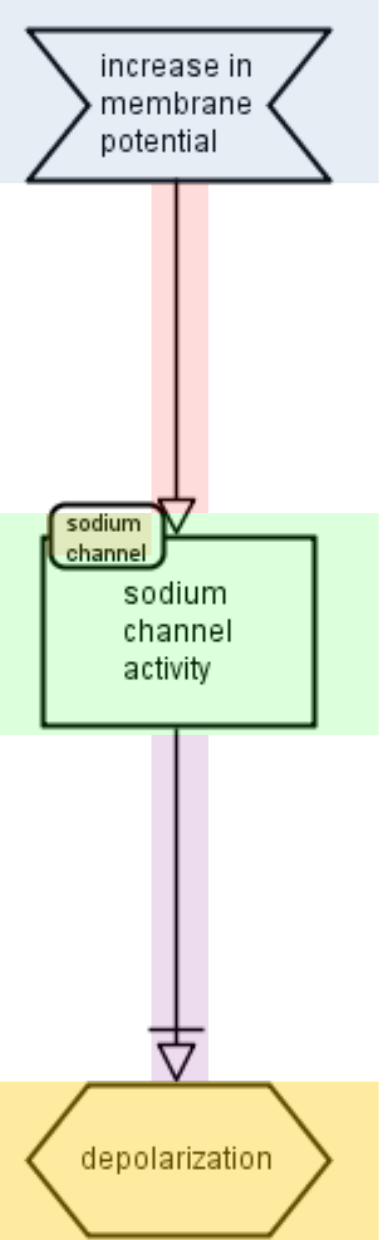
- **Milestone 1 released (Jan. 2011)**
 - Only support for SBGN PD
 - Only high-level graphics specification
 - Basic validation using XML Schema
- **Milestone 2 (planned for Oct. 2011)**
 - Implement semantics for all 3 languages: SBGN PD, ER and AF
 - Extra validation using Schematron
 - Third-party extensibility
- **Milestone 3**
 - Complete graphical specification
 - Submaps...
- **Milestone 4**
 - Linking, MIRIAM compatibility, ...

What is new (since Harmony)

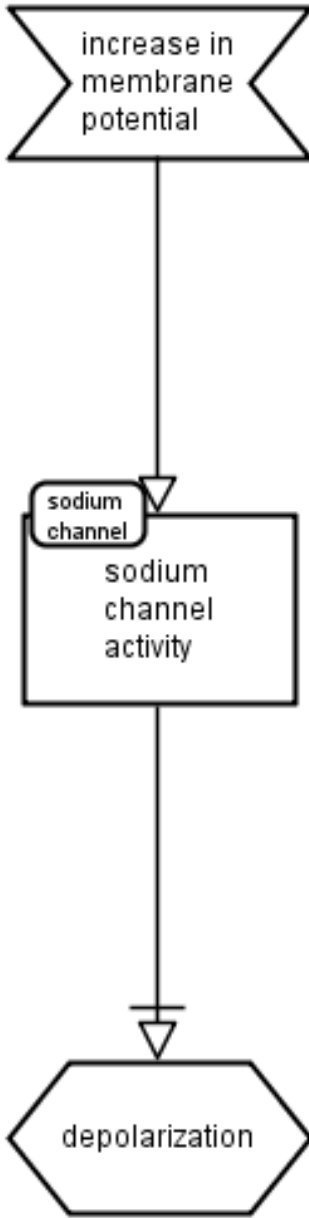
- More test cases
- Schematron rulesets
- Third-party extensibility
- AF support
- compartmentRef and compartmentOrder
- Id's for Arcs are compulsory
- Arcgroups

Brief SBGN-ML overview

- Main requirements
 - **Easy to draw** (explicit coordinates)
 - **Easy to interpret** (network and semantics)
- Top level: **Map** element
- Most important elements: **Glyph** and **Arc**
 - “class” attribute determines semantics, e.g. “macromolecule”
- Glyph geometry: **bounding box** only
- Arcs **refer to glyph** or glyph ports (network connectivity)

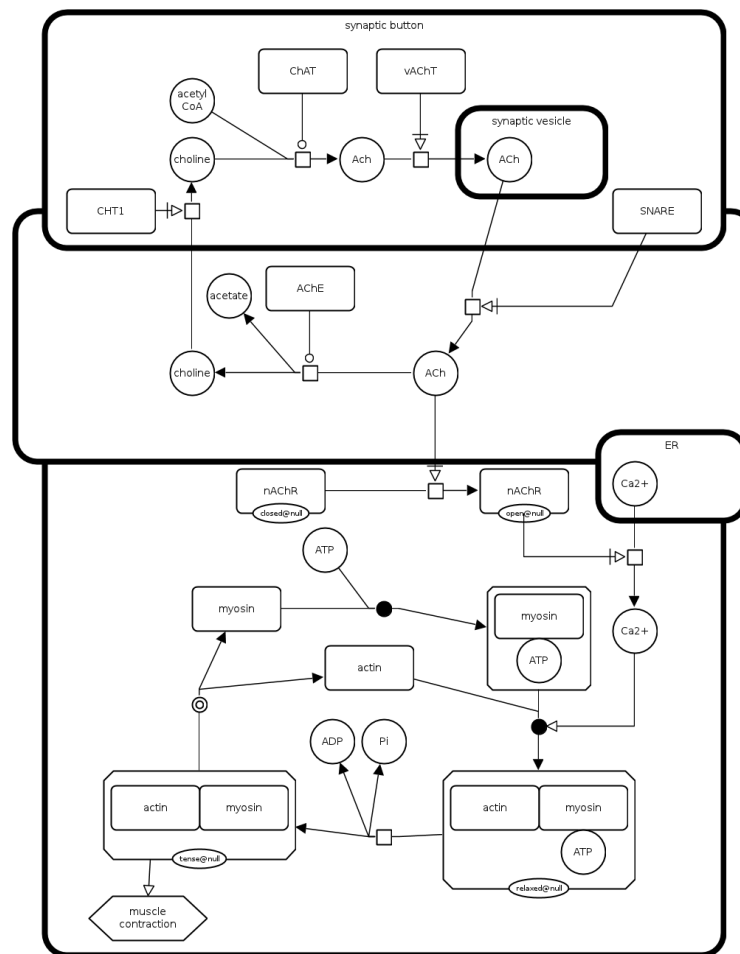
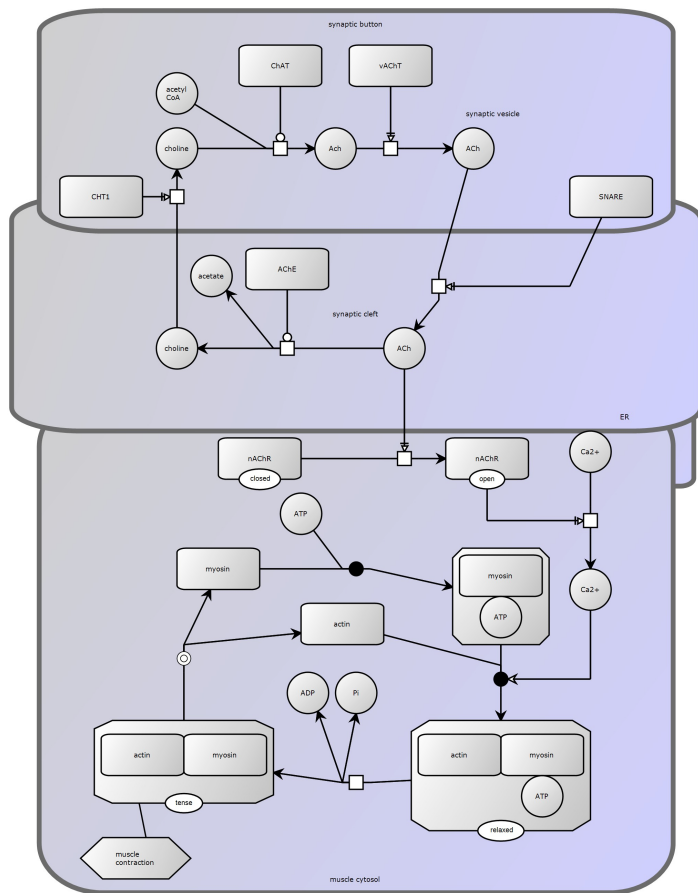


```
1 <?xml version="1.0" encoding="UTF-8"?>
2 <sbgn xmlns="http://sbgn.org/libsbgn/0.2">
3   <map language="activity flow">
4
5     <glyph class="perturbation" id="g1">
6       <label text="increase in&#xA;membrane&#xA;potential"/>
7       <bbox x="30" y="30" w="120" h="60"/>
8     </glyph>
9
10    <glyph class="biological activity" id="g2">
11      <label text="sodium&#xA;channel&#xA;activity"/>
12      <bbox x="36" y="232" w="108" h="75"/>
13      <glyph class="unit of information" id="g2.1">
14        <label text="sodium&#xA;channel"/>
15        <entity name="macromolecule"/>
16        <bbox x="39" y="219" w="46" h="26"/>
17      </glyph>
18    </glyph>
19
20    <glyph class="phenotype" id="g3">
21      <label text="depolarization"/>
22      <bbox x="30" y="450" w="120" h="60"/>
23    </glyph>
24
25    <arc class="positive influence" source="g1" target="g2" id="a1">
26      <start x="90" y="90" />
27      <end x="90" y="232" />
28    </arc>
29
30    <arc class="necessary stimulation" source="g2" target="g3" id="a2">
31      <start x="90" y="307" />
32      <end x="90" y="450" />
33    </arc>
34
35  </map>
36 </sbgn>
37
```

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24
25    </map>
26  </sbgn>
27
28
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```

compartmentOrder & compartmentRef



Extensions

```
<map language="process description">
  <extension>
    <renderInformation id="example" programName="SBML Layout"
      programVersion="3.0"
      xmlns="http://projects.eml.org/bcb/sbml/render/level2">
      <listOfColorDefinitions>
        <colorDefinition id="yelloComp" value="#ffffccff" />
        ...
      </listOfColorDefinitions>
      ...
    </renderInformation>
  </extension>
</map>
```

Future Plans

WHAT NEXT?

Software support

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ClientTools

Tools using or planning to use LibSBGN:

Editors

[edit]

- [SBGN-ED](#) SBGN-ED, based on VANTED, is currently the most complete solution for creating and editing SBGN diagrams. SBGN-ML import / export is supported in the upcoming release.
- [PathVisio](#) PathVisio has a plugin for creating and editing SBGN diagrams. This plugin is still a work in progress (For latest information, see plugin page [here](#))

Other

[edit]

- [The SBML Layout and Rendering extension](#) supports conversion from SBGN-ML.
- [VISIBIOweb](#), a free, open-source, web-based pathway visualization and layout services software for BioPAX (level 2) pathway models, can export to SBGN-ML.
- [Paxtools](#) supports conversion from BioPAX to SBGN-ML.
- [KEGG Translator](#) will support conversion from KEGG to SBGN-ML in the upcoming release.

Navigation

- [Main Page](#)
- [Community portal](#)
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- [Recent changes](#)
- [Random page](#)
- [Help](#)

Search

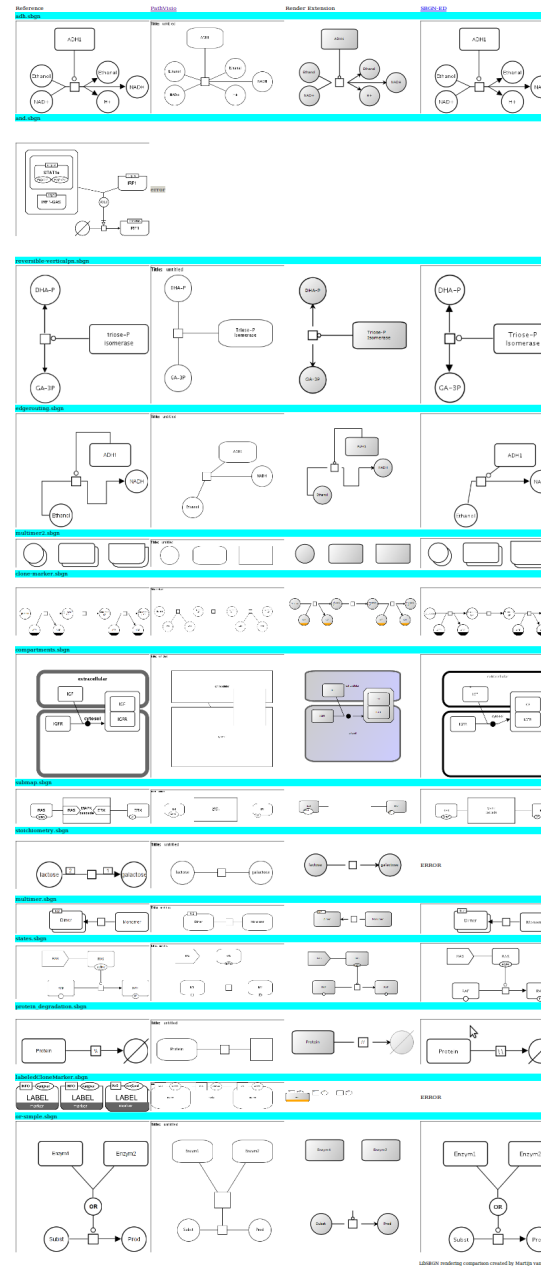
Toolbox

- [What links here](#)
- [Related changes](#)
- [Upload file](#)
- [Special pages](#)
- [Printable version](#)
- [Permanent link](#)

YOUR TOOL HERE

Software support

- Conversion SBGN-ML -> PNG
 1. PathVisio
(Martijn van Iersel)
 2. SBGN-ED
(Tobias Czauderna)
 3. SBML Layout
(Frank Bergmann)



YOUR
TOOL
HERE

What's next

- Release (Soon - October 2011)
- More detailed graphics
 - Roundness of rounded rectangles
 - Arrow-glyph size
 - Line thickness
 - ...
- Better handling of submaps

THANK YOU

- To everyone involved so far: **GOOD JOB TEAM**
- To **all developers supporting SBGN** (or planning to):
 - feel free to join the club!
 - Use the **library** and support the **schema**
 - Take part in online discussions
 - **Contribute content** to the SourceForge project

<http://libsbgn.sourceforge.net>