COMBINE 2015, Salt Lake City | October 13th, 2015

STON
Representing SBGN PD and AF in a Neo4j graph database

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UNIVERSITÉ PARIS SUD

SYSTEMS BIOLOGY BIOINFORMATICS ROSTOCK

U-BIOPRED

eTRIKS

eisbm European Institute for Systems Biology & Medicine
A SYSTEMOSCOPE INSTITUTE

Outline

1. Context of STON project

2. Project STON : SBGN TO Neo4j

3. Conclusion on STON

4. Presentation of YTOS project

EISBM : European Institute of Systems Biology and Medicine

Unbiased **BIO**markers in **PRED**iction of respiratory disease outcomes

Study Asthma

U-BIOPRED is actively supported by eTRIKS.

Link website U-BIOPRED

european **TR**anslational **I**nformation and **K**nowledge Management **S**ervices

Provides a plateform for translational medicine research

eTRIKS is based on the tranSMART platform.

http://www.etriks.org/

Connected projects

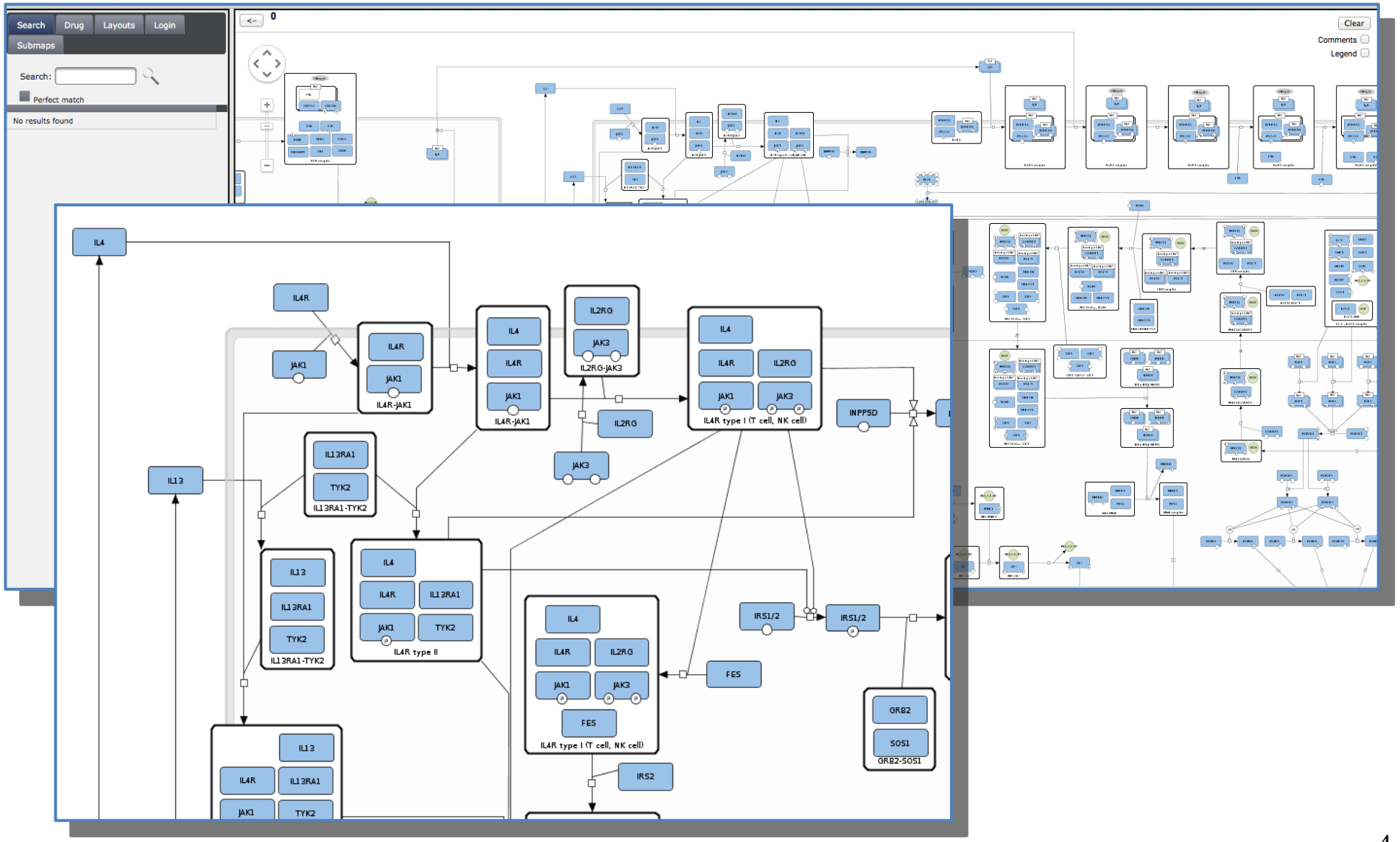
tranSMART

http://www.transmartfoundation.org/

The tranSMART Foundation is a global non-profit organisation. tranSMART knowledge management platform enables sharing and analysis of heterogeneous data.

http://www.imi.europa.eu/

AsthmaMap in SBGN Process Description



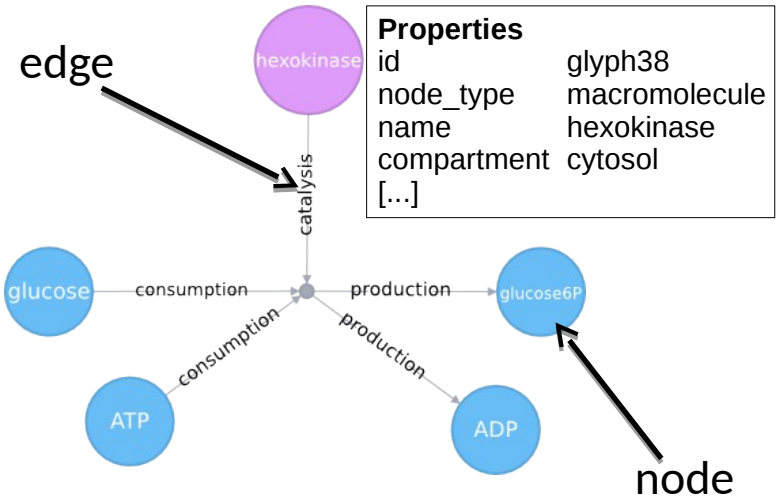
Project STON : SBGN to Neo4j

What is Neo4j ?

Neo4j graph database

NOSQL

Labeled - property



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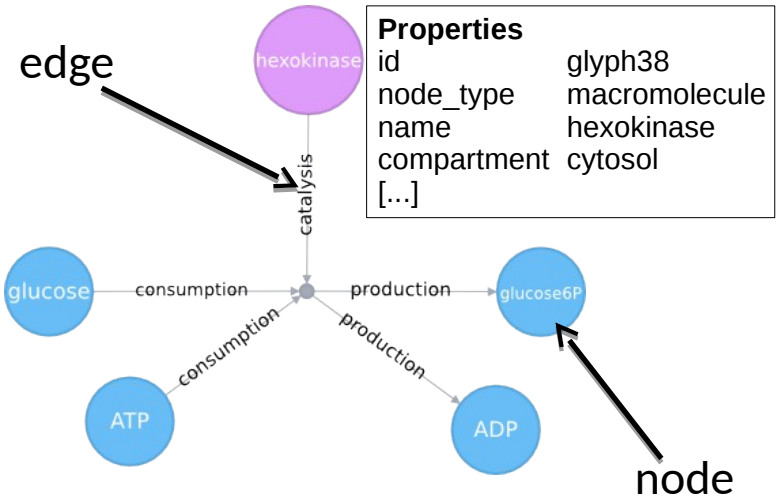

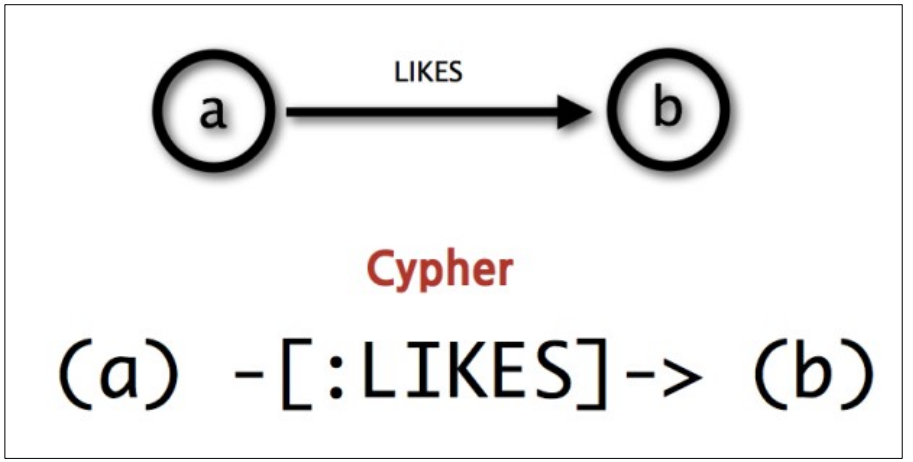

http://neo4j.com/developer/cypher-query-language/

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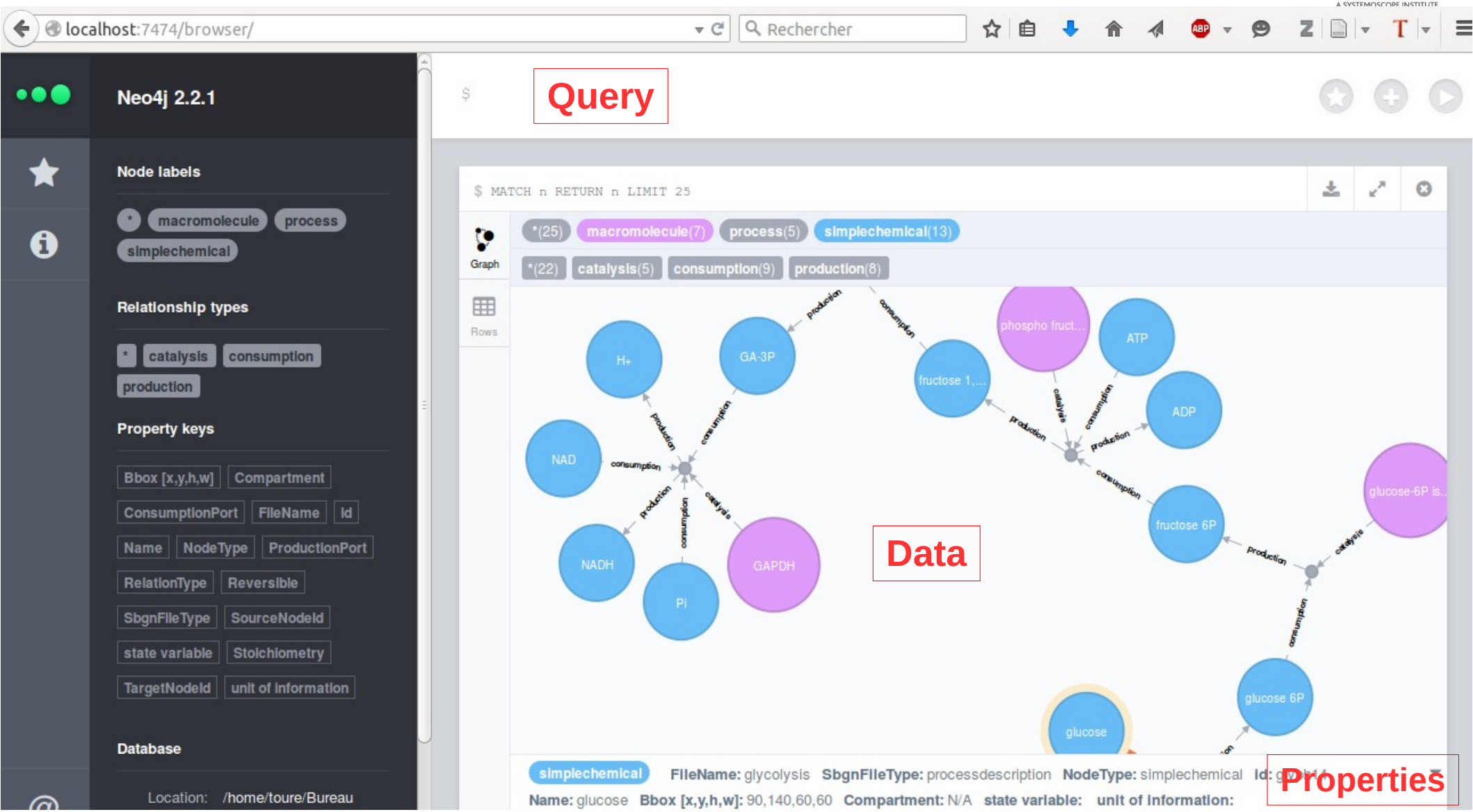
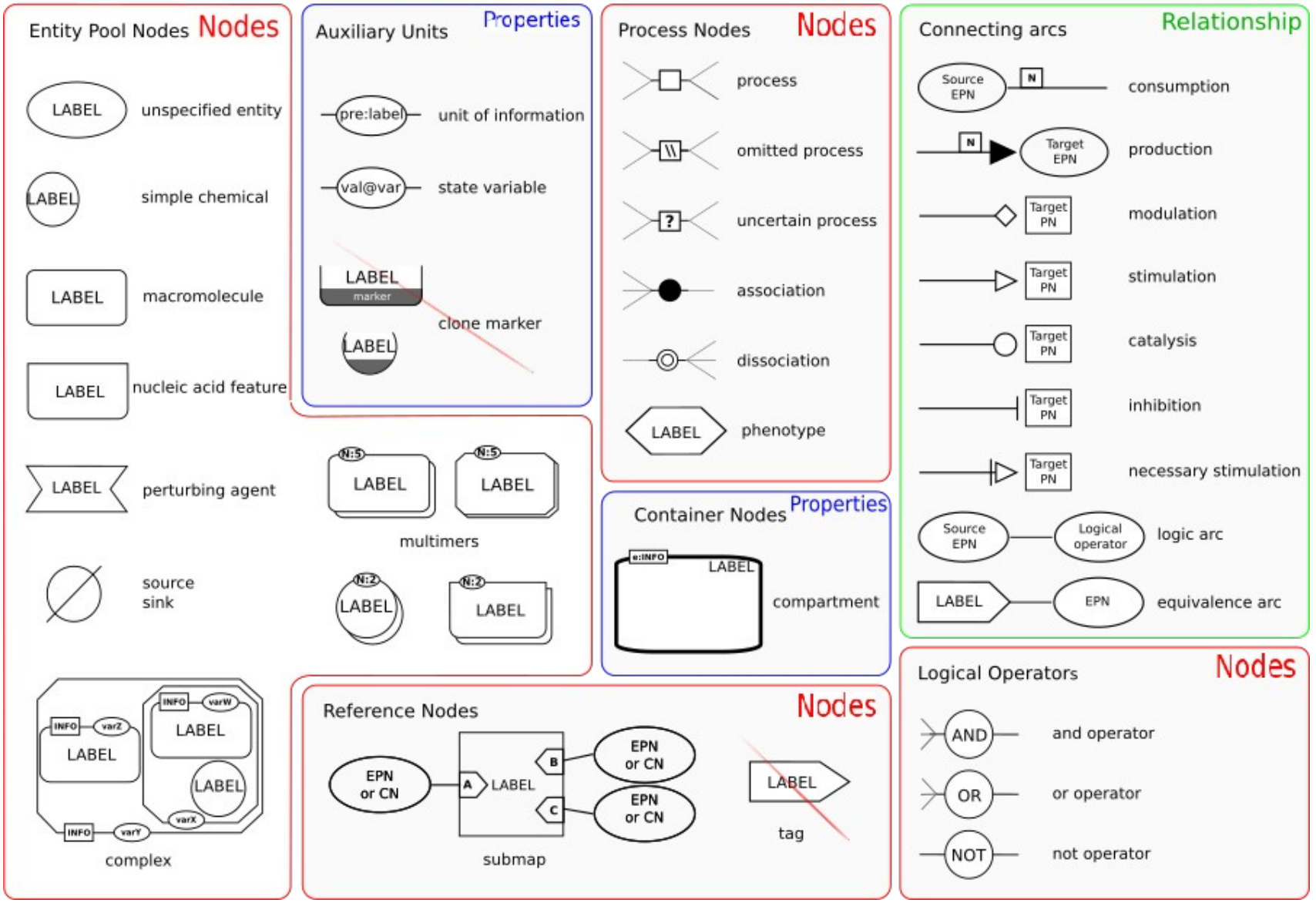


Implementation of STON

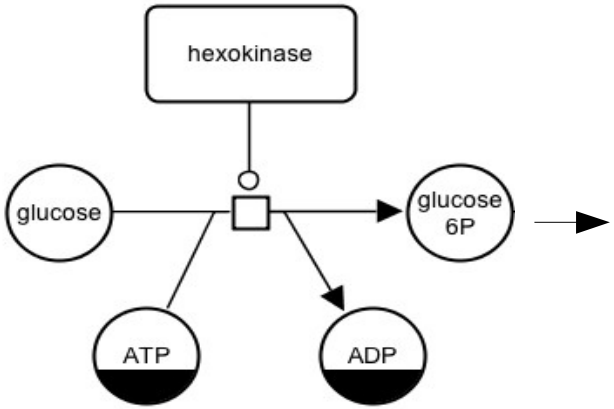
Translation rules for SBGN PD into Neo4j

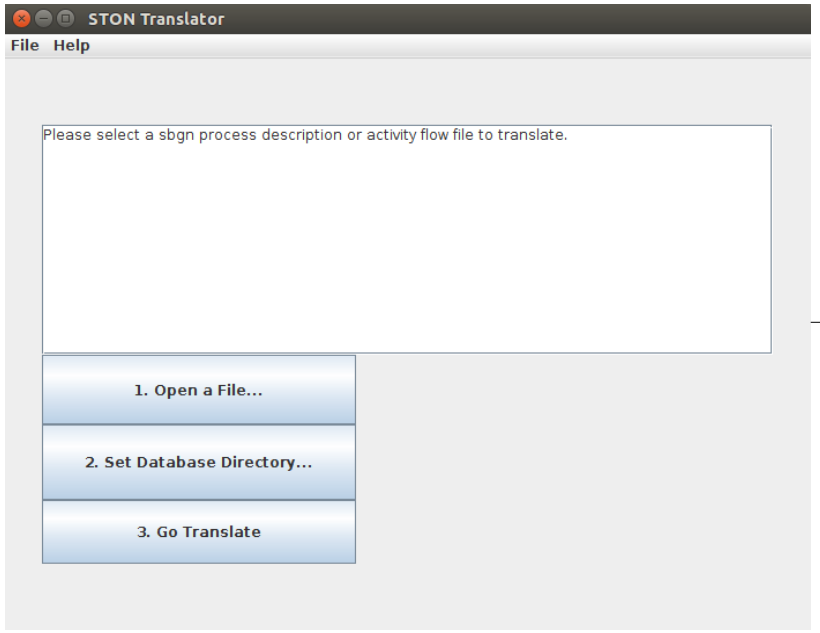


Implementation of STON

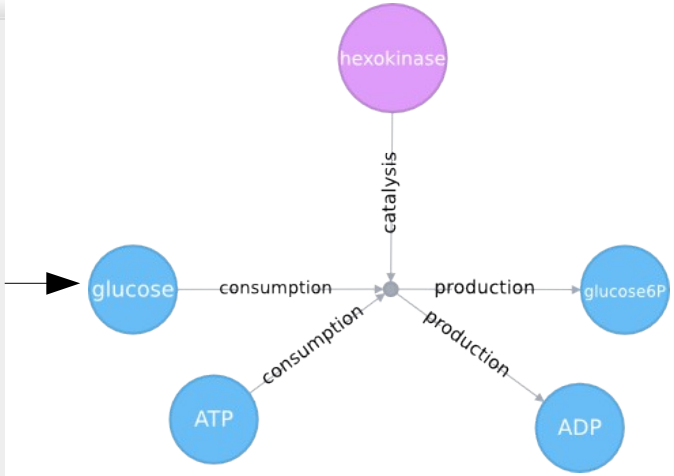
SBGN

PD & AF





Neo4j

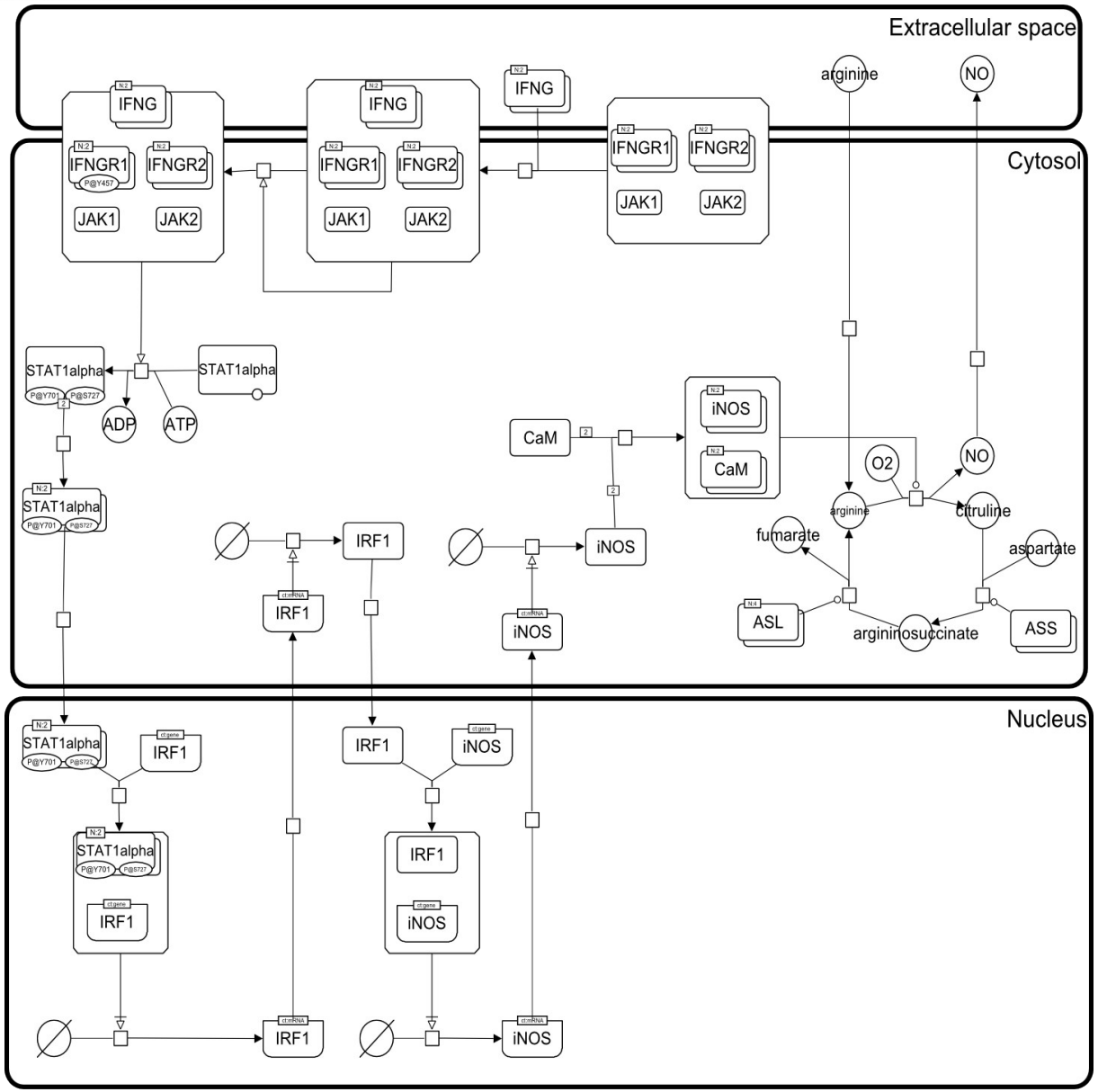


Software development

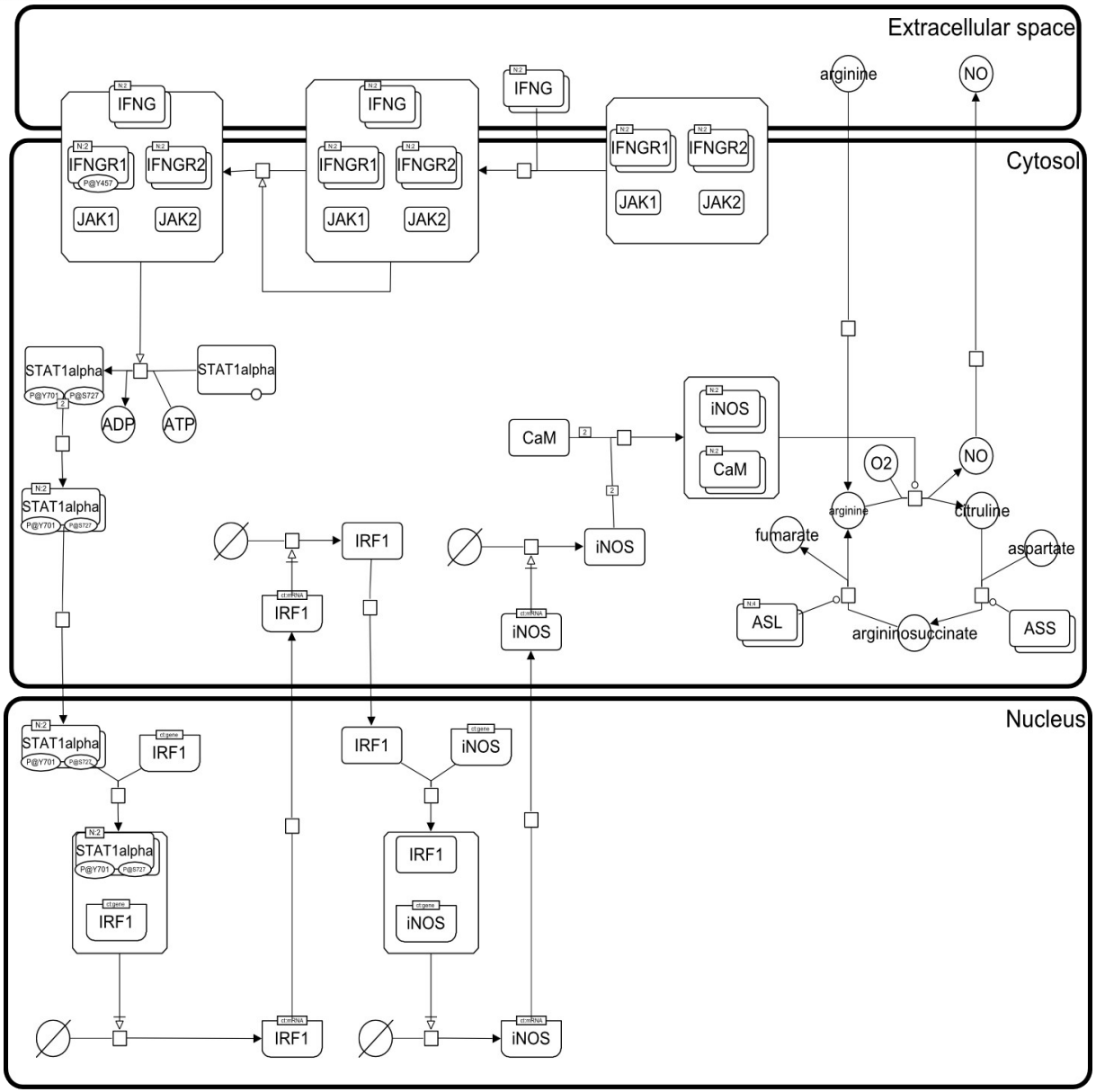
LibSBGN
Neo4j Community Edition 2.2.1

http://sourceforge.net/projects/ston/

Example of contribution : Finding sub-modules

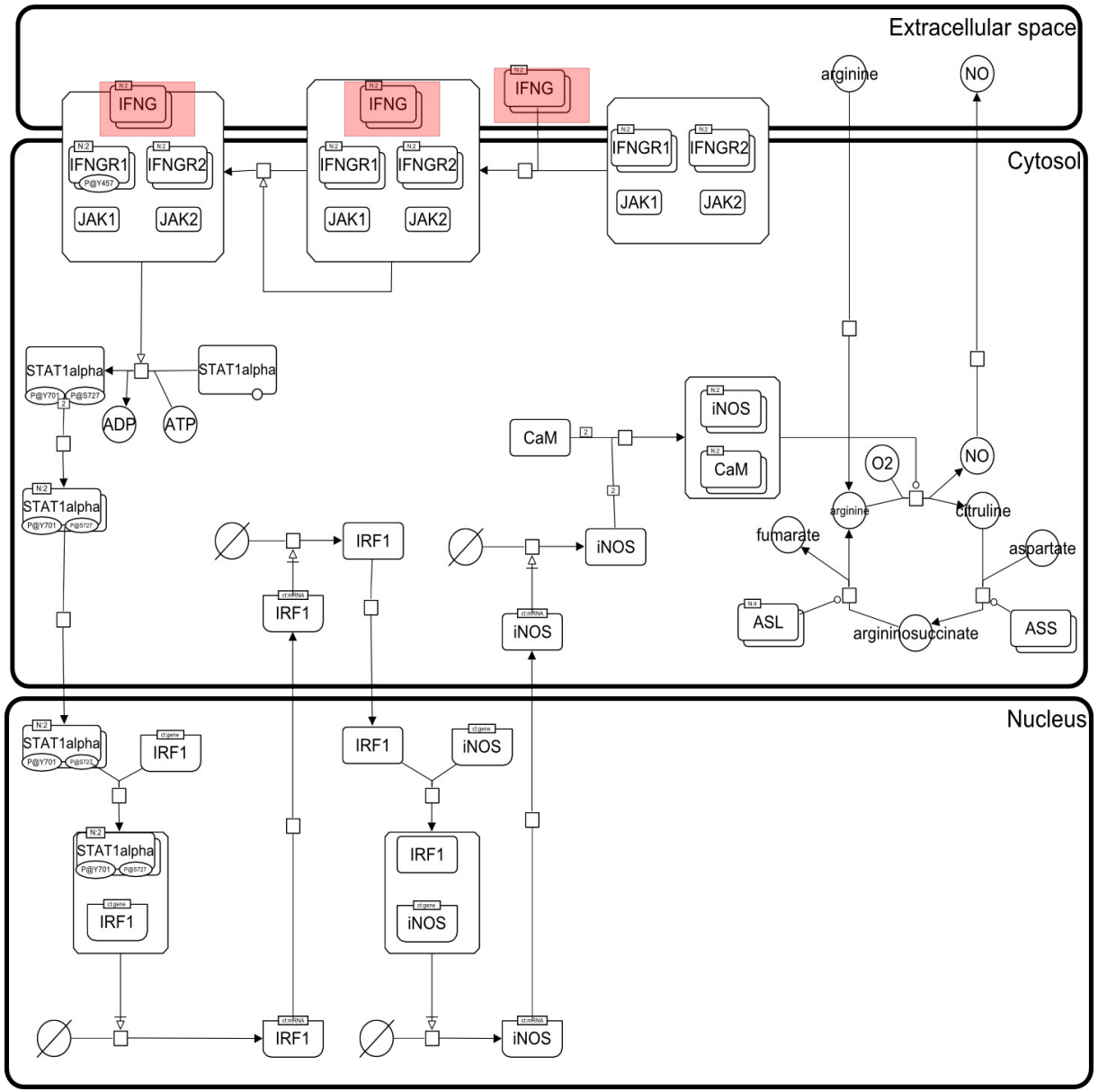


Example of contribution : Finding sub-modules



Entity of interest : **IFNG**

Example of contribution : Finding sub-modules



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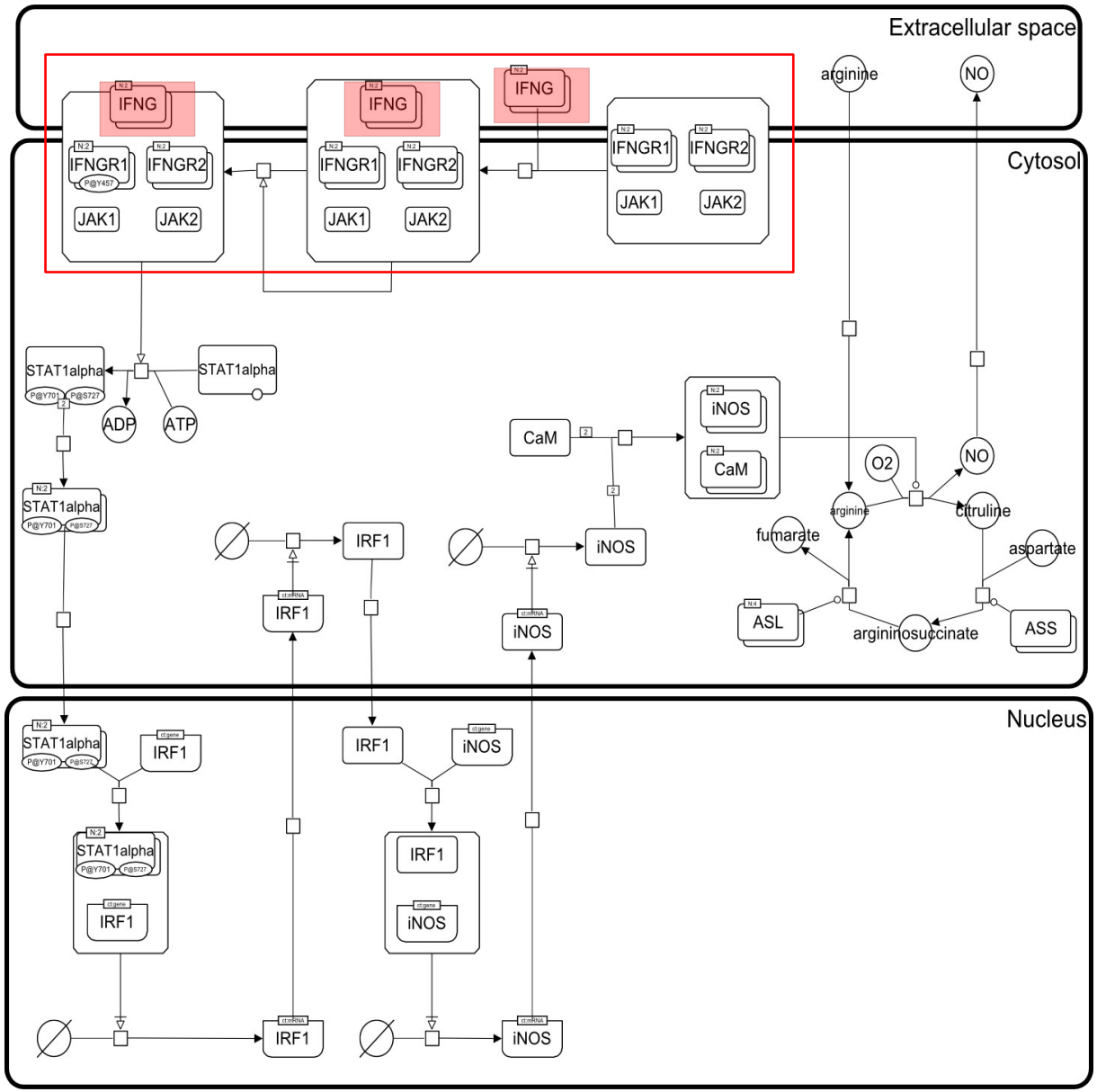


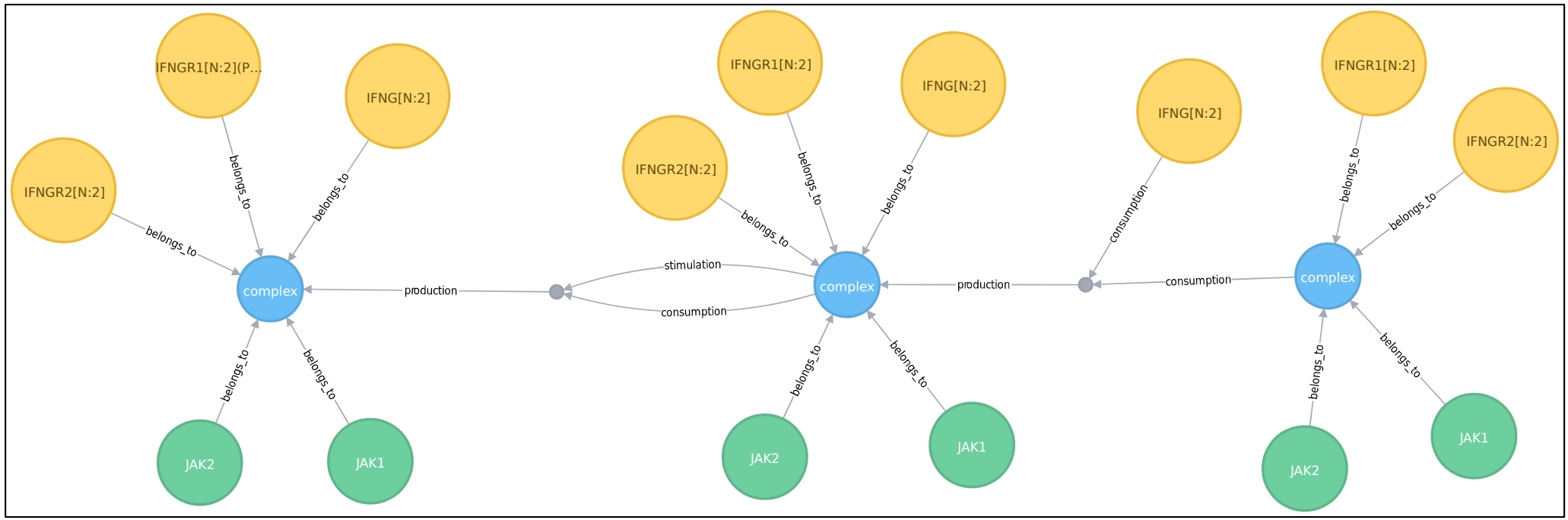
Entity of interest : **IFNG**

Example of contribution : Finding sub-modules

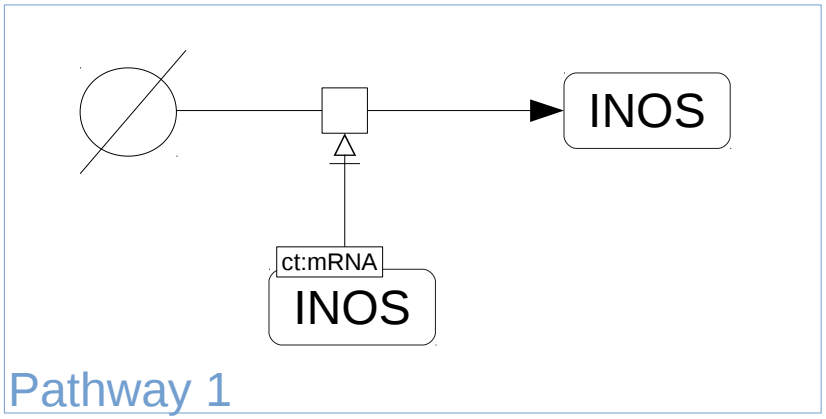
Cypher query

```
match n-->p, x, z
where n.name = 'IFNG' and x.node_type <> 'process' and z.node_type <> 'process'
return n-->p, p-[*1]->x, z-[*1..2]->p
```

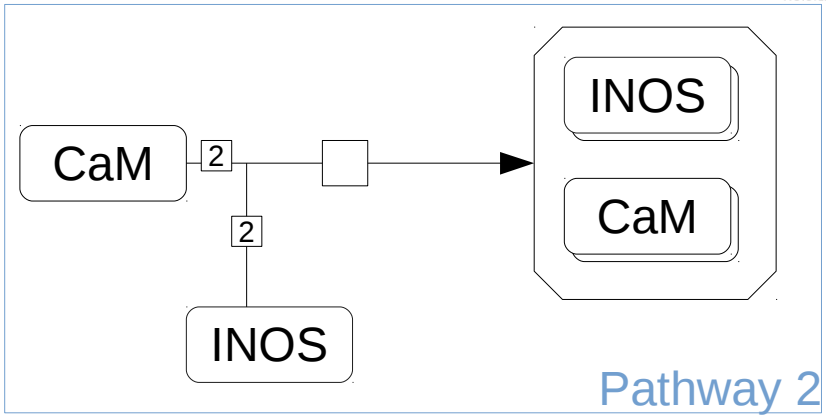
Result in Neo4j :



Perspectives : Combining pathways

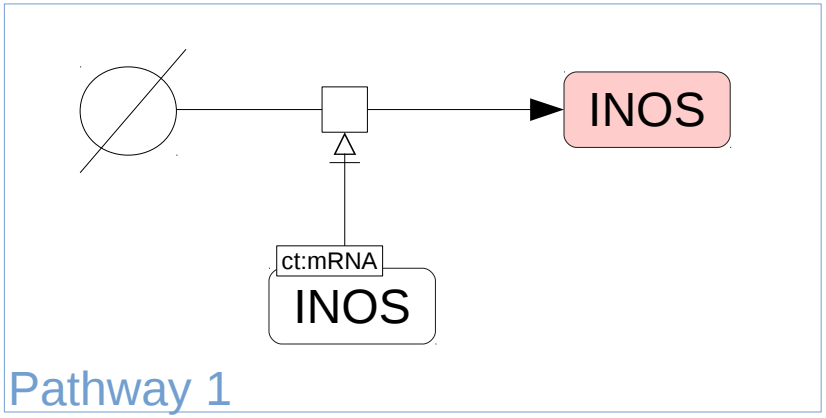


Pathway 1

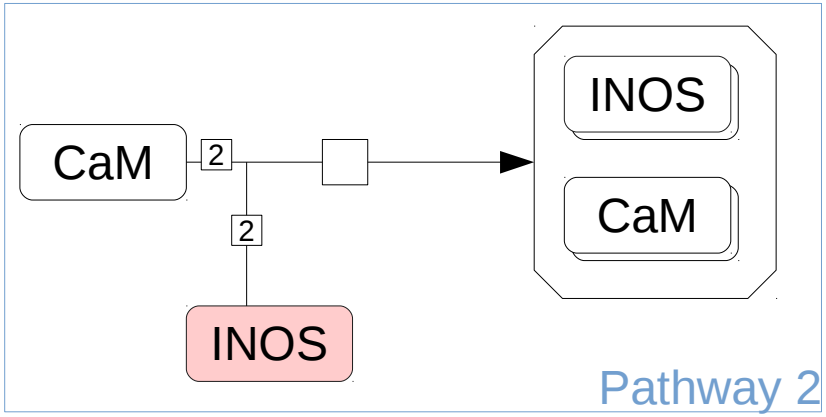


Pathway 2

Perspectives : Combining pathways

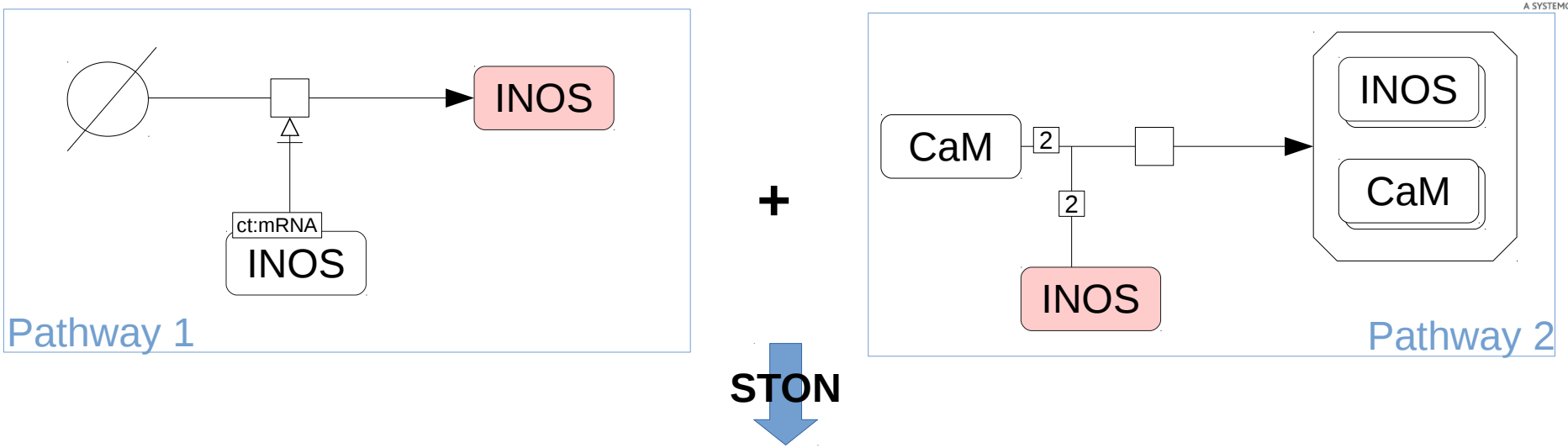


Pathway 1

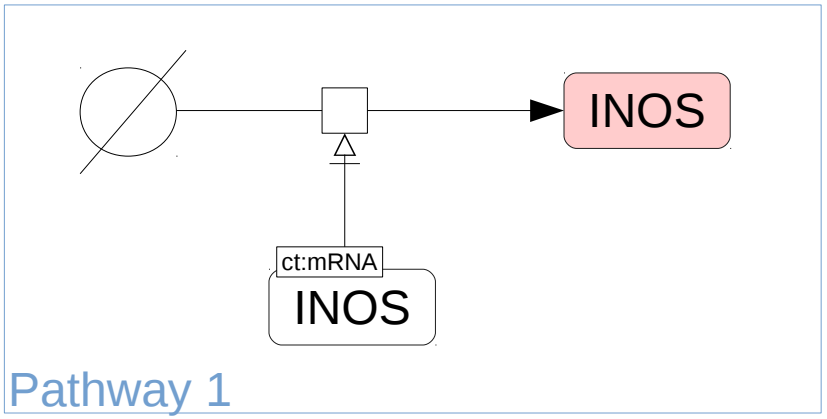


Pathway 2

Perspectives : Combining pathways



Perspectives : Combining pathways



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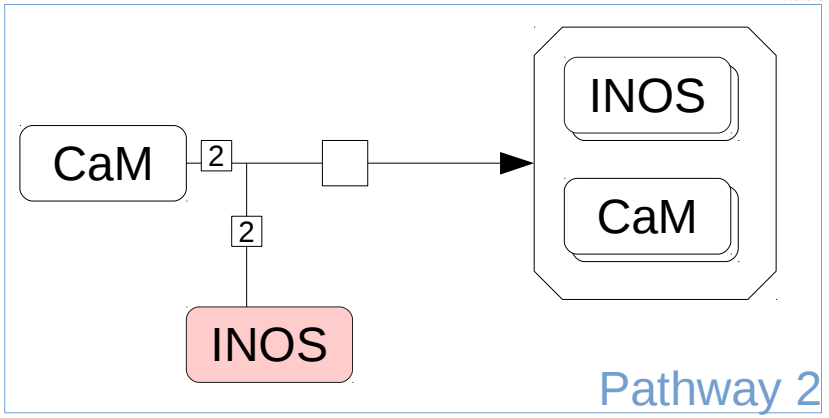
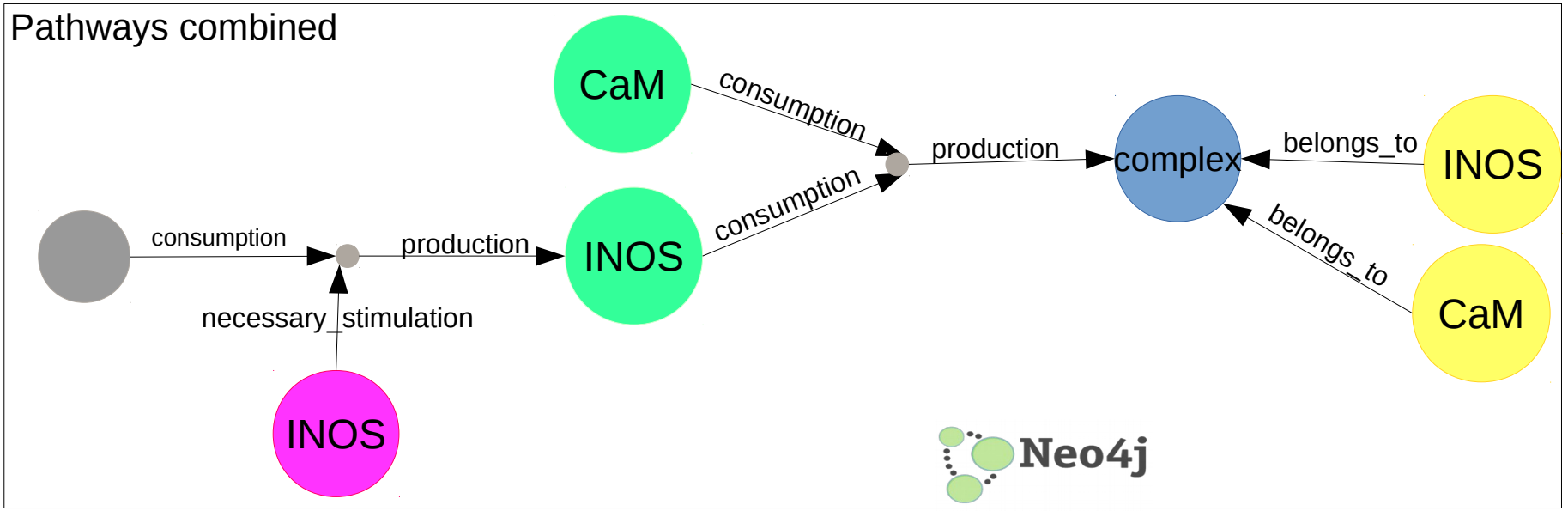


STON



Conclusion

STON

Complete translation of SBGN PD & AF into Neo4j graph database

Perspectives :

- Combining pathways
- Integrate into MaSyMoS

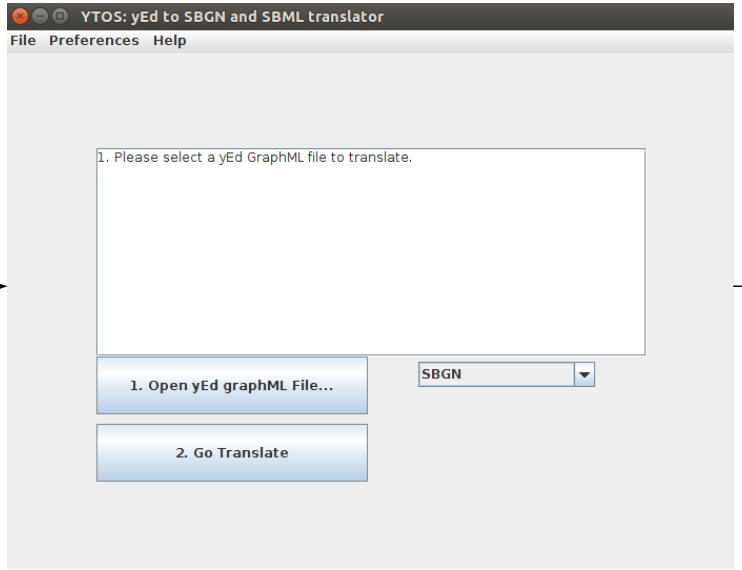
Project YTOS : yEd TO SBGN & SBML

Project YTOS

Yed Graph Editor
Easy drawing – Good layout
Powerful zooming

yWorks

Metabolic & Signalling pathways



SBML

SBGN

Software development

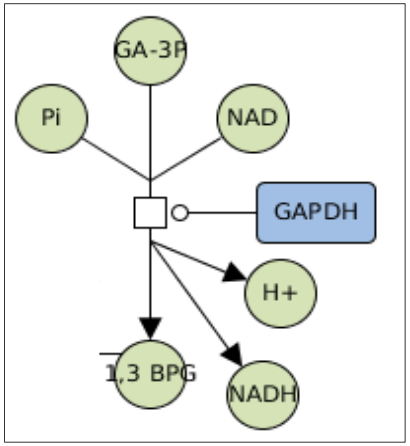
LibSBGN - JSBML
XML parser

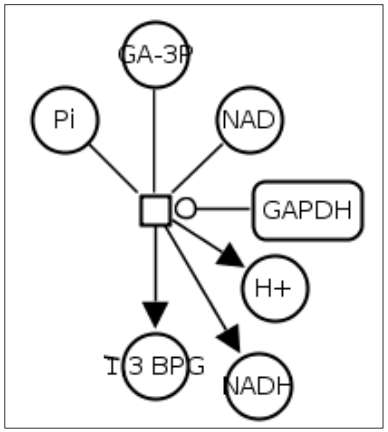
http://sourceforge.net/projects/ytos/

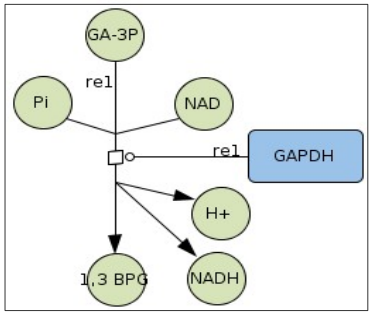
Project YTOS

yWorks → YTOS → SBGN → SBML

Metabolic





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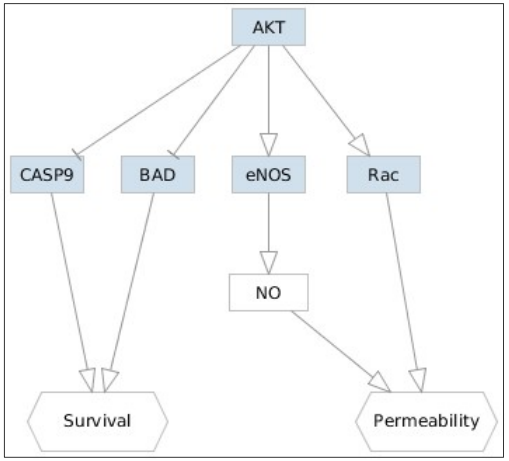
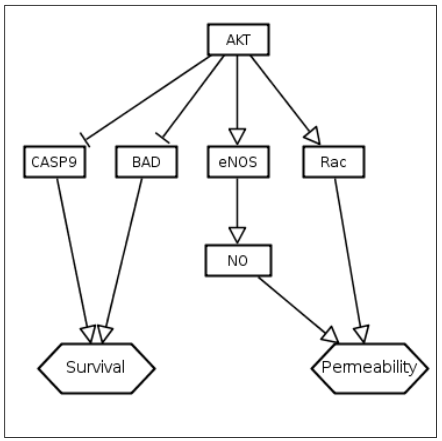
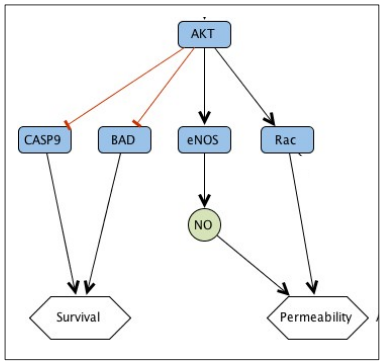
```

Signaling / AF







A special thanks to:

- Dr. Alexander Mazein
- Dr. Irina Roznovat
- Johann Pellet
- Dr. Mansoor Saqi
- Pr. Charles Auffray

- Dr. Dagmar Waltemath
- Ron Henkel

- Pr. Christine Froidevaux

Financial support :

Manuscripts in preparation:

- Touré V, Mazein A, Roznovat I, Waltemath D, Henkel R, Saqi M, Pellet J and Auffray C: **STON, SBGN to Neo4j: Representation of Systems Biology pathway as graph-oriented models.** 2015. In preparation. Target journal: BMC Systems Biology.
- Touré V, Mazein A, Roznovat I, Saqi M, Pellet J and Auffray C: **YTOS, yEd to SBML and SBGN: Adapting metabolic pathways developed with general-purpose yEd graph editor to Systems Biology standards.** 2015. In preparation. Target journal: Journal of Computational Biology.