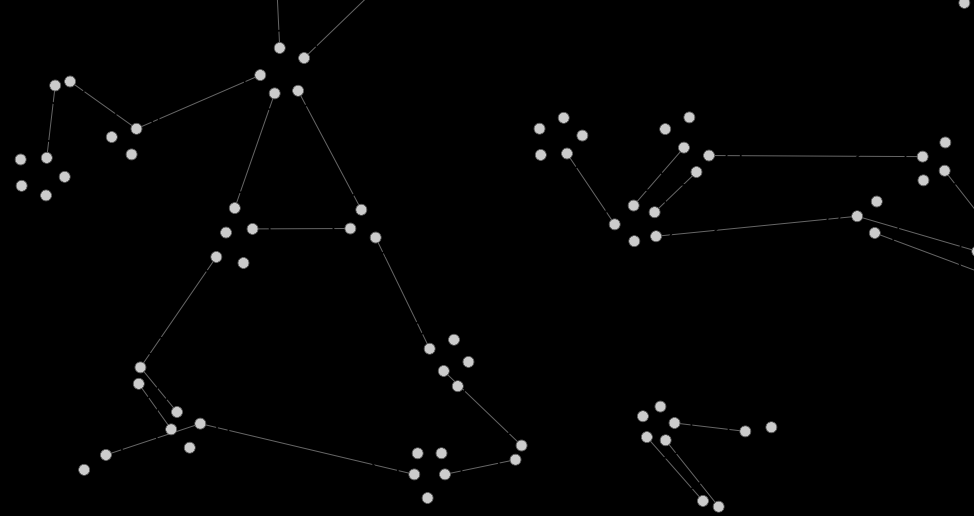


Matthias Reimann
BIOTEC, TU Dresden



CyOog

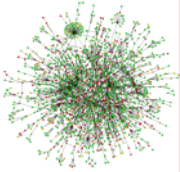
Power Graph Analysis in Cytoscape



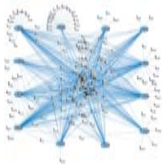
TECHNISCHE
UNIVERSITÄT
DRESDEN



Complex Networks in Biology



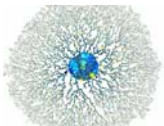
Protein Interactions



Domain-motif-interactions



Transcriptional Regulation



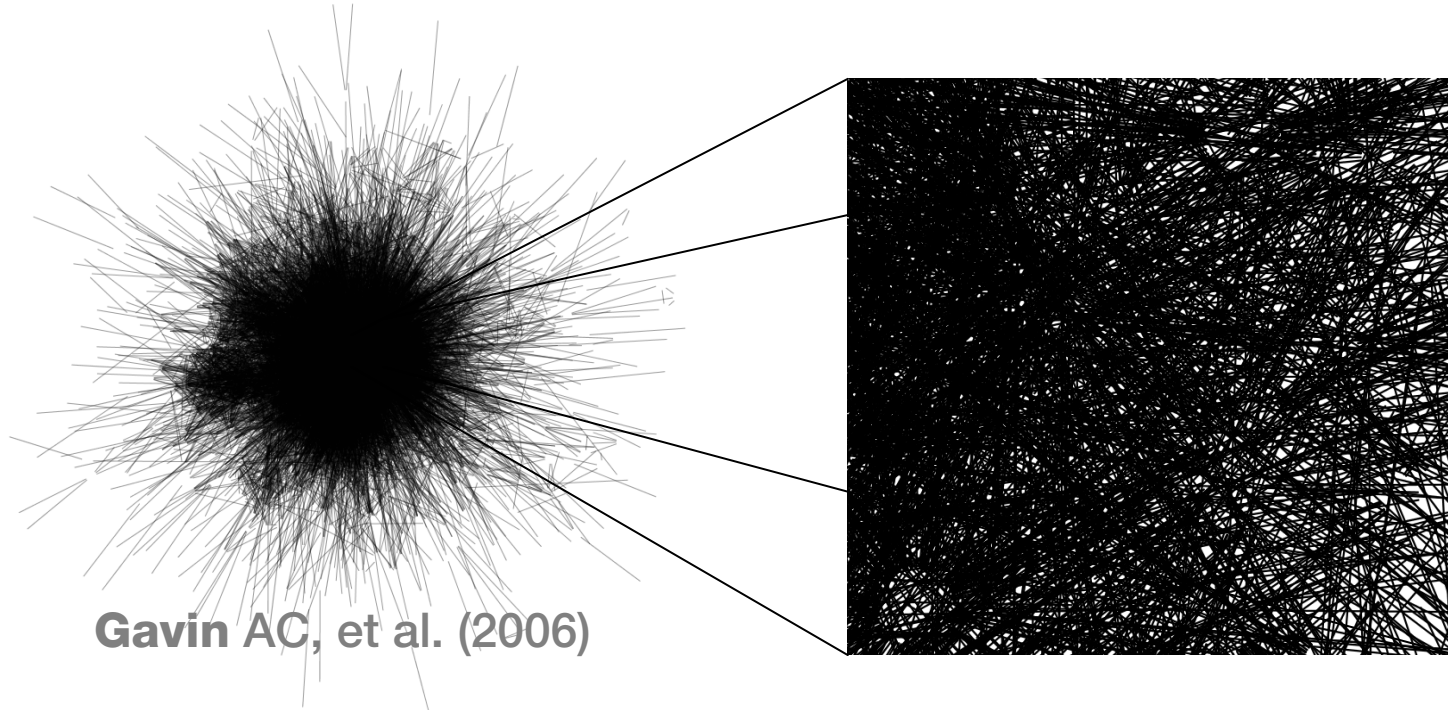
Protein homology

How to gain insight into these networks?





Direct Visualization



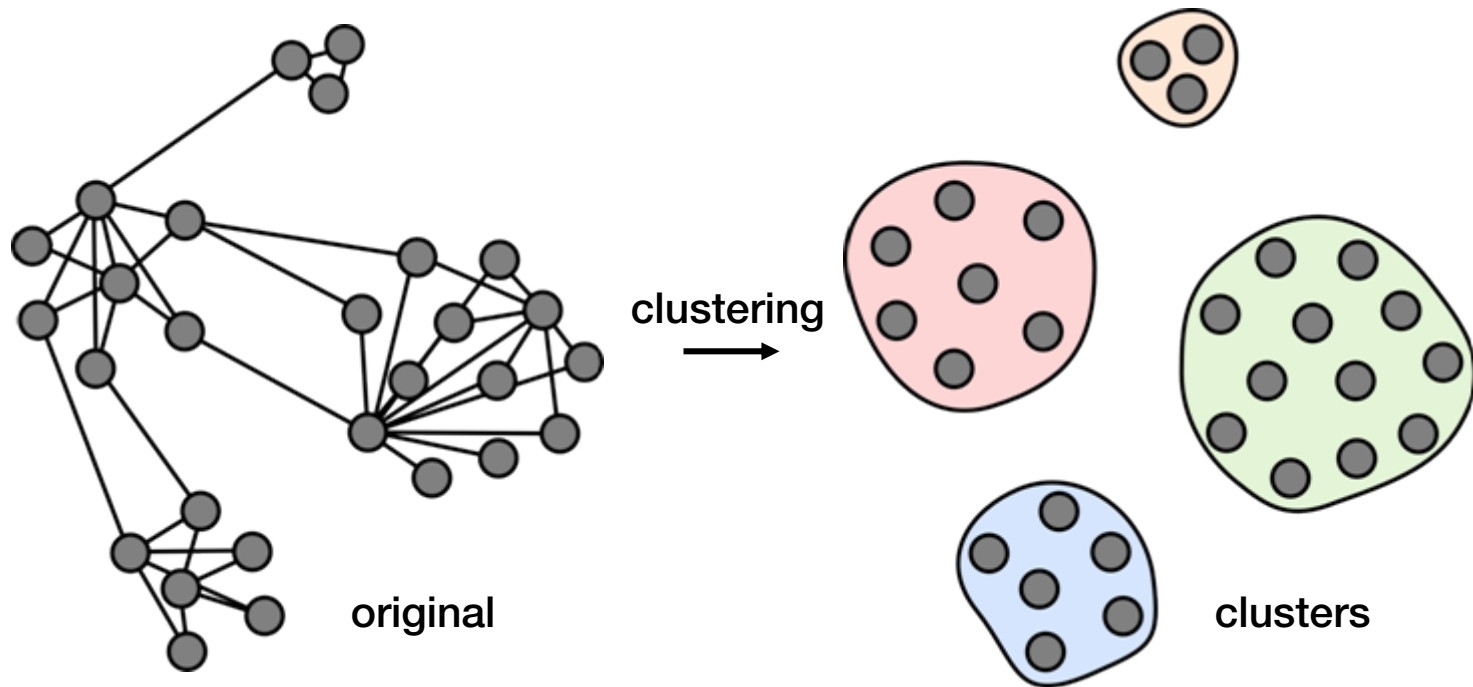
Overall structure is difficult to grasp





Clustering

Coarse-Graining the networks



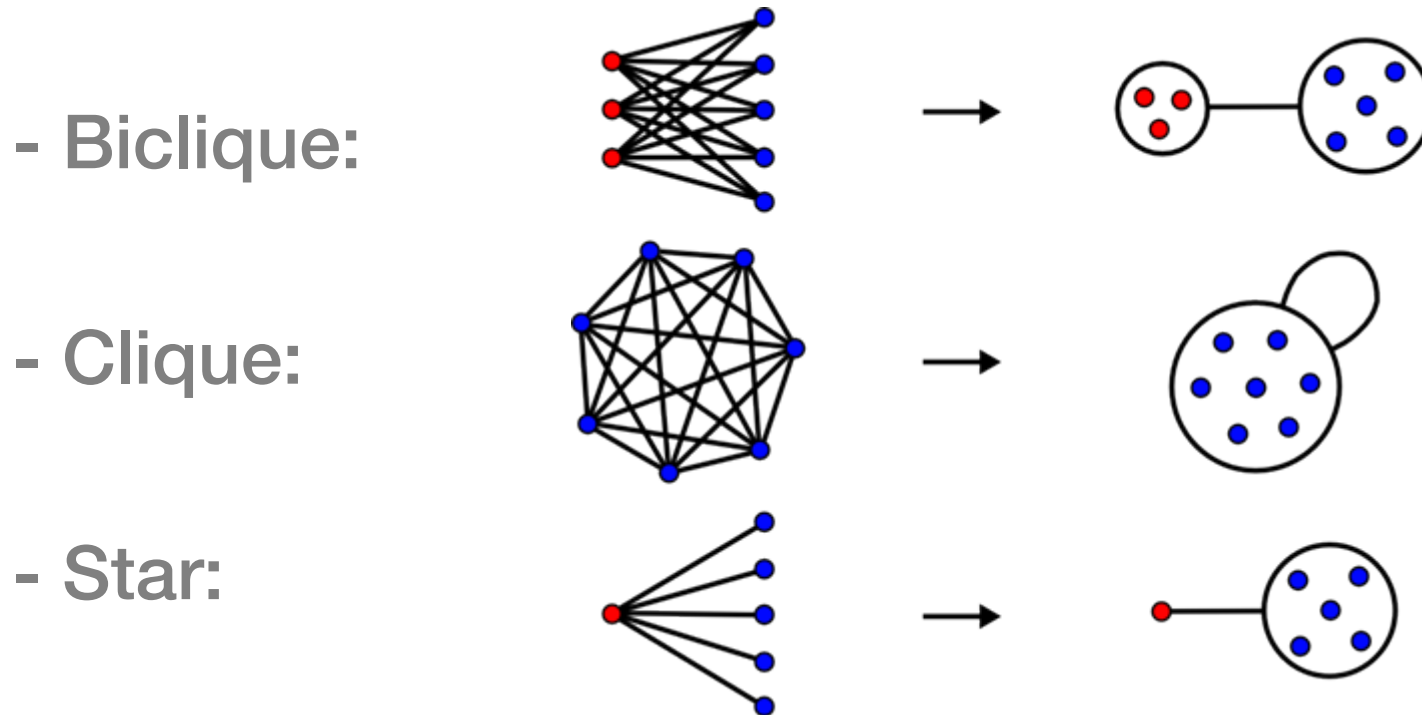
Connectivity details are lost





Power Graph Language

Solution: Transform networks into Power Graphs by Clustering both nodes **and** edges



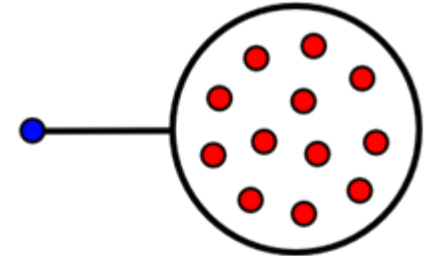
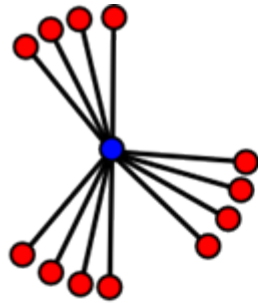
Transformation is reversible



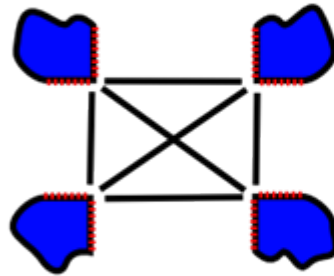


Protein Interactions

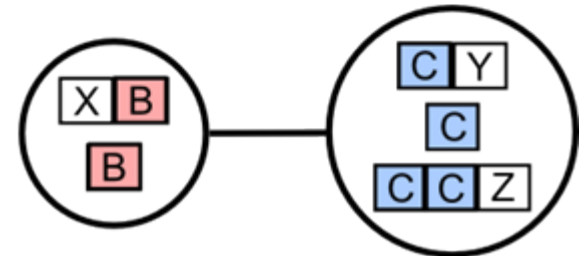
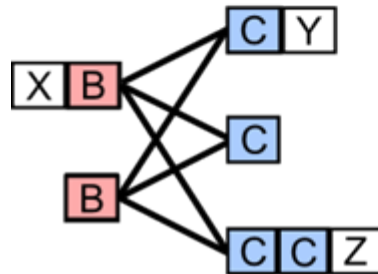
Hub Proteins



Protein Complexes



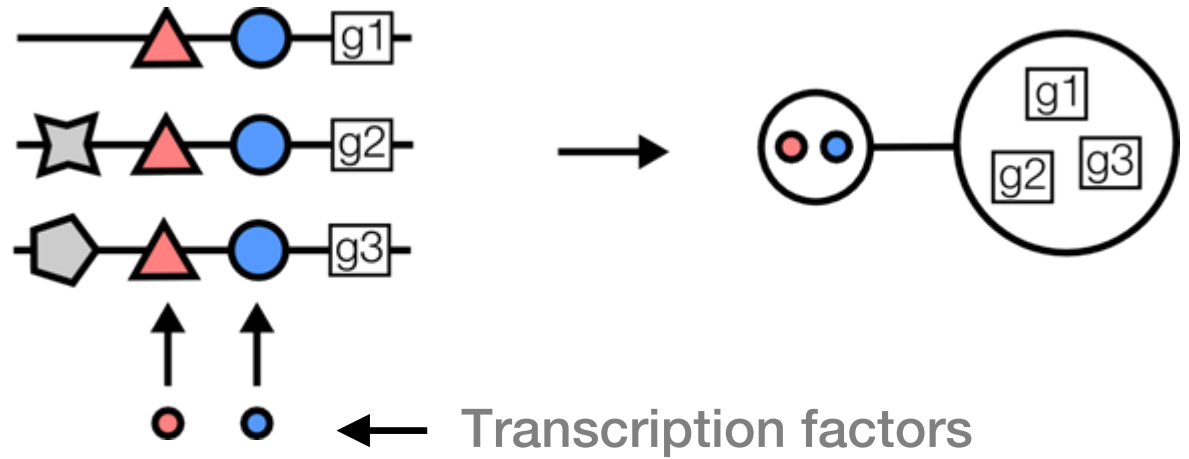
Domain and motif induced Interactions



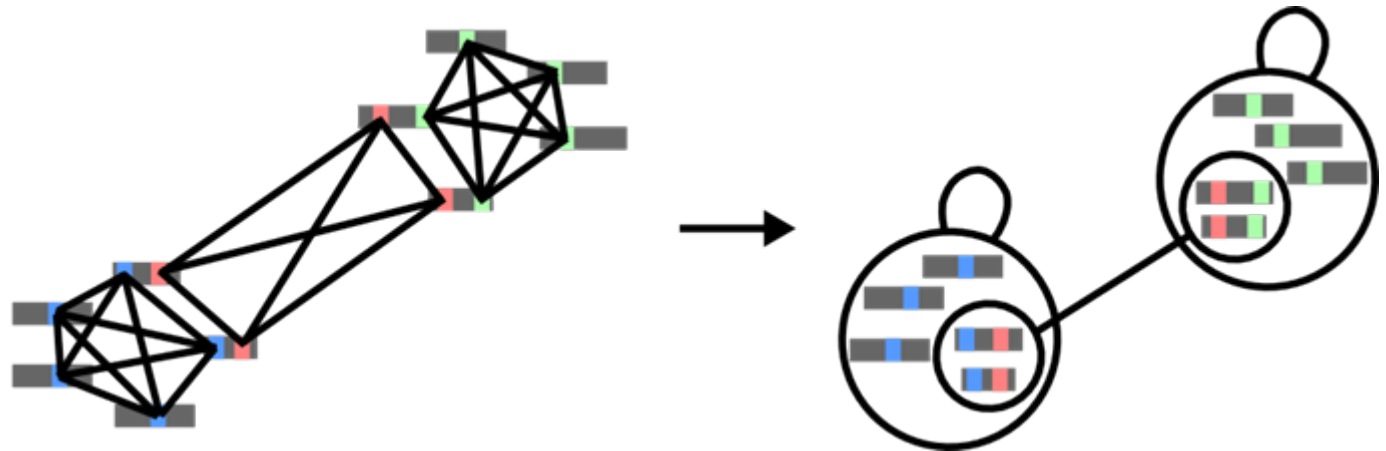


Behind Protein Interactions

Regulatory networks

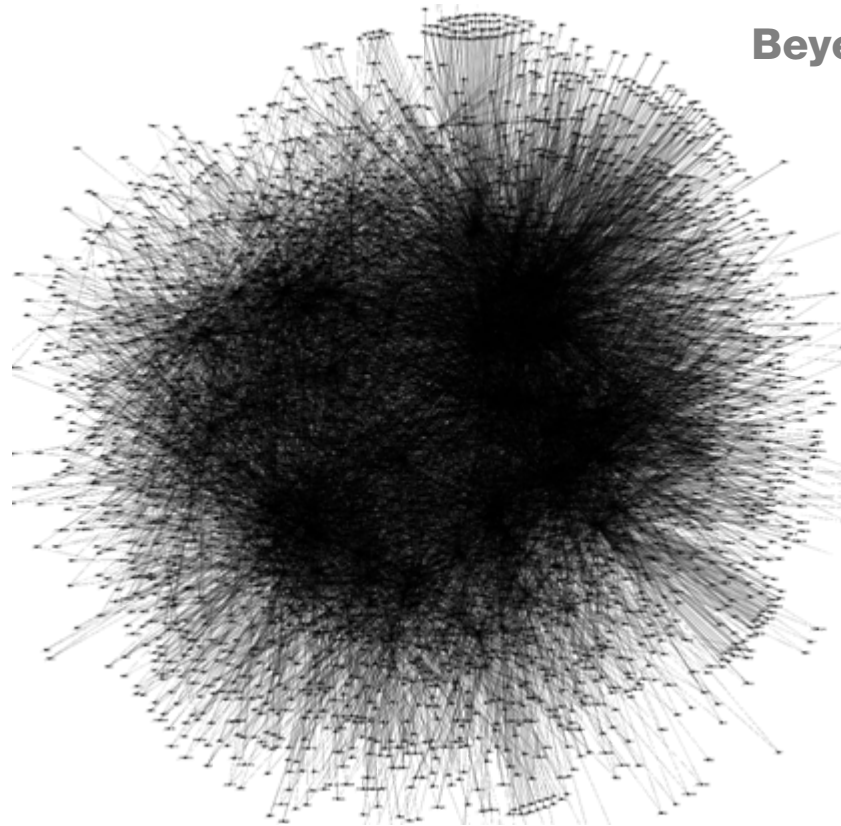


Homology networks





Bipartite Regulatory Network



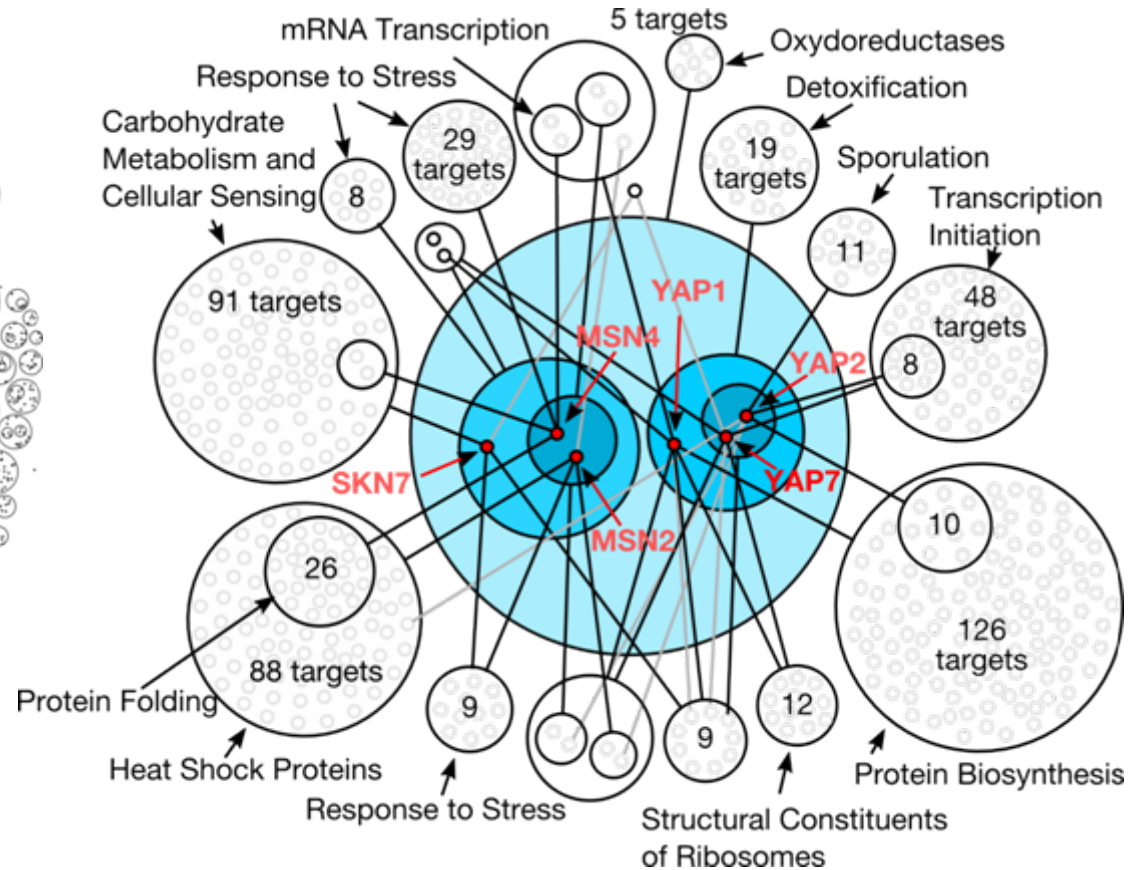
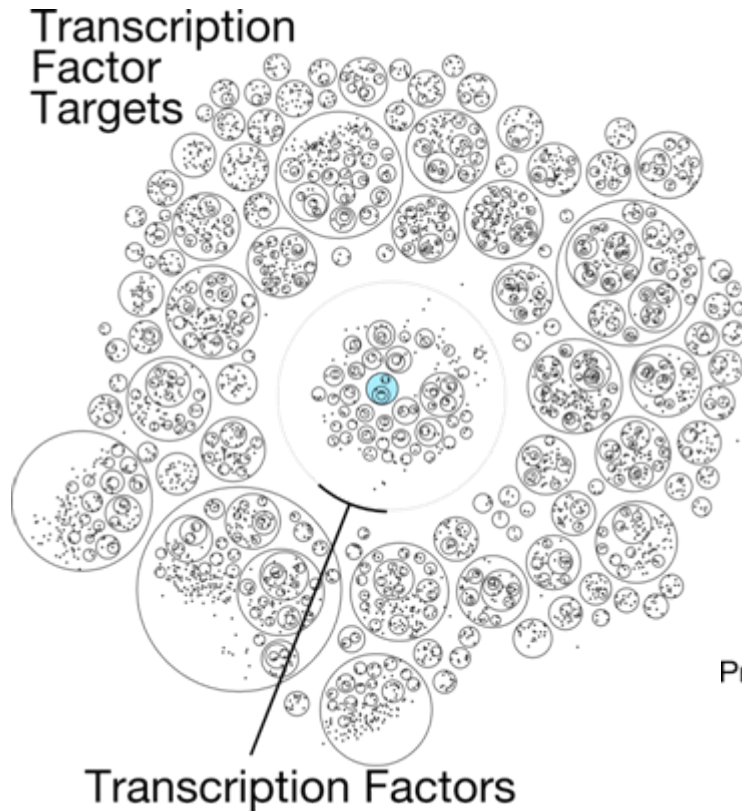
Beyer et al. (2006)

What insights can be gathered about the poorly characterized factor YAP7?



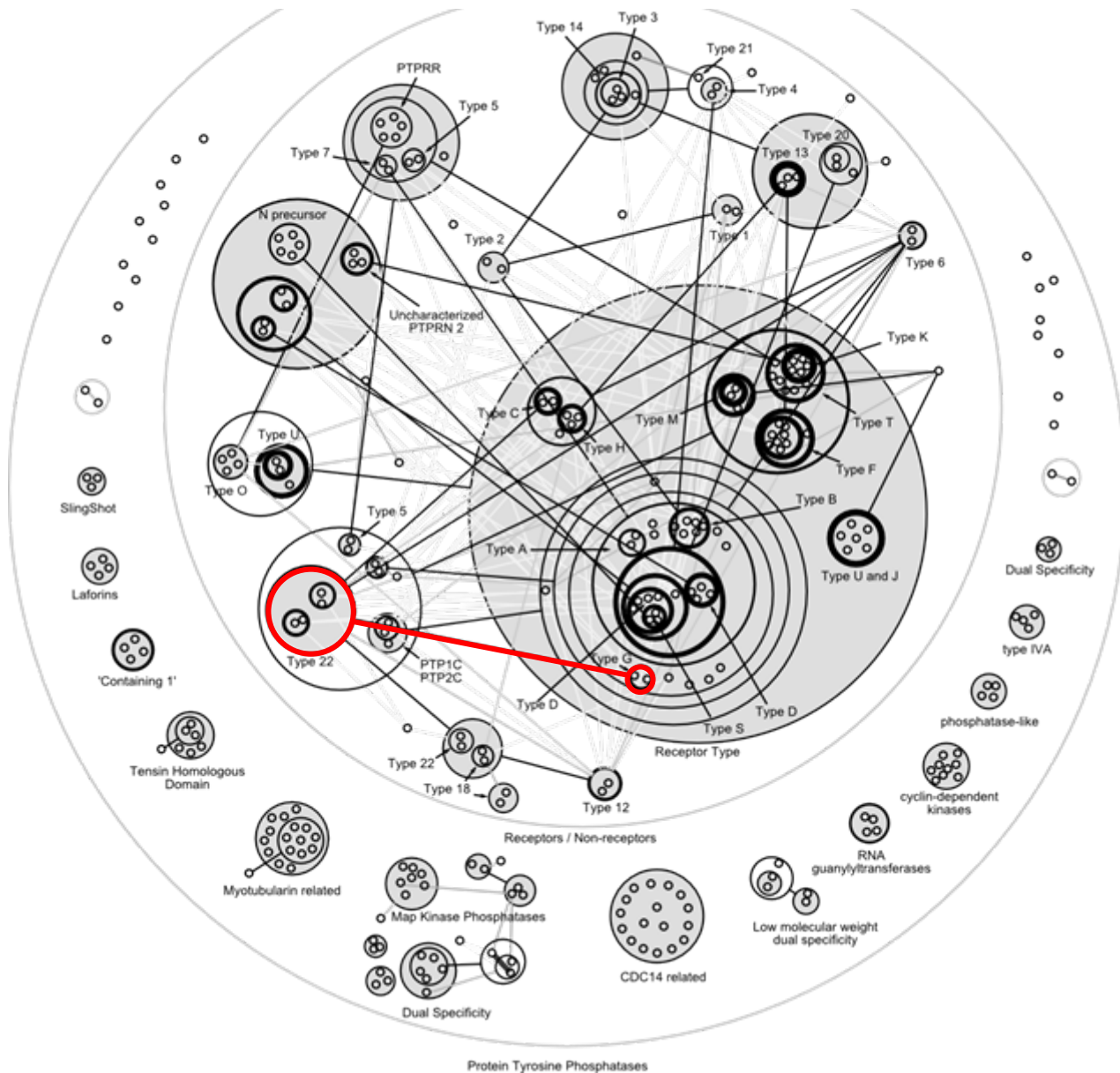


Bipartite Regulatory Network



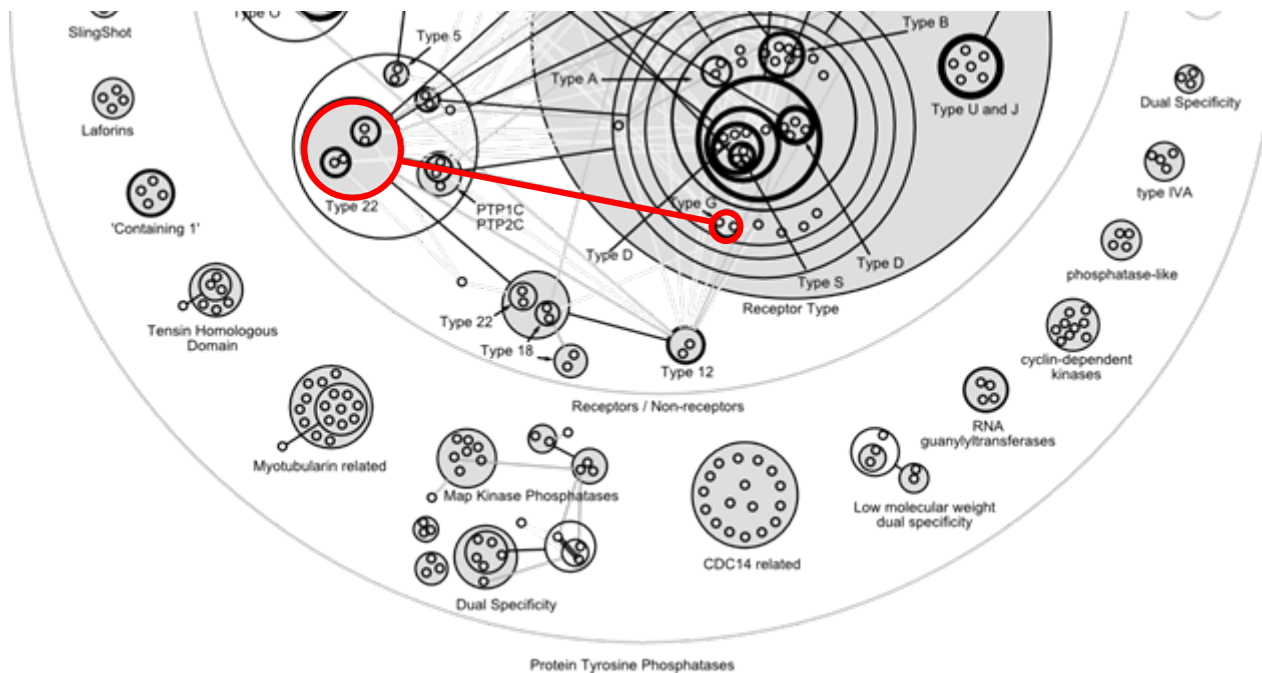
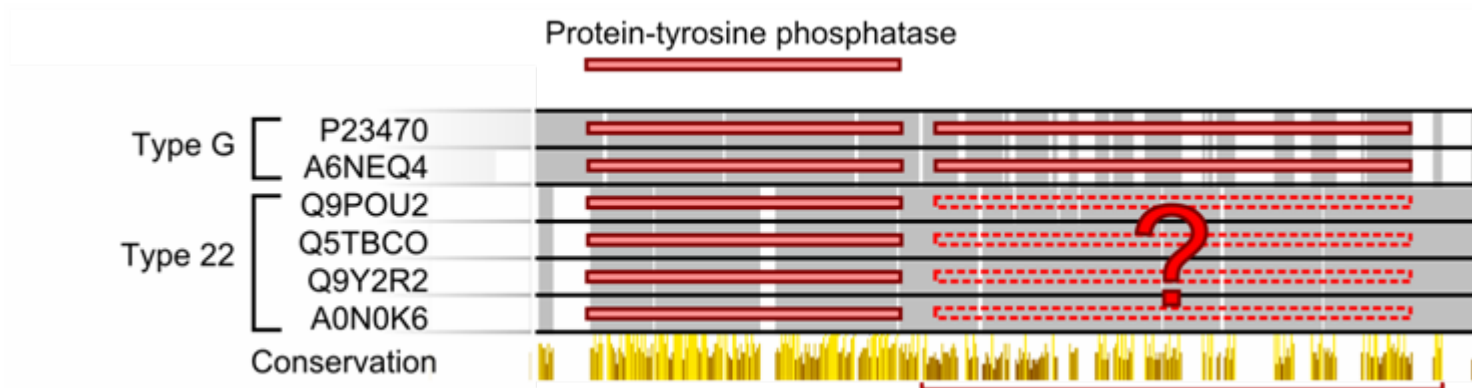


Homology Network





Homology Network





CyOog Demonstration

Cytoscape Desktop (New Session)

File Edit View Select Layout Plugins Help Tools

Control Panel

- Network
- VizMapper™
- EagleVista
- Artic...

Power Graph Organization

- Power Graph Editor
- (Incomplete) Power Edges
- Edge Filtering

Power edge size

- Minimum power node depth
- Maximum power node depth
- Power node crossings

Bar chart showing power edge size distribution.

lesmiserables.bbl

Gavin.Casein.edg.bbl

Welcome to Cytoscape 2.6.0 Right-click + drag to ZOOM Middle-click + drag to PAN

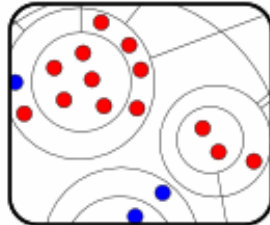




Webpage



<http://www.biotec.tu-dresden.de/schroeder/group/powergraphs>



[Power Graph Analysis Examples](#)

Explore **interactively** several biological and non-biological networks with Power Graph Analysis. (Java applets)



[Power Graphs Plugin for Cytoscape](#)

This starts a Java WebStart enabled version of Cytoscape with the **OoG plugin** pre-installed.

[More information](#)

```
• OoG - PowerGraph Library (Ma
• PowerGraph Analysis through
.....
Extracting power graph ...
Power edge search and po
<--> Power graph extraction too
<..> Equality check ... Underly
<II> <degree>: 6.59740259740259
<II> Power graph written (learn
user@workstation:~$
```

[Power Graph Analysis Tool](#)

This **command line tool** reads widely used graph file formats (edg, sif) and converts them into power graphs (bbl).

[More information](#)





Acknowledgment



Loic Royer & Michael Schroeder





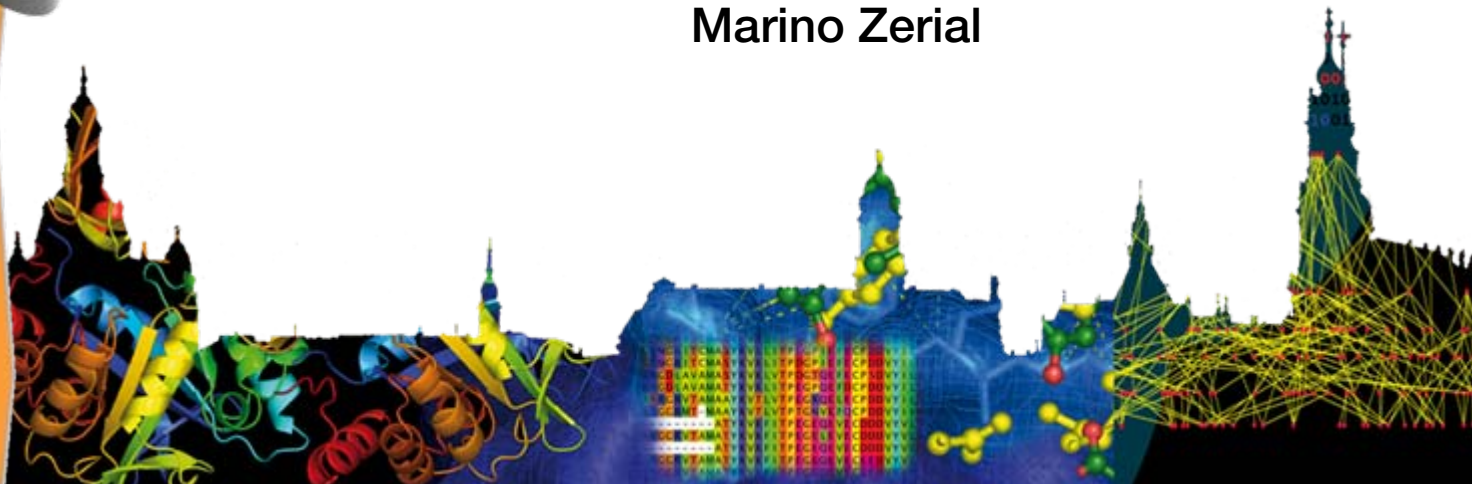
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Janusz M. Bujnicki
David Gilbert
Trey Ideker
Jens Reich
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