

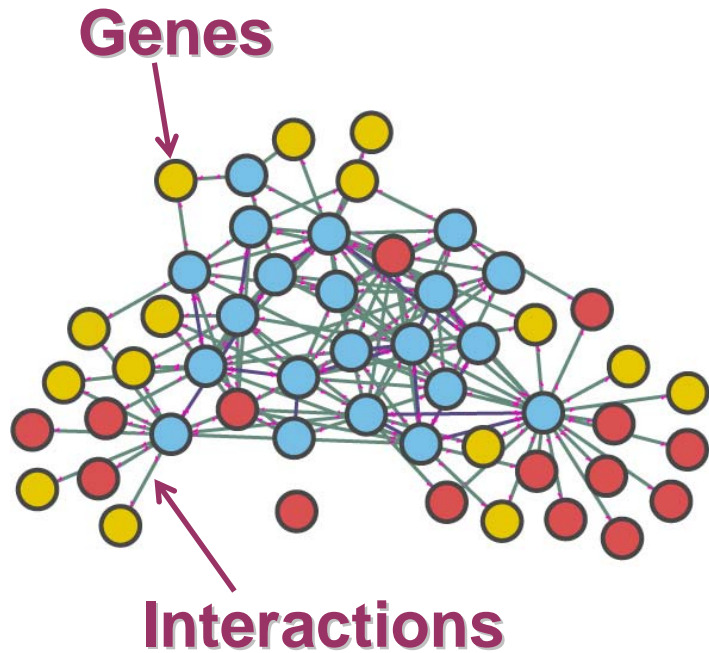
Linking molecular networks to clinical decision-making support



Francisco Azuaje, Yvan Devaux, Daniel Wagner



The question

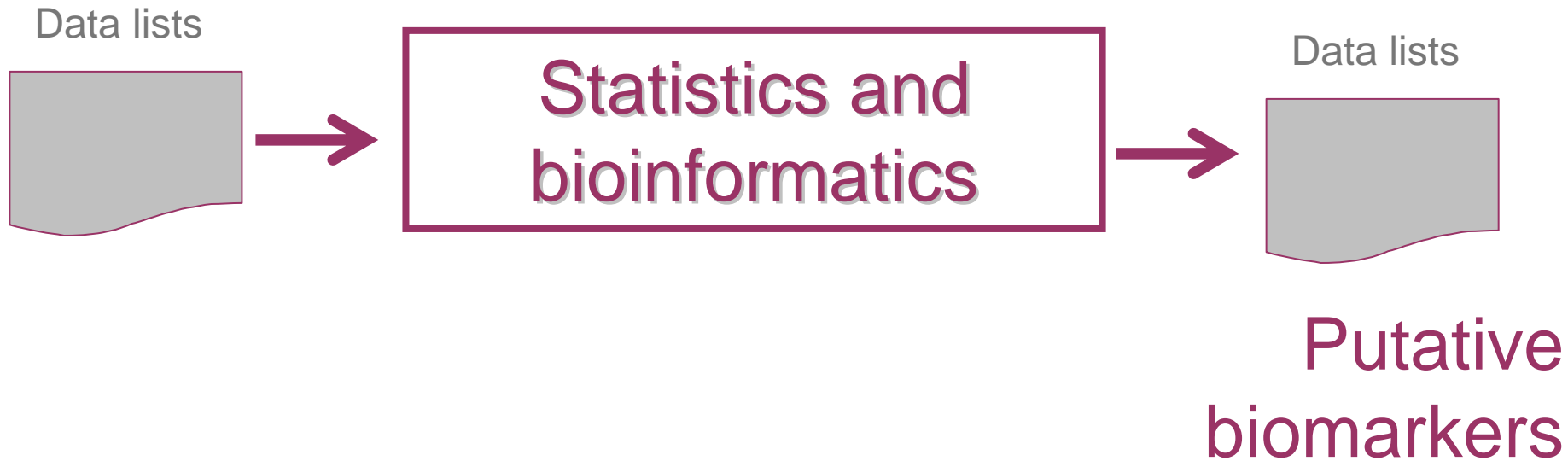


Disease, poor outcome

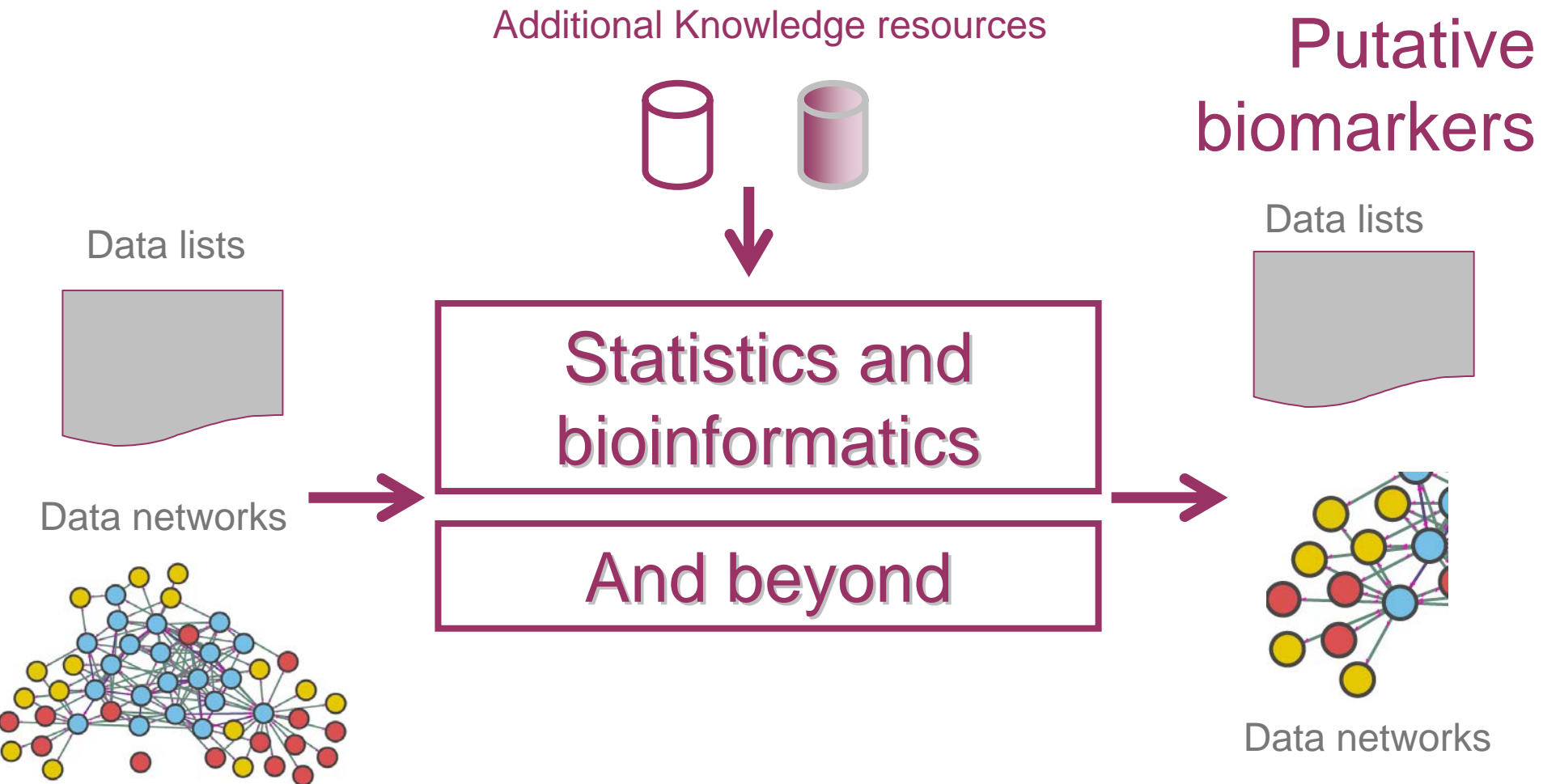


Health, good outcome

Traditional approach

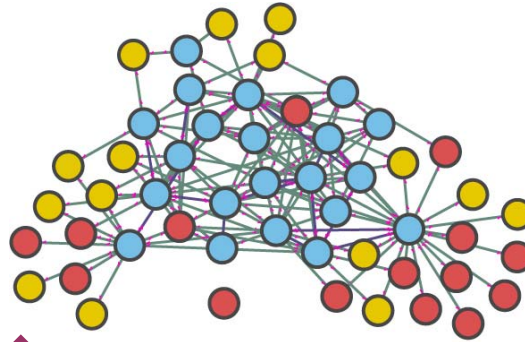


Network-based approach



Why?

Network-based approaches



**To improve
understanding**

**To improve
prognostic accuracy**

Requirements analysis

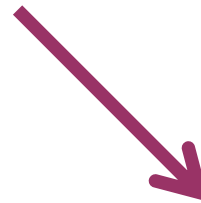
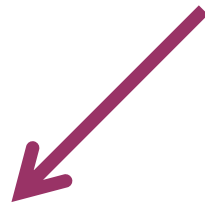
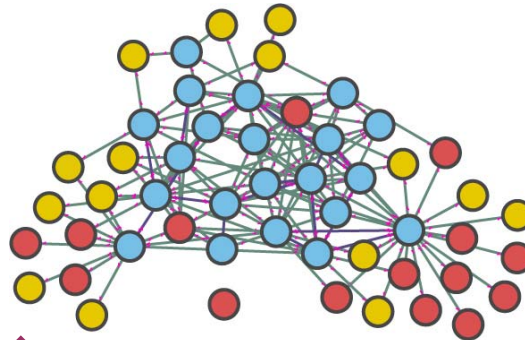
What you
wish

What you
can afford



How?

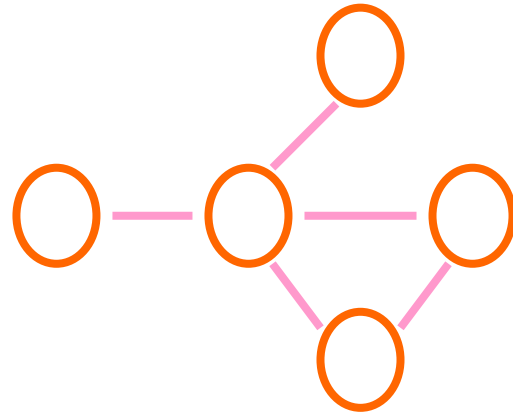
Network-based approaches



Networks **guide** the
search for “biomarkers”

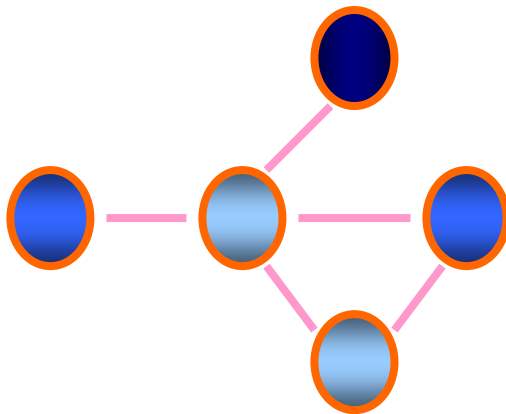
Networks **become**
the “biomarkers”





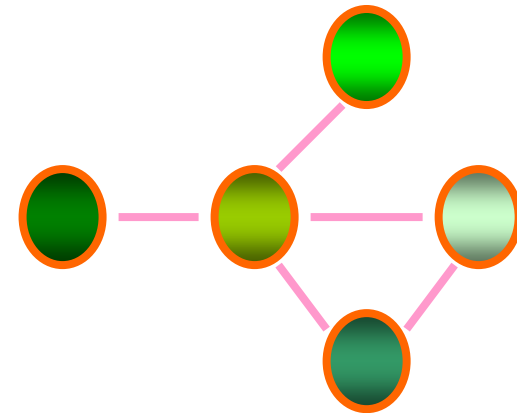
**Putative network-based
biomarker** 

“High activity”



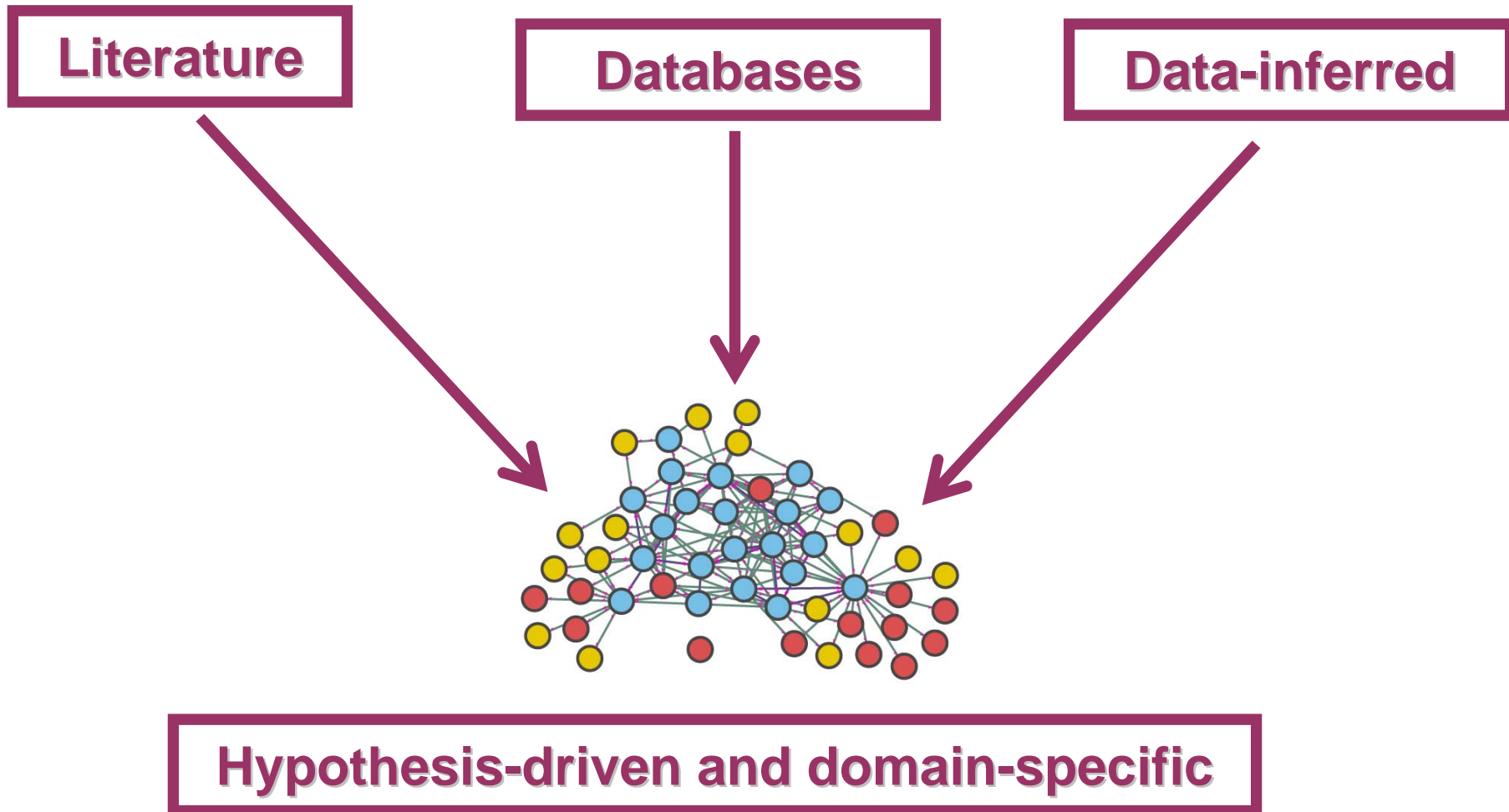
Good clinical outcome

“Low activity”



Poor clinical outcome

Where from?

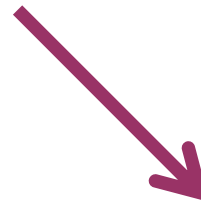
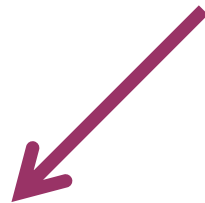
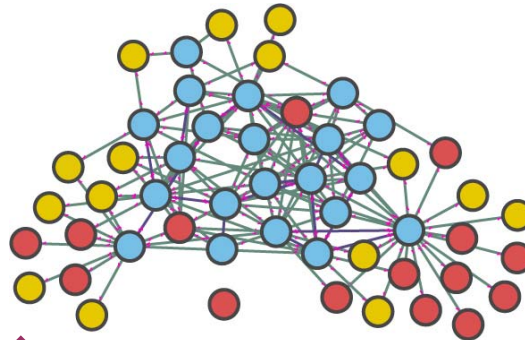




Luxembourg Acute Myocardial Infarction Registry (LUCKY)

Examples

Network-based approaches

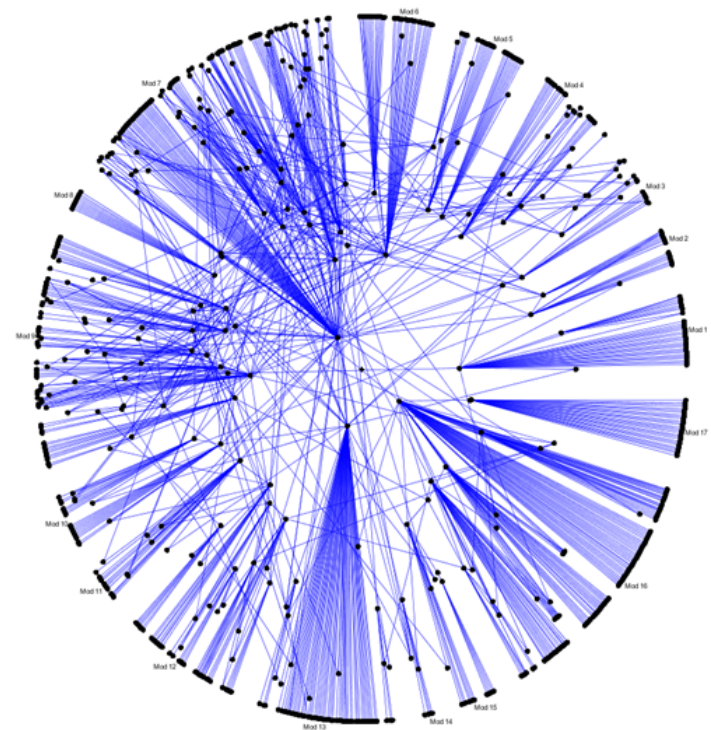
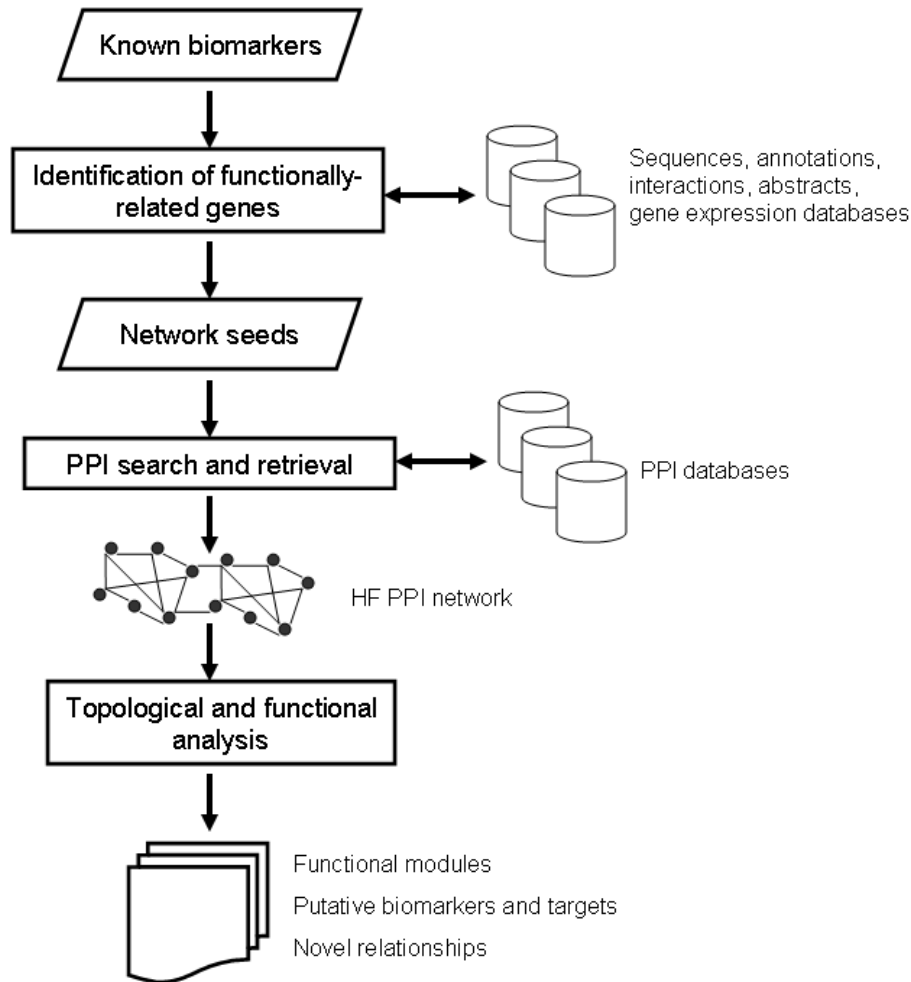


**Networks guide the
search for
“biomarkers”**

**Networks become
the “biomarkers”**

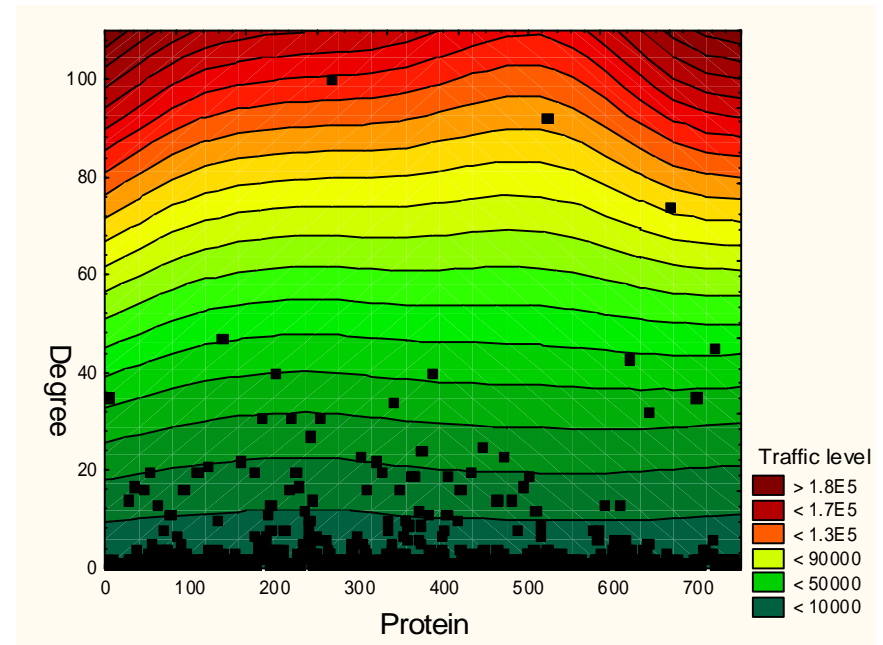
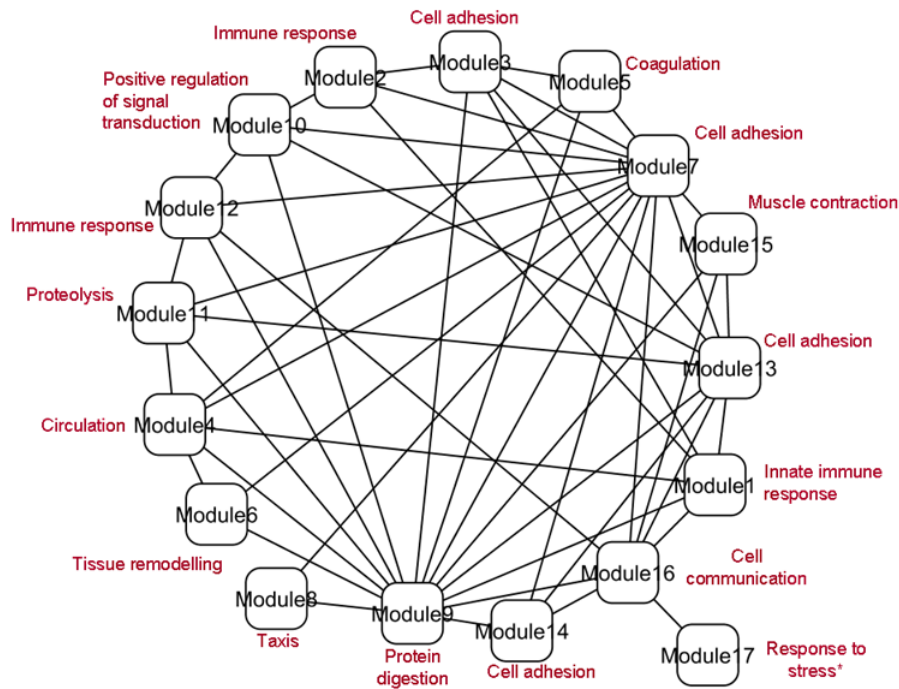
Approach example 1

Linking network structure and phenotype classification



Approach example 1 (cont.)

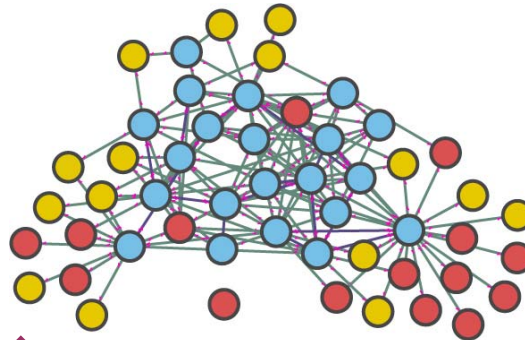
Linking network structure and phenotype classification



Gene expression of **high-traffic** nodes can predict **clinical outcome**

Examples

Network-based approaches

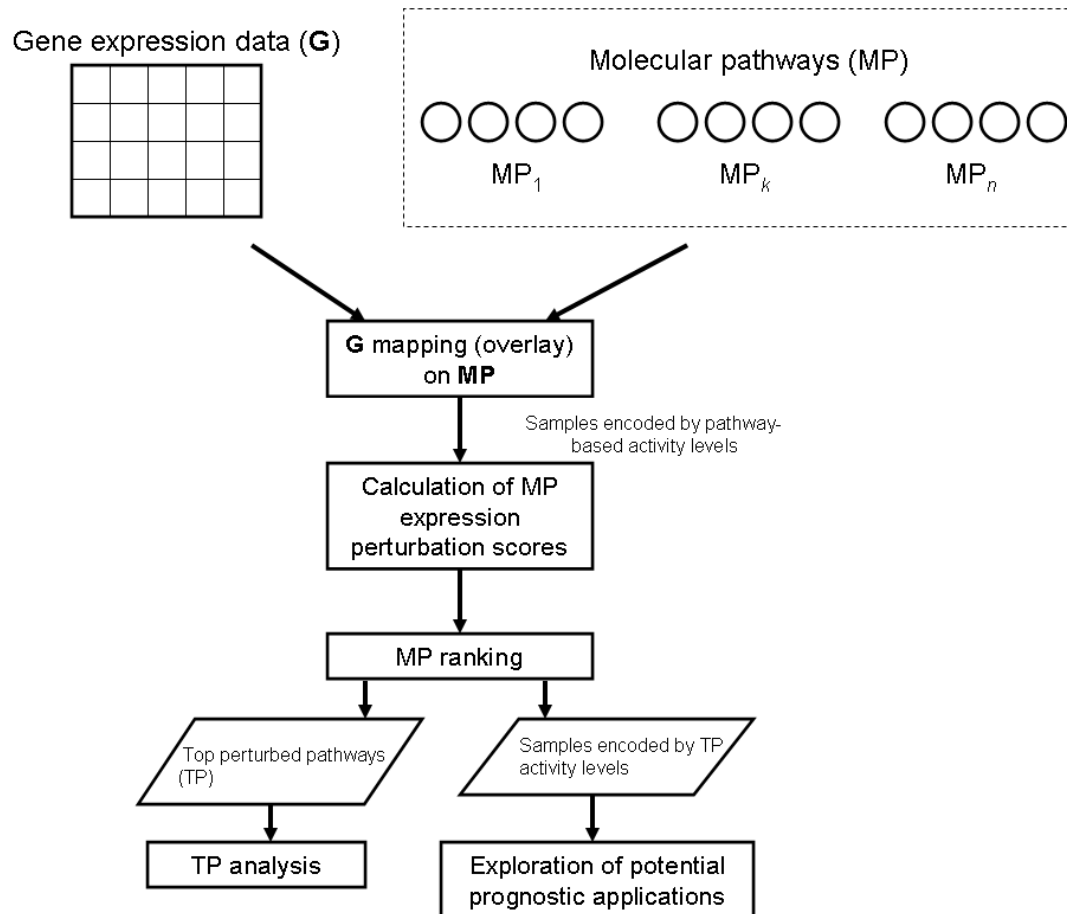


Networks guide the search for “biomarkers”

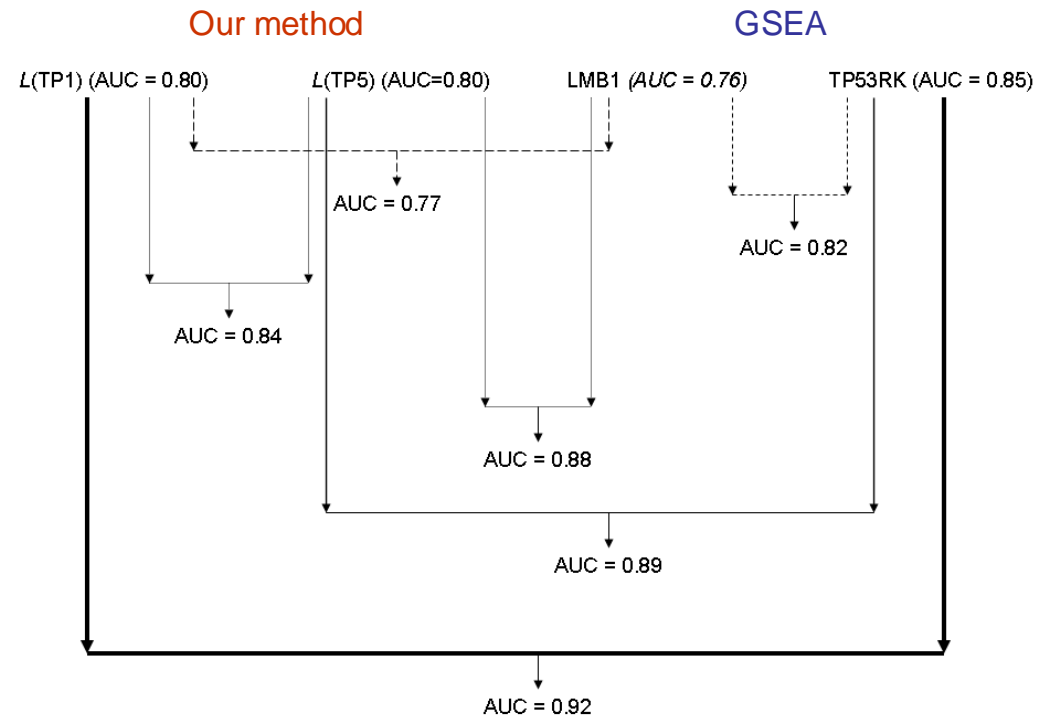
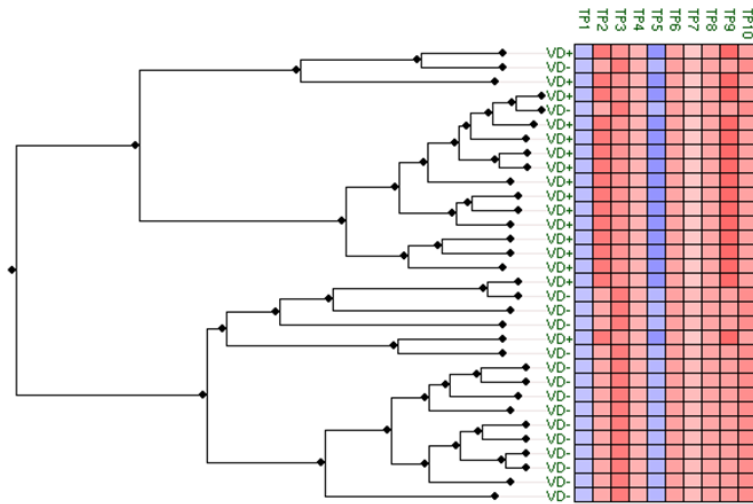
Networks become the “biomarkers”

Approach example 2

Gene sets and pathways as putative biomarkers



Approach example 2 (cont.)



Conclusions

**Molecular networks can
guide biomarker discovery**

**Networks can be used
as biomarkers**

CRP-Santé

Cardiovascular Research