

## Inferring Gene Regulatory Networks from Large-scale Experimental Data

The Systems Biology Institute

## PCP (pentachlorophenol) dataset

- Gene expression data with PCP from mouse liver
- 4 time-points (2, 4, 8, and 24 hours) and 4 dosages (0, 10, 30, and 100 mg/kg PCP). Data of 2hour and 0 mg/kg Three replicates for each condition. 2 hours vehicle value is used for virtual 0 hour values

## PCP (pentachlorophenol) dataset

- 98, 55, 127, and 1192 genes started to change in response to PCP treatment at 2, 4, 8, and 24 hours.
- By using the list of genes and time-course of the genes, we will generate a gene network at each time points.



## Inference of a network at 0 – 2 hours

	T0			T1						T2															
	D0			D1			D2			D3			D0			D1			D2			D3			
	S1	S2	S3	S1	S2	S3	S1	S2	S3	S1	S2	S3	S1	S2	S3	S1	S2	S3	S1	S2	S3	S1	S2	S3	
g1																									
g2																									
g3																									
g4																									
g5																									
.																									
.																									
g20000																									

## Inference of a network at 0 – 2 hours

	T0			T1						T2															
	D0			D1			D2			D3			D0			D1			D2			D3			
	S1	S2	S3	S1	S2	S3	S1	S2	S3	S1	S2	S3	S1	S2	S3	S1	S2	S3	S1	S2	S3	S1	S2	S3	
g1																									
g2																									
g3																									
g4																									
g5																									
.																									
.																									
g20000																									

94 genes started to change their expression value at 2 hours

The changes occurred from 0 hours to 2 hours.

	T0			T1									
	D0			D1			D2			D3			
	S1	S2	S3	S1	S2	S3	S1	S2	S3	S1	S2	S3	
g1													
g2													
g3													
g4													
g5													
g94													

Expression values of 94 genes at 0 – 2 hours

## Inference of a network at 0 – 2 hours

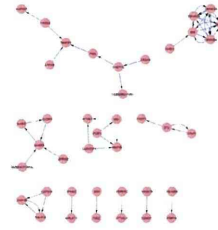
	T0			T1			T2		
	D0	D0	D1	D2	D3	D0	D1	D2	D3
g1									
g2									
g3									
g4									
g5									
...									
g20000									

94 genes started to change their expression value at 2 hours

The changes occurred from 0 hours to 2 hours.

	T0			T1		
	D0	D0	D1	D2	D3	D3
g1	S1	S2	S3	S1	S2	S3
g2						
g3						
g4						
g5						
g94						

Expression values of 94 genes at 0 – 2 hours



## Inference of a network at 2 – 4 hours

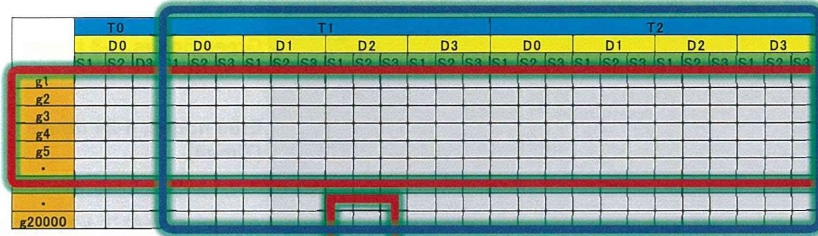
	T0			T1			T2		
	D0	D0	D1	D2	D3	D0	D1	D2	D3
g1									
g2									
g3									
g4									
g5									
...									
g20000									

94 genes started to change their expression value at 2 hours

55 genes started to change their expression value at 4 hours.

The changes occurred from 2 hours to 4 hours.

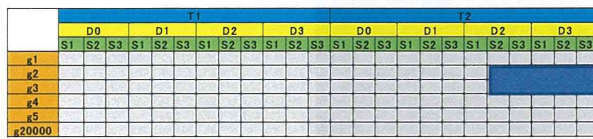
## Inference of a network at 2 – 4 hours



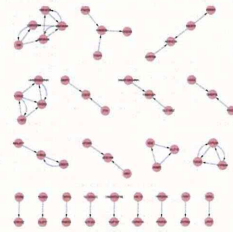
94 genes started to change their expression value at 2 hours  
55 genes started to change their expression value at 4 hours.

The changes occurred from 2 hours to 4 hours.

**In total, 149 genes.**



Expression values of 149 genes at 2 – 4 hours



0 – 2 hours (Time1)

Time2

Time1

Time3

Time4

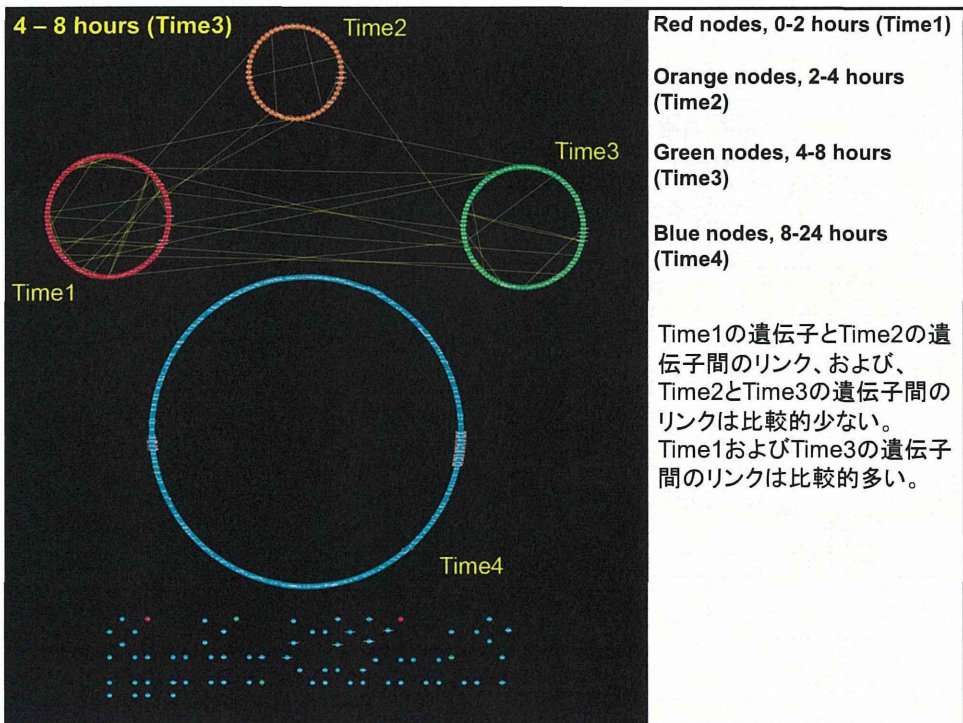
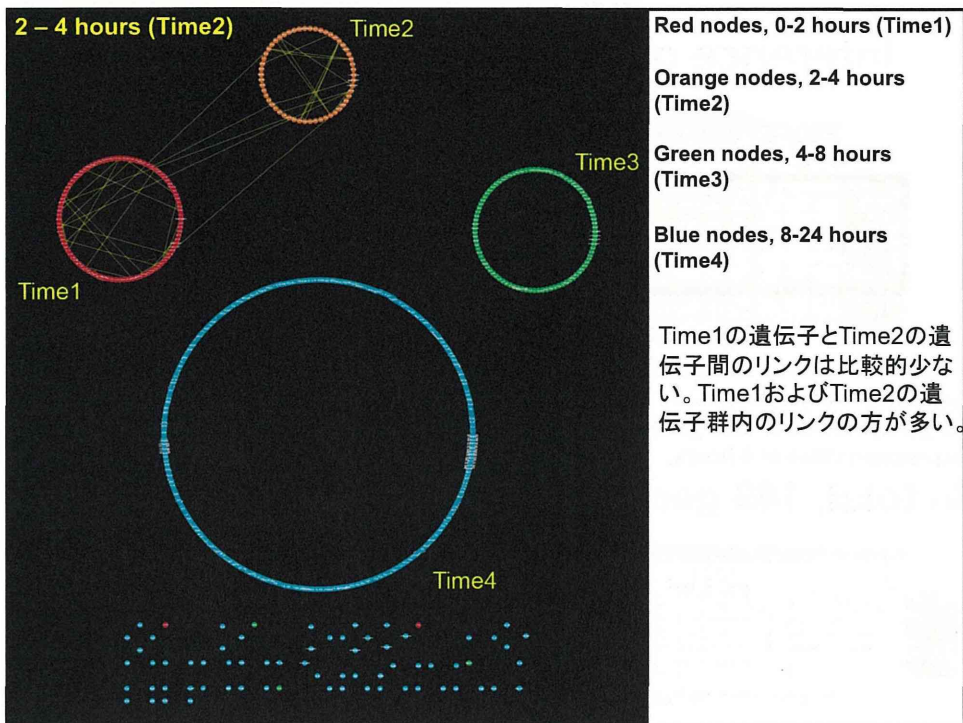
Red nodes, 0-2 hours (Time1)

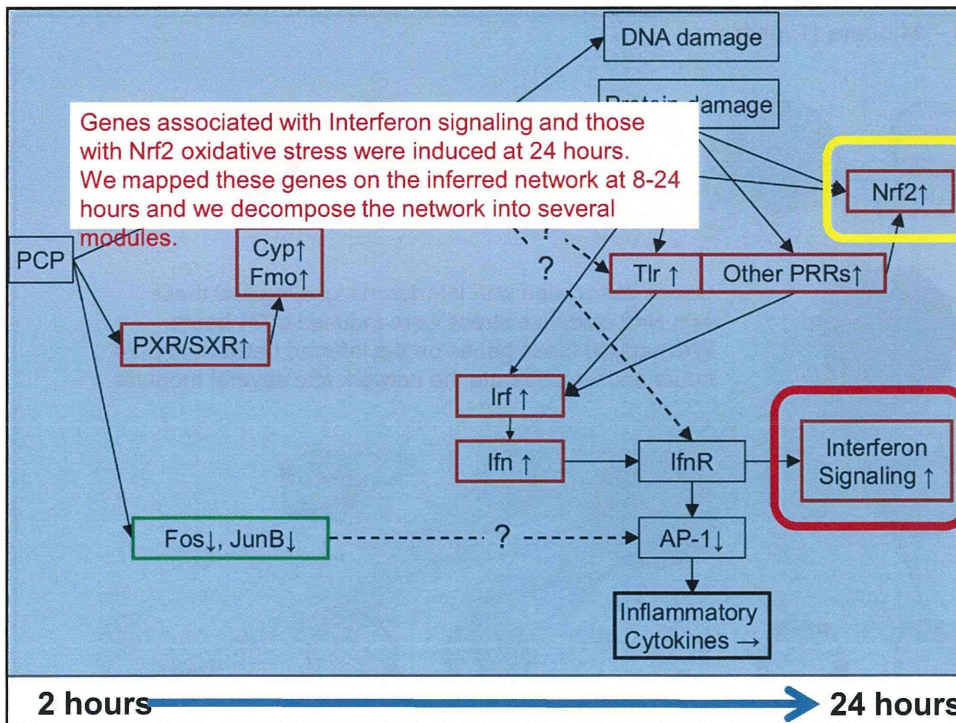
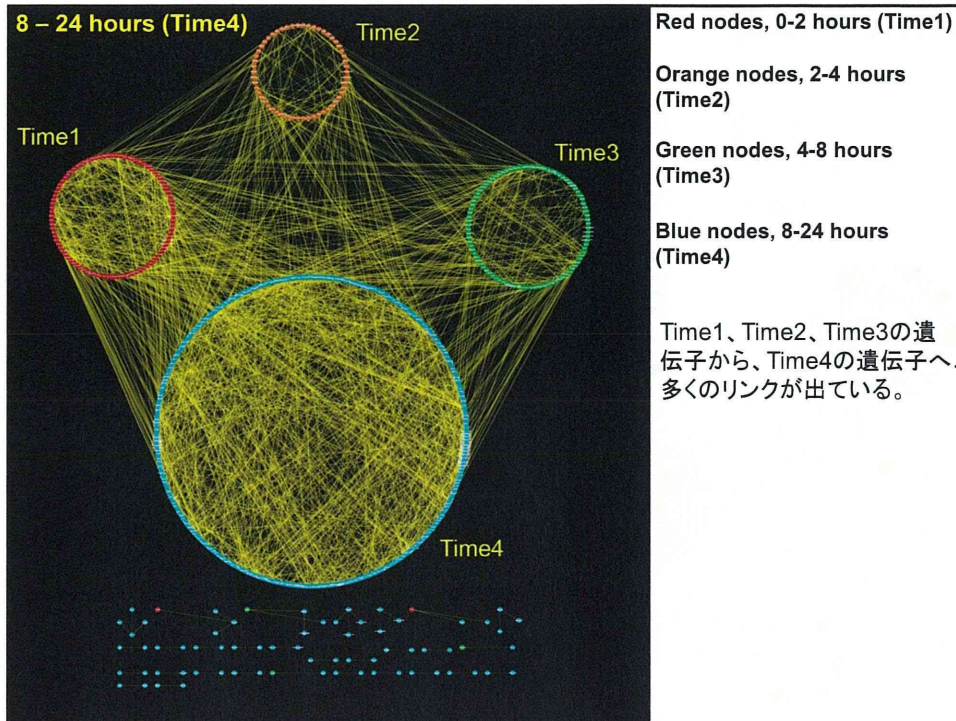
Orange nodes, 2-4 hours (Time2)

Green nodes, 4-8 hours (Time3)

Blue nodes, 8-24 hours (Time4)

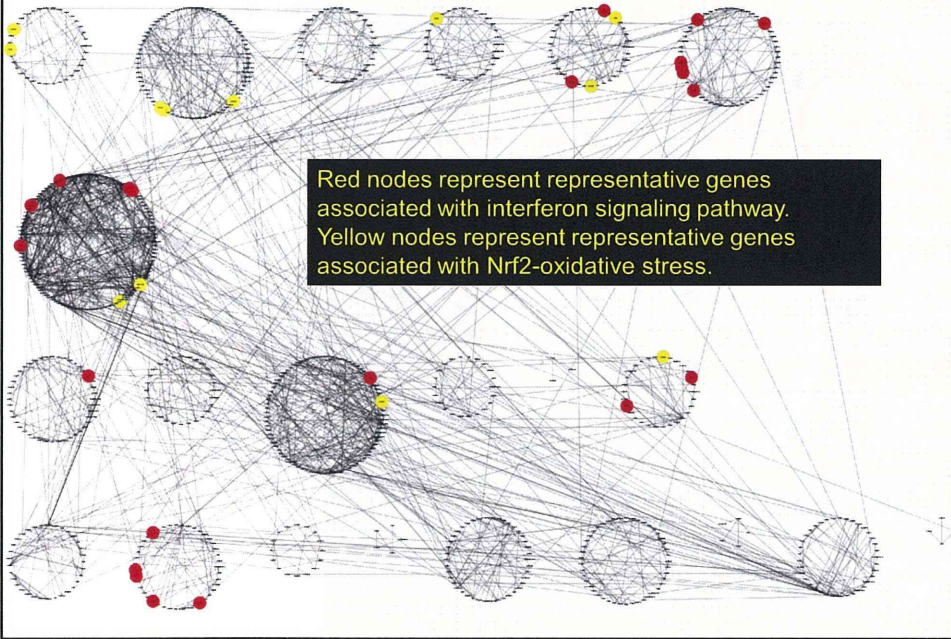




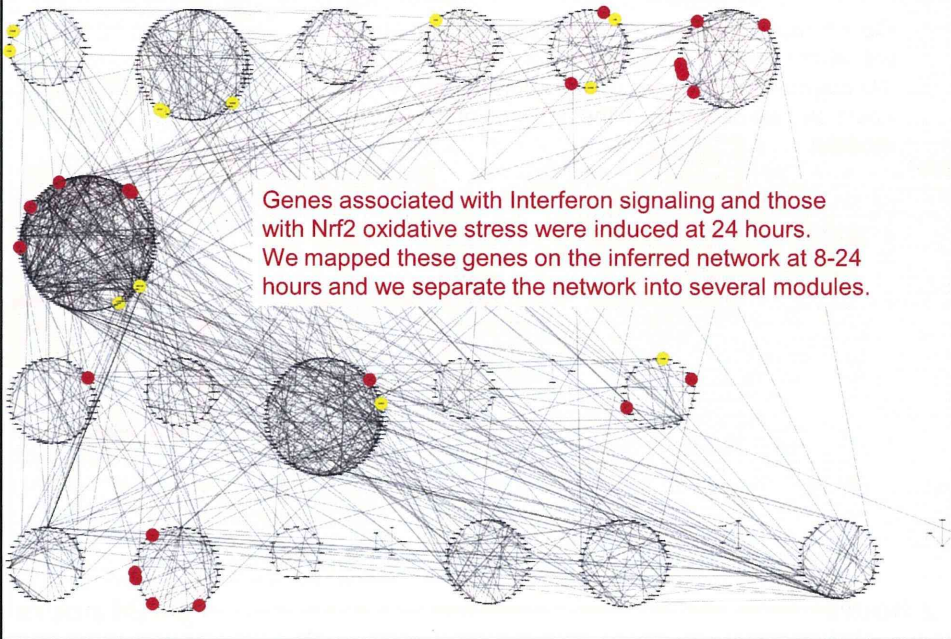




8 – 24 hours (Time4)

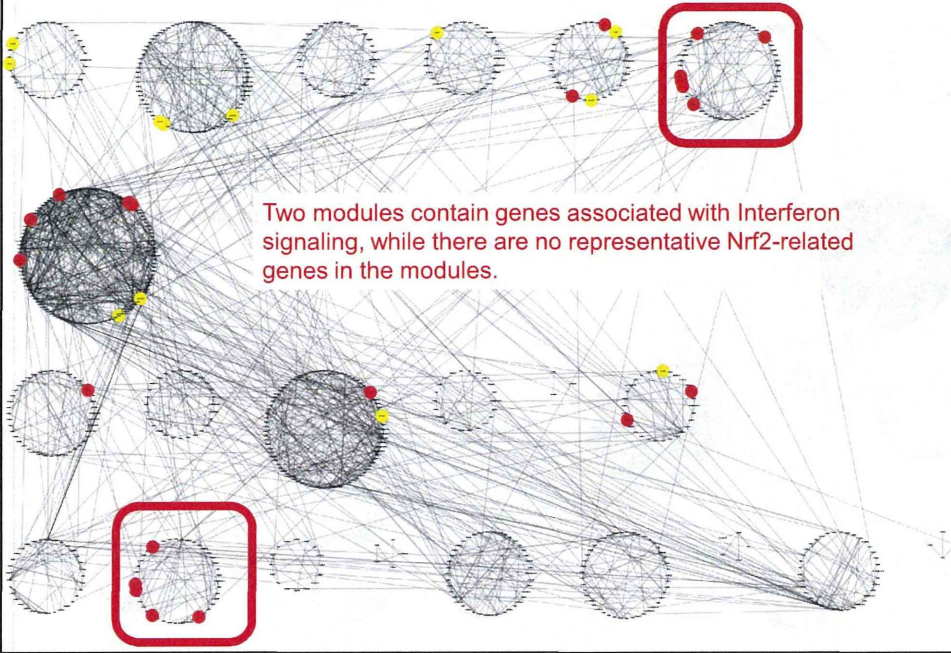


8 – 24 hours (Time4)

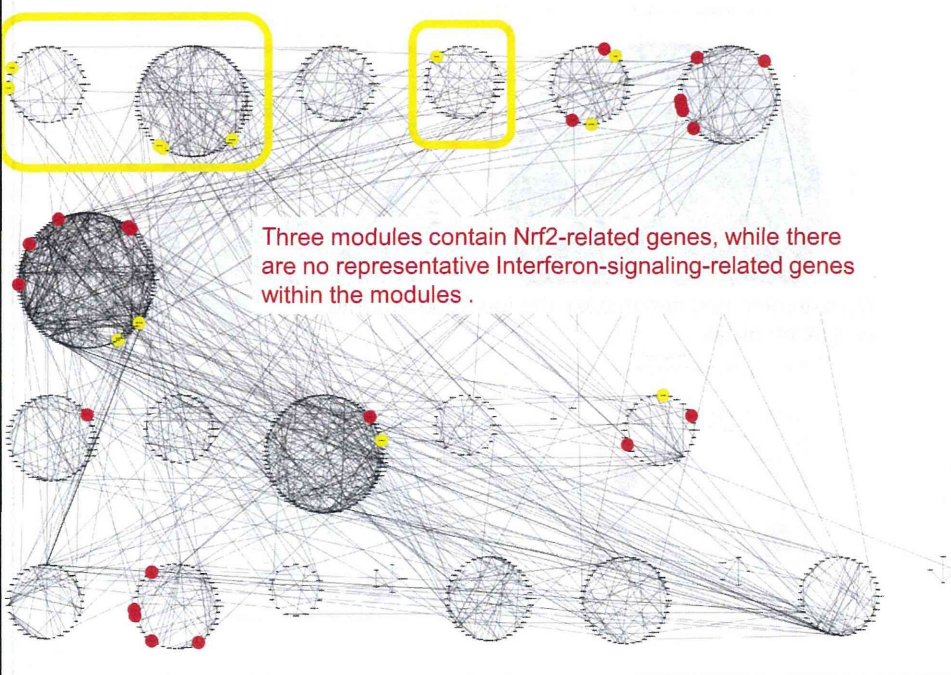




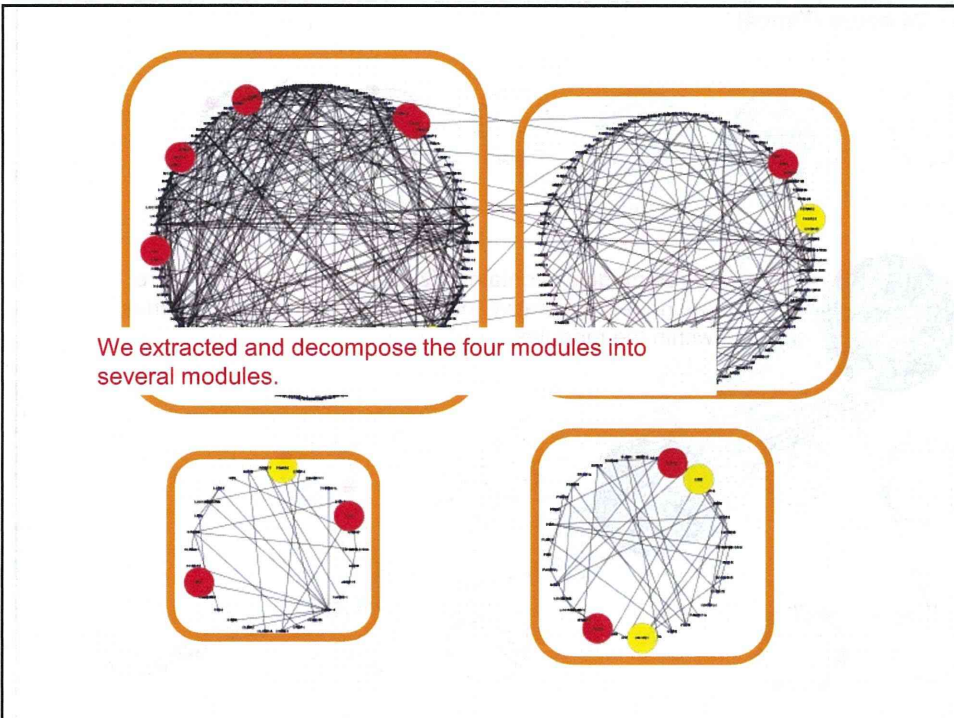
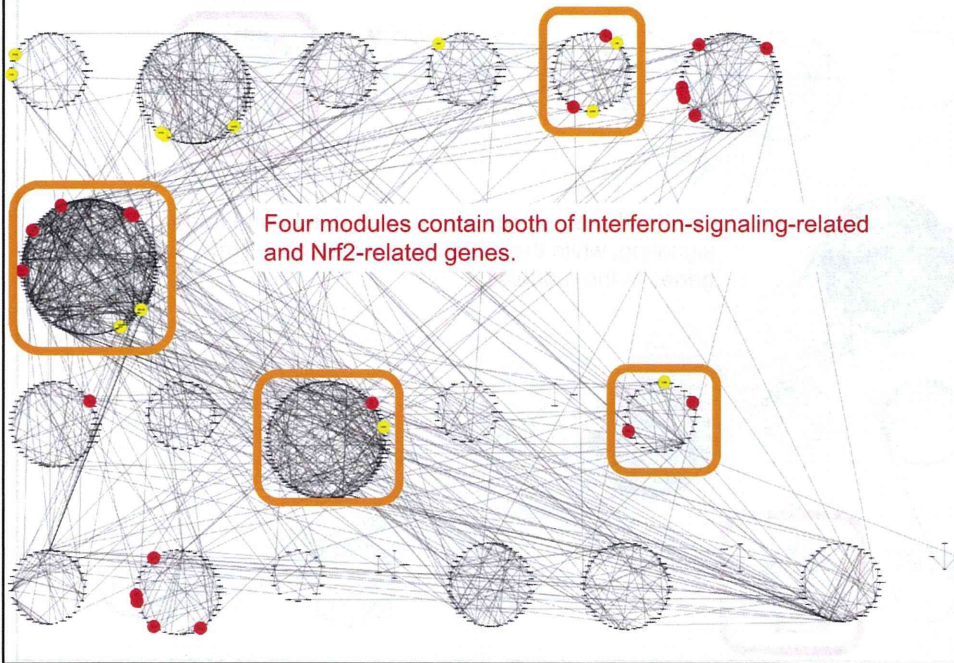
8 – 24 hours (Time4)



8 – 24 hours (Time4)



8 – 24 hours (Time4)





# GARUDA

THE WAY BIOLOGY CONNECTS

Percellome & Garuda

Jan 2014



## Release Notes: 1.0 beta

32

**Gadgets** available in 1.0 beta  
(30 gadgets with 2 installers)



Available on **OSX** and **Windows**

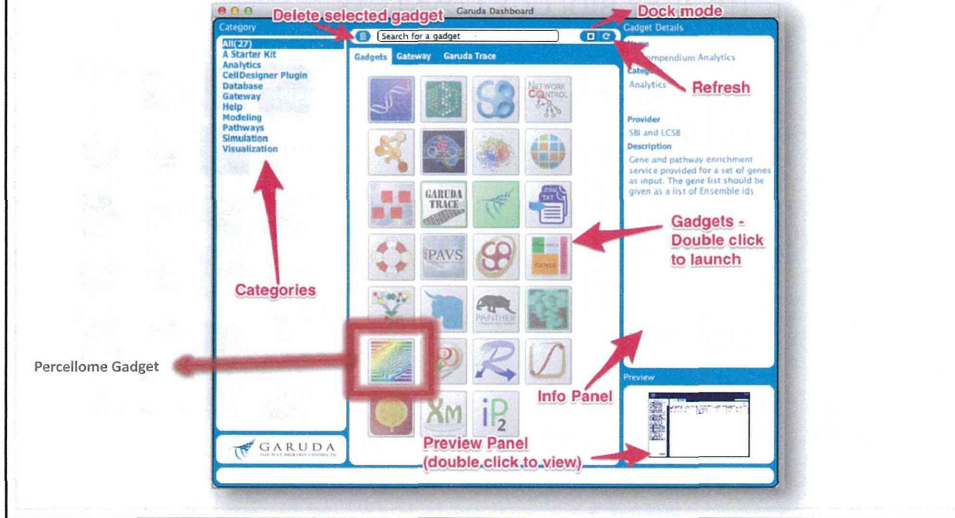


Access to **Garuda Gateway**  
for download of gadgets  
coming soon



# Garuda Dashboard

On launching Garuda, the Dashboard provides the window to the world of Garuda gadgets



# Percellome Garuda Pipeline

View expression data for a list of genes extracted from a pathway model

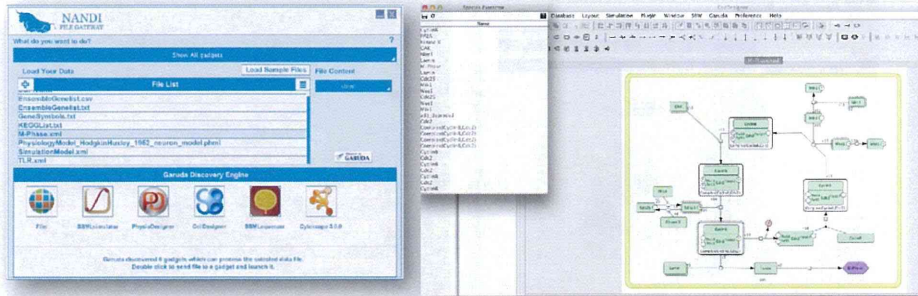
Gene expression analysis pipe



# Percellome Garuda Pipeline

View expression data for a list of genes extracted from a pathway model

View pathway Model in CellDesigner and extract gene list



# Percellome Garuda Pipeline

View expression data for a list of genes extracted from a pathway model

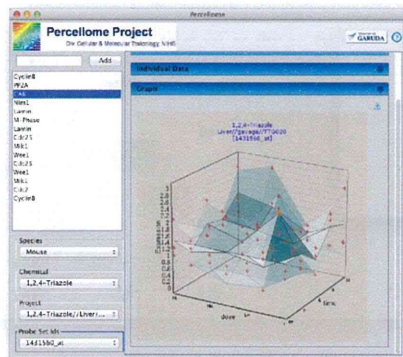
View extracted genelist on Nandi and "discover" Percellome gadget to view expression data



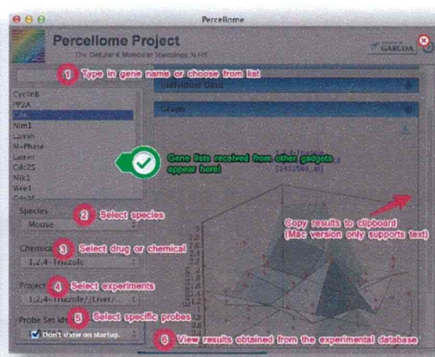
# Percellome Garuda Pipeline

View expression data for a list of genes extracted from a pathway model

View extracted genelist on Nandi and “discover” Percellome gadget to view expression data



Percellome Results



Percellome Help

Garuda

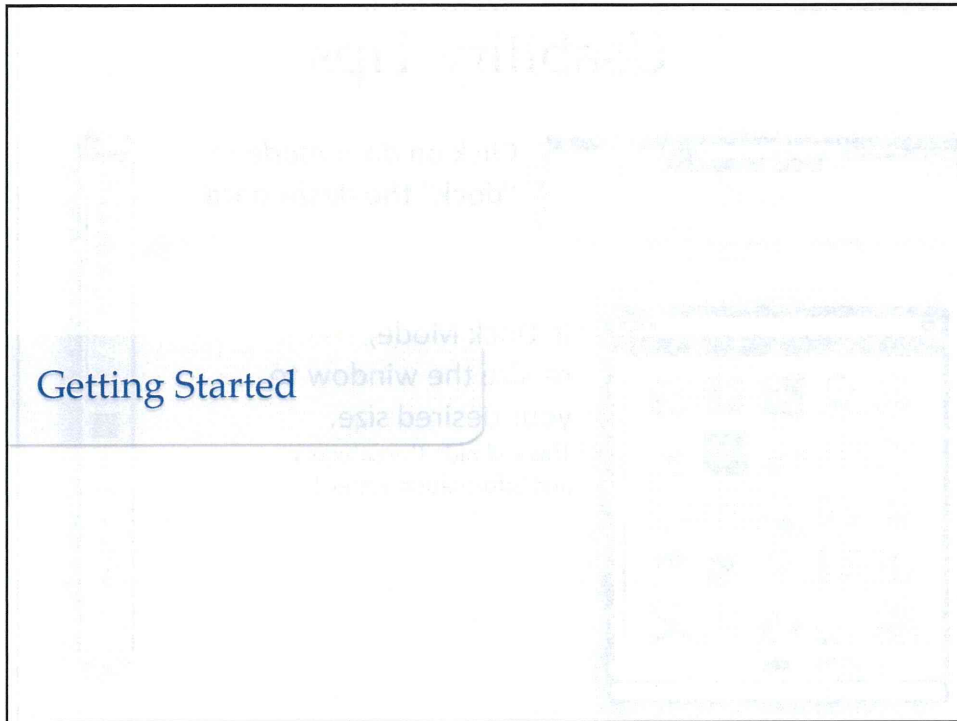


# What is Garuda?



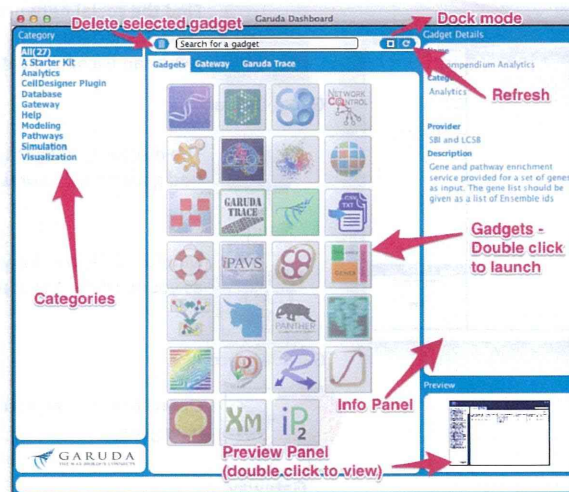
Two key features





## Garuda Dashboard

On launching Garuda, the Dashboard provides the window to the world of Garuda gadgets







# Usability Tips



Click on *dock mode* to “dock” the dashboard

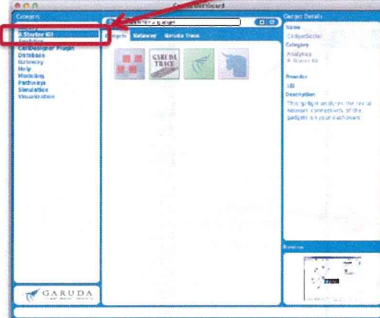


In Dock Mode, re-size the window to your desired size. This will hide the category and Information Panels!



# Where to start?

A good place to start is the “**Starter Kit**” category which has **four** gadgets:



Find the social network of gadgets on your dashboard (who can exchange data with whom)

GadgetSocial



The discovery gadget to load data and find gadgets for your workflow

Nandi



Monitor activities between gadgets as you work on Garuda

Garuda Trace



Opens the marketplace of new gadgets

Gateway