

## How “social” is your gadget?

Pipelines of gadgets in Garuda are built dynamically depending on the data and analytics workflow

- Build your own pipeline of gadget starting with your own files
- How can I know which gadgets can “talk” with other gadgets ?



### **GadgetSocial:**

Builds dynamically the “social network” of gadgets based on their connectivity

**Gadget Social**  
The gadget “social network”  
Find how gadgets on your dashboard “talk” to each other

CellDesigner  
by 2012-2014 The Systems Biology Institute  
Design, Simulate, and Analyze  
Cellular Models  
CellDesigner: A Modeling Tool for Biochemical Networks

Filter network by data type  
Gadget Social: “The gadget ‘social network’.” Find how gadgets on your dashboard “talk” to each other  
Click or hover on a gadget node to get more information  
Click or hover on an edge to see how two gadgets can exchange data  
Connectivity matrix view

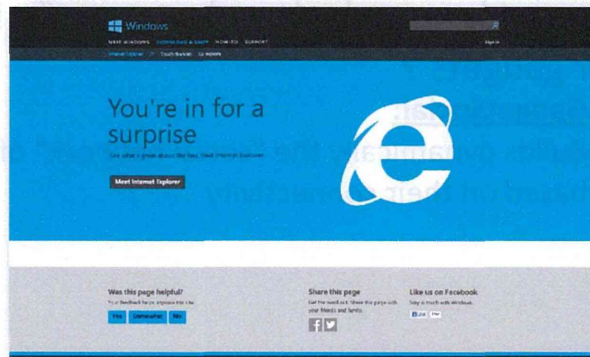
Reorder by name, number of connection, etc  
Connectivity matrix shows which gadgets can talk with each other  
Shows number of common formats between two gadgets (click to get details)

Network Matrix



## Usability Tips

If you are running a Windows machine (Windows 7, 8 or 8.1),  
**Please ensure that your Internet Explorer (IE) version is 9.0 or above (the latest version is 11.0)**  
GadgetSocial does not work if the IE browser version is less than 9.0



## Monitor activities between gadgets as you work on Garuda

Timestamp	Message	Source Gadget	Destination Gadget
11/28/2013 17:03:14.0517	Core sent a connection response. Connection successful. GadgetSocial		
11/28/2013 17:03:14.0516	GadgetSocial sent an activate gadget request to Core		
11/28/2013 17:03:12.0018	Core is attempting to launch GadgetSocial		
11/28/2013 17:01:37.0343	Core sent a connection response. Connection successful. GadgetSocial		
11/28/2013 17:01:37.0341	GadgetSocial sent an activate gadget request to Core		
11/28/2013 17:01:34.0134	Core is attempting to launch GadgetSocial		
11/28/2013 16:46:37.0117	Core sent a LoadGadget request for gadget open "gadgets/ba528141-245c-4358-b1c4-f1713c1e5ca4/GarudaDashboard.jar" to Dashboard		
11/28/2013 16:46:37.0116	Core sent a LoadGadget request for gadget ./gadgets/cad84b2b-1289-4d43-9008-d855f459167/GLauncher.sh to Gateway		
11/28/2013 16:46:33.0565	Core sent a connection response. Connection successful. Dashboard		

**NANDI FILE GATEWAY**  
An entry point gadget for the rest of the Garuda gadgets

1. Choose a question or "show all gadgets"

2. Load your data or choose from sample files

3. Select file content or unknown if not sure

4. Press "discover"

5. Garuda shows gadgets here. Double click on a gadget to send your data and begin analyze.

## Productivity Tips

Closing the Dashboard window does not close Garuda Core.

To Close Garuda,

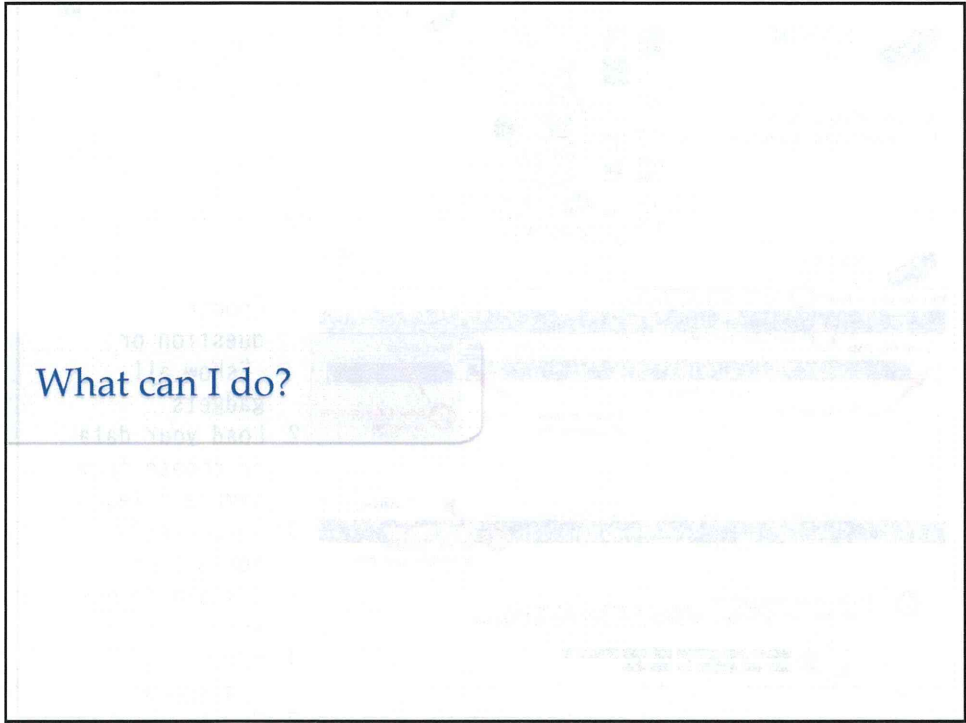
1. Locate the Garuda icon on your taskbar and
2. click to show Dashboard to **Exit** Garuda Core.

Clicking the **help** icon on most gadgets bring the help view.

Click on red cross to **close help**.

Check **"Don't show on startup"** to prevent auto launch of help view.

Alt + H also brings the Help



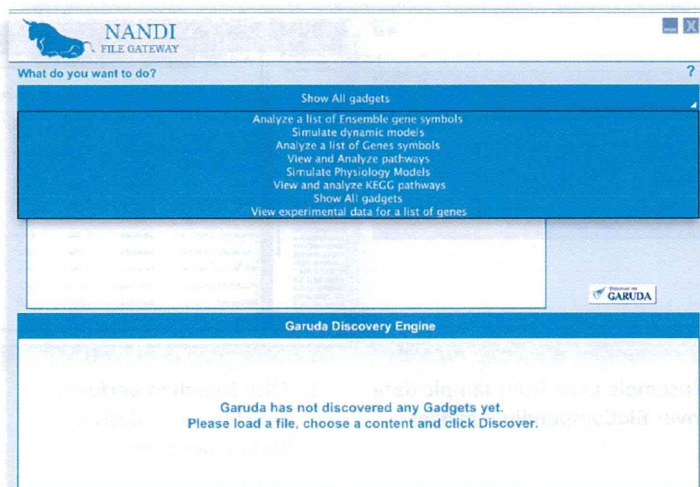
## What can I do?

Garuda does not refine any specific analytics workflows. It is an **“open” platform** where you *discover* and *navigate* through different gadgets depending on your question

Subcategory	Code
...	...
...	...
...	...

# What can I do?

**Nandi** as the gate-keeper gadget can provide a starting point with a pre-defined set of analytics



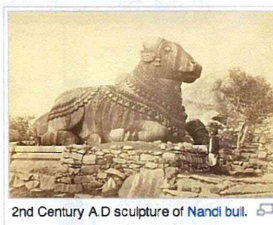
## Myth Tip: Nandi

### Nandi (bull)

From Wikipedia, the free encyclopedia

**Nandi** (Sanskrit: नन्दी, Tamil: நந்தி, Telugu: నంది) is the name for the bull which serves as the mount (Sanskrit: *Vahana*) of the god *Shiva* and as the gate keeper of *Shiva* and *Parvati*. In *Hindu* mythology, he is the chief guru of eighteen masters (18 siddhas) including *Patanjali* and *Thirumular*.<sup>[1]</sup> Temples venerating *Shiva* display stone images of a seated *Nandi*, generally facing the main shrine. There are also a number of temples dedicated solely to *Nandi*.

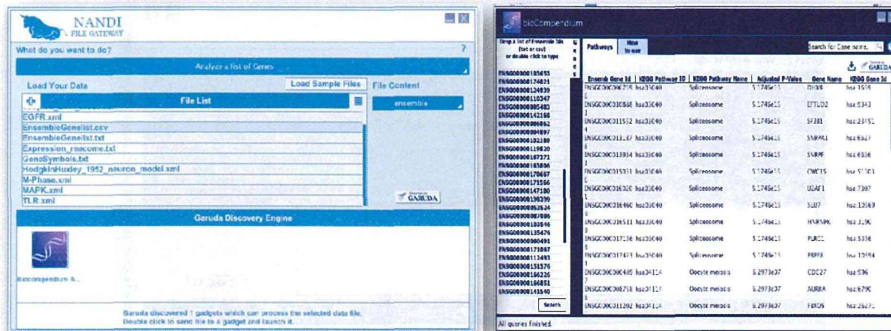
The application of the name *Nandi* to the bull (Sanskrit: *vṛṣabha*) is in fact a development of recent centuries, as *Gouriswar Bhattacharya* has documented in an illustrated article entitled "Nandin and Vṛṣabha".<sup>[2]</sup> The name *Nandi* was earlier widely used instead for an anthropomorphic deity who was one of *Shiva*'s two door-keepers, the other being *Mahākāla*. The doorways of pre-tenth-century North Indian temples are frequently flanked by images of *Mahākāla* and *Nandi*, and it is in this role of *Shiva*'s watchman that *Nandi* figures in *Kālidāsa*'s poem the *Kumārasambhava*.



2nd Century A.D sculpture of Nandi bull.

# What can I do?

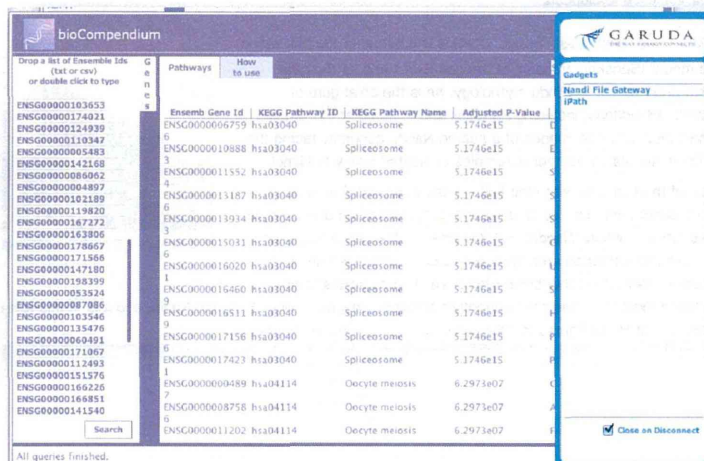
Perform enrichment analysis on a list of Ensemble gene identifiers



1. Choose Ensemble gene from sample data and discover BioCompendium gadget
2. Click Search to perform enrichment analysis on BioCompendium

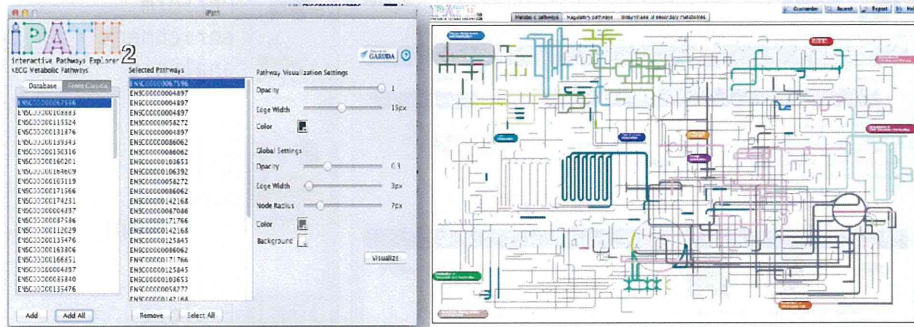
# What can I do?

Continue the analysis for pathway enrichment by clicking on Garuda Discover and selecting iPath gadget



# What can I do?

Continue the analysis for pathway enrichment by clicking on **Garuda Discover** and selecting **iPath** gadget



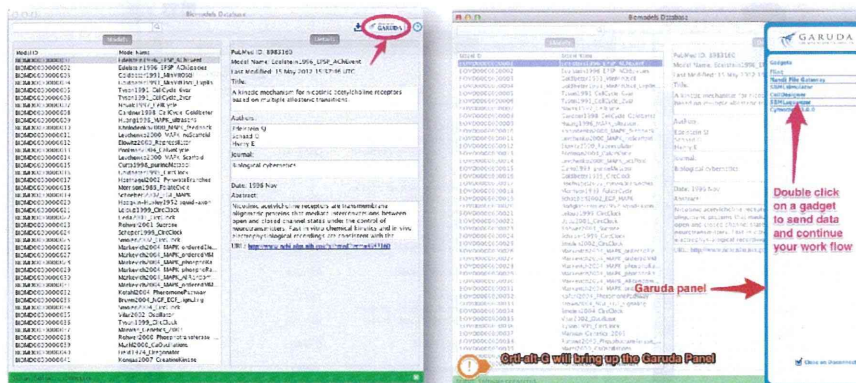
1. Configure KEGG pathways on iPath gadget

2. Click Visualize to view on browser



## Navigability Tip

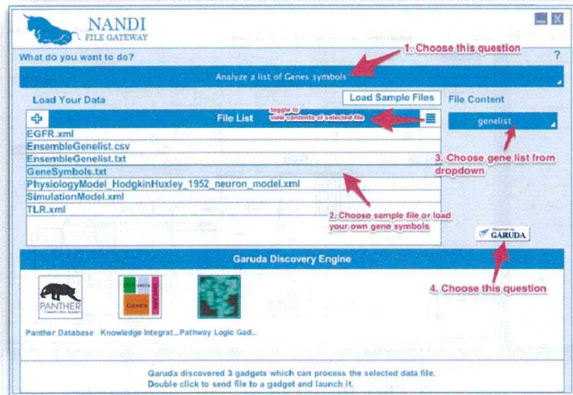
To navigate from one gadget to next, locate the **“Discover on Garuda”** button and click to show **Garuda Panel**



Ctrl + Alt + G also brings the Garuda Panel  
Click anywhere outside the panel to hide it

# What can I do?

I have a list of Gene Symbols.  
What kind of analytics can I perform?



Perform enrichment analysis



Explore semantic enrichment



Explore literature mining

**Tip:** If no results are found, choose "Show All gadgets" from question list and click Discover again!

# What can I do?

**Panther gadget** performs enrichment across genes, families, pathways and GO category



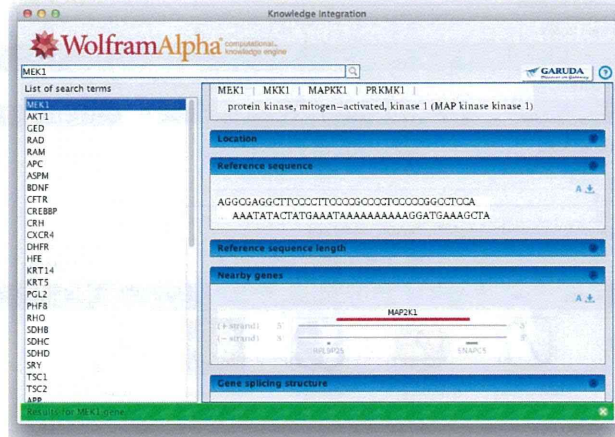
Gene	Family	Pathway	Category
SMXK	DICDI dictyBase=DDB_G0289067 UniProtKB=Q54118	Suppressor of Mek1	
MKCE	DICDI dictyBase=DDB_G0281649 UniProtKB=Q54118	Probable serine/threonine-protein kinase	
Q55716	DICDI dictyBase=DDB_G0274399 UniProtKB=Q55716	MEK1 interacting protein 1	
F11M14	RAT RGD=61888 UniProtKB=F11M14	Dual-specificity mitogen-activated protein kinase	
MP2K1	DICDI dictyBase=DDB_G0269152 UniProtKB=Q55716	Dual specificity mitogen-activated protein kinase	
MP2K1	RAT RGD=70495 UniProtKB=Q0198	Dual specificity mitogen-activated protein kinase	
ABI6E0	CHLRE ENTREZ=5726354 UniProtKB=AB16E0	Predicted protein	
ABIUA4	CHLRE ENTREZ=5718079 UniProtKB=AB1UA4	Predicted protein	
Y8550	DICDI dictyBase=DDB_G0268550 UniProtKB=Q55716	Probable serine/threonine-protein kinase	
H2Y2V1	CIORN ENSEMBL=ENSCING0000023 UniProtKB=H2Y2V1	Uncharacterized protein	
D3ZAG5	RAT RGD=1307318 UniProtKB=D3ZAG5	Protein SK-36	
A8HY77	CHLRE ENTREZ=5722233 UniProtKB=AB1HY7	Mitogen-activated protein kinase kinase 1	
AB16U8	CHLRE ENTREZ=5722831 UniProtKB=AB16U8	Predicted protein	
AB16U2	CHLRE ENTREZ=5722315 UniProtKB=AB16U2	Predicted protein	



# What can I do?



**Knowledge Integration** uses the Wolfram Alpha semantic engine to retrieve enriched information on genes

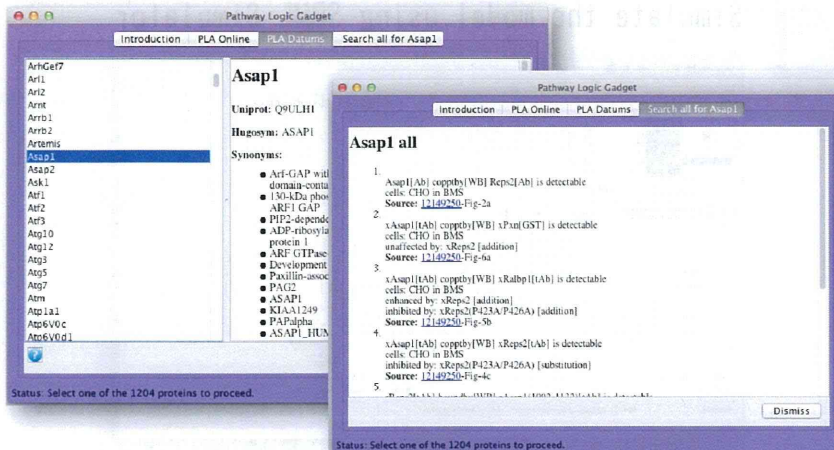


**Note:** Knowledge Integration requires an API key registration to work  
It will not launch on Mac OS X 10.6 or below

# What can I do?

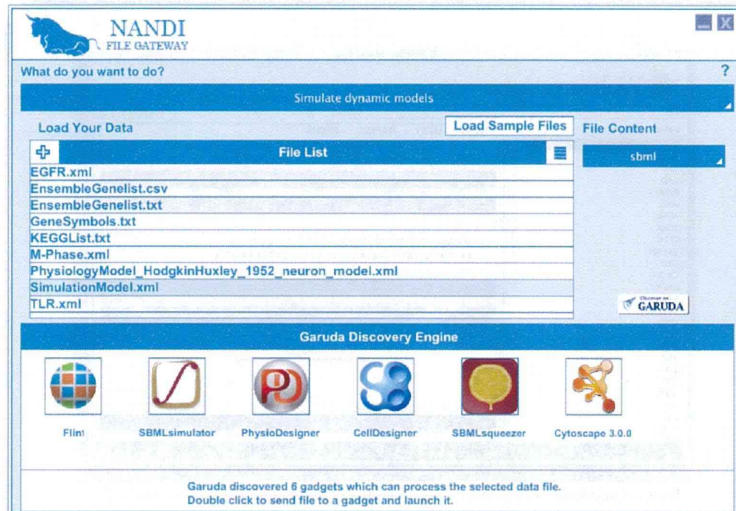


**Pathway Logic** performs specific search on curated literature and logical connections derived from the data



# What can I do?

**Simulate biochemical models** based on Ordinary Differential Equations to study molecular dynamics

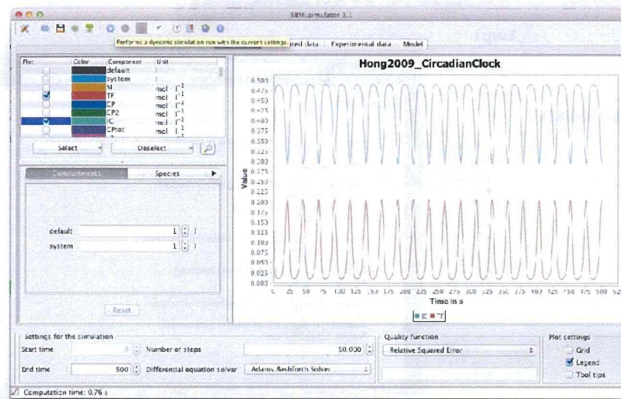


# What can I do?

**Compare simulation results** for a single biochemical model across different engines by using the different gadgets



Simulate the model using SBML Simulator

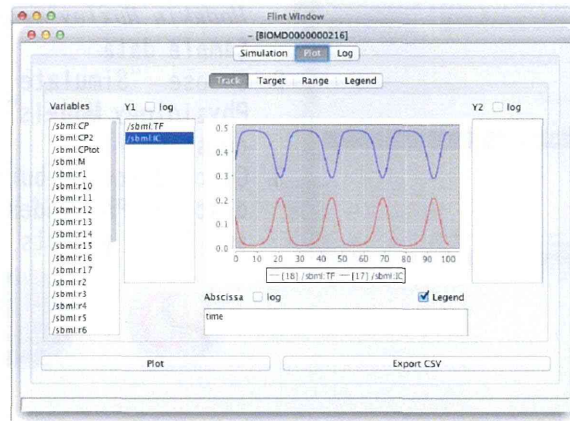


## What can I do?

Compare simulation results for a single biochemical model across different engines by using the different gadgets



Simulate the model using Flint

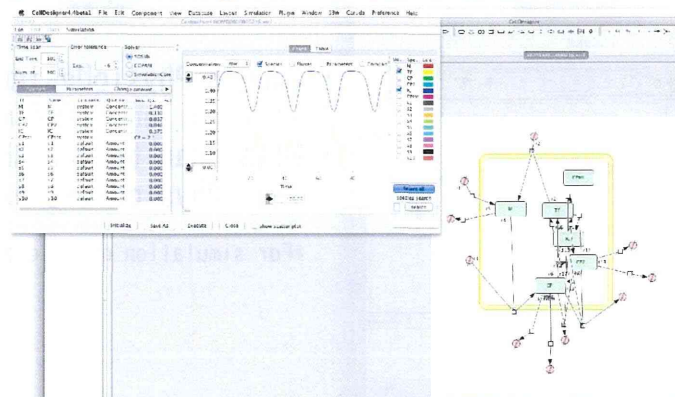


## What can I do?

Compare simulation results for a single biochemical model across different engines by using the different gadgets

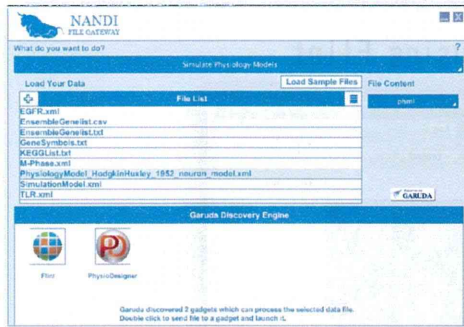


Visualize the model in CellDesigner and simulate using the in-built simulators



# What can I do?

## How can I simulate Physiological Models?

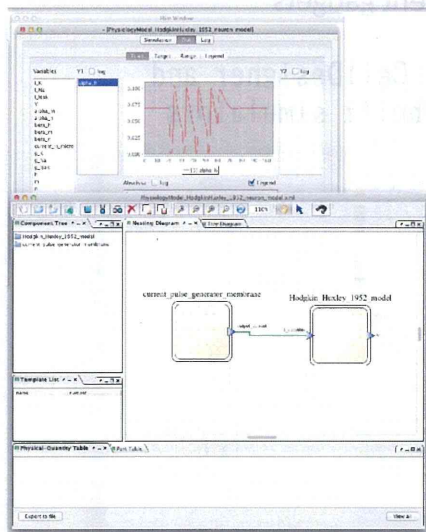


1. Load your own model (e. g. PHML file) or choose *Hodgkin Huxley model* from Sample data.
2. Choose "Simulate Physiology Models" from question list
3. Click Discover button to discover Physiodesigner and Flint gadgets



# What can I do?

## How can I simulate Physiological Models?



- Launch Physiodesigner to view, edit the model
  - Flint can be launched from Physiodesigner
- \*For simulation only, choose Flint

## Feedback

Garuda is in beta and **feedback** from the community is key.



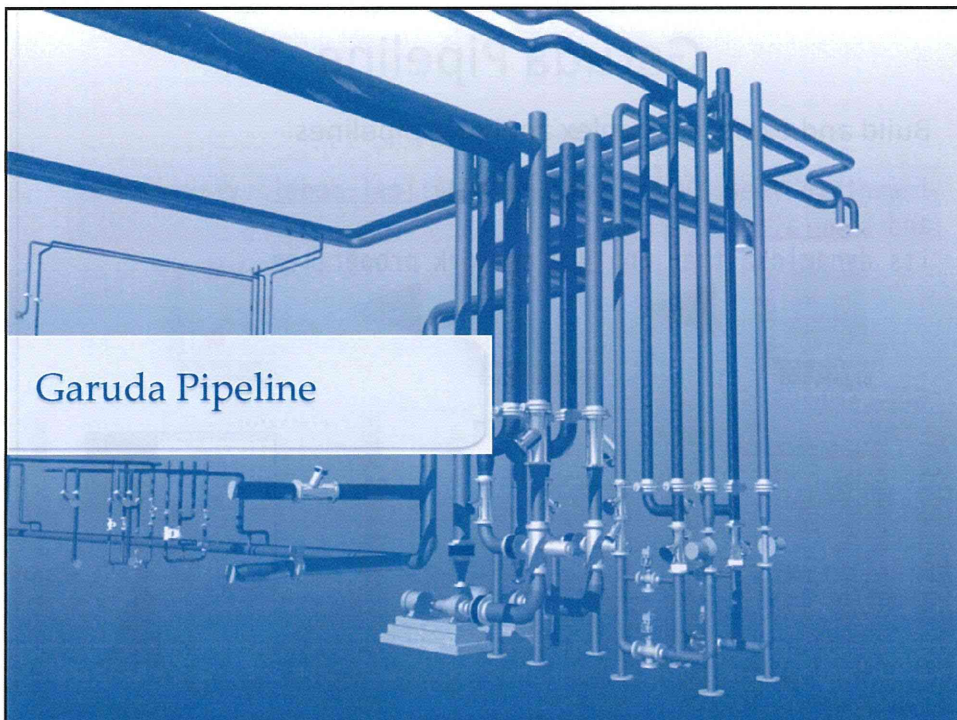
### **Wish list gadget:**

Make a “wish” on features gadgets which you would like to see on Garuda



### **Feedback gadget:**

Report on bugs, usability issues, example files missing, anything..



# Garuda Pipeline

Pipelines of gadgets in Garuda are built dynamically depending on the data and analytics workflow

I have a gene list and I want to -

Find information on genes



Gene list



Knowledge Explorer

Gene exploration pipe

View expression patterns



Gene list



Percellome

Gene expression analysis pipe

Perform gene and pathway enrichment



Gene list



BioCompendium



iPath

Enrichment pipe

# Garuda Pipeline

Build and explore complex analytics pipelines

I want to view a published mathematical model, visualize and simulate its dynamics, then analyze network properties



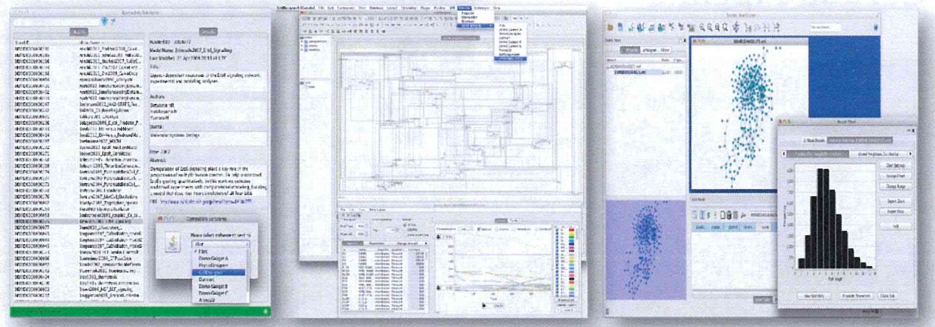
BioModels



CellDesigner



Cytoscape



## Discover and Navigate

Controllability

Anal  
entit

DBPF Client  
Dynamic Brain Platform Client

EnrichNet  
EnrichNet computes a network-based pathw the in pathw molec

Pathway Logic Gadget  
Pathway Logic models cellular processes using formal executable specifications. The gadget provides access to curated models and an experimental evidence (datums) knowledge



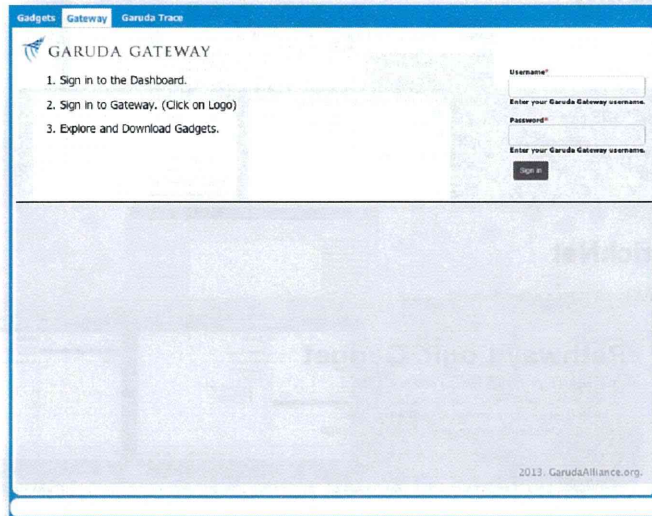
## Features and gadgets

- **New gadgets** including model visualization (Dunnart), bio-medical text-mining (NacTeM) and many more
- **Known bug fixes** for Reactome gadget
- **New Features** on BioCompendium, Panther gadgets
- **Newly designed Dashboard**
- Open access to **Garuda Gateway** with free registration

COMING SOON

# Garuda Gateway

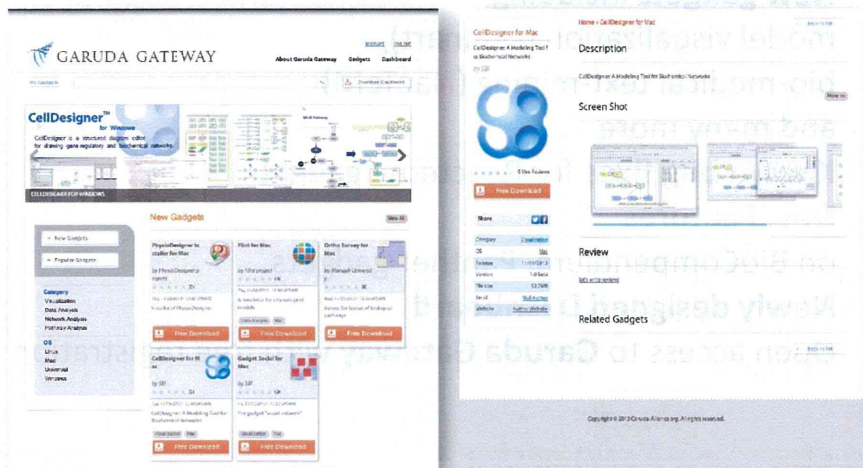
Gateway window from local dashboard




COMING SOON

# Garuda Gateway

Web-based interface to access and discover gadgets







**GARUDA**  
THE WAY BIOLOGY CONNECTS

www.garuda-alliance.org

contact

---

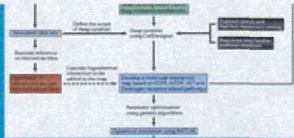
Home
Overview
Garuda Alliance Members
Garuda Resources
User Stories
News/Topics
Events
Developer Center

## About Garuda Alliance

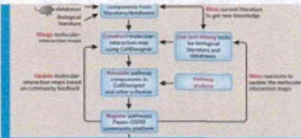
About Anuda Alliance About Anuda Alliance About Anuda Alliance About Anuda Alliance

[More](#)

### User Stories



😊 **To understand mechanisms of drug resistance**  
7 November, 2011



😊 **Distributed pathway curation**  
7 November, 2011

Distributed pathway curation - collaboration

**Developer Center Log in**

Garuda Alliance Member Center Log in

Garuda Developer Center Log in

Create an account

Developers Center will open in 2012 ↑

### News/Topics more

- 📄 **Topics** Introducing Garuda  
7 November, 2011
- 📄 **News** New Garuda-Alliance.org site open for preview!  
29 September, 2011

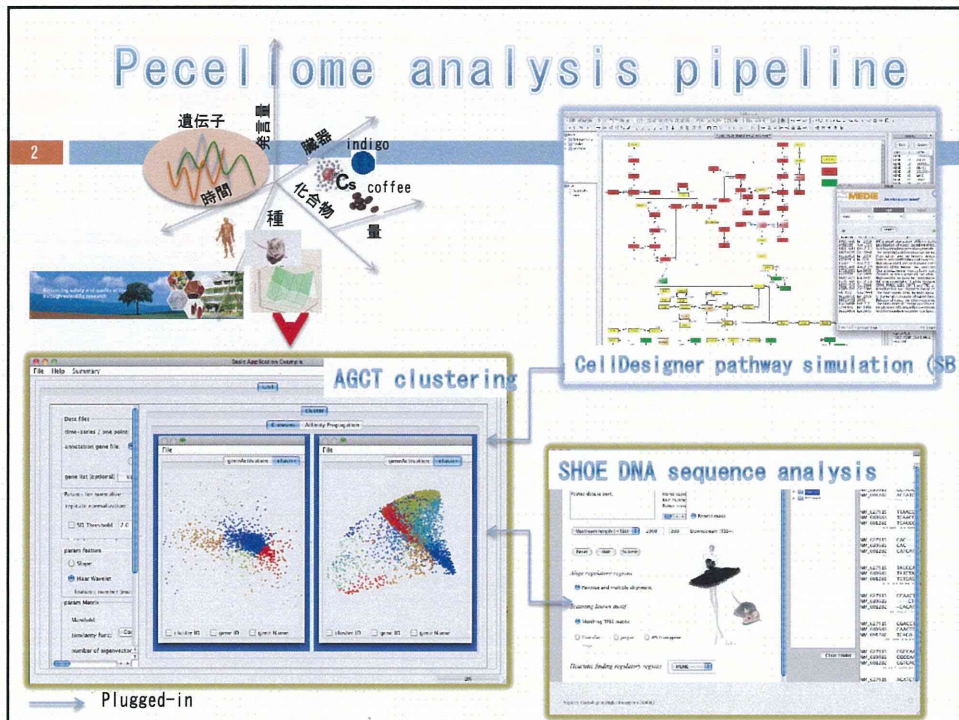
### Events more

- 📅 Garuda Seven in Okinawa  
29 September, 2011
- 📅 Garuda Six in Luxembourg  
28 September, 2011

班會議平成26年2月6日

Clustering with AGCT and  
transcription regulation  
analysis with SHOE

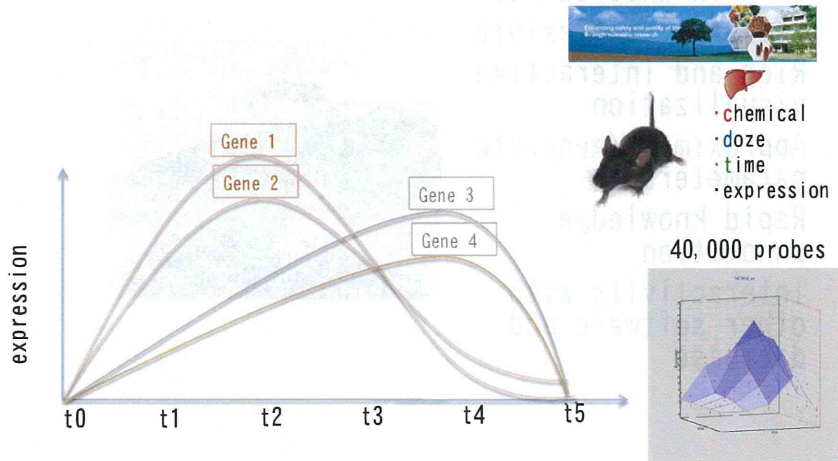
Sony CSL



# Atlas of Cell Life by AGCT

3

- AGCT reconstructs gene network basing on the similarities of the expression profiles of genes



## データの現状

4

- 全発現プロファイルが4万プローブを含む
  - 初期反応遺伝子 (responsive transcription)
  - Circadian 遺伝子 (basal transcription)
  - 無反応遺伝子 (not circadian)
  - 実験誤差



## Independent and Interactive )

5

- Fast
- Work in uncertainty
- Macro/micro flexible
- Rich and interactive visualization
- Approximate/generate parameters
- Rapid knowledge annotation
- Interactivity with other software and database



## AGCT A Gene Geometric Clustering Tool

6