

## 1.0 GENERAL

### 1.1 WHAT IS ORA:

ORA is a network analysis package that helps the user enter, analyze, visualize, and forecast changes in networks using graph based and statistical based techniques.

ORA consists of two parts: The **Editor**, which allows you to work on loaded Meta-Networks and the **Visualizer**, which allows you to see a graphic depiction of the Meta-Network.

### 1.2 INSTALLATION:

This is the procedure to install ORA on your computer:

Go to <http://casos.cs.cmu.edu/projects/ora/software.php>

Click the **Download** link

Select the [ **Yes** ] button to agree to terms and click [ **Continue** ]

Insert your Information and click [ **Continue** ]

Choose your platform.

Click the link for your system [ **32-bit or 64-bit** ]

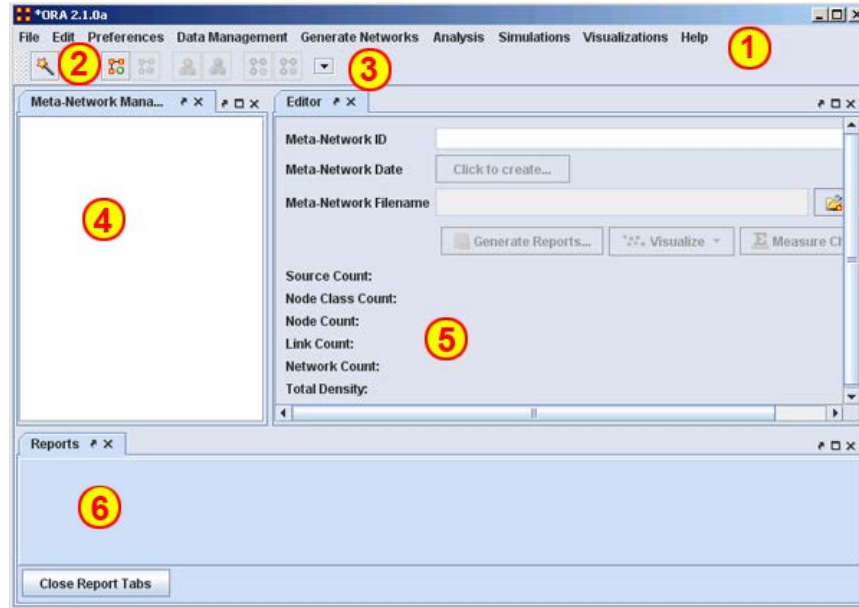
After the program is downloaded double click the ORA icon to install. Follow installation instructions.

## 2.0 EDITOR

### 2.1 EDITOR GUI

The ORA interface is organized into three sections which are placed in resizable and dockable panes.

Each pane will have one or more individual parts. On each tab are two buttons: **undock and close**. In the upper right corner of each pane are three buttons: **undock, maximize, and close**. This will allow you to arrange the interface to suit your needs.



*The ORA Editor Interface*

- 1) **Menu** – Source for performing the majority of tasks. The Menu Items are separated into categories each with their own functions.
- 2) **Toolbar** –Buttons for main functions to work with Meta-Networks, NodeClasses and Networks.
- 3) **Toolbar Button Adder** – Allows you to add menu functions to the toolbar.
- 4) **Meta-Network Manager** – This pane displays all currently open Meta-Networks.
- 5) **Editor** – This pane displays in multiple tabs information on Node Classes and Networks.
- 6) **Reports** – This pane display reports run on Meta-Networks.

## 2.2 WHAT'S IN A META-NETWORK:

**Meta-Network** – A representation of a Group of Networks.

**Node** – A representation of a real-world item (a who, what, where, how, why item).

**Node Class** – A set of nodes of one type.

**Link** – A representation of a tie, edge, connection, or relation link between any two nodes.

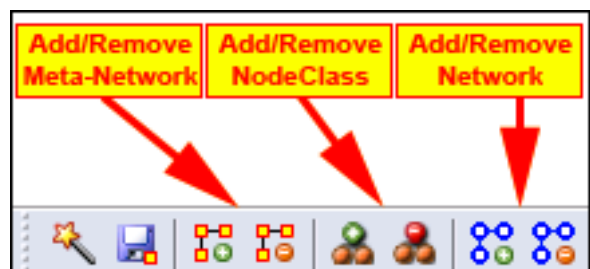
**Network** – A representation of a set of nodes (including meta-nodes) of one type and the links (including meta-links) of one type between them.

**Attribute** – Additional information about a node. The most common agent attributes are **age** & **gender** although it can be anything you choose.

## 2.3 META-NETWORKS, NODECLASSES, AND NETWORKS BUTTONS

ORA contains tools to Add or Remove **Meta-Networks**, **NodeClasses**, or **Networks**. The **Plus** sign denotes adding and the **Minus** sign denotes removing.

To add a **Meta-Network**, **NodeClass**, or **Network** click the appropriate button. The new item will appear in the Meta-Network Manager.



To remove a **Meta-Network, NodeClass, or Network** highlight the item and click the appropriate button.

**NOTE :** When in the actual program only the applicable buttons will be active e.g. if a network is highlighted then only the Network buttons are active. All others would be greyed out.

## 2.4 CREATING A NETWORK AND NODECLASS FILE

A NodeClass or Network can be created either in ORA or in an external program such as a text editor [Notepad or Notepad++] or a spreadsheet program [Excel].

### Using a Text Editor

To create a Network in a Text Editor all information will be separated by commas. The lefthand column consists of the **FROM** nodes and the top row consists of the **TO** nodes. A **“0”** at an intersection means there is no link while a **non-zero number** means there is a connection.

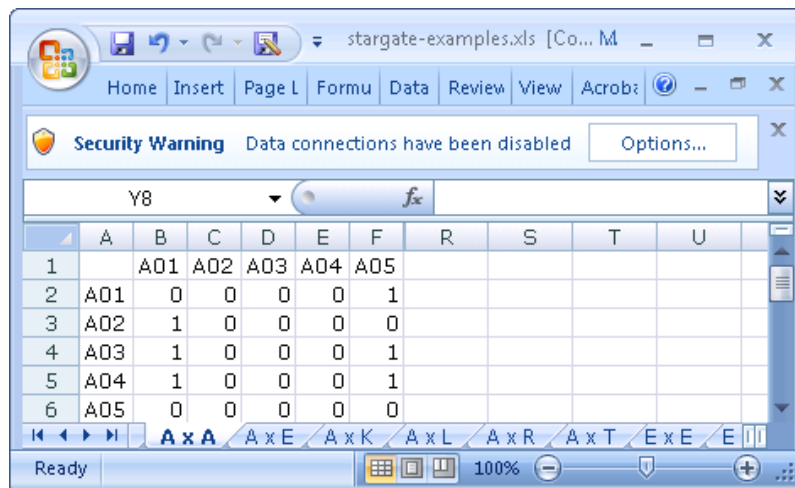
```
,A01,A02,A03,A04,A05
A01,0,0,0,0,1
A02,1,0,0,0,0
A03,1,0,0,0,1
A04,1,0,0,0,1
A05,0,0,0,0,0
```

**NOTE :** In the text file above notice the **empty value** in the top row just to the left of the top comma. This corresponds to the empty cell in the Excel spreadsheet **Column A – Row 1**.

To create csv files save them as a text file (.txt) but change the extension name to **.csv**.

### Using Excel

In an **Excel Spreadsheet** you would place each set of nodes in a separate row or columns with each piece of information in a separate intersecting cell. To create a csv file select **File > Save As...** and save it as a comma-delimited file.




*Excel with the SG-1 Network data*

Links will run from the node in **Column A** to the node in **Row 1**. For example there is a link from A02 > A01 [cell B3] but there is no link from A01 > A02 [cell C2].

Again note that the cell [A1] is blank. This is common in all network files created in this manner.

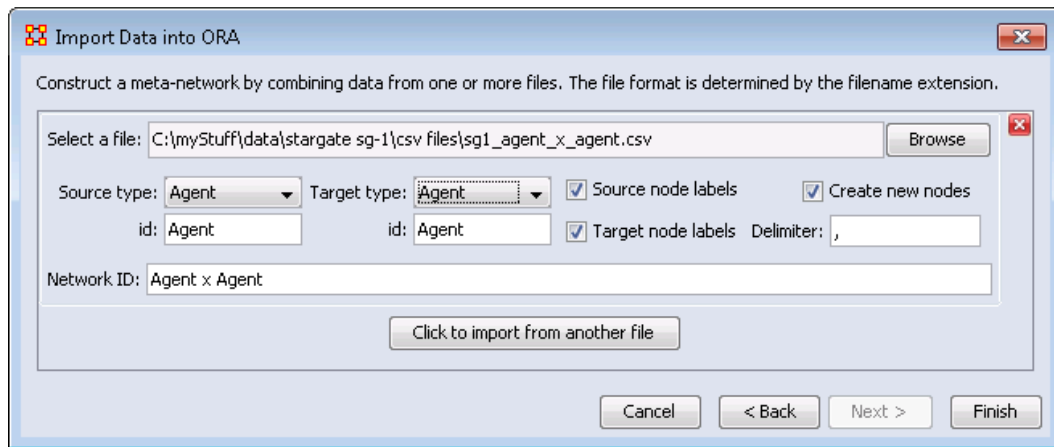
## 2.5 IMPORT CSV FILES INTO ORA TO CREATE NODECLASS AND NETWORK:

 With **NodeClass** and **Network** created it is time to import them into ORA. For this we use the **Data Import Wizard**.

Select **Import existing data? > Table Data from Excel of delimited formats > Rectangle of link weights (a Matrix)**. Click [ **Next >** ].

Click **Create a new meta-network with ID:**

Replace **Meta Network** with the name for your new MetaNetwork then click [ **Next >** ]



*The Import Data Interface*

Click [ **Browse** ] and locate the csv file of the agents.

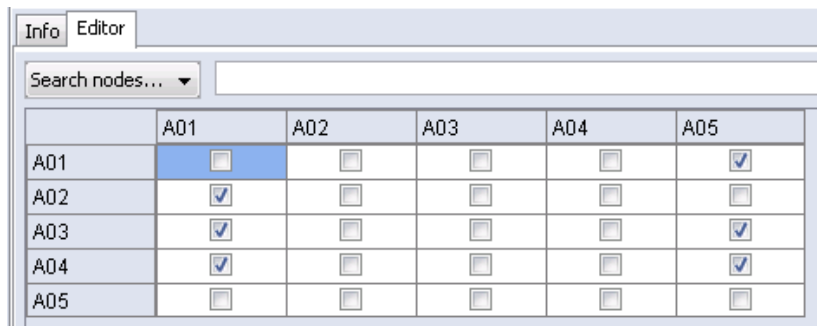
Set **Source type** and **Target type** to agent.

**NOTE :** For this Network both are set to agent. Depending on the data you are importing these may be set to different nodeclasses.

**NOTE :** Clicking on the **Click to import from another file** allows you to import additional networks.

Click [ **Finish** ].

To import additional files into the **Meta-Network** choose **Add to the existing meta-network** instead of **Create a new Meta-Network with ID:**. Then select the Meta-Network to add.



	A01	A02	A03	A04	A05
A01	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
A02	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
A03	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
A04	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
A05	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

*The ORA Editor with the SG-1 network loaded*

## 2.6 CREATING A NODE TITLE/ATTRIBUTE FILE

CSV files are used to create NodeClass and Network files. These can be created in either a text editor or a spreadsheet program.

In a **Text Editor** you would place each node on a separate line with all information separated by commas. To create csv files same them as a text file (.txt) but change the extension name to **.csv**. For this example the file will create Node Titles. This could be used to import any attribute. The top row contains the names of the fields that will be imported.

```
id,title
A01,col_jack_o'neill
A02,maj_samantha_carter
A03,daniel_jackson
A04,teal'c
A05,gen_hammond
```

In an **Excel Spreadsheet** place each node name or attribute into a separate row with each piece of information in a separate cell. The juxtaposition of the various cells on a row code the relations of interest. To create csv files **Save As...** a comma-delimited file.

In a **Text Editor** place each node on a separate line. Save as a text file with the **.csv** extension.

**NOTE :** Only rows with ids which match up to existing nodes will be imported unless the **Create new nodes** option is checked.

## 2.7 IMPORT ATTRIBUTES INTO ORA:

Select **Import existing data? > Table Data from Excel of delimited formats > Simple Table > Node Attributes**. Click [ **Next >** ].

Select the Meta-Network to add information. Click [**Next >**].

Click **Browse** and navigate to your attribute file.

Select from the drop down which column to use to identify your node IDs.

For each column a box will appear allowing you to chose which attributes to import. Place a check mark next to each attribute you want and give it a Type: Text Category, Text, URI, Number Category, Number, or Date. An attribute without a check mark will not be imported.

Select the NodeClass to add the attributes. This drop down will contain multiple entries if your Meta-Network contains more than one NodeClass.

Click [ **Finish** ].

The A01, A02, etc will be replaced with the titles in the attribute file.

**NOTE :** Only the attributes you check mark will be imported. All others will be ignored.

## 2.8 ADD/REMOVE NODES IN THE EDITOR:

Nodes can be added or removed to any NodeClass through the Editor. Highlight the NodeClass then use the buttons on the right side of the Editor to manipulate the nodes. Some of the functions require that you place a check mark next to the node you are working with [i.e. deleting a node].

**Create:** Insert new nodes into meta-network

**Move:** Move node(s) from one node set to another

**Delete:** Remove node from NodeClass

**Merge:** Combine two or more nodes into one

**Clean:** Condense all references of one person into a single node.

## 2.9 CHANGE DISPLAY TO BINARY OR NUMERICAL

The grids in the Editor can display link data as numeric or check marks. Binary data is usually done with check marks as it is simply on or off. Numerical data [for weighted links] can show a link as 0 of a positive/negative number.

Click **Display Options** near the bottom right of the Editor interface.

Select **Binary link vales** to display data as check marks.

Select **Numerical link vales** to display data as numbers

## 2.10 ADD/REMOVE LINKS IN THE EDITOR TAB [BINARY]

Click the [**Options...**] button in the lower right of the Editor.

Highlight a **Network** in the Meta-Network panel

Select the **Editor Tab**.

In the grid find the intersection of the column node and row node.

To **create** a link place a **check mark** in the cell. This can be done by clicking the box or pressing the spacebar while the cell is active.

To **remove** a link deselect a cell by removing the **check mark**.

## 2.11 ADD/REMOVE LINKS IN THE EDITOR TAB [NUMERICAL]

Highlight a **Network**

Select the **Editor Tab**.

In the grid find the intersection of the column node and row node.

To **create** a link place a **non-zero number** in the cell.

To **remove** a link place a [ **0** ] in the cell.

## 2.12 SAVE A META-NETWORK

It is important to save your work from time to time. If something happens to your computer or ORA then all work done since your last save will be lost. You have two options.

**File > Save Meta-Network :** Saves your work to the file that was originally open.

**File > Save Meta-Network As...** : Saves your work to a new file. Give the file a new file name when ORA asks. This can be useful if you are experimenting with different ideas and do not want to affect your original data.

## 2.13 PREFERENCES

Every user will have their own way they want ORA to perform. The preferences allow for tweaking those functions. There are many parameters that can be set but the important ones to a new user are listed for the individual tabs.

**General :** Preferences for the look and feel of ORA such as whether tooltips are shown when hovering over items and the size of the toolbar icons.

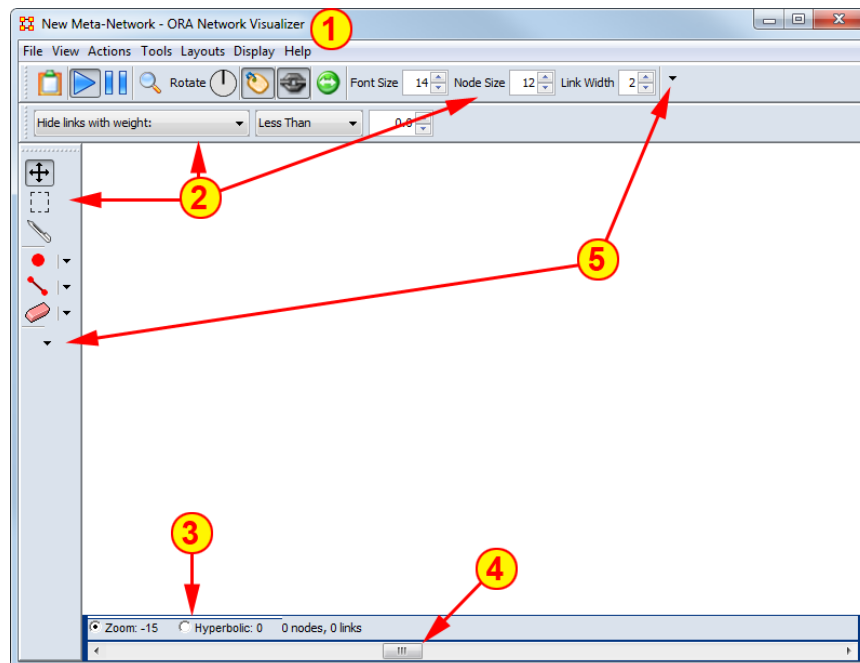
**Data Sets :** As a new user concentrate on the three radio buttons near the bottom. These allow you to specify what files you want to load whenever you restart ORA. To start make sure it is set to **Restore previously loaded workspace files at startup**. This can be changed as you learn more about the workings of ORA.

**NOTE :** Reports and Custom Reports are for advanced users.

## 3.0 VISUALIZER

### 3.1 VISUALIZER GUI :

Contains the visual representation of your Meta-Network



*The ORA Visualizer Interface*

- 1) **Menu** – Source for performing the majority of tasks.
- 2) **Toolbars** – Main functions for working with displayed Meta-Network.
- 3) **Zoom/Hyperbolic selector** – Select the radio button for the either the sizing or fish-eye view
- 4) **Zoom/Hyperbolic controller** – Controls degree of function.
- 5) **Toolbar Button Adder** – Allows you to add menu functions to the toolbar.

### 3.2 DISPLAYING META-NETWORK IN EDITOR:

Meta-Networks can be visualized in many ways.

Highlight a Meta-Network. Note we are back in the main ORA interface, not the Visu??

Click the  **Visualize** button

Or from the Editor Menu select **Visualizations > View Networks > 2D Visualization**

**NOTE :** The Visualizations menu also contains other display functions for your Meta-Networks. Many of which are advanced functions.

### 3.3 ADD/REMOVE NODES WITH THE VISUALIZER MENUS:

**Actions > Add Node(s):** Allows you to add nodes to existing or new NodeClasses.

**Tools > Node Status:** Displays all the information about the selected node.

**Tools > Node Locator:** Selecting a node from the dialog box will reveal the location of the node in Visualizer.

**Display > Node Shaper:** Use this tool to change the size and shape of the selected node.

### 3.4 ADD NODE IN VISUALIZER WITH NODE CREATOR



The **Node Creator** button is in the left toolbar. **NOTE:** [2] on *The ORA Visualizer interface*.

In the drop down menu select a **NodeClass**.

Place a **check mark** in the box. ORA will ask for a name for each new node

Click in the Visualizer to create a new node.

### 3.5 ADD LINKS IN VISUALIZER WITH LINK CREATOR



The **Link Creator** button in the left toolbar. **NOTE:** [2] on *The ORA Visualizer interface*.

Select the **Network** from the dropdown menu to add a link.

Select the weight for new links created.

Click and hold on the **source node**.

Drag the mouse to the **target node**

Release the mouse to create a new link.

### 3.6 REMOVE NODES OR LINKS IN VISUALZER WITH LINK ERASER



Click **Node/Link Eraser** is in the left toolbar. **NOTE:** [2] on *The ORA Visualizer interface*.

Removes node(s) and link(s) from the Visualizer display. Click on a **node** or a **link** to remove it from the display and Meta-Network.

If the **Permanently Delete** check box is empty ORA will remove the node(s) ro link(s) from the display only. The node(s) or links(s) will be retained in the Meta-Network.

If the **Permanently Delete** check box contains a check mark the node(s) or links(s) will be permanently deleted from the Meta-Network as well.

### 3.7 SHOW/HIDE VISUALIZER LABELS, LINKS, & ARROWS:

In the display various items can be shown or hidden. **NOTE:** [2] on *The ORA Visualizer interface*.



Toggles the display to **show/hide** the node titles.



Toggles the display to **show/hide** the links.





Toggles the display to **show/hide** the node arrows.

### 3.8 CHANGE NODECLASS COLOR:

You can change the color of an entire NodeClass in the Visualizer.

If the **Legend** is not visible, open it by selecting **Tools > Legend**.

Click on the color node for a NodeClass.

In the color selector dialog box select a new color.

Click [**OK**].

### 3.9 DATA REDUCTION STRATEGIES

At times the Visualizer display can be difficult to read. There are multiple ways to reduce unneeded information temporarily from the display.

#### 3.9.1 HIDE ISOLATES

You can remove Isolates from the display without permanently removing them from the Meta-Network.

From the Visualizer menu select **Actions > Isolates > Hide Isolate Nodes**.

#### 3.9.2 REMOVE ISOLATES

You can permanently remove Isolates from a Meta-Network in two ways:

From the Visualizer menu select **Actions > Delete Isolates > Delete Currently Visible Isolates**.

This will remove from the Meta-Network only those nodes that are visible.

From the Visualizer menu select **Actions > Delete Isolates > Delete Underlying Isolates**. This will remove all Isolates from the Meta-Network.

#### 3.9.3 HIDE PENDANTS

You can remove Pendants from the display without permanently removing them from the Meta-Network.

From the Visualizer menu select **Actions > Hide Pendant Nodes**.

### 3.10 ADD ICONS OR PICTURES

Nodes can be replaced by icons or pictures [50 x 50 pixel max] for easier identification.

#### Icons

Right-Click a node and select **Appearance Submenu > Set Picture**.

From the drop down menu select a category then click and highlight your icon.

Click [**OK**] when finished, The node will then display the icon

### 3.11 CHANGE SIZE/COLOR NODES BY METRIC

**Display > Node Appearance > Size Node by Attribute or Measure**

This will scale the size of all nodes by using the attribute or measure selected.

Numbers for each node value are user adjustable.

**Display > Node Appearance > Node Color > Color Node by Attribute or Measure**

This will color all nodes by using the attribute or measure selected.

Colors for each node value is adjustable.

To reset color and size select **Display > Node Appearance > Reset Color and Size**.

## 4.0 REPORTS

Reports give you information about your Meta-Networks. These are the four most important reports. The other reports are more specialized.

**Key Entity** : Identifies key entities and groups who, by virtue of their position in the network, are critical to its operation.

**Networks**: agent x agent, agent x knowledge, agent x resource, agent x task, agent x event, agent x location, all knowledge networks, any resource networks, task x event, task x task

**Standard Social Network Analysis** : Calculates the standard network analysis measures

**Networks**: Any square Network [i.e. agent x agent]

**Sphere of Influence** : For each individual, identifies the set of actors, groups, knowledge, resources, etc. that influence, and are influenced, by that actor.

**Networks**: agent x agent, agent x knowledge, agent x resource, agent x task, agent x location

**Locate Sub-Groups** : Identifies the subgroups present in the network using various grouping algorithms. Most algorithms only work on a single network at a time .

**Networks**: Networks selected by the user

These reports are run from the Editor menu.

From the menu select **Analysis > Generate Report > [ type in name of specific report]**

In the searchbox at top type in the name of the report.

You can type in the entire name or select the report from the drop down menu.

Place a check mark next to the Meta-Networks to process and click [ **Next >** ].

Place a check mark next to the NodeClasses and Networks to process. Click the box to remove unwanted check marks.

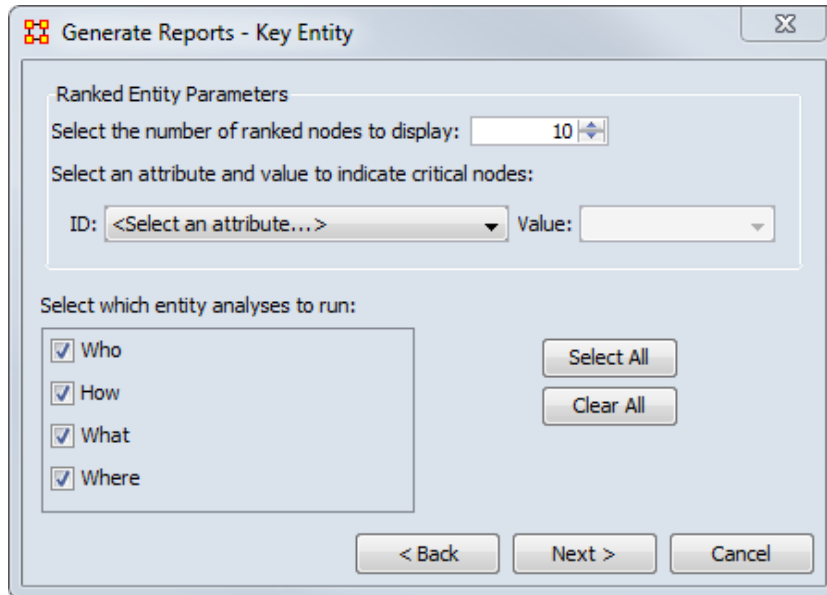
Select the number of nodes to display and click [ **Next >** ].

Select the location to save the files and the filename for the report and click [ **Finish** ].

The reports will open in the Report tab of the editor in a text format. They will also open your browser and display with animated graphics

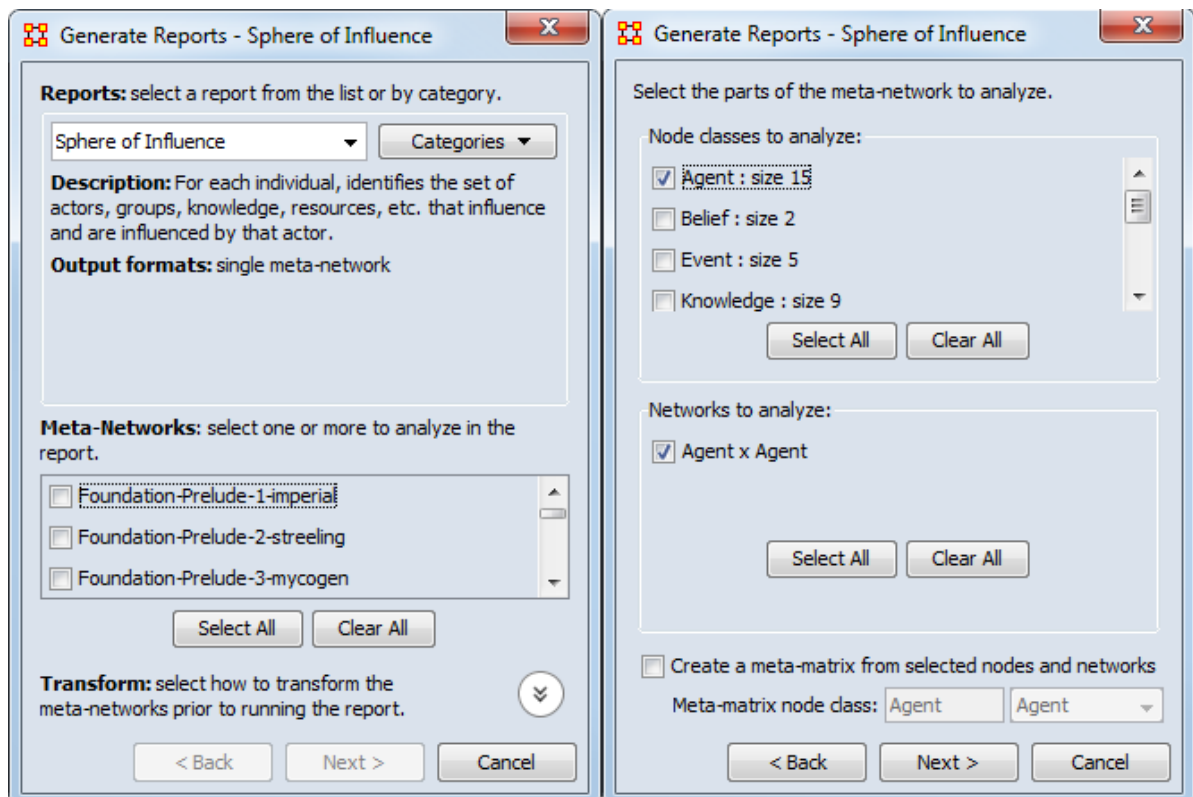
### 4.1 FOCUS ON ACTOR

One item you need to discover is who is important in a Meta-Network. To obtain this information you can run the **Key Entity report**. Go to **Analysis > Generate Reports > Locate Key Entities > Key Entity**.



The report will ask you for the number of nodes to display and if you want to use a particular attribute in the calculation. But the most important selection is the **Who, How, What, and Where**. When focusing on actors place a check mark in the **Who** only. By default the report lists the top 10. This can be changed when running the report.

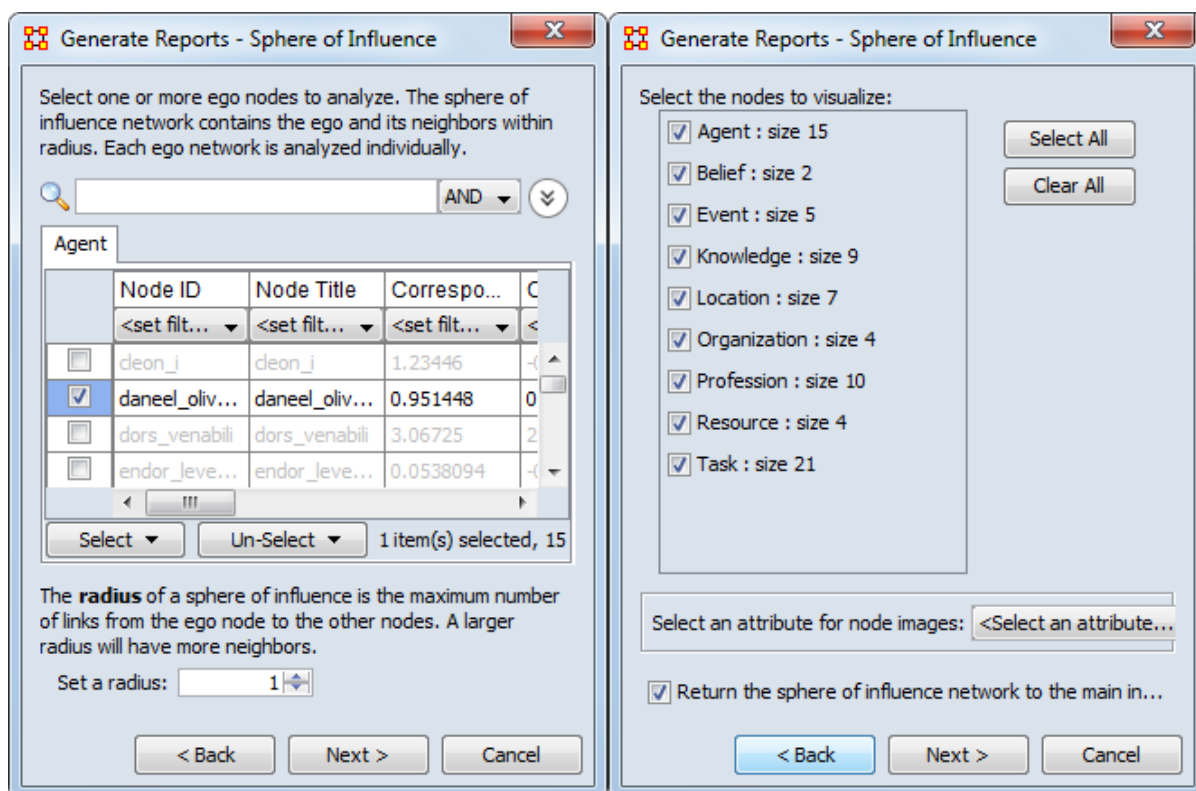
To find out how a particular person is connected run the **Analysis > Generate Reports > Locate Key Entities > Sphere of Influence** report.



Begin with placing a check mark next to one or more a Meta-Networks from the list. Then click [ **Next >** ].

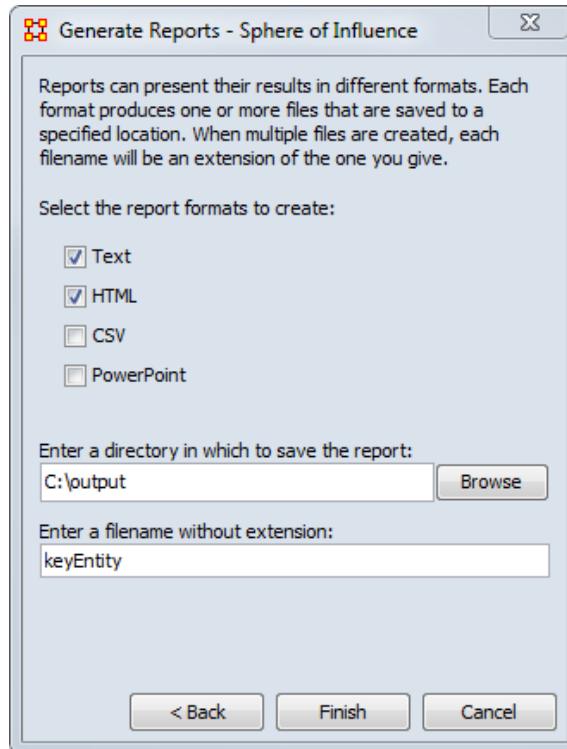
In the second window place a check mark next to the **NodeClass(es)** to analyze. In this case choose **Agent**.

All networks which contain any of the NodeClasses selected appear in the bottom pane. Having only choosen **Agent** only the **Agent x Agent** Network appears. Place a check mark next to **Agent x Agent**. Then click [ **Next >** ].



Next place a check mark next to the agent(s) to track. Then click [ **Next >** ].

Finally place a check mark next to all the nodes to visualize. Then click [ **Next >** ].



The final screen allows you to choose where to send the results. The two most common choices are: **Text** will display it in the **Report Tab** in ORA. **HTML** will open a file in your browser. The browser version is usually best for presentations as it contains more visual elements.

## 4.2 FOCUS ON REGION

In addition to finding out who the important agents are in a Meta-Network the Key Entity report can also show you the important locations.

As with **Focus on Actor** above the check mark should be placed in the **Where** box only.

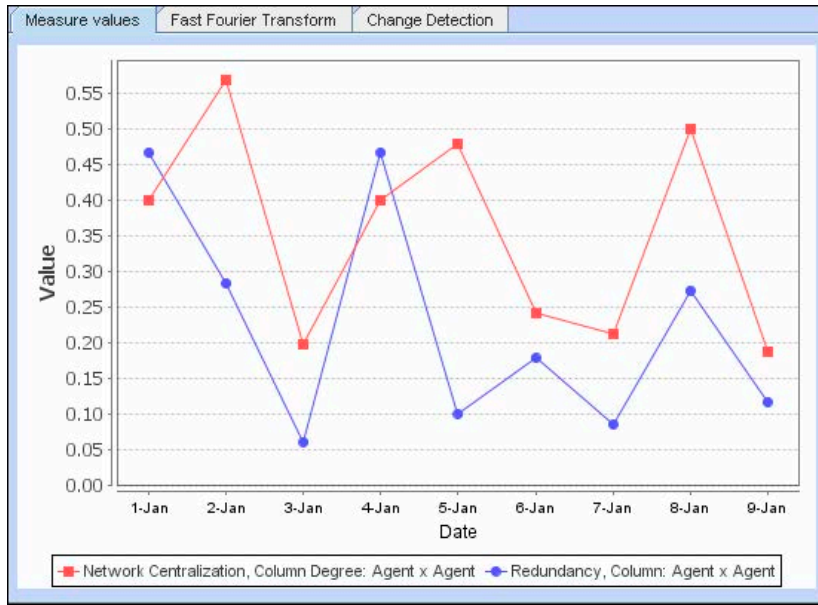
Once the key locations are discovered agents connected to that location can be analyzed. In time marked data it will also show **when** those agents were in those locations.

## 4.3 FOCUS ON TIME

In the Editor the **Measures Over Time** allows you to see how a network measures changes over multiple time periods.

This requires your data to have **time data**. Highlight a Meta-Network and in the Editor pane to **Date:**. If the area is blank your Meta-Network does not have time data and the function will not run. You can click the [ **Click to create...** ] button to assign a data to each time slice.

Below is an example of the type of display viewing two measures over nine time periods.



Any Networks included in a Meta-Network can be displayed in the fashion.

In the Visualizer the **View Networks Over Time** allow you to see how Networks change over the specified time periods.

Each Meta-Network included should contain nodes and networks named the same. This is necessary in order for ORA to assess how individual items have changed for each time period. If a node has a slightly different name then ORA will assume they are not the same node.

The animated sequence will display the selected networks for each Meta-Network.

This display is the normal Visualizer display.

Refer to the User's Guide for more information.

## 5.0 MEASURES

A measure is a function that takes as input a Meta-Network and outputs a single value or a vector of values. For more information on the measures see the User's Guide.

## 6.0 GEOSPATIAL, LOOM & TRAILS

These are advanced topics and you should refer to the ORA Users Guide for more information

## 7.0 ORA INFORMATION

### 7.1 CONTACT INFORMATION

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## **7.2 QUESTIONS, BUGS, AND COMMENTS**

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## **7.3 COPYRIGHT NOTIFICATION**

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