Near Term Analysis

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COS Program, School of Computer Science, Carnegie Mellon
Summer Institute 2015

Agenda

- Load in a network, run a simulation using Near Term Construct
  - Look at the networks in ORA, compare generated to input
    - Initial vs. final knowledge
- Remove the 10 actors that are highest in one of the centralities
  - Examine change in knowledge diffusion
  - Look at generated knowledge networks in ORA
  - Compare to immediate impact report

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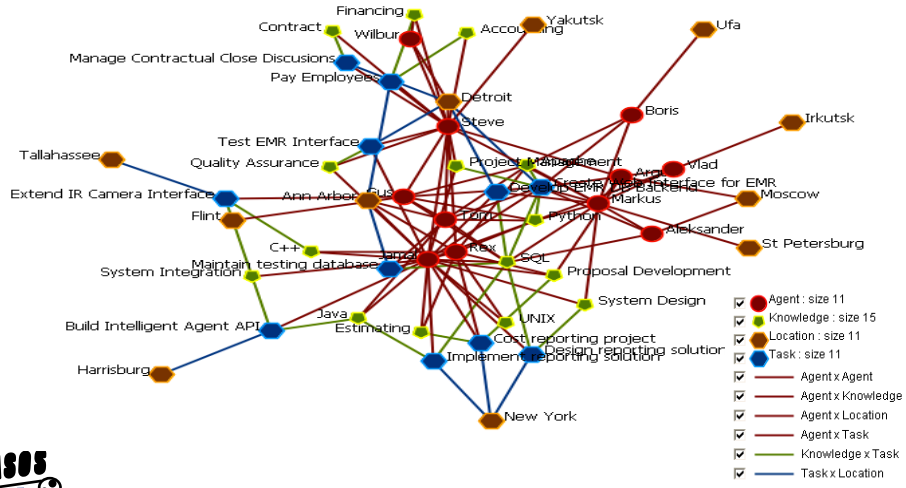
What happens if....



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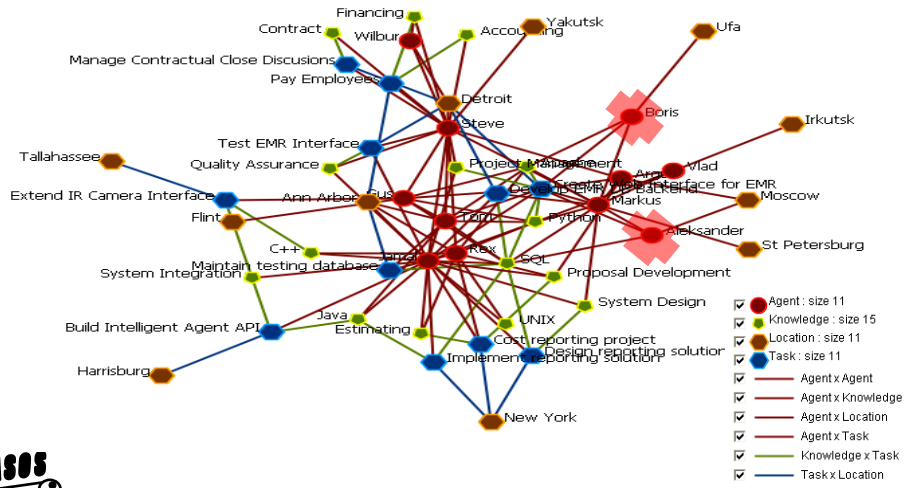
We remove node(s)....



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We get…

- Changes to
  - A few to many changes in network measures
  - Node-level measures adjacent to removed node(s)
  - Emergent behavior (e.g. knowledge diffusion)
- **Knowledge Diffusion delta's are the focus of NTA**
- Knowledge Diffusion: a bit of 'knowledge' given to a random node spreads over time to the remainder of the due to agent-to-agent interactions & exchanges of knowledge

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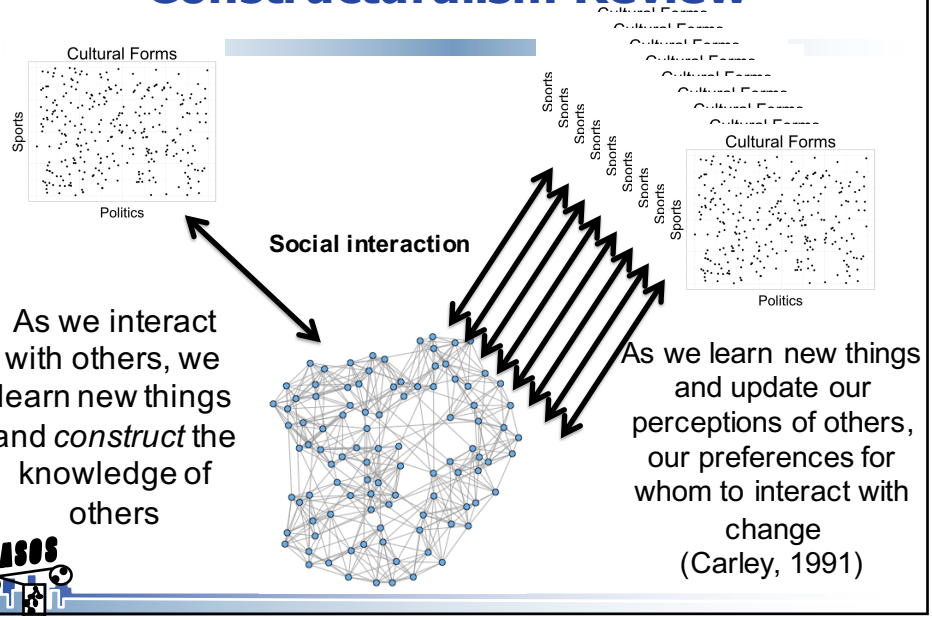
Constructuralism Review



As we interact with others, we learn new things and *construct* the knowledge of others

As we learn new things and update our perceptions of others, our preferences for whom to interact with change (Carley, 1991)

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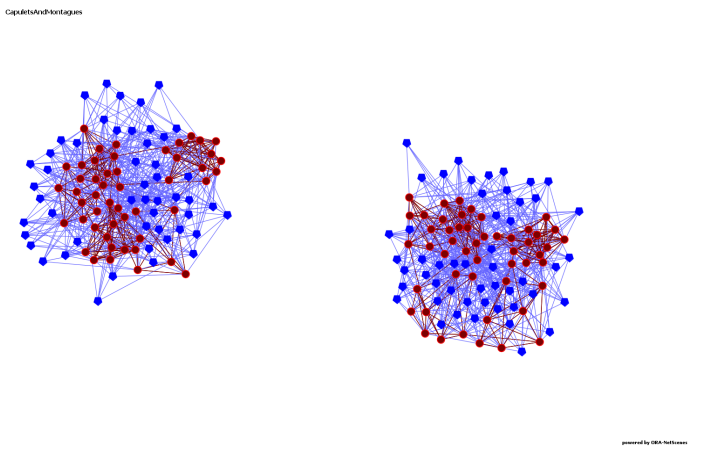
Load in CapuletsAndMontagues



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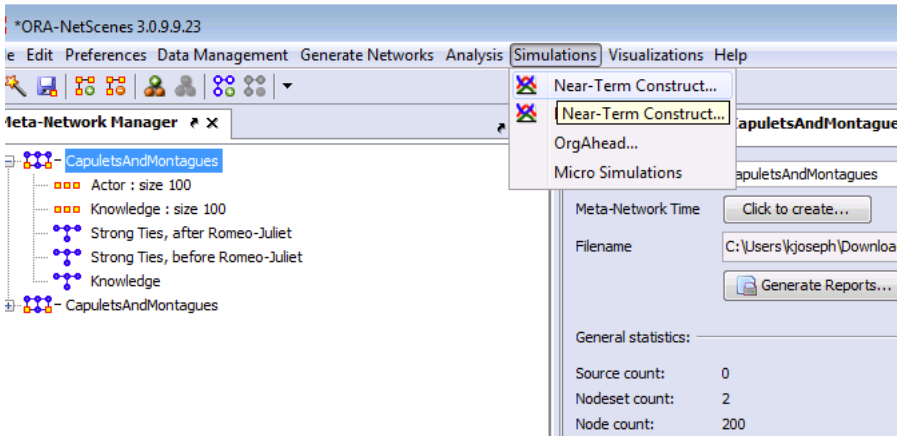
Go to Near Term Construct



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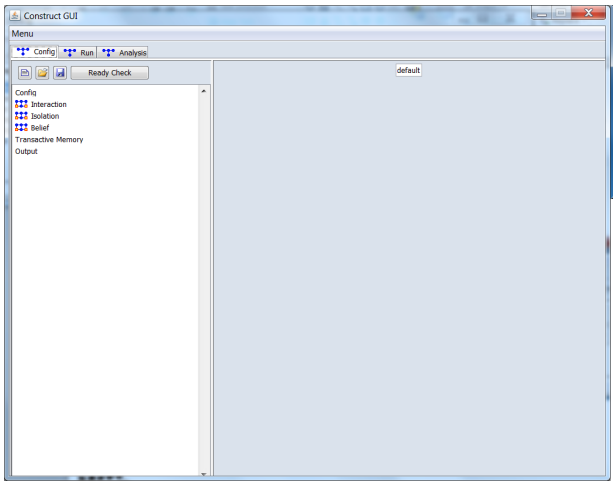
The Construct GUI



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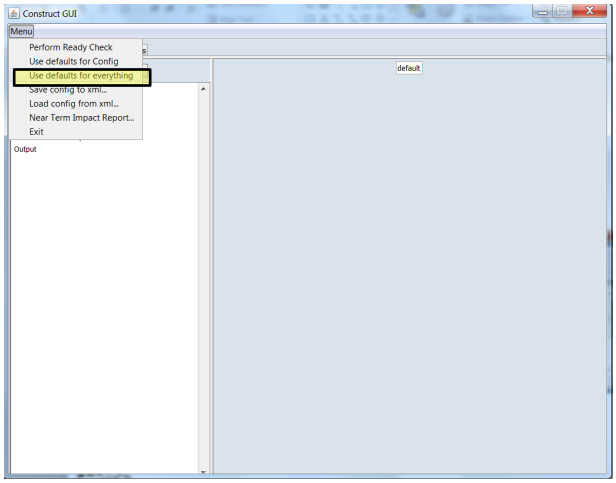
Set Defaults For Everything

1. On Construct GUI, go to "Menu"
2. Click "Use Defaults for Everything"



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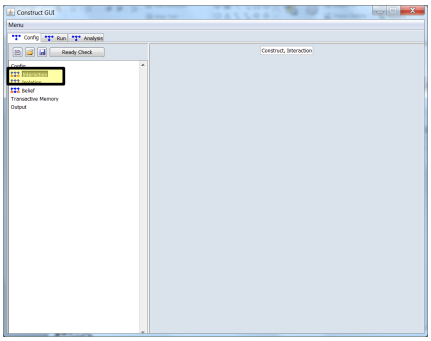
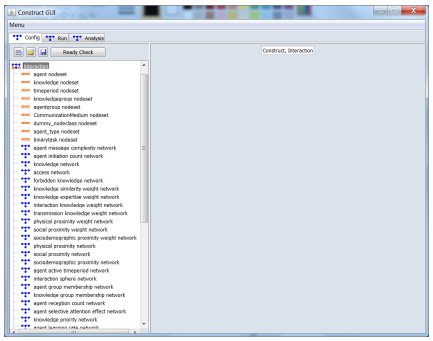
Open "Interaction" Meta-Network

1. Double-Click "Interaction"





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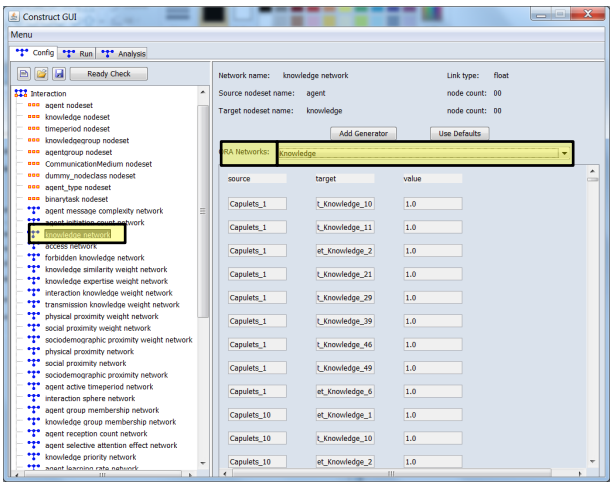
Set Knowledge Network

When we clicked "Use Defaults", the Construct GUI assumed we every agent to have a chance of knowing everything. This is not what we want, so we use our ORA network to set the network in Construct.

1. Click "knowledge network"
2. Go to ORA Network Combo-Box
3. Select "Knowledge Network"



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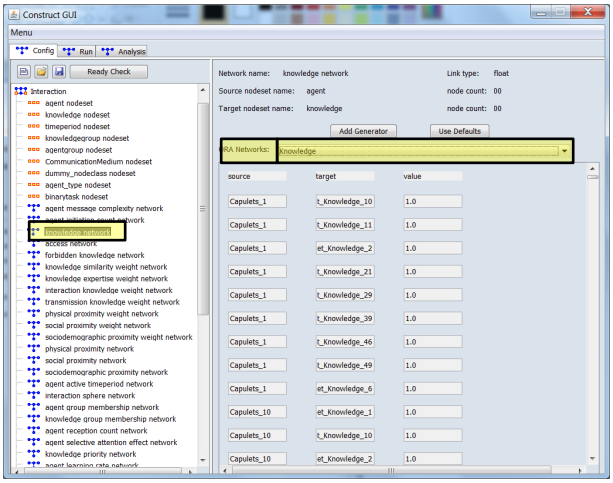
Set Knowledge Network

When we clicked "Use Defaults", the Construct GUI assumed we want every agent to have a chance of knowing everything. This is not what we want, so we use our ORA network to set the network in Construct.

1. Click "knowledge network"
2. Go to the "ORA Networks" Combo-Box
3. Select "Knowledge" *(this is the name of the network in ORA)*



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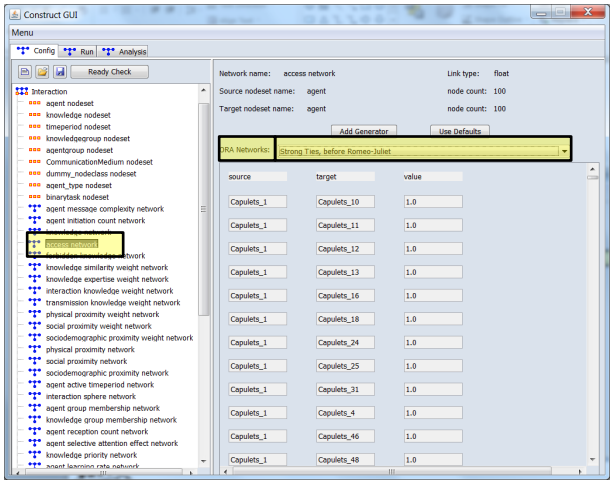
Set Access Network, Use "Before"

When we clicked "Use Defaults", the Construct GUI assumed we want every agent to be able to interact with everyone. This is not what we want, so we use our ORA network to set the network in Construct.

1. Click "access network"
2. Go to the "ORA Networks" Combo-Box
3. Select "Strong Ties, **before** Romeo-Juliet" *(this is the name of the network in ORA)*



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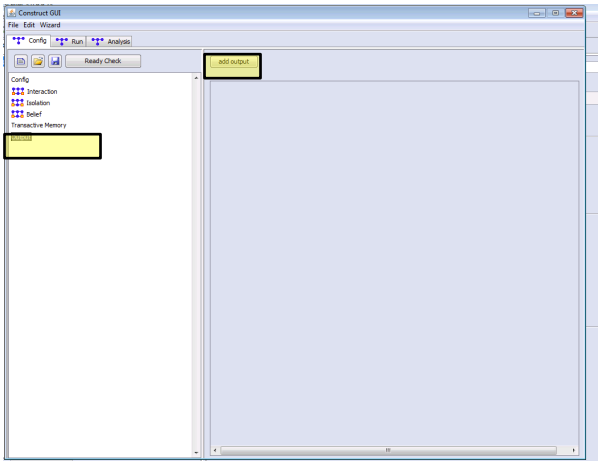
Configure Output

When we clicked "Use Defaults", the Construct GUI assumed we want every agent to be able to interact with everyone. This is not what we want, so we use our ORA network to set the network in Construct.

1. Click "access network"
2. Go to the "ORA Networks" Combo-Box
3. Select "Strong Ties, **before** Romeo-Juliet" *(this is the name of the network in ORA)*



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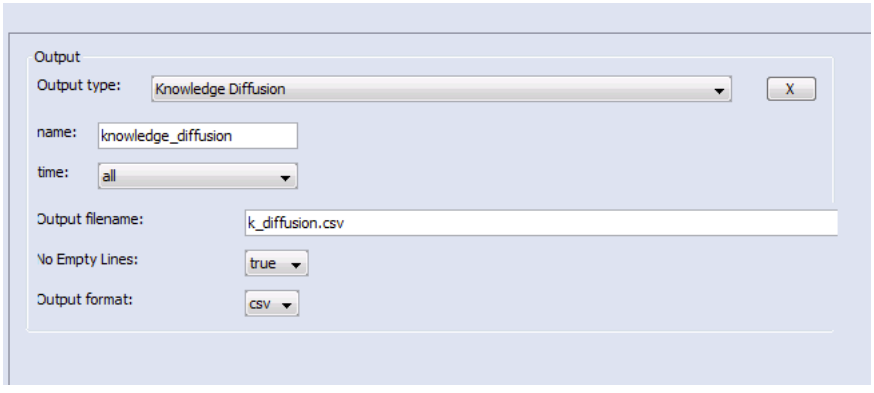
Add Knowledge Diffusion



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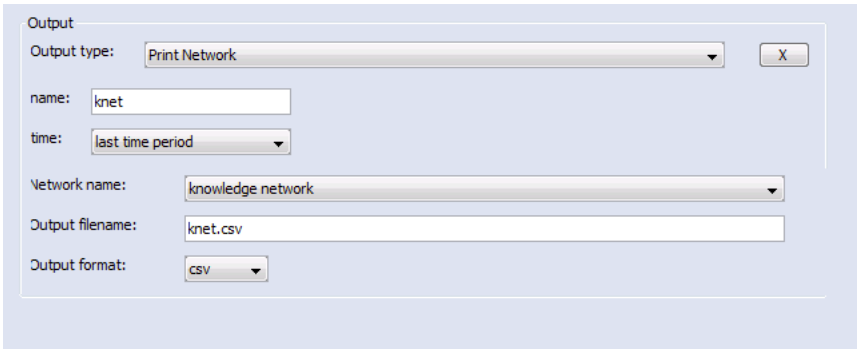
Add Knowledge Network at last time period



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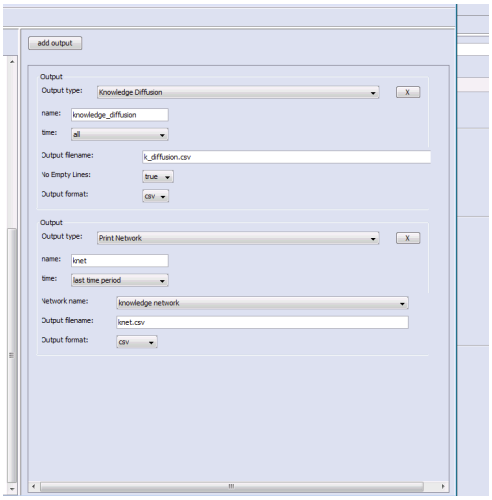
You should have two outputs



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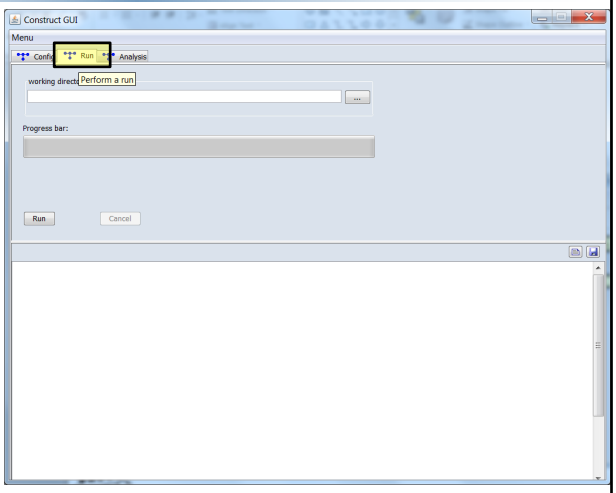
Go to the Run Tab

We have to tell Construct where to run to put the output, and then start the run.



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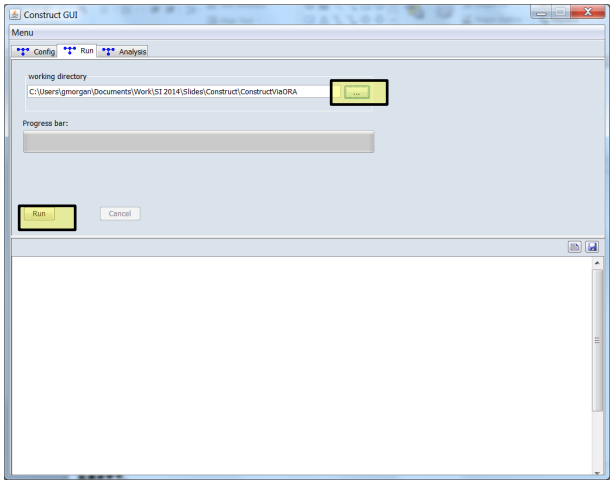
Configure the working directory, start the sim!

We have to tell Construct where to run to put the output, and then start the run.

1. Set the working directory by clicking "…"
2. Click "Run"

(There will be lots of text. And this will take a few minutes.)



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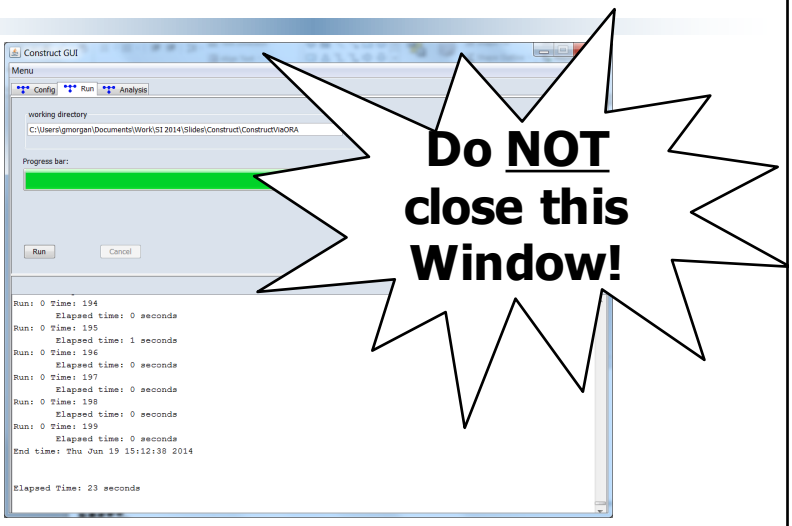
Voila!



Do NOT close this Window!

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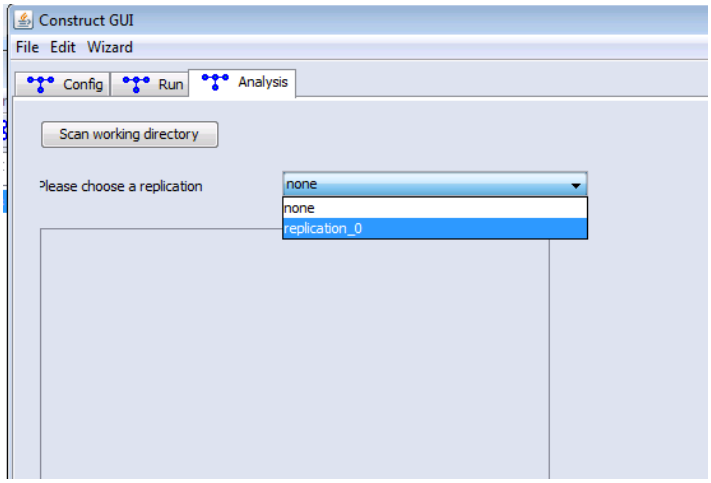
Scan the working directory, select replication_0



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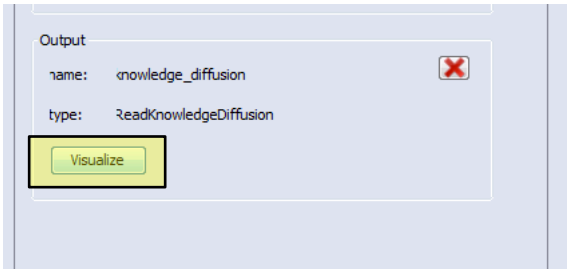
Lets look at knowledge diffusion



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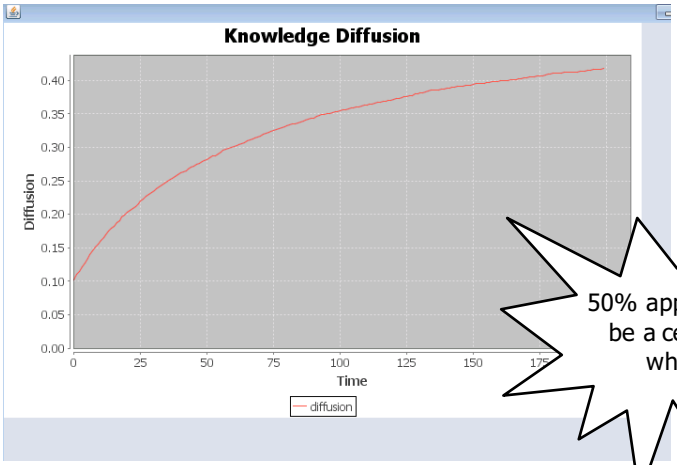
What is knowledge diffusion?



50% appears to be a ceiling, why?

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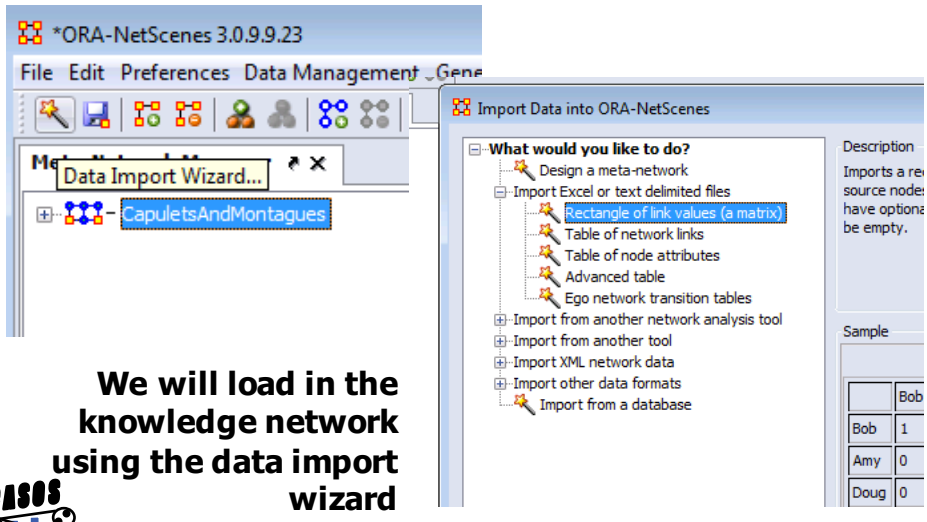
Looking at the knowledge network



We will load in the knowledge network using the data import wizard

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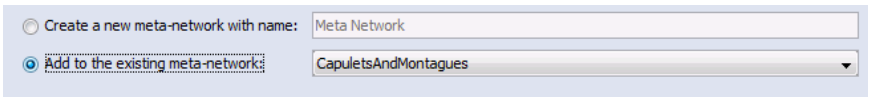
Importing knet.csv



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Importing knet.csv

Navigate to what you set the working directory to in the Construct GUI

Data will be in YOUR_DIR/replication_0/output/knet/knet.csv

Note, your data does not have headers!

Note, you need to change the name of the node class!

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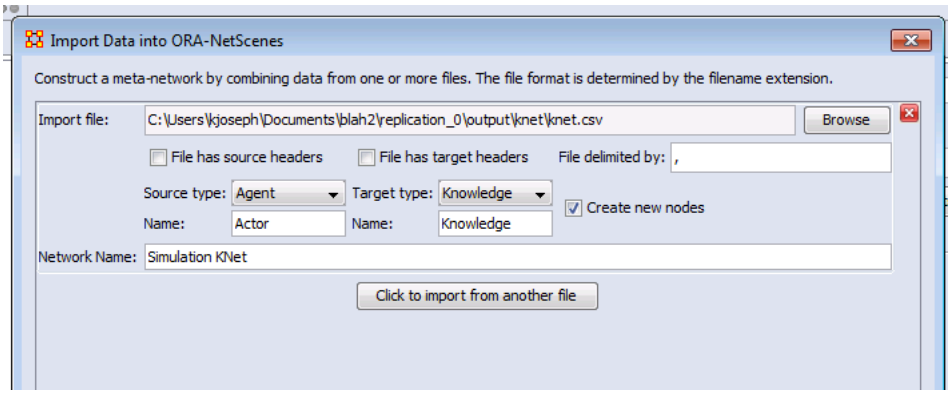
Importing knet.csv



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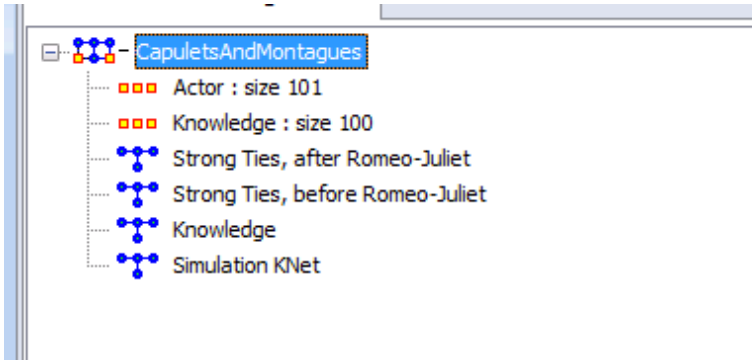
If you don't have this now, raise your hand



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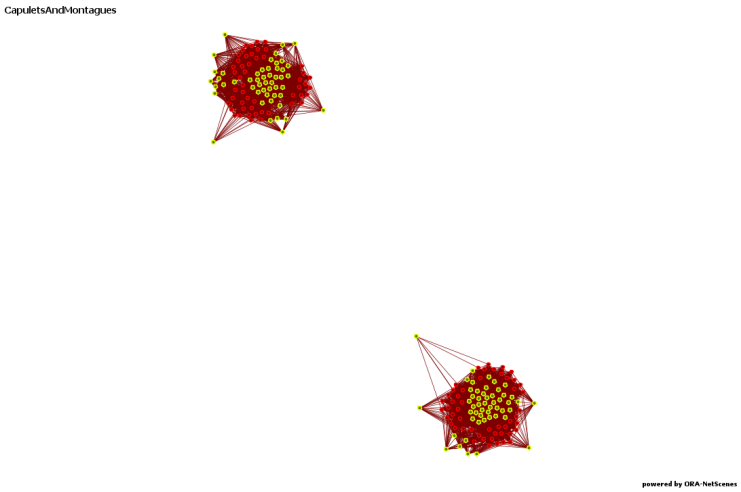
Look at the networks and their differences



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Turning into a Near Term Impact Report

- Now, let's look at what happens to knowledge diffusion when we remove actors
- Pop-quiz … how do we find the top-K actors in this network?

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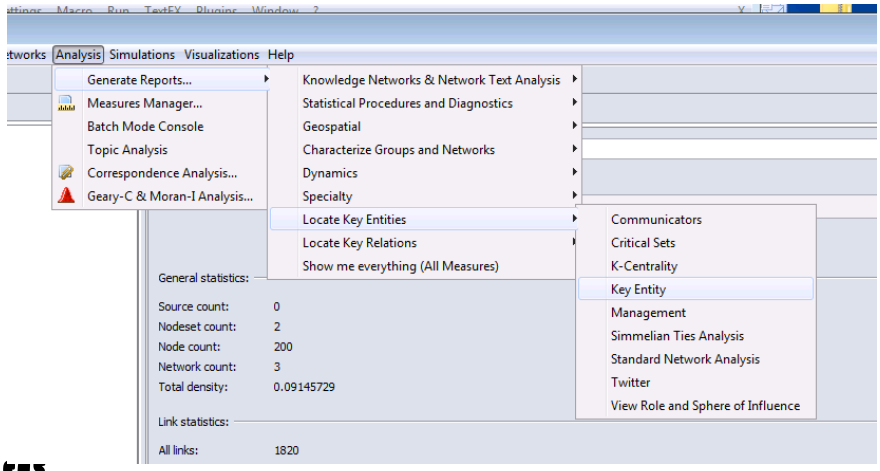
Key Entity Report



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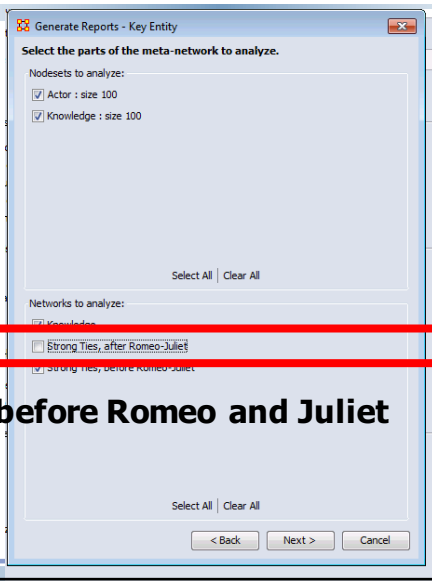
Key Entity Report



Only look at before Romeo and Juliet

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Key Entity Report

KEY ENTITY REPORT

Input data: CapuletsAndMontagues

Start time: Thu Jun 25 09:42:51 2015

Data Description

Table of Contents

Key Actor - Who Analysis

Key Knowledge - How Analysis

Performance Indicators - measures performance of the organization(s) as a whole

Component Analysis

Produced by ORA-NetScenes, a joint product of the CASOS center at Carnegie Mellon University and Netanomics

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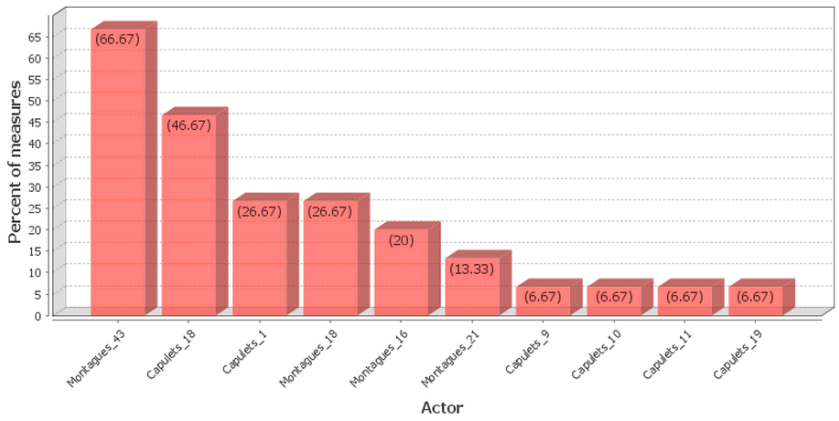
The Key Entities

There are 100 nodes in the nodeset.



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Near Term Impact Assessment

- What happens to knowledge diffusion if we remove these actors?
- Let's go back to the Construct GUI now and check it out
- **Hopefully, you haven't closed the Construct GUI window … if you have, you'll have to redo…

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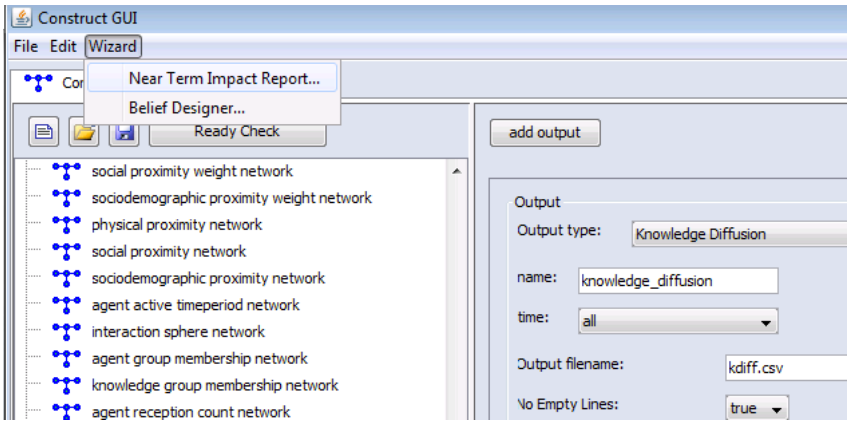
Select the Near Term Impact Report from the Wizard menu



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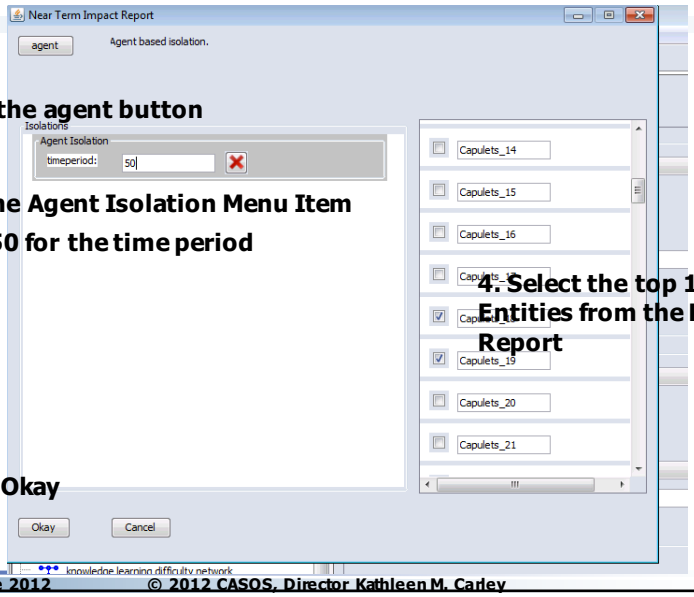
Selecting the Isolation event

1. Click the agent button
2. Click the Agent Isolation Menu Item
3. Fill in 50 for the time period
4. Select the top 10 Key Entities from the Key Entity Report
5. Click Okay



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Great, now simply re-run!

- Note: This will overwrite your existing data, but that's okay for now (or change the working directory)
- What happens to knowledge diffusion?

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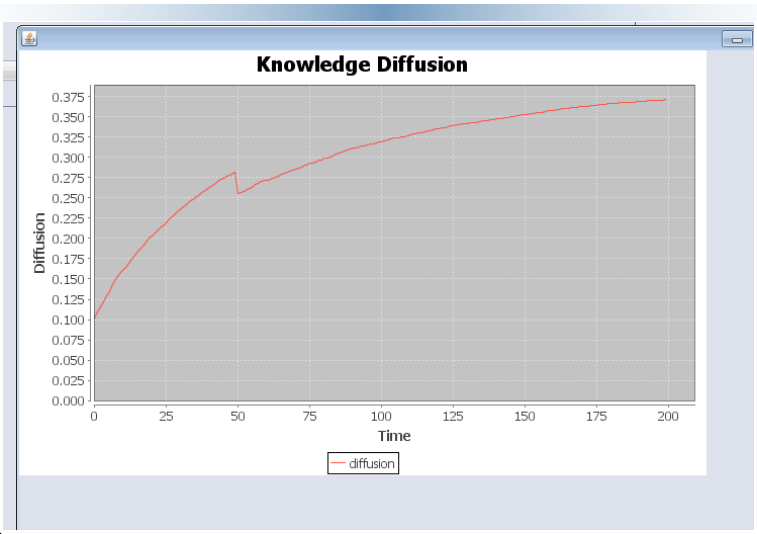
Knowledge Diffusion



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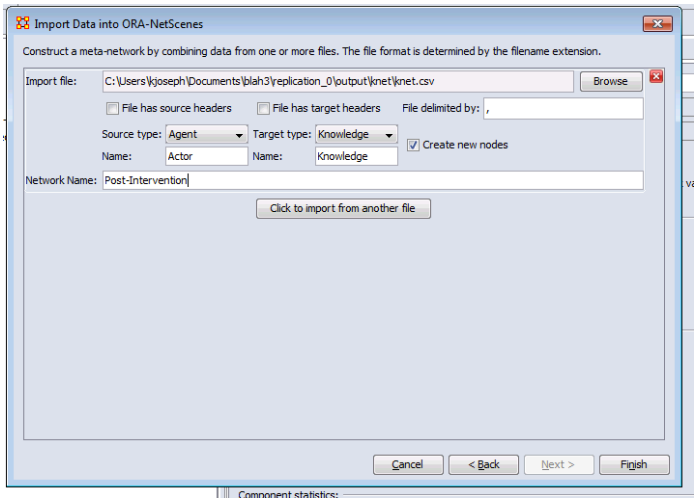
Let's import the new knowledge network and look at it



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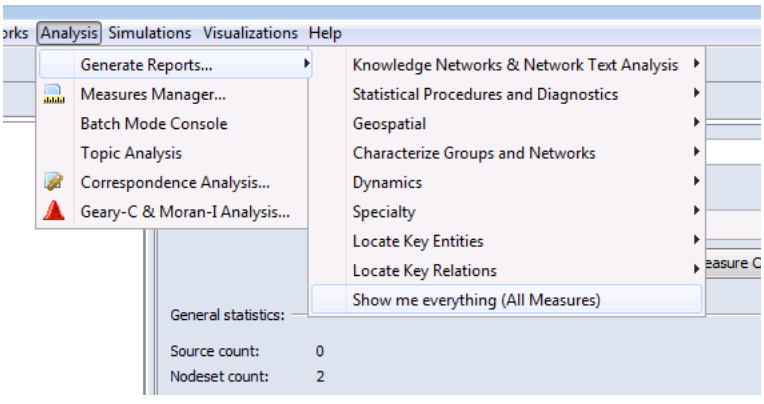
Now, lets compare the knowledge networks



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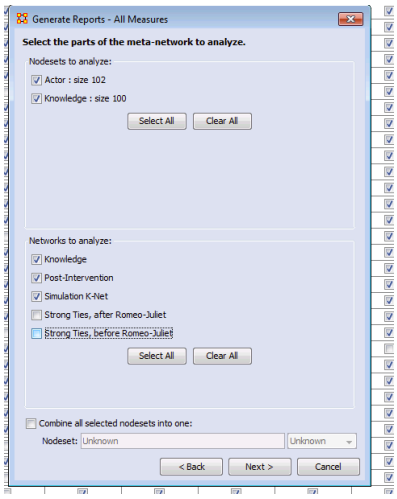
Only run with the three knowledge networks



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Take a look at the different metrics

- In particular, look at density

Density	0.100

Original knowledge network

Density	0.405

No intervention

Density	0.350

With intervention

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Now

- Is this different interesting/significant?
- What about removing/adding knowledge, or adding new people/connections?
- What about people's beliefs?
- What about if knowledge isn't perfect in the system? E.g. what if we play with transactive memory
- … later!

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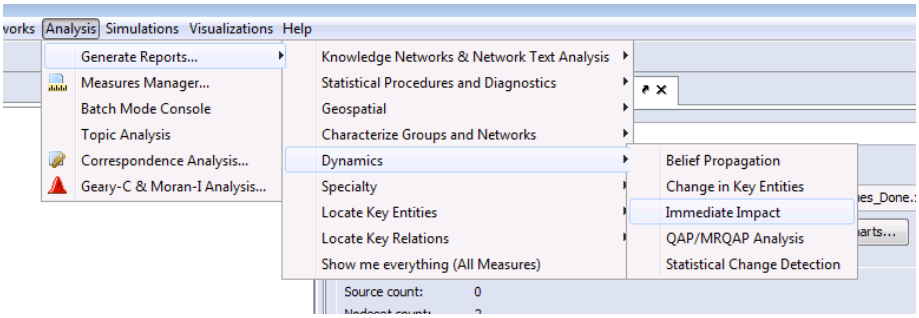
One last thing – Comparing to Immediate Impact Report



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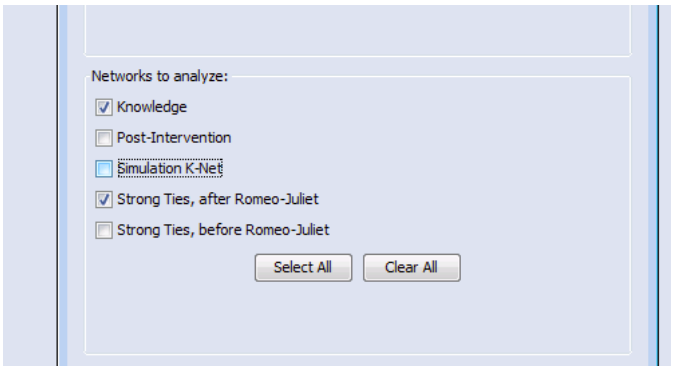
Run on initial network



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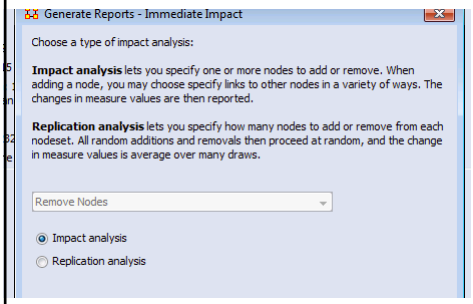
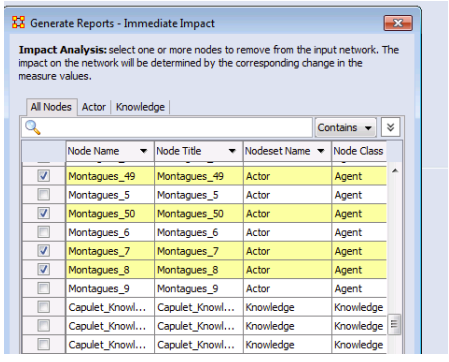
Impact Analysis

- Lets just remove some random people to see what happens





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What's different between NTA and Im. Impact. Report?

Network Level Measures

	Before	After	Percent Change
Overall Complexity	0.093	0.093	-0.01%
Input: entire meta-network considered as a single network			
Diffusion	0.929	0.914	-1.60%
Input network(s): Strong Ties, after Romeo-Juliet			
Clustering Coefficient	0.677	0.677	-0.05%
Input network(s): Strong Ties, after Romeo-Juliet			
Characteristic Path Length	4.560	5.228	+14.65%
Input network(s): Strong Ties, after Romeo-Juliet			
Social Density	0.078	0.075	-3.40%
Input network(s): Strong Ties, after Romeo-Juliet			
Average Communication Speed	0.219	0.191	-12.78%
Input network(s): Strong Ties, after Romeo-Juliet			
Number of Isolated Agents	2	2	+0%
Input network(s): Strong Ties, after Romeo-Juliet			
Fragmentation	0.039	0.043	+10.81%
Input network(s): Strong Ties, after Romeo-Juliet			

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Recap

- Load in a network, run a simulation using Near Term Construct
  - Look at the networks in ORA, compare generated to input
    - Initial vs. final knowledge
- Remove the 10 actors that are highest in one of the centralities
  - Examine change in knowledge diffusion
  - Look at generated knowledge networks in ORA
  - Compare to immediate impact report
- This was just an introduction to the process, we'll get more into what you can do with these tools soon!