RCN Evaluation
Background and Process
Research Coordination Network on the Digital Economy and the Environment

Dr. Gemma Jiang, Senior Team Scientist, Institute for Research in the Social Sciences, Colorado State University will conduct network evaluation to track the evolution of relationship patterns among the RCN participants. Data will be collected twice a year over the two-year period from all RCN participants using a network survey. To ensure the high return rate required by social network analysis, a link to the network survey will be shared during planned workshop time where most of the network members are present, and network members are invited to fill out the survey on the spot.

We will measure both the task related aspects of the network (for example, advice seeking) and the affective aspects (for example, friendship) of the network participants. Below is the full list of survey questions, subject to minor changes.
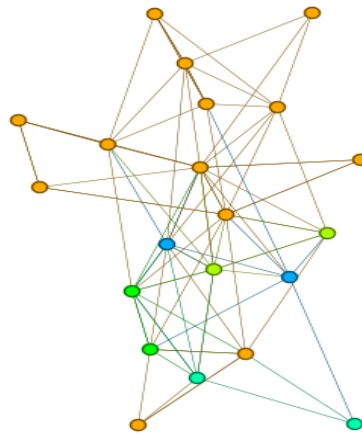
- From the following list, identify the people with whom you have existing collaborative relationships (eg. jointed conference presentation and publication, co-PI on funded projects, mentoring the same students). (choose all that apply). [existing relationship]
- From the following list, identify the people to whom you typically turn for help in thinking through a challenge related to RCN topics over the past three months. The interactions do not necessarily occur within the context of this project specifically. (choose all that apply). [advice]
- From the following list, identify the people with whom you interact regularly (eg. at least once per month) over the past three months for informal activities such as texting, virtual coffee, going out for lunch. (choose all that apply) [social]
- From the following list, identify the people who have expertise different from yours and with whom you plan to initiate a collaboration in the next three months. The collaborations do not necessarily occur within the context of this project specifically. (choose all that apply). [interdependence]
- From the following list, identify the people whose perspectives you are most curious about (this does not have to deliver immediate results for this RCN project, but it stimulates your thinking for the long term). (choose all that apply). [catalyst]

Network survey data will be analyzed utilizing the analytical software ORA which produces network visualizations, as well as network and agent-level metrics. Visualizations and metrics will be compared across the timeframe to track relationship evolution patterns. An increasingly robust network is documented evidence for convergence and collaboration happening in the RCN community. A sub-community detection mechanism will be applied to identify disciplinary and cross-disciplinary clusters. The evaluator will share significant findings with the steering committee and RCN participants and provide consultation on adaptive strategies to increase network coherence.

Example from prior evaluation
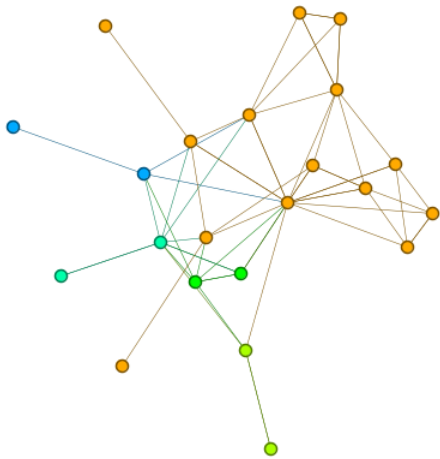
Picture 1: density = 0.14; February 2020   Picture 2: density = 0.21; August 2020

In the evaluation study for an NSF funded Growing Convergence Research, the same 21 team members took the network survey in February 2020 when the project just started, and then in August 2020, half a year in the project. The two pictures showed the evolution of their advice network. We can see a much more integrated network and much more network activities.

Selected network metrics, definition and significance

Term	Definition	Significance
Betweenness Centrality	The Betweenness Centrality of node v in a network is defined as across all node pairs that have a shortest path containing v, the percentage that passes through v.	This measure indicates the extent that an individual is a broker of indirect connections among all others in a network. Such people are thought of as gatekeeper of information flow.
Closeness Centrality	The closeness of a node to other nodes in a network (also called out-closeness). It is the inverse of the sum of distances in the network from a node to all other nodes.	High scoring nodes could monitor the information flow in an organization better than most others and will often times have the best picture of what is happening in the network as a whole.
Clustering Coefficient	Measures the degree of clustering in a network by averaging the clustering coefficient of each node, which is defined as the density of the node's ego network.	The clustering coefficient gives a sense of the local characteristics of the network-- how information spreads by means of employee groups. A higher clustering coefficient supports local information diffusion as well as a decentralized infrastructure because employees are likely to share information and know what is happening in their work group.