Planning a Social Network Analysis
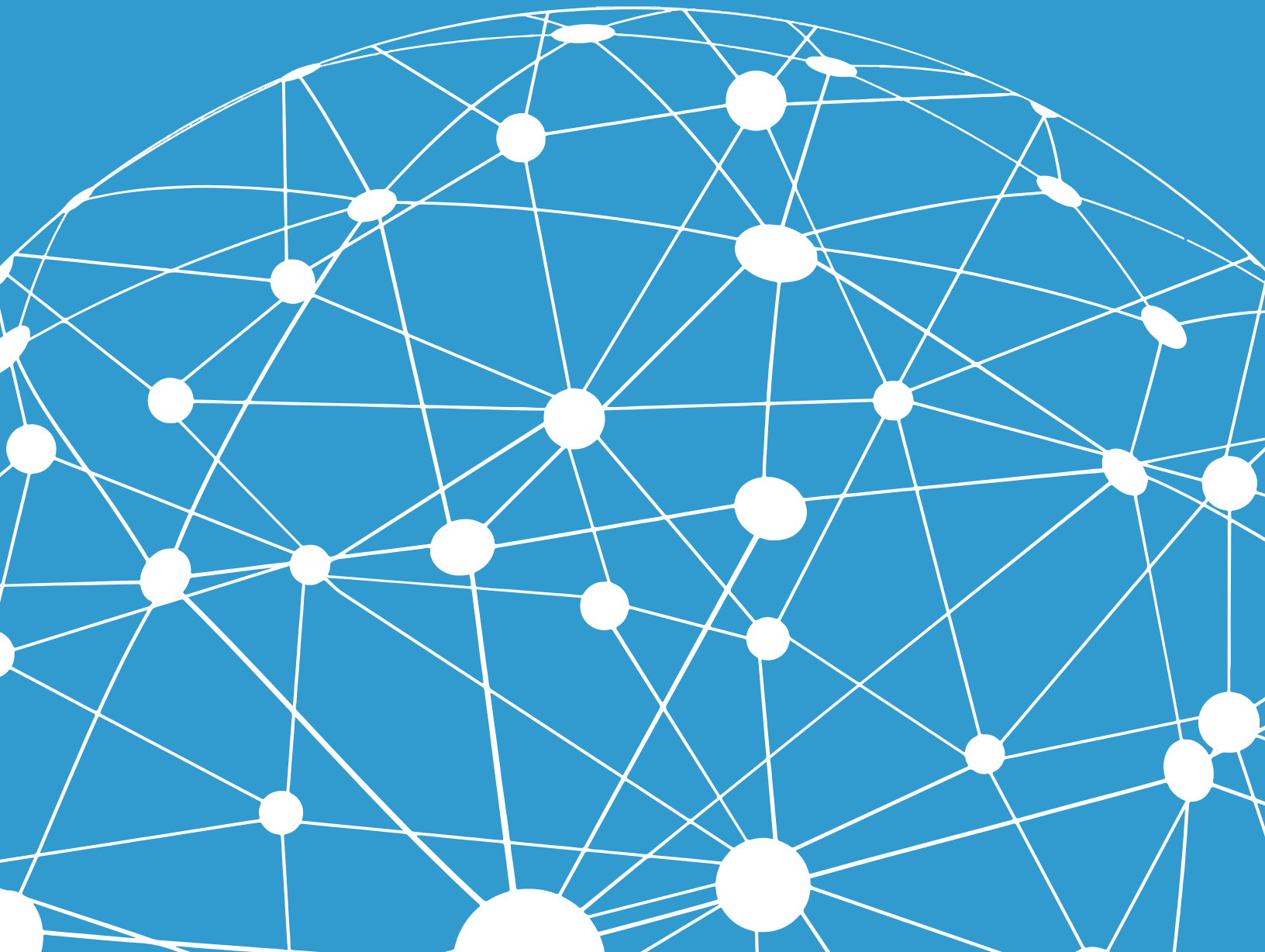
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Introduction

This toolkit provides a simplified approach to Social Network Analysis (SNA), which is a research method of understanding relationships and connections between individuals, groups, and things. This approach helps us understand who is working with whom, how information is given or acquired, how power is concentrated or shared within an organization, and how special interest groups form and function.[1][2][3]

In the education sector, SNA combined with questions about the qualities of the people or organizations in the network can help us understand pressing issues and uncover opportunities in education in specific regions such as: how teachers engage with community partners, how communities can better support education in their regions, or how to increase students' access to social capital.

The following pages are meant to help practitioners understand more about the basics of SNA, how to plan to conduct one, ways to collect and analyze data, options for mapping network data, and other resources. While SNA requires a concerted effort and an ability to find patterns and connections from data, this toolkit will guide practitioners so they can customize their approach based on time and funding constraints.

The content for this toolkit came from a variety of resources, but some of the major sources include: Introduction to social network methods, Social Network Analysis: An Introduction, Social Network Analysis (Wikipedia), and Diffusion Levers Toolkit.

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1   http://www.kstoolkit.org/Social+Network+Analysis
2   https://en.wikipedia.org/wiki/Social_network_analysis
3   http://www.orgnet.com/sna.html

Planning a Social Network Analysis

The following sections will take you through the process of planning an SNA. As you read through the following sections, determine the tasks that you would need to complete for your specific network analysis and think about a potential timeline for your work.

Step 1: Establish the network's basis for your research

Before starting an SNA, you will need to determine the type of network you have.

Networks come in different shapes and sizes, and it is important to determine the kind of membership your network comprises to determine who will be surveyed. Knowing your network will help you understand what kind of information you can get from it.

A **bounded network** is a network with a set number of network members (e.g., students in a classroom).

An **unbounded network** is a network that does not have set membership (e.g., weekly meetup group with an open invitation to anyone in the community).

Step 2: Develop and refine research questions

Like other types of analysis, an SNA will be driven by your research questions; they will provide guiding direction, influence the data collection process, and shape your methods for data analysis.

Most research questions that guide an SNA analysis will be focused on **descriptive or exploratory research**. This kind of research will help you understand the *composition and function of your network*.

You can also have research questions that focus on *understanding an intervention* in your network or *evaluating the impact of a network program or service*.

Exploratory research could focus on several things, including identifying:

- Central individuals/organizations in your network

- Knowledge/information brokers

- Isolated members and bottlenecks

- Knowledge/information flow

- Informal networks[4]

Research questions should define your subject/network of interest, describe your topic of investigation, and define the outcome you plan to measure. Example questions include:

- What organizations are formally connected to the Oz learning ecosystem? In what ways do they contribute to the ecosystem?

- Who are the newest members of the Gotham learning ecosystem? What are the entry connections that help individuals join the network?

Step 3: Determine type of data to collect

When collecting data on networks, it is also important to determine the *type of connection data* you want to collect.

In order to conduct an SNA, you need to collect **relational data**. This is data that reveals some kind of connection between the individuals, groups, or things in the network.[5][6]

This data can come from **surveys** that you collect from members in the network you are analyzing. It could come from **existing data**, like public datasets on organizational connections, data on social media connections, datasets from CRMs (like Salesforce), etc. And it can come from **your own knowledge** of the relationships that exist in the network you are analyzing.[7]

Here are some *categories of relational data* you might consider collecting from respondents:[8]

- Social roles (supervisor, teacher, friend, acquaintance, etc.)

- Kinship (e.g., sister, brother, cousin, etc.)

- Affective (like, dislike, respect, etc.)

- Resource (knowledge, facility access, resource access, etc.)

- Actions (talk with, meet with, collaborate with, eat with, etc.)

- Distance (number of miles between, etc.)

- Co-occurrence (same organization, same school, etc.)

The relationship data could be in the form of:

- Simple **binary data** like yes or no (connected vs. not connected; like or dislike)

- **Categorical data** or categories/ranks (e.g., like, dislike, like the most, dislike the most, etc.)

- **Interval data** or simply numbers (e.g., number of times you communicated, number of events you attended together, number of projects you have worked on together, etc.).

4   https://www.odi.org/sites/odi.org.uk/files/odi-assets/publications-opinion-files/6381.pdf
5   http://faculty.ucr.edu/~hanneman/nettext/C1_Social_Network_Data.html
6   https://docs.kumu.io/guides/sna-network-mapping.html
7   https://docs.kumu.io/guides/sna-network-mapping.html
8   http://www.analytictech.com/networks/whatis.htm

Step 4: Select data collecting tools

The most common data collection methods used in SNA are surveys and interviews.

A survey should include questions regarding the background of the respondent and a way for them to provide information on connections. For a **bounded network**, you should consider providing a list of all members in the network (possible ways to get this information includes lists of program participation, attendance at events, etc). If you plan to use a snowball sampling method (see Step 5), your survey should include a section for respondents to list connections.

There are many banks of survey questions that have been used in SNA research made publicly available, some of which we have included at the bottom of this document. You can recycle these questions in your own surveys and adjust them to your needs.

Step 5: Select data collecting method/processes

When planning data collection for an SNA, you need to determine the sample that you will draw from. Two popular sampling methods include:

- **Full Network Method:** Collecting data from every member of your network (or network subset that you are investigating). This method works with a **bounded network**. You may not be able to get everyone, but the more people you get, the more complete your understanding of the network will be.

- **Snowball Method:** Starting with a core group of network members, you collect data on all of their connections. Then you reach out to the new connections and collect data on all of their connections. This continues until you cannot surface any more new members or until you run out of time. This method will miss members who are not connected to the people sampled and may bias your sample; on the other hand, it may also help you access a wider sample of network members than you could have identified on your own.
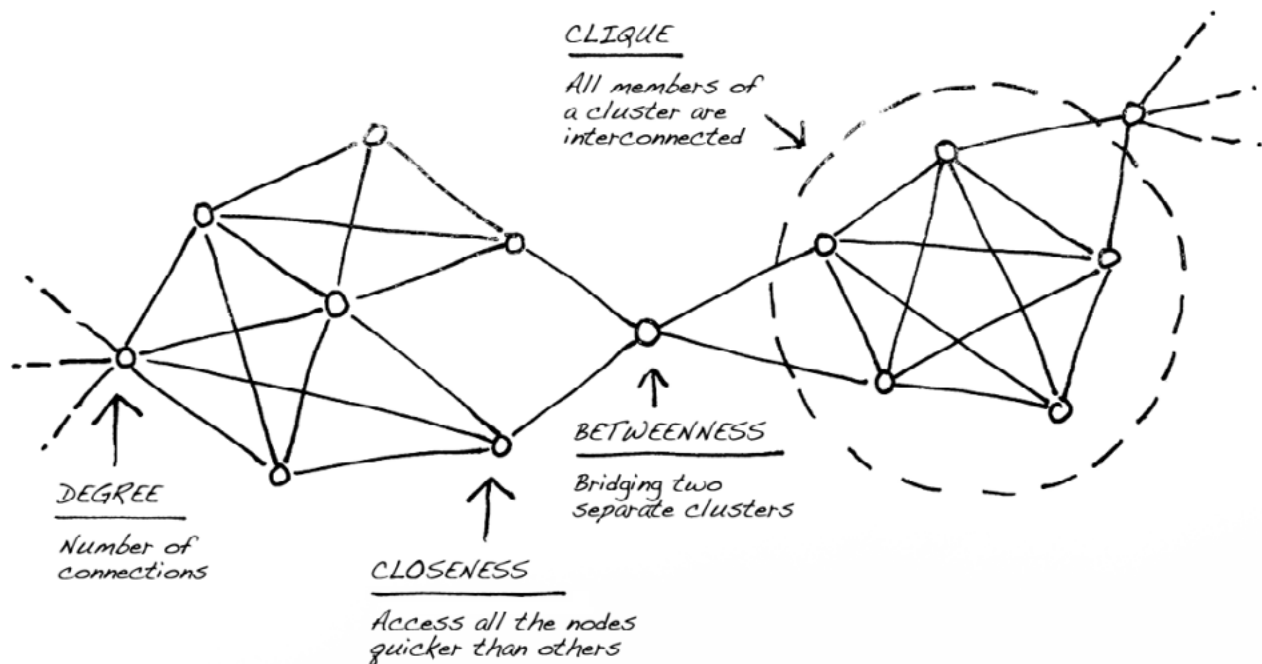
Step 6: Analyze the data

Visual analysis, like mapping a social network, is usually used when conducting an SNA. Using your relational data, you can then begin to develop a network model.

node

edge

directed

undirected
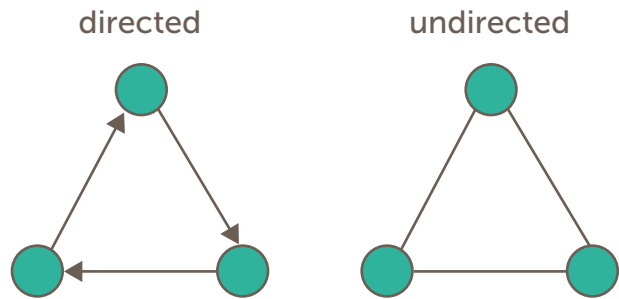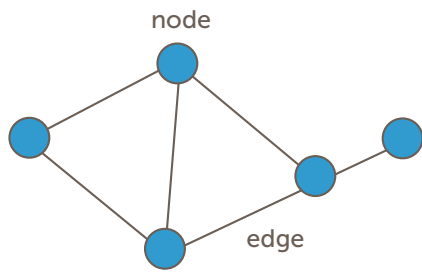
Networks are made up of nodes and paths. **Nodes** are the actors—individuals, groups, or things—that make up the network.[9] **Paths** are the lines (or edges) that connect the nodes together.[10] Paths can differ based on the kinds of interactions happening between nodes.

One important characteristic of paths is directionality. Some networks are **undirected**, so a simple path (or line) exists between two nodes. Other networks are **directed**, so paths flow in a certain direction. In a directed graph, the paths are represented as a line with an arrow at one or both ends to indicate the direction of a connection (e.g., you follow someone on Twitter, but they don't follow you).[11] [12]

Through visually depicting a network, you can explore the connections and patterns that exist and make conclusions based off of that exploration. For example, the following image illustrates how you can visually break down a network.[13]

CLIQUE
All members of a cluster are interconnected

BETWEENNESS
Bridging two separate clusters

DEGREE
Number of connections

CLOSENESS
Access all the nodes quicker than others

9   http://faculty.ucr.edu/~hanneman/nettext/C1_Social_Network_Data.html

10   https://www.linkedin.com/learning/social-network-analysis-using-r/what-you-should-know-before-watching-this-course

11   https://www.e-education.psu.edu/geog597i_02/node/832

12   http://faculty.ucr.edu/~hanneman/nettext/C7_Connection.html

13   Image from Medium article "Analysing data networks": https://medium.com/graph-commons/analyzing-data-networks-f4480a28fb4b

Once you have your data prepared, you have a lot of options to consider. You can use a mapping software or map your data by hand; you can use free software or paid software that might be easier to use and provide more features; or you can create static maps (just an image) or interactive maps that you embed into a website.

Most network mapping software require a "From" and a "To" column in your relational dataset. When you import the data you will need to specify if the map is **directed** or **undirected**. You can also add variables about the type of connection (see first table) and additional qualitative data about the people or organizations (second table). This additional information will let you see more about the patterns of your connections.

From	To	Type
Harry Potter	Lord Voldemort	Negative
Harry Potter	Hermione Granger	Positive
Hermione Granger	Ron Weasley	Positive
Hermione Granger	Draco Malfoy	Negative

Mapping tools will also allow you to add additional datasets.[14][15][16]

Label	Bio
Harry Potter	The boy who lived. Main character of the series.
Lord Voldemort	The antagonist of the series who murdered many.
Hermione Granger	One of Harry's best friends. Marries Ron Weasley.

Here are popular options for mapping your data:

- [Kumu](#) is a user-friendly tool that helps users make attractive network graphs. It is free for public projects, but users have to pay a monthly fee for private use. They also provide several step-by-step guides to help you upload your data and start mapping your network.

- [Gephi](#) and [Cytoscape](#) are free, open-source platforms built specifically for network modeling and analysis. They provide a broad range of features for SNA.

- [R](#) is a completely free, open-source software for analyzing data with robust network mapping capabilities. To map your data in R you have to do some coding/scripting. There are a lot of forums and resources online to get help with your R projects.

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14 http://faculty.ucr.edu/~hanneman/nettext/C6_Working_with_data.html
15 You can find additional network data examples here: https://snap.stanford.edu/data/
16 The Harry Potter data can be found here: http://dpmartin42.github.io/projects/Harry_Potter/Harry_Potter_Network.html

Further, more tools are available in a [curated list](curated) of social network analysis visualization tools put together by KDnuggets.

Through this analysis, there are several ways to examine connections and to analyze your network. Here are some of the ways to look at connections:

- **Connectedness/Centrality:** Number of connections one node has to other nodes[17]

- **Density:** Number of connections divided by total possible connections[18]

- **Betweenness:** Measures if a node stands between other nodes (bridging)[19]

- **Clique:** A group of nodes where all possible links are present[20]

- **Component**: A group of connected nodes[21]

- **Closeness:** How close a node is to all other nodes (shorter path to other nodes increases closeness)[22]

- **Degree:** Number of connections[23]

- **Measures of power:** Being connected to connected nodes[24]

- **Homophily:** How similar or dissimilar network members are from their connections (demographics, education, occupation, etc.)[25]

- **Multiplexity:** Number of connections between two network members (e.g., you've worked together on several projects).[26]

- **Reciprocity:** The level to which a connection is reciprocal[27]

- **Propinquity:** Degree to which individuals have more ties with people geographically close to them[28]

Quantitative analysis can also be used to analyze network data. Your analyses should be accompanied by some descriptive statistics on your network (breakdown of members by stakeholder group, by gender, by region, etc.). You can also use more advanced statistical models, which we are not going to cover here, but some of the network mapping applications can do these analyses for you.

You may also want to use **qualitative analysis** to understand the patterns that you are seeing in your network. This could include interviewing members or observing situations (like a convening or a design session) that help you understand why some of the patterns exist. If you have time, you could also do additional surveys and interviews to ask network members more about the patterns you are finding.

17   https://www.lsu.edu/faculty/bratton/networks/closeness.ppt
18   http://www.the-vital-edge.com/what-is-network-density
19   https://en.wikipedia.org/wiki/Betweenness_centrality
20   https://www.safaribooksonline.com/library/view/social-network-analysis/9781449311377/ch04.html
21   https://en.wikipedia.org/wiki/Connected_component_(graph_theory)
22   https://www.sci.unich.it/~francesc/teaching/network/closeness.html
23   https://docs.kumu.io/guides/sna-network-mapping.html
24   https://www.lsu.edu/faculty/bratton/networks/closeness.ppt
25   http://aris.ss.uci.edu/~lin/52.pdf
26   https://en.wikipedia.org/wiki/Social_network_(sociolinguistics)
27   https://en.wikipedia.org/wiki/Reciprocity_(network_science)
28   https://en.wikipedia.org/wiki/Propinquity

SNA Examples from EdClusters

Digital Promise worked with EdClusters on strategic, short-term, or exploratory research for their regions over the course of four months in 2018 to leverage a form of social network analysis to better understand their Clusters' networks. Atlanta, Madison, Rhode Island, and Tucson shared their preliminary findings.

Atlanta

Community Guilds in Atlanta wanted to understand the value that stakeholders in the region were bringing to maker education efforts. They received a grant from a foundation to convene all organizations in the local maker education effort. At those convenings, they discussed how the ecosystem around maker education functions in Atlanta.

After these conversations, they used a value mapping approach to show the major players in the region and illustrate the value that each group brings to the network. They found that facilitated in-person meetings were a more impactful form of data collection for them than surveys, as it allowed their reach to expand beyond the five organizations they originally included in their bounded network sample size.

Madison

We Think Big is an organization in Madison working to convene education stakeholders and catalyze education innovation in the region. As an emerging EdCluster, they wanted to better understand how the education organizations in Madison were developing partnerships.

They conducted an SNA that consisted of surveying education stakeholders across the Madison education ecosystem and asking respondents about their organizational connections. Organizations filled out surveys over a four-week period in the summer.

From their analysis, they learned the following about their ecosystem: *"The 'profile' of what could be an ideal collaboration partner was fairly consistent, with high marks for partners who could influence and bring partners together, add value to the project, and who had alignment with their own mission, objectives, and goals."*

This SNA has set the stage for the Madison education ecosystem to have productive conversations and build deeper collaborations that will help drive innovative education in the region.

Rhode Island

EduvateRI is a convener of the Rhode Island EdCluster. They wanted to understand how the education ecosystem in Rhode Island has evolved over time and understand how the current education network in Rhode Island is connected.

To gather data for their SNA, EduvateRI engaged in targeted outreach to ensure many members of their education ecosystem provided responses about the network. They asked respondents to rate the quality of their programming and indicate their trusted professional connections. In addition, they asked questions about the efficacy of EduvateRI's work.

After analyzing their data, EduvateRI understood more about the stakeholders who actively participate in the education ecosystem. They found that current educators and nonprofit leaders are the most actively engaged, and that there is less participation from government, funder, and corporate stakeholders.

Active network members come from a range of backgrounds, but one reason that a majority of members are involved in the network is for professional networking.

The findings from this SNA will help EduvateRI to better track and improve their programming going forward. This includes better communication of the power of the network to improve education in Rhode Island and better leveraging the expertise of members in the network.
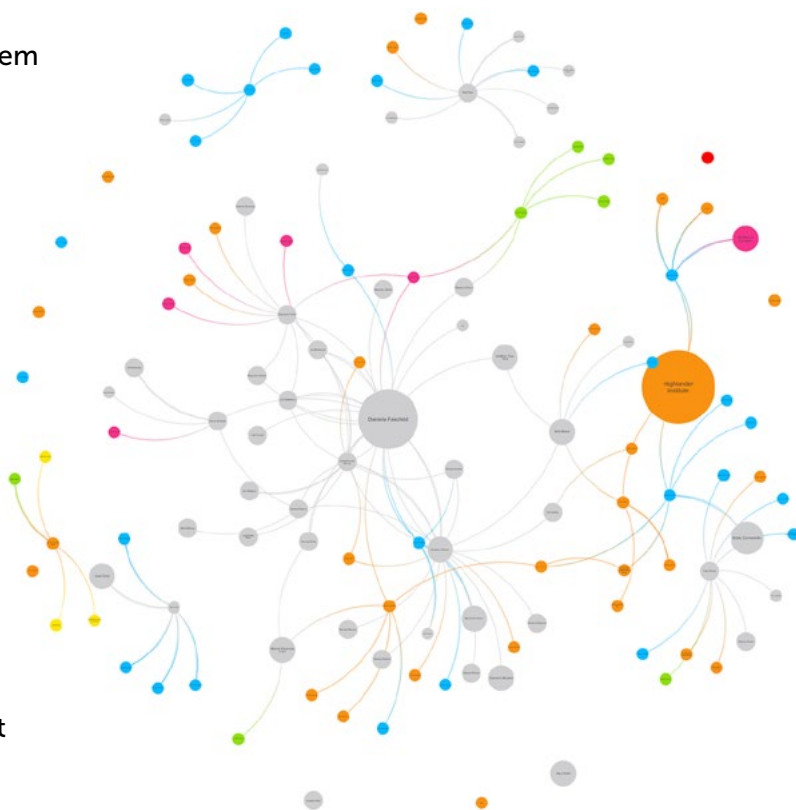
Tucson

LeadLocal and CommunityShare are two organizations working to build an innovative and equitable education network in Tucson. They engaged in an SNA because they wanted to understand more about how teachers in Tucson engage with community partners.

For their SNA, they designed and printed a survey for teachers at three schools in the Tucson region. There were 42 educators at the schools who ended up taking the survey about their community connections.

From their analysis, they learned that a majority of teachers have no community connections in the education ecosystem. Learning resource professionals (e.g., librarians, counselors) had the highest number of community connections. And elementary school teachers were most likely to invite community partners into the classroom. Through the surveys they were also able to learn about the specific kinds of community partners that the teachers engaged with.

This SNA spurred schools into thinking more about their community connections, and one school involved in the SNA is now going to track community connections each quarter.

LeadLocal and CommunityShare plan to use this SNA data to continue to build a knowledge base and understanding of the school-community connections in their region and use that information to continually strengthen their education ecosystem.
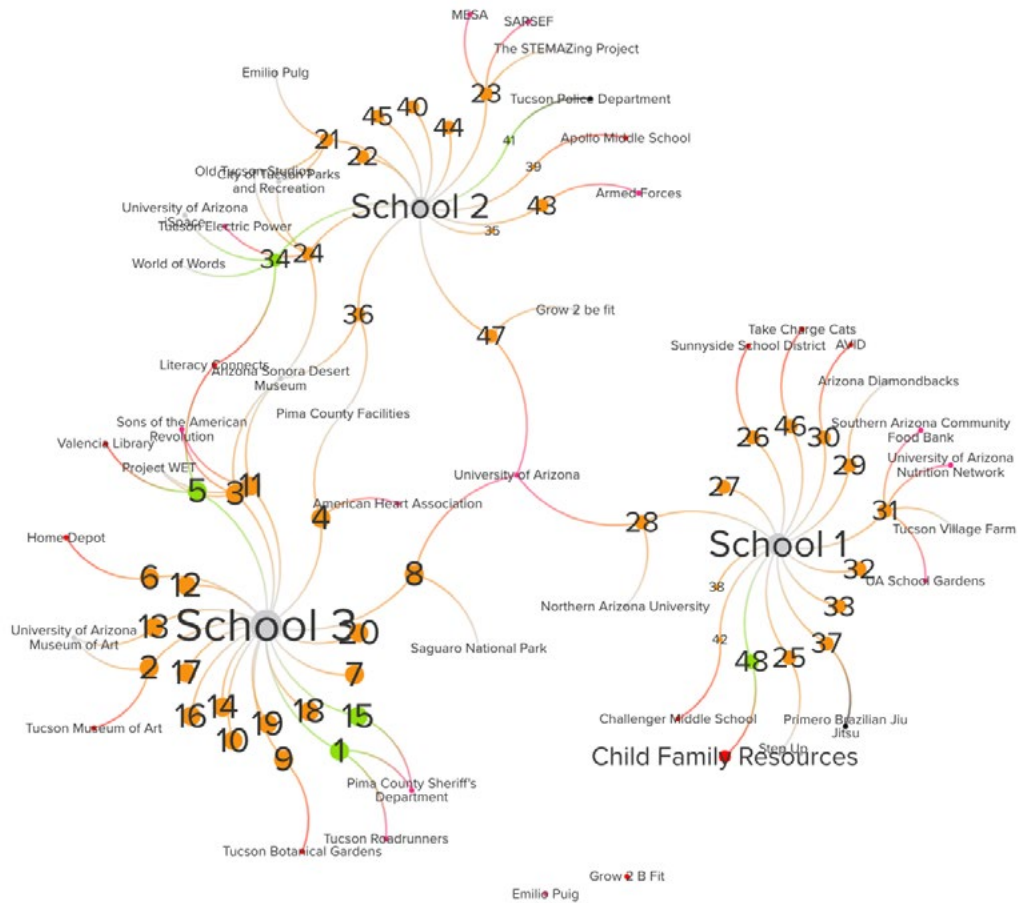
Conclusion

SNA is a powerful tool for educational ecosystems seeking to better understand the individuals and groups that comprise them and the relationships that drive the work. It is an adaptable research methodology that can help identify deficits in and possibilities for collaboration that may provide insights toward better understanding educational ecosystems.

Appendix

SNA is a powerful tool for educational ecosystems seeking to better understand the individuals and groups that comprise them and the relationships that drive the work. It is an adaptable research methodology that can help identify deficits in and possibilities for collaboration that may provide insights toward better understanding educational ecosystems.

Drafting and Launching Surveys

This section provides additional information and question examples that can be used in drafting surveys.

If you are developing questions from scratch or refining your questions, SurveyMonkey developed a great survey writing guide to help people through the process.

If you are considering providing incentives for your survey (a quality network analysis usually requires a high response rate), SurveyMonkey also developed a great guide on providing incentives.

There are three major sections you should consider including in your survey:

- **Background information:** Usually to create a network map you'll need identifiable information in your data. You need to know about the individuals/organizations that are part of the network in order to map and analyze the network.

- **Connection/relational information:** Relational information can encompass a variety of things including communication, collaboration, trust, expertise, roles, distance, etc. It is important to keep this section focused and simple, so decide early on what type of relational data is most important to you and your team.

- **Additional qualitative data:** You can also include additional qualitative data on your survey (biography, role, satisfaction, etc.) and you can include that in your survey.

Sample Survey Questions
Questions may be used as is or modified.

Background Information

Name	Your name:
Title	Your title (if applicable):
Organization	Your organization or school (if applicable):
Time at Organization	Length of time at your organization or school (if applicable):
Time in Network	When did you join the network (mm/yyyy): [29]

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[29] https://drive.google.com/file/d/1gFBMwrqKXNg0rGKaOpHNuDovyeapvuO1/view?usp=sharing

Stakeholder Group	Which of the following groups do you primarily represent (please select only one):
	☐ Education (Educator/School/District) ☐ Government ☐ Nonprofit ☐ Funder ☐ Researcher ☐ Business/Entrepreneur [30]

Connection Information

Collaboration Example 1	For each person, check the box that best describes how often you have worked together in the last six months (e.g., plan an event, write a report, conduct an observation). ☐ Not in last 6 months ☐ Once in last 6 months ☐ Multiple times in last 6 months ☐ Multiple times a month ☐ Weekly ☐ Multiple times a week ☐ Don't know person ☐ It's me [31]
Collaboration Example 2	Check your connection to this person: ☐ I know this person ☐ I have talked/shared ideas with this person in the last 6 months ☐ I have worked with this person in the past, but not in the last 6 months ☐ I have interacted regularly/collaborated with this person in the past 6 months

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30 https://drive.google.com/file/d/1gFBMwrqKXNg0rGKaOpHNuDovyeapvuO1/view?usp=sharing
31 https://drive.google.com/file/d/1gFBMwrqKXNg0rGKaOpHNuDovyeapvuO1/view?usp=sharing

Collaboration Example 3	Select how you and this person/organization collaborate (select all that apply): ☐ Developed an informal relationship ☐ Bring together diverse stakeholders ☐ Meet regularly ☐ Exchange information/knowledge ☐ Share resources ☐ Engage in collective decision making ☐ Share mission and goals [32]
Communication Example 1 (broad)	Who do you communicate with? (check all that apply) ☐ Person 1 ☐ Person 2 ☐ Person 3 ☐ (Note, you can provide a list of all persons or let people write in names)
Communication Example 2 (specific)	Please check the box that best represents how often you communicated with each person in the last six months (e.g., in writing, over the phone, face to face, or in meetings). If you don't know the person, check the box marked "Don't know person." [NOTE: This works best as a matrix question. You need to answer this question about every person] ☐ Not at all ☐ Less than monthly ☐ Monthly ☐ Weekly ☐ Daily ☐ Don't know person [33]
Learn Example 1 (broad)	Who do you go to to learn about [topic]? (check all that apply) ☐ Person 1 ☐ Person 2 ☐ Person 3 ☐ (Note, you can provide a list of all persons or let people write in names)

32   http://partnertool.net/tools-and-training/partner-tool/resources/#partner-template-materials
33   https://drive.google.com/file/d/1gFBMwrqKXNg0rGKaOpHNuDovyeapvuO1/view?usp=sharing

Learn Example 2 (specific)	For each person, check the box that best describes how often they have provided you with information you used to do your work in the last 6 months (e.g., new idea, a report, contact information, etc.). [NOTE: This works best as a matrix question. You need to answer this question about every person] ☐ Not in last 6 months ☐ Once in last 6 months ☐ Multiple times in last 6 months ☐ Multiple times a month ☐ Weekly ☐ Multiple times a week ☐ Don't know person ☐ It's me [34]
Relationship Example 1	[Put a checkbox for each question next to each person] For each person, please answer the following questions. Information Sharing: At least twice in the last month, have you received information from this person that you need to do your job? Problem Solving: At least twice in the last month, have you gone to this person for help with work-related problems. Support: At least twice in the last year have you gone to this person for help with a difficult situation?[35]
Relationship Example 2	What kinds of activities does your relationship with this program/partner/department entail: ☐ None ☐ Cooperative Activities: Involves exchanging information, attending meetings together, and offering resources to partners ☐ Coordinated Activities: Include cooperative activities in addition to intentional efforts to enhance each other's capacity for the mutual benefit of programs ☐ Integrated Activities: In addition to cooperative and coordinated activities, this is the act of using commonalities to create a unified center of knowledge and programming that supports work in related content areas [36]

34 https://www.surveymonkey.com/r/63R8XMT
35 http://partnertool.net/tools-and-training/partner-tool/resources/#partner-template-materials
36 http://www.durantlaw.info/sites/durantlaw.info/files/SNA_Survey.pdf

Snowball Sample Question 1	Please identify up to 10 people who are important to you in your professional network. [37]
Snowball Sample Question 2	List up to 10 people you feel are missing from our list of network members.

Additional Qualitative Data

Expertise	What is your expertise?
	☐ Authentic/Real-World Learning
	☐ Personalized Learning/Differentiation
	☐ Teaching with Technology/Edtech Integration
	☐ Personalized Professional Development
	☐ Instructional Support/Leadership
	☐ Teacher Collaboration/PLCs
	☐ Teacher Recruitment and Retention
	☐ Student Learning: Literacy
	☐ Student Learning: Math/STEM
	☐ Student Learning: Kindergarten Readiness
	☐ Student Learning: College and Career Readiness
	☐ Mental Health and Trauma
	☐ Student/Teacher Relationships
	☐ Social-Emotional Learning
	☐ Formative Assessment
	☐ Assessment: Grading
	☐ Alternative Assessment Tools and Practices
	☐ Assessing Student Engagement
	☐ Assessing 21st Century Skills
	☐ Diversity
	☐ Opportunity Gaps
	☐ Culturally Responsive Practices
	☐ Summer Slide
	☐ Supporting Students Experiencing Poverty

Expertise (continued)	☐ Supporting English Learners ☐ Family Engagement: Communication ☐ Family Engagement: Increasing and Sustaining Engagement ☐ Engaging Diverse Families ☐ Connecting Family Engagement to Student Learning ☐ Device /1:1 ☐ Data Interoperability ☐ Open Educational Resources ☐ Edtech Procurement/Adoption ☐ Change Management ☐ Public Relations/Stakeholder Engagement ☐ Program Evaluation/Data-informed Decision Making ☐ School Redesign ☐ Student Pathways/Competency-based System
Interests	What are you interested in? ☐ Authentic/Real-World Learning ☐ Personalized Learning/Differentiation ☐ Teaching with Technology/Edtech Integration ☐ Personalized Professional Development ☐ Instructional Support/Leadership ☐ Teacher Collaboration/PLCs ☐ Teacher Recruitment and Retention ☐ Student Learning: Literacy ☐ Student Learning: Math/STEM ☐ Student Learning: Kindergarten Readiness ☐ Student Learning: College and Career Readiness ☐ Mental Health and Trauma ☐ Student/Teacher Relationships ☐ Social-Emotional Learning ☐ Formative AssessmentAssessment: Grading ☐ Alternative Assessment Tools and Practices ☐ Assessing Student Engagement ☐ Assessing 21st Century skills

Interests (continued)	☐ Diversity ☐ Opportunity Gaps ☐ Culturally Responsive Practices ☐ Summer Slide ☐ Supporting Students Experiencing Poverty ☐ Supporting English Learners ☐ Family Engagement: Communication ☐ Family Engagement: Increasing and Sustaining Engagement ☐ Engaging Diverse Families ☐ Connecting Family Engagement to Student Learning ☐ Device /1:1 ☐ Data Interoperability ☐ Open Educational Resources ☐ Edtech Procurement/Adoption ☐ Change Management ☐ Public Relations/Stakeholder Engagement ☐ Program Evaluation/Data-informed Decision Making ☐ School Redesign ☐ Student Pathways/Competency-based System
Satisfaction	Overall, how satisfied or dissatisfied are you with your experience with [organization/program]? ☐ Very dissatisfied ☐ Dissatisfied ☐ Neither dissatisfied nor satisfied ☐ Satisfied ☐ Very satisfied

Network Mapping Example

Cytoscape is a free, open-source network mapping and analysis platform. It is easy to get started in Cytoscape, and this section provides some basics on how to quickly get up and running.

Go to cytoscape.org and **download** the latest version of Cytoscape.

Open the Cytoscape application and **drag and drop your network connection data** to the panel on the left side of the screen.
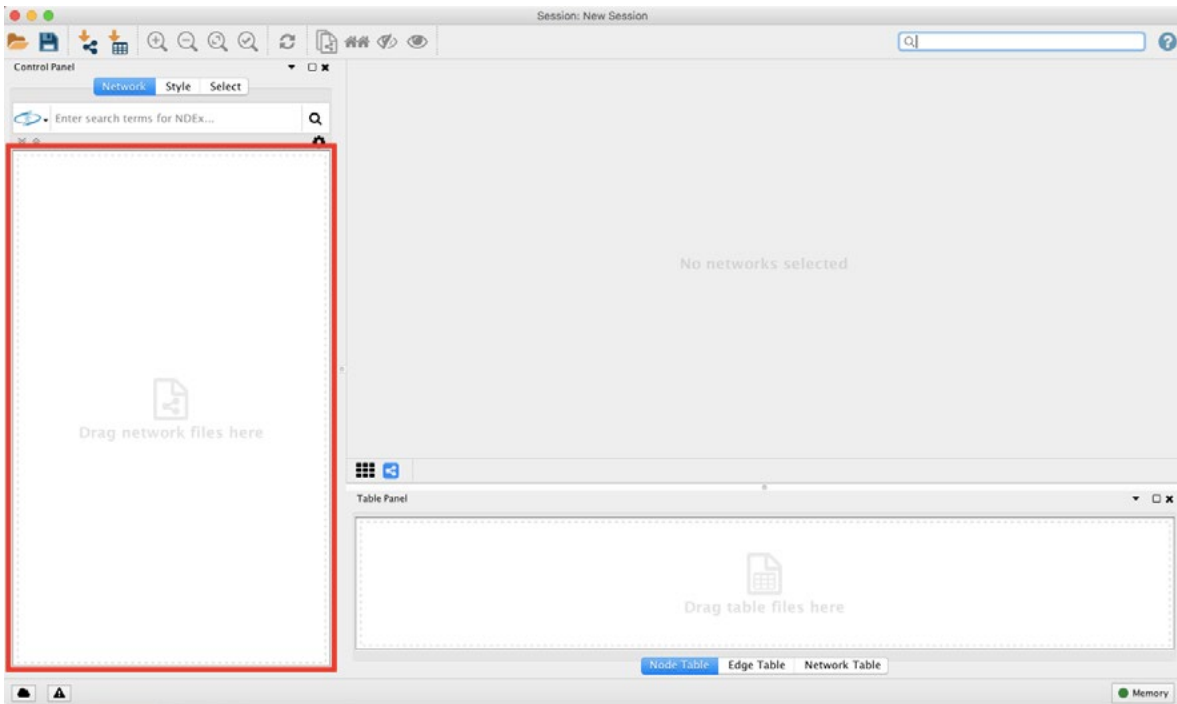

You will be prompted to **select your "Source" and "Target" node columns.** You can also select the aspect of the network your additional data is connected to (source node, target node, edge).
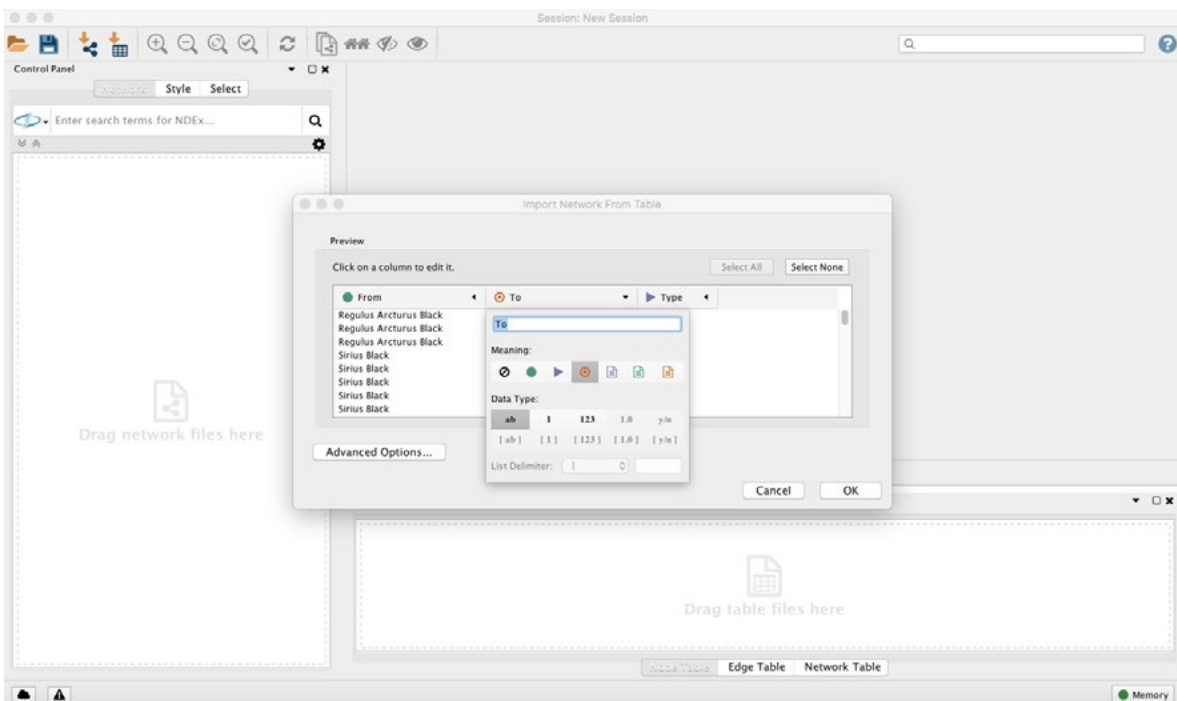
Then you will get an initial map of your data. If you have additional datasets that contain information on your nodes/edges, you can **drag and drop that data** on the panel at the bottom of the screen.
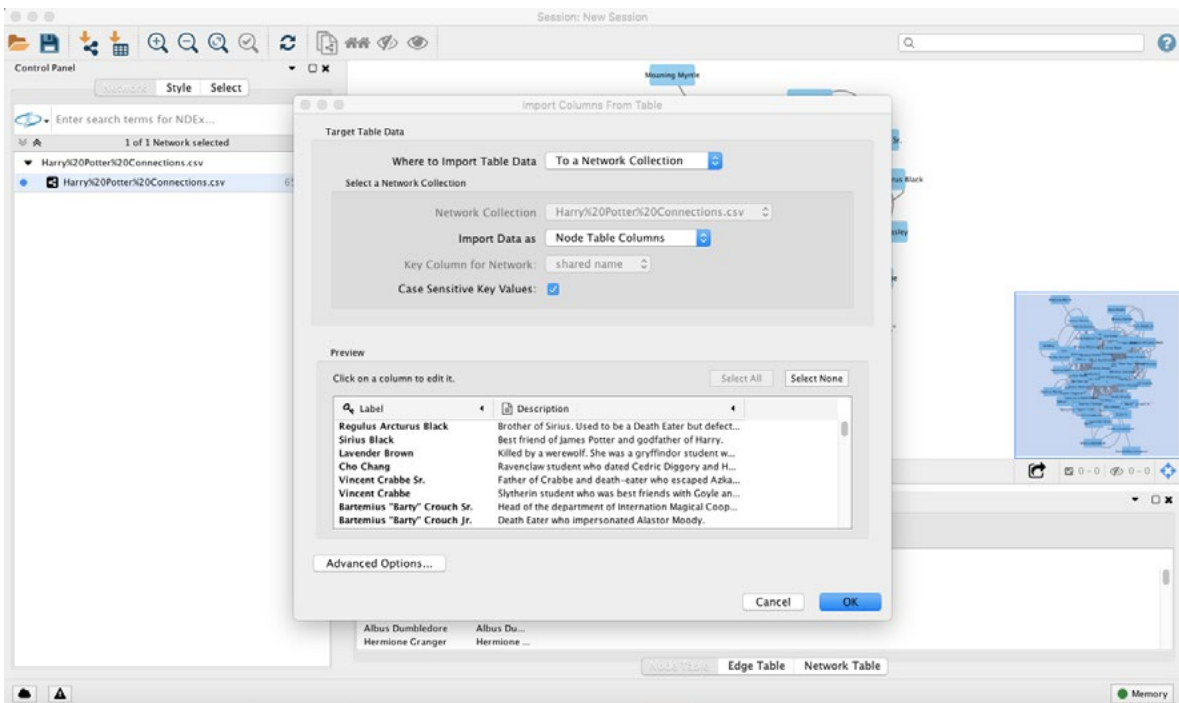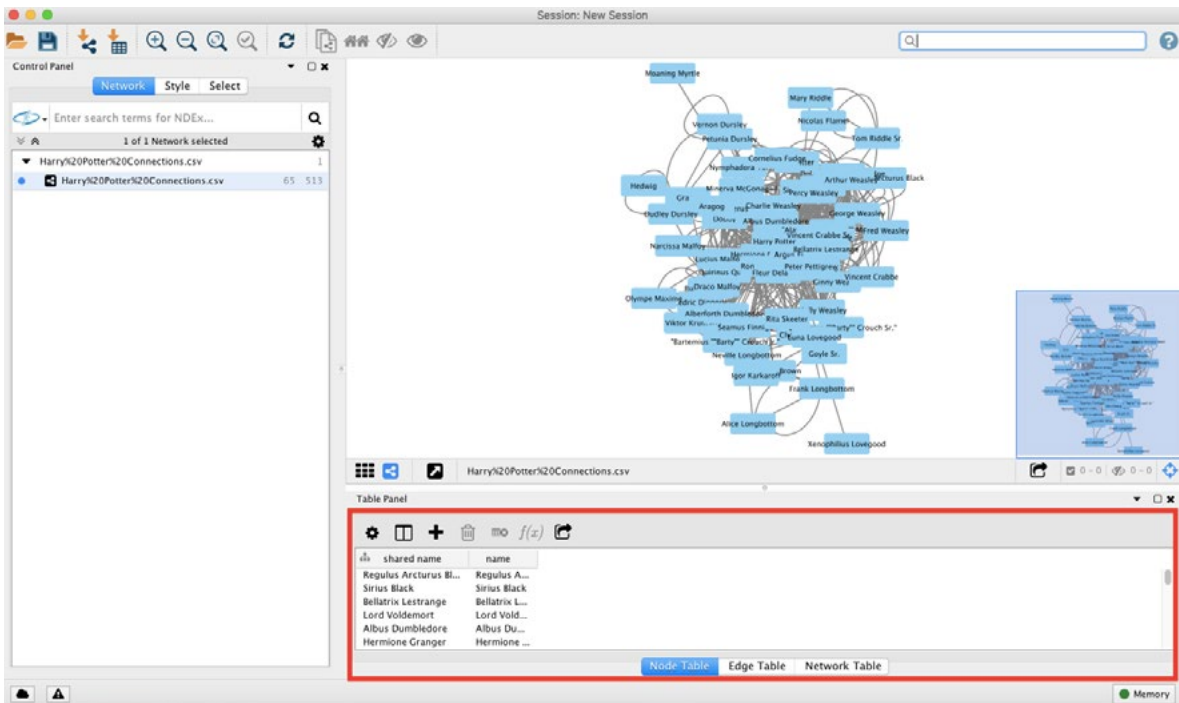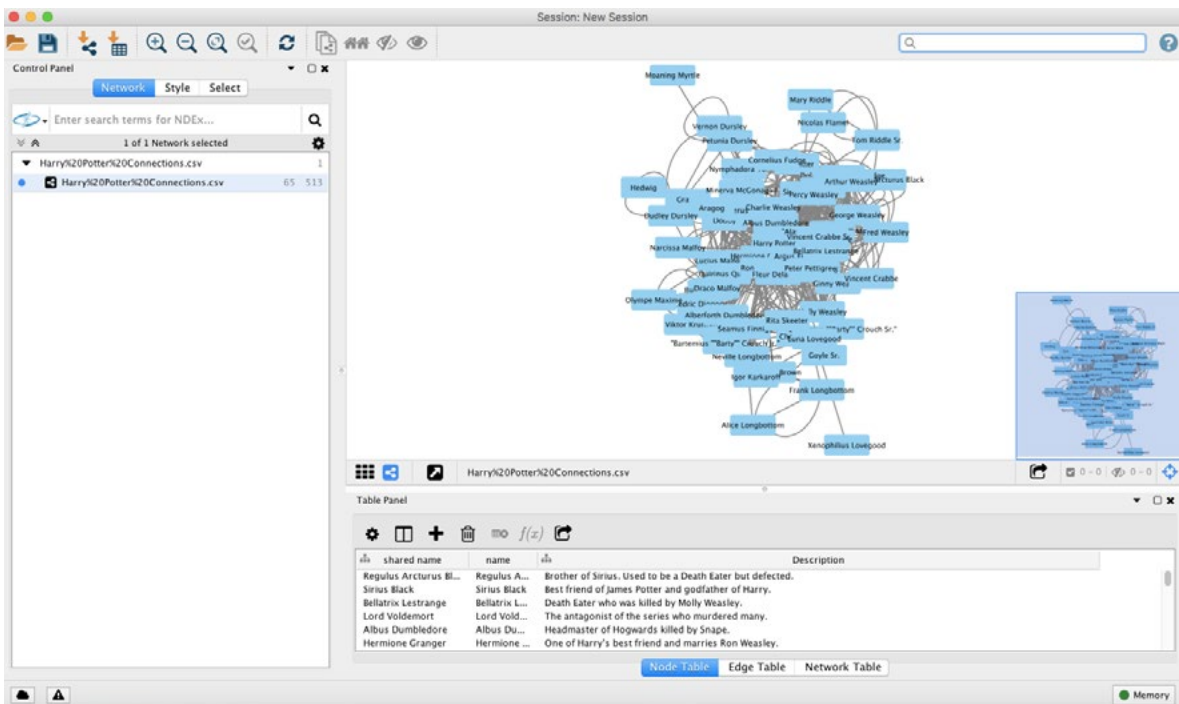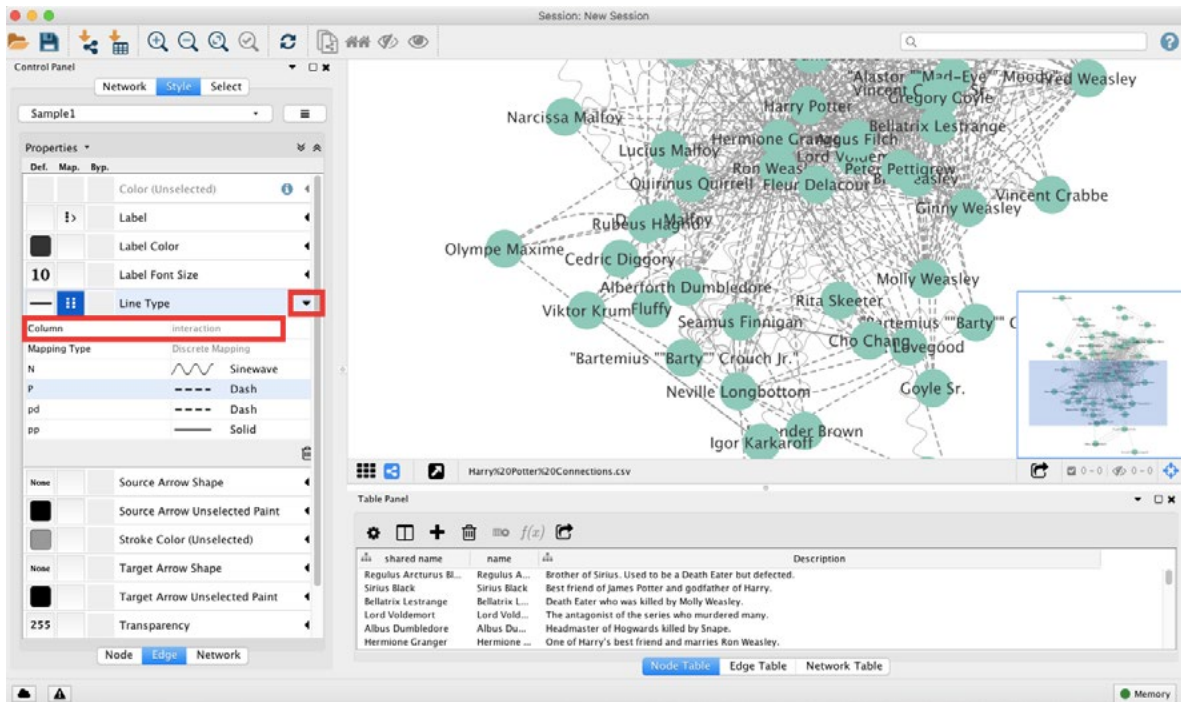
If you want to change the look of your map, you can **select "Style"** on the left panel. You will then have options to format the nodes, edges, and overall network. There is also a drop-down menu of pre-set styles you can use.
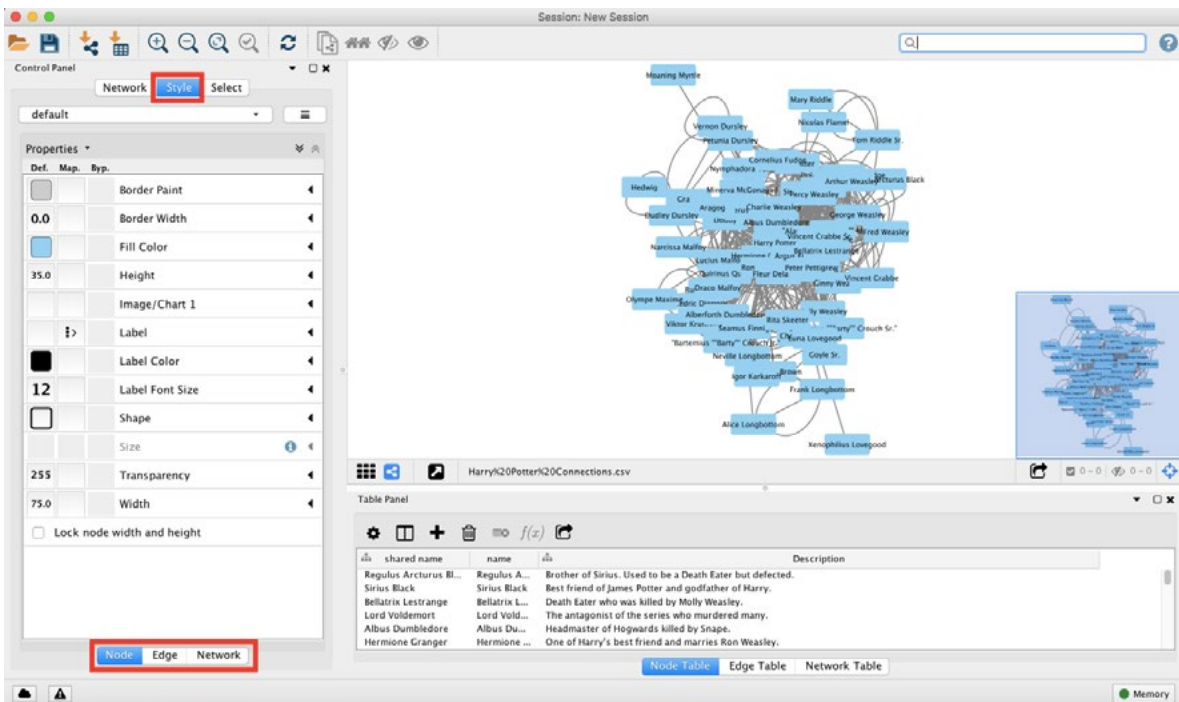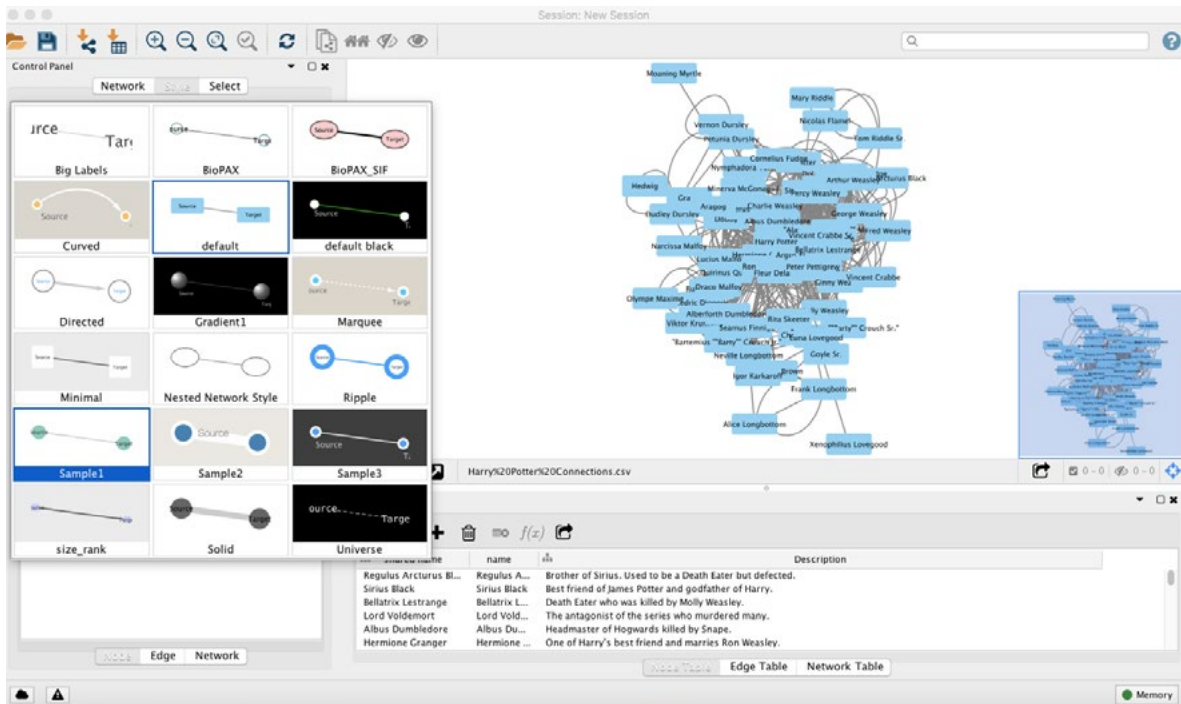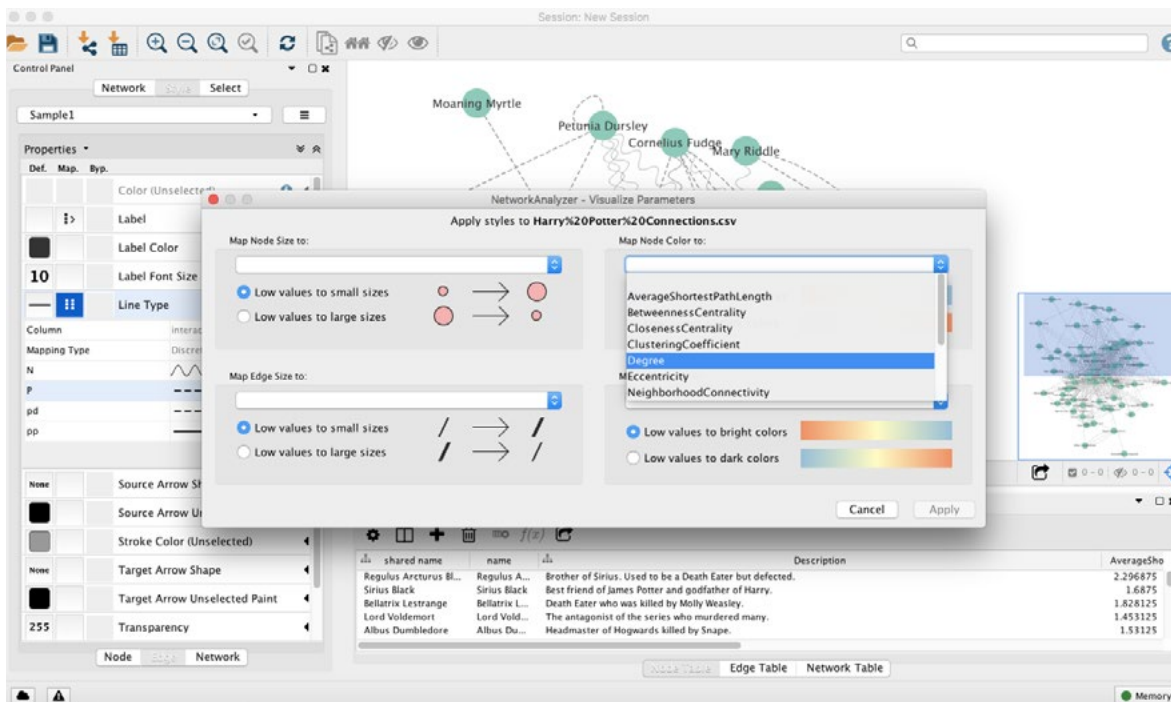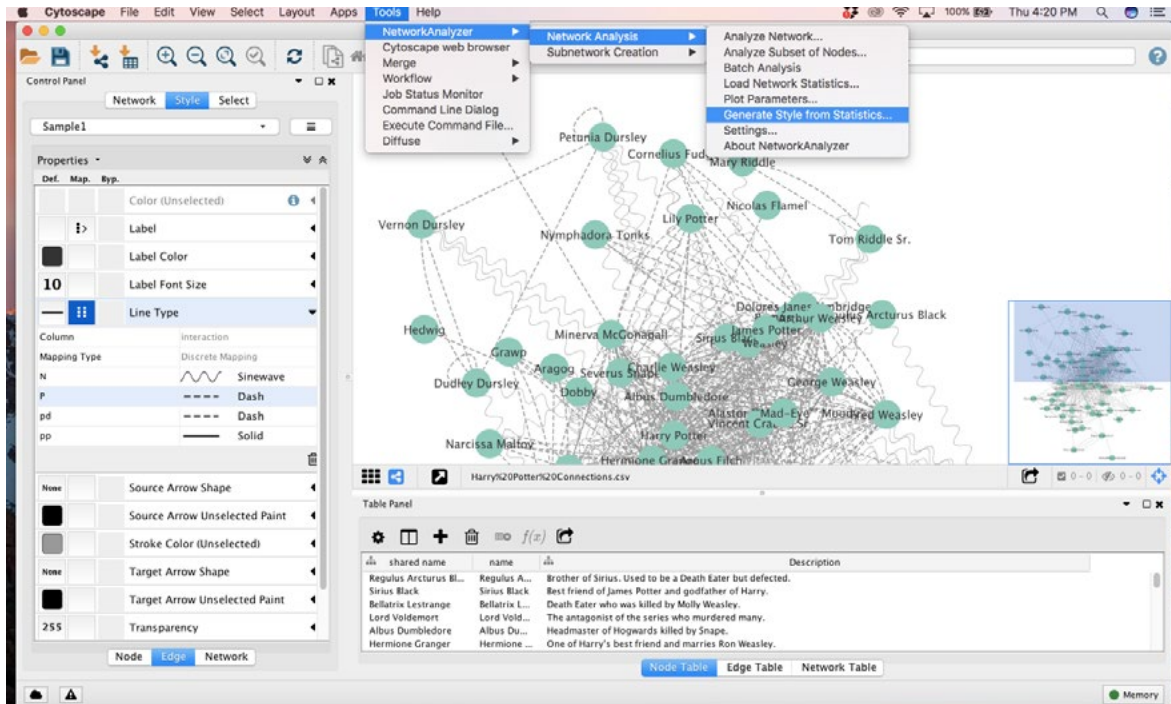
You can change the style of the network map based on your descriptive data. Select the drop-down arrow next to the feature you want to change and then select the column of data you want to use to **create your new style.**

Cytoscape also has built-in tools to help you **analyze your network**. For example, you can go to Tools > NetworkAnalyzer > Network Analysis > Generate Style from Statistics to change the look of your map based on things like degree or betweenness.

In the Apps menu, you can download additional apps to help you analyze your network in ways beyond the standard analysis features in Cytoscape.

Additional Resources

Further Reading

- Diffusion Levers Toolkit
- Introduction to social network methods
- Social Network Analysis: An Introduction
- LinkedIn Learning SNA course
- Coursera SNA courses

Additional Survey Resources

- Social Network Survey Examples
- Example Network Survey on SurveyMonkey
- Survey Question Bank

Network Mapping

- Cytoscape.org
  - Cytoscape user manual
  - Cytoscape style directions
- Kumu.io
- Gephi.org

Network Data Examples

- Stanford Large Network Dataset Collection
- UC Irvine Network Data Repository