Practical Tips for When and How to Use Social Network Analysis (SNA):
Examples from Mixed-Methods Evaluations of Federal STEM Education Award Portfolios

November 12, 2015

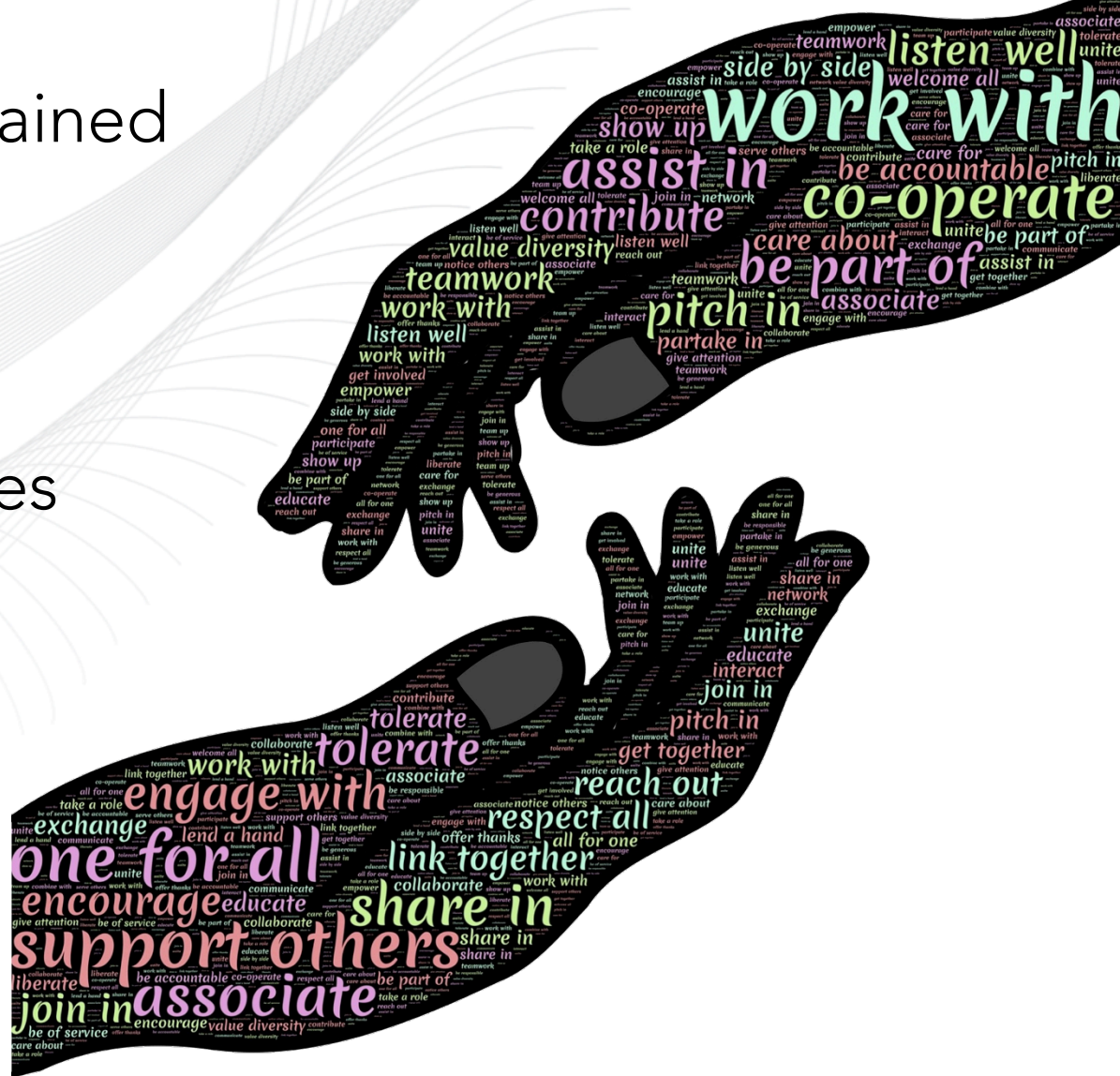Ann M. Martin, Science Systems & Applications, Inc.

Joeletta Patrick, NASA Headquarters
Margaret Pippin & Monica Barnes, NASA Langley Research Center
Edward Gonzales, NASA Jet Propulsion Laboratory

Context – NASA Education

- Resource-constrained environment
- National goals
- Partnerships & external awardees

Context - Evaluation

- Regulations and restrictions
- Diversity of activities & outcomes
- Multiple Reasons to Evaluate:
  - Accountability
  - Institutional Learning
  - Actionable Information

Why Social Network Analysis (SNA)?

- Partnership & Collaboration
  - Key in our work
  - Key in logic models and strategic plans
  - Often not evaluated in a concrete or useful way
  - Documented very heavily

Building the Network

ID	Institution	City	State	Total Funding	STEM Focus Area
A	NASA Langley	Hampton	VA	N/A	N/A
B	Hampton University	Hampton	VA	$1,000,000	Earth Science – Climate & Radiation

Build tables in Excel (or CSV/other formats) to establish all actors and links

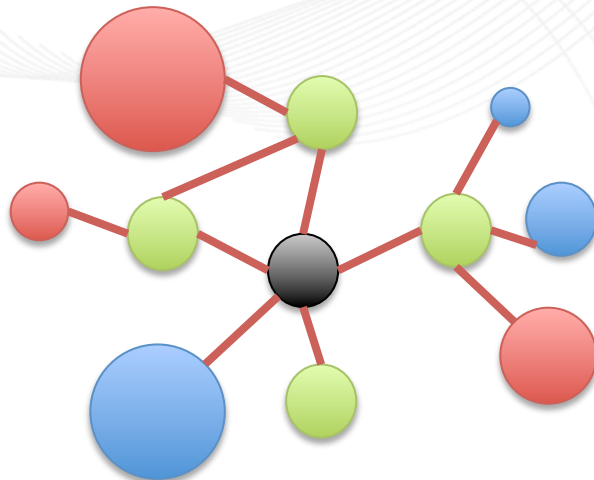| Source	Target	Duration (Years)	Resource Exchanged	Area of Resource Exchanged
B	A	3	STEM Expertise	Earth Science – Climate & Radiation
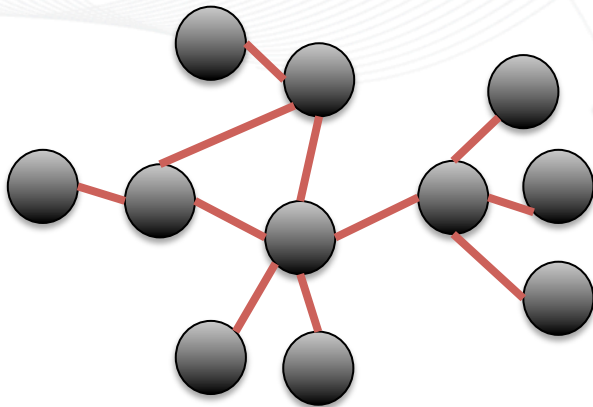
Use analysis tools (Gephi or NodeXL) to visualize and analyze

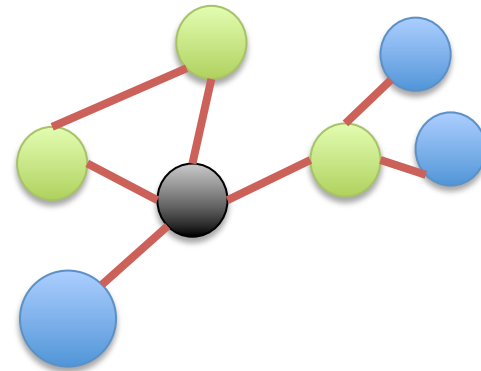# Visualizing & Analyzing the Network

- Gephi options for layouts, weighting, formatting, partitioning, filtering & more
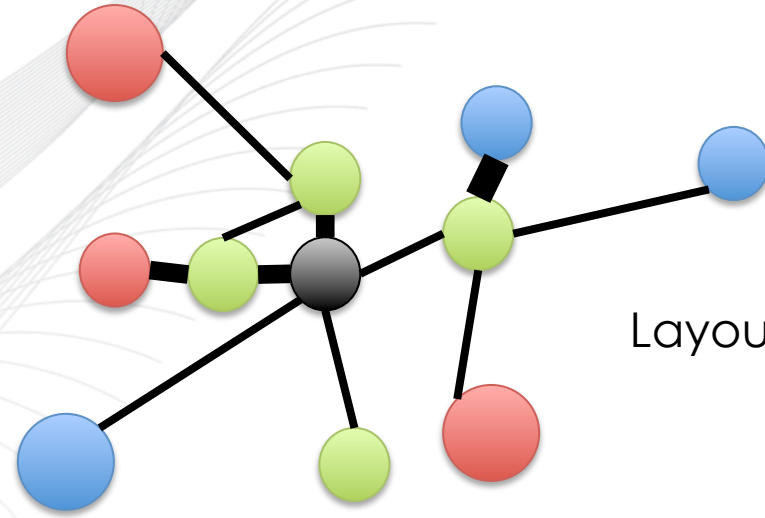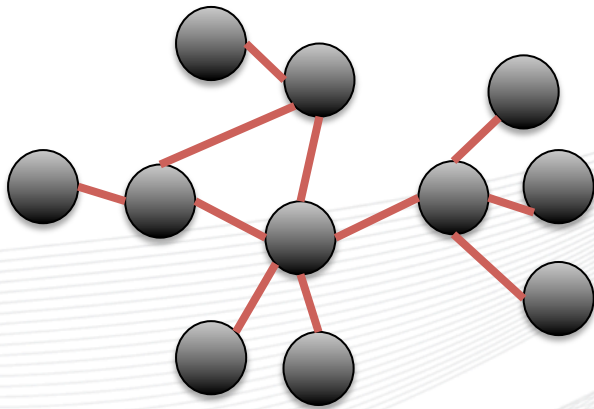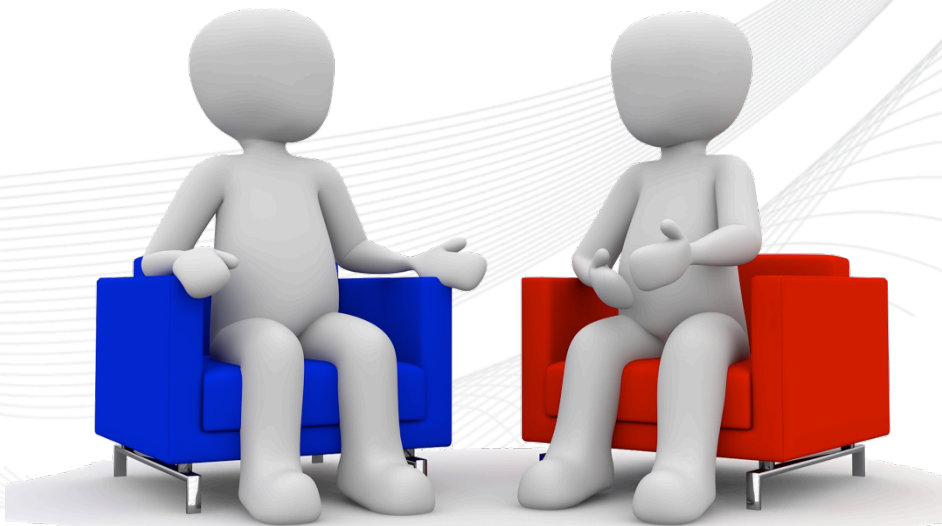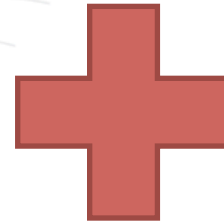

Layout & Weight

Format

Filter

Sidebar – SNA Surveys vs. Extant Data

- Excellent resource: Bobbi Carothers' AEA Coffee Break Webinar

Sidebar – SNA Surveys vs. Extant Data

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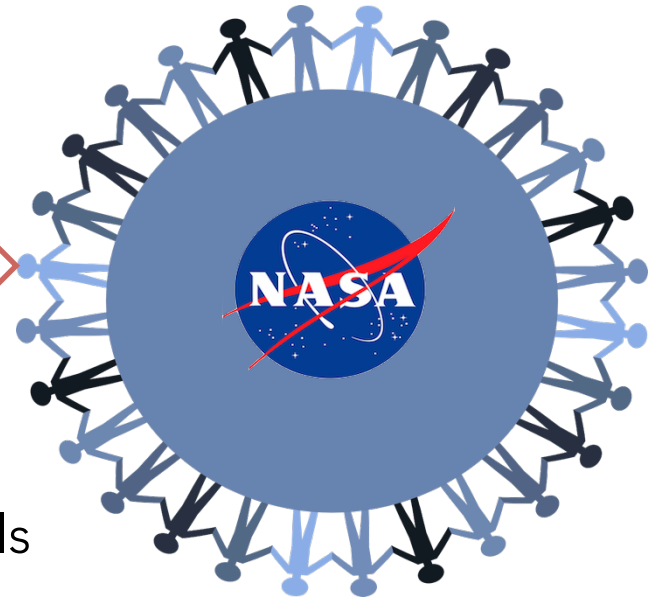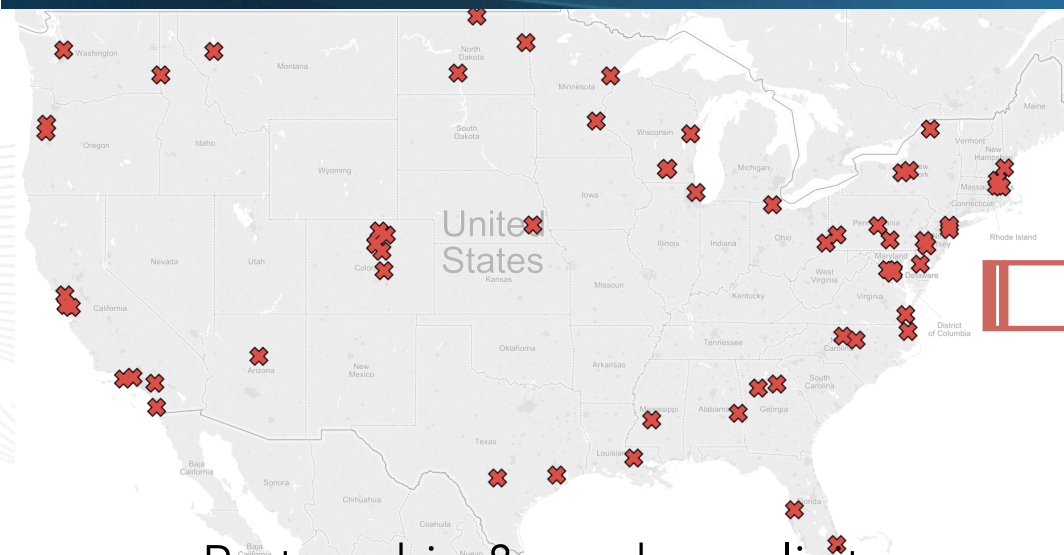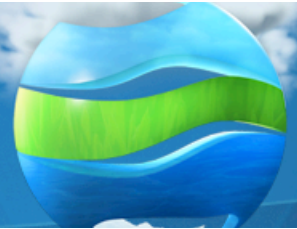# Results & Use of SNA – 2 Example Cases

- 1 External Grant Award Program with 75 awards

- 1 Blended Internal/External NASA Project with 124 Elements

# ESTEEM – External Climate Change Education
75 Awards, 2008-2014

- Partnership & reach: explicit program goals
- Tactics:
  - Funding requirement for partnership
  - Strongly encouraged in funding call – partnership with previous awardees
  - Annual PI meetings focused on collaboration
  - Monthly webinars focused on identifying synergies and sharing outputs
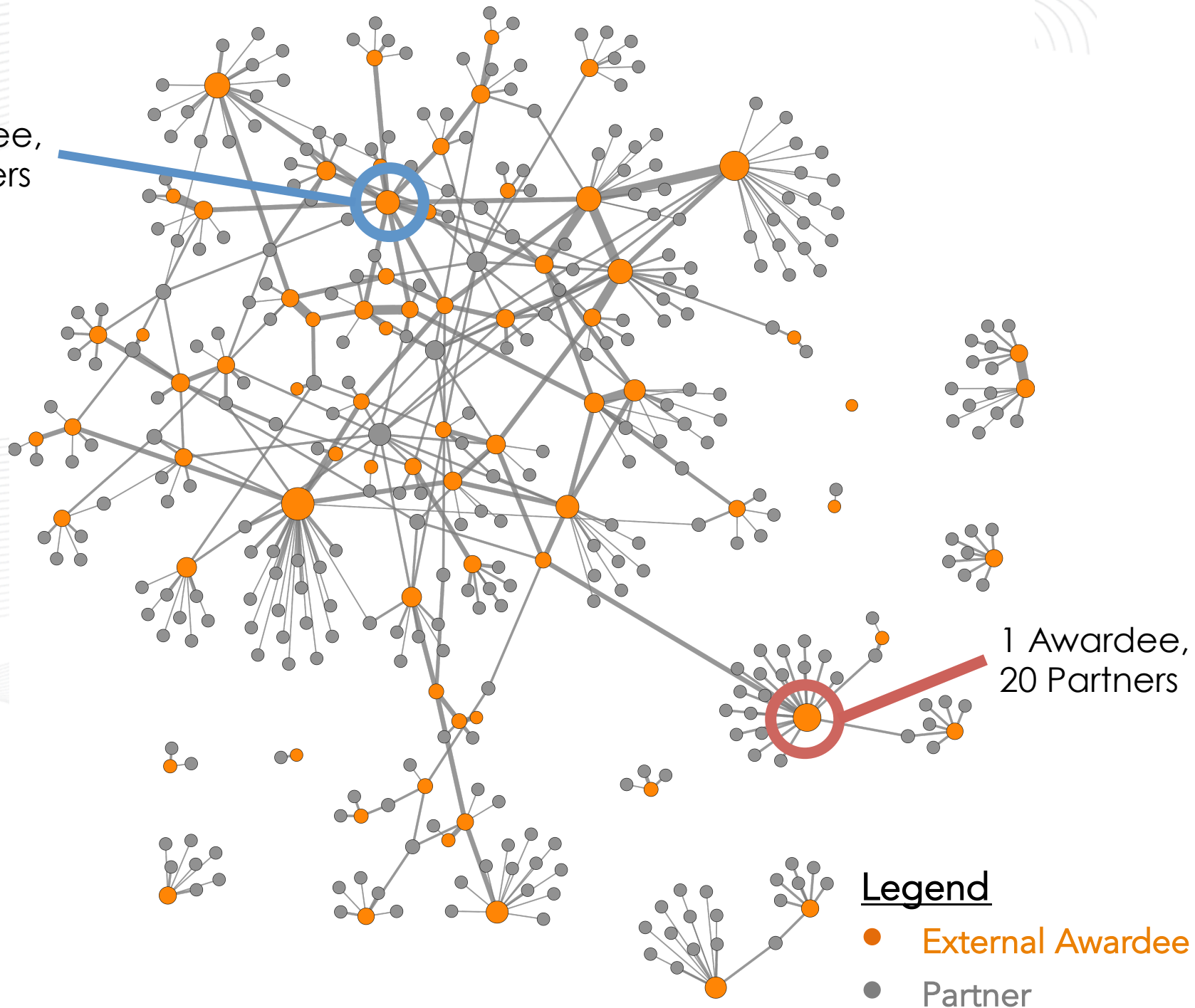
75 Awardees
302 Additional
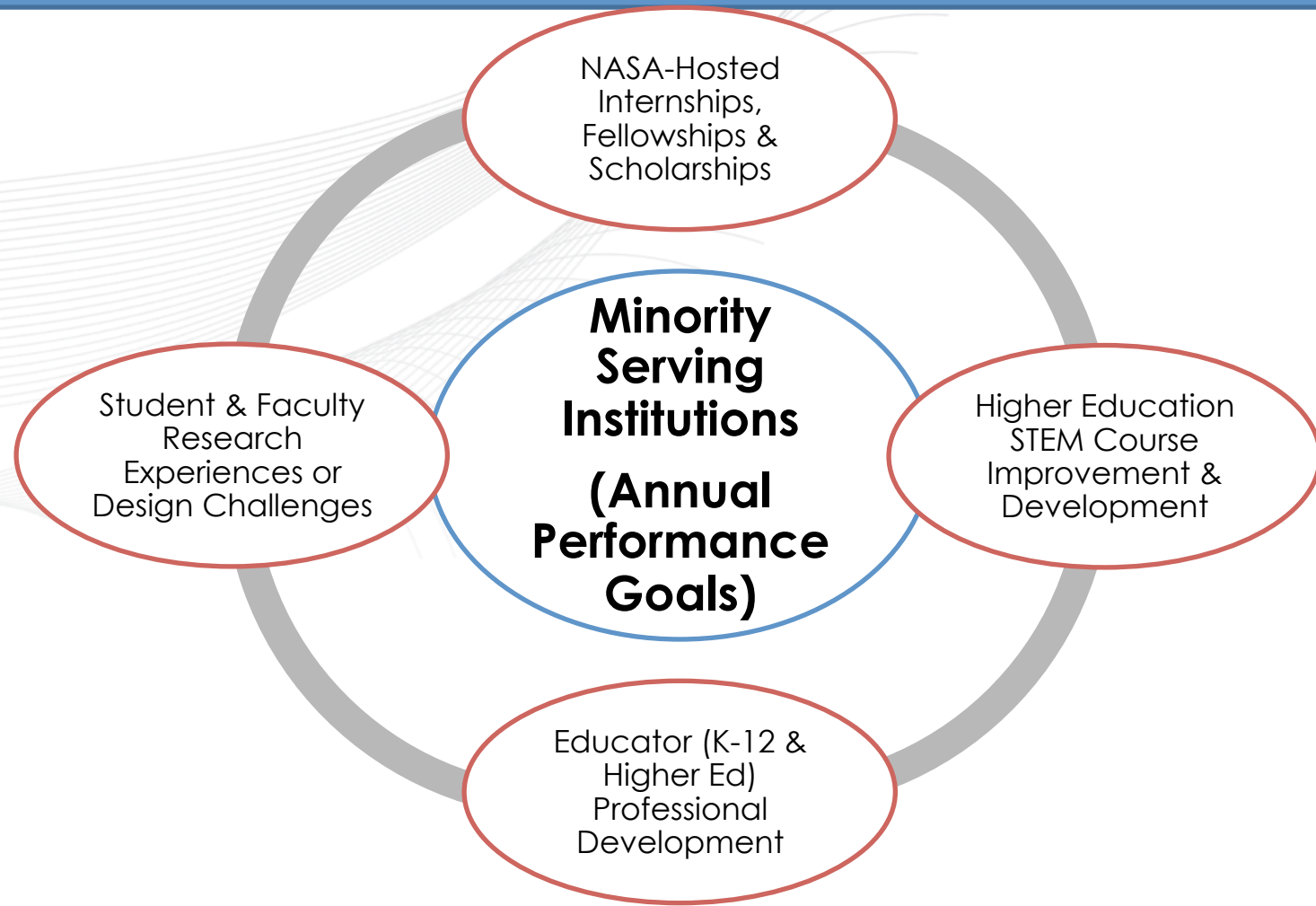Institutions

44 States + DC
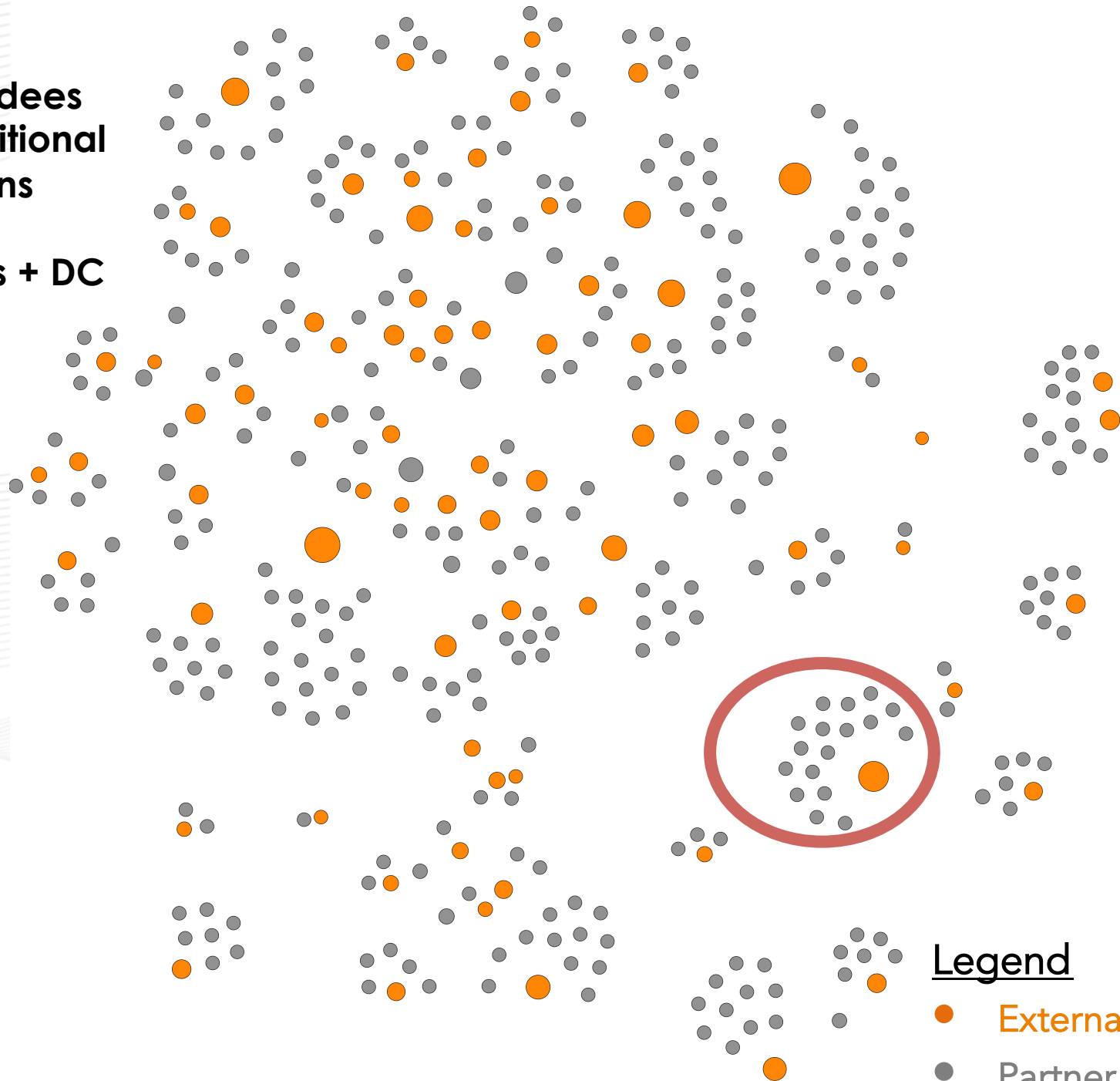
Legend

● External Awardee

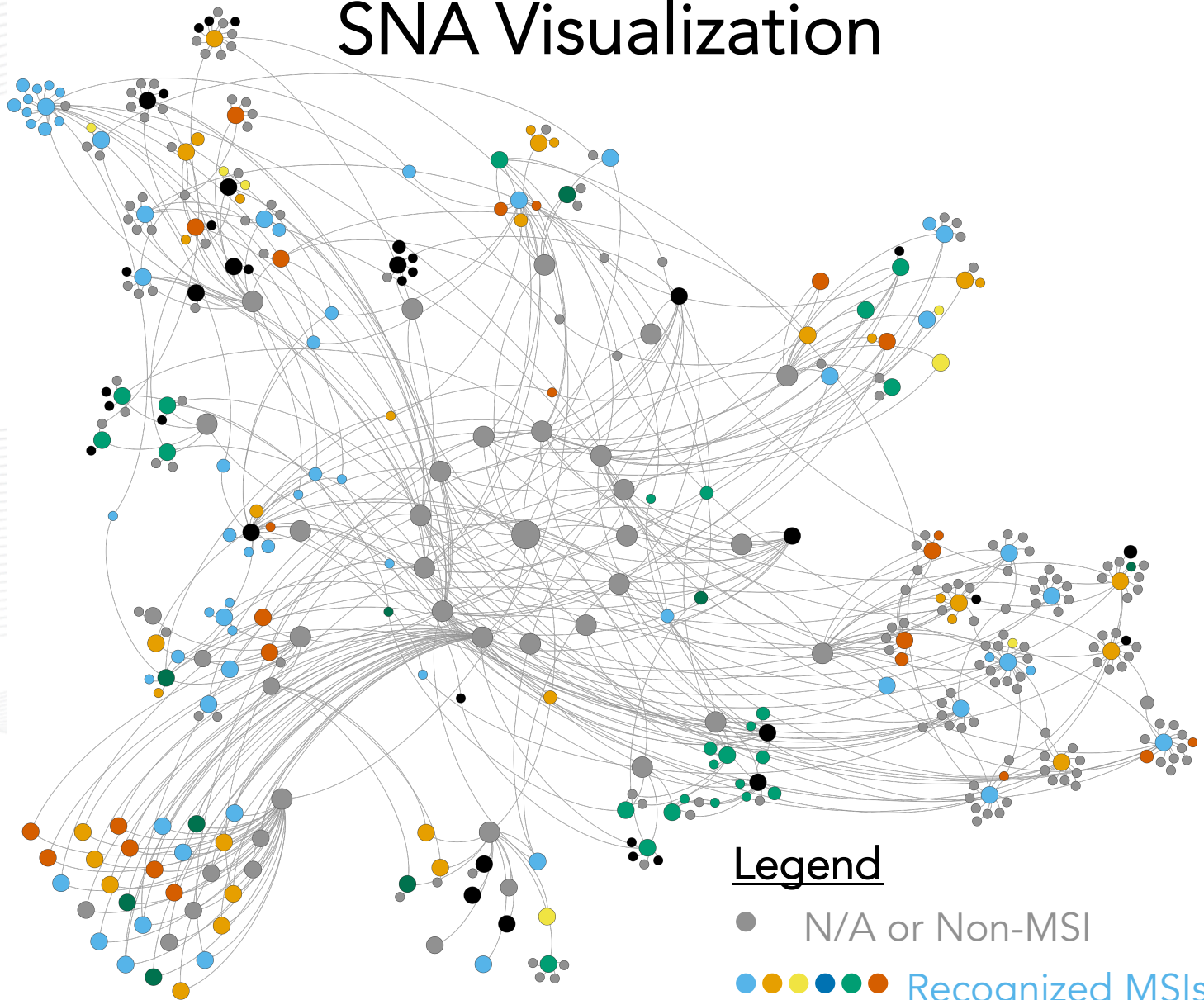● Partner

1 Awardee, 15 Partners

1 Awardee, 20 Partners

Legend

- External Awardee
- Partner

MUREP – Internal/External Minority Serving Institution Initiative; 124 Elements
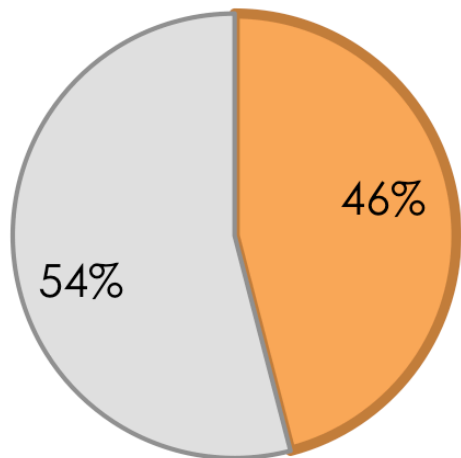
SNA Visualization

Legend

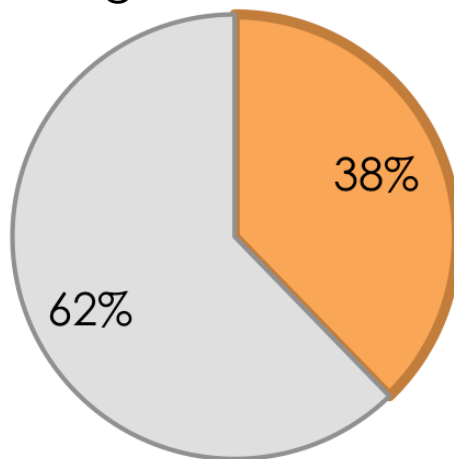● N/A or Non-MSI

●●●●●● Recognized MSIs

● Other Minority Serving Entity
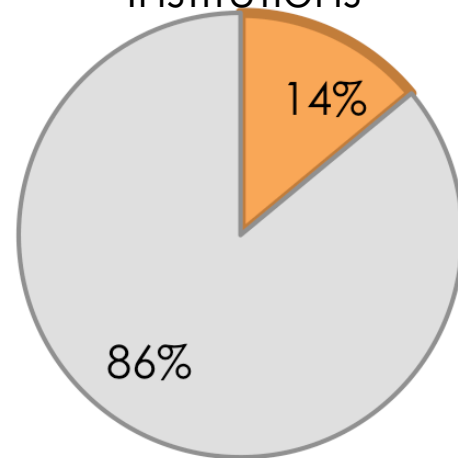
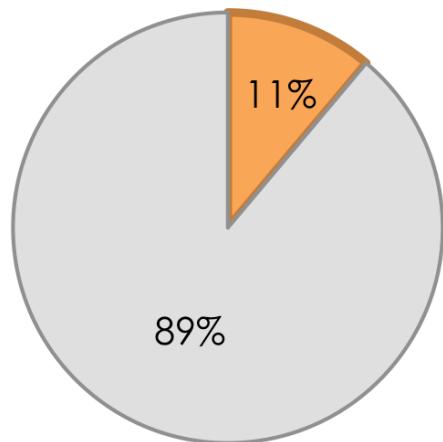# Example Evaluation Question: Reach to All MSIs

Tribal Colleges & Universities: 46%, 54%

Historically Black Colleges & Universities: 38%, 62%
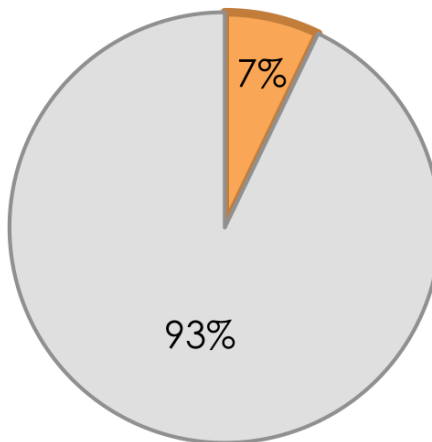
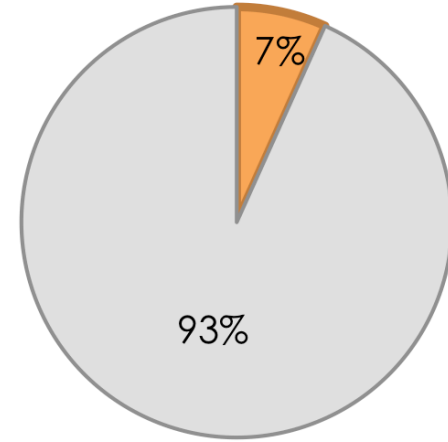Asian American & Native American Pacific Islander Serving Institutions: 14%, 86%

Hispanic Serving Institutions: 11%, 89%

American Indian & Alaskan Native Serving Institutions: 7%, 93%

Predominantly Black Institutions: 7%, 93%

Key Take-Aways

- SNA serves multiple purposes
  - Institutional learning
  - Real use of evaluation
  - Triangulation & mixed-methods to understand context
  - Responsive to accountability requirements

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SNA + Evaluation: Types of Questions

- <u>Who</u> is connected?
- <u>How</u> are they connected?
- <u>Which characteristics</u> of the network are important to project success?
- <u>How</u> do partnerships correlate or lead to successful and unsuccessful outcomes?
- <u>What opportunities</u> can be identified for the future?