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A NETWORK ANALYSIS OF COAUTHORSHIP AMONG AEC FACULTY

NON-THESIS PRESENTATION



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MASTER'S CANDIDATE



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COMMITTEE CO-CHAIR

AEC 2020-2025 STRATEGIC PLAN

AREA 1

GOAL

Strengthen formal and informal faculty networks within and across expertise areas to enhance our research program

KEY OUTCOME

AEC faculty lead the development of new initiatives that expand existing collaborative networks throughout Florida and beyond

WHAT IS SOCIAL NETWORK ANALYSIS (SNA)?

DEFINITION

- A tool used to examine the complex web of connections among members within a defined network.

KEY COMPONENTS

- **Nodes** – The individuals or entities within the network
- **Edges (Ties)** – The connections or relationships between nodes

PURPOSE

- To uncover patterns, themes, and structures within social networks

HISTORICAL BACKGROUND

- **1930: Began with Jacob L. Moreno and Helen Jennings**
 - Analyzed the relationships between students at Hudson School for Girls to understand the relationship between social structures and runaways.
- **Refined in the mid-20th century by incorporating matrix algebra and graph theory.**

NETWORK MEASURES

Networks can be characterized by individual (nodes) or by the entire network. These measures give us a way to make comparisons with the most common being centrality measures and cohesion measures, respectively.

CENTRALITY MEASURES

- **Degree** – The number of ties held by each node
- **Betweenness** – The number of times a node lies on the shortest path between other nodes
- **Closeness** – Scores each node based on the 'closeness' to all other nodes in the network

COHESION MEASURES

- **Density** - The number of links within a network divided by all possible links which could exist in a network
- **Centralization** – The extent to which a network is dominated by a single node

KEY METRICS

#2 EXPAND NETWORKS AS MEASURED BY SOCIAL NETWORK ANALYSIS TOOLS

WHOLE CO-AUTHOR NETWORK ANALYSIS:

OVERVIEW

- *Total nodes* range from 128 (2022) to 191 (2023) with an average of 161.
- *Ties* peaked in 2019 at 1,738 with an average of 1,134.
- *Average degree* gradually declined throughout the dataset.
- *Centralization* peaked in 2019 at 0.333 but averaged at 0.213.
- *Density* was fairly consistent and low at an average of 0.043.

AEC-ONLY NETWORK ANALYSIS:

OVERVIEW

- *Total nodes* range from 27 (2019, 2023) to 30 (2022) with an average of 28.
- *Ties* peaked in 2021 at 76 with an average of 52 annually.
- *Average degree* was generally low, averaging 1.879.
- *Centralization* was overall moderate but have trends correlating to tenure and specialization.
- *Density* averaged at 0.035 indicating a sparse network structure.

There are two primary anomalies to consider with the data: 2019 saw multiple large grant projects and 2022 saw delayed publishing impacts from COVID-19.

METHODOLOGY

- Peer-reviewed articles from 2019-2023
- At least one author is a faculty member of AEC
- UCINET was utilized to create and analyze matrices
- Netdraw was utilized to created matrix of all AEC faculty contributions in given years

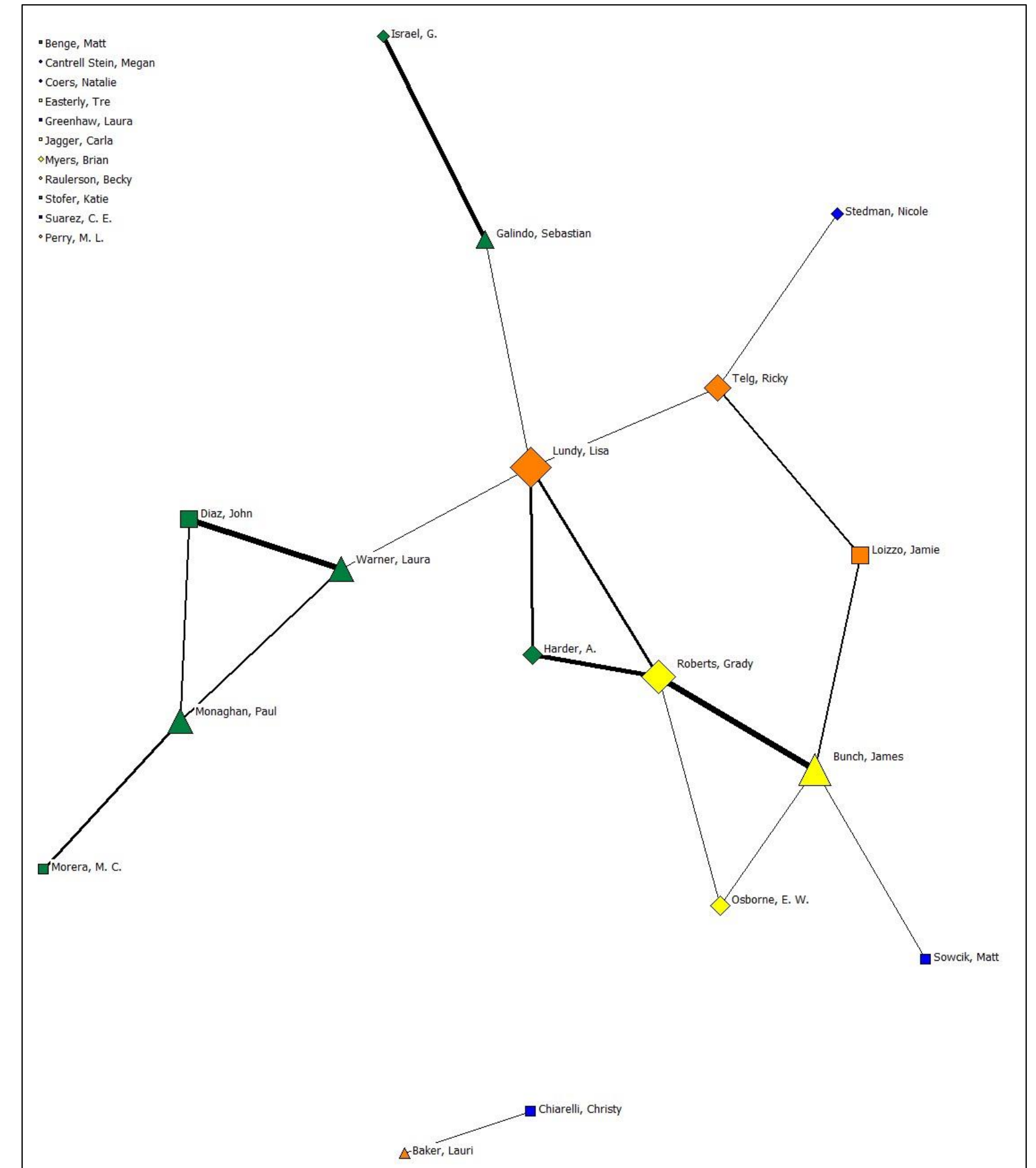
Article Title	Ahn, Jaehyun	Baker, Lauri	Barry, Debra	Beattie, Peyton	Benge, Matt	Bunch, James	Bush, Sarah	Cantrell, Megan	Chiarelli, Christy	Coers, Natalie	Diaz, John	Easterly, Tre	Galindo, Sebastian	Greenhaw, Laura	Hundemer, Sadie	Jagger, Carla	Loizzo, Jamie	Lundy, Lisa	Monaghan, Paul	Myers, Brian	Raulerson, Becky	Roberts, Grady	Stowcik, Matt	Stedman, Nicole	Stofer, Katie	Tarpley, Troy	Telg, Ricky	Warner, Laura	White, Shane	Young, Heather
Podcasts in production: An examination of current and best practices for agricultural and natural resource podcast producers.						X											X	X												
What's Trust Got to Do with It? Exploring Agricultural Science Podcast Producers', Guests', and Listeners' Perceptions and Levels of Trust in Science						X											X	X												
Exploring how an integrated skills acquisition activity impacts the teaching ability and perceived self-efficacy to teach agricultural technical skills of preservice teachers.						X															X									
Online and on-campus transfer students experienced different impacts from the pandemic													X																	
High school students' perceptions of science and scientists improve following university-based online DNA day.																	X							X						
Online adventures: Virtual experiential learning in leadership education.														X																
Competency needs assessment of national association of extension 4-H youth development professionals members						X																								
Challenges and barriers to developing commercial beekeeping education programs in Florida						X																								
Exploring small-scale farmers' perceptions and needs for non-formal leadership education.														X																

2023 COAUTHOR MATRIX

AEC ANALYSIS

WHAT DID WE DO?

- Reviewed all peer-reviewed journal articles from 2019 – 2023 that had at least one AEC faculty member as a contributor
- Utilized UCINET to visualize the AEC network for each year
- Secondary visualizations were produced to show AEC-only co-authorship networks.



2020 AEC ONLY MATRIX

RESULTS KEY

NODE SHAPE	TENURE STATUS
Plus (+)	Not in AEC (or unknown)
Circle	Lecturer
Square	Assistant
Triangle	Associate
Diamond	Full

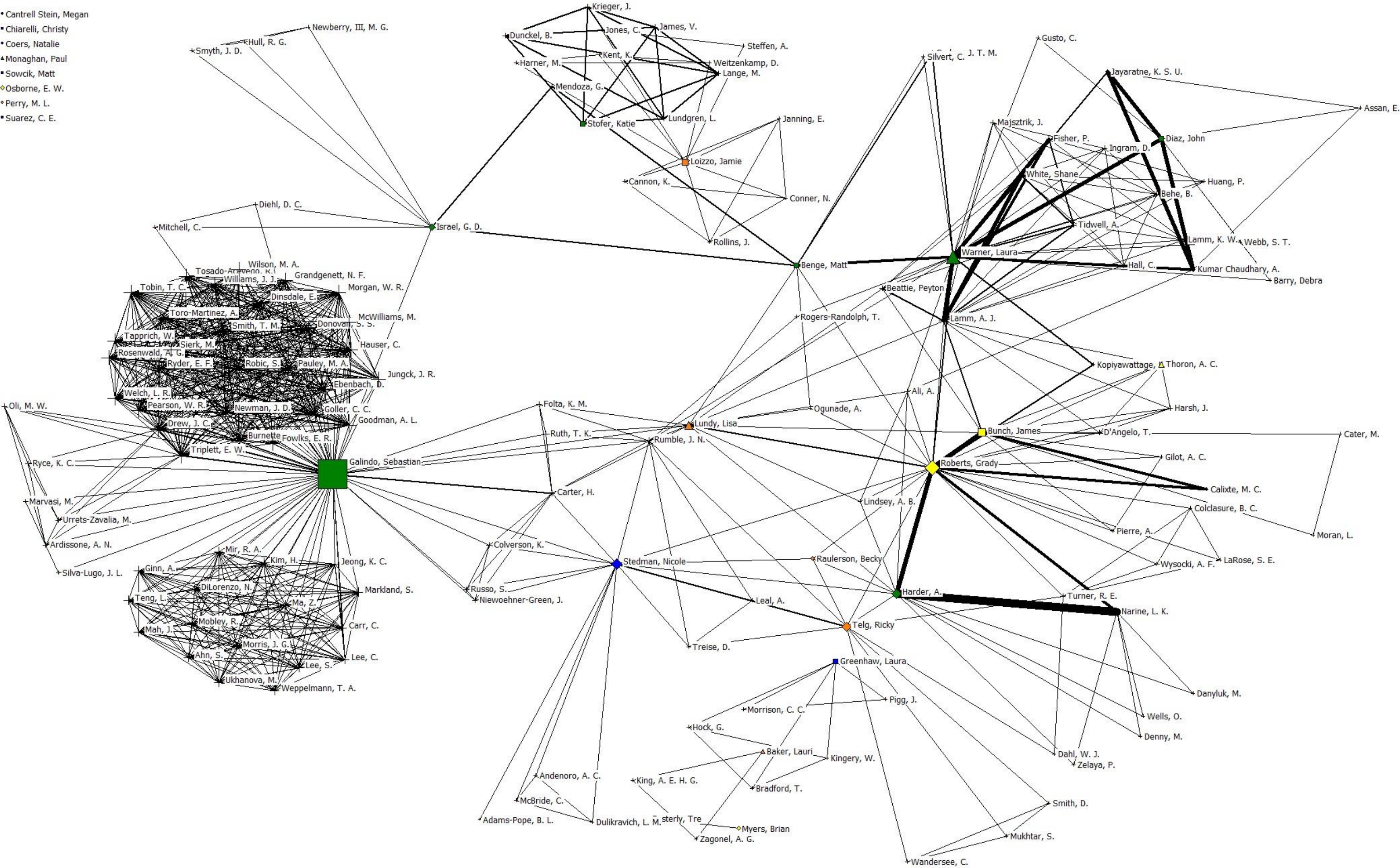
NODE COLOR	UNIVERSITY DEPARTMENT
Black	Not in AEC (or unknown)
Yellow	Teacher Education
Blue	Leadership
Orange	Communications
Green	Extension

- NODE SIZE CORRELATES TO DEGREE
- LINE WEIGHT CORRELATES TO TIE STRENGTH

RESULTS

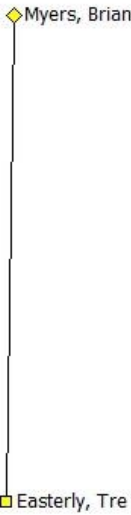
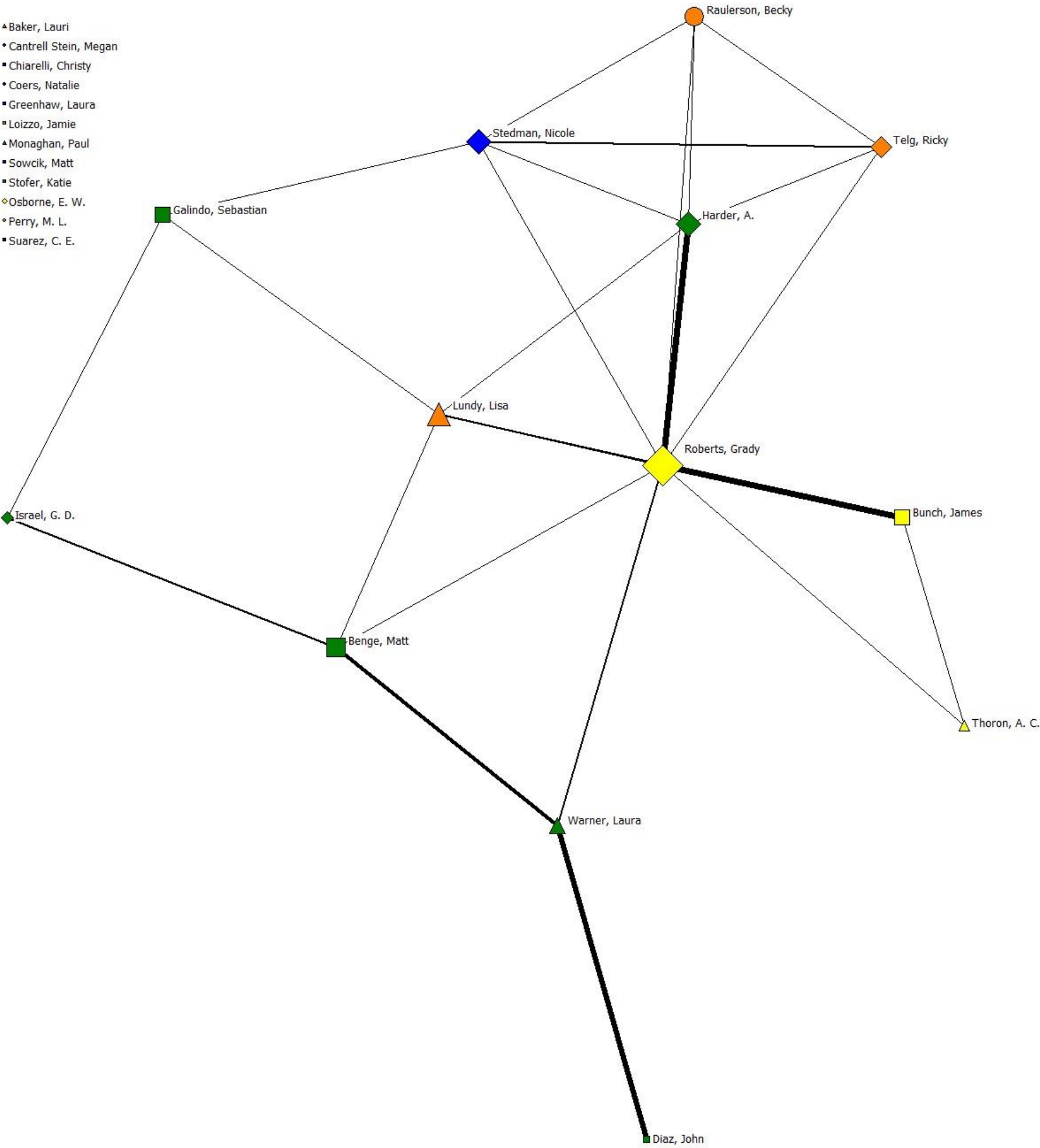
2019 WHOLE NETWORK COAUTHORSHIP

- Cantrell Stein, Megan
- Chiarelli, Christy
- Coers, Natalie
- Monaghan, Paul
- Sowcik, Matt
- ◊ Osborne, E. W.
- Perry, M. L.
- Suarez, C. E.



RESULTS

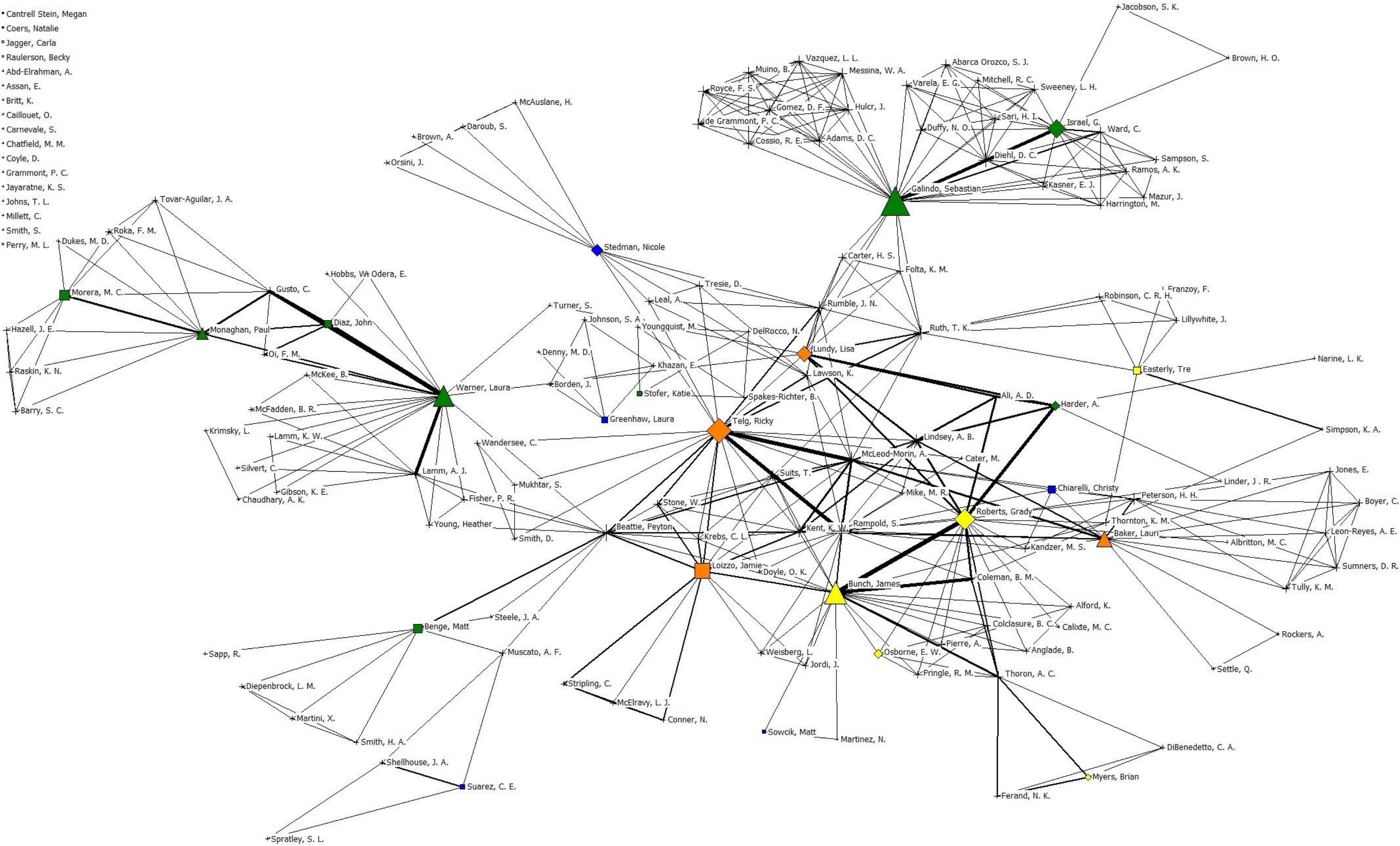
2019 AEC ONLY COAUTHORSHIP



RESULTS

2020 WHOLE NETWORK COAUTHORSHIP

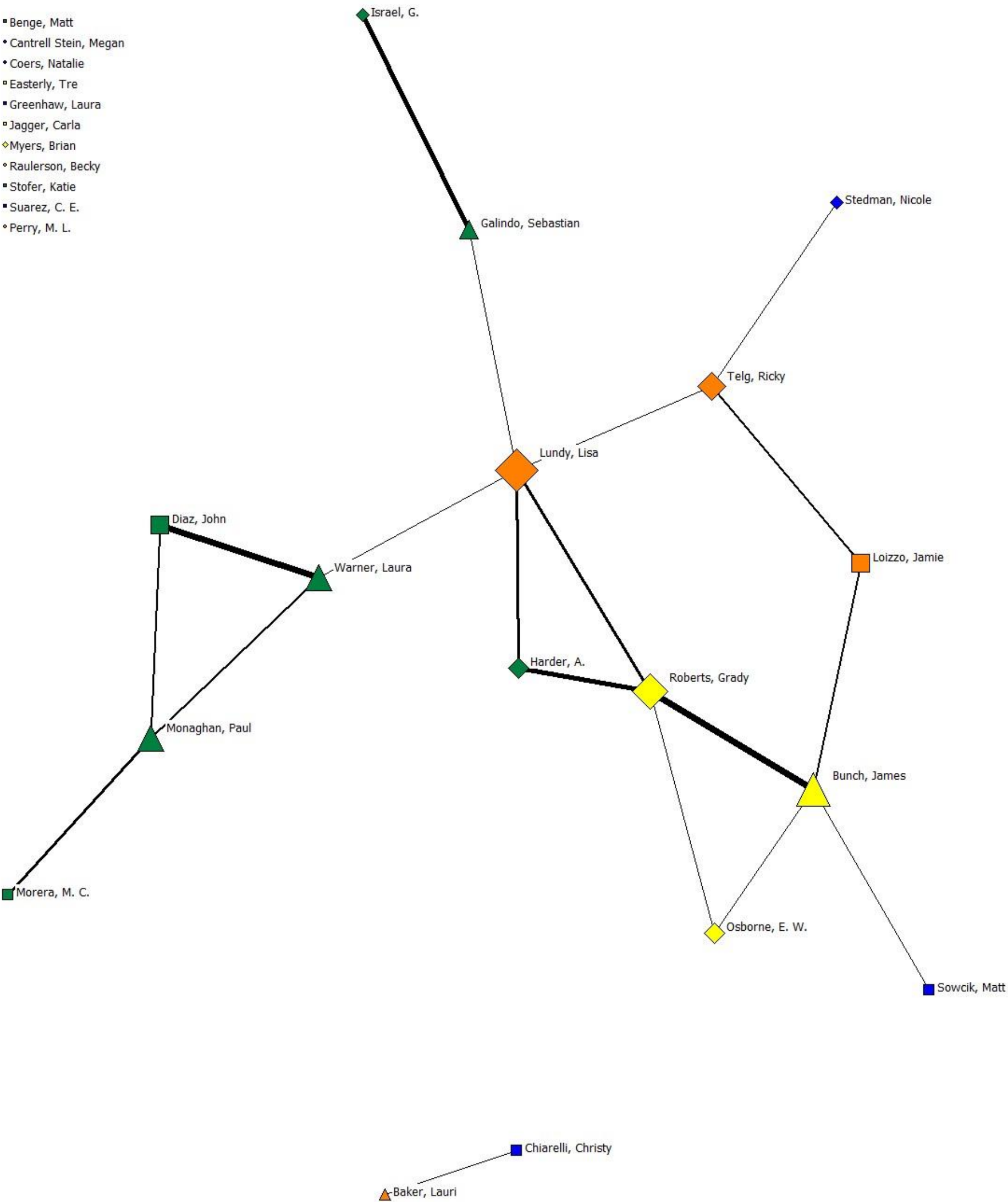
- Cantrell Stein, Megan
- Coers, Natalie
- Jagger, Carla
- Raulerson, Becky
- Abd-Elrahman, A.
- Assan, E.
- Britt, K.
- Caillouet, O.
- Carnevale, S.
- Chatfield, M. M.
- Coyle, D.
- Grammont, P. C.
- Jayaratne, K. S.
- Johns, T. L.
- Millett, C.
- Smith, S.
- Perry, M. L.



RESULTS

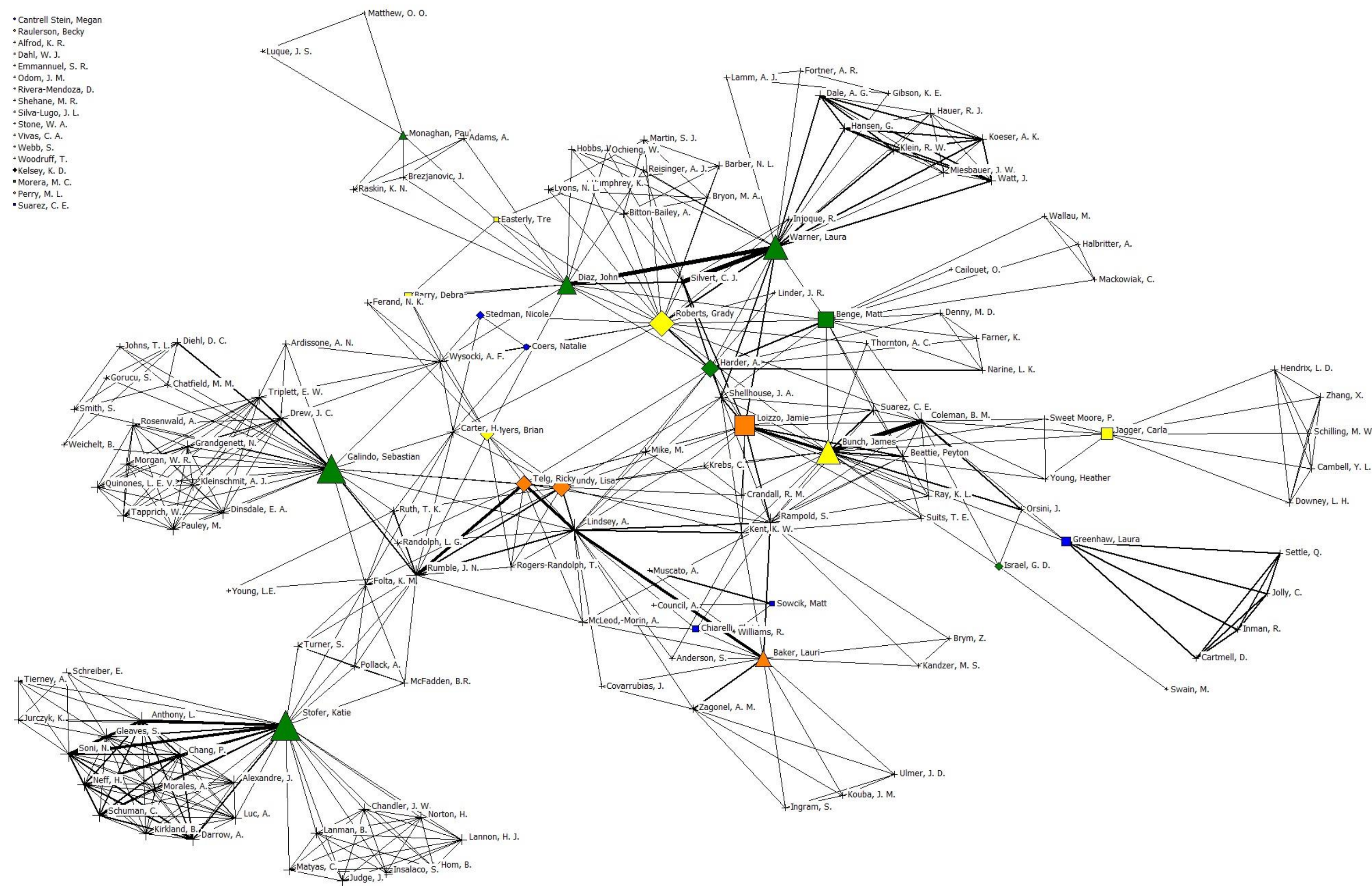
- Benge, Matt
- Cantrell Stein, Megan
- Coers, Natalie
- Easterly, Tre
- Greenhaw, Laura
- Jagger, Carla
- ◆ Myers, Brian
- Raulerson, Becky
- Stofer, Katie
- Suarez, C. E.
- Perry, M. L.

2020 AEC ONLY COAUTHORSHIP



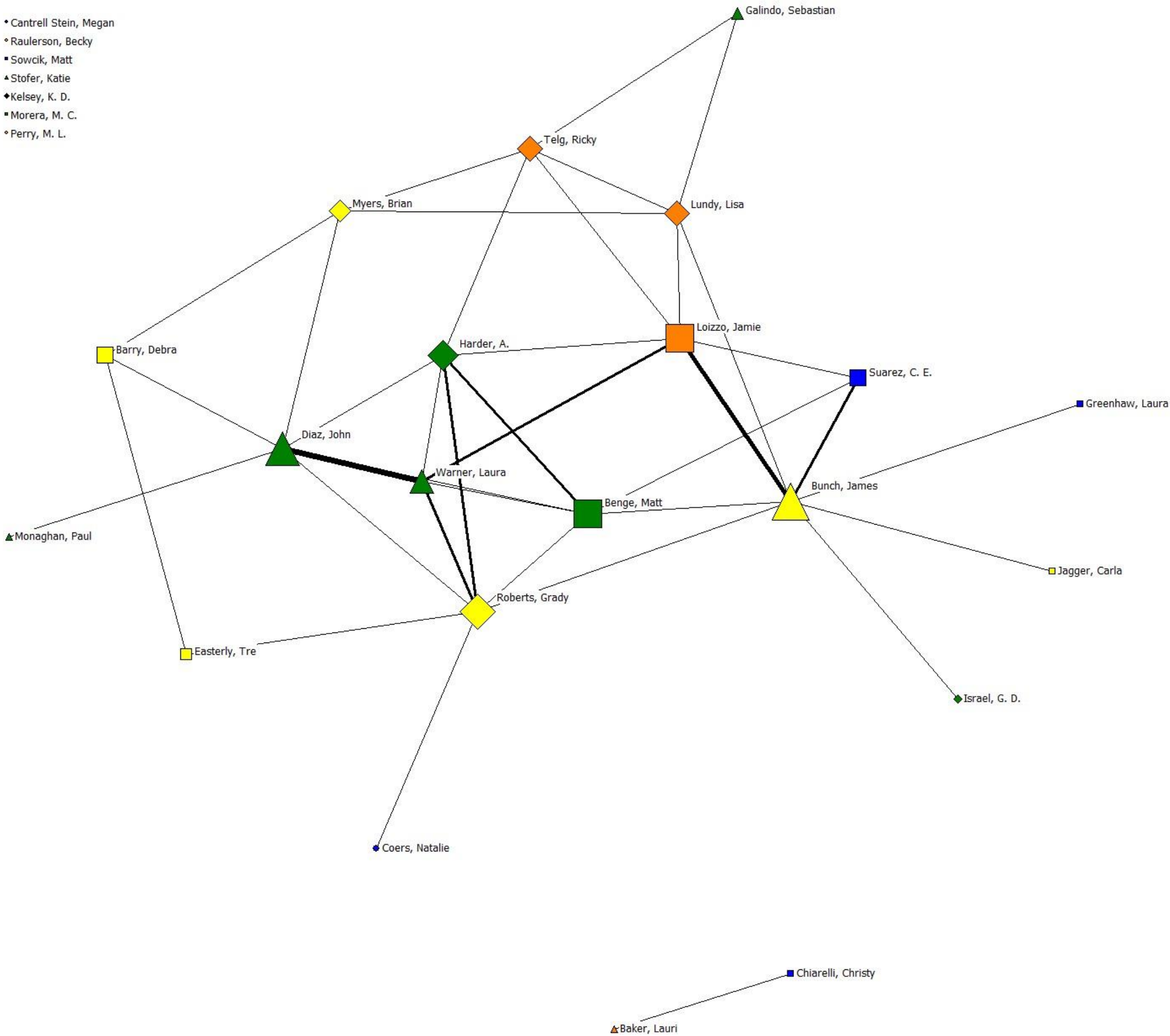
RESULTS

2021 WHOLE NETWORK COAUTHORSHIP



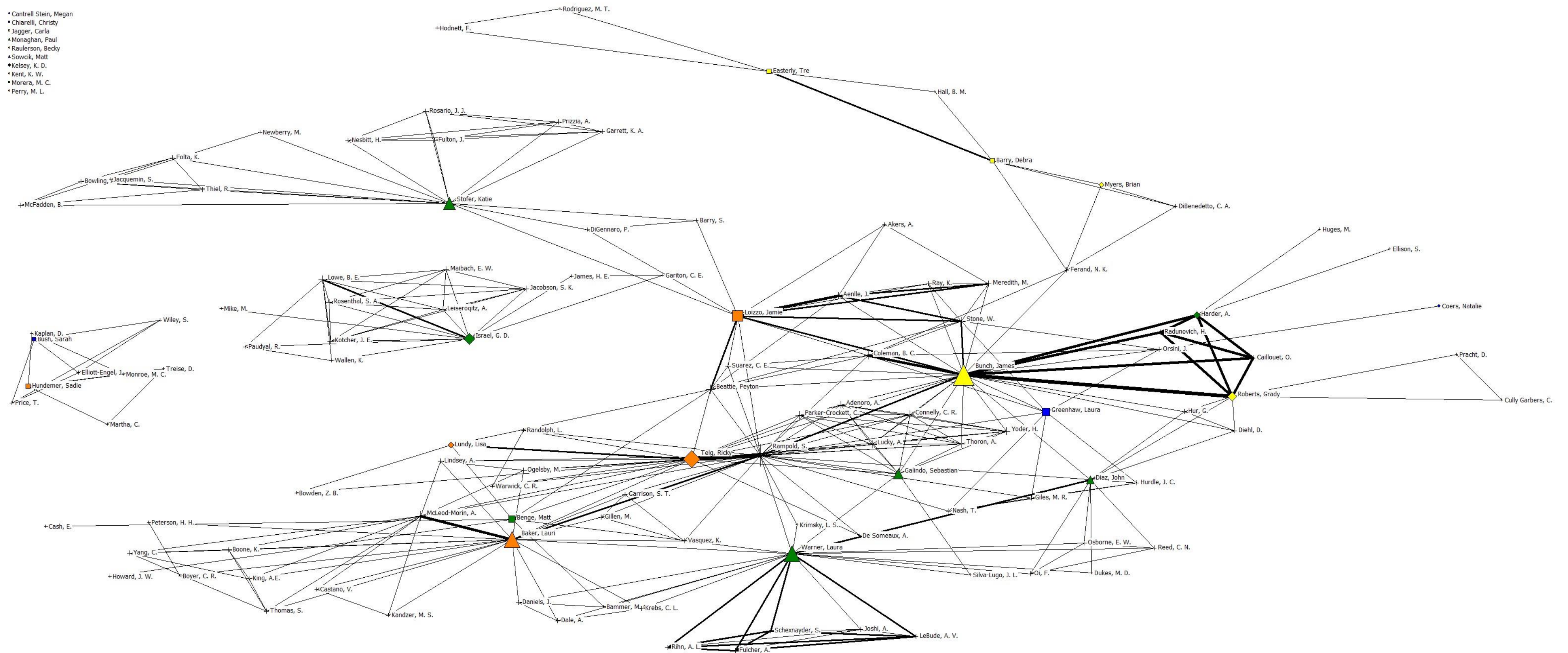
RESULTS

2021 AEC ONLY COAUTHORSHIP



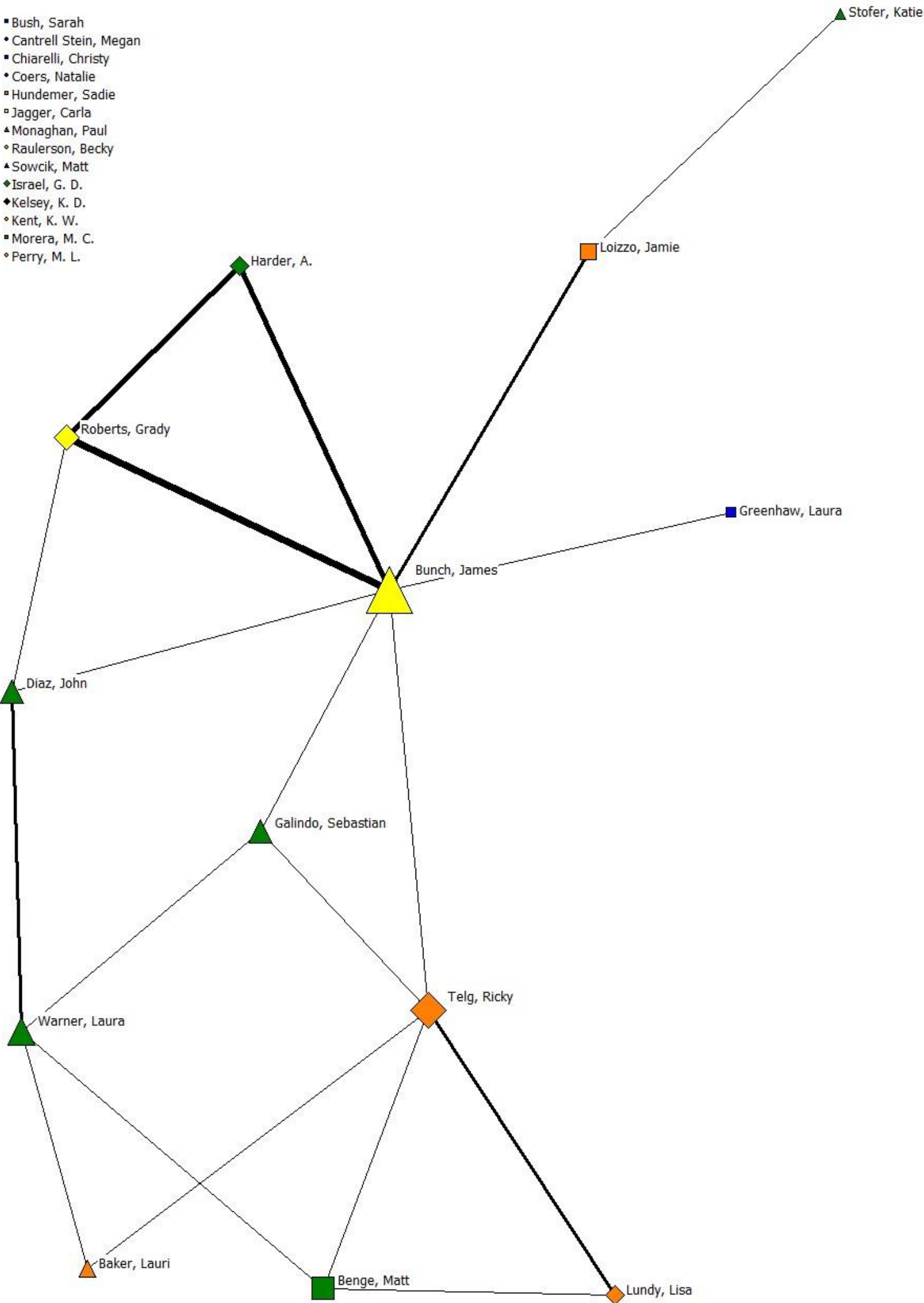
RESULTS

2022 WHOLE NETWORK COAUTHORSHIP

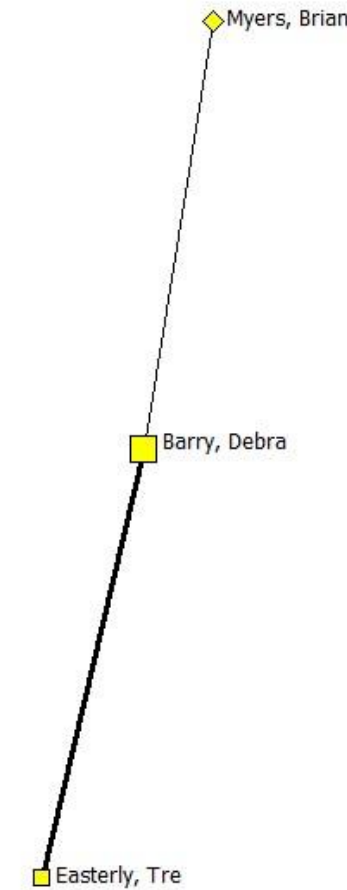


RESULTS

- Bush, Sarah
- Cantrell Stein, Megan
- Chiarelli, Christy
- Coers, Natalie
- Hundemer, Sadie
- Jagger, Carla
- ▲ Monaghan, Paul
- Raulerson, Becky
- ▲ Sowcik, Matt
- ◆ Israel, G. D.
- ◆ Kelsey, K. D.
- Kent, K. W.
- Morera, M. C.
- Perry, M. L.



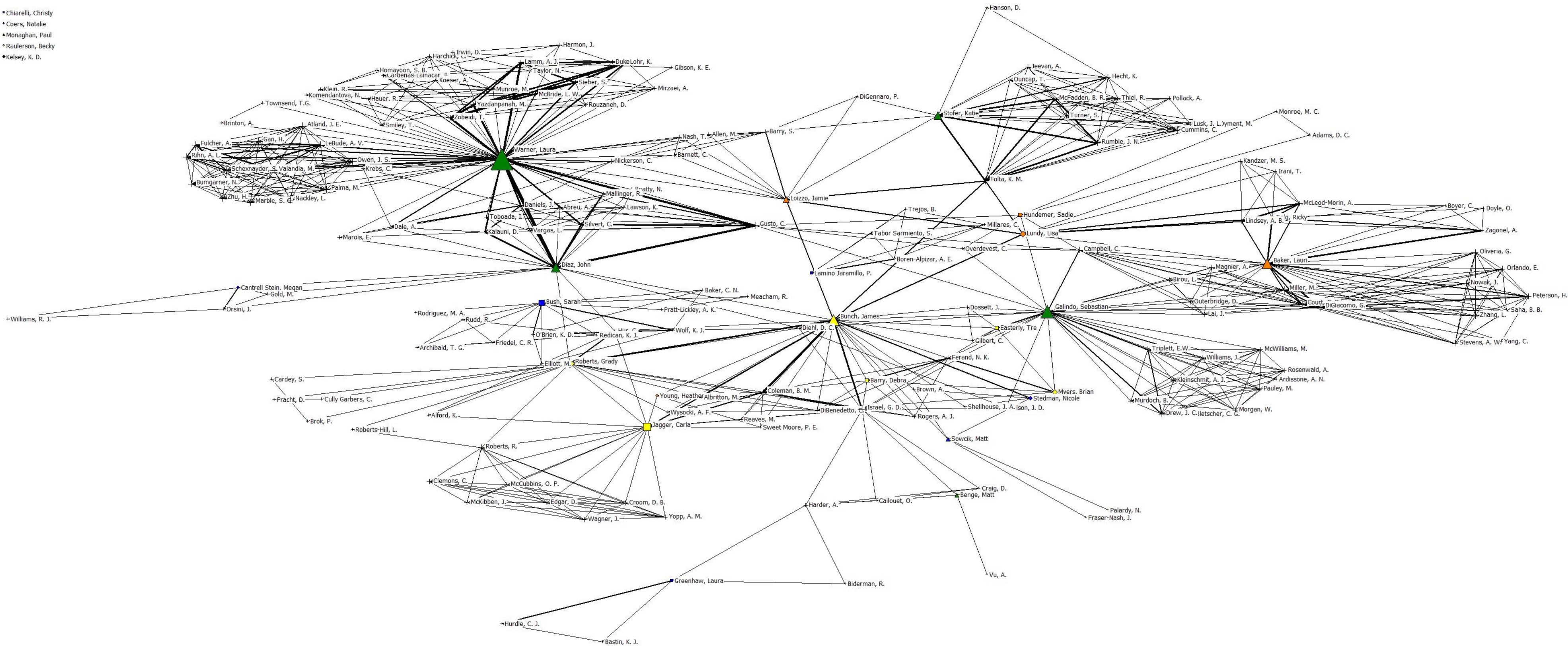
2022 AEC ONLY COAUTHORSHIP



RESULTS

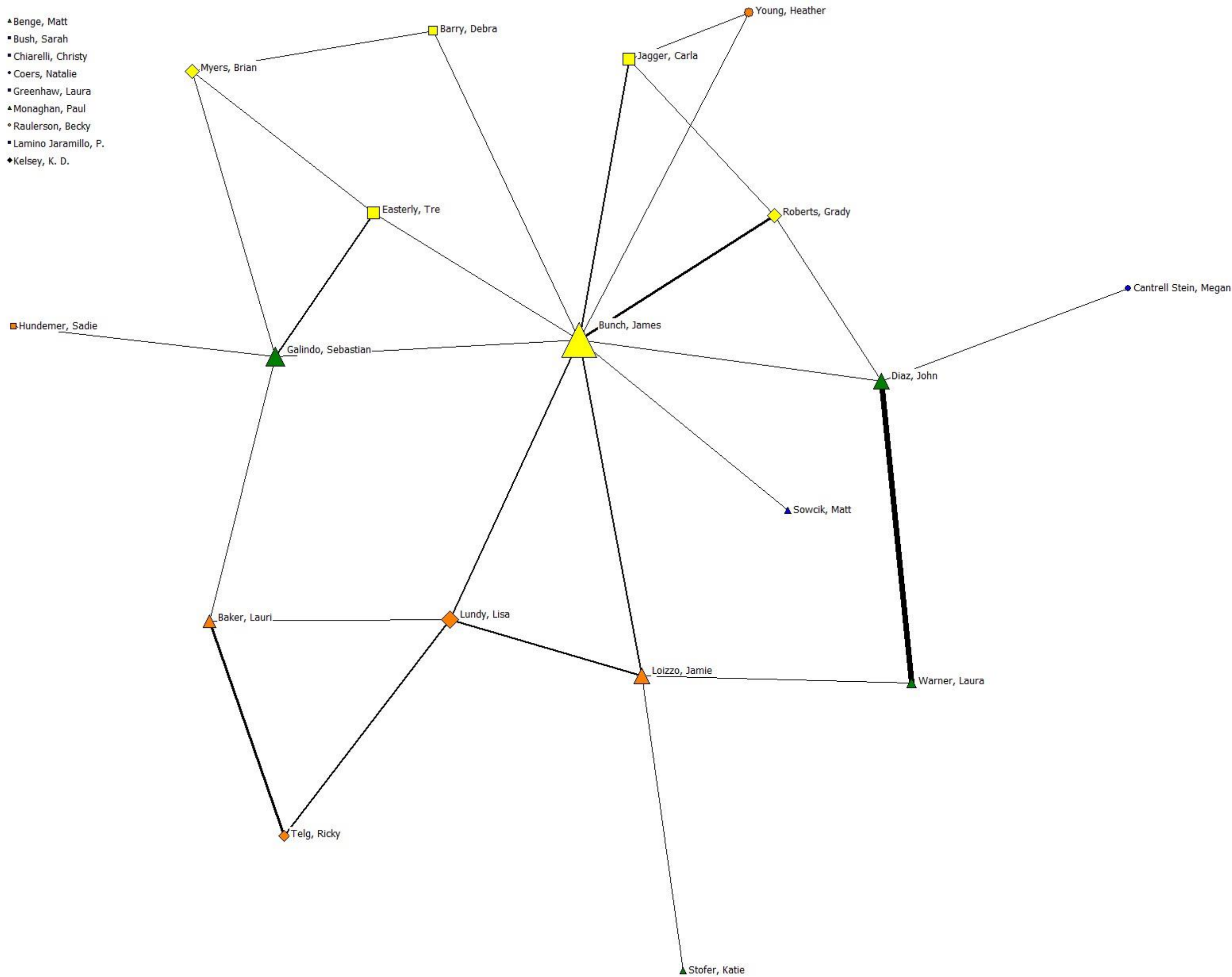
2023 WHOLE NETWORK COAUTHORSHIP

- Chiarelli, Christy
- Coers, Natalie
- ▲ Monaghan, Paul
- Raulerson, Becky
- ◆ Kelsey, K. D.



RESULTS

2023 AEC ONLY COAUTHORSHIP



WHOLE NETWORK CONCLUSIONS

- **Fluctuating Engagement** – There was a notable dip in 2022 of total nodes and ties which are likely attributed to delayed impacts of COVID-19, but 2023 made a resurgence with the highest number of nodes and ties to date.
- **Changes in Connectivity** – The average degree (connections per faculty member) consistently decreased from 2019-2022 but rebounded in 2023 indicating more connections made by faculty.
- **Evolving Centralization** – Centralization scores decreased from 2019-2021, however there was a rise in 2022 and 2023 indicating increasing prominence of select nodes.
- **Peak Activity** – 2019 saw the highest activity of the five years but also saw high centralization. This is partially due to high degree metrics by Dr. Galindo (67) and Dr. Warner (45) as outliers for the year.

	2019	2020	2021	2022	2023	Avg.
Number of Nodes	163	159	163	128	191	160.8
Number of Ties	1,738	826	1,054	638	1,412	1,133.6
Average Degree	10.663	5.195	6.466	4.984	7.393	6.940
Centralization	0.333	0.146	0.128	0.192	0.264	0.213
Density	0.066	0.033	0.040	0.039	0.039	0.0434

AEC ONLY CONCLUSIONS

- **Outliers in 2019 and 2022** – The spike in co-authorship in 2019 was likely due to large grant projects, while the decline in 2022 was likely delayed impacts from the COVID-19 pandemic on publishing timelines, making both years anomalies to the dataset.
- **Increasing Centralization** – The steadily increasing centralization trend suggests that a few key faculty members played a more dominant role in co-authorship among peers.
- **Specialization-Based Collaboration** – Faculty members primarily co-author within their own specializations rather than collaborating across different areas.

	2019	2020	2021	2022	2023	Avg.
Number of Nodes	27	28	28	30	27	28
Number of Ties	52	38	76	42	54	52.4
Average Degree	1.926	1.357	2.714	1.400	2.000	1.879
Centralization	0.294	0.145	0.211	0.207	0.332	0.238
Density	0.074	0.050	0.101	0.048	0.077	0.350

RECOMMENDATIONS FOR PRACTICE

EXPANDING OUR NETWORK

- **Collaboration Across Disciplines** – Explore joint projects with other departments (e.g., education, psychology, or business) to diversify ideas and relationships.
- **Interational Scholars** – Connect with global faculty (e.g., faculty from study abroad programs or conferences) to add world-wide information to the discipline.
- **Diverse Publication Opportunities** – Encourage faculty in non-research roles to contribute to extension publications, EDIS publication, and industry reports to broaden the department's impact beyond academic journals.

LEVERAGING OUR NETWORK

- **Mentorship** – Utilize the centralization data to identify highly-connected faculty to mentor early-career faculty to boost engagement.
- **Encourage Reciprocity** – Ensure network connections remain mutually beneficial by providing insights, research, and relationships to foster long-term partnerships with individuals outside of AEC.

COMMUNICATING OUR IMPACT

- **Graduate Project Page** – The findings will be shared on the UF AEC non-thesis project page for viewing.
- **Faculty Meetings & Workshops** – Data can be shared among faculty for an enhanced understanding of collaboration efforts.

RECOMMENDATIONS FOR RESEARCH

EXPLORING OUR NETWORK

- **Identify External Collaborators** – Assess who faculty works with outside of AEC along with how and why these connections exist.
- **Evaluate Interdisciplinary Work** – Continue with SNA each year to determine if collaborations are increasing over time.

OTHER NETWORKS

- **Utilize SNA Data** – Identify relationships outside the department and AEC specialties to focus on shared interests.
- **Leverage Outside Connections** – Strengthen and refer connections from other universities, organizations, and agencies to broaden knowledge base and relationships.

LEVERAGING OUR NETWORK

- **Continue Annual Analysis** – Track collaboration trends and share insights with faculty.
- **Diversify Publication Outputs** – Research areas of journal publications that can be contributed to by faculty, particularly faculty who is not research based.
- **Analyze central faculty roles** – Identify key faculty who connect specializations and drive interdisciplinary work.