Report on the Network Structures and Characteristics of the Hill Side Business

A Sample Sociometric Technical Report
Based on a real application
To accompany a PowerPoint report

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Introduction

Project Goal

The primary goal of this project was to identify, measure and create visual representations of the overall network, key individual, clique and small group interactions among the managers of the Hill Side Business.

Format of Report Summary

This Reports Summary contains five areas:

1. Demographic Profile
2. Overall Sociogram for Hill Side
3. Social Network Analysis Results
4. Sociogram by Team
5. Project Summary and Recommendations

Appendices contain the Key for identifying the individuals on the sociograms and the results for the centrality measures.

Results Summary

Demographic Profile

In the fall of 2001, the Hill Side Business held a meeting for their department managers with 35 managers attending, to talk about developing economic proposals for the next quarter. At this meeting, the Hill Side Business began an exploratory process to document their manager's information networks.

The communication structures and characteristics of a business, such as information networks, highlight the structural capacity of a business to successfully implement an initiative. This kind of data provides a potential tool for learning more about the overall communication structure of business leaders. This knowledge, paired with other data such as leaders' areas of interest for economic development, or their specialty areas of work, gives a fuller picture of the capacity of a business to successfully develop and implement any type of initiative, such as teaming. The strengths and weaknesses of this structure can be evaluated against the capacities required to successfully implement a particular project. This report is the analysis of the data collected at that meeting.

The individuals who participated in the Hill Side Business meeting were all department managers. Thirty-three attendees completed at least partial survey and questionnaire data. Because one or two managers sent representatives to the meeting, there is a difference in meeting participants and invited participants. This will be noted throughout the report. Based on just the survey responses, 91% of the managers attended the meeting.

Data Collection

Meeting participants were asked to provide survey data for three major questions. Question 1 asked participants to indicate their areas of specialty and personal interest by checking a general area from a list and to add other areas if necessary. Twenty-seven of the participants (82%) responded to Question 1. Some respondents indicated multiple areas of specialty, so the total across all areas will exceed the number of respondents.

Table 1. Specialty Area and Number of Respondents

Specialty Area of Respondents	
1. Banking	**16**
2. Government	**7**
3. Leadership	**13**
4. Legal	**8**

Specialty Area of Respondents	
5. Manufacturing	**7**
6. Organizational Development	**4**
7. Retail	**9**
8. Technology	**8**

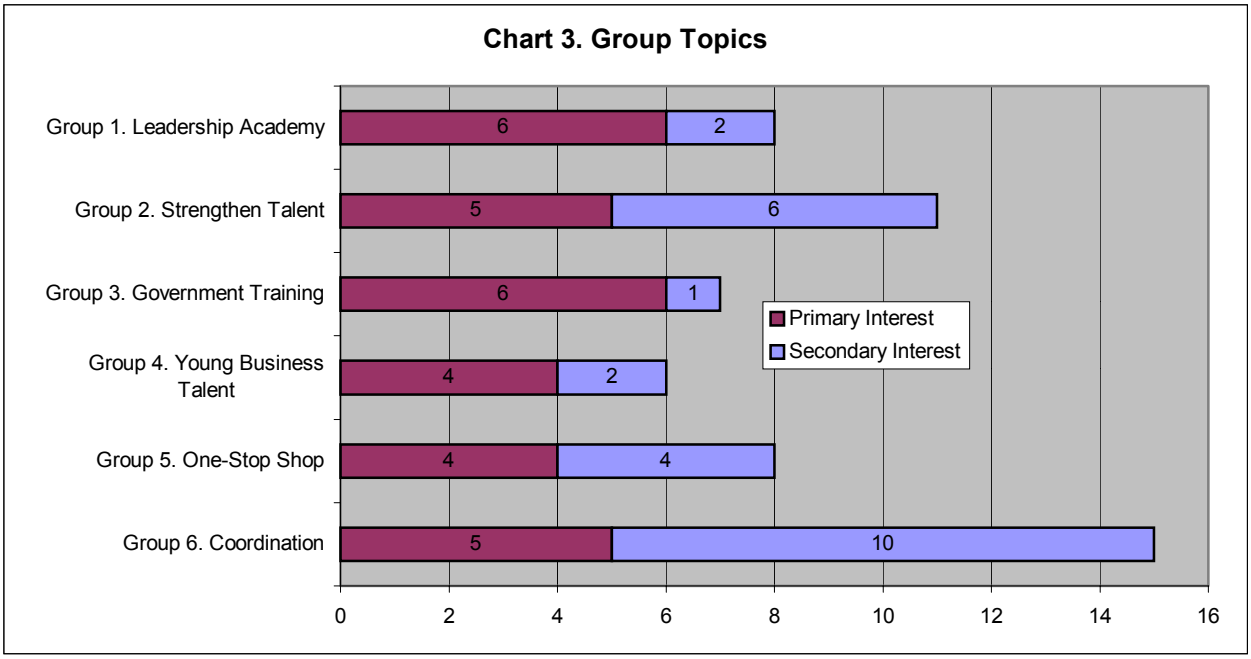
Question 2 asked participants to list up to five individuals outside of the organization on whom they rely for information and opinions about issues that affect the Hill Side Business. The 33 participants provided names for 55 contacts. The responses to Question 2 were used to construct a network for conducting a social network mapping. A total network of 115

Individuals was constructed from the formal lists of invited managers, the list of actual participants who provided data, and the contact names that were provided. This network mapping is intended to provide an indication of what the communication network might look like and to get a sense of how the managers currently interact. The overall sociograms and network analyzes included the total network of 115 individuals.

Question 3 asked participants to indicate their primary interest in one of six Group Topics for business development. Participants were also asked to indicate secondary interests. Thirty participants provided data on Group Topic interest.

Table 2. The Topical Groups

Group	Focus	Process
Group 1	Strengthen and Deepen Local Leadership	Senior Leadership Academy for existing leaders
Group 2	Strengthen and Deepen Local Leadership	Strengthen current board members and talent for Boards of Directors
Group 3	Strengthen and Deepen Local Leadership	Government leadership training program
Group 4	Groom Young Business Talent	Create and deploy resources to retain college grads
Group 5	One-Stop Shop for Entrepreneurs	Develop and coordinate services
Group 6	Coordinate Downtown Activities	Develop new function for downtowns and promote sense of region



There is some need to be cautious in interpreting the network data from the Hill Side Business meeting. The individuals who participated in the Hill Side Business meeting were a sample of the larger business organization. The participants who responded to the three questions provide a partial picture of the overall communication network within the larger Hill Side Business managers group. However, if viewed as a sample, this data can indicate communication patterns, and where there are gaps or holes in connections. Partial data can

also hint at a possible direction for a larger underlying structure, if the sample is considered representative.

In addition, using informal validation techniques, such as reviewing with the Advisory Board how representative of the business the results appear, we might also find that this level of responsiveness and the corresponding structures and results are representative of their perceptions of the network. In the next section, the network analysis results and sociograms are presented. The analyses provide additional indicators of the overall structure.

Overall Sociograms for Hill Side Business

A sociogram is a visual or graphic representation of the connections from one individual to others within a network of individuals. A more complete description of sociograms can be found in the accompanying document – *Understanding Sociograms*.

The sociograms were constructed from the responses to the question, "Help us identify individuals on whom you rely for information and opinions about issues that affect the Hill Side Business." The response was limited to provided five choices. The data were analyzed using a network analysis program, UCINET V [i], and a graphing program, Krackplot 3.2. The graphing program was set so that the lines between individuals were shortened so that the clusters of connections would be clearer. All the data is one direction, from the managers out.

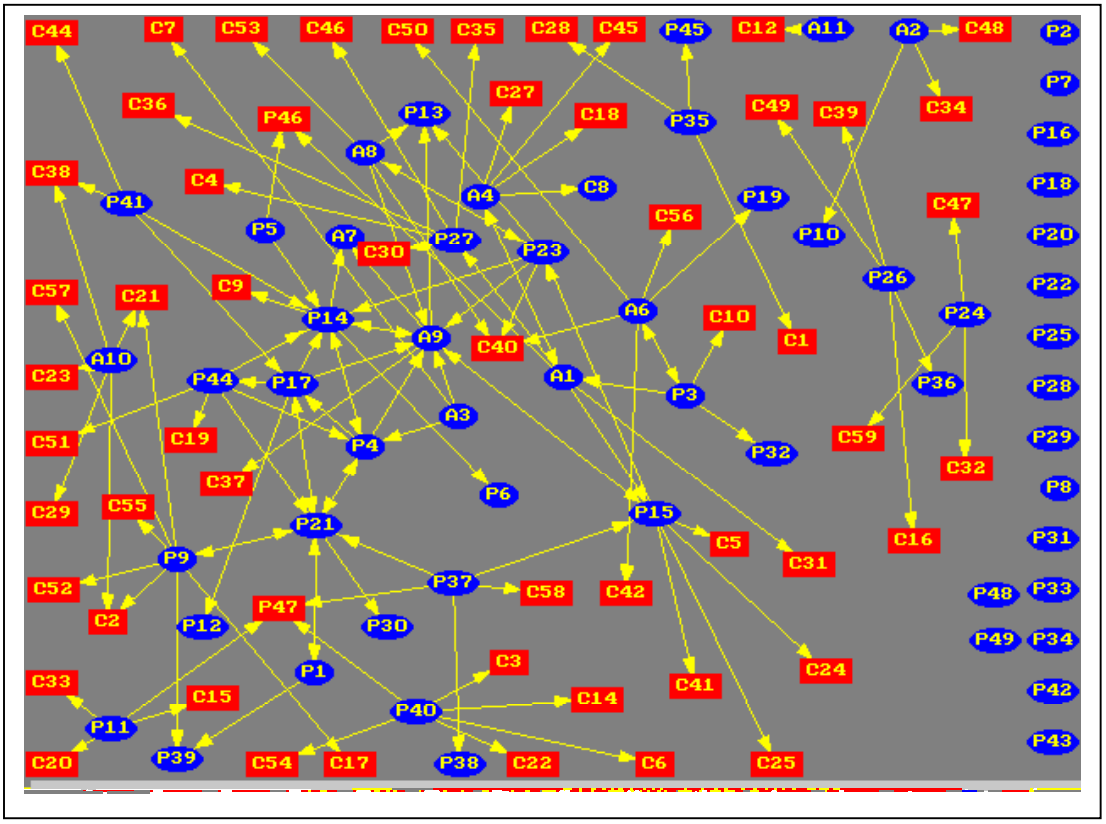
Sociogram 1 is a broad overview of the communication links for this sample of the Hill Side Business (the 115 individuals in the total network). Each manager who was invited to participate or who participated in the meeting and each contact listed by participants were included in the total network. Each individual has a letter/number code. In Sociogram 1, participants are blue ovals, contacts are red squares. (See Appendix A for key for identifying individuals.) Participants are sub coded by P or A, Participant or Advisory Board member. The Advisory Board Members are managers who have a special role providing communication directly to the board membership.

If a participant did not complete Question 2, and they were not a contact for another participant, then they would show up as an isolate. Isolates are those individuals listed along the right side of the sociogram. There are 18 isolates. The overall density of this network is .009, less than 1% of all possible connections. The density based on the 33 individuals who provided data, as a representative sample of their contacts to the entire network, is .11. Density is the total number of lines divided by the total number of possible lines between two people. This indicates that this is a relatively sparse network, with about 11% of the possible connections actually made from the 33 to the 115. Nevertheless, it may be enough to get information through the network, depending on the actual structural characteristics and the location of the individuals within that structure. The structure will be clearer in further analyses.

The direction of each choice is always from a participant to a contact. This sociogram illustrates that not all participants provided contact names. The contacts provided may have been other participants, such as Advisory Board members or other managers, or may have

been individuals with other positions within the organization. Arrows between two individuals indicate a mutual choice, such as between A1 and A4.

Sociogram 1. Total Network – All Choices



Social Network Analysis Results

The Analysis - Definitions

Four network analysis measures were calculated. Two were centrality measures and two were measures of subgroups. Centrality describes the status, power or popularity of an individual within a group. Each centrality measure differs in how the data are calculated, which is based on a definition of individual status, power or popularity within the group.

The first centrality analysis was Freeman's Indegree, which measures **network activity**. Degree is the sum of times an individual was selected as a contact by someone else.

The second analysis was Freeman's Betweenness, which is described as a measure of **information control**. Betweenness is how much an individual is indirectly linked to other members of the group and is an indicator of the extent to which an individual is between two other individuals within the network. Individuals high on betweenness may be gatekeepers or they may be facilitators. Betweenness was calculated with the Hill Side Business data as an indicator of location within the network. Location will also be evident in subgroup analysis, and from the visual representations on the sociograms.

Raw totals were used for reporting indegree. The overall numbers are so small, that the raw numbers are easier to understand and though the normalized measures could be used, this is not necessary since there are no comparisons to other networks.

The last two analyses were measures of subgroups. Analysis 3 was the number of components within the network, based on the available data. Components are subgroups defined as a set of individuals all linked together through a common path. Components are breaks in the overall network. If all the individuals in a network are linked to someone else and there is at least one path to get to all individuals, there is one component.

The Analysis 4 was the number of network cliques. A clique is a complete subgroup. This means that all the individuals in the clique are connected to each other. The largest clique for the network was calculated. The analysis adjusts for the one-way connections, so the cliques are based on a relaxed definition of mutual choices.

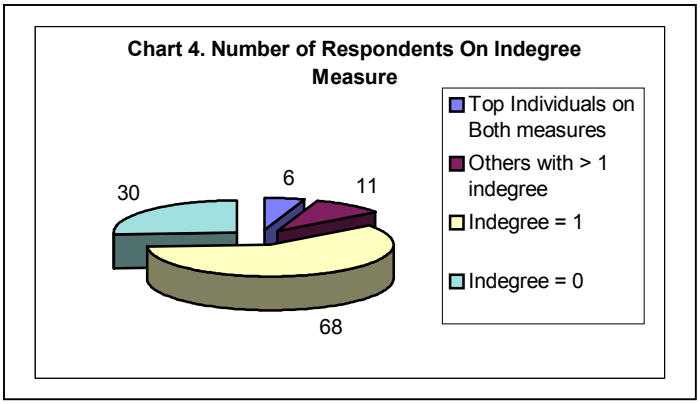
Limitations of Analysis

Because the network data are incomplete, the measures calculated for this report can only provide a glimpse of the communication structure within the Hill Side Business. The data are incomplete because not all participants completed the survey questions and the direction of the link is from the participant to the contact only. This means that the verification of the link from the contact to the participant is not possible and the links between contacts is missing. However, this network can be considered a sample of the overall network, can provide insights into the larger structure, and can indicate where more communication information would be helpful for gaining a more complete perspective.

Analysis – Results

Centrality Analysis

Six individuals had the highest Indegree and the Betweenness measures (individuals P14, A9, P21, P4, P14, P15 and A1). The highest were considered the individuals with a measure above one on the normalized betweenness and two or above on the indegree measure. All six were participants and two, A1 and A9, were Advisory Board Members. The Charts 4 and 5 summarize the range of individual measures.



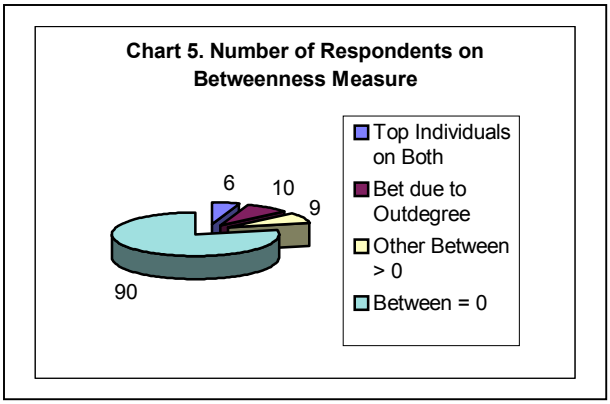


Table 2 lists the centrality measures for the six top ranked individuals on both the Indegree and the betweenness measures.

Table 2. Centrality Measures

	Between	NBetween	OutDegree	InDegree	NrmOutDeg	NrmInDeg
P14 *	220.33	1.71	5	7	4.39	6.14
A9 *	204.25	1.59	5	7	4.39	6.14
P21 *	222.83	1.73	5	6	4.39	5.26
P4 *	209.25	1.62	4	4	3.51	3.51
P15 *	235.50	1.83	6	3	5.26	2.63
A1 *	131.00	1.02	5	2	4.39	1.75

From the total network, 11 individuals have a betweenness measure dependent upon their own self-report. This means that the individuals had a relatively high selection of contacts, compared to how many other individuals chose them as a contact.

Table 3 shows those individuals with a betweenness measure that appears dependent on the outdegree measure.

Table 3. High Betweenness Relative to Low Indegree

	Code	Between	NBetween	OutDegree	InDegree	NrmOutDeg	NrmInDeg
1.	P17	110.75	0.86	5	3	4.39	2.63
2.	P23	112.75	0.88	5	2	4.39	1.75
3.	P9	116.50	0.90	8	1	7.02	0.88
4.	P3	48.00	0.37	4	1	3.51	0.88
5.	P44	36.33	0.28	5	1	4.39	0.88
6.	P27	20.00	0.16	5	1	4.39	0.88
7.	A8	18.00	0.14	5	1	4.39	0.88
8.	A4	12.00	0.09	5	1	4.39	0.88
9.	P1	8.50	0.07	2	1	1.75	0.88
10.	A6	5.00	0.04	6	1	5.26	0.88
11.	P11	0.00	0.00	4	0	3.51	0.00

In general, the overall centrality measures are low, though there are six individuals who seem to have strong connections to others and others indicate a connection back. In general, a high percentage of the contacts have one link from one participant. Because this is a directional, network - from the participants to the contacts - the missing data that the contacts could provide might indicate an increase in the number of contacts who might be more centered within the network.

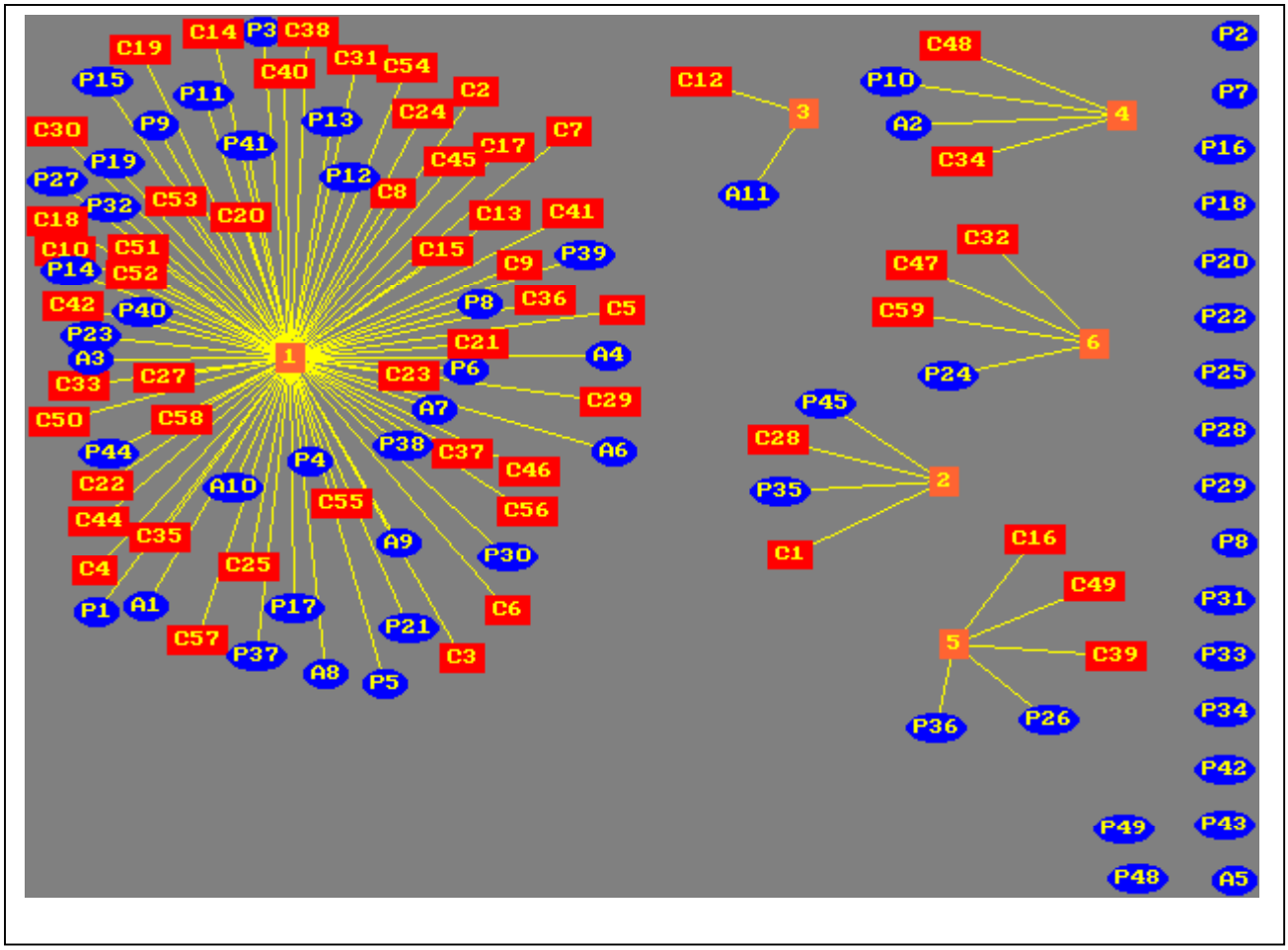
Contacts might be actually higher on betweenness measures because they may have links to participants that were not reported here, or to each other. The participants were asked to list up to five contacts that they go to most, and so each participant's list may not have been complete. The current level of data suggests that the business contact base is large and that individuals rely on a variety of sources for information, but the overall level of connectedness is low and managers do not go the same contacts.

Components

Components are breaks in the larger overall network. There are 24 components in this network. Six Component Groups contain at least two individuals, the rest are isolates. The six Component Groups are illustrated in the following sociogram. There is no order to the arrangement of the graphs. This sociogram illustrates each group (1,2,3,4,5,6) and the individuals in that group, fanning out around the group number. Individuals along the right side are isolates.

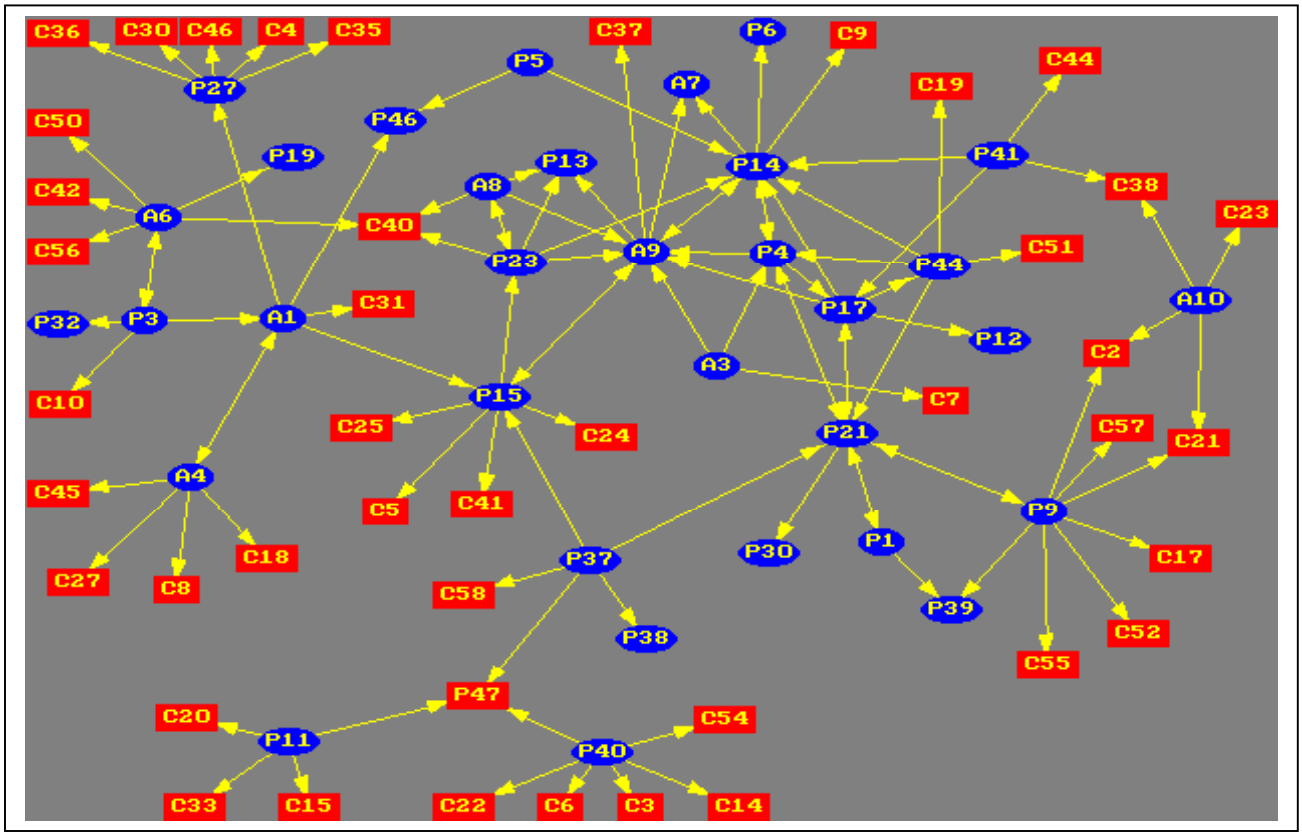
The six individuals highest on centrality, P14, A9, P21, P4, P15 and A1, are all contained in Component Group 1.

Sociogram 2. Components



Component 1 is the largest component with 78 individuals (68% of the total network) reachable through one path. Sociogram 3 illustrates how the individuals in component 1 are connected to each other. The graph settings were adjusted so that the lines between individuals are shorter, in order to see clusters better.

Sociogram 3. Component 1 Connections



Component 1 illustrates how, though the network is very loosely connected, each individual in the component is connected to at least one communication path. There are several ways to think about these connections. First, in a more limiting framework, each participant with contacts can be thought of as a cut point. A cut point is a point where there would be breaks in the network if that connection were lost.

In a more expansive framework, each cut point is a result of minimal information about the total communication structure. Therefore, if contacts had provided information it would be feasible that those additional links would show a more webbed network, with links going from contacts to contacts and from contacts to participants. So as a result you might see, for example, links between C20 and C8 and between C8 and C18. These additional links would take the pressure off the cut points.

Also this mapping of component one, illustrates two patterns of communication. The first has two parts. Throughout the network, we see each cluster of contacts around a manager, with a pattern of the managers linked to each other. For example, P9 to P21, p21 to P37, P37 to P47, P47 to P11, and so on.

Second, you see a pattern of those individuals who are highest on the betweenness and degree forming a more tightly structured network of connections. For example P21 to P9, P1,

P30, and P17; P9, P17, and P1 back to P21; P9 to C55, C52, C21, C57, C2 and C17; C2 to A10, A10 to C38, on to P42, to P14, to P4 and back to P17. This cluster will be most obvious in the clique analysis.

Cliques

Cliques are subsets of the network. All members of a clique indicate a connection to all other members. (Since this data was directional, definitions for cliques are more relaxed and any line between two individuals constitutes a mutual connection.)

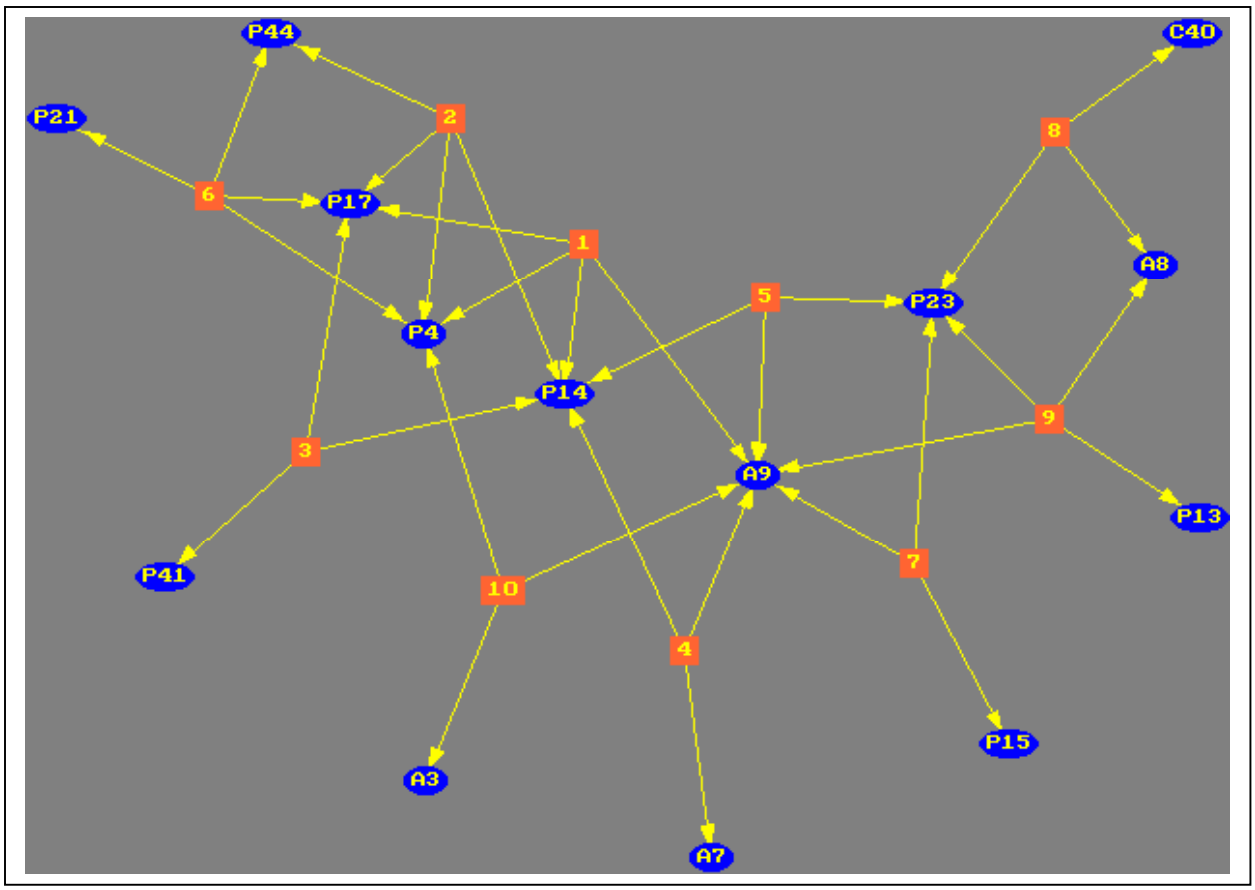
Based on the total network, there are 10 cliques. Six cliques have three members each and four cliques have four members each. All clique members, but one, were either Advisory Board members or participants. One person was a contact.

Table 4. Cliques and Members

Clique	Member	Code
1.	Scott, Brown, Akins, R. Johnson	P4, P14, P17, A9
2.	Scott, Brown, Akins, Smith	P4, P14, P17, P44
3.	Brown, Akins, Staley	P14, P17, P41
4.	Brown, R. Johnson, Waldorf	P14, A9, A7
5.	Brown, R. Johnson, Knolls	P14, A9, P23
6.	McElroy, Scott, Akins, Smith	P21, P4, P17, P44
7.	Gjovig, R. Johnson, Knolls	P15, A9, P23
8.	Peabody, Knolls, Enlow	C40, P23, A8
9.	R. Johnson, Harris, Knolls, Enlow	A9, P13, P23, A8
10.	Scott, R. Johnson, Grandt	P4, A9, A3

Clique memberships overlap from clique to clique and may be different by just one member. Sociogram 4 illustrates how the members of each clique share memberships across cliques. The brown boxes are the cliques, 1-10. The blue ovals are the members of the cliques. For example, person P21 is only a member of clique 6. Three other individuals are members of this clique also. P17 is one of the members of clique 6, but this person is also a member of clique 2, 3, and 1. Sociogram 4 is a visual representation of Table 4, with grouping by clique. The arrows around an individual indicate the individuals' clique memberships.

Sociogram 4. Cliques and Members

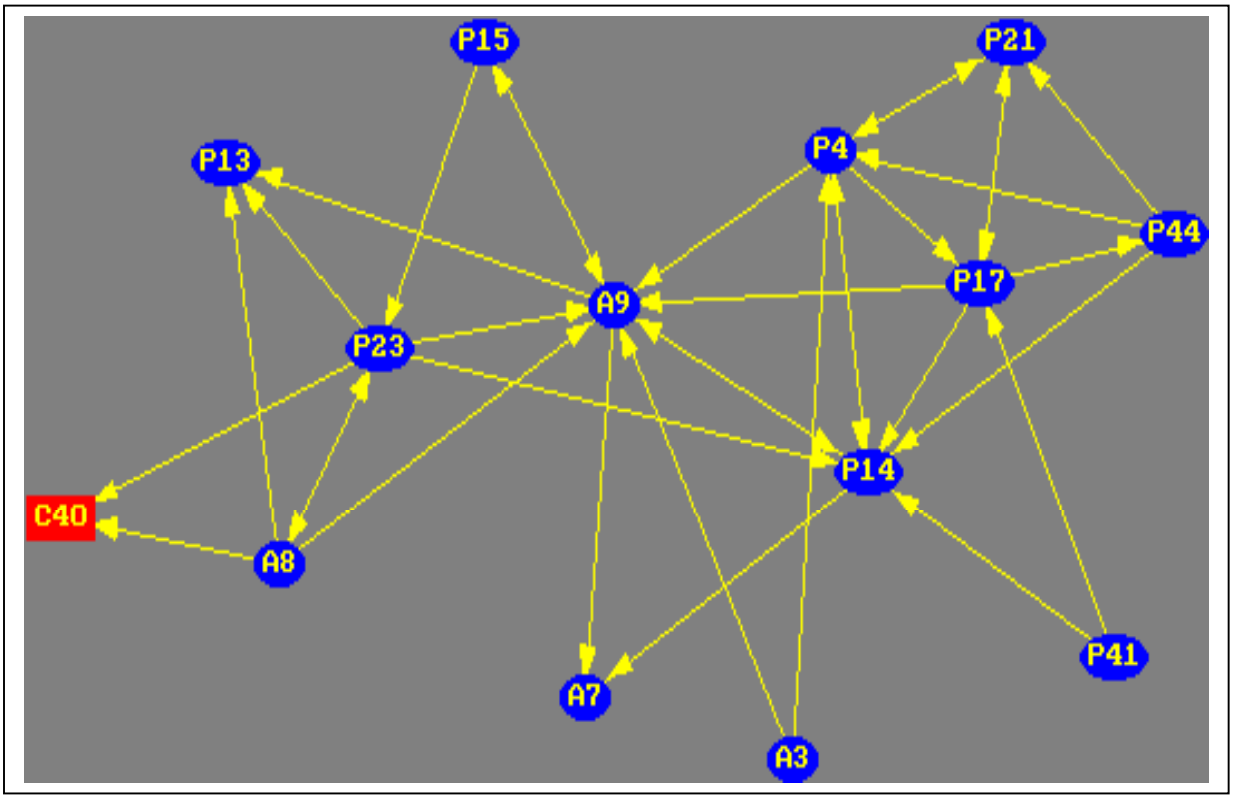


The Individuals and their code number are:

1.	Scott	P4
2.	Harris	P13
3.	Brown	P14
4.	Gjovig	P15
5.	Akins	P17
6.	McElroy	P21
7.	Grandt	A3
8.	Knolls	P23
9.	Waldorf	A7
10.	Enlow	A8
11.	Peabody	C40
12.	R. Johnson	A9
13.	Staley	P41
14.	Smith	P44

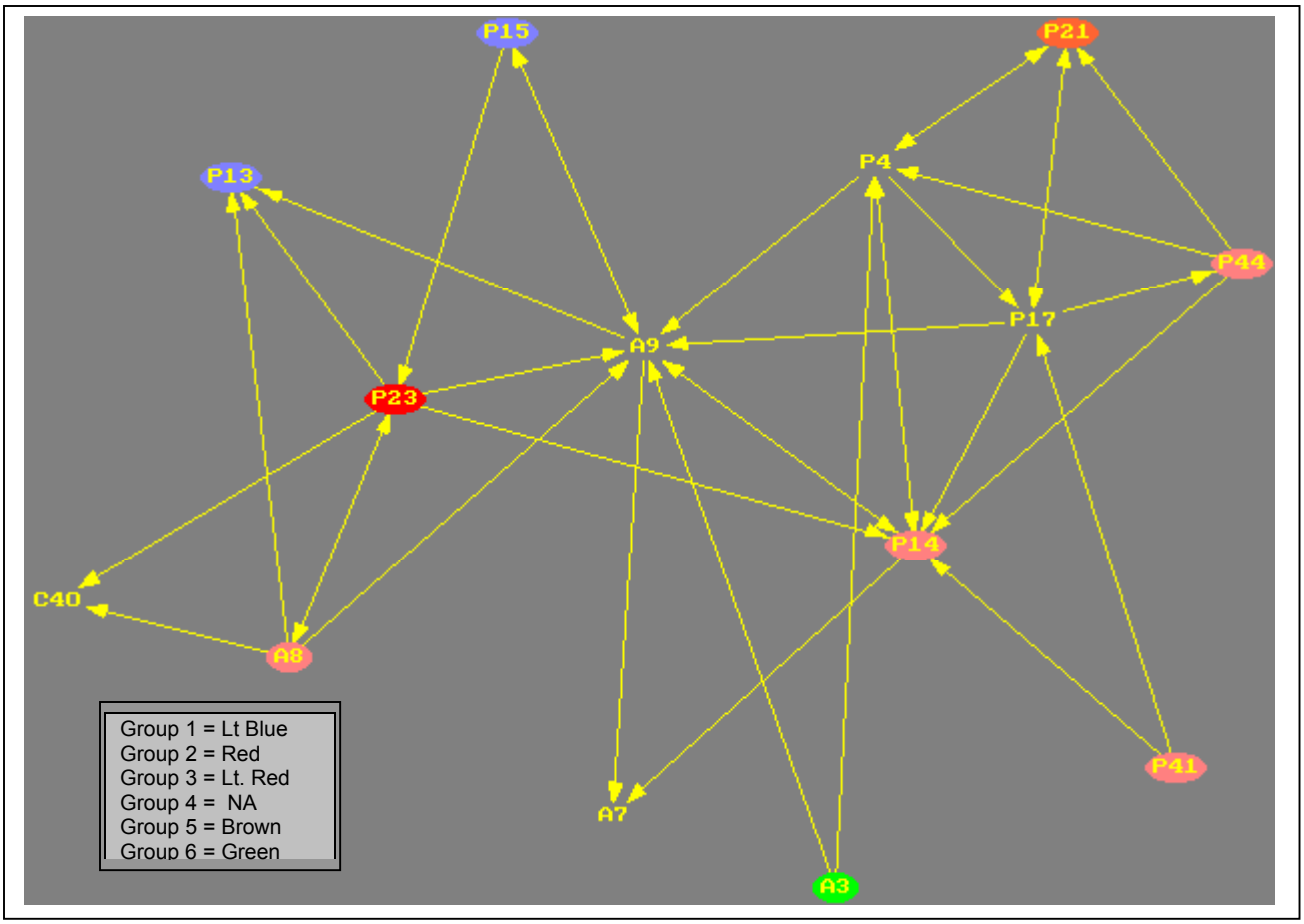
The next view of cliques shows the 14 individuals who are in cliques and their direct connections to each other. This sociogram was constructed by creating a network of only the members of cliques and their connections. The arrows indicate the direction of the contact. A two-way arrow indicates that the two individuals indicated a mutual connection. Mutual choices can validate the individual's choice, so they can sometimes indicate a sense of confidence about the data. In Sociogram 5, there is almost one strong clique between individuals P4, P21, and P17. It lacks one tie between from P17 to P4.

Sociogram 5. Clique Members Network



Sociogram 4 illustrates the overlapping nature of clique memberships, the connections of this network across cliques. Each clique is linked to other cliques through one or more shared members. Sociogram 5 shows overlapping connections between the individuals in the all cliques combined.

Sociogram 6. Cliques by Interest Group



Sociogram 6 is coded by the interest group the individual selected as a primary interest for business development. (The full description of each interest group is in Table 2.) Several individuals, who participated, did not indicate an interest in any specific group.

Sociogram ID	NAME	GROUP
A7	Waldorf	0
A9	Erickson (male)	0
C40	Peabody	0
P13	Harris	0
P17	Akins	0
P4	Scott	0
A8	Enlow	2
P23	Knolls	2

Sociogram ID	NAME	GROUP
P14	Brown	3
P41	Staley	3
P44	Smith	3
P21	McElroy	5
P15	Grant	5
A3	Grandt	6

Project Summary and Recommendations

Matrix Summary

The following table summarizes respondent's rankings across all indicators. It provides an profile on the location of potential and existing leaders across the network.

Each individual was ranked on each indicator. Using the ranked lists and other measures, such as membership in component 1, the ranked lists were divided into the matrix cells, 1 being the highest level. A description of each level is included in each matrix cell.

Level 1		Level 2	
Individuals Highest on all measures: Centrality Components Cliques	Scott P4 Harris P13 Brown P14 Grant P15 Akins P17 McElroy P21 Grandt A3 Knolls P23 Waldorf A7 Enlow A8 Peabody C40 R. Johnson A9 Staley P41 Smith P44	Other Individuals in component 1 and/or with centrality measures	A1, P47, P39, C38, C21, P46, P6, P45, P38, P36, P32, P30, P19, P12, P10, C9, C8, C7, C6, C59, C58, C57, C56, C55, C54, C53, C52, C51, C50, C5, C49, C48, C47, C45, C44, C46, C42, C41, C4, C31, C32, C33, C34, C35, C36, C37, C39, C29, C28, C27, C25, C23, C22, C20, C19, C18, C17, C16. C15, C14, C12, C10, C1
Level 3		Level 4	
Individuals with connections, which may be under counted or over inflated	P1, P3, P9, P11, A4, A6, A8, P23 P27, P44	Isolates	P2, P7, P8, A5, P16, P18, P20, P22, P25, P 28, P29, P31, P33, P34, P42, P43, P48, P49

Though the overall density of the Hill Side Business network is low, one large component includes 68% of the network. This component contains all the cliques' members. The overall structure indicates a large, loosely knit business with a web of core leaders threaded throughout the network. Though there are other smaller components and indications of cut points in component one, strategic planning could included strategies for utilizing and

developing bridges which would lead to tighter inclusion. Using bridges, a link from one component to another, is a way to further strengthen the overall network.

One particular recommendation would be to validate the overall structure with other data. Suggestions of other data include the knowledge that the Hill Side Business would most likely already have about this business.

This information would include perceptions about how responsive managers are in general and perceptions about how open or closed the business seems to be with regard to communication. Responsiveness, though not meant to be a finite definition, could be defined as willingness, overall, to participate indicated by a level of activity.

Based on the primary goal of the project, four key indicators stand out about Hill Side Business network:

- First, there is a core group that is well webbed within the overall network, and that is large, as seen in Sociogram 1.
- Second, there is one large component that forms the basis for the network, as seen in Sociogram 2.
- Third, multiple cliques are well interconnected, as seen in Sociograms 4 and 5.
- Fourth, there is a strong core group, linked to a larger group of managers, as seen in Sociogram 6.

Taking these indicators and with other information and data on responsiveness and openness, here, for example, are three possible scenarios for interpreting and understanding the dynamics of the Hill Side Business.

- If this is a business with a high degree of responsiveness and openness then the network most likely indicates a broad, but loosely connected network, with a strong core group.
- If the business is less responsive, but still open, then the network might again indicate a broad but loose business structure, but one that may not be tapping all resources available. This might also indicate a core group who functions as the web that keeps the business together.
- However, if the business is not as responsive and is perceived to not be open, then the network could indicate a tightly held core group who loosely connect to a larger group and a larger group that is not well networked with connections to the core group.

Appendix A

Key for Sociogram Identification Key

Key for Sociogram Identification

(list would be included here)

Number Name
XXXXXX

P = Invited Participant
A = Advisory Board Member
C= Contact

Appendix B

Centrality Analysis Raw Data

Definitions for both raw measures and the normalized measures are provided where appropriate.

Freeman's Degree Centrality

This measure is equal to the number of other members directly linked to an individual. This measure was created by taking the normalized indegree for dichotomous - the choices were either 1 or 0, did or did not go to a contact for information, and non-symmetric - the contacts were one way, from the participants only - data. Indegree is the number of times the individual was chosen by others.

The normalized indegree centrality (Bolland, 1988) controls for network size by dividing the indegree by (n - 1). This number is then multiplied by 100 to reduce the decimal places and thereby represents a percentage of the possible number of times an individual could have been chosen. In this network if all 56 participants had chosen one contact, that individual's measure would have been 50, the highest possible.

Freeman's Betweenness Centrality

Betweenness is calculated from the paths that link one individual to another in a network. It is possible (and generally the case) that individuals are connected to other individuals through multiple paths. The paths used for betweenness calculations are the shortest paths from one individual to another. Betweenness is calculated for each individual by taking the number of paths linking any two people, which also contains the individual under measure, then dividing this by the total number of paths linking the two people. These proportions are then summed. (The formula (Bolland, 1988) for betweenness is: $C_{b(i)} = \Sigma\Sigma b_{ijm}$, across all *n*'s. Where, $b_{ijm} = g_{ijm} \div jm$; g_{ijm} is equal to the number of paths containing *i* that are linked to both *j* and *m;* and jm is equal to the number of paths linking *j* to *m.)*

This measure was normalized by taking the betweenness measure divided by the maximum possible betweenness expressed as a percentage - formula: $C'_{b(i)} = 2C'_{b(i)} \div (n^2 - 3n + 2)$.

Table 1. Centrality Analysis

		Between	NBetween	OutDegree	InDegree	NrmOutDeg	NrmInDeg
12.	P14 *	220.33	1.71	5	7	4.39	6.14
13.	A9 *	204.25	1.59	5	7	4.39	6.14
14.	P21 *	222.83	1.73	5	6	4.39	5.26
15.	P4 *	209.25	1.62	4	4	3.51	3.51
16.	P15 *	235.50	1.83	6	3	5.26	2.63
17.	P17	110.75	0.86	5	3	4.39	2.63
18.	P13	0.00	0.00	0	3	0.00	2.63
19.	C40	0.00	0.00	0	3	0.00	2.63
20.	C13	0.00	0.00	0	3	0.00	2.63
21.	A1 *	131.00	1.02	5	2	4.39	1.75
22.	P23	112.75	0.88	5	2	4.39	1.75
23.	A7	0.00	0.00	0	2	0.00	1.75
24.	P39	0.00	0.00	0	2	0.00	1.75
25.	C38	0.00	0.00	0	2	0.00	1.75
26.	C21	0.00	0.00	0	2	0.00	1.75
27.	C2	0.00	0.00	0	2	0.00	1.75
28.	C11	0.00	0.00	0	2	0.00	1.75
29.	P9	116.50	0.90	8	1	7.02	0.88
30.	P3	48.00	0.37	4	1	3.51	0.88
31.	P44	36.33	0.28	5	1	4.39	0.88
32.	P27	20.00	0.16	5	1	4.39	0.88
33.	A8	18.00	0.14	5	1	4.39	0.88
34.	A4	12.00	0.09	5	1	4.39	0.88
35.	P1	8.50	0.07	2	1	1.75	0.88
36.	A6	5.00	0.04	6	1	5.26	0.88
37.	P6	0.00	0.00	0	1	0.00	0.88
38.	P45	0.00	0.00	0	1	0.00	0.88
39.	P38	0.00	0.00	0	1	0.00	0.88
40.	P36	0.00	0.00	0	1	0.00	0.88

		Between	NBetween	OutDegree	InDegree	NrmOutDeg	NrmInDeg
41.	P32	0.00	0.00	0	1	0.00	0.88
42.	P30	0.00	0.00	0	1	0.00	0.88
43.	P19	0.00	0.00	0	1	0.00	0.88
44.	P12	0.00	0.00	0	1	0.00	0.88
45.	P10	0.00	0.00	0	1	0.00	0.88
46.	C9	0.00	0.00	0	1	0.00	0.88
47.	C8	0.00	0.00	0	1	0.00	0.88
48.	C7	0.00	0.00	0	1	0.00	0.88
49.	C6	0.00	0.00	0	1	0.00	0.88
50.	C59	0.00	0.00	0	1	0.00	0.88
51.	C58	0.00	0.00	0	1	0.00	0.88
52.	C57	0.00	0.00	0	1	0.00	0.88
53.	C56	0.00	0.00	0	1	0.00	0.88
54.	C55	0.00	0.00	0	1	0.00	0.88
55.	C54	0.00	0.00	0	1	0.00	0.88
56.	C53	0.00	0.00	0	1	0.00	0.88
57.	C52	0.00	0.00	0	1	0.00	0.88
58.	C51	0.00	0.00	0	1	0.00	0.88
59.	C50	0.00	0.00	0	1	0.00	0.88
60.	C5	0.00	0.00	0	1	0.00	0.88
61.	C49	0.00	0.00	0	1	0.00	0.88
62.	C48	0.00	0.00	0	1	0.00	0.88
63.	C47	0.00	0.00	0	1	0.00	0.88
64.	C46	0.00	0.00	0	1	0.00	0.88
65.	C45	0.00	0.00	0	1	0.00	0.88
66.	C44	0.00	0.00	0	1	0.00	0.88
67.	C42	0.00	0.00	0	1	0.00	0.88
68.	C41	0.00	0.00	0	1	0.00	0.88
69.	C4	0.00	0.00	0	1	0.00	0.88
70.	C39	0.00	0.00	0	1	0.00	0.88
71.	C37	0.00	0.00	0	1	0.00	0.88
72.	C36	0.00	0.00	0	1	0.00	0.88

		Between	NBetween	OutDegree	InDegree	NrmOutDeg	NrmInDeg
73.	C35	0.00	0.00	0	1	0.00	0.88
74.	C34	0.00	0.00	0	1	0.00	0.88
75.	C33	0.00	0.00	0	1	0.00	0.88
76.	C32	0.00	0.00	0	1	0.00	0.88
77.	C31	0.00	0.00	0	1	0.00	0.88
78.	C30	0.00	0.00	0	1	0.00	0.88
79.	C3	0.00	0.00	0	1	0.00	0.88
80.	C29	0.00	0.00	0	1	0.00	0.88
81.	C28	0.00	0.00	0	1	0.00	0.88
82.	C27	0.00	0.00	0	1	0.00	0.88
83.	C25	0.00	0.00	0	1	0.00	0.88
84.	C24	0.00	0.00	0	1	0.00	0.88
85.	C23	0.00	0.00	0	1	0.00	0.88
86.	C22	0.00	0.00	0	1	0.00	0.88
87.	C20	0.00	0.00	0	1	0.00	0.88
88.	C19	0.00	0.00	0	1	0.00	0.88
89.	C18	0.00	0.00	0	1	0.00	0.88
90.	C17	0.00	0.00	0	1	0.00	0.88
91.	C16	0.00	0.00	0	1	0.00	0.88
92.	C15	0.00	0.00	0	1	0.00	0.88
93.	C14	0.00	0.00	0	1	0.00	0.88
94.	C12	0.00	0.00	0	1	0.00	0.88
95.	C10	0.00	0.00	0	1	0.00	0.88
96.	C1	0.00	0.00	0	1	0.00	0.88
97.	A11	0.00	0.00	1	0	0.88	0.00
98.	A10	0.00	0.00	5	0	4.39	0.00
99.	P8	0.00	0.00	0	0	0.00	0.00
100.	P7	0.00	0.00	0	0	0.00	0.00
101.	P5	0.00	0.00	2	0	1.75	0.00
102.	P43	0.00	0.00	0	0	0.00	0.00
103.	P42	0.00	0.00	0	0	0.00	0.00
104.	P41	0.00	0.00	4	0	3.51	0.00

		Between	NBetween	OutDegree	InDegree	NrmOutDeg	NrmInDeg
104.	P40	0.00	0.00	6	0	5.26	0.00
105.	P37	0.00	0.00	5	0	4.39	0.00
106.	P35	0.00	0.00	3	0	2.63	0.00
107.	P34	0.00	0.00	0	0	0.00	0.00
108.	P33	0.00	0.00	0	0	0.00	0.00
109.	P31	0.00	0.00	0	0	0.00	0.00
110.	P29	0.00	0.00	0	0	0.00	0.00
111.	P28	0.00	0.00	0	0	0.00	0.00
112.	P26	0.00	0.00	4	0	3.51	0.00
113.	P25	0.00	0.00	0	0	0.00	0.00
114.	P24	0.00	0.00	3	0	2.63	0.00
115.	P22	0.00	0.00	0	0	0.00	0.00
116.	P20	0.00	0.00	0	0	0.00	0.00
117.	P2	0.00	0.00	0	0	0.00	0.00
118.	P18	0.00	0.00	0	0	0.00	0.00
119.	P16	0.00	0.00	0	0	0.00	0.00
120.	P11	0.00	0.00	4	0	3.51	0.00
121.	A5	0.00	0.00	0	0	0.00	0.00
122.	A3	0.00	0.00	3	0	2.63	0.00
123.	A2	0.00	0.00	3	0	2.63	0.00
124.	P48	0.00	0.00	3	0	2.63	0.00
125.	P49	0.00	0.00	3	0	2.63	0.00

Endnotes.

1. Borgatti, S.P., M.G. Everett, and L.C. Freeman. 1999. *UCINET 5.0 Version 1.0*. Natick: Analytic Technologies.
2. 2. Krackhardt, D., Blythe, J., McGrath, C. *Krackplot 3.2*.