Coordinating across the Enterprise:

Finding a Balance Between Brokerage and Closure
Returning to Where We Began . . .

Lines indicate frequent and substantive work discussion; heavy lines especially close relationships.

Figure 1 in Burt and Soda, "The social origins of great strategies" (Strategy Science, 2017)


**Advantage and Pathology in the Enterprise Network**

**TOP-LINE GROWTH**
New Services, New Processes, New Business

**BOTTOM-LINE GROWTH**
Efficient Use of Resources (labor, supervision, speed)

**MECHANISM**
Vision of what to do and who to involve from exposure to diverse external information

**PATHOLOGY**
Inefficiency, Agency Costs, Chaos

**MECHANISM**
Alignment from reputation defined by local information echoed in gossip

**Brokerage**
Bridging Structural Holes between Clusters

**Closure**
Closing Structural Holes within the Cluster

Graphs are from Figures 1.8 and 4.6 in *Brokerage and Closure* (Ron Burt, Oxford University Press, 2005).
A. Social Capital of Brokerage Is Evident from Compensation, Evaluations, and Promotion Rates Better than Peers

\[ Z = 2.78 - 0.82 \ln(C) \]

\[ r = -0.53 \]

B. Which Can Be Traced To a Vision Advantage in Detecting and Developing Good Ideas

\[ Z = 3.35 - 0.84 \ln(C) \]

\[ r = -0.80 \]

C. But Returns to Brokerage Are Contingent on a Would-Be Broker’s Social Standing in the Group to Which He or She Makes a Proposal.

Brokerage for Top-Line Growth

Circles are average scores on the vertical axis (Z) for a five-point interval of network constraint (C) within each study population. Dashed line goes through mean values of Z for intervals of C. Bold line is performance predicted by the natural logarithm of C. The study populations include bankers and managers in Asia, Europe, and the US (see Figures 1.8 and 2.3 in Brokerage and Closure).
RULE 3, Closure for Collaboration: Closed networks facilitate and maintain trust and reputation within the network, promoting reliable, efficient operations within the network (Sherif, 1935; Festinger et al., 1950; Asch, 1951; Katz and Lazarsfeld, 1955; Granovetter, 1985, 1992; Coleman, 1988; Greif, 1989; Ellickson, 1991; Bernstein, 1992, 2001; Barker, 1993; Putnam, 1993; Uzzi, 1997; Burt, 2005: Chps. 3-4).
Closure for Bottom-Line Growth

Graph A describes 46,231 colleague relations with analysts and investment bankers. Graph B describes 262 subsample correlations between reputation this year and next for the bankers. Graph C describes "liberty" ship production times.

Graph C is from Figure 3.7 and graph B is from Figure 4.6 in Brokerage and Closure. Graph A is from Figure 5.6 in "Closure and Stability," (cf. Figure 4.8 in Brokerage and Closure).
Joe: Please put everything aside and get down to our Oklahoma manufacturing plant. I don’t know what is wrong down there, but that operation is killing us. The plant is hemorrhaging cash and losing us future orders. Almost every order involves substantial re-work, late-delivery penalties, and costly service calls after delivery. We’ve had a SixSigma team down there for ten months and the problem has only gotten worse with finger-pointing and mounting tension.

See if you can figure out what is going on. If we can’t fix it, we have to rethink our decision about keeping the plant.

I’ll have John draw up a quick sketch of the production process to guide you. I’ve had John call Jerry LeFleur, the plant manager, to let him know that you will be coming down. Get back to me quickly on this one. / Mike

Joe: The Oklahoma plant is organized like our others (below). HQ works with the customer to figure out what turbine they want (requisition engr), we design it (design engr), then oversee its production (production engr & quality control). Working from our designs, production plan, and quality specs, people in the Oklahoma plant manufacture the airfoils, rotors, combustors and injectors, assemble the rotor unit, and assemble the casing around the rotor unit. Those five tasks define the five work groups in the plant. The flow of product through the five groups is managed by the plant manager and the materials control people, who manage the flow of supplies from outside vendors and between work groups in the plant.

I had my assistant talk with people here and with Greg Anderson, Director of Final Assembly at the Oklahoma plant, to run a Network Diagnostic so you can get a quick sense of the plant’s social organization. The Diagnostic is run from Greg Anderson’s perspective, summary output follows this page, and my assistant sent a disk containing the raw data to your secretary. Let me know if I can be of any further help (use the mobile number; I’m away this weekend). Good luck. / John
The situation and network are described in Burt and Ronchi, “Measuring a large network quickly” (Social Networks, 1994)
Senior Management Network

Lines indicate frequent and substantive work discussion; heavy lines especially close relationships.

EU and Emerging Markets

Figure 1 in Burt and Soda, "The social origins of great strategies" (Strategy Science, 2017)
Figure 3.1 in Burt (2010, *Neighbor Networks*)

Kind of organization is indicated by color:
- White for corporate administration (outside the new initiative)
- Yellow for local administration
- Other for regional organizations

Kind of organization is indicated by shape:
- Squares for administration
- Circles for regional ops
- Diamonds for sales
- Pyramids for support
Social Network Behind the Product Launch

CLUSTER 1
Northeast Region

CLUSTER 2
(Northern Region and some people from Sales A group)

CLUSTER 3
Southern Region

CLUSTER 4
(Western Region, most of Sales A and C groups, and much of the Operations group)

CLUSTER 5
(Southeast Region, Sales B and C groups, and Product Service)

CLUSTER 6
(Administration; Finance, Product Support, and various other corporate people)

CLUSTER 7, ADMINISTRATIVE HUB
(Launch Director, Operations leaders, and people from Sales A and C groups)

Figure 3.2 in Burt (2010, *Neighbor Networks*)
Network Map of Senior Management in a Large Financial Organization

These are people in their organization’s senior management roles. Symbol shape indicates job rank (triangle for level 1 [white are C-suite], circle for level 2, square for level 3 or lower).

Largest symbols indicate people in the current executive education cohort (random ID numbers), slightly smaller symbols indicate people in the previous cohort.

Bold lines indicate relations in which three of four connections are strong, one of which is supervision (other three are frequent email, 360 evaluations, and close contacts cited in the network survey).

Light lines indicate relations in which at least one of the three non-authority connections are strong.
The Same Organization Two Years Later
The Same
Organization
Still Another
Two Years
Later
Balance in Principle for the General Case
Brokerage for top-line growth (vision, dissipation)
Closure for bottom-line growth (alignment, myopia)

Balance in Stable Networks, "Where"

Balance in Dynamic Networks, "When"

For variations on the theme of balancing brokerage versus closure, see Klapp (1978) on opening vs. closing, Zaleznik (1977) and Kotter (1990) on leaders vs. managers, March (1991) on exploration vs. exploitation.
B-C Balance in Stable Networks, "Where"

Performance Is Highest for Closure Within a Group combined with Brokerage Beyond the Group

From Figure 3.5 in Brokerage & Closure

Structural Autonomy =

\[ E(\text{Performance}) = \alpha \text{Closure}_{\text{in}}^{\beta} \text{Brokerage}_{\text{out}}^{\gamma} \]

Steve Jobs, 1995
Which Can Make a "Business Network" Valuable

A business network brings together otherwise disconnected people to share valuable and otherwise difficult-to-obtain information (i.e., the network creates bridge relations embedded in a reputation-inducing, trust-facilitating, closed network; e.g., Les Cunningham's Business Network of home contractors*, Chicago's Commercial Club, Ian McDaniels' China-US Business Council, Mark Twain Bancshares*, Dennis and Donna Joannides' National Business Associates)

Pro: early access to experience and leads, broad access to benchmarking experience

Con: early disclosure of future plans, broad disclosure of past mistakes (rep critical)

Consider Michael McCarthy's experience, quoted in Inc Magazine (November, 1995): Many entrepreneurs worry that they'll outgrow their early relationships with banks. But not Michael McCarthy, CEO of McCarthy Co., a St. Louis construction company. Although McCarthy has grown his business to $1 billion in sales, he remains close to the local community bank that backed him more than 20 years ago, Mark Twain Bancshares.

“The bigger the bank, the more you’re at the whim of a very capricious management situation. You never know when the senior executives of a big bank will suddenly decide that your kind of company doesn’t fit in with its new business plan and you’ll be out of luck.”

“I’ve continued to do business with Mark Twain Bancshares even when I also needed to borrow larger sums from bigger banks,” he says. “And that saved us during one year, seven or eight years ago, when we had unexpectedly large, multiple losses. Our big banks suddenly came up with all kinds of new criteria and required us to pay off our loans, because of our financial problems. Mark Twain stood by us and continued to support us, even creating a new $7-million line of credit for us.”

His conclusion: “Big banks often respond to an entrepreneur and his or her special needs with edicts. If you’ve built a good relationship with a smaller bank, maintain it. You never know when you’ll need that extra level of support.”

*See Sgourev and Zuckerman, "Improving capabilities through industry peer networks" (2006, Sloan Management Review) and the HBS case, "Mark Twain Bancshares," for details on using the bank-branch board of directors as a business network to identify attractive loans with mid-size companies and high-wealth individuals.
Before there was Facebook, there was the Wednesday 10.

In 1957, as men in their late 20s, they began meeting—initially over breakfast, then over dinners held at the Sherry-Netherland Hotel or at the Harvard Club in midtown Manhattan. Few were born to means. Many were sons of immigrants. Most went on to become luminaries in their fields—presidents of television networks, partners at banks, editors of magazines.

On occasion, they shared their influence with one another. When member Mort Janklow made a career switch from corporate attorney to literary agent, a fellow member, columnist William Safire, offered himself as a famous first client. When Robert Menschel, a senior director at Goldman Sachs Group Inc., was considering deals involving large consumer companies such as Procter & Gamble, he would pick the brain of fellow club member Ed Meyer, the former chief executive of Grey Advertising.

In a day when “social network” is a buzz term from colleges to board rooms, the members of Wednesday 10 show the benefits of old-fashioned networking. “We were all young kids starting out, and it is easy when you are so involved in building your career to lose touch with other people who are outside your field,” says Mr. Menschel, who has been at Goldman Sachs for 55 years. “It helped me to understand why other people do what they do—which is important in life and in business. You don’t learn anything from talking to sameness.”

The Wednesday 10 comprised, at various points, more than 20 men; the goal was a number small enough to maintain intimacy yet large enough to ensure that at least 10 members would show up for each of the monthly Wednesday-night meetings. No
Balance Can Vary Over the Three Worlds: Periphery, Outer Circle, Inner Circle

A random sample of 500 people was drawn in the virtual world Second Life, then snowballed out to include friends of the sampled people, resulting in a network of 1,533 people.

- Sample Isolate
- Sample Person Who Has Friends
- Friend to a Sample Person

Legend:
- Strong Tie (modify objects)
- Tie (locate)
- Weak Tie (online, no-privilege)
Sociogram of Directors in Chicago Index Companies

1,380 Chicago directors.

Gold indicates Commercial Club member, concentrated in center (13.2 t-test).

818 isolates sit on one Chicago board or one Chicago board plus outside boards containing no other Chicago elites.
These are the senior leaders at the top of a large bank.

Lines indicate people who have frequent and substantial face-to-face contact. Average such connection is embedded in 28 mutual friends (0 minimum, 63 maximum).
Optimum Balance between integrating operations (closure) and preserving differentiation (brokerage) is contingent on the work being performed. In a classic study showing contingency, Lawrence and Lorsch distinguish kinds of work by the industry in which a firm operates.

Firm profitability in the plastics industry increases with both integration across the three functions (sales, production, and research), and differentiation (structural holes) between the three functions. This is an illustration of Jack Welch’s “integrated diversity.”

**Firms in the Plastics Industry**

Managers behave and are organized differently in different functions

- Functions compared on four dimensions:
  - Goals (e.g., quantity vs. quality)
  - Time frame (short-term vs. long-term)
  - Interpersonal (getting job done vs. building relations)
  - Hierarchy (many levels, reviews, supervisors/employees)

- Difference between two functions on each attribute divided into five categories:
  - 1 two functions least different on attribute (e.g., sales and research functions have the same hierarchy in low-A firm, relative to the other 9 firms)
  - 5 two functions most different on attribute

- Then summed across the four attributes to describe differentiation between functions:
  - E.g., here is differentiation in the low-A firm
  - S 5 P 13 R 9

- And the firm’s differentiation score is average differentiation between key functions (e.g., the 9 on p. 103 for low-A firm is \((5+9+13)/3\))

Managers are tightly coordinated across functions

- Respondents think about cross-function ties:
  - Senior managers who span functions
  - Cross-function teams
  - Individual managers working outside official channels

- Then are asked to characterize relations between each pair of functions:
  - 1 couldn’t be worse; bad relations; serious problems
  - 2-3 somewhat breakdown in relations
  - 4 average — sound enough to get by
  - 5-6 better than average, almost full unity
  - 7 sound, full unity of effort is obtained

- Then their average response is used to describe integration between functions:
  - E.g., here is integration in the low-A firm
  - S 5.87 P 4.55 R 4.88

- And the firm’s integration score is average integration between key functions (e.g., the 5.1 on p. 103 for low-A firm is \((5.87+4.55+4.88)/3\))

Data are from pp. 40 (performance), 36, 50 (differentiation), and 47, 50 (integration) of Lawrence and Lorsch (1967, 1986), Organization and Environment; (see pp. 258-260 of the book for methodological details).
Optimum is contingent on work being performed, here distinguished by the industry in which a firm operates.

Where firms compete primarily on price, differentiation (structural holes) has no value. It is best to tightly integrate operations across functions. To the right, container firms compete primarily on price (e.g., tin can producers). Low- and high-performing container firms have low differentiation. High-performers are distinguished by their integration across functions.

The economic value of having a strong corporate culture shows a similar contingency (see Appendix IV in the "Closure" handout).

Quotes are from pp. 25-26, 89-90, in Lawrence and Lorsch (1967, 1986), Organization and Environment. Graph is from page 103 of the book (plastics high-performer scores are averages of the two high-performing firms and low-performer scores are averages of the two low-performing firms).
B-C Balance
"When"

For example, Oscillating Networks and Learning-Curve Cascades

A. Oscillation

Focus on network brokerage & top-line growth
Focus on network closure & bottom-line growth

B. Learning-Curve Cascade

Cumulative Volume

Time

Unit Cost

Time

Focus on network brokerage & top-line growth
Focus on network closure & bottom-line growth
Building Your Network: A Broker Network Can Result from Always Being a Broker or from Network Oscillation

Figure 1 in Burt & Merluzzi, "Network Oscillation" (2016, Academy of Management Discoveries)
Substantial Differences in Individual Returns to Brokerage

Graph A below is from Brokerage & Closure and the previous handout showing achievement increasing with more access to structural holes. Circles are z-score residual achievement for 1,986 observations averaged within five-point intervals of network constraint in each of six management populations (analysts, bankers, and managers in Asia, Europe, and North America, see discussion of Figure 2.3 in Chapter 2; heteroscedasticity is negligible, $X^2 = 2.97$, 1 d.f., $P \sim .08$). Bold line is the vertical axis predicted by network constraint.

Graph B to the right shows the raw data that were averaged to create Graph A. Vertical axis is wider to accommodate more variable achievement. Heteroscedasticity is high due to achievement differences between advantaged individuals ($X^2 = 269.5$, 1 d.f., $P < .001$), but the association between achievement and network advantage remains statistically significant when adjusted for heteroscedasticity (Huber-White, $t = -8.49$).

A. Achievement Scores for People in Open Networks Are Higher than Peers on Average ($r = -.58$, $t = -6.78$, $n = 85$)

B. But Vary Widely between the Advantaged Individuals (overall $r = -.24$, $t = -9.98$, $n = 1,989$)

Figure adapted from Figure 1 in Burt (2012, "Network Related Personality," American Journal of Sociology).
Returns to Brokerage Are Contingent on Oscillation

Vertical axis is a banker’s z-score annual compensation — adjusted for the banker’s job rank, evaluation by colleagues, years with the bank, gender, race, and geographic location — averaged across the four-year observation period. Horizontal axis is annual network constraint averaged across the four years. Symbols indicate averages of individual scores on the horizontal and vertical axes, within five-point intervals of network constraint. The three lines distinguish bankers by the extent to which oscillation across the four years is visible in their annual networks: Definite oscillation refers to bankers who experienced reversals in network status and constraint. Probable oscillation refers to bankers who experienced a reversal in status or constraint, but not both. No oscillation refers to bankers who experienced no reversals. As a summary test for oscillation, compensation was regressed for all 346 bankers across the control variables plus a dummy variable for probable oscillation and a dummy variable for definite oscillation, plus two interactions between the oscillation dummies and log network constraint. Negligible association between constraint and compensation for “no oscillation” bankers (−.86 t-test, P ~ .39), increases to significantly higher associations for probable and definite oscillation (15.28 F
ttest, P < .001), yielding significantly higher levels of compensation for broker bankers (17.20 F
ttest, P < .001).

NOTE - Test for oscillation association with relative compensation for each row of bankers using a contrast of 1 for definite oscillation, 0 for probable oscillation, and -1 for no oscillation. Average z-score compensation across four years is predicted from average network constraint, holding constant job rank, seniority, peer evaluations, gender, race, and geography (Model IV, Table 1, Burt and Merluzzi, 2015).

Figure 5 in Burt and Merluzzi, "Network Oscillation" (2016 AMD)
**Cocoon Hypothesis — Success is more likely, and greater, for network brokers who begin their project within a closed network, which dissolves in subsequent brokerage.**

An initial closed network provides safe haven for engaging and surviving the exploratory trial and error of getting a project launched.

Network brokers enjoy the information breadth, timing, and arbitrage advantages associated with project success.
The graph shows benefit to entrepreneurs of having an early multi-person, closed network subsequently expanded into a large, open network characteristic of a broker.

A tournament is defined across the horizontal axis. Entrepreneurs are removed when they use a contact for help on more than one significant event in building the business.

This is from Figure 11 in Burt and Opper (2017, *MOR*), Figure 3 in Zhao and Burt (2018, *MOR*).
Strong Performance Association with Network Disappears if Old Event-Based Guanxi Ties Are Excluded

NOTE — Plotted scores are 365 individual scores on vertical and horizontal axes averaged within five-point intervals of network constraint. Dark dots show average return on assets (adjusted for value of business assets, years from founding until business was profitable, and industry). Hollow dots show average return on equity (adjusted for value of business equity, years from founding until business was profitable, and industry). Correlations are computed from plotted data with log(network constraint).

from Burt and Opper (2019), "What is guanxi?"
(1) Reputation Is Essential to Broker Achievement, and Reputation Is Maintained in Closed Networks

(Graphs are from "Closure" handout.)

A. Broker Achievement Depends on Reputation

B. And Reputation Depends on Closed Networks

Bold line through white dots describes positive reputations (8.1 routine t-test). Thin line and black dots describe negative reputations (6.1 routine t-test). Dashed line goes through mean correlations for all bankers.
(2) Agility is another oscillation advantage


The Naskapi Indians of Labrador survive primarily by hunting. Each morning the adult males gather to ask: “Where should we hunt today?”

An unusual procedure is used to answer the question: The men take the shoulder bone of a caribou, hold it over a fire until the bone cracks, then hunt in which ever direction the crack points.

The procedure works. The Naskapi almost always find game, which is rare among hunting bands.

Why is their procedure successful?

Central random shocks improve coordination

(Shirado & Christakis, "Locally noisy autonomous agents improve global human coordination in network experiments" Nature 2017, 454:370-374): "We show that bots acting with small levels of random noise and placed in central locations meaningfully improve the collective performance of human groups, accelerating the median solution time by 55.6%. This is especially the case when the coordination problem is hard."

The task is color coordination within a 20 person network (details on last page of this handout). You have 3 contacts and a choice of 3 colors. Conflict is when you and one of your contacts is the same color. Solution is when there are no conflicts. In some trials, three bots replace people, and chose their colors at one of three levels of random. Quicker solution is indicated in the graphs by faster and further drop in "survival proportion" (which is % of sessions that remain unsolved at the x-axis time).

Figure 2 | Survival curves of sessions, by noisiness and location of bots. The curves show the percentage of sessions unsolved at a given time.

Dark blue lines show results for the sessions including bots (n = 20), by their noise level (horizontal dimension) and geodesic location (vertical dimension). Light blue curves show results for the control sessions involving solely human players (n = 30). Total n = 210. Sessions are censored at 300 s; P values given by the log-rank test.

Bots having 10% behavioural noise and located at the centre of the network cause a significant improvement in the solvability of the game (P = 0.015), and induce 55.6% acceleration in the median time to solution, from 232.4 s to 103.1 s.
Further on agility as second oscillation advantage

During a discussion at a conference on learning, one of the attendees, a U.S. Army Colonel who runs a course for field commanders at the Army’s Command and General Staff College (a graduate school for American and foreign military leaders founded in 1881), told a story about a misguided search for knowledge. For many years this course has been based on nine war games played by intact battalion teams. In the long history of the course, only one commander has ever won all nine war games. That was in 1985.

The success of this commander is the stuff of folklore at the college. It has led many subsequent commanders on a hunt for how the celebrated commander was able to achieve perfection. Typically, operations commanders who are scheduled to attend the course try to get a copy of the 1985 “battle book” written by the victorious commander. It doesn’t seem to matter that battle scenarios and technology have changed considerably since 1985. Nor does it seem to matter that it is well-known that the underlying reason for the unique 1985 success is not in the codified knowledge in the battle book, but in the commander’s style of preparation for the course. Every week for six months prior to the course, the commander assembled his staff for an informal lunch. The commander began by sketching a hypothetical battle scenario, then inviting his team to discuss how they would engage the enemy. In the ensuing debate, the team explored alternatives with the commander — serving less as final authority, and more as a Socratic instructor helping his team reason through the risks and advantages of alternative tactics. By the time this team entered the course, they had explored hundreds of hypothetical scenarios and learned a great deal not only about how each of his colleagues reasons, but how to reason together.

This example illustrates the somewhat depressing fact that often times it’s not a lack of knowledge that causes performance failures but an inability to take in, metabolize, and learn from knowledge that is readily available. If we try to solve every puzzle only through the paradigm of the learning curve, we shall discover that all learning curves reach an asymptote. Eventually we exhaust the stock of knowledge available to us in our immediate community.

Time and again I see in my own company examples of people who become quite content — indeed even take great pride — with the fact that they have formed highly cohesive, close-knit teams. Surely cohesiveness is valuable … to a point. But at some point, cohesiveness starts to take on the characteristics of a cult. Cults abhor questioning, criticism, and, debate. They are petrie dishes for group think. Great leaders intuitively understand this. They are like conductors who ensure that while their teams may be playing from the same overall score, there is always the sound of alternative voices. Positions are framed and argued on the basis of available knowledge and data but always in juxtaposition to one or more alternatives.

Dwight Eisenhower 1957

on national defense:
"Plans mean nothing, but planning is everything."

Text is from Dr. Mike Prevou (Lt. Col., US Army Retired), relayed by Dr. Don Ronchi (Exec. VP, Raytheon). On tactics in adaptive organization, see Bechky & Okhuysen (2011, Org Science), "Expecting the unexpected? How swat officers and film crews handle surprises."
(3) The difficulty of shifting between brokerage and closure highlights a third oscillation advantage: large networks. "Dunbar's number" — an extrapolation from correlation between primate brain size and average group size — says 150 relations is the average upper limit to a human group.

Below graph is based on numbers in Table 1 of Dunbar's initial report (1992, *J Human Evolution*), "Neocortex size as a constraint on group size in primates." Black dots are primates. White dot is humans. Graph to the right is from Dunbar (1998, *Evolutionary Anthropology*), "The social brain hypothesis."
(3 cont.) A third oscillation advantage: large networks.

Dunbar calculations ignore dormant relations. In addition to sharpening skills in shifting between projects, and building reputation, oscillation creates an inventory of dormant contacts to be re-animated as needed.

Granovetter (1973, AJS) "The strength of weak ties." Information that leads to a new job tends not to come from close friends or colleagues. It is more likely to come from a dormant contact — a person with whom you were close in school, or where you used to live, or where you used to work, et cetera. The point in this classic article: Dormant ties, when re-animated, are often valuable bridges.

Levin, Walter, Murnighan (2011, Org Science) "Dormant ties: the value of reconnecting." Some EMBA students were asked to think of an important current project, then name 10 contacts dormant for at least three years who would be likely to have information useful on the project, then sort the 10 contacts from most to least likely to have useful information. People were asked to re-connect with the first-ranked dormant contact and one other randomly selected from the other nine contacts. The above graph shows a high perceived value to information received, on average, from the first through the tenth contact. If there is a decline in value, it happens beyond the first 10 dormant contacts.
The volume of structural holes to which you have access is likely much higher than you might initially believe . . .

This worksheet is completed in four steps:

(1) In the oval, write your name.

(2) In the squares, write the names of five contacts with whom you once had very close and substantial business contact - but you haven't seen for more than two years.

(3) Draw a line between any pair of contacts that are connected, to the best of your knowledge, in the sense that the two people speak often enough that they have some familiarity with current issues in one another's work.

(4) Compute network density. Count the number of lines between contacts (TIES). Divide by the number possible (n(n-1)/2, where n is the number of contacts, which is 5 if you entered five contacts). Multiply by 100 and round to nearest percent.

DENSITY = _____________

This exercise is a variation on the one you did in the first handout describing a colleague's network (page 5 in the "Brokerage" handout). The network you describe here is typically much lower density than a current network.
Can Be Difficult for Individuals

Hermina Ibarra’s (2003) book, *Working Identity*, is a helpful and accessible discussion for network brokers transitioning to new identities (also see her HBR note "How leaders create and use networks"). Hermi elaborates nine points of advice (below). Note the similarities to our discussion of tactical issues in establishing brokerage in an organization (second session). If you feel trapped in a closed network, then you might find it useful to read Helen Ebaugh’s (1988) book, *Becoming an Ex*, on her transition from being a nun (and the similarity to other transitions).

1: **Act your way into a new way of thinking and being.** You cannot discover yourself by introspection. Start by changing what you do. Try different paths. Take action, and then use the feedback from your actions to figure out what you think, feel, and want. Don’t try to analyze or plan your way into a new career. Conventional strategies advocated by self-assessment manuals and traditional career counselors would have you start by looking inside. Start instead by stepping out.

2: **Stop trying to find your one true self.** Focus your attention on which of your many possible selves you want to test and learn more about. Reflection is important. But we can use it as a defense against testing reality; reflecting on who we are is less important than probing whether we really want what we think we want. Acting in the world gives us the opportunity to see ourselves through our behaviors and allows us to adjust our expectations as we learn. In failing to act, we hide from ourselves.

3: **Allow yourself a transition period in which it is okay to oscillate between holding on and letting go.** Better to live the contradictions than come to premature resolution. The years preceding a career change necessarily involve difficulty, turmoil, confusion, and uncertainty. One of the hardest tasks of reinvention is staying the course when it feels like you are coming undone. Those who try to short-circuit the process often just end up taking longer.

4: **Resist the temptation to start by making a big decision that will change everything in one fell swoop.** Focus on small wins, in which incremental gains lead you to more profound changes in the basic assumptions that define your work and life. Accept the crooked path. Small steps lead to big changes, so don’t waste time, energy, and money on finding the “answer” or the “lever” that, when pushed, will have dramatic effects. Almost no one gets change right on the first try.

5: **Identify projects that can help you get a feel for a new line of work or style of working.** Try to do these as side projects, temporary assignments, or parallel paths so that you can experiment seriously without binding decisions. Pursue these activities seriously, but delay commitment. Just make sure that you vary your experiments, so that you can compare and contrast experiences before you narrow your options.

6: **Don’t just focus on the work.** Find people who are what you want to be and who can provide support for the transition. But don’t expect to find them in your same old social circles. Break out of your established network. Branch out. Look for role models—people who give you glimpses of what you might become and who are living examples of different ways of working and living.

7: **Don’t wait for a cataclysmic moment when the truth is revealed.** Use everyday occurrences to find meaning in the changes you are going through. Practice telling and retelling your story. Over time, it will clarify. Major career transitions take three to five years. The big “turning point,” if there is one, tends to come late in the story. In the interim, make use of anything as a trigger. Don’t wait for a catalyst.

8: **Step back, but not for too long.** When you get stuck and are short on insight, take time to step back from the fray to reflect on how and why you are changing. Only through interaction and active engagement in the real world do we discover ourselves.

9: **Change happens in bursts and starts.** There are times when you are open to big change and times when you are not. Take advantage of any natural windows (e.g., the period just after an educational program or assuming a new position; a milestone birthday) to start off on the right foot. Communicate to others that you have changed (and will be making more changes). Don’t let unanswered questions bog you down; move on, even if to an interim commitment.
Adopting a New Organization Practice

\[ y = \text{proportion of target population that has adopted} \]
\[ k = \text{probability of adoption by average individual} \]

\[ \frac{dy}{dt} = k(1-y) \]

How should we think about leadership strategy, given the current organization?

- Brokerage changes easily, depending on individual preferences.
- Closure changes more slowly as a function of interlocked relationships.
- Closure-enforced opinion & behavior norms can arise from minor initial social behavior (Salganik, Dodds & Watts, 2006 Science).
Abandoning a Current Organization Practice

$y =$ proportion of target population that has abandoned the practice

$k =$ probability that average individual will abandon the practice

Even when people want to change and have complete control over change, they tend not to change. Ingram and Morris (2007, ASQ, “Do people mix at mixers?”) show that EMBA students intending to meet new people at a program mixer provided in response to student requests for a networking mixer tend to spend their time with people they already know.

In the early days of WWII, when armaments of all kinds were in short supply, the British made use of a venerable field piece that came down to them from previous generations. These guns, hitched to trucks, served as useful mobile units in the coast defense. But it was felt that the rapidity of fire could be increased. A time-motion expert was called in to suggest ways to simplify the firing procedures. He watched one of the gun crews of five men at practice in the field for some time. Puzzled by certain aspects of the procedures, he took some slow-motion pictures of the soldiers performing the loading, aiming, and firing routines. When he ran these pictures over once or twice, he noticed something odd. A moment before the firing, two members of the gun crew ceased all activity and came to attention for a three-second interval extending throughout the discharge of the gun. He summoned an old colonel of artillery, showed him the pictures, and pointed out this strange behavior. What, he asked the colonel, did it mean. The colonel, too, was puzzled. He asked to see the pictures again. “Ah,” he said when the performance was over, “I have it. They are holding the horses.” (from Elting Morison, pp. 17-18, 1966, Men, Machines, and Modern Times)
Timing Transition to a New Practice

The Shadow of History as a New Focus on Brokerage Spreads through the Organization

- Brokerage spreads as a process of individuals adopting.
- Closure is abandoned as a social contagion process triggered by friends abandoning it.
- So brokerage is understood more quickly than it is used because closure preserves the legacy organization (fraction adopting brokerage minus fraction stuck in closure).

Even when people are eager to adopt brokerage ($k = .75$), closure fades more slowly than brokerage spreads because closure is based on interconnected relationships so no one relation is easily changed without changing others.

When people are reluctant to adopt brokerage ($k = .25$), closure remains ready to reassert itself long after most people have adopted brokerage.
Using what you have learned so far, how would you explain how they do it?


*Photos are from the 1999 Nightline video on IDEO’s "shopping cart" project.
The IDEO process looks like the oral, workshop culture of certain educational institutions.

"Inside the Nobel Factory: U. of C. economists have a lock on the prize. What’s their formula for success?"

(Chicago Tribune Magazine, December, 1995)
Appendix Materials
At the Organization Level, B-C Shifting Is Especially Difficult

This is a Virtual Organization across a Four-Division Manufacturing Company

Discussion Network Before and After an Intervention

Figure 5 from Burt "Network duality of social capital," in Social Capital, edited by Viva Bartkus and James H. Davis (2009). Also remember two examples discussed in class: corruption in Atlanta and Coca-Cola distributors.
**Turnover**

- 88 after one year (58% exit)
- 37 continue
- 104 after two years (64% new)

**Myopia**

Budget for Specific New Products, Year 3 versus 2 (FY3 - FY2) / FY2

- Year 2 Integration into Discussion Network (maximum leader or team centrality)
  - Isolated: -70%
  - Moderate Integration: +18%
  - High Integration: +72%
Network Map of Japanese Micro-Chip Production

Map lists firms at three points in time: 1982, 1987, and 1992. Firms are close together (e.g., Sharp and Sony in 1987) to the extent that they filed US patents citing the same antecedent patents (i.e., are structurally equivalent with respect to past technology). Firms that continue in the same location over time (e.g., Sanyo in 1982, 1987 and 1992) worked the same technology niche over time. The arrow shows Mitsubishi's evolution from a specialty producer in the upper right (producing for their own consumer electronics businesses) to an industry-leader at the far left (producing complex devices such as logic circuits and MOS memory for computer and industrial applications, e.g., as a second source for Intel microprocessors).

from Figure 3 in Stuart and Podolny (1996), "Local search and the evolution of technological capabilities," Strategic Management Journal.
Network Map of American Markets

MECHANICAL MACHINES
- primary iron and steel manufacturing
- metal working machines
- special industrial machines
- engines & turbines
- farm and garden machines
- construction & mining machines
- general industrial machines
- materials handling machines
- motor vehicles
- service industry machines
- other transportation equipment
- electric lighting & wiring equipment
- household appliances
- miscellaneous electric machinery & supplies
- household furniture
- electric industrial equipment and apparatus
- primary nonferrous metals manufacturing

ELECTRICAL MACHINES
- communication equipment
- scientific and controlling instruments
- electronic components
- aircraft & parts
- ordinance
- maintenance & repair construction

AEROSPACE & ELECTRONICS
- optical, ophthalmic & photographic equipment
- electronic components
- aviation
- aircraft & parts
- miscellaneous manufacturing

TEXTILES
- rubber and miscellaneous plastic products
- miscellaneous textiles and floor coverings
- textiles & synthetic materials
- yarn & thread mills
- miscellaneous fabricated products
- metal containers
- paint
- paper boxes & containers
- glass

FOOD
- livestock
- food
- chemicals & selected chemical products
- coal mining
- crude petroleum & gas drilling
- petroleum refining
- television & radio broadcasting
- electric, gas, water, and sanitary services
- paper (not containers)
- paper, (except auto)
- footwear & other leather products
- television & radio broadcasting
- printing & publishing
- transportation & warehousing
- auto repair services
- wholesale & retail trade
- finance & insurance
- business services
- communication services (not TV or radio)
- hotels and personal repair services (except auto)

OIL
- crude petroleum & gas drilling
- petroleum refining
- electric, gas, water, and sanitary services
- paper (not containers)
- paper, (except auto)
- footwear & other leather products
- transportation & warehousing
- auto repair services
- wholesale & retail trade
- finance & insurance
- business services
- communication services (not TV or radio)
- hotels and personal repair services (except auto)

SERVICES
- new construction
- eating and drinking establishments
- amusement services
- printing & publishing
- transportation & warehousing
- auto repair services
- wholesale & retail trade
- finance & insurance
- business services
- communication services (not TV or radio)
- hotels and personal repair services (except auto)

from Figure 3.2 in Burt (1992) Structural Holes; also see Figure 1 in Burt & Carlton (1989)
"Another Look at the Network Boundaries of American Markets" American Journal of Sociology
Building a Strategy Map

Strategy maps can be constructed as spatial representations of structural equivalence distances between projects or the components and processes involved in projects. The raw data are illustrated below. Rows correspond to projects. Columns correspond to components or processes. Cell (3,b) measures the extent to which project 3 involves component/process b. Cell entries could be a binary measure of involved versus not, or a continuous measure of relative investment.

The (M,M) matrix of distances among the M projects in the rows defines a strategy map in terms of projects. Projects close together in the map use similar components or processes.

The (N,N) matrix of distances among the N columns defines a strategy map in terms of components and processes. Components/processes close together in the map are being used in the same projects.

Coordination across the structural holes between proximate projects, components, or processes is most likely successful and rewarding in terms of new products/services/revenue and resources liberated from investments in redundant work.

```
 a  b  c  . . .  N

R&D project 1
R&D project 2
R&D project 3
 .
 .
 .
R&D project M
```
Targeting Structural Holes in the Client

Here is a company's September 2002 reach into the Defense Advanced Research Projects Agency (DARPA, founded in response to Sputnik launch in 1958 and father of the internet).

Density of Perceived Discussion Ties within & across DARPA offices

<table>
<thead>
<tr>
<th>Category</th>
<th>Total</th>
<th>Density</th>
</tr>
</thead>
<tbody>
<tr>
<td>Defense Sciences</td>
<td>10</td>
<td>1</td>
</tr>
<tr>
<td>Microsystems Tech</td>
<td>80</td>
<td>32</td>
</tr>
<tr>
<td>Information Technology</td>
<td>8</td>
<td>5</td>
</tr>
<tr>
<td>Information Awareness</td>
<td>7</td>
<td>5</td>
</tr>
<tr>
<td>Advanced Technology</td>
<td>49</td>
<td>10</td>
</tr>
<tr>
<td>Information Exploitation</td>
<td>62</td>
<td>1</td>
</tr>
<tr>
<td>Special Projects</td>
<td>29</td>
<td>4</td>
</tr>
<tr>
<td>Tactical Technology</td>
<td>24</td>
<td>4</td>
</tr>
<tr>
<td>TOTAL</td>
<td>952</td>
<td>15</td>
</tr>
</tbody>
</table>

(641 within our organization)
Detail on color coordination task on page 34 of this handout (from Shirado & Christakis, "Locally noisy autonomous agents improve global human coordination in network experiments" Nature 2017, 454:370-374). Text below is from the article [brackets added], and here is a video of the coordination task in process: https://media-nature-com.proxy.uchicago.edu/original/nature-assets/nature/journal/v545/n7654/extref/nature22332-sv1.mp4 (you will need to authenticate yourself via U of Chicago).

We recruited 4,000 unique subjects online and randomly assigned them to 1 of 11 conditions in a series of 230 sessions (see Supplementary Information). Subjects were assigned a location in a network of 20 nodes, generated by a preferential attachment model; the network structure was created de novo for each session by attaching new nodes (each with two links) to existing nodes; and subjects were placed into the resulting networks at random. [Each subject has three contacts.] The collective goal is for every node to have a colour different than all of its neighbour nodes. This colour coordination game successfully captures the problem of systematic failure by sub-optimization in coordination; that is, while each individual attempts to reach a solution that is optimal for that individual, this may not be optimal for the whole group.

In the sessions, each subject was allowed to choose a colour from three choices (green, orange and purple) at any time. The number of colours made available was the minimum necessary to colour the entire network without conflicts [conflict means your color matches one of your neighbors], which is known as the chromatic number; and all networks in our experiments are, by construction, globally solvable. However, while all the networks allowed the subjects to reach the collective goal, the networks could (by chance) vary in their number of solutions (that is, the networks ranged from 6 to 13,824 possible colourings that would work, known as the chromatic polynomial; see Supplementary Information).

Subjects could see only the colours of neighbours to whom they were directly connected, in addition to their own colour. Thus, although a subject might have solved the problem from his or her own point of view, the game might continue because the network still had conflicts in other regions of the graph. In terms of the optimization problem, the cost function of the game is expressed as the sum of the number of conflicts. As in past work, the subjects got paid according to how long it took for all conflicts in the network to be resolved, and they had to complete the task within 5 min (see Supplementary Information for details).
Network Map of Senior Management in a Large Financial Organization

Gold is C-Suite.
Red is program participant.
Bold lines are strong connections.
Light lines are weak connections.

Organization:
- △ BU1
- ○ BU2
- □ IT
- □ HR
- ◇ BU3
- □ Other

GOV
FIN
ITSO
NB
HR
LRB