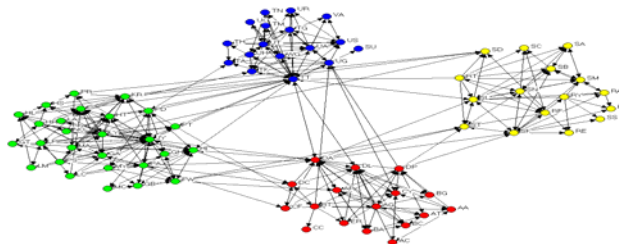


It's Not What But Who You Know: How Organizational Network Analysis Can Help Address Knowledge Loss Crises

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Abstract

With aging baby boomers and an increasingly transient workforce comes a question of how to minimize the loss of expertise, customer contacts, and product/service knowledge when key employees leave. Some organizations address these departures with retention programs focused on capturing and storing what a person knows. However, most neglect the impact that departing employees have on the informal networks central to getting work done in an increasingly dynamic and complex business environment. Departure of those central to informal networks often means loss of key technical expertise and disruption of the network, as these people leave with knowledge of who-knows-what and an understanding of how work gets done in the organization. People who are peripheral in organizational networks may not have a great deal of institutional wisdom, but when they depart they often do so with innovative ideas and key external relationships. In this article, we describe how organizational network analysis can be used to lessen the impact of knowledge loss by: 1) identifying employees whose departure could substantially fragment a network and 2) specifying unique kinds of knowledge loss that occur when people in central, broker, and peripheral network positions leave.

The Developing Knowledge Loss Crisis

After the 9/11 terrorist attacks, Delta Airlines was forced to undertake a significant workforce reduction to remain competitive. Having gone through a similar episode in the mid-1990s, management was keen to avoid problems resulting from the loss of critical expertise. When many experienced mechanics left Delta in the mid-1990s, the company was able to reduce compensation costs in the short term, but it took much longer for less-experienced employees to diagnose and repair airplanes. Flight delays and cancellations, unhappy customers, and an overall increase in Delta's cost-per-seat-mile resulted from a workforce reduction effort that did not consider the criticality of expertise walking out the door.

After 9/11 Delta wanted to make sure that critical knowledge was not departing among the 11,000 employees who agreed to voluntarily leave.¹ In addition to retaining employees who were high-performers or were in positions with few backups, Delta also focused on employees that interviews revealed were "go-to" people during crises and/or those with substantial relationships both inside and outside of the organization.² This time around, Delta wisely placed emphasis on both technical expertise and relationships key to getting work done efficiently and effectively. In doing so, management recognized that critical knowledge loss is not simply what departing employees know about their job, but also whom they know and collaborate with to get work done on time.

Both public and private sector organizations are beginning to struggle substantially with knowledge loss resulting from employee turnover. In terms of broad demographics, aging baby boomers present a major challenge, with nearly 20% of the American workforce holding executive, administrative, and managerial positions set to retire by 2008.³ In addition to retirements, however, critical knowledge loss occurs more subtly via job mobility and alternative work arrangements: Substantial but often unrecognized knowledge loss occurs when established employees quit or contract workers (representing 1 in 6 American workers⁴) move on to another organization. In a recent Hay Group survey of 5000 executives, 46% indicated that they expected to remain in their position for only two to five years.⁵

In sectors such as manufacturing, oil and gas, utilities, government, and defense, these departures are nearing crisis proportions. For example, in the oil and gas industry, the average employee age has risen dramatically; current estimates suggest that roughly 60% of experienced managers will retire by 2010.⁶ And the cost of this loss can be enormous. General Mills, for example, estimated that the departure of just one experienced marketing manager could cost millions of dollars due to the loss of critical marketing and client knowledge.⁷ More broadly costs of recruiting and filling vacancies, lost productivity, and training, to replace employees is estimated to range from 30% to 150% of an employee's salary.⁸

Most organizations do not take prudent steps to guard against this very real and costly resource drain. Only half of the organizations in a recent Deloitte survey had identified a list of critical skills needed for future growth, and more than one-quarter indicated

defining critical skills as “unimportant”.⁹ Even those forward-thinking institutions that are taking action tend to do so in an ad hoc, reactionary manner with efforts to capture and store what departing people know by codifying electronic files and reports, conducting subject matter interviews, capturing lessons learned or best practices from projects in which the employee played a lead role, or trying to embed knowledge into an expert system. Although sometimes helpful, there are two substantial problems with these approaches.

First, just because some knowledge has been captured and stored in a database or a process manual does not mean it will ever be found, interpreted in the right way, or given enough credibility to be used outside of the legitimacy of the expert that authored the document. The key problem with many retention approaches is that they capture only a small fragment of what made an individual successful and knowledgeable to begin with. Departing employees take many kinds of knowledge with them: subject matter expertise, organizational memory of why certain key decisions were made in the past, awareness of past company projects (the results of which may never have been documented), and of course relationships with both internal employees and external business partners and customers.

Second, many retention approaches focus too heavily on a person’s knowledge independent of the network of relationships critical to getting work done. As work has become more complex and interdependent, it is rare for individuals to accomplish anything of substance on their own. Yet few knowledge-retention approaches focus on this network-based knowledge, and so capture only a portion of the knowledge that made a departing employee successful. For example, in one pharmaceutical company we studied, a few key scientists possessed not only key technical expertise about their therapeutic area, but also critical relationships with academia that helped the organization remain on the forefront of research. If those scientists left, the time to re-create their abilities--both their individual expertise and the trusted contacts they had with key scientific advisors--was estimated by senior management to be five years or more.

In short, when employees leave, they depart with more than what they know--they leave with critical knowledge about who they know. Although these networks and relationships are seemingly invisible, lose them and a substantial impediment to getting work done and responding to new opportunities arises. An approach called *organizational network analysis* (ONA) can help on this front. In this article, based on qualitative and quantitative research with 20 organizations, we show how ONA can help reveal the relational fabric of an organization that must also be a part of effective knowledge-retention strategies. Specifically, we have found the approach helps to: 1) identify key knowledge vulnerabilities in a network by virtue of both what a person knows and how their departure will affect a network and 2) address specific knowledge loss issues based on three roles in networks – central connectors, peripheral players, and brokers – that each hold unique kinds of knowledge (see “About the Research” sidebar).

Sidebar: **About the Research**

We have studied the knowledge loss issue using organizational network analysis (ONA) in several ways. For the past several years, we performed ONAs at 80 organizations of different sizes and across different industries. After conducting each ONA, we also performed interviews to, among other objectives, understand the characteristics and implications of different roles in the network: central connector, broker, and peripheral member. More recently, the focus of our post-ONA interviews has been on the types of knowledge and the knowledge loss risk associated with each of the three roles. We have conducted approximately 100 post-ONA interviews across 20 organizations that specifically addressed this issue. In addition, we have done several other interviews with managers at organizations that are implementing knowledge-retention practices, consultants who are providing knowledge-retention services, and other researchers on this topic.

(end sidebar)

A Relational View of Knowledge Loss

You can't simply replace an employee who has been with a company for 10 or so years with another employee—even someone with a very similar skills profile—without expecting disruptions in the web of formal and informal relationships that get work done. It takes time for others to understand a new person's true expertise and when to seek them out. It takes even longer to develop trust in that person's intentions and capabilities. In short, departure of key people--not just those high in the hierarchy but those central to the inner workings of a network--can significantly impact the relationship structure and consequent functioning of an organization. ONA can inform knowledge-retention efforts by allowing managers to visualize the myriad and often invisible relationships that exist behind the formal organizational chart and are critical to getting work done.

Figure 1a shows the information network of a key group of employees in a government intelligence agency. What happens if the highly central people (most of which have long tenure in the agency) retire, leave the organization, or are promoted? Of course, their individual knowledge will be missed. But perhaps more significant is that these departures will severely disrupt the information flows in the network and thus how work gets accomplished. Figure 1b shows what would happen if the most connected employees (top 10% of employees receiving requests for information) in the organization departed. With these employees removed, it is much more difficult for employees on the periphery of the network to communicate with others in the organization. In fact, the overall connectivity drops by 46%, and there is a 50% fall-off in cross-divisional relationships that were considered critical to gathering and acting on intelligence in a prudent and timely fashion.

The leader who initiated the ONA was trying to create a collaborative and integrative environment and the network results confirmed his suspicions that the current hierarchical structure did not support integration. The question then became, "How do we unfreeze the environment that we are in?" One of the initiatives he proposed was to get the top brokers ("bridges" across departments as identified by the ONA) to meet periodically in problem solving sessions that helped make them aware of each other's

expertise and perspectives on the future direction of the agency. These sessions would help promote lateral connectivity as well as decrease overall network reliance on this small set of brokers. Further, when asked what knowledge was most at risk in the agency, he replied, “Not much subject matter expertise would be lost or missed, since it keeps changing. What would be missed the most are the work processes and how and why things are done a certain way.” Much of this knowledge resided with the centrally connected personnel and brokers. Therefore, another initiative he is now pursuing is to create mentoring relationships between brokers and targeted people on the periphery to transfer knowledge at risk: a knowledge retention effort that also builds a more integrated, collaborative network less susceptible to departure of key employees.

<Insert Figure 1a and 1b here: The impact of removing highly connected employees in a government agency>

Of course, beyond information flow, managers are often interested in value creation and ways of assessing economic return from key personnel, relationships, or entire networks. This kind of relational view of effectiveness can quantify the value lost in departures of those who may not be high on the formal organization chart but are instrumental to the inner workings of an organization. For example, relationships in the network diagram in Figure 2 reflect time-saved estimates due to interactions among members of a community of practice in a financial services organization. Here each member estimated the typical amount of time saved per month as a result of resources, information, and help received from other members of the community. Although we can measure value creation relationally in other ways (e.g., revenue creation, economic value add), this approach allowed us to quantify the value of this network by multiplying time savings by a loaded compensation figure for each employee.

In this case, our ONA revealed a handful of people contributing a great deal of time-savings value to the organization. For example, the most central person, #13, generated savings of \$21,300 per month. When we asked what would happen if that person left, we got a long silence in response. It turned out that, in fact, she was leaving. Thus, a critical function of the network analysis became to help identify emerging leaders in the network who could take her place.

<Insert Figure 2 here: Identifying key value creating roles in financial services community of practice >

Clearly ONA can provide a lens that helps identify vulnerability points in a network if key employees were to depart. In addition, it can highlight the unique knowledge held by three key network roles: central connectors, peripheral players, and brokers (see Figure 3 for an explanation and depiction of these three roles). Our research shows that each role involves unique knowledge and that retaining this knowledge is more complex than simply documenting employees’ skills and expertise areas. Certainly individual knowledge is important; however, most companies can replace key expertise if they are willing to spend sufficiently. What is more difficult to replace are the network connections that enable work to get done in a given context. A close look at the network

roles, and the specific knowledge associated with each, can help organizations identify critical knowledge areas to retain and the potential means to do so. We have summarized the knowledge loss and actions that can be taken by role in Table 1 and characterize these roles with examples below.

<Insert Figure 3 and Table 1 About Here >

Central Connectors

Central connectors are those who have a high number of direct information relationships, typically as a result of having a great deal of expertise in one if not many areas (though occasionally you find people in this role due to job design, personality or political posturing). Because of the help they provide others, central connectors also have a strong awareness of expertise in the network and have established a favor bank such that people will help them when asked. If the central connector does not know the answer he or she usually knows who does and has social capital built up with these people which helps get a response quickly. With their depth of expertise and influential position in the network, central connectors often pose two key knowledge risks.

Loss of deep, network-embedded expertise critical to current operations.

The first key knowledge risk lies with loss of deep, network-embedded technical expertise critical in both day-to-day operations and times of crisis. Employees seek out central connectors for different reasons, but one of the most prevalent and important is to obtain deep subject matter expertise. Often, the knowledge that central employees possess is what Dorothy Leonard and Walter Swap refer to as “deep smarts,” expertise based on experiences, intuitive judgments, and the ability to analyze problems from different perspectives.¹⁰ For example, in the petroleum industry, many of the geoscientists we interviewed had more than 20 years of experience prospecting for oil and gas. According to a VP of Exploration,

The rule of thumb has always been that ten percent of your people find you about ninety percent of your hydrocarbons. Well that’s a little bit of an overstatement, but the business has gotten to be so complicated technically that what it comes down to is you’ve got to get multi-disciplined people looking at the same data to come up with difficult decisions on where to drill the well. It’s not a sequential business. It’s an integrated simultaneous business. So knowing who and when to tap into others’ deep expertise and package this are really critical too.

The most effective central connectors are trusted, have credibility, and are willing to help. They make day-to-day work possible for many others and are critical when things go awry because they are often the first called on in crisis situations. For example, in the oil industry, we found central engineers, geoscientists, and drillers were the most frequently contacted during unexpected challenges with oil wells. Alternatively, in IT groups, we found central programmers critical to problem solving when a computer system shut down. Some answers the central connectors provide themselves, but many they acquire through the vibrant set of relationships around them. The strong relationships they have

with others help them to think about challenges and obtain information or resources when they need help in a hurry.

More than just developing the technical skills of potential central connectors, organizations need to create effective collaborators and help position them in the network via relevant projects and initiatives. This means that potential connectors need to develop skill in collaborative behaviors (that often do not come naturally in technical groups) and organizations need to help them move into the inner workings of a network so that other members develop awareness of and trust in their abilities. One efficient means of doing this lies with embedding personal network assessments into career development and onboarding processes. Rather than indiscriminately telling people that they need to just go network, these more targeted processes help employees focus on specific relationships that need to be developed and action plans to do so. Further, they also focus on behaviors that when engaged throughout an employee base help to create a more adaptive culture.

Of course, work experiences themselves can be another powerful means of developing budding central connectors. Using the natural unit of work--whether a financial transaction, consulting project, or new product development team--is a very efficient way to build connectivity as people learn what and how to rely on others. Further, because central connectors have high social capital, energy, and trust, they make ideal candidates to lead critical ventures. In order to help transfer some of their subject matter expertise, while at the same time building relationships around an expertise area, some organizations have enjoyed success by having these people lead communities of practice. This or more structured approaches that re-allocate information access, decision rights, and role responsibilities in a network can serve to reduce the burden on central connectors, develop other less connected network members in ways that better integrate them into the fabric of the organization, and importantly, do so in a way that decreases the impact of an untimely departure of a central connector.

Transferring organizational memory and getting newcomers up to speed.

The second key knowledge risk posed by a central connector lies with their organizational wisdom: knowledge of an organization and its past that helps productively engage newcomers as well as avoid repeating old mistakes. More often than not, getting connected and productive in an organization is a process of becoming embedded in a network. Unfortunately, most orientation programs focus heavily on policies and procedures, while relying on staffing and chance to get a new employee (either experienced or just of college) productively embedded in a network. It is very common to see ONA results like that of a major pharmaceutical company portrayed in Figure 4 below. The diagram clearly reveals the extent to which less experienced people and new hires are peripheral to the network—and inner workings—of the organization.

<Insert Figure 4 about here>

Most people get connected in a network through unstructured means that usually require two or three years for them to feel connected. However, some savvy fast movers establish ties early with central connectors and thereby bootstrap their own efforts to get connected

in a network. Such a tactic helps to avoid a number of relational challenges faced by newcomers. First, the newcomer's expertise is rarely known to the rest of the network and so they are rarely sought out. The central connector can help by directing people to these peripheral members and telling others about their expertise. Second, the newcomers are not trusted or credible. Here the central person can help by vouching for the newcomer, essentially allowing them to borrow the goodwill of their reputation as the newcomer gets established. Third, although newcomers might have a lot of great ideas, they rarely have insight into the norms, politics, or work practices in the new organization. Central connectors are the best possible advisors in this regard.

In some organizations we studied, central employees were formally assigned the role of acclimating newcomers to the organization's network. In a pharmaceutical organization, for example, joint interpretation was needed on voluminous data, and so effective collaboration among scientists was a must. By design, junior scientists were often teamed up with centrally connected scientists on projects. The central scientists collaborated with junior scientists on doing the analysis and helping with decision making. The central scientist constantly provided real-time feedback and worked to help build the junior scientists' relationships throughout the organization.

We found a similar arrangement in one consulting firm, where partners were responsible for helping to bring some of the junior consultants on board in the company. The junior consultant basically "shadowed" the partner by attending meetings, listening to day-to-day discussions, and generally observing the partner perform his or her work activities. Usually, the consultant followed the partner on a specific project or client engagement, observed how the partner made decisions, and was encouraged to participate in certain discussions with clients and team members. During the course of the junior consultant's first year, the partner also provided periodic feedback on the consultant's performance. Of course, some partners were better than others at this. Selecting centrally connected network members for the informal knowledge transfer, rather than simply using partners, is a tactic the organization has adopted in pursuit of more consistent results.

Other, more structured approaches can help create connections between more peripheral and more central employees. For example, first work assignments are crucial for newcomers to get connected to the network: Thus, it is a sound move to craft an assignment such that newcomers have to connect with people and especially central people.¹¹ Similarly, knowledge management initiatives such as after action reviews or project lessons learned (with good document meta-data to contact authors) are an effective way to capture some of the organizational memory. One organization is in the process of piloting both audio and video segments with the objectives of reducing knowledge loss and easing knowledge gain. For example, one segment captured an employee's experience at the customer site, including what to expect and how to behave in certain situations; it is targeted towards helping the novice employee get acclimated and so be more effective at integrating into the network.

Brokers

Brokers are those who have ties across subgroups in a network and so have a disproportionate ability to help an organization capitalize on opportunities requiring integration of disparate expertise. They may not have the most ties in a network, but by virtue of key relationships across subgroups, they have a unique understanding of political dynamics and resources/expertise embedded in a network. When they leave, they impair an organization's ability to 1) see opportunities uniquely based on the integration of expertise and resources distributed throughout a network and 2) coordinate efforts among people with different perspectives and values. Brokers often play a key translating function at a technical level, with their knowledge of the expertise and terminology of different groups. They also play an important translating function at a cultural level by understanding and appreciating differences in values and norms across groups. This perspective makes them uniquely able to both spot and then act on opportunities requiring integration.

When brokers depart, they may not affect as many people directly as a central connector does, but their departure can disproportionately fragment an overall network at key junctures. We can clearly see this in the network analysis of a function responsible for innovation in a well-known professional services organization (see Figures 5a and 5b). For example, if we remove the top five brokers, including "29", "53," "56," "54," and "47," there are some significant disruptions to the information network. Two of the research clusters become nearly isolated, and the connections between the research side of the organization and the business unit and development groups become tenuous. What is particularly interesting is that the brokers' role and importance in the network is almost always un-recognized by leaders. For example, when shown this diagram, several managers were unaware and surprised that some of these employees were brokers because they weren't as central or as visible as some of the other employees.

<Insert Figure 5a and 5b here: The impact of removing broker employees in a services organization>

To provide a qualitative example of the importance of brokerage in networks, we interviewed a recently departed strategy executive from an automobile manufacturer who played the broker role in many ways. First, he was on the decision review board for the company's vehicle programs, where he was able to effectively translate and transfer relevant processes and data from one vehicle program to another. This executive also acted as a broker between two groups involved with market research: a decision analytic group that was very "process-rich and data-poor" and a group that collected customer and market data. These were two vastly different work cultures, where better collaboration between the two groups would lead to more effective decisions and new innovations.

What made this broker successful was his ability to transfer knowledge, ideas, and understanding from one group to the other and to integrate market research into the decision-making process. According to the executive, "I don't belong to any one specific network, but I have ties to all of them. I've been sufficiently accepted by each group, but I haven't been technically or functionally drawn so strongly into one of them that I

couldn't connect to another." Since his departure, the market research organization is not as well integrated or effective as before, with the result being a much more siloed structure. Even though he has been replaced by another technically competent executive, without him the relational bridges do not exist. He also played a bridging role to external expertise for the company. He knew and had worked with many consultants and academics over the years, and even though he made his Rolodex available to his successor, he was unable to pass along the relational capital he had accumulated.

Brokers are increasingly important as organizations struggle with silos driven by formal structure, deep technical expertise, or occupational subcultures. Unfortunately, however, the type of relational knowledge and organizational perspective they hold are rarely captured in retention programs. The irony is that when brokers leave, many organizations don't even know what has been lost. Three practices can help organizations identify, develop, and position brokers in their network. First, they can encourage and reward lateral movement for employees across projects, divisions, and geographies through job rotation. Brokers possess unique knowledge that allows them to integrate disparate groups, but this knowledge must come from work experiences that provide a deep understanding of expertise, subcultures, and work processes. Second, organizations can identify and groom potential brokers by performing an ONA and seeing who currently plays the role of a broker in the network or identifying which employees fit the broker profile (i.e., well-tenured, have worked in different groups, have high credibility, is an effective translator and negotiator). Once identified, a broker can be trained to integrate networks by establishing contacts in multiple groups, understanding the needs and objectives of each group, and looking for "win-win" opportunities through the transfer and application of ideas. Finally, organizations need to assign or position brokers thoughtfully in business processes and strategic initiatives. It makes no sense to place brokers in non-critical areas or in areas where collaboration is not important. Rather, place brokers where tighter integration between groups would benefit the organization.

Fully implementing a broker role may mean giving them greater authority or more flexibility in decision rights. It is useless if brokers can see opportunities and threats in the marketplace but cannot act on them in a timely manner. For example, in an online retailer we studied, product managers were often brokers between marketing, operations, and IT groups. In order to do their jobs well, they needed real-time customer and market feedback concerning new product ideas, the impact of advertising and discounts on product sales, and the impact of the website layout on product sales. Focus groups or surveys would take weeks to run, and the product managers could not wait for IT to perform an extensive data mining analysis, most of which would not pertain to their individual products. The company's executives decided to give the product managers the right to run their own "experiments" on the company website. They did not have to seek approval from IT. Of course, in order to make this work, tighter linkages needed to exist between the operations, marketing, and IT groups. Essentially, product managers became brokers among these groups; they knew whom to turn to in each organization for specific help. The result was real-time, cost-effective feedback from customers about product and marketing ideas, resulting in a more effective website and ultimately more product sales.

Peripheral Players

Peripheral employees have the fewest ties and often reside on the boundaries of a network. Employees on the periphery tend to be more disengaged and dissatisfied with the organization than those who are well-connected, and as a result, are more likely to depart. Because they are on the periphery, their knowledge tends to be marginalized. They are not as visible within the company as central employees or brokers, and as a result, they are usually ignored when it comes to knowledge-retention strategies. This, however, can be a mistake. We've often found peripheral employees to possess knowledge that would be missed by the organization, namely niche expertise and knowledge resulting from external relationships.

Capitalizing on relevant marginalized perspectives.

Peripheral people in our interviews often had niche expertise; though it may be employed only infrequently, it would leave gaps in crisis situations were those employees not present. In daily operations, loss of this expertise was not a big deal--but when crises arose it could bring things to a dramatic halt. Peripheral people also tend to have novel insights and can be substantial sources of innovation if heard. They are often not steeped in existing paradigms of thought and do not have personal or career investments in current ways of working to the same degree that central connectors might. As a result, they can combine fresh insights with an understanding of the inner workings of an organization to generate feasible innovations.

New and innovative ideas are also at risk when peripheral employees depart because they are often "early adopters" in the organization. Consider Jake, a member of a small IT consulting firm that had merged with a company's large IT division. Jake considered himself an early adopter of technology and had success bringing new technology ideas into his previous group. He was also able to develop complete end-to-end solutions on his own, including client/server architectures and interactive, dynamic Web applications. However, the structure of the large IT division was one in which most people had a specialist role, such as database or network administrator. Management would call on him to do projects that had a tight deadline because they knew he could do most of the project himself. They also knew that he was a workhorse and would produce good results. According to Jake, "I may not be networked because it is self-serving to management to keep me where I am. Sometimes I feel like I'm not getting a seat at the table. A few of us who came over in the merger feel like isolated pack mules." The knowledge loss risk here is that people like Jake have innovative ideas, but they have insufficient voice or legitimacy to get their ideas into action.

It is important to include at least a sampling of peripheral employees in any knowledge-retention strategy. In addition to more standard approaches to capturing this group's insights we have found it highly efficient to get their ideas into action by connecting them with more central members. For example, one effective practice to both get their novel ideas into action and create a more robust network is to connect them to a broker. In our work with companies, we can usually identify the top 10 or so brokers or "influencers" in the network. Then, by adding just one connection from each broker to someone

peripheral in their division, for example, we can increase the overall connectivity of the network dramatically. In one 100-person network, we were able to simulate a 25% increase in cohesion (i.e., the average distance for information to travel across the entire network) by adding simple connections from the top 12 brokers to people in their division who resided on the periphery. What this suggests is that if you have a good understanding of your network structure, it takes only a few changes to have a large positive impact on connectivity and mitigate your organization's knowledge loss risk.

Another management practice is to ensure peripheral employees are not disengaged or disinterested. Get them involved in activities that make them feel connected to the organization, while at the same time, making others aware of the expertise they possess. This may include encouraging mobility across projects so the employee is not stuck on a project forever, allowing the peripheral person to experiment and bring in new ideas, and making peripheral workers visible by giving them the opportunity to do webcasts/teleconferences and "lunch-and-learns" on work they are doing. Finally, peripheral people, especially newcomers, can be encouraged to join a community of practice. This gives them the opportunity to meet people who have similar interests and keeps them engaged (especially if they are not satisfied with their formal work assignment).

External ties of value.

Although peripheral people may not be well-connected within their own organizations, it is a mistake to assume they are not part of an extensive network outside of their immediate work group or organization. Therefore, a much less obvious source of knowledge loss risk comes from external relationships. In fact, our research showed that peripheral employees, on average, had roughly an equivalent number of relationships outside the organization as central employees. We see common examples of this in sales divisions or any direct customer-facing groups. However, the external partner does not have to be the customer. Vendors, academics, independent research centers, and colleagues from previous jobs are all sources of important external knowledge. Often the departing employees take their external contacts with them as they walk out the door. The loss to the organization could be deep insights about markets, technologies, and products; an understanding of customer requirements; and the relational capital that encourages the partner to keep the best interests of the organization in mind in times of crisis.

External relationships are also a source of new ideas, thus helping to keep the organization from becoming too insular in its thinking. In a pharmaceutical company, for example, a peripheral research scientist brought in scientists and colleagues from outside the organization to give talks and workshops. The benefits were two-fold: New ideas flowed into the organization to help with their drug discovery program, and new connections were formed between employees who attended the workshops and these external scientists. In another example, a junior programmer told us about a Linux users group to which he belongs. He felt he got more out of that, as well as external technical blogs and forums, than he did from interacting with other programmers in the company. In one sense, he incorporated this knowledge into the software that he wrote for the company. However, because he was not well-connected internally, these new ideas were

not being leveraged by other programmers in the organization as a whole. Again, this knowledge would be at risk if he decided to depart.

Companies can formalize these “hidden” external relationships (i.e., known and managed by only one person on the periphery) by inviting the external partner to conduct workshops, give presentations, or sit in on meetings to provide feedback. In that way, more connections will be established between employees in your organization and the external partner, versus the one or two peripheral connections that exist today. Another effective practice is to reward individuals if they bring external contacts and their expertise into the organization. There is usually a disincentive in many organizations for employees to share their contacts, so a change in the reward system may be needed. For example, by recognizing and rewarding joint sales efforts, an organization is encouraging the sharing of external relationships versus a “go it alone” mentality to maximize personal monetary commission and recognition. In one example, a pharmaceutical company rewarded scientists who published papers jointly with both an external partner and another colleague.

Conclusion

Because work and the knowledge associated with it are becoming more collaborative in nature, it makes sense to apply a network lens to knowledge-retention programs. Certainly, an individualistic approach to capturing a perceived expert’s know-how is important. However, as we have shown above, these programs also can overemphasize the expert’s subject matter expertise and miss out on relational knowledge that is equally or more critical to getting work done. Marrying the organizational network analysis ideas with knowledge retention can help organizations to both identify and retain critical knowledge.

A network perspective allows an organization to locate key susceptibilities by role (e.g., central connectors, brokers and peripheral employees) and even model the costs of doing nothing by “removing” key people from the network. This vantage point allows executives to focus retention strategies on know-who. In addition to subject matter documentation and interviews, key tenured employees should be involved in documenting their key contacts and relationships, as well as providing introductions to strategic contacts, both internal and external.

The more advanced organizations are taking actions that keep the crisis from ever being a crisis. Career development and staffing practices that help to fill network holes created by potential departures--before such people leave--can enable more seamless operations. Pfizer, for example, has an initiative using ONA and other tools to identify employees for whom the organization would be at risk if they left. Both traditional individual knowledge and relational knowledge are assessed during certain change situations at Pfizer, including executive transitions and reorganizations in both the sales and drug development groups. For example, Pfizer captured some of the knowledge associated with internal and external relationships during its merger with Pharmacia as a means to more effectively integrate the two companies and to increase learning and minimize any knowledge loss.

Clearly the knowledge loss issue is not just about specific expertise walking out the door but also about a group's collective ability to get something done. A network approach allows organizations to identify people, their roles, and their knowledge in getting work accomplished.

Figure 1a: Information network of a government agency.

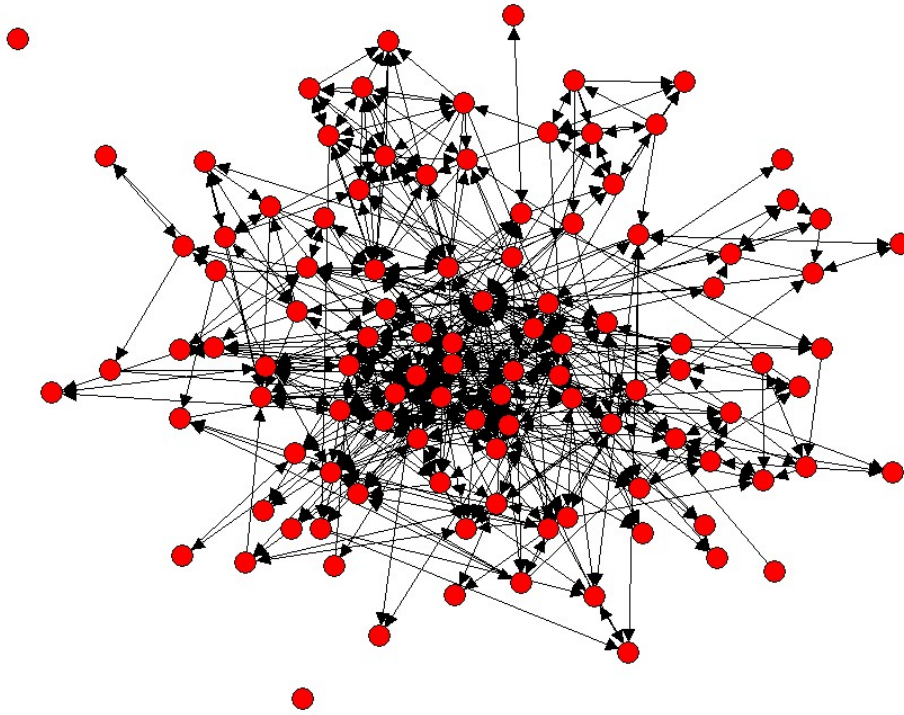


Figure 1b: Information network of a government agency with highly connected employees removed.

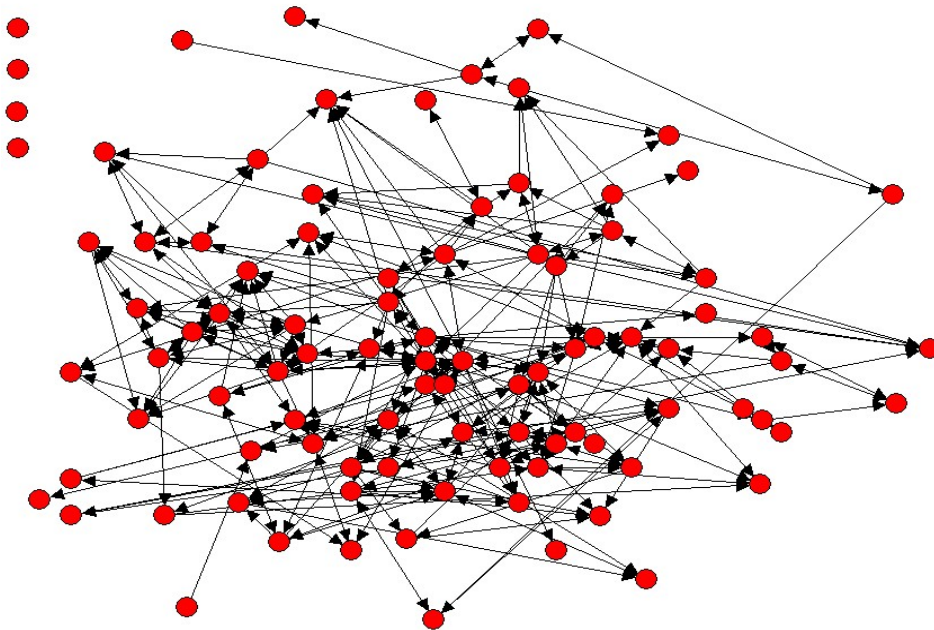
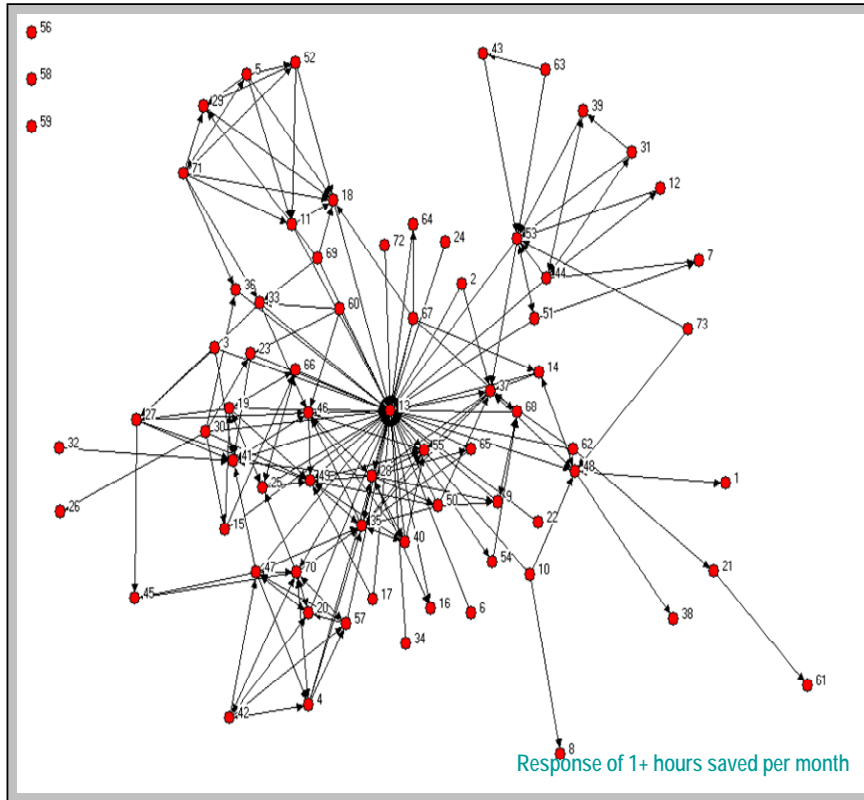


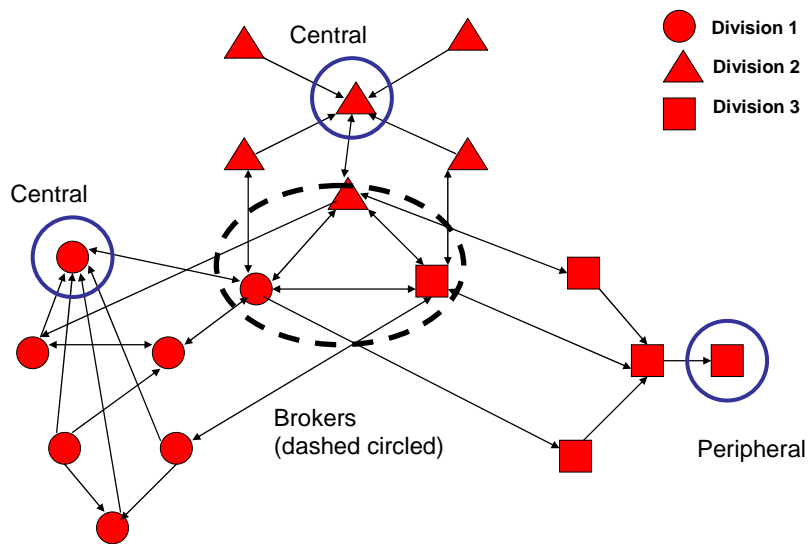
Figure 2: Putting a value to key departures.



Savings for the past month:
1,035 hours
Converted to \$ at \$100/hr
\$103,500

Potential time & \$ saved per month
Person # 13 - 213 hours (\$21,300)
Person # 53 - 66 hours (\$6,600)
Person # 49 - 46 hours (\$4,600)
Person # 41 - 40 hours (\$4,000)
Person # 70 - 37 hours (\$3,700)

Figure 3: Specifically our interviews have shown specific knowledge loss issues in relation to each category or role in the network: central connector, broker, and peripheral player (see diagram below). Central connectors are those people who have a high number of direct information relationships and they are often most heavily sought out for information in a network. Brokers are those who have ties across subgroups in a network and so serve to integrate the entire group. As seen in the diagram, the three brokers act as bridges across the three divisions. Peripheral people are those who reside on the boundaries of the network, with few people going to them for information, while at the same time, they do not seek information from others in the network.



In addition to these qualitative interviews, we also performed a quantitative analysis on 12 of the ONA datasets to determine the profile of the three roles, central, broker, and peripheral. We looked at the following four characteristics to help us understand the profile of each role: group tenure; company tenure; hierarchy; and personal network boundaries. As seen in the table, peripheral employees had much lower department and organization tenure than well-connected employees. Although peripheral employees were not well-connected in their immediate network, the results also implied that they had a personal network that existed beyond their immediate workgroup. Brokers distinguished themselves from central connectors by having longer company tenure, a higher position in the organization, and a higher percentage of personal relationships outside the immediate network. As expected we did find that certain employees were both central in the network and acted as brokers (70 employees in our sample).

Quantitative Analysis based on 12 ONA datasets:

	Department Tenure (months)	Organization Tenure (months)	Hierarchical Level [1 to 5]	Boundary [1 to 5]
Peripheral (n=128)	35	102	2.95	2.95
Central (n=85)	45	125	3.25	2.85
Broker (n=75)	46	150	3.32	3.21
Broker & Central (n=70)	45	160	3.40	2.90

Peripheral employees were selected by being 1 standard deviation below the average in-degree centrality for their organization’s information network. Central employees were selected by being 1 standard deviation above the average in-degree centrality for their organization’s network. Brokers were selected by being one standard deviation above the average betweenness score for their organization’s network. Tenure was measured in months. A normalized [1 to 5] Hierarchy scale was created, with a higher score indicating a higher employee position in the network. A normalized [1 to 5] Boundary scale was created, with a higher score indicating a greater extent to which employees rely on personal networks outside their immediate workgroup. Employees were asked to list up to 15 people to whom they turn to for information to help them with their work, and then the relative position or “boundary” of these people (e.g., immediate workgroup, outside the workgroup but inside their division, etc.).

Figure 4: Lack of connectivity of new hires in a pharmaceutical company.

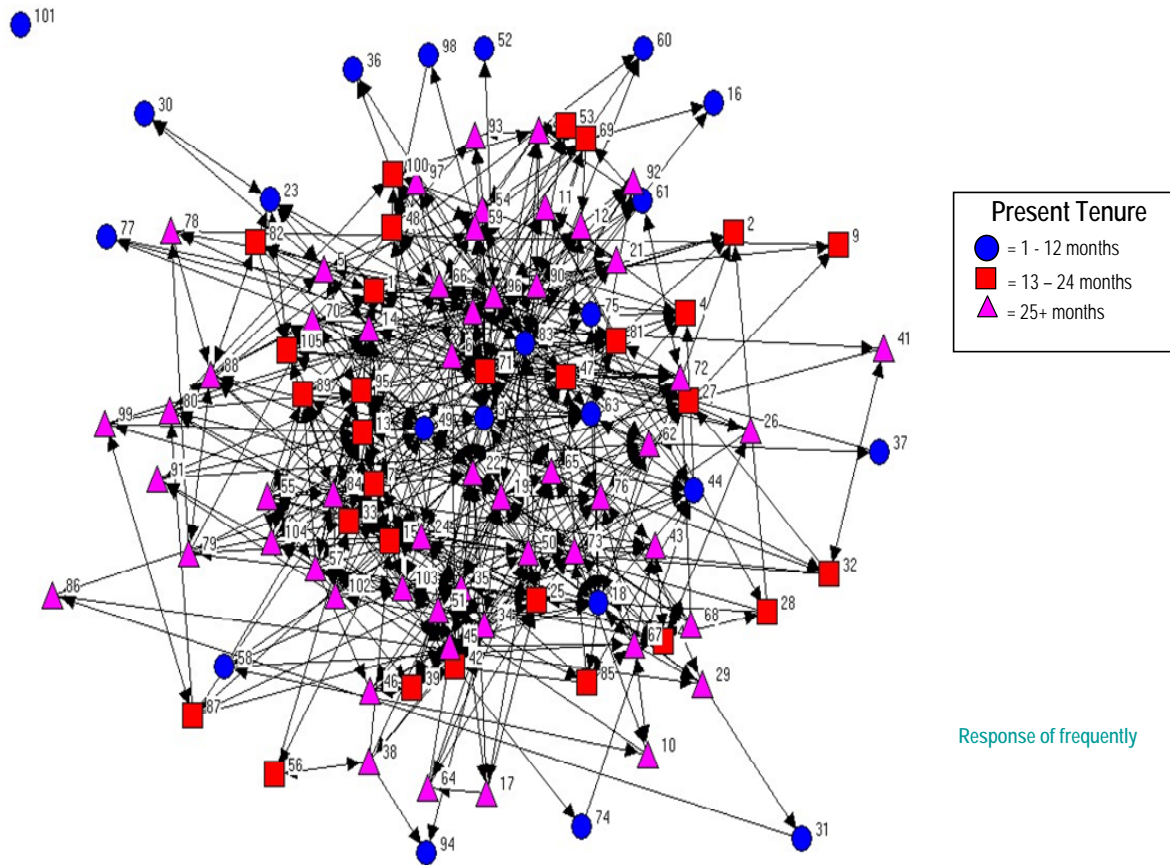


Figure 5a: Information network of a services organization by group.

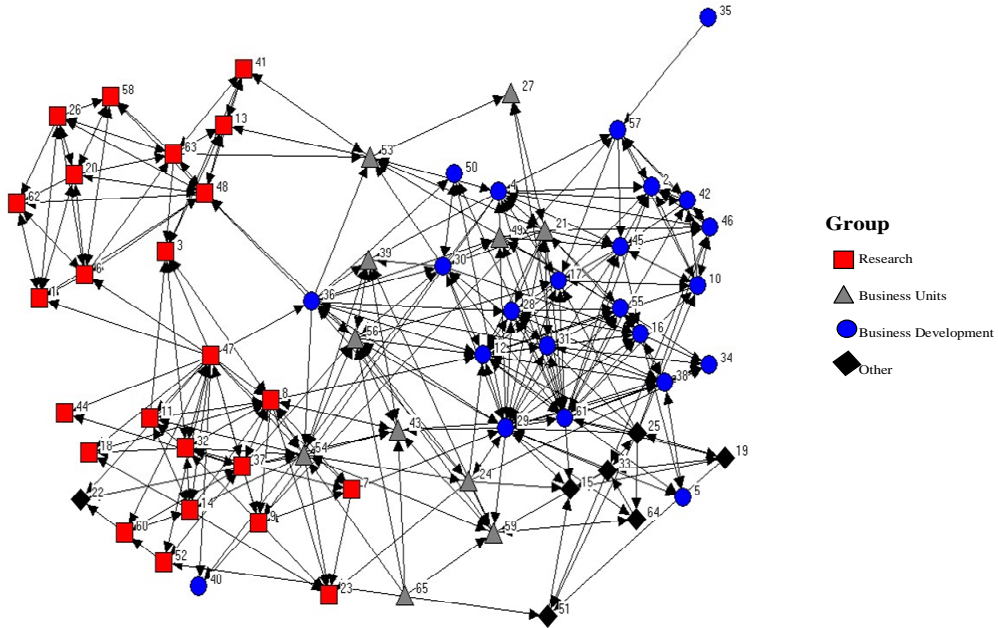


Figure 5b: Information network of a services organization with top 5 brokers removed.

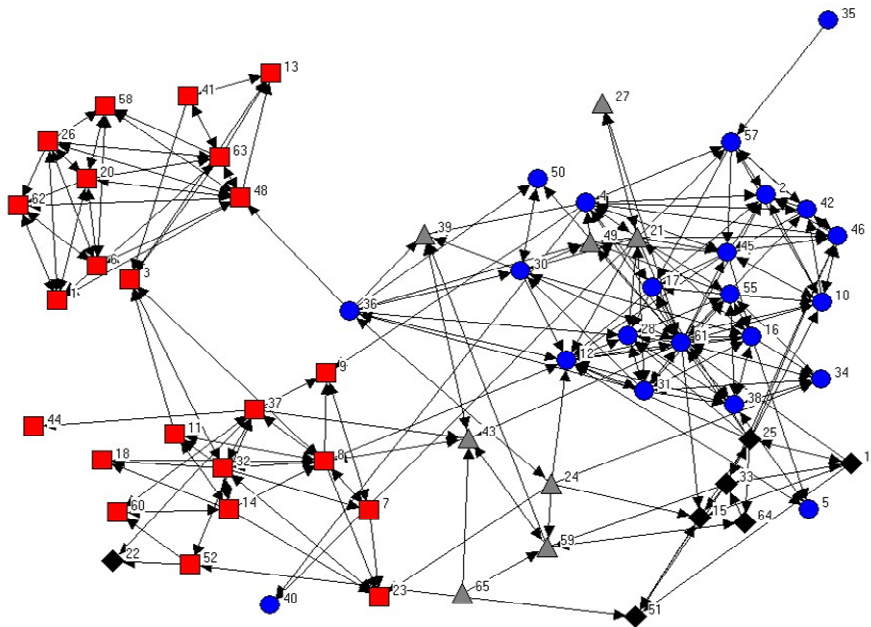


Table 1
Unique Knowledge-Retention Strategies by Network Role

Network Role	Knowledge Loss Risks	Actions
<p>Central connector (many direct information seeking connections as defined by degree)</p>	<ul style="list-style-type: none"> • Technical expertise and organizational memory as well as a set of relationships that help many others get information or other resources to do their work • Experiential knowledge and reputation that enable rapid on-boarding 	<ul style="list-style-type: none"> • Use personal network profiles in career development and on-boarding practices to systematically create network redundancies where departures might dramatically fragment a network • Reallocate information access and decision rights to ensure that one point does not become too vulnerable in the network • Have central connectors lead communities of practice as a means of creating connections around them • Require central connectors to help newcomers get acclimated through strategic introductions, shadowing, mentoring, and joint projects
<p>Brokers (many bridging connections as defined by betweenness)</p>	<ul style="list-style-type: none"> • Broad knowledge of how the organization operates and ability to recognize opportunities requiring integration of disparate expertise • Ability to mobilize and coordinate efforts of disparate groups in the pursuit of opportunities 	<ul style="list-style-type: none"> • Identify and develop brokers through staffing and rotation across division, geography, and expertise groups • Assign brokers strategically: where information gaps exist or where ideas can move from concept to action • Give brokers preauthorized decision limits to tap into network resources. Allow them to experiment to obtain real-time information
<p>Peripheral players (few direct information seeking connections as defined by degree)</p>	<ul style="list-style-type: none"> • Marginalized or niche expertise or early adopter ideas that have the potential to reshape offerings or operations • Loss of external relationships built on trust and familiarity 	<ul style="list-style-type: none"> • Pair peripheral people with brokers and/or central connectors to bootstrap them into the network • Ensure relevant peripheral people are visible and engaged: encourage project mobility, speak at “lunch-and-learns”, and give webcasts • Invite external partners to conduct workshops and attend meetings to broaden then network • Reward employees for bringing external ideas and connections into the organization

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