How Well Do We Collaborate?
Using Social Network Analysis (SNA) to Evaluate Engagement in Assessment Program

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Introduction
In the past decade, the interest in library assessment and evaluation has expanded greatly, in particular to provide evidence and context for operational and strategic planning, priority setting, and decision making. In order to evaluate the quality and effectiveness of library services, collections, and facilities, the number of assessment activities has grown rapidly. Previously, the occasional assessment task was assigned as “other duties” to a library staff member who had an interest in it or a specific area of expertise. However, the demand for assessment and evaluation expertise has led to full-time positions, and sometimes evaluation units, charged with sole responsibility to provide leadership, coordination, and support to carry out assessment activities geared toward data-informed decision making. As the field of library assessment and evaluation has advanced considerably during the past three decades, libraries made great strides in organizing assessment activities and establishing sustainable assessment programs that fit into their organizational structures.

As organizations go through the process of establishing a structure for the assessment function, questions arise whether the program should be centralized or decentralized, whether assessment librarians should be attached to functional units or central administration, and so on. In seeking responses to these questions, there is no one-size-fits-all approach, as an optimal program model will vary depending on the size and structure of the organization. From the beginning, it is important to clearly articulate the purpose of the assessment program and outline relevant roles, skills, and capabilities that should be in place for a successful program implementation, which enables continuous improvement of the organization.

At Columbia University Libraries, we developed a collaborative model, where a single full-time librarian provides centralized leadership, coordination, and guidance on assessment activities. The assessment coordinator works with division-based or organization-wide teams to carry out assessment activities, breaking functional silos and improving decision making. This approach is based on the premise that staff engagement in assessment is vital to the success of an organization-wide assessment program. Columbia University Libraries is a large and highly decentralized organization. Therefore, the success of its assessment program depends on joint ventures, collaborative relationships, and alliances.

A critical but often invisible area of our organization, where we have done little to evaluate, is the formal and informal collaborative network of the assessment program. Informal relationships among employees are often far more reflective of the way work happens in an organization than relationships established by position within the formal structure. Informal relationships—meaning those captured by formal organizational reporting structures like managerial relationships—can help us understand how the program functions and unveil areas where key intraorganizational connections are being made and maintained. The purpose of this research project is to establish applications of social network analysis (SNA) as a diagnostic tool to:

- Investigate the extent of engagement in the assessment program
- Retain and recruit assessment partners for continued success of the program
- Promote effective collaborations on assessment projects

Background and Review of Literature
SNA is the analysis of individuals and their relationships. The context for the social network can be personal or professional, and the relationships that individuals have with one another can be hierarchical, peer-to-peer, or some mixture of
both. The key concepts for SNA are the definition of individuals (typically called “nodes”) and relationships (among those nodes typically called “edges”). As noted, different types of SNA may consider different types of relationships for measurement. By varying the choice of nodes and relationships to study, the researcher can vary the type of social interaction under consideration. As the focus of this study is collaborative connections of Columbia University Libraries’ professional staff with the assessment program, the literature review focuses on studies about collaboration networks.

Previous work using SNA in the context of collaborative networks has revealed some of the benefits that this particular social science research technique can provide. Overall, the major findings that emerge from the application of SNA to organizations fall into two camps: (1) descriptive information about the existing relationships among individuals and clusters, and (2) suggested strategies for enhancing or modifying network structures in line with organizational goals.

Hoppe and Reinelt provide a good overview of the basic methodological principles underlying SNA. They highlight the important qualities of social networks that reveal information about the nodes and relationships under study, and they claim that connectivity, clustering, centrality, and density are major dimensions that characterize social networks. The combination of these dimensions and the variation this produces provide leverage for comparing the results of different network structures on network operations. In their review of leadership networks, they claim that peer networks can benefit organizations by leveraging the comparative advantages of different individuals as ways of expanding the range of skills for individuals. Peer networks contain both bonding—close relationships among clusters—and bridging—relationships that link clusters, and this mixture in the types of connectivity achieved enable peer networks to provide a more general level of support than networks with comparatively fewer mixed connections. Overall, these authors provide evidence that SNA provides insights into organizational behavior that would be missed with other types of behavioral study, though they do also caution that this type of analysis requires sensitivity in data collection.

Looking at a direct application of SNA to organizational efficiency, a review of a comparative study of social networks focused on the role that SNA plays in revealing informal connections was also conducted. Cross, et al. have shown through their analysis of collaborative networks in corporate settings that SNA can reveal hidden patterns of collaboration that provide insights into how individuals interact and engage with colleagues across an organization. The authors assert that once “critical junctures”—the connections that bridge clusters and cross network boundaries—are identified, steps can be taken to strengthen these junctures and improve the resiliency of the network. SNA can also help to identify key clusters where collaboration is essential to organizational success, creating opportunities to increase the support of these clusters and deepen the collaborative connections. Cross, et al. show the effect that interventions to support critical junctures had through the use of a case study, transforming a tenuous connection among two key groups into a well-integrated cluster.

**Methodology**

At the outset, it was decided to employ SNA as the method by which to investigate the organizational engagement in the Columbia University Libraries assessment program. SNA was selected because of its utility in mapping relations between and among individuals, allowing for collection and use of graph data. Graph data consists of two main elements: nodes, which represent individual units, and edges, which represent the connections between those units. For the purpose of this project, the nodes are the professional staff and the edges are their collaborative connections.

In order to build the dataset, existing sources of information were used rather than gathering new data through a survey. For this analysis, data were scraped from the published internal reports of the assessment program for the previous four years (2012–2015)—these internal reports detail the results of various assessment projects across the libraries. Drawing upon the listed coauthors and project participants, a dataset that consisted of the individuals involved in assessment activities was constructed. The relationships between and among participants were drawn from their relationships on the assessment projects as reported. Individuals who worked on the same project were considered to have a shared collaborative connection. In addition,
Columbia University Libraries human resources provided a list of all professional staff members and their respective divisions.

To explore different aspects of the network, various attributes about the individuals (nodes) and collaborative connections (edges) were extracted from these data sources:

1. Division affiliation of professional staff members
2. Project type
   i. Organizational projects—which are assessment projects in alignment with achieving high-level strategic goals (e.g., large scale survey such as LibQUAL+®)
   ii. Divisional projects—which are assessment projects in alignment with operational or strategic goals of a particular division (e.g., wayfinding study at the Burke Library)
   iii. Consultation sessions—which are meetings to provide assistance with micro-assessment projects (e.g., data analysis or survey design)
   iv. Administrative projects—which are ad-hoc administrative requests as needed
3. Type of collaboration—whether the collaboration was formal (i.e., assigned by managers) or informal (i.e., grassroots activities)

An open web application called Gephi® was used to process, analyze, and visualize the network diagram and calculate network metrics.

Findings

Figure 1: Organizational Network Diagram—All Nodes

This social network diagram is organized by degree centrality. The size of the node indicates degree centrality, with larger nodes having a higher degree centrality. The colors of the node indicate the division of the staff members within the Columbia University Libraries. The thicknesses of the edges indicate weight of relationships.

Of the 237 nodes, 43 nodes are connected, indicating that 18% (43) of the professional staff engaged in at least one assessment activity. The results show that professional staff members from all three main branches within Columbia University Libraries are engaged in the assessment program: Collections and Services, Bibliographic Services and Collection Development, and Digital Programs and Technology Services. A division-level review of the shows that the assessment program collaborates with a diverse set of divisions including the Social Sciences Library, History and Humanities Library, Access Services, Rare Book and Manuscript Library, Burke Library, Global Studies, Collection Development, Library Information Technology Office, and Libraries Digital Programs.
This social network diagram shows data about the types of projects undertaken by the professional staff. The colors of the edges indicate the type of projects—purple representing organizational projects, aqua representing divisional projects, red representing consultation sessions, and green representing administrative projects. The thickness of the edges indicates weight.

There are a total number of 129 collaborative connections recorded. Of these, 64% (83) involved organizational projects, 26% (33) involved divisional projects, 8% (10) involved consultation sessions, and 2% (3) involved administrative projects.
Figure 3: Type of Collaboration

This social network diagram shows data about the types of collaborations undertaken by the professional staff. The colors of the edges indicate the type of collaborations—red representing informal collaborations and aqua representing formal collaborations.

The graph data shows 67% of collaborative connections represented work that occurred through informal networks of relationships and 33% of collaborative connections represented work that occurred through formal reporting structures.

Figure 4: Degree Centrality
This social network diagram shows the data organized by degree centrality. The color and size of the nodes both designate the degree centrality—darker colors and larger nodes mean the node has a higher degree centrality.

Degree centrality is a measure of the number of connections (i.e., edges) each individual node has. The more connections that a node has, the higher degree centrality it has. Predictably, the Assessment Coordinator has the most direct connections in the network.

**Figure 5: Degree and Between-ness Centralities**

This social network diagram shows the data organized by both degree and between-ness centralities. The color of the node represents the degree centrality, with darker colors indicating higher degree centrality. The size of the node represents between-ness centrality, with larger nodes having higher between-ness centralities.

Between-ness centrality is a measure of how each node operates as a bridge to other nodes. A node with high between-ness centrality has great influence over what flows in the network and may control the outcomes of the projects.
Figure 6: Degree and Closeness Centralities

This social network diagram shows the data organized by both degree and closeness centralities. The color of the node represents the degree centrality, with darker colors indicating high degree centrality. The size of the node represents closeness centrality, with larger nodes having higher closeness centralities.

Closeness centrality is a measure of how connected each node is to other nodes. Closeness centrality captures information about how far the distance is between a given node and the other nodes in the social network. Nodes with high closeness centrality have the best visibility into what is happening in the network.

Practical Implications
At the most elementary level, the visual representation of collaborative connections with the assessment program added to our understanding of organization-wide engagement in assessment activities and created opportunities to improve our collaborative model. Overall, engagement in the assessment program was not as broad as we expected. The network diagram revealed that, over a four-year period, many of the same individuals have participated in multiple assessment projects. While having the same individuals participate in multiple projects may have advantages, it could prove a significant weakness for the assessment program if the same few individuals inadvertently discourage new people from participating. In addition, as the demand for assessment increases, it is critical to provide professional development opportunities and increase expertise in library assessment across the organization.

In conclusion, the graph data provided useful insights in finding the right balance between retaining existing partners and recruiting new partners in future assessment projects. For example, finding out about individuals that are highly central in the collaboration network helped identify key individuals who could serve as bridges among project teams and should be retained. Alternatively, understanding who is peripheral in the collaboration network helped find ways to engage these people to ensure that relevant expertise is developed in different of the organization.

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Endnotes


Bibliography


