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CONFERENCE PAPER

A social network framework for stakeholder engagement analysis

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Synopsis

In this paper, we develop a social network–based framework for the analysis of stakeholder engagement relationships. We demonstrate that senior stakeholders identified by traditional models such as the Salience Model are not necessarily "commanders," as shown by the social network model, as far as engagement (operationalized as "problem solving") is concerned. We discuss several implications of our model at the theoretical level for contribution to project management science and at the practical level for the application of the model.

Research design

Demographic, social network and attitudinal data were collected from employees of an Australian telecommunications company. Using a sociocentric approach, respondents were asked to rate their degree of influence and interest in the project as a stakeholder and nominate team members whom they had interacted with for problem-solving purposes. As well as the self-reported rating of influence and interest described above, a measure of a stakeholder's influence and interest from the perspective of others is collected.

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Relevance for practice and education

This case demonstrates the value of social network theory and analytics for identifying key stakeholders and understanding how to engage them through the perspective of the stakeholder networks they are embedded in.

Main findings

Comparing the traditional project management (PM) model and the social network (SN) model for stakeholder analysis, the former is useful in the initiation and planning phases of project whereas the latter is useful mainly in the project execution phase, where significant problem solving occurs, and team members have to settle in and work on significant phases of the project.

The PM model is useful as a way to navigate the organizational hierarchy. The SN model, however, helps to identify those who hold high organizational authority, salience, currency and influence in the project.

Research Implications

Combining both models together with social network metrics that allow for statistical testing and association with project team and project outcomes appears to be promising, giving a richer, more complete picture of stakeholder identification, engagement and analysis in both the formal and informal networks.

Keywords

Social Network Analysis, Stakeholder Engagement, Stakeholder Management, Stakeholder Analysis, Salience Model

Introduction

At the launch of the *Pulse of the Profession®* report in Sydney in February 2017, the Project Management Institute President and CEO, Mark Langley, stated "Commitment from top executives and clear communication between project team members (horizontally) and between executive management (vertically) is absolutely crucial and *the* most important success factor for successful projects" (Langley 2017). Stakeholder management – the process of identifying stakeholders, aligning them with project objectives and organizational strategy, prioritizing them and constantly engaging with them – is an important, albeit latterly recognized, knowledge area in the PM Body of Knowledge (PMBOK) Guide of 2013 (PMI 2013).

In a previous paper, Chung and Crawford (2015, 2016) discuss limitations with current project management models for analysing stakeholder engagement. In particular, they critique the salience model (Mitchell, Agle & Wood 1997) on a number of grounds. First, the model is useful for identification and mapping of stakeholders, but not for the *analysis* of stakeholder engagement. Second, it is fairly static in that it labels stakeholders based on attributes such as power, legitimacy, influence, interest and salience. Third, while it provides a mapping and identification mechanism of stakeholders in the beginning phases of a project, it does not delineate engagement in terms of relationships in the form of influence, behaviour,

information flow, advice seeking and how work actually gets done. In other words, it does not capture "organic" relationships embedded within social networks – the very essence and platform of stakeholder engagement.

Given these limitations, Chung and Crawford (2016) propose the need for the social network model (SNM) in order to realistically analyse stakeholder engagement in a number of forms – be they collaboration, advice seeking, information providing, socializing and so on. In that paper, they also discuss at length the social network theories upon which the constructs for the model had been developed. In this paper, we demonstrate using empirical data based on a small telecommunications company in Tasmania, Australia, and how the model may be applied as one particular form of stakeholder engagement – problem-solving. In the following section, we provide a brief overview of the SNM for analysing and understanding stakeholder engagement.

Social network model for analysis of stakeholder engagement: conceptual foundations

In the management and organizational studies literature, the first and perhaps only study that suggested the use of a network approach as an alternative analytic stakeholder management approach is by Timothy Rowley (1997). Rowley suggests the need for moving beyond the dyadic ties analysis that was recurrent in most of the contemporary stakeholder management approaches. In essence, he mapped multiple and interdependent interactions that simultaneously exist in stakeholder environments, thus holistically capturing the complex nature of stakeholder interactions for both the focal organization and its stakeholders and its stakeholders' stakeholders. Rowley also theorized that how stakeholders affect the focal organization and how the focal organization responds to these influences depends on the network of stakeholders surrounding the relationship.

In order to do this, Rowley used the notion of density and (betweenness) centrality as key factors for stakeholder analysis. Although stakeholder network density indicates the nature of coalitions or shared behaviour, thus increasing the power of stakeholders to pressure or govern expectations of the focal organization, the centrality of the focal organization confers power in its ability to resist stakeholder pressures. In effect, Rowley (1997) proposes a four-way structural classification of stakeholder influences accounting for organizational responses to stakeholder pressures, shown in Table 1:

Table 1 Structural classification of stakeholder influence

Density of the Stakeholder Network (DSM)	Centrality of the Focal Organization (CFO)	
	High	Low
High	Compromiser	Subordinate
Low	Commander	Solitarian

Source: Rowley 1997, pp. 901

- **Compromiser:** When the density of the stakeholder network (DSN) and the centrality of the focal organization (CFO) are high, it means that the high DSN facilitates stakeholder problem-solving and coordination to form an influential collective force. However, because the CFO is also high, it can influence the formation of expectations.

Therefore, the strategy here would be to pacify and balance expectations with a view to creating win–win situations.

- **Commander:** When DSN is low, it means that stakeholders are rather sparse or isolated, leaving them in a position where they do not communicate or collaborate with each other so as to form a coalition. Coupled with the high CFO, it means the focal organization is now in a commanding position to stipulate expectations and exercise high levels of discretion.
- **Subordinate:** The reverse of the "commander" scenario applies here, as the CFO is low and the DSM is high. This means stakeholders enjoy a power advantage and have higher access to information flows, leaving the focal organization no choice but to accede stakeholder expectations and pressure.
- **Solitarian:** In this scenario, there is low CFO and low DSN. Neither the focal organization nor its stakeholders are well connected, and therefore the power difference remains trivial. Information flow is impeded in such a scenario.

Although Rowley's network theory on stakeholder management is indeed valuable, there are several issues both at the operational and pragmatic level that need to be considered. For instance, how would one operationalize the constructs of high–low density and high–low centrality? Is it possible to conduct similar analyses at the micro-levels of the organization and stakeholder networks? Organizations comprise departments, groups and individuals, and this is similar to stakeholders (e.g. communities, local councils, suppliers, etc.) as well. Furthermore, when considering projects and project organizations, it becomes even more complicated at the micro-level. One particular project may be deemed as the focal organization in such analysis, but in reality, it is actually relationships between people within those projects that constitute the unit of analysis. Determining the centrality of these relationships and capturing the stakeholders themselves as individuals or groups, for instance, is overlooked in Rowley's classification, as it is much more fine-grained. Furthermore, how does one build on Rowley's stakeholder framework in the context of project management where stakeholders are at times ad hoc in nature and are only relevant for the duration of the project?

To address some of these issues, we now illustrate the operationalization of the SSM with empirical data collected from a small- to medium-sized enterprise (SME) engaged in information communications technology (ICT) project work.

Methodology

The context of our study is a small ICT company (referred to as "ACME Telco" thereafter) based in Tasmania, Australia, that was established in 2008 when the founders saw a gap in the market for quality Internet services provision, particularly a need for service-focused providers who were more pragmatic and willing to partner and grow with businesses, and play the role of a trusted business advisor. Since then, ACME Telco grew significantly in operations and now works with over 100 SMEs in Australia across all industries. Employing 31 employees at the time of writing this paper, ACME Telco's primary objective is to maintain the utmost levels of service for their customers and strive to place the local Telco company at the forefront of internet and cloud services within the ICT industry. This company was selected for the research study as they were in the process of announcing company structure changes that would impact all teams. The deployment of the structural changes provided an opportunity for the research study to review the pre-and post-deployment impacts to change and stakeholder management in projects.

Demographic and social network data collection

Ethics application was successfully obtained for this study. For the purpose of demonstrating our social network framework for analysing stakeholder engagement, we restricted our analysis to only internal stakeholders (i.e. the employees), although in reality external agencies can and should be included as well. All 31 employees, including team members, team leaders and business unit managers in ACME Telco, were invited to participate in an online survey in September 2016 which closed a month after. With support from top management, a total of 27 employees responded, achieving a response rate of 87%.

Demographic items in the survey included gender, birth year, highest level of education, role in ACME Telco, years worked and department. Respondents were also asked to consider the most recent project they were involved in and to rate themselves on a scale of 1 (low) to 5 (high) on their degree of (i) influence and (ii) interest in the project as a stakeholder.

The second section of the survey pertained to social network data. As the entire list of the employee names was available, a sociocentric approach (Chung, Hossain & Davis 2005) was utilized, where each respondent was asked if he or she had communicated with the other employees in the list. Using the following name generator, a problem-solving network of each respondent was elicited:

"Looking over the past three months, please tell us who you have you interacted with for problem-solving matters in your project work."

Respondents could then choose the name of the person they had interacted with, followed by another set of questions which elicited the strength and nature of the relationship. This included frequency of the interaction (daily to quarterly) and emotional closeness (ranging from "not close at all" to "very close"). Respondents were then asked to rate the degree to which each person they nominated had influence and interest in the project as a stakeholder. Unlike the self-reported rating of influence and interest described above, this provides a measure of the person's stakeholder influence and interest from the perspective of others.

As each respondent completed his or her survey, we could obtain a whole problem-solving network (sociogram) of the organization. Even though there were five respondents who did not participate in the survey, others have nominated them during the name generator component of the problem-solving network question. Therefore, all 31 employees appear in the sociogram. Rather than names, unique IDs were used for all employees to preserve their anonymity, privacy and confidentiality.

Measures

SOCIAL NETWORK MEASURES: BETWEENNESS CENTRALITY AND EGO-DENSITY

To operationalize the model proposed above, we used betweenness centrality and ego-density. In graph theoretical terms, betweenness centrality measures the extent to which a node (person) lies in between the shortest path of all other nodes (persons) in the network. Mathematically, it is expressed as the ratio of the number of shortest paths between two nodes passing through a particular node over the total number of shortest paths from one node to the other. Therefore, it is a number between zero and one. High betweenness centrality means more information will flow through that node. Hence, it will have more control over the network and is more likely to be the information broker or bottleneck of the network. The mathematical expression for betweenness centrality is:

$$b(i) = \sum_{j,k} \frac{g_{jik}}{g_{jk}}$$

where g_{jik} is the number of shortest paths from node j to node k ($j, k \neq i$), and $gjik$ is the shortest paths from node j to node k passing through node i.

Density or ego-density, in this case, is calculated as the ratio of the actual number of ties over the maximum possible number of ties in the network. The higher the density, the more members in the network connecting with one another. From an egocentric perspective, ego density represents how densely other nodes that one specific ego communicates with are connected. An ego density of 1 means all members that the ego communicates with are connected with one another, which forms a clique. The mathematical expression for ego density is:

In order to produce the cut points and then form the grids in Table 1, we utilized the median scores of betweenness and density, as both variables were not normally distributed.

INTEREST AND INFLUENCE MEASURES

To operationalize *interest* and *influence*, we considered the average of all ratings from others, rather than the self-reported ratings, to keep the measures of interest and influence objective. The ranges of the x- and y-axes were then determined by the minimums and maximums of the variables – interest and power. Because both samples are normally distributed, means of interest and power rated by others were chosen to be the cut points for the x- and y-axes, respectively, in order to produce the grids in the graph that depicts the PM model. The process of data analysis is captured in the following flowchart (Figure 1).

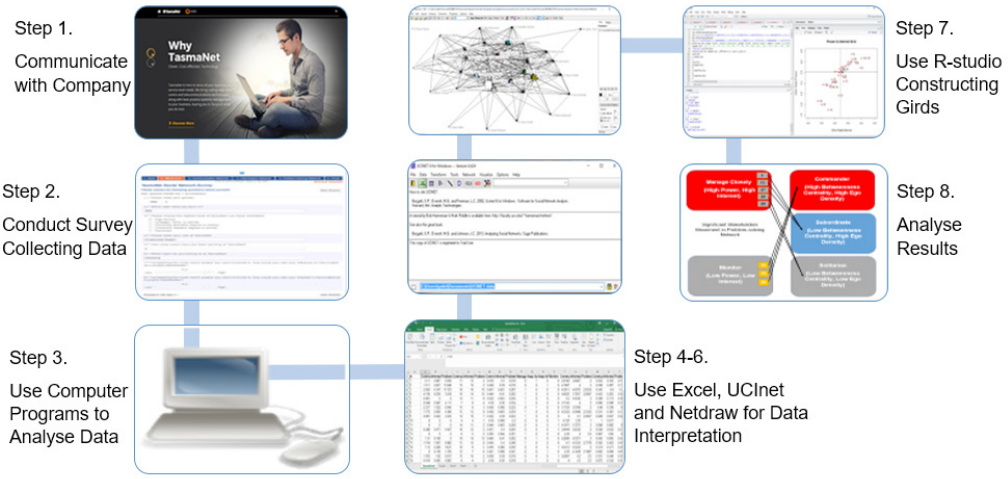

Figure 1 Process of data collection, extraction and analysis

Results

PM MODEL VERSUS THE NETWORKS MODEL FOR STAKEHOLDER IDENTIFICATION AND ENGAGEMENT ANALYSIS

For the power (influence) and interest grid (see Figure 2), the mean scores for interest and power are 3.72 and 3.34, respectively (scale of 1–5). Results are summarized as follows:

- 12 out of 31 members are suggested to be "managed closely" (IDs 3, 4, 5, 6, 8, 9, 13, 15, 24, 27, 28, 29), indicating both high power and interest as stakeholders of the project;
- Five are rated to be "kept satisfied" (IDs 1, 7, 14, 19, 20), which means they are rated to have high power but less interest as stakeholders in the project;
- Three are classified to be kept informed (IDs 2, 17, 23); and,
- 11 of all members should be just monitored (IDs 10, 11, 12, 16, 18, 21, 22, 25, 26, 30, 31) according to the grid.

In addition, there is a very significant and high positive correlation between interest and power according to the data ($r = 0.888$, $p < 0.01$), which means in the opinions of majority employees in the company, a person rated with high interest will most likely also be rated to have high power/influence in the project.

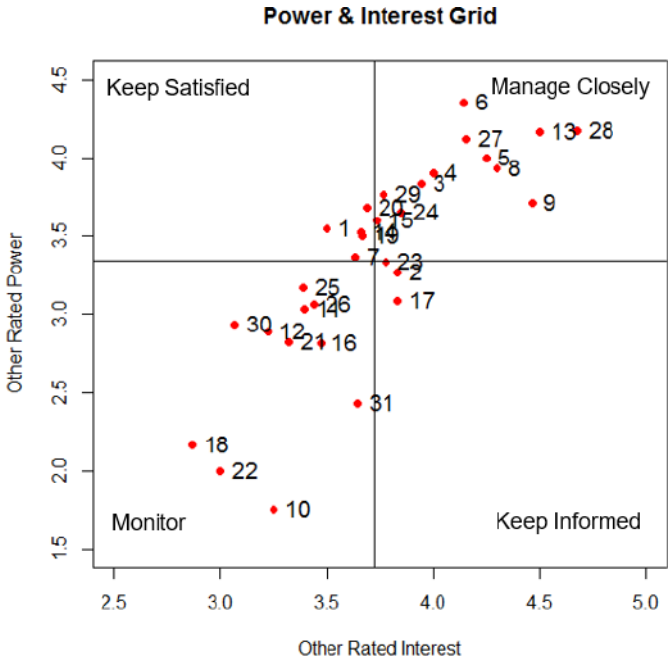

Figure 2 Power (influence) and interest grid (PM model)

On the other hand, according to the betweenness centrality and ego density grid (see Figure 3), the medians for centrality and ego density are 0.1 and 0.42, respectively (out of 1).

- Of the 31 employees, 10 are commanders in the problem-solving network structure (IDs 2, 3, 4, 6, 8, 9, 12, 16, 23, 26), indicating their ability to execute or broker information (Chung & Crawford 2015).
- There were nine subordinates (IDs 5, 7, 11, 13, 18, 20, 25, 27, 30), indicating their dense ego network structure but low centrality in the entire problem-solving network;
- There were five solitarians (IDs 1, 14, 21, 28, 29), indicating that these five employees either do not provide advice or are not asked for advice at all and have low influence in the entire problem-solving network.
- The remaining four are classified as compromisers (IDs 15, 17, 19, 24) – and these are people with moderate density in their advice network while they are also fairly helpful in providing advice for problem-solving.

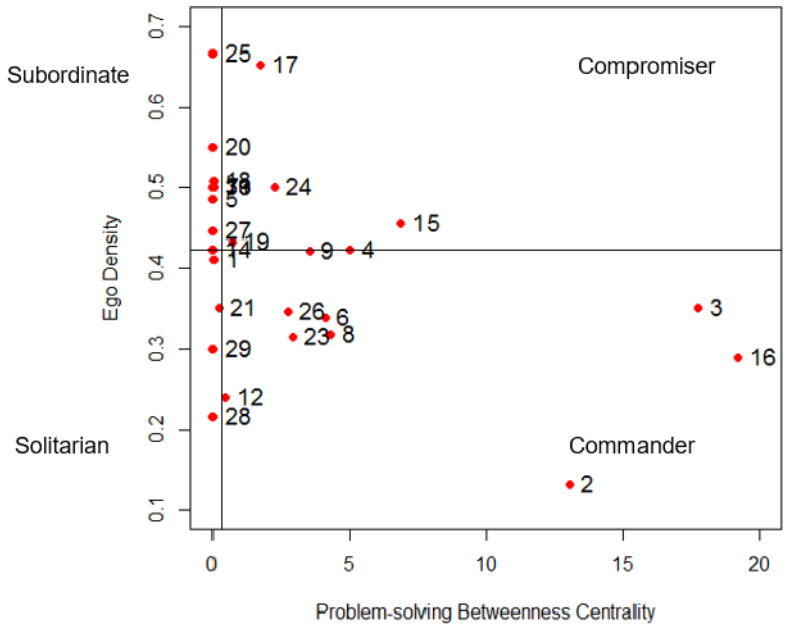

Figure 3 Betweenness centrality and ego-density grid (SN model)

Discussion

Among the four groups in the power and interest grid (project management, or PM, model), members who need to be "managed closely" are more likely to have a significant impact on the project, in contrast with members who are being "monitored", who have both low interest and power. Similarly, in the centrality and ego density grid (social network, or SN, model), information is more likely to flow through members with high betweenness centrality; hence those who have higher centrality in the network are probably more influential.

After comparison, it is obvious that there are differences between the two grids. For instance, employees 5, 13, 27, 28 and 29 have been rated as having both high power and interest and are suggested to be "managed closely" according to the power and interest grid. Of these, 5, 13 and 27 are actually subordinates in the SSM. Numbers 28 and 29 are, in fact, solitarians when it comes to problem-solving. On the other hand, another significant difference is that employees 12, 16 and 26, who have been classified to be in "Monitored" (i.e. low influence/power and low interest), are actually commanders in the problem-solving network, as demonstrated by the SN model.

To visualize the changes of positions between two grids, some of the members with significant shifts who have been mentioned above are depicted in the chart (see Figure 4), showing key movements between the two different classifications of the PM model and the SN model. In fact, only a few of all 31 members are shown to have consistent importance or shown to be less in impact on the project in both grids. Hence, it is reasonable to deduce that managing stakeholders by using only classification models such as the PM models or social network models cannot summarize the complex diversity of stakeholders in the context of a real organization; rather, a more accurate and comprehensive model needs to be proposed to manage stakeholders appropriately.

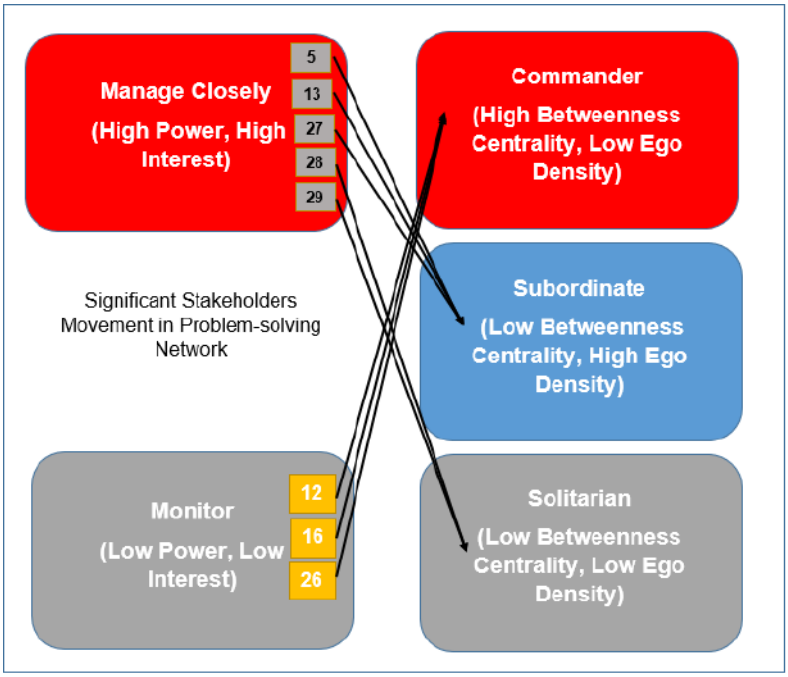

Figure 4 Key movements highlighted between classifications in the PM model and the SN model

To improve the previous two models, Chung and Crawford's model (2016) combines a power and interest grid (PMI 2013) with the SSN. This approach enables the visualization of stakeholder management strategies suggested by a power and interest grid, and attributes data-like roles as well as the relationships between stakeholders. The model utilizes different colours of nodes indicating management strategies, sizes of nodes indicating betweenness centrality and shapes indicating organizations to which stakeholders belong. In addition, tie strength between stakeholders is represented by the thickness of the lines. Combining with social network, relationships between stakeholders can be understood better and are easier to propose proper management approaches.

We do not contend that one model is superior to the other. As stated above, it is useful to form an amalgamation of both models, as there are clear advantages in doing so.

First, the PM model is useful at the outset of the project life cycle – particularly in planning phases. The SN model would not be useful – particularly in the instance of problem-solving networks, where much problem solving of the project has not occurred as yet. The SN model would be useful in the project execution phase, where significant problem solving occurs, and team members have to settle in and work on significant phases of the project.

Second, the PM model is useful as a way to navigate the organizational hierarchy. It does help to identify those who hold high organizational authority, salience, currency and influence in the project. These could be stakeholders who literally hold the highest stakes – ones who could stop or continue to fund the project. The PM model, however, is less useful when one needs to identify how influence occurs, or work really gets done, or who the real commanders and leading groups are within the organization in an informal context. This is where the SN model can address each of these areas.

Combining both models together with the social network metrics that allow for statistical testing and association with the project team and project outcomes appears to be extremely promising. By doing so, one gets a richer and more complete picture of stakeholder identification, engagement and analysis in both the formal and informal networks.

Conclusion

Understanding how to engage with stakeholders and sustaining this engagement remains at the heart of stakeholder management. Contemporary models for stakeholder identification and engagement include the process of mapping stakeholders in terms of their interest or influence and power – which is generally encapsulated by Mitchell et al.'s Salience Model (Mitchell, Agle & Wood 1997). In this paper, we provided a brief overview of stakeholder management literature and models for identifying and analysing stakeholder engagement, discussed the limitations of such models and proposed a social network–inspired model for understanding stakeholder identification and engagement using social network analytics.

We highlight the fact that current PM models do not accurately reflect the significance of stakeholders in terms of influence and power, particularly where crucial information is needed for project work to get done. Our models also show that current PM models are not able to accurately capture those stakeholders who truly need to be "monitored closely." At the same time, we also note that we do not propose that one model is better than the other. We suggest that, although the PM model is better suited to the earlier stages of a project's life cycle and is more suitable for teasing out important stakeholders who are usually in line with organizational and project organization hierarchy, the SN model is more useful in determining *commanders* and *compromisers* of the stakeholder network and in teasing out the informal network structures at play, which is highly valuable for understanding influence, resistance, change championing and opinion-leading behaviour during the life cycle of projects.

In terms of limitations of the study, one of the most serious limitations is the sample size of data. Because the sample size was only 31 respondents from a small Telco, it is difficult to judge the significance of the findings in a generalizable context, as larger sample sizes are generally required for statistical testing. In addition, the scope of the study is limited to an ICT company, and whether the findings can be generalized to other industries requires further research.

This research originated as conceptual and exploratory in nature. Further empirical research is needed to substantiate and evaluate the applicability of the framework in a number of different project contexts and industries. Furthermore, the application of this framework via a case study might be conducted on how a particular organization managed its stakeholders during the different phases of the project; such a study would indeed be valuable. A focus group study or a semi-structured interview with project/program managers might also be conducted to delineate the usefulness of the tool. Operational issues will include the availability of network data, the stakeholders to be included within the scope of the project, a definition of what constitutes a tie and whether the multiplex nature of the tie (i.e. contractual relationships, collaborations, etc.) needs to be considered.

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