Chapter 6
The *Who* of Systemic Thinking

Abstract The main focus of the *who* question of systemic thinking is on the stakeholders associated with our mess. This chapter discusses our approach for the analysis and management of stakeholders. This introduction provides a brief background of stakeholder analysis and an introduction to our approach to stakeholder analysis and management, which is then followed by a detailed discussion of each of these steps. Finally, a framework for stakeholder analysis and management is presented and demonstrated.

6.1 Stakeholder Analysis

Study of the individuals and organizations involved in our mess is critical to understanding (and influencing it). There are two competing theories as to how to undertake this analysis, *shareholder theory* and *stakeholder theory*. Shareholder theory, or the theory that corporations are strictly beholden to their shareholders and thus, driven entirely by financial objectives, was championed by Friedman (1962). Seen by many as too myopic a viewpoint, this perspective was later broadened to include all stakeholders with the development of R. Edward's stakeholder theory (Freeman, 1984). Another way to view this expansion is to understand that value, broadly defined, had expanded in scope from a purely financial perspective to one that is more inclusive. In fact, Freeman's view was founded in corporate social responsibility, coupled with financial responsibility, as complementary perspectives to consider in running a business. "Stakeholder analysis was first explored by Freeman (1984) as a methodology to assist business organization leadership with their strategic management functions. Stakeholder analysis has since expanded beyond the corporate arena" (Hester & Adams, 2013, p. 337). Stakeholder analysis is now considered an essential part of many complex problem solving endeavors (Hester & Adams, 2013).

Shareholder theory is singularly focused on maximization of return on investment or ROI. Stakeholder theory, on the other hand, is focused on maximizing *value* to stakeholders. As we have shifted from a shareholder-driven perspective in

which maximizing value = maximizing ROI, the goal of maximizing value for stakeholders has grown more complicated. We must now widen our aperture and appreciate that many different, and possibly competing, stakeholders can derail or enhance our system's goals. Thus, we must appreciate the richness of value representation to a diverse stakeholder body. While maximizing ROI may be synonymous with maximizing value to some stakeholders, it may be drastically different for others. The notion of value and its ties to personal objectives is explored more in depth in Chap. 7.

So, what exactly is a stakeholder? There are many perspectives on this question. Friedman and Miles (2002) cite 75 different sources offering individual views or adoptions on what a stakeholder is. They also cite the statistic of 100,000 references to be found in Google Scholar for a simple search of the term *stakeholder*. One of the earliest and broadest definitions of a stakeholder comes from Freeman (1984), who defined a stakeholder as someone who "can affect or is affected by the achievement of the organization's objectives" (p. 46). Mitchell, Agle, and Wood (1997) expand on these notions, questioning, … "who (or what) are the stakeholders of the firm? And to whom (or what) do managers pay attention?" (p. 853).

What about the perspective of value? Adopting Freeman's (1984) definition, we can say that stakeholders are those individuals or organizations whose value is affected by the achievement of the organization's objectives. Hester and Adams (2013) offer a big picture view of stakeholders:

> Stakeholders exist at the center of any complex problem solving effort and holistic consideration of them is a key element of analyzing a problem systemically. Stakeholders are the customers, users, clients, suppliers, employees, regulators, and team members of a system. They fund a system, design it, build it, operate it, maintain it, and dispose of it. Each stakeholder contributes their own value-added perspective, as described by the systems principle known as complementarity. (p. 337)

Thus, stakeholders are far reaching and affect every element of our organization's goals. To that end, we must analyze and manage them holistically in order to improve our mess understanding and doing so can invoke a number of different approaches based on the underlying theory being utilized. Friedman and Miles (2002) discuss the differing stakeholder theory classes as follows:

- *Normative* stakeholder theory which describes how managers and stakeholders should act based on ethical principles.
- *Descriptive* stakeholder theory describes how managers and stakeholders actually behave.
- *Instrumental* stakeholder theory describes how managers should act if they wish to further their own interests and the interests of the organization, typically viewed as profit maximization.

Normative stakeholder theory is interesting but not the focus of the remainder of this chapter. Descriptive stakeholder theory invokes elements such as human psychology and organizational behavior, which, while also interesting, are not particularly relevant to the emphasis of this chapter. Instead, the proposed approach

will focus on instrumental stakeholder theory in an effort to provide readers a methodology by which to advance their own interests and make better decisions in the context of a stakeholder-rich environment. To support these objectives, we propose the following six-step process for stakeholder analysis and management:

1. Brainstorm stakeholders
2. Classify stakeholders
3. Evaluate stakeholder attitudes
4. Map stakeholder objectives
5. Determine stakeholder engagement priority
6. Develop a stakeholder management plan.

This is followed by an implicit 7th step, manage stakeholders. Much like other elements of systemic decision making, stakeholder analysis and management is an iterative process as depicted in Fig. 6.1.

Thus, while we begin with brainstorming, as systemic decision makers, we recognize that we will likely have to revisit our steps as our understanding of our problem evolves. The following sections provide details regarding each of the six steps, and a framework for undertaking stakeholder analysis and management, which is demonstrated on a simple example concerning real estate rezoning, which will be carried throughout the remainder of the text.

Fig. 6.1 Stakeholder analysis and management process
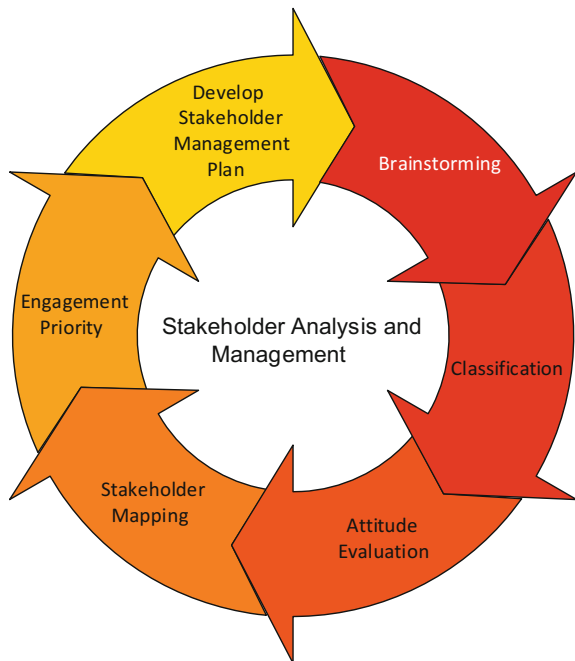
6.2   Brainstorm Stakeholders

The first step necessary for stakeholder analysis is arguably the most straightforward, that is, identifying the stakeholders relevant to the problem being analyzed and speculating as to their desires. It should be noted that the issue of which was came first, the stakeholder or the problem, is a classic chicken-or-egg issue. We must have some notion of our problem before we can brainstorm who might be relevant to our systemic decision making effort; however, we need those very stakeholders to help us clearly structure (and potentially later restructure) our problem. Thus, we must, in all but the simplest of cases, start with an initial problem formulation, perhaps with a subset of stakeholders, and iterate on both stakeholders and problem definition (as well as our context). This naturally leads to the question of who should be considered as a stakeholder for our problem. While the notion of a stakeholder is fairly ubiquitous, we will show throughout the course of this chapter that analysis of them is anything but trivial.

Given Freeman's (1984) seminal stakeholder definition and Mitchell et al. (1997) emphasis on managerial attention, we must consider (1) how to identify stakeholders and (2) how to engage these stakeholders in support of our organizational objectives. These two elements are crucial to effective stakeholder analysis and management.

Maintaining a problem-centric posture on our effort, we focus on the question of *who can affect or is affected by the problem solution*. But where do we start in generating a comprehensive list of possible stakeholders to answer such a broad question? Friedman and Miles (2002) provide the following common list of stakeholders to serve as a sufficient starting point:

- Shareholders
- Customers
- Suppliers and distributors
- Employees
- Local communities.

  They also add additional stakeholders, including the following:

- Stakeholder representatives such as trade unions or trade associations
- NGOs or "activists"
- Competitors
- Governments, regulators, or other policymakers
- Financiers beyond stockholders (e.g., creditors, bondholders, debt providers)
- Media
- The public
- The environment
- Business partners
- Academics
- Future and past generations
- Archetypes.

With this frame of reference in mind, we can see why stakeholder analysis is a crucial element in systemic decision making. Stakeholders influence every aspect of our problem. The choice of Freeman's definition, admittedly an intentionally broad definition, is purposeful. Systemic decision making involves taking a broad perspective on a problem and, in the case of stakeholders, we ought to err on the side of inclusion rather than exclusion. Step 1 of the stakeholder analysis process truly is a brainstorming exercise. At this point, it is up to the systems practitioner and other identified participants to brainstorm answers to a question form of Freeman's notion of stakeholders, that is, *who can affect or is affected by the problem solution*? This list may include any or all of the list suggested by Friedman and Miles (2002). The next question we must ask ourselves is *what does the stakeholder want as a result of problem resolution?* Articulation of a stakeholder desire is a simple narrative summarizing what a stakeholder may wish to achieve as the result of a successful problem resolution. This allows us to brainstorm what the stakeholder wants from the intervention or, if possible, simply ask the stakeholder about their desires with respect to the problem (this of course is the most straightforward manner to obtain this information but it may not be feasible or desirable). This should be written as a simple statement of stakeholder desire, including a verb and object. For example, we may wish to *maximize safety*, *mitigate environmental impact*, or *maximize ROI*. It may be necessary to ask *why* to understand the fundamental desires of our stakeholders. A stakeholder expressing a desire to see a competitor fail may really be seeking to advance his or her own interests (e.g., financial return), which do not necessarily come at the expense at a competitor (e.g., by growing the market, each company may flourish). It is worth noting that the focus is on what a stakeholder *wants* and not what they *need* due to the *principle of suboptimization* (Hitch, 1953); that is, everyone will not get what they want in order for the problem to be resolved in the most effective manner.

The output of the brainstorming step is simply a list of individuals and groups that *may* be considered as stakeholders and their desires. The following is an example list of stakeholders and their associated expectations that might be generated by a real estate development company after they have been awarded a contract for a new commercial real estate development:

1. The real estate developer wants financial gain.
2. City council wants to be reelected.
3. State government wants tax revenue.
4. Zoning commission wants compliance from any new development.
5. Tenants of the proposed development want a nice place to live at an affordable price.
6. Customers of proposed commercial entities want attractive shopping.
7. Environmentalists want a development with minimal environmental impact.
8. Rival real estate developers want the development to fail.
9. Safety personnel want compliance of the design with ADA standards.
10. Tourists want additional attractions to consider during their visit.

11. The Chamber of Commerce wants additional members.
12. and so on…

It is clear that this list can grow quite large rather rapidly. The key to this step is to capture all of these entities in Step 1, without regarding for classification, attitude, or relationship of these stakeholders in any manner. Consideration for these elements will be accounted for in subsequent steps of the stakeholder analysis process. If we think that they may affect or be affected by the problem, then they should be included as potential stakeholders.

6.3   Classify Stakeholders

As we complete Step 1, we have a potentially overwhelming list of stakeholders to consider during our stakeholder analysis and management effort. In order to begin to make sense of this list, we must classify these stakeholders. To do so, we draw from Mitchell et al. (1997), who developed a typology in order to enable organizations to analyze and decide which stakeholders demanded the greatest organizational attention. Their typology specifies three key stakeholder attributes: (1) power; (2) legitimacy; and (3) urgency. These terms are defined in Table 6.1 in terms of their sources and the definitions provided for them by Mitchell et al. (1997).

For each stakeholder, one should answer the question of whether or not each attribute is exhibited by the stakeholder on the range [0,1], with 0 being a complete lack of attribute in question, and 1 being the highest possible value. We can then go on to define a combined measure, *Prominence*$_i$ of the ith stakeholder as follows:

$$Prominence_i = [P_i + L_i + U_i]/3 \tag{6.1}$$

where P is Power, defined on [0,1]; L is Legitimacy, defined on [0,1]; and U is Urgency, defined on [0,1].

Table 6.1   Stakeholder attribute definitions

| Attribute	Definition	Sources
Power	"A relationship among social actors in which one social actor, A, can get another social actor, B, to do something that B would not" (Mitchell et al., 1997, p. 869)	Dahl (1957), Pfeffer (1981), Weber (1947)
Legitimacy	"A generalized perception or assumption that the actions of an entity are desirable, proper, or appropriate within some socially constructed system of norms, values, beliefs, definitions" (Mitchell et al., 1997, p. 869)	Suchman (1995), Weber (1947)
Urgency	"The degree to which stakeholder claims call for immediate attention" (Mitchell et al., 1997, p. 869)	Mitchell et al. (1997)
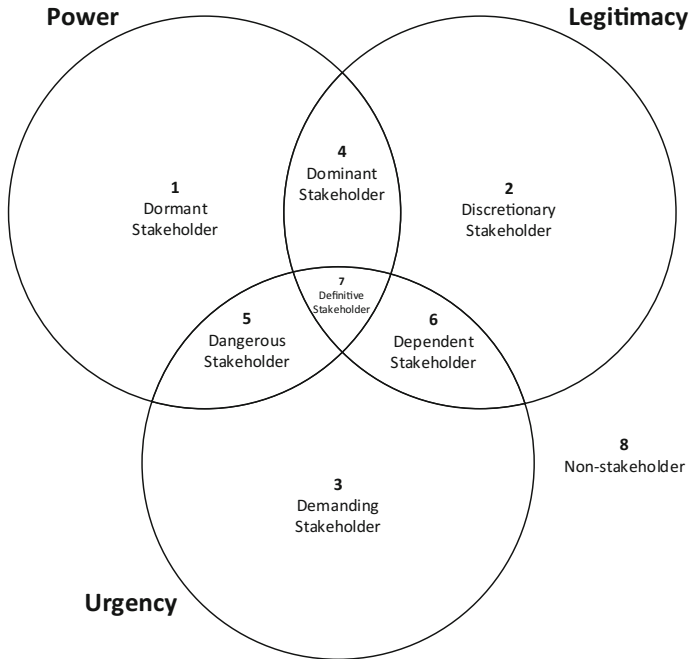
Fig. 6.2 Stakeholder typology, adapted from Mitchell et al. (1997)

Prominence represents a relative level of importance of each stakeholder to a given problem. The number and type of attributes possessed help to define the class for each stakeholder. Mitchell et al. (1997) go on to classify each of the eight possible combinations of these attributes as shown in Fig. 6.2. This graphic should be interpreted as intersecting regions indicate any presence of the contributing attributes; however, the stronger an attribute's presence, the stronger the shared category. For example, a stakeholder who has a *P* of 0.3, *L* of 0.2, and *U* of 0 can be categorized as Dominant; however, a different stakeholder with a *P* of 0.5, *L* of 0.7, and *U* of 0 would also be dominant, although in this case, the attributes are more strongly possessed, so we may say that this stakeholder is *more dominant*.

Further, these stakeholders can be classified in terms of the number of attributes they exhibit; thus, any given stakeholder classification contains one or more class of stakeholders. Individuals who exhibit none of the attributes are considered to be *Nonstakeholders*. Stakeholders exhibiting any one of power, legitimacy, or urgency are classified as *Latent* (either dormant, discretionary, or demanding). Latent stakeholders have little expectation for influence on an associated system, and "managers may not even go so far as to recognize those stakeholders' existence" (Mitchell et al., 1997, p. 874). Stakeholders exhibiting any two attributes can be classified as *Expectant* (dominant, dangerous, or dependent), individuals who "are seen as 'expecting something,' because the combination of two attributes leads the

Table 6.2 Stakeholder class, attributes, and classifications

Stakeholder class	Stakeholder attribute			Stakeholder classification
	Power	Legitimacy	Urgency	
Dormant	Yes	No	No	Latent
Discretionary	No	Yes	No	
Demanding	No	No	Yes	
Dominant	Yes	Yes	No	Expectant
Dangerous	Yes	No	Yes	
Dependent	No	Yes	Yes	
Definitive	Yes	Yes	Yes	Definitive
Nonstakeholder	No	No	No	Undefined

stakeholder to an active versus a passive stance, with a corresponding increase in firm responsiveness to the stakeholder's interests" (Mitchell et al., 1997, p. 876). Those stakeholders classified as latent or expectant may be thought of as so-called secondary stakeholders in Clarkson's (1995) typology, stakeholders on whom the "corporation is not dependent for its survival…Such groups, however, can cause significant damage to a corporation" (p. 107). Finally, *Definitive* stakeholders exhibit all three stakeholder attributes. With these individuals, "managers have a clear and immediate mandate to attend to and give priority to that stakeholder's claim" (Mitchell et al., 1997, p. 878). Definitive stakeholders are akin to what Clarkson (1995) calls *primary stakeholders*, describing them as "one without whose continuing participation the corporation cannot survive…" (p. 106). Table 6.2 illustrates stakeholder class, attributes, and classification as they relate to one another.

While this is a useful typology and Mitchell et al. (1997) make some initial recommendations regarding actions to deal with stakeholders based on their classification, we contend that it is insufficient. Their typology fails to account for the underlying attitude of the stakeholder, to which we now turn our attention.

6.4 Evaluate Stakeholder Attitudes

As we transition to Step 3 of the stakeholder analysis process, we have brainstormed our stakeholders and classified them according to their prominence within the context of the problem we are addressing. A strategy for engaging stakeholders based solely on their relative classification is insufficient as it does not account for stakeholder support or opposition to a particular endeavor. For example, if a stakeholder is supportive of a project, while they may not be classified as definitive, it still may be advantageous for us to engage them in developing strategies for dealing with a complex problem. Thus, it is imperative that we evaluate the attitude of our stakeholders with respect to our particular effort. For this classification, the authors draw on work by Savage, Nix, Whitehead, and Blair (1991), who categorize

Fig. 6.3 Stakeholder attitude characterization, adapted from Savage et al. (1991)

Stakeholder's Potential for **Threat** to Organization

	High	Low
High Stakeholder's Potential for **Cooperation** with Organization	Mixed	Supportive
Low	Non-Supportive	Marginal

stakeholder attitude according to two characteristics: (1) potential for threat and (2) potential for cooperation, as shown in Fig. 6.3.

Savage et al. (1991) propose four strategies for dealing with stakeholders of varying attitudes as follows:

1. *Involve*: Leverage key relationships and network, possibly engage in an active champion role.
2. *Collaborate*: Enter strategic alliances or partnerships, educate if necessary.
3. *Defend*: Move toward reducing dependency on stakeholder.
4. *Monitor*: Gather information and observe.

To this set of four strategies, we add the strategy of *no action*. As we will show in the ensuing discussion, this is a valid approach for particular stakeholder classification and attitudes. Figure 6.4 shows all of these strategies in what Hester, Bradley, and Adams (2012) term a *continuum of stakeholder involvement*.

The continuum of stakeholder involvement shows the strategies available for an organization to use when dealing with a stakeholder. As the strategies progress from left to right, stakeholders become more involved, thereby requiring substantially more resources at every step, thus, *monitor* is more resource intensive than *no action*, *defend* is more resource intensive than *monitor*, and so on. Savage et al. (1991) propose the following strategies for their four stakeholder types:

- *Involve* supportive stakeholders
- *Collaborate* with mixed stakeholders

No action   Monitor   Defend   Collaborate   Involve

Direction of increased stakeholder involvement
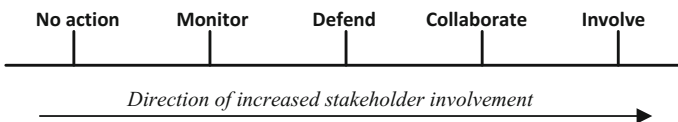
Fig. 6.4 Continuum of stakeholder involvement, adapted from Hester et al. (2012)

- *Defend* against nonsupportive stakeholders
- *Monitor* marginal stakeholders.

Aligning the appropriate strategy with a stakeholder's attitude toward a problem is critically important. Expending too many resources on a stakeholder is at best a resource waste and at worst a risk. We risk alienating that particular stakeholder and turning their attitude into one that is in opposition to our endeavor. Thus, if we involve a nonsupportive stakeholder, they will consume resources which are better spent on stakeholders who may otherwise have supported our effort. Conversely, spending insufficient resources on a stakeholder means that we have wasted an opportunity. Merely collaborating with a supportive stakeholder means that we have potentially missed out on an opportunity to involve them in the solution process.

Savage et al. (1991) devote specific attention to the dangers of the collaborate strategy. Collaborating with a mixed stakeholder can result in either a positive outcome (they become supportive) or a negative one (they become nonsupportive). Thus, once again with an eye toward resource conservation, we must be careful as to which stakeholders we choose to engage with and to what extent. While offering an additional stepping stone toward a complete set of stakeholder strategies, we must point out a deficiency of the approach developed by Savage et al. (1991), namely that it doesn't account for the relative importance of the stakeholder. Using the typology of Mitchell et al. (1997), we understand the importance of investing more heavily in ensuring that definitive stakeholders (e.g., those with power, legitimacy, and urgency) maintain a supportive attitude toward our endeavor. Thus, both approaches provide insights into the stakeholder problem, yet neither paints a complete picture. For a more comprehensive approach to dealing with stakeholders, we can utilize the concept of a Power-Interest grid, a common stakeholder analysis technique which plots stakeholder *Power* versus *Interest* in order to consider both elements as they relate to an engagement strategy. The Power-Interest grid approach, developed by Mendelow (1991), is shown in Fig. 6.5, complete with stakeholder categories from Eden and Ackermann (1998).

Fig. 6.5 Power-Interest grid, adapted from Eden and Ackermann (1998)
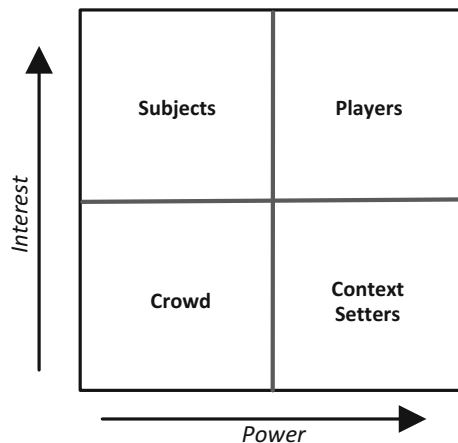
We can adapt the Power-Interest grid approach using Prominence, as defined in the previous section, as a proxy measurement for Power and Support, as defined below using terms from Savage et al. (1991), as a proxy measurement for Interest. We can calculate a stakeholder's support for a given problem as follows:

$$Support_i = C_i - T_i \text{ on } [-1,1] \tag{6.2}$$

where i represents the ith stakeholder, T_i is potential for threat, defined on [0,1], and C_i is potential for cooperation, defined on [0,1], with 0 being a complete lack of the particular attribute, and 1 being the highest possible value for both T_i and C_i.

Interest, as it is conceptualized by Mendelow (1991) and Eden and Ackermann (1998), is simply the magnitude of *Support_i*. The suggested use of *Support*, vice *Interest*, is purposeful. *Interest* is devoid of direction; thus, an individual can be interested in our project but only because they wish to see it fail. Conversely, they may be interested in our project as an active champion. Given the insights of Savage et al. (1991), it is clear that direction of support will have a bearing on the strategy we choose to engage a stakeholder. Power-Interest grids can be adapted to account for support and prominence, and to reflect appropriate stakeholder strategies, as shown in the adapted Power-Interest grid in Fig. 6.6.

While Fig. 6.6 shows crisp separation between categories, the reality is that category membership is fuzzy. Thus, this grid is intended merely as a guideline to

**Fig. 6.6** Prominence-support grid, including stakeholder strategies
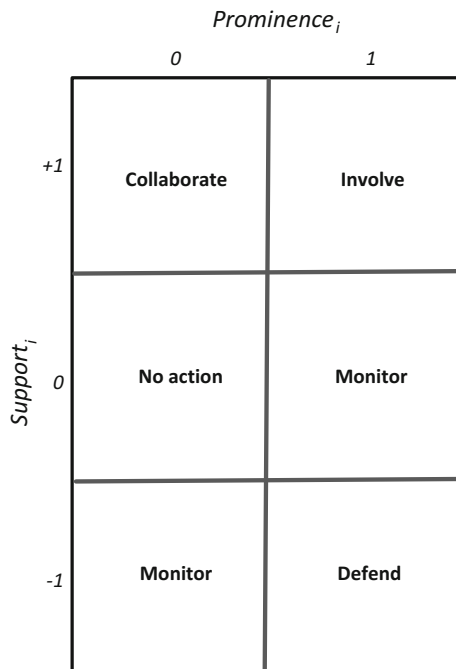
readers. In accordance with Savage et al. (1991) and Mitchell et al. (1997), we can identify five strategies corresponding to the cells shown in Fig. 6.6 as follows:

- *Involve* supportive, prominent stakeholders
- *Collaborate* with supportive, less prominent stakeholders
- *Defend* against nonsupportive, prominent stakeholders
- *Monitor* neutral, prominent, and nonsupportive, less prominent stakeholders
- *Take no action* pertaining to neutral, less prominent stakeholders.

The goal of each of these strategies is to ensure all active stakeholders (latent, expectant, and definitive) are supportive and to increase the prominence of supportive stakeholders. Figure 6.7 illustrates the outcome when implementing the strategies based on Fig. 6.6.

Examination of Fig. 6.7 provides some insight regarding stakeholder treatment. We would like to secure all stakeholders as supportive. Of course, this becomes a resource constraint issue as engagement of stakeholders is a resource-intensive process that is not without risk. To this end, we must engage stakeholders in an effort to maximize our resources. However, this entire analysis supposes that stakeholders exist in isolation, which we know not to be the case. In an effort to understand stakeholder interactions (and their effect on the prioritization of our actions), we now turn to the idea of mapping stakeholder objectives.

**Fig. 6.7** Transformation of stakeholders
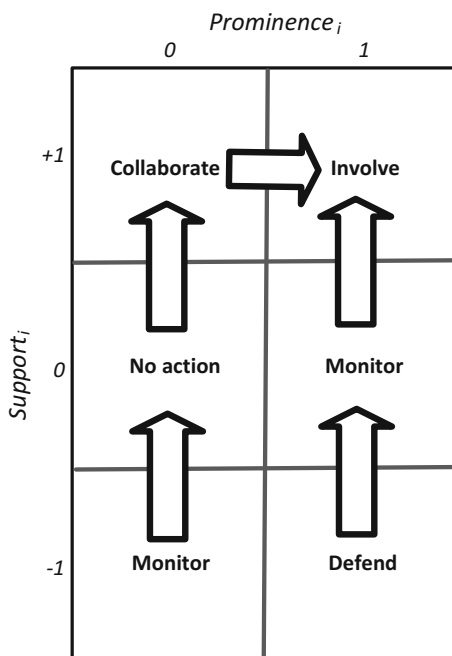
6.5   Map Stakeholder Objectives

At this point, we have brainstormed appropriate stakeholders, and determined their prominence and support. However, we lack the ability to prioritize our efforts regarding stakeholder engagement. This is crucial to our endeavor as we must focus our stakeholder management efforts on the stakeholders who can affect the largest amount of change. In order to determine engagement priority, we must first think about our stakeholders in relation to one another. We must complete the fourth step in the stakeholder analysis process, mapping our stakeholder's objectives.

Since the *darkness principle* (Cilliers, 1998) informs us we are not capable of complete knowledge of a mess, we must consider multiple perspectives (i.e., stakeholders) and their relation to one another. Our suggested mechanism for capturing these relationships is with a network-based representation of stakeholders and their relationships. Nodes within a network may be thought to represent stakeholders (and their objectives), while a connection between two nodes indicates a causal influence between the two nodes. More specifically, a directed graph can be constructed, where the directionality of arrows between nodes may represent the direction of influence exerted by one stakeholder on another (e.g., the CEO of a company, whose goal is to maximize company profits, may exert influence over the company janitor, whose goal is to keep his job, and this influence is likely not symmetric, thus in this case their relationship is unidirectional), as well as the magnitude and direction of this influence on [−1,+1], in keeping with FCM guidelines discussed in Chap. 5. A depiction of this relationship is shown in Fig. 6.8.

Thus, we should create a concept for each stakeholder and their associated objective (from Step 1) and identify any causal linkages between these objectives. This allows for a more holistic perspective of our stakeholders and their relationships between one another. When we proceed to the next stage of stakeholder analysis, this will help us prioritize our efforts in seeking resolution to our mess.
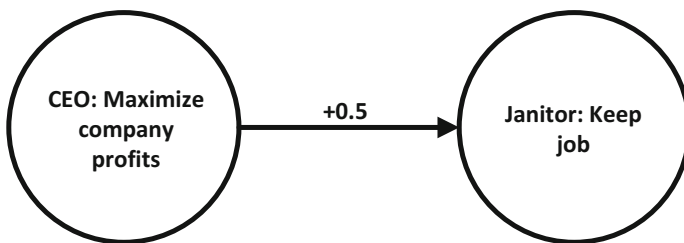
Fig. 6.8 Illustration of causal influence

6.6   Determine Stakeholder Engagement Priority

At this point, we have brainstormed appropriate stakeholders, determined their attitude and classification, and mapped them. The fifth step in the stakeholder analysis process is to determine the priority with which we should engage stakeholders to gain increased understanding about our problem. In order to fully capture the relationship between stakeholders, we can explore various notions of what is termed node centrality (Bavelas, 1948; Bonacich, 1987; Borgatti, 2005; Borgatti, Carley, & Krackhardt, 2006; Freeman, 1979). Centrality is a measure of determining the importance of a node within a network. Table 6.3 is a list of three formalized measures of centrality as formalized by Freeman (1979).

There are several issues with the measures present in Table 6.3. Directed graphs are problematic to assess using the *closeness* measure as many nodes in a directed graph may be unconnected with one another (i.e., we cannot travel from node A to node B). Further, most networks have a large proportion of nonshortest-path nodes that therefore are each equally determined to have zero *betweenness*, and thus, no influence on the network. Finally, the measures in Table 6.3 were intended only for binary networks, i.e., those with arcs whose values are either one of zero. This is problematic as stakeholders are likely to have varying degrees of influence on one another and thus, a more sophisticated measure is necessary. Barrat, Barthélemy, Pastor-Satorras, and Vespignani (2004), Brandes (2001), and Newman (2001) attempted to generalize the work of Freeman (1979) to weighted networks, but their work focused on weighted arcs and not on the number of connections of a particular node.

If we explore *degree*, recent research has provided adequate evolution to consider its use in a directed graph. Freeman's original notion of degree can be defined using nomenclature from Opsahl, Agneessens, and Skvoretz (2010) as follows:

Table 6.3 Freeman's measures of centrality (Freeman, 1979)

Measure of centrality	Description	Comments
Degree	The number of nodes that a given node is adjacent to	While this is a simple, and therefore appealing, measure, it lacks the ability to account for the relative importance of the nodes to which a given node is connected to
Closeness	The inverse sum of shortest distances to all nodes from a given node	This has problems when networks have unconnected nodes, a problem that is of particular concern in a directed graph, where connections may not be symmetric
Betweenness	The degree to which a node lies on a shortest path between any other two nodes	Its appearance along a shortest path indicates that the node acts as a conduit for information flow, and thus, is an important contributor to network information transfer

$$k_i = C_D(i) = \sum_{j}^{N} x_{ij} \qquad (6.3)$$

where C_D is the degree centrality, i is the node of interest, j represents all other nodes, N is the total number of nodes, and x_{ij} is the adjacency matrix, defined as 1 if an arc exists between i and j, and 0 otherwise.

Degree has generally been revised (Barrat et al., 2004; Opsahl et al., 2010; Opsahl, Colizza, Panzarasa, & Ramasco, 2008) for weighted networks as the sum of arc weights and redefined as *strength* as follows:

$$s_i = C_D^W(i) = \sum_{j}^{N} w_{ij} \qquad (6.4)$$

where C_D^W is the weighted degree centrality and w_{ij} is the weighted adjacency matrix, defined as the weight of the connection between i and j (>0) if i is connected to j, and 0 otherwise. This weight is an assessment of the strength of causal influence between concepts, defined on $[-1,1]$.

A further complication is the presence of both positive and negative weights. Thus, in order to calculate strength properly, we define a new term, $s*$, which calculates strength based only on the magnitude of influences as follows:

$$s_i^* = \sum_{j}^{N} |w_{ij}| \qquad (6.5)$$

This measure of influence can be conceptualized as a proxy for the *communication principle* (Shannon 1948a, b); are cited in the text but not provided in the reference list. Please provide the respective references in the list or delete these citations." –>nnon 1948a, b); i.e., if a strong influence exists between two stakeholders, then a strong communication channel can be thought to exist between the two, whereas the absence of influence is an indicator of poor communication. Two additional elements are worth noting for this assessment. The first element is that the relationships are likely not to demonstrate symmetric behavior. That is, the CEO discussed in Fig. 6.8 likely has a high influence on the Janitor, yet the feeling is likely not to be mutual. Further, we can think of entities that exhibit no influence on one another as not having a linkage between them. Thus, in the network depiction of the problem, no arc exists between any stakeholders who have no influence between them (i.e., $w_{ij} = 0$).

Simply evaluating their strength, however, is insufficient. "Since degree and strength can be both indicators of the level of involvement of a node in the surrounding network, it is important to incorporate both these measures when studying the centrality of a node" (Opsahl et al., 2010, p. 246). Based on this assertion, Opsahl et al. (2010) developed a measure which combines degree and strength as follows (note, this measure has been modified to use $s*$):

$$C_D^{W\alpha}(i) = k_i \left(\frac{s_i^*}{k_i}\right)^\alpha = k_i^{(1-\alpha)}(s_i^*)^\alpha \tag{6.6}$$

where α is a positive tuning parameter used to adjust the relative importance of degree and strength. If $\alpha = 0$, the measure reduces to degree, as shown in Eq. 6.3.

If $\alpha = 1$, the measure reduces to strength, as shown in Eq. 6.4. We suggest adopting an α of 0.5 for the purposes of this analysis, thereby ensuring that the effect of both strength and degree are accounted for.

Use of this measure is complicated somewhat by the fact that our stakeholder network is directed. Opsahl et al. (2010) elaborate on this issue as follows:

> Directed networks add complexity to degree as two additional aspects of a node's involvement are possible to identify. The activity of a node, or its gregariousness, can be quantified by the number of ties that originate from a node, k^{out}. While the number of ties that are directed toward a node, k^{in}, is a proxy of its popularity. Moreover, since not all ties are not necessarily reciprocated, k^{out} is not always equal to k^{in}. For a weighted network, s^{out} and s^{in} can be defined as the total weight attached to the outgoing and incoming ties, respectively. However, these two measures have the same limitation as s in that they do not take into account the number of ties. (p. 247)

Opshal et al. (2010) go on to define *activity* and *popularity*, respectively, as follows (note again, these measures are modified to use *s**):

$$Activity(i) = C_{D-\text{out}}^{W\alpha}(i) = k_i^{\text{out}} \left(\frac{s_i^{*-\text{out}}}{k_i^{\text{out}}}\right)^\alpha \tag{6.7}$$

$$Popularity(i) = C_D^{W\alpha}(i) = k_i^{\text{in}} \left(\frac{s_i^{*-\text{in}}}{k_i^{\text{in}}}\right)^\alpha \tag{6.8}$$

Activity is a measure of the amount of reach that a stakeholder has in a network. It is a function of both the number of outgoing connections and the strength of these connections. Individuals with high activity are seen as highly connected and therefore important because their perspective carries a great deal of weight within the network. Recall that the *principle of redundancy of potential command* (McCulloch, 1959) informs us that "power resides where information resides" (Adams, 2011, p. 151). Those individuals with high activity are perceived to have power in our stakeholder network. They can disseminate information rapidly to many individuals. Thus, even though they may not be the CEO of an organization, their connectedness affords them power.

Popularity can be conceptualized of as the inverse of the ease with which someone is able to be influenced. That is to say, those with high popularity have a high number of incoming perspectives and are difficult to influence as a result. Those with low popularity have a small number of incoming perspectives and should be easier to influence with less dissenting opinions to deal with. Popularity considers both the number of incoming connections and the strength of those connections.

Table 6.4 Intersection of popularity and activity

		Popularity	
		Low	High
Activity	High	Important and easy to influence	Important but hard to influence
	Low	Not important but easy to influence	Not important and hard to influence

Fig. 6.9 Illustrative influence network
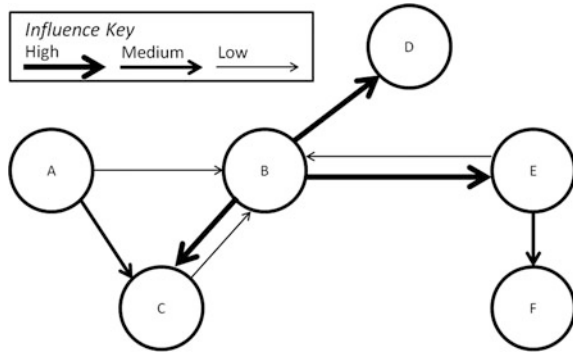
In terms of engaging our stakeholders, we must consider both their popularity and their activity. We want to influence individuals that are easy to influence, but that are important. The relationship of these two elements is important and is shown in Table 6.4.

A simple illustrative example demonstrates the calculation of activity and popularity and how we would use these characteristics to prioritize our stakeholders. We adopt an illustrative example provided by Opsahl et al. (2010) and shown in Fig. 6.9 with directionality added and high influence defined as a weight of 1, medium influence a weight of 0.5, and low influence a weight of 0.25, all positive for simplicity's sake. Note all causal influences in this network are positive.

Table 6.5 illustrates the Popularity and Activity results for this network, including the supporting calculations necessary for strength and degree.

Examination of Table 6.5 shows that the most active node is B. This makes sense as B has more outgoing influences than any other node and these are all rated as high. Further examination shows that the least popular (i.e., easiest to influence)

Table 6.5 Illustrative network characteristics

Node	k_i^{in}	k_i^{out}	s_i^{*-in}	s_i^{*-out}	Popularity	Activity
A	0	2	0	0.75	0.0	1.2
B	3	3	0.75	3	1.5	3.0
C	2	1	1.5	0.25	1.7	0.5
D	1	0	1	0	1.0	0.0
E	1	2	1	0.75	1.0	1.2
F	1	0	0.5	0	0.7	0.0

Table 6.6 Illustrative prioritization of stakeholders

Node	Popularity	Activity	Engagement priority
B	1.5	3	1
A	0	1.2	2
E	1	1.2	3
C	1.7	0.5	4
F	0.7	0	5
D	1	0	6

node is node A. This also makes sense as it has no incoming influences and therefore, no outside detracting opinions to contend with. Accounting for popularity and activity to determine stakeholder engagement priority should be done with an eye for accomplishing the movement of all stakeholders toward a supportive role (as shown in Fig. 6.7). It is our belief that, in order to do this, all stakeholders should be sorted by activity first (in descending order), and then, if multiple individuals share the same activity level, by popularity (in ascending order). This order reflects the order in which stakeholders should be engaged in support of an effort. Table 6.6 illustrates the prioritization values for the illustrative example.

One final element should be considered in engaging stakeholders. Each of the stakeholders A-F has a unique strategy associated with it, defined by the taxonomy shown in Fig. 6.6. Stakeholders with a more involved strategy (i.e., involve or collaborate) will require more resources to engage than a stakeholder demanding a more passive strategy (i.e., defend, monitor, or no action). This is a problem for us as we struggle with how to dispatch our scarce resources as we likely will have less resources than we have stakeholders. Resources must be utilized in a manner which gives us the most *bang for the buck*, a measure consistent with the approach presented here.

Before moving on the next step of the stakeholder analysis process, we would be remiss in not pointing out that, while we believe our first order approach to engagement priority is sufficient, we have also developed a higher order approach involving Leontief (1951) input-output modeling; the reader is referred to Hester and Adams (2013) for details of this approach. The approach presented in this book is intended to provide the reader with an approachable method for determining stakeholder priority without sacrificing resultant method insight. We believe the presented approach does just that.

6.7 Develop a Stakeholder Management Plan

At this point in the stakeholder analysis process, we have brainstormed stakeholders, classified them, determined their level of support, and mapped their objectives. The sixth step is the development of a Stakeholder Management Plan (SMP). The SMP allows us to track stakeholders and maintain a plan for dispatching resources to secure and maintain a stakeholder's support for our effort. At a minimum, a SMP should include the following:

Table 6.7 Construct for a stakeholder management plan (SMP)

Stakeholder name	Wants	Prominence	Support	Priority of engagement	Strategy

- Stakeholder name/identifier (from Step 1)
- Stakeholder wants (from Step 1)
- Stakeholder prominence (from Step 2)
- Stakeholder support (from Step 3)
- Stakeholder engagement priority (from Step 5)
- Strategy (defend, collaborate, etc.) for dealing with stakeholder, based on their prominence and interest (from Step 3)
- Method for engagement (e-mails, in-person, etc.)
- Frequency of engagement (e.g., monthly, weekly)
- Responsible party who pursues the identified strategy
- Notes that are necessary for housekeeping purposes (call before showing up to office, prefers early morning, etc.).

Table 6.7 is a generic construct for a SMP. Several columns have been eliminated for ease of reading, namely the method for engagement, frequency of engagement, responsible party, and notes.

Once a stakeholder management plan is generated, stakeholders should be sorted by their priority of engagement. This presents a ranking of the order in which stakeholders should be engaged. Recalling that the strategy for engagement is determined as a function of both classification and attitude, this provides a first pass at what level of involvement we should wish to afford a particular stakeholder. We wish to heavily involve those stakeholders that are both prominent and supportive. However, in most complex problems the myriad number of stakeholders involved will likely result in redundant engagement strategies across stakeholders. For example, multiple individuals will be assigned the strategy of *Involve*. Thus, stakeholder activity and popularity are used to determine engagement priority.

6.8   Manage Stakeholders

Once a stakeholder management plan has been generated, the organization is charged with executing it. That is to say, we must *follow through* on the strategies outlined by the SMP. The stakeholder analysis process does not end here, however. Thus, after establishing a SMP, we may wish to revisit our brainstorming exercise to identify stakeholders, perhaps streamlining our list as our knowledge gained from the process informs us that many of our previously identified stakeholders are no

longer relevant to the problem at hand. Given its recursive and iterative nature, the
process will necessarily continue throughout the resolution of our problem.

In each of the chapters discussing the six systemic thinking perspectives, a
framework is provided to assist the reader in understanding which steps must be
followed to sufficiently address the perspective as it pertains to a mess and its
constituent problems. The first of these frameworks is provided in the following
section.

6.9   Framework for Addressing *Who* in Messes and Problems

Undertaking a stakeholder analysis requires an individual to complete the six-step
process outlined in this chapter as it pertains to an identified problem, namely

1. Brainstorm stakeholders
2. Classify stakeholders
3. Evaluate stakeholder attitudes
4. Map stakeholder objectives in a FCM
5. Determine stakeholder engagement priority
6. Develop a stakeholder management plan.

Each of these six steps is required to completely account for stakeholders in our
messes and constituent problems. The following section demonstrates each step on
an example problem.

6.10   Example Problem

The problem introduced in this section will be analyzed throughout the remainder
of this text. It represents a more comprehensive examination of the problem dis-
cussed briefly in Hester et al. (2012). In this example, a local real estate developer
sought to rezone portions of an upscale, single family home residential neighbor-
hood. The impetus for this intended rezoning was the Great Recession during the
late 2000s and early 2010s, which caused a decrease in the purchasing power of
potential homebuyers. In order to recoup their investment in land which was
suddenly no longer profitable, the developer aimed to build condominiums, which
required that they rezone the land, necessitating approval from the city council.
Viewing the change as undesirable largely from a financial standpoint, a group of
nine local communities opposed the rezoning process and fought adamantly to
prevent it. The intended rezoning needed to take into account the values of
important stakeholders (e.g., neighbors, local government) in order to ensure project
success.

The example is being discussed from the perspective of the developer, who is seeking to determine which stakeholders they will need to garner support from. The developer has been included as a stakeholder in the analysis in order to understand their relationship to other relevant stakeholders.

6.10.1   Example Stakeholder Brainstorming

Brainstorming stakeholders for the rezoning problem yields the following stakeholders and their associated wants as follows:

1. The real estate developer *wants* financial gain from the project.
2. Nine local communities *want* to maintain their property values.
3. Local media *want* news stories that sell.
4. City Staff *wants* minimal disruption.
5. City Planning Commission *wants* compliance with regulations.
6. City Council *wants* to be reelected.

While many more individuals and groups could be added into the analysis, it is thought that the initial stakeholder analysis should include, at a minimum, these six entities and their associated desires.

6.10.2   Example Stakeholder Classification

Table 6.8 shows evaluations of the attributes and class for each of the stakeholders identified in the previous section. They have been sorted according to decreasing order of prominence.

Clearly, the two most prominent stakeholders are the real estate developer and the local community affected by the developers' efforts. This is fairly intuitive as both of these groups possess all three attributes of power, legitimacy, and urgency. Moving to the next tier, the City Planning Commission and the City Council, both have power and legitimacy, but they are unlikely to possess the urgency to place a

Table 6.8 Example stakeholder classification

Stakeholder	Stakeholder attribute			Prominence
	Power	Legitimacy	Urgency	
The real estate developer	1	1	1	1.0
Nine local communities	1	1	1	1.0
City Planning Commission	1	1	0	0.67
City Council	1	1	0	0.67
Local media	0	1	0	0.33
City Staff	0	1	0	0.33

priority on the execution of this particular project due to other commitments. Finally, the local media and assorted city staff have legitimacy in that they should be involved in the planning process, but they have neither power nor urgency; they cannot directly influence the other members of the problem and they don't appear on the surface to have the urgency to see the project's execution occur.

6.10.3   Example Stakeholder Attitude Evaluation

Table 6.9 shows evaluations of the potential for threat and potential for cooperation for each of the stakeholders identified in the previous section. These two parameters provide an identification of the attitude of each stakeholder. They have been sorted in decreasing order of support according to their assigned stakeholder attitude.

Both the real estate developer and city staff are seen as supportive of this effort. The developer's support is obvious, while perception of the city staff as supportive comes from their unwillingness to object to the project's development. The City Planning Commission, City Council, and local media all have a high potential for cooperation as they would like to see the project succeed, but their high potential for threat demonstrates their unwillingness to be a champion for project success at the cost of their more prominent desires. Thus, these three stakeholder groups possess a mixed attitude. Finally, the nine local communities pose a high potential for threat and a low potential for cooperation. They have a vested interest in seeing the project fail as they are opposed to it on fundamental grounds (i.e., they believe it is likely to reduce their property values). They are therefore nonsupportive of the effort.

6.10.4   Example Stakeholder Objective Mapping

With classification and attitude defined in the previous two sections, Fig. 6.10 shows a stakeholder objective map (an FCM), including the influence (direction and magnitude) for all identified stakeholders involved in the problem. The thicker the line, the stronger the causal influence.

Table 6.9 Example stakeholder attitude evaluation

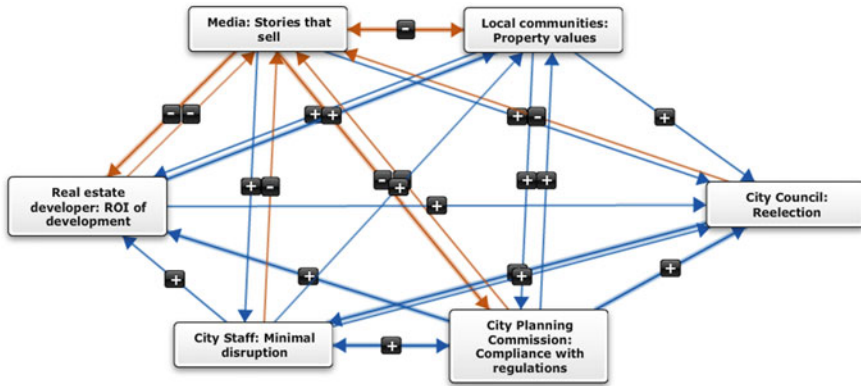| Stakeholder	Potential for threat	Potential for cooperation	Support
The real estate developer	0	1	1
City Staff	0	1	1
City Planning Commission	1	1	0
City Council	1	1	0
Local media	1	1	0
Nine local communities	1	0	−1

Fig. 6.10   Stakeholder relationship map

After examination of this relationship map, it is clear that there are a number of complicated connections at play in this problem.

6.10.5   Example Stakeholder Engagement Priority

In order to calculate the stakeholder engagement priority for all the stakeholders in the real estate development project, we need to calculate k_i^{in}, k_i^{out}, s_i^{*-in}, s_i^{*-out}, *Popularity*, and *Activity*, in accordance with earlier equations. These results are shown in Table 6.10.

We then sort the stakeholders by activity first (in descending order), and then, by popularity (in ascending order). Table 6.11 illustrates the order in which stakeholders should be engaged in support of this effort.

It is clear that the nine local communities should be prioritized in terms of their engagement in the development project. This makes intuitive sense given the stakeholder relationships shown in Fig. 6.10. On the other end of the spectrum, the city staff should be the final entity engaged. They have no influence on any other stakeholder and, thus, should be given a low priority in terms of their engagement.

Table 6.10   Real estate network characteristics

Stakeholder	k_i^{in}	k_i^{out}	s_i^{*-in}	s_i^{*-out}	Popularity	Activity
The real estate developer	3	3	2	0.75	2.45	1.50
City Staff	2	0	0.75	0	1.22	0.00
City Planning Commission	3	2	1	1.5	1.73	1.73
City Council	4	3	1.5	1.25	2.45	1.94
Local media	1	2	0.25	0.5	0.50	1.00
Nine local communities	1	4	0.25	2	0.50	2.83

Table 6.11 Real estate stakeholder prioritization

Stakeholder	Activity	Popularity	Engagement priority
Nine local communities	2.83	0.50	1
City Council	1.94	2.45	2
City Planning Commission	1.73	1.73	3
The real estate developer	1.50	2.45	4
Local media	1.00	0.50	5
City Staff	0.00	1.22	6

6.10.6   *Example Stakeholder Management Plan*

The final step in analyzing this example is to develop a stakeholder management plan. An example stakeholder management plan is shown below in Table 6.12. Two elements should be noted. Just like in Table 6.7, several columns have been eliminated for ease of reading, namely the method for engagement, frequency of engagement, responsible party, and notes. Second, as this stakeholder assessment is being performed by the real estate developer, their priority of engagement is a nonissue. They are inherently a part of the stakeholder management process. Thus, although they are both prominent and supportive, they are moved to the bottom of the list.

Using information gained by holistically considering our mess, we can identify priorities and manage our stakeholders. What is clear at this stage is that the strategy we employ varies greatly based on the stakeholder we are considering. It is very important, for example, for the real estate develop to defend against the nine local communities, rather than ignoring them. In order to do so, they should consider the wants of the communities (property values and quality of life). This is directly counter to their chosen strategy of simply ignoring the communities. Had they undertaken a thorough stakeholder analysis, they might have saved themselves from the eventual failure of their project. Unfortunately for them, they did not (Hester et al., 2012).

Table 6.12 Example stakeholder management plan

Stakeholder name	Wants	Prominence	Support	Priority of engagement	Strategy
Nine local communities	Property values and quality of life	1	−1	1	Defend
City Council	Re-election	0.67	0	2	Monitor
City Planning Commission	Regulation compliance	0.67	0	3	Monitor
Local media	Stories that sell	0.33	0	4	No action
City Staff	Minimal disruption	0.33	1	5	Collaborate
The real estate developer	Financial gain	1	1	n/a	Involve

6.11   Summary

Because stakeholders exist at the center of all systems problems and serve as the principal contributors to the solution of these problems, we must formally address them as part of the solution to any systems problem. In this chapter, we developed a six-step approach to stakeholder analysis and management. This approach includes identification of stakeholders, classification of these stakeholders, assessment of their attitude, calculation of their engagement priority, developing a plan for managing them, and carrying out the plan (i.e., managing them). This comprehensive technique is an important discriminator enabling systems practitioners with an effective method for dealing with stakeholders appropriately.

After reading this chapter, the reader should be able to:

1. Identify and classify stakeholders for a problem;
2. Evaluate stakeholder attitudes;
3. Map stakeholder objectives;
4. Calculate stakeholder engagement priority; and
5. Develop a stakeholder management plan.

References

Adams, K. M. (2011). Systems principles: Foundation for the SoSE methodology. *International Journal of System of Systems Engineering, 2*(2/3), 120–155. doi:10.1504/IJSSE.2011.040550.

Barrat, A., Barthélemy, M., Pastor-Satorras, R., & Vespignani, A. (2004). The architecture of complex weighted networks. *Proceedings of the National Academy of Sciences of the United States of America, 101*(11), 3747–3752. doi:10.1073/pnas.0400087101.

Bavelas, A. (1948). A mathematical model for group structures. *Applied Anthropology, 7*(3), 16–30.

Bonacich, P. (1987). Power and centrality: A family of measures. *American Journal of Sociology, 92*(5), 1170–1182.

Borgatti, S. P. (2005). Centrality and network flow. *Social Networks, 27,* 55–71.

Borgatti, S. P., Carley, K. M., & Krackhardt, D. (2006). On the robustness of centrality measures under conditions of imperfect data. *Social Networks, 28,* 124–136.

Brandes, U. (2001). A faster algorithm for betweenness centrality. *Journal of Mathematical Sociology, 25*(2), 163–177.

Cilliers, P. (1998). *Complexity and postmodernism: Understand complex systems*. New York: Routledge.

Clarkson, M. B. E. (1995). A stakeholder framework for analyzing and evaluating corporate social performance. *Academy of Management Review, 20*(1), 92–117.

Dahl, R. A. (1957). The concept of power. *Behavioral Science, 2*(3), 201–215.

Eden, C., & Ackermann, F. (1998). *Making strategy: The journey of strategic management*. London: Sage.

Freeman, L. C. (1979). Centrality in social networks: Conceptual clarification. *Social Networks, 1* (3), 215–239. doi:10.1016/0378-8733(78)90021-7.

Freeman, R. E. (1984). *Strategic management: A stakeholder approach*. Boston: Pitman.

Friedman, A. L., & Miles, S. (2002). Developing stakeholder theory. *Journal of Management Studies, 39*(1), 1–21.

Friedman, M. (1962). *Capitalism and freedom*. Chicago, IL: University of Chicago Press.

Hester, P. T., & Adams, K. M. (2013). Determining stakeholder influence using input-output modeling. *Procedia Computer Science, 20,* 337–341.

Hester, P. T., Bradley, J. M., & Adams, K. M. (2012). Stakeholders in systems problems. *International Journal of System of Systems Engineering, 3*(3/4), 225–232.

Hitch, C. J. (1953). Sub-optimization in operations problems. *Journal of the Operations Research Society of America, 1*(3), 87–99.

Leontief, W. W. (1951). Input-output economics. *Scientific American, 185*(4), 15–21.

McCulloch, W. S. (1959). *Embodiments of mind*. Cambridge, MA: MIT Press.

Mendelow, A. (1991). *Stakeholder mapping*. Paper presented at the Proceedings of the 2nd International Conference on Information Systems, Cambridge, MA.

Mitchell, R. K., Agle, B. R., & Wood, D. J. (1997). Toward a theory of stakeholder identification and salience: Defining the principle of who and what really counts. *Academy of Management Review, 22*(4), 853–886. doi:10.5465/amr.1997.9711022105.

Newman, M. E. J. (2001). Scientific collaboration networks. I. Network construction and fundamental results. *Physical Review E, 64*(1), 0161311–0161318.

Opsahl, T., Agneessens, F., & Skvoretz, J. (2010). Node centrality in weighted networks: Generalizing degree and shortest paths. *Social Networks, 32*(3), 245–251. doi:10.1016/j.socnet.2010.03.006.

Opsahl, T., Colizza, V., Panzarasa, P., & Ramasco, J. J. (2008). Prominence and control: The weighted rich-club effect. *Physical Review Letters, 101*(16), 1687021–1167024.

Pfeffer, J. (1981). *Power in organizations*. Marshfield, MA: Pitman.

Savage, G. T., Nix, T. W., Whitehead, C. J., & Blair, J. D. (1991). Strategies for assessing and managing organizational stakeholders. *The Executive, 5*(2), 61–75.

Shannon, C. E. (1948a). A Mathematical Theory of Communication, Part 1. *Bell System Technical Journal*, *27*(3), 379–423.

Shannon, C. E. (1948b). A Mathematical Theory of Communication, Part 2. *Bell System Technical Journal*, *27*(4), 623–656.

Suchman, M. C. (1995). Managing legitimacy: Strategic and institutional approaches. *The Academy of Management Review, 20*(3), 571–610. doi:10.2307/258788.

Weber, M. (1947). *The theory of social and economic organization*. New York: Free Press.