4

How to Organize: Systems Organizing

Unlocking the promise of systems approaches in tobacco control requires a participatory, collaborative environment among stakeholders. This in turn requires a fresh approach to management, leadership, and interactions in and between organizations. This chapter describes an adaptive systems view of organizing that represents a well-documented evolution in management theory and serves as a cornerstone to implementation of systems methods and approaches.

The chapter reviews the evolving field of management theory and explores possible changes in traditional management theory with the addition of a systems perspective. It proposes a model for facilitating and organizing purposeful and adaptive organizations and describes associated "systems-friendly" methods that researchers and practitioners can use. The framework for the model includes four major interrelated dimensions:

- Vision: *From leading and managing to facilitating and empowering*
- Structure: *From organizing to self-organizing*
- Action: *From delegation to participation*
- Learning: *From discrete evaluation to continuous evaluation*

The chapter presents two real-world case studies that use concept mapping, a method for organizing participatory systems, to address two tobacco control issues: integration of research and practice and development of criteria for high-quality state and local initiatives to control tobacco use.

Science is organized knowledge. Wisdom is organized life.

—Attributed to Immanuel Kant (1724–1804)

Introduction

The springboard for this chapter is the premise that traditional approaches to management will not be sufficient to address the complex environment of systems in tobacco control specifically and public health generally in the twenty-first century. Traditional management theory is predicated on the notion of the corporation and focuses primarily on command and control using hierarchical structures and theories of directive leadership to accomplish planning, implementation, and control functions. These traditional approaches to management are evolving as the complex management challenges of today are addressed.

This chapter also focuses on *how to organize* tobacco control efforts from the viewpoint of systems thinking, and its central purpose is reconciliation of the tension between the idea of a *purposeful organization* and an *adaptive* one. Organizations generally are thought of as purposeful, with goals, vision, and planning toward specific means and ends. Purposeful organizations purportedly do what they were designed to do. However, they might be expected to have greater difficulty adapting to novel situations. In contrast, adaptive organizations are subject to the processes of evolution, with no prescribed purpose, no a priori design, and no rational designer. Both purposeful and adaptive organizations are systems, composed of parts brought into relationship as a whole. Purposeful organizations benefit from the command-and-control structures that bring about goal-seeking activities. Adaptive organisms benefit from the adaptivity that enables survival in unpredictable and changing environments.

This chapter suggests how systems thinking can be used to better understand both types of systems and to incorporate their features into tobacco control efforts. The term *organization* is used in this chapter in a broad "ecological" sense encompassing loose affiliations, traditional organizations, and more complex interorganizational structures, such as coalitions, networks, initiatives, collaborations, and partnerships comprising many distinct organizations.

In chapter 2, tobacco control is shown to be a complex and continually evolving collaboration of stakeholders and organizations that increasingly requires cooperation in networks to accomplish crosscutting tasks. Contemporary practice of public health in general increasingly depends on cross-organizational collaborations and networks to address complex problems. In this increasingly networked environment, member groups come to the table with mixed agendas, competing interests, and often, dramatically different resources and capabilities. Typically, no overarching command-and-control decision structure exists.

Collaborating organizations create their own governance mechanisms and negotiate differences as they evolve. Frequently, the system has a motivating purpose (e.g., desire for greater efficiency, need for better coordination, or intent to concentrate efforts). However, the organizations usually serve voluntarily or because of overt or covert inducements or incentives. In a rapidly changing environment, such systems are extremely fragile, and many do not survive for long. Members can and do leave, and the system changes and either adapts or dissolves when leadership of member organizations changes, strategic interests of key members become threatened, or the political and economic context is dramatically altered. Organization is really about how these complex systems are steered toward a purpose without sacrificing their profoundly powerful adaptive qualities.

Chapter 3 introduces the idea of systems thinking as a more effective approach to

understanding and adapting to complexity. In this chapter, systems thinking is viewed as it applies to organizational and management theory. A model and methods for managing from a systems thinking perspective are outlined. A systems approach to management is essential for enabling collaborative networks in tobacco control to organize, learn, and adapt to a rapidly changing environment and to the competitive forces of the continuously subversive and creative tobacco industry.[1] These evolving approaches to management will be required to achieve more effective integration of research and practice, build a tobacco control system with sufficient agility to anticipate and counter strategies of the tobacco industry, efficiently use diminishing resources, and reach the next level of health outcomes in today's public health environment.

Traditional Management Theory

Concepts of management have evolved considerably over the past century. Management experts have arrived at broad agreement on the general contours of the evolution. In approximate chronological order, management theory has progressed through four general phases:[2,3] (1) classical or technical management, (2) humanistic or behavioral perspective, (3) management science or quantitative perspective, and (4) integrative or contemporary management approaches.

Classical or *technical management* originated during the industrial revolution of the late nineteenth and early twentieth centuries. This approach tends to use a mechanistic metaphor, viewing organizations as machines, leaders as engineers, and workers as mechanical parts. It emphasizes (1) the division of labor that divides work into a subseries of basic tasks and (2) the use of production or assembly lines that incorporate efficient application of technology. Taylor[4] called these strategies "scientific management."

The *humanistic* or *behavioral perspective* arose in the late 1920s through the human relations movement, born of research at the Hawthorne facilities of the Western Electric Company and led by Elton Mayo. In these approaches, the organization is viewed through the behavioral and social sciences, with an emphasis on the concept that workers are people rather than simply parts of a machine. These perspectives include the human relations movement and origins of the fields of organizational development and organizational behavior. The focus generally is on human behaviors, motivation, and the socioemotional factors of organizational life.

The *management science* or *quantitative perspective* originated after World War II. Frequently confused with the classical or technical perspective, this viewpoint was distinctive for its reliance on quantitative modeling as a general approach to management issues. The approach includes the fields of management science, operations research, operations management, and information sciences.

Integrative or *contemporary management theories* tend to combine or integrate across traditional approaches, using each perspective as appropriate. For instance, the contingency perspective argues that the management approach in any organization or situation should be contingent on the circumstances. In this approach, managers adapt methods from classical, behavioral, or quantitative traditions as needed and required.

Most surveys of management theory include systems perspectives within contemporary management theories. This scenario suggests both their recent evolution and the degree to which management is adopting

them. The history of management and organization theory supports the contention in this monograph that management theory is evolving to a form that incorporates systems thinking as a major emphasis.

The basic management process as presented in typical courses in management is multiphased. The assumptions are that the organization is the primary unit of management and that such organizations are hierarchical, use command-and-control procedures, and have leaders who initiate and implement planning and control of key processes. This process is described in multiple texts on contemporary management.[2,3] Four functions typically are associated with this traditional view of the management process: planning, organizing, leading, and controlling.

The *planning* function in management emphasizes actions that can achieve goals. Planning typically occurs in a specialized department (planners) and is implemented by the executive team and disseminated to the lower ranks. Planning involves a short-term (often 1 to 2 years or less) or a long-term (5-year) timeline tied to goals and more efficient processes. Planning is conceived as a linear process that proceeds from mission, goals, and objectives to actions and timelines.

The *organizing* function in management involves "…the assignment of tasks, the grouping of tasks into departments, and the assignment of authority and allocation of resources across the organization."[3(p7)] Organizing also includes allocation of resources and authority into hierarchical levels and often is associated with individuals or departments (organizers).

The *leading* function is rooted in the idea of a top-down organization motivated and driven by the passions, foresight, and charisma of its leader. Leadership is thought of as a function of the executive, and the power to lead is ascribed through status roles, with decreasing power through each lower level. In this view, the leader is metaphorically a driver and the corporation is a well-engineered and well-oiled machine.

The *controlling* function is associated with monitoring activities and making corrections. Specialized individuals or departments (controllers) perform essential control functions. In addition, control frequently is derived from financial or legal structure.

The model of the four-phase management process also is consonant with a long tradition in planning and evaluation that construes the basic planning–evaluation cycle as consisting of three phases—planning, implementation, and evaluation.[5] In this model, the *planning* function is retained, the two functions of organizing and leading are integrated into the broader function of *implementing,* and the term *evaluation* is substituted for the related "controlling function."

The four functions of management theory are derived from a number of assumptions about how organizations work. The organization is viewed as a type of machine, driven and directed by one or more leaders, in which ideas, resource allocation, power, and information flows are pushed through the hierarchical levels. The metaphor of a machine is a derivative of the time and thinking in which the classical management theory was developed—the preindustrial and industrial ages. Power is allocated by positions of ascribed status in a hierarchical structure that is broad at the base and small and exclusive at the pinnacle. Organizations are controlled by controllers; strategy and execution could be planned by planners, managed by managers, and led by leaders; specialization yields efficiency; and little crossover of duties or roles exists. The four functions are related to common descriptors in table 4.1.

Table 4.1 Four Functions of Classical Management Theory and Descriptors

Management function	Descriptors
Planning	▪ Leadership driven and vision of leader enforced ▪ Motivation through charisma of leadership team
Organizing	▪ Goal oriented, efficiency centered, hierarchical ▪ Agenda set by planners ▪ Exclusive planning process, few executives/planners, 1- to 5-year plans, and planning department ▪ Structured ▪ Starts with mission, goals, objectives, and timeline
Leading	▪ Assignment of tasks and grouping of tasks into departments ▪ Allocation of resources and authority ▪ Hierarchical
Controlling	▪ Activities monitored and corrections made ▪ Departmental function ▪ Hierarchical ▪ Exercise of control at regular intervals

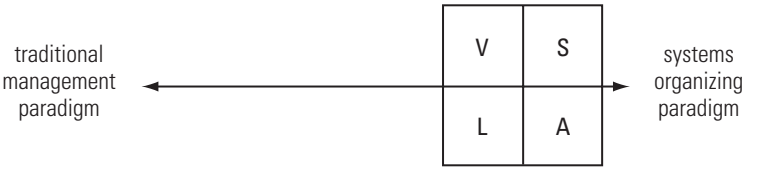
This management paradigm yielded results that were judged as positive by those who benefited. The Industrial Revolution owes its dominance to the classical management approach, but times are changing. The world's peoples and nations are increasingly more interconnected and interdependent as the result of globalization. Information flows rapidly in many directions. Organized arrangements are more complex. Traditional command-and-control structures are difficult to establish and maintain. Even the relationship between employee and employer has been reframed so that both intrinsic and extrinsic motivations and motivational strategies are different. Chapter 2 of this monograph presents the recent evolution of tobacco control and points to the need for new models that deal with systems issues. Systems thinking offers promising extensions to a classical management theory that is not adequate to handle these complexities.

Systems Organizing Model

Moving tobacco control toward a systems approach to management does not mean abandonment of the traditional functions of management. Some degree of planning, organizing, leading, and controlling, or alternatively, planning, implementation, and evaluation, will always be required in organizations. A new model is offered here that integrates the advantages of the traditional and the systems views of organizations and enables leaders or agents to deal flexibly with myriad organizational contexts. A continuum ranging from the traditional management model to a systems organizing model is envisioned. This model is based on four principles (**v**ision, **s**tructure, **a**ction, and **l**earning [VSAL]) that enable movement between these two hypothetical end points, as a bead moves on a string (figure 4.1). The VSAL model is adapted from Cabrera's "operating system"[6] and is offered here as an organizing framework for its utility and applicability in managing complex systems.

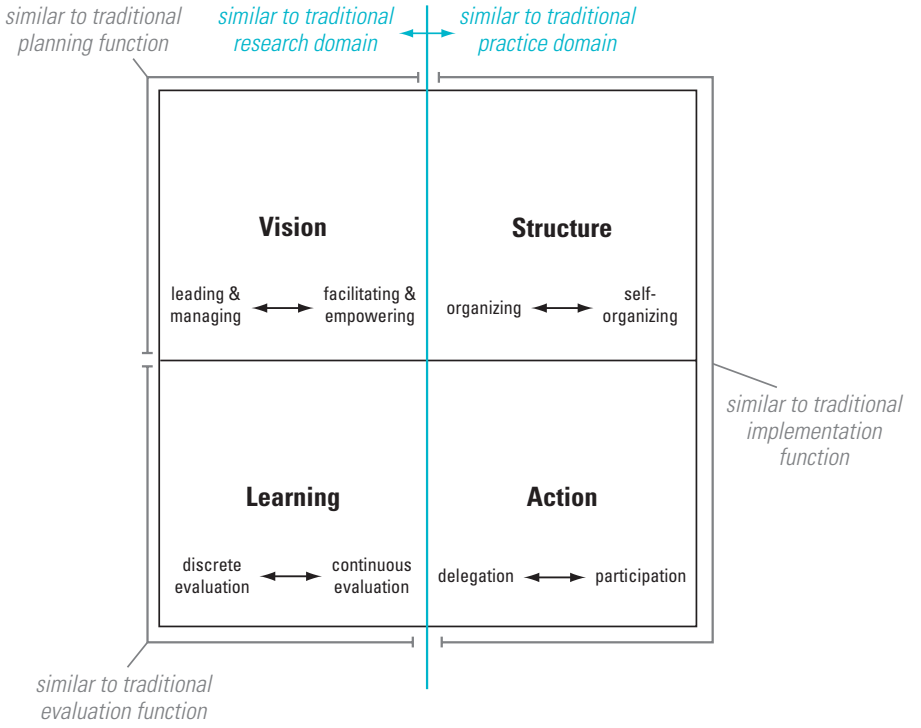
Using these four principles, organizational leaders may choose a balance of traditional approaches (such as leadership, management, delegation, organized structures, and discrete evaluations) and systems approaches (such as facilitation and empowerment, self-organizing structures, participatory action, and continuous

Figure 4.1 Continuum from Traditional Management to Systems Organizing



Notes. VSAL = vision, structure, action, and learning. From Cabrera, D. A. 1998. *Knowledge Age Operating System (KAOS): Four principles of organizational design.* Loveland, CO: Project N Press. Reprinted with permission.

Figure 4.2 Systems Organizing Model



Note. From Cabrera, D. 2001. *Knowledge Age Operating System: Four principles of project design.* Version 1.0. Loveland, CO: Project N Press. Reprinted with permission.

evaluation), depending on the context and circumstances. This "systems organizing" model is compatible with both traditional and systems perspectives (figure 4.2). The continua within each principle illustrate how a leader has the freedom to move among positions on the four continua much as one tunes the equalizer on a stereo, matching the organizational situation to a particular style for each of the principles.

However, because of the uniqueness and complexity of the interorganizational structures of contemporary tobacco control initiatives, much of value will be found in the systems organizing end of the continuum. This is not to say that the systems approach eclipses the traditional approach. In many organizations, a top-down, leader-centered, command-and-control structure is ideal, and subsystems

better suited to more traditional approaches may exist within the larger tobacco control network. However, as was illustrated in chapter 2, tobacco control efforts typically have many interorganizational parts, each with its own policies, culture, history, expertise, and methods. To manage such a system from a traditional approach is to neutralize the system's most potent advantages—diversity, adaptivity, self-organization, and creativity.

The systems organizing model shown in figure 4.2 has four principles: vision, structure, action, and learning. Each of these principles is associated with a different continuum. On the left side of each continuum is a descriptor of that principle from a traditional view. On the right side is a descriptor associated with a systems view as follows:

- Vision: From leading and managing to facilitating and empowering
- Structure: From organizing to self-organizing
- Action: From delegation to participation
- Learning: From discrete evaluation to continuous evaluation

The four principles can be thought of as similar to the traditional progression of planning, implementation, and evaluation. In figure 4.2, the planning, implementation, and evaluation functions are depicted by the outer lines that enclose the VSAL boxes. Therefore, vision is associated with the traditional planning function; learning, with the traditional evaluation function; and structure and action, with the traditional implementation function. These similarities help ease the transition from a traditional linear model to a continuous systems model, but they also may hinder an understanding of the integrated nature of systems organizing. The traditional model of planning, implementation, and evaluation is a linear and discrete progression usually performed by "experts": planning comes first, then implementation, then evaluation. In the systems organizing model, planning, implementation, and evaluation can occur throughout the system, continuously over time; they are not the private domain of expert planners or evaluators.

Likewise, there are similarities between the systems organizing model and the traditional domains of research and practice. The center line in figure 4.2 distinguishes between the traditional research domain (vision and learning) and the traditional practice domain (structure and action). Because VSAL is an integrated model, these distinctions are relatively unimportant. However, it is relevant that there are areas in common between traditional functions and the newer systems organizing model. The traditional view assumes that (1) research is distinctly separate from practice, (2) research is the driver of practice, and (3) research and practice are the domains of specialized experts. In contrast, the systems organizing model makes no such distinctions. An organization is just as likely to benefit from evidence-based practice as from practice-based research. The boundaries between planning, implementation, and evaluation and between research and practice are blurred in the systems organizing model.

Both the traditional and systems models have four interrelated components. In the traditional management process, the four components are considered to be management *functions*. However, in the systems organizing model, they are more analogous to *principles*. It is tempting to assume that the planning, organizing, leading, and evaluating functions are analogous to the VSAL principles. Although these functions appear to be similar, they are subtly and importantly different. For example, consider the following descriptions of the four functions of traditional management (table 4.1):

- Planning: Select goals and ways to attain them
- Organizing: Assign responsibility for accomplishment of tasks
- Leading: Use influence to motivate
- Controlling: Monitor activities and make corrections

The perspective of each function is leader–follower centered. A *leader* selects goals, assigns responsibilities to followers, uses influence to motivate followers, and monitors activities and makes corrections. The traditional management functions are based on leadership and management, because the assumption is that leaders and managers can direct, delegate, motivate, and control their organizations. Thus, although traditional functions and systems principles appear to be similar, they are not similar. The systems principles are *agent–system* centered, rather than *leader–follower* centered. For example, the vision principle does not live in the private domain of people at the top of the organization. Any agent in the system can possess and be directed by a vision. Consider, for example, that many innovations in science and society do not "trickle down from the top." Instead, they "percolate up from the bottom." Another key difference between the traditional and systems views is the role of "thinking" versus "doing," which is alternatively an alias for "ideal versus real" or "research versus practice." In the traditional paradigm, these functions are differentiated, whereas in the systems paradigm, they are integrated.

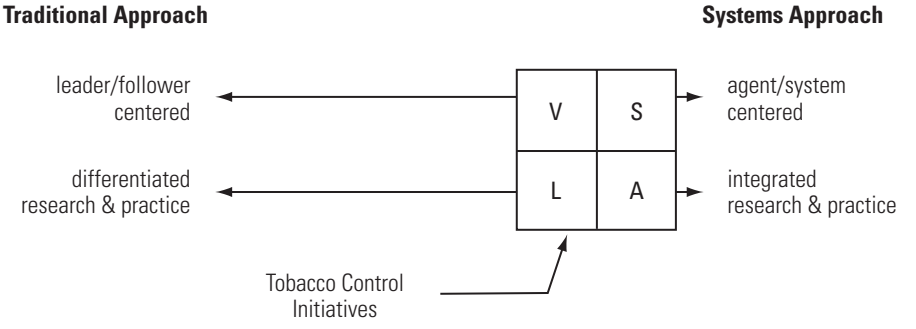
In general, contemporary tobacco control efforts are likely to be better served by systems perspectives toward the right side of these continua. The proposed location of tobacco control initiatives is depicted in figure 4.3. Likewise, most tobacco control efforts are better served by the right side of the specific continua associated with VSAL (figure 4.2).

Same but Different

Within a systems organizing context, the traditional roles of planning, organizing, leading, and controlling take on a different perspective:

- The traditional *planning* function is goal oriented, with an emphasis on actions that can achieve leader-defined goals. Reaching organizational goals is predicated on a paradigm centered on leaders and followers, in which the leader

Figure 4.3 Optimal Placement of Tobacco Control Initiatives in the Continuum of Traditional and Systems Approaches



Note. The VSAL model, developed by D. A. Cabrera, was originally published in 1998 (see figure 4.1 Note). Figure 4.3 and the figures in the VSAL sections that follow are adapted from the 1998 model.

sets the goals and motivates, organizes, and controls followers. In the systems organizing perspective, leaders become more like facilitators. The focus is shifted to a principle of collaboratively developed vision, suggesting a more collective sense of purpose.

- The *organizing* function in traditional management involves "…the assignment of tasks, the grouping of tasks into departments, and the assignment of authority and allocation of resources across the organization."[3] In a systems organizing perspective, the emphasis is shifted to include both purposefully organized structure and provision for self-organizing structures.
- The traditional *leading* function, which is described as "using influence to motivate," has been transformed to an *agent-centered* principle. Individual agents of a system are not thought of as inert bodies waiting for a leader to delegate and motivate them to action. Instead, they are self-motivated individuals or organizations alternatively capable of motivating other agents and driven by internal goals and constraints. Agents are not merely active; they also are participatory.
- Finally, the *controlling* or *evaluation* function in the traditional model is transformed into agent and systemwide *learning*. Evaluation is not merely a discrete and linear process accomplished by impact assessments or by counting outcomes. Instead, evaluation is a continuous process of evaluative feedback that is critical to adaptation, creativity, innovation, and survival.

Other subtle differences exist between the two approaches. First, in the systems organizing model, these categories are not discrete, whereas in the traditional management model they are discrete. The principles of systems organizing are themselves a system, so the four systems organizing principles are integrally interconnected.

Second, systems organizing principles have no set order, whereas there is an assumed phasing of the four traditional management functions. In a systems organizing model, participants may self-organize, learn together, and then realize they are working toward a common vision. In addition, agents may develop a common vision and then self-organize, adapt, and learn who needs to take what action to achieve the vision. The VSAL sections that follow describe a family of potentially useful methodological models that could be used to manage the four principles of systems organizing.

Third, the systems organizing model, like its traditional predecessor, also is related to the three phases of planning, implementation, and evaluation.[5] However, a systems perspective transforms the meaning of these three functions. Like the four principles, they are not discrete and/or sequential; they can be entered into in any sequence. Sometimes one implements and then learns; in other situations, one may evaluate and then implement. The three functions are continually interacting.

Finally, the systems organizing model explicitly incorporates the ideas of research and practice. In general, the traditional view of research is associated with planning and evaluation, whereas a traditional view of practice is associated with implementation. The dynamic relationship between research and practice in the systems organizing model suggests that systems thinking may help to address the integration of research and practice.

Many aspects of traditional management must be used to effectively manage systems. Consequently, the four principles (vision, structure, action, and learning) can be adapted to a more traditional approach by

"moving the slider" to the left on any one of the continua. For example, it is common for a catalytic and influential leader to "have a vision" and then use a more traditional leadership style (e.g., ascribed power or influence) to promote that vision. However, at a critical point, the leader may realize that shifting to more participatory action will better accomplish the vision than will delegating actions to individuals. The four principles allow for this type of transition across each of their dimensions. Some of the differences highlighted here demonstrate the transformation that is occurring in management and that more aptly addresses the complexities of systems environments, especially in tobacco control settings.

It is tempting to describe the systems organizing approach as an "end of the chapter" tool for increasing the understanding of contemporary management. In almost every chapter of every current textbook on management, a future-looking section near the end of the chapter explores the latest thinking in management theory and is populated with phrases such as[3] "new workplace"; "learning organization"; "virtual organization approach"; and "increasing participation in decision making." Such wording gives a glimpse into the future of contemporary management theory. These sections reveal that management thinking is evolving to address a more complex, networked, and dynamic world. The suggestions in this chapter and in the model of systems organizing that is presented are not meant to be antithetical to contemporary management thinking. These suggested approaches seem to be right there, at the end of the chapters of nearly every modern textbook on management.

The following sections discuss each of the four principles and primary methods associated with them. Because all of the principles are interrelated, the methodologies are interrelated as well. Although methods are discussed in connection with specific principles, they should be viewed as crosscutting.

Vision: From Leadership and Management to Facilitation and Empowerment

A collective vision is one that is shared throughout the organization. It is not the exclusive purview of the "leaders" or hierarchy in an organization but is "held" in common by each of the agents in the network. The more agents in a network share the same vision and "see" the same possibilities, the more a system can be said to have a collective vision. The job of a leader is to facilitate the acquisition of a collective vision. Because each agent holds part of the collective vision, each is capable of influencing another agent's vision and, in turn, the whole system. In this way, collective vision takes on three important qualities that are different from the traditional vision.

First, collective vision is *distributed* throughout the network. Second, collective vision is a *dissipative* structure, that is, the structure remains stable despite changing flows through it. This characteristic makes collective visions more durable and timeless, because they are not radically changed by the natural recidivism of the network. Third, collective vision is *adaptive* and *dynamic*. Although the vision is a durable dissipative structure, it also is susceptible to the dynamics of the network and can adapt over time. The systems organizing leader will find that many traditional techniques of planning remain useful in facilitating collective vision. However, he or she should reframe these traditional planning techniques in light of the characteristics of these important changes to the traditional vision (e.g., distributed, dissipative, adaptive, and dynamic).

Vision is not always a *collaborative* process, but it should always be *collective*. Organizational leaders may need to establish a vision. However, one that is not broadly held to be important will have little support and thus lack the necessary support from individual agents. Also, it is not necessary to establish the vision before moving to the other systems organizing principles. A collective vision could be an emergent property of a complex system or the catalyst for a set of discrete agents to self-organize into a network. Some of the methods discussed later in this chapter are well suited for facilitating a collective vision. Systems leaders play a key role in facilitating processes that help agents link local and semiautonomous action (mission) to the collective vision.

The idea of "management," which has the same Greek root as "manipulate" and implies an action "at the hand of" a leader (L. *manus,* hand), is challenged by the evolving paradigm toward systems. The organizational leader does not manage per se but becomes a facilitator of organization (L. *facilis,* to make easier). A leader makes self-organization *easier* by removing constraints on the system, rather than adding them.

In the traditional management framework, planning usually is considered a top-down process with leadership from the highest levels of the organization. This traditional view has been challenged, especially in the area of strategic planning, where it became clear that the planning function often was in conflict with the development of strategy. Mintzberg argues that planning efforts often stifle commitment and innovation and confine the organization and its members.[7] He proposes a model in which planners are more facilitative and supportive, rather than structural and proscriptive. The past decade brought a transformation of the idea of planning along these lines that parallels the shift to systems thinking generally. Historically, planning in large organizations tended to be confined to a department or unit. The planners worked with top management in a tightly structured process that proceeded from the statement of mission and goals to objectives, actions, and delineation of timelines, responsibilities, and costs. Today, planning has evolved into a more collaborative and collective endeavor, in which planners are facilitators, rather than leaders. Moreover, the process itself has shifted from being a goal-oriented exercise to more of an adaptive one.

A broad range of methods and processes can be applied in systems planning to encourage development of a collective vision. Here the territory is briefly sketched, and more detailed descriptions of methodological choices are cited.[8] Many of these strategies fall within the broad rubric of collaborative *needs assessment*.[9] One of the oldest collaborative group methods used in planning is traditional *brainstorming*.[10] The *nominal groups* approach[11] is a structured participatory method in which people work individually to brainstorm and then share ideas. *Focus groups*[12] essentially are a type of group interview to generate ideas in response to a focus prompt or stimulus. The *Delphi technique*[13] began as a relatively delimited, iterative, structured group method of surveying participants and, through feedback of results, moving the group toward consensus. As they evolved, Delphi methods became so broadly defined as to be virtually indistinguishable from any structured collaborative methods for identifying and assessing planning options.

A broad range of planning methods are particularly relevant to the notion that "vision" has as a root the idea of a "visual" model. Visual models involve the construction and use of maps of ideas. Some, such as the *concept-mapping* methods of Novak[14] or Buzan and Buzan's[15] *mind maps,* are primarily tools for use by individuals, although collaborative use

may be possible. Explicitly collaborative *concept mapping,*[16] sometimes referred to as structured conceptualization, is a participatory mixed-methods approach that integrates group process activities (brainstorming, unstructured pile sorting, and rating of brainstormed items) with multivariate statistical analyses (multidimensional scaling and hierarchical cluster analysis) to yield both statistical and graphic representations of a conceptual domain. This approach is designed around a well-informed, group-oriented, decision-making process that drives both planning and evaluation. In public health, it has been used to address statewide planning in Delaware[17] and Hawaii,[18] development of an evaluation framework for a center grant initiative of the National Cancer Institute (NCI),[19] and articulation of an expert model of the activities the tobacco industry uses to undercut public health efforts.[1] This concept-mapping method is illustrated in detail in the case study later in this chapter. Other map-based approaches to planning incorporate the idea of causation and consist of sequential paths of expected or predicted activities and outcomes:

- *Strategy maps*[20] pictorially link perspectives in an organization to encourage strategic alignment that leads to greater value.
- *Cognitive maps*[21] are among the earliest causal maps that were widely used.
- *Logic models*[22] are designed to link planning and evaluation by mapping the causal connections between program activities and outputs and outcomes.
- *System dynamics models*[23,24] are causal maps that can be integrated into the planning function. Chapter 5 considers these models in detail.
- *Outcome maps*[25] are ways of depicting the changes in behavior of an individual, group, or organization with which a program or intervention works.

An array of collaborative, participatory methods that have value in the planning function come from the field of organizational development and are used in large-scale efforts toward organizational change. Many are ideal for facilitating and empowering a collective vision. Such methods include the following:

- *Future-search conferences* are events, typically approximately three days in duration, designed to help an organization find an ideal future and aim for it.[26]
- The *conference model*[27,28] is a comprehensive system designed for a top-to-bottom redesign of an organization. It involves factors such as a customer/supplier conference, vision conference, technical conference, and design conference, across separate two- or three-day events.
- The *large-scale interactive process*[29] is an intervention encompassing mix-and-match table groups of 8 to 10 people usually over approximately three days.
- *Real-time strategic change*[30] is an approach that grew out of Dannemiller and Jacobs's[29] work in large-group interventions and also is used to implement organization-wide change, as the beginning of a process that aims to change the way an organization works, rather than planning only one event.
- *Participative work redesign*[31] emphasizes a democratic approach to job design, in which the people who do the work determine how it should be done, in groups of 8 to 10. It often follows a search conference, and the vision for the future of the organization frequently is established before this event occurs.
- *Open-space meetings*[32–34] are minimally structured events where a group gathers, a blank page on the wall constitutes the agenda, and participants are encouraged to sponsor a discussion by writing the

title of the session on one of the many flipcharts in the room.

- *Appreciative inquiry summit methodology,*[35] pioneered by Cooperrider and Whitney, cofounders of the Taos Institute (Chagrin Falls, Ohio), focuses attention on expanding an organization's capacity for positive change through inquiry into its positive core of strengths, gifts, and life-giving forces.
- The *search conference*[36] is a highly participative and democratic planning process developed to empower an organization to identify, design, and enact its most desired future, in which people create strategic goals and action plans that develop the organization or system.

The variety of methods available for participatory, collaborative planning and the establishment of a collective vision illustrate both the potential and the challenge for systems organizers. Many of the methods share common features (e.g., brainstorming and ranking). Moreover, systematic, empirical comparative evidence of relative strengths and weaknesses needs to be developed. Even so, explicit structured processes for participatory planning and for helping systems develop maps describing the collective vision of the group or organization are critical tools for systems organizers.

Structure: From Organizing to Self-Organizing

Despite the limitations of the traditional management paradigm, one of its strengths is its usefulness in leading an organization toward a predefined purpose. However, no organizational leader, no matter how skilled or charismatic, can single-handedly move a complex organization toward a desired goal. Organizations are complex and evolving "organisms" encompassing diverse stakeholder groups, political and cultural processes, and competing demands. Especially in the context of tobacco control efforts, in which loosely knit coalitions and collaboratives form with limited central control, the traditional approach alone is not sufficient. Therefore, the central task of a new management model is to reconcile the paradox between *purposeful organization* and *adaptive self-organization.* The real power of complex organizations is the ability to self-organize, adapt, and evolve. However, the self-organization and evolution must be directed toward a *purposeful* goal. These countervailing forces speak to fundamental issues of power and infrastructure in organizations, particularly as they move toward a systems environment.

When Darwin wrote his treatise on evolution by natural selection,[37] he began with examples of domestic breeding for selective traits in pigeons to provide an analog for what would prove to be a profoundly influential argument: a similar kind of selection that resulted from *natural* causes, rather than divine inspiration or intelligent design[38] (W. B. Provine, pers. comm., 2004). The phylogeny of organs like the human eye, organisms like the kangaroo, or superorganisms like a colony of ants, is the result of good genes combined with a modest amount of good fortune.[38,39]

Instead of developing traditional command-and-control systems, the systems manager facilitates (eases the formation of) systems that encourage self-organization. This end frequently is accomplished by reducing restraining forces, instead of adding directing forces. Systems organizing leaders must facilitate and empower *interaction* of all kinds. When adaptive agents are allowed to freely interact, self-organization typically results. Many of the structures, policies, and rules in a traditional organization are designed to direct, control, or otherwise inhibit interaction. Departmentalization and imposed specialization are driving forces for organization, but they restrain self-

Going with the Flow

Consider the following anecdote, which differentiates between purposeful organizing and adaptive self-organizing. In the world of river-raft guiding, novice guides can be distinguished from seasoned guides because novices work harder and expert guides work smarter. Novice guides rely on raw power and young muscles to maneuver the raft. A great deal of effort is expended fighting against the natural flow of the river. The seasoned guide surrenders the boat to the flow of the river and pays close attention to critical moments when a single stroke in the right place, at the right time, with the right amount of force can alter the course of the raft, transitioning the boat from one turbulent flow to another. The differences between the novice and expert guide are subtle but profound.

The parallels to management and organizations are obvious: the leader, manager, or agent of change floating on the turbulent flows of a complex organization cannot hope to move an organization toward a goal or objective. However, well-placed and well-timed actions, based on a thorough understanding of the system's complexities and behaviors, can lead to purposeful and adaptive change. In this anecdote, "going with the flow" does not mean simply letting the river take the boat wherever it takes it without a care for outcomes or path. Instead, going with the flow means understanding the effects of the larger systems at work and coordinating one's actions to use and leverage these systems toward purposeful ends.

organization. Self-organizing systems may cluster into subsystems that may adapt to fill specialized roles, but they do so organically.

Systems organizers understand that systems allowed to form naturally are better able to adapt and evolve. When agents self-organize, they often form novel bonds in the network that can help decrease the relative distances in the network, making the world smaller.[40] In turn, a "smaller" world can be navigated more quickly and may be better able to adapt to rapid changes in the environment. Because these novel, "long" bonds connect discrete clusters, they facilitate the flow of critical system components, such as information, resources, knowledge, learning, and power, from one part of the system to another.

The issue of structure in systems organizing is closely related to the issue of networks, because networks either constitute the structure or can be used to represent it. This finding is consonant with a literature on collaboration in networks[41] and the idea of "network organizations"[42] that addresses structural issues (types of networks) and how to perform facilitation effectively in networked contexts. Chapter 6 considers networks and network analysis as they relate to systems thinking. However, much of that discussion is relevant here.

The systems organizing leader recognizes similarities between efforts to encourage structures that enable self-organization and the traditional implementation functions. However, the paradigm shift to systems thinking requires a transformation of traditional thinking. The rules of the traditional manager become "recipes"[43] to the systems organizer. Where rules attempt to control, recipes suggest. Encouraging structures that allow self-organization is a complex and difficult process, but it need not be any more difficult than traditional approaches. The systems organizer must develop a keen sense of the behavior of complex adaptive systems and must be a catalyst for systems change at critical times, while "letting go" to self-organizing processes at other times.

The organizational environment that currently characterizes tobacco control can be viewed as a *loosely coupled system,* a term Weick[44] coined in studying educational organizations. Loosely coupled systems are

distinguishable from the command-and-control environments normally found in the business sector. They are characterized by several factors.[44] They exist in situations in which several means can produce the same result. There is a lack of coordination or dampened coordination and an absence of regulations throughout the system. These systems consist of connected networks with very slow feedback times. The various subsystems evidence causal independence, and planned unresponsiveness exists in the system. Orton and Weick[45] summarize major advantages and disadvantages of loose coupling:

- *Persistence:* Stability and continued operation in the good sense; resistance to change and reduced responsiveness in the bad sense
- *Buffering:* Inclination to seal off and prevent the spread of problems, which also can manifest itself in the lack of communications that may have led to problems such as the Three Mile Island accident[46]
- *Adaptability:* Great tendency to experiment and find local solutions to problems
- *Satisfaction:* Fostering of efficacy and self-determination[44] and creation of an environment in which deviance and experimentation are protected;[47] loosely coupled systems can also contribute to loneliness,[48] reducing satisfaction levels

Orton and Weick reach several conclusions on the best management of loosely coupled systems.[45] They recommend subtle leadership that focuses on providing centralized direction and coordination while recognizing the value of increased discretion on the part of agents. The investigators suggest focusing attention on specific relationships in the system by use of strategies such as carefully selecting targets; managing/controlling resources; and initiating focused, forceful action as appropriate. Orton and Weick advise an emphasis on shared values and tight cultural couplings to counteract loose couplings between policies and actions.[45] The study of loosely coupled systems suggests four insights about navigating collaborations in public health:

1. The focus should be on the *interfaces*—defining the inputs and end products required for each participating organization, rather than activities that occur within each.
2. The system should rely less on detailed instructions and more on encouraging mutually agreed upon operational milestones for each partner and facilitating economic incentives that are driven by fulfilling explicit operational milestones.
3. The systems organizer should anticipate that in the course of the system's evolution, it may be necessary to substitute new participants for others who have left or are not performing well.
4. Structuring the system's work so that it can be accomplished with minimal disruption to the system is essential.

Moreover, the systems organizer should encourage development of distinctive competencies by (1) providing opportunities for partners to become involved in activities that use their expertise and (2) reassigning activities that can be better performed by other partners.

While this chapter maintains that tobacco control is a loosely coupled system, this should not be taken to suggest that it cannot or should not organize. Many issues in tobacco control are best addressed through well-coordinated, orchestrated, organized efforts on the part of the system. For example, efforts to lobby state legislatures around specific tobacco control legislation being considered (e.g., cigarette taxes, clean indoor air laws) need to be planned and executed

carefully to be effective. In a loosely coupled system, this often will require that multiple groups or organizations come together and self-organize to achieve such ends.

Power, Conflict, and Structure

The structure that is used in a system is directly related to the potential for power and conflict to arise. For example, issues surrounding the distribution of power among key stakeholders are a common theme whenever researchers and community members form a partnership. Historically in such cases, researchers control the resources and thus are the primary decision makers. Community-based participatory research, which is discussed later in this chapter, attempts to adjust the balance so that researchers and community members equally share power, funds, and responsibility.[49] This research has important insights for systems organizing in situations of power disparities. If participants do not address issues of power and develop relationships built on trust, they are unlikely to embrace the results of the research,[50–52] a factor that may contribute to the lack of research utilization in public health practice.

The literature on open systems and self-managed teams is particularly relevant to the issue of structure and its relationship to power and conflict in systems. Proponents of the open systems framework[53] argue that, in any environment, there is a set of factors so interrelated that a change in one may create changes in the others. As factors of a system interact, members of the organization receive feedback on whether they are accomplishing their goals.[53,54] This feedback is especially apt in a context of contemporary dynamic systems that require participants to monitor and adapt to external changes to survive.[55] Within this context, systems must themselves be able to adapt.

In traditional management, the idea of self-managing teams emerged as a solution to help organizations manage the dynamics of a more complex environment.[54,55] The concept of self-management often is used interchangeably with terms such as self-controlling and self-regulating. The idea behind self-managing teams is that when the manager is removed from the interaction, the team is left to self-regulate and consequently becomes better able to adapt to the organization's changing needs and goals.[55] The assumption is that giving groups control over decision making and behavior leads them to better organize and direct their work, more rapidly address problems, and have a stronger sense of commitment.

Much of the discussion about governance in self-managed groups is essentially a consideration of the role of conflict in such systems. There are several types of conflict, and each one may have different implications for governance. Conflict over tasks involves disagreement about the nature of the task or prioritization of tasks. Conflict over relationships pertains to personal differences among participants. Conflict over process relates to tensions about how to address tasks. The literature on conflict within a team suggests that some level of conflict can enhance team performance, but excessive conflict has negative effects.[56]

Power differentials create the need for interaction guidelines that can form a basis for working together in a systems environment. For example, based on a review of the literature and stakeholder research, Cordero-Guzmán identified several key factors for such collaborations in community-based organizations (CBOs), including an explicit mechanism for the selection of participants and concrete criteria for selection.[57] Possible criteria include identification of members who share a stake in both the process and outcome and those who have the ability to compromise and resolve disagreements on goals,

programs, and procedures. Development of mutual respect, understanding, and trust is another essential early step. The challenge is how best to promote development of respect.[57] A structured participatory process may be critical in early phases of systems development (e.g., engagement in an active and professionally led planning process that involves significant involvement of participants). Efforts should be made to create opportunities for the collaborating organizations to engage in group activities, discuss common interests, develop clear expectations, and build trust.

Although cross-organizational systems are unlikely to be as structured as organizations themselves are, it is important that roles and policies are clearly defined. Open and frequent communication and established formal and informal communication links are especially important in cross-organizational systems in which opportunities for regular face-to-face exchanges are likely to be less frequent. It is important to be clear and selective in targeting the types and contexts of activities related to the work of the system. Starting an initiative with concrete and visible projects that can show clear and early gains is desirable. This approach enables the systems team to gain experience working as a group and to obtain a quick success that can increase self-confidence. As in any organization, the pressures of day-to-day demands tend to crowd out plans for longer term strategic issues related to the system. Having a process that promotes planning for long-term systems strategies and goals is critical. Finally, and perhaps paradoxically, it is important to manage the exit of organizations from the collaborative group.

Action: From Delegation to Participation

One important concept gained from complex systems research is that interactions of local semiautonomous agents unaware of larger goals can lead to emergent complexity, adaptivity, and self-organization. Using this knowledge, the systems organizing leader must enable individuals to connect their daily objectives and actions (mission) to the larger collective vision of the whole system. One can imagine a system of active agents who are not participating in a larger effort. In everyone's experience, they are people who are very busy but accomplish little. As soon as agents make the link between their local mission and the collective vision, they move from being "active" to being "participatory." When agents are called on to *participate,* rather than merely to take action, they are encouraged to connect their actions to the collective vision of the whole.

One key concept of the systems organizing model is the intimate link between mission and vision—between the action of the parts and the action of the whole. To benefit from a purposeful process, mission must be linked to a collective vision. To benefit from the powers of self-organization and emergence, agents must become participants. Like establishing a vision, establishing a mission is a continuous rather than a discrete process. Agents require time to determine how they can participate and in turn contribute to the collective vision. Many unique gifts and talents of individuals are unknown to their leaders and frequently, even to themselves. However, a systems organizing leader empowers and facilitates a process that helps individuals identify key contributions. Such leaders do not say, "We're going to do X, and I need you to do Y." Instead, they say, "We want to do X. What can you contribute?"

The first step in exploring the concept of facilitative leadership to achieve participant missions is examination of the literature on management for contexts similar to those of complex and dynamic interorganizational systems. One leading candidate is the field of large group interventions (LGIs),[58]

Agents and Missions

When religious missionaries go on a mission, they are active participants in the vision of a larger system. They understand the part their participation plays in serving the vision of the whole. Even though each mission is different, all the missions share abstract or general qualities. The same is true for agents in a system. Each agent may have a mission uniquely suited to him or her, and the collective effect of these missions is attainment of a collective vision. Missions are not "statements" on a boardroom wall. They are collective, distributed, adaptive, and dynamic actions and interactions. Unlike the dissipative structure of visions that makes them dynamically timeless, missions are timely. They change.

collaborative interventions involving the systems, practices, and policies of transorganizational environments. In traditional organizations, such interventions embody strategies to involve both internal and external systems in the change process.[59] These methods are designed to create alignment and consensus around strategic direction and global issues for an organization. Generally, they are processes involving key stakeholders at all levels of the organizational environment. LGIs, also known as critical mass events, large group interactive events, whole systems change, and large-scale organizational change, grew out of the field of organizational development in the 1950s, with the formulation of the theory of sociotechnical systems.[60]

An emerging paradigm of change has arisen to formally challenge and compete with the more traditional sociotechnical systems approaches. LGIs have been embraced by many as the preferred method of change, because they bring a higher level of consciousness and an ecology of the whole system.[61] Whole-systems approaches to organizational change are rooted in the philosophy that organizations act as living systems or communities and that overall health must be viewed from the perspective of the total system. A whole-systems perspective involves understanding how all parts of the system (e.g., people, resources, knowledge, processes, and leadership) contribute to the successful functioning of the system and how each of the parts relates to each other and to the whole. Other approaches to redesigning organizations to improve productivity, quality, and organizational effectiveness include total quality management and business process reengineering. LGIs can trace their ancestry to a diverse set of approaches including systems theory,[53,60,62] sociotechnical systems and social constructionism,[63,64] values theory,[65,66] social psychology,[67] futuring,[68,69] group dynamics,[70–73] and large group dynamics.[74–78]

Several essential design principles support LGI methodology[58] and are worth consideration in the context of organizing tobacco control. Dialogue among stakeholders is necessary to transform understanding and find deeper meaning, essentially an affirmation of the critical importance of collaborative and participatory approaches in this context. Through powerful and generative dialogue processes, people are capable of extreme change that becomes the source of collective action and collaboration. Community building and relationship formation practices foster interdependence and interconnectedness among the participants in the system. Collective learning increases a system's capacity to produce results that matter. Diversity through shared inquiry promotes system vitality, synergy, resourcefulness, and growth. Self-managing methods build dynamic and synergistic energy that fosters commitment and shared responsibility.

In addition to LGI methods, approaches such as participatory action research are well suited to linking a participatory

mission to a collective vision. The systems organizing leader finds that many of the traditional techniques of planning and implementation remain useful in linking this participatory mission. However, these traditional techniques should be reframed in light of these important systems changes to the traditional mission "statement."

Learning: From Discrete Evaluation to Continuous Evaluation

Learning is the adaptive function of societies and organizations. In the traditional management model, learning is most like evaluation. The field of evaluation is undergoing changes parallel to those in science that were discussed in chapter 3 and to the changes in organizational and management thinking discussed earlier in this chapter. The field of evaluation is evolving away from the discrete and linear control model of planning, implementing, and evaluating to more dynamic models that constitute collective adaptive learning. At the cutting edge of the evaluation field, scholars already are moving evaluation criteria from researcher-defined approaches to a participatory, stakeholder-based model consonant with linking theory to practice and evaluation to learning. When evaluation becomes a stakeholder-driven process that integrates both the goals of researchers and the needs of practitioners, the problem addressed is one of the most critical roadblocks in the current science model—the gap between research and implementation of evidence-based practices.

Developing a learning organization[23] means that agents view themselves as both students and teachers in a continuous process in which making mistakes, taking risks, acquiring new knowledge, and sharing that knowledge with others are critical advantages, not just fanciful and occasional reflective indulgences. Individuals in the system must be encouraged not only to *reflect* on what they are doing and adjust their mental models but also to *report* or disseminate what they learn to others.

Evaluation as a conscious empirical endeavor can trace its roots back hundreds or even thousands of years.[79,80] However, evaluation emerged in its modern form primarily as a coherent field, at least in the United States, in the era of the Great Society during President Lyndon Johnson's administration. From the outset, evaluation involved a confluence of many fields, both research based and practice oriented, including most of the applied social sciences and substantive areas of education, health, and social welfare. Thus, it encompassed an eclectic mix of methodologies ranging from experimental and quasiexperimental approaches to qualitative anthropological and field-based strategies and addressed a broad range of concerns from technical and scientific to managerial and practical. Charting the history and evolution of the various strands of evaluation is easily a book in itself.[79–89] Nonetheless, here it is important to identify the most recent directions and how they relate to systems learning in systems organizing.

This section focuses on three broad areas of evaluation methodology illustrating the evolution of systems organizing principles: participatory evaluation, program theory and logic models, and system models for evaluation.

Participatory Evaluation

Participatory evaluation embodies the kind of collaborative, multistakeholder approach envisioned in the four principles of system organizing. Traditionally, the gap between researchers and practitioners has served as one of the major impediments to dissemination and adoption of evidence-based practices. In public health in general, there frequently is a dissonance

between research results and the needs of practitioners and other stakeholders, often to the point that community members have a well-documented mistrust of health researchers.[90] There are some key structural reasons for this dissonance.[51] Dissemination of research findings frequently is not by itself an effective tool for initiating behavior change. Best practices, which traditionally result from applied research, often are viewed suspiciously by potential users. Moreover, much of the research that informs the development of guidelines for best practices is conducted in distant places by unknown researchers.

Incorporating the knowledge and expertise of practitioners and community members strengthens the quality of the research.[91] When research questions address issues important to both researchers and practitioners, the data collected are more applicable to the scientific hypothesis under study.[92] Likewise, a close, collaborative relationship between the evaluator and the consumers of the evaluation increases the quality and effectiveness of program evaluation.[93]

Community-based participatory research (CBPR) is an evaluation approach that facilitates collaboration between researchers and community members. The three key elements of participatory research are collaboration, education, and action,[91] which enable the development of effective interventions and address specific community health needs.[94] The involvement of all participants in all aspects and at all stages of the research is essential to CBPR.[49,52,92,94,95] Each participant adds important expertise to any research endeavor and can increase the understanding of factors contributing to poor health outcomes and thus enhance the quality of the research.[90,91,96] To ensure that the voices of community members are heard, the research must involve an active partnership with a CBO, a community advisory committee, community forums, and public presentations, and must include formative data collection, including interviews with community members.[92]

CBPR can be viewed as an overarching term that encompasses a variety of participatory evaluation methods. Participatory action research is an iterative process of inquiry, reflection, and action, in which a researcher participates with stakeholders to define a problem, generate knowledge, perform research, take action, and evaluate results.[97] The participatory intervention model is a closely related approach that integrates theory and research on interventions that are sensitive to culture and context.[98] This partnership between investigators and communities is designed to promote long-term sustainable involvement of affected stakeholders. Empowerment evaluation[99] is a collaborative approach to the development and use of program evaluation criteria, driven by community stakeholders, as well as investigators. Many of these approaches use the methods described earlier in the section on "vision." They overlap with the emphases described in the discussion of large group interactions in the section on "structure."

Development of a partnership is facilitated by establishing research priorities, funding, and mechanisms for collaboration and decision making early in the collaborative process.[94] Establishing and maintaining trust also are essential to an effective collaboration and require the flexibility and patience of all stakeholders.[49,90,94] To ensure the success of a partnership in research, it is advisable to determine the roles of all stakeholders, define principles of collaboration, and develop a code of ethics before a project is started.[52,90,91,100]

Even though CBPR has many benefits, it does pose challenges, including time constraints, cost-effectiveness issues, and lack of program durability. Funding agencies generally do not provide adequate time for

performance of CBPR projects, making detailed community analysis difficult.[52,101,102] In addition, most community research projects primarily are concerned with determining whether the intervention has an effect, not whether the program will endure.[100,102] Despite these concerns, CBPR has much to commend it, especially in the context of open systems.

Program Theory and Logic Models

One of the most important changes in evaluation over the past few decades has been the recognition that good evaluation depends on understanding the underlying theory of how programs or interventions might affect outputs and outcomes, a concept known as *program theory*.[103] Program theory was a reaction to the traditional experimental and quasiexperimental approach[104] that tends to treat the program or intervention as a "black box" and assess causality without concentrating on the processes that bring about effects. Program theory also can be viewed as a transitional step from a more reductionist and hierarchical view of causal relationships toward one that is more dynamic and systems oriented. Paralleling this evolution to program theory were two trends that have implications for systems organizing.

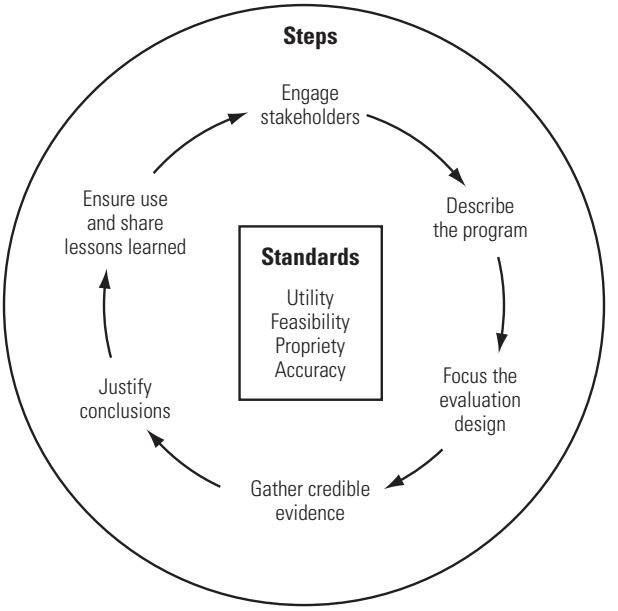
First, methods and processes that would enable comprehensible description and depiction of implicit theories were needed. It was not sufficient for individual scientists and researchers to perform this function alone. Many of the most detailed causal models were likely to be implicitly held in the minds of practitioners and community members who were close to the phenomena. Thus, the problem became one of identifying methods to help groups of stakeholders, including researchers, practitioners, policy makers, and consumers, articulate their implicit models of how interventions work to affect outcomes. Then these models could be used to perform more sensitive evaluations through methods such as matching of theoretical patterns of expected outcomes with the observed patterns obtained through measurement.[105–107] Not surprisingly, many of the processes that proved useful came from the planning context (see the section on "vision," earlier in this chapter). This is because planners historically used methods to surface implicit models based on the input of heterogeneous groups of stakeholders.

Second, there had been a rise in emphasis on developing visual models that capture the complexity of the program–outcome process, in parallel with the growth of stakeholder-driven models. Perhaps primary among these is the use of *logic models* representing structured evaluation criteria that link outcomes with program activities and processes, as well as the theoretical assumptions and principles of the program.[22] Logic models represent causal models of evaluation in which actions lead to measurable outcomes. As such, they are precursors to the more dynamic analyses with feedback that comes from system dynamics (see chapter 5), where the effects of actions can influence factors, which in turn affect the relationships between actions and outcome.

System Models for Evaluation

The evaluation framework of the Centers for Disease Control and Prevention (CDC; figure 4.4) is a recent example of a participatory evaluation system model that is integrated with use of logic models. This framework illustrates well the shift that is occurring to more collaborative system models for evaluation and systems learning. This model involves a six-step process[108] in which engagement of stakeholders is the initial activity in an evaluation effort, preceding the definition of more formal aspects of the evaluation, such as the program design and logic models used,

Figure 4.4 Elements of Evaluation Framework



Note. From Framework for program evaluation in public health. 1999. *Morbidity and Mortality Weekly Report Recommendations and Reports* 48 (RR-11): 1–40, Figure 1.

evaluation design, and expected outcomes. This framework also is set in the context of four core standards (figure 4.4, center) that are relevant to the evaluating function of systems organizing:

1. Utility—Degree to which the information needs of intended users are served by evaluation
2. Feasibility—Potential for achievement in terms of project scope, cost, and political factors
3. Propriety—Conformity to legal and ethical standards and acceptable benefit to affected parties
4. Accuracy—Technically accurate information

This framework represents an evolution of evaluation methodology within a large hierarchical organization such as CDC and further evidence of systems organizing trends combining quantitative and mixed-method techniques with an increased level of stakeholder input.

Summary of Systems Organizing Model

From the perspective of complex systems, the local interactions of semiautonomous agents lead to emergent complex phenomena. To facilitate achievement of purposeful ends in a complex adaptive system, the system as a whole must have a stated goal (*vision principle*) and participatory action of individual agents (*action principle*). Agents also need to connect their actions (missions) to the collective vision and understand that the vision and the mission of the system are in constant feedback with each other; they are distributed, dissipative, dynamic, and adaptive. Structures that afford self-organization rather than simple

organization also should be encouraged (*structure principle*). In addition, the culture must be infused with a passion for learning (*learning principle*) and ongoing evaluation. It also is critical that mission be intimately linked with vision and vice versa and that the capacities for self-organization and learning are mapped onto vision and mission. Using these four principles, organizational leaders may choose between more traditional approaches (e.g., leadership, management, delegation, organized structures, and discrete evaluations) and systems approaches (e.g., facilitation and empowerment, self-organizing structures, participatory action, and continuous evaluation).

The leader has the freedom to move between these positions on the continua much like the equalizer on a stereo is tuned, matching the organizational situation and immediate context to a particular style. However, because of their unique and complex interorganizational structures, tobacco control initiatives can benefit greatly from moving toward the systems end of the continua. Numerous methods are available for the systems organizing leader. By linking (mapping) the purposeful principles of vision and action to the emergent principles of structure and learning, a balance between powerful emergent properties and purposeful constitution can be achieved. In addition, because the self-organizing system is participatory and because mission is linked to vision, systems-friendly methods can be used to link semiautonomous and local action and the larger goals and objectives of the whole.

In the discussion of the four systems organizing principles, a wide variety of methods were presented. Table 4.2 shows a matrix that relates the four principles of systems organizing to those methods. Each method is classified in terms of its primary and secondary emphases related to the four principles. This classification is not meant to be definitive; different people would likely classify the methods differently. Some of the methods are ideally suited for one principle; others could be used for several or all of the principles. Excluded from this table and chapter are the great variety of methods relevant to systems organizing that come from the traditions of system dynamics modeling (chapter 5), network analysis (chapter 6), and knowledge management and transfer (chapter 7), because these methods are considered in detail in those chapters.

Collaboratively Constructed Concept Maps for Systems Organizing: Case Studies

A major challenge in systems organizing (of consortia, networks, or partnerships) is the development of methods and processes appropriate for complex interorganizational contexts. Two case studies illustrate incorporation of the ideas of systems organizing into real-world contexts. One study was conducted to improve integration of research and practice in public health, and the other was conducted to develop a conceptual model of the characteristics of strong, cooperative local and state tobacco control programs. Both case studies involve key issues in tobacco control and provide examples of the creation of outcomes through a structured process in a participatory, multistakeholder environment—a system of organizations. At a deeper level, both also produced results that would not have been possible in the absence of organizing a system of stakeholders. The intent is not to argue for a specific methodology but rather to underscore the importance of engaging

Table 4.2 Systems Organizing Methods by Principle

Systems organizing methods	Planning collective vision	Organizing and participatory self-organizing	Facilitating mission leadership	Evaluating and systems learning
Collaborative needs assessment[9]		X		
Brainstorming[10]	X	X	X	X
Nominal groups approach[11]	X	X	X	X
Focus groups[12]	X	X	X	X
Delphi technique[13]	X	X		X
Concept-mapping structured conceptualization[109]	XX	XX	X	X
Concept mapping (mind mapping, idea mapping)[14,15]	X	X		
Strategy maps[20]		X	X	
Cognitive maps[21]		X	X	X
Outcome mapping[25]	X	X		XX
Logic models[22]	X	X	X	X
Future-search conferences[26]	XX	X	X	X
Conference model[27,28]	X		X	X
Large-scale interactive process[29]	X			
Real-time strategic change[30]	X		X	
Participative work redesign[31]		X	XX	
Open-space meetings[32–34]		XX		XX
Appreciative inquiry summit methodology[35]		XX		
Search conference[36]	XX	X	X	
Large group interventions[58]	X	X	X	X
Total quality management				X
Business process reengineering		X		
Community-based participatory research				XX
Participatory action research				X
Participatory intervention model				XX
Empowerment evaluation[99]				XX
Appreciative inquiry as methodology[35]				XX
CDC evaluation framework				XX

Notes. X = method suited for systems organizing function; XX = method especially suited for systems organizing function; CDC = Centers for Disease Control and Prevention.

Managing a Complex National System of Organizational Partners: Notes from the Real World

Systems organizing issues are well illustrated by an example from a field in public health that neighbors tobacco control, the field of obesity control and nutrition. The latter has a much longer history of attempts to coordinate across sectors and organizations. One such effort was a national coalition sponsored by a foundation seeking to mobilize the major national players in nutrition around a campaign called Project Low-Fat Eating for America Now (Project LEAN) in 1988–92. Organizations in the public, private, voluntary, and independent sectors were convened to form a coalition to coordinate their nutrition messages, products, and services around the theme of low-fat eating. The systems organizing issues that needed to be addressed in building a system or coalition of disparate stakeholder organizations were examined by creating vision, structure, action, and learning:

Creating vision. Who is the leader? The first of several caveats on coalitions that one could draw from this example is, "Everybody wants coordination, but nobody wants to be the coordinatee." One corollary is that designation of a chairperson for the meeting of disparate partners in a coalition immediately establishes a perception of imbalance in the partisan positions of the various sectors or organizations. The private sector versus the public sector views of food-labeling policies, for example, would be perceived to be tilted in one direction or the other by the designation of anyone selected to chair the meetings.

Creating structure. The first system problems encountered at the first meeting related to managing the balance of power—governance questions such as who should chair the meetings and what the representation and the voting rights and weights should be of the various organizations. Considering the vastly different sizes and power of the organizations at the table, it was clear that the conveners could treat them equally only at the peril of the cohesiveness of the coalition.

Moreover, a corollary of the coordinator–coordinatee dilemma mentioned here is that large organizations with considerable stake in an issue are loathe to be at the mercy of a coalition's decisions and are the first to break ranks and leave the coalition when they find that their influence is diminished by their membership. The first point at which they may feel diminished is in selection of the chairperson. However, a more compelling reason to bolt arises when they realize that their vote counts equally with the votes of many small partner organizations. They will be even more concerned if they sense that some smaller organizations are or could be ganging up on them in the voting or using the coalition as a platform to berate them or disparage their products or motivations.

Creating action. Another systems issue arises in managing the chain of command in the coalition as the meetings unfold. The first meeting might be attended by many of the chief executive officers of several organizations, and the second and third meetings, by their deputies. By the time of the third meeting and later meetings, depending on the size of the organizations, the people around the table might not be in a position to cut deals or cast a vote that would commit their organization to a plan or an offering of support. Meetings begin to bog down and end in stalemates because many of those present must defer a vote on decisions or withhold support for actions until they can check with superiors.

Creating learning. Finally, following through on the initial vision can be yeoman's work. A set of coalition systems issues arise in the phasing from initial meetings on consensus building and declaration of common purposes, where coalitions are at their best, to later meetings on implementation, where coalitions frequently are at their worst. Coalitions make blunt instruments for micromanagement and often collapse under the weight of their own cumbersome managerial and decision-making structures when they come to the implementation phase.

Over time, there have been a growing number of successful systems organizing efforts in public health practice and literature, ranging from coalition-building efforts such as the Global

Tobacco Research Network[a] to the case studies outlined later in this chapter. At the same time, understanding the kinds of roadblocks that have occurred in past efforts such as Project LEAN can help to inform the kinds of social and organizational issues that must be addressed to make these systems efforts practical and effective.

[a]Research for International Tobacco Control. 2002. Bridging the research gaps in global tobacco control: A synthesis document. Ottawa, ON: Research for International Tobacco Control.

tobacco control from a systems organizing perspective.

These case studies involve the use of concept mapping, one of many systems organizing approaches discussed earlier in this chapter. (For a detailed explanation of concept mapping, see appendix 4A.) Concept mapping, sometimes called structured conceptualization, is a participatory and integrated mixed-methods approach facilitating the collaboration of tens or hundreds of people synchronously or asynchronously on a project, in person or using Web technology, in a manner that enables active involvement of each participant.[16] The primary product of this method is a series of "maps" that summarize the collective thinking of the group, consensus matches to explore the diversity of participant views, bivariate graphs that enable considerable detail to be organized for action planning and implementation, and a broad array of summary data. The method integrates qualitatively based, judgmentally oriented individual and group processes (brainstorming, sorting, rating, and interpretation of results) with a series of multivariate statistical analyses to produce the maps and related outputs. The products enhance the ability of groups or networks to purposefully envision, enact, and manage systems changes that increase the capacities for self-organizing and/or learning.

As one example of systems organizing "friendly" methods, concept mapping is especially useful to build collective vision and the perception that an individual's daily actions are situated in a larger contextual purpose. Metaphorically, concept mapping results in a "you are here" map of the larger system that allows each agent in the system to understand how his or her efforts (mission) are situated in the larger collective action (vision). In addition, methods such as concept mapping provide groups and individuals with a powerful reflective learning process. Finally, any methodology that increases the bonds between agents in a network, especially special types of bonds such as long bonds or a combination of weak and strong ties across diverse networks, can create capacity for desired outcomes. These include phenomena of small worlds, in which small numbers of links bridge any two points within a network,[40] as well as self-organization, adaptation, complexity, and emergence.

There are several reasons for using concept mapping as the vehicle for illustrating systems organizing approaches. First, it is a good exemplar of a structured participatory method, a key feature of systems organizing. Second, it is a hybrid method that integrates well-known qualitative (brainstorming, sorting) and quantitative (multidimensional scaling, hierarchical cluster analysis) methods. In a sense it is a conglomerate of several other systems organizing methods (various group processes and formal modeling methods), and, as a result, the examples illustrate some of the major features of each. Third, it was timely; several projects that were particularly apt illustrations for public health and tobacco control either were in

progress or had been recently completed at the time of this project. Despite its advantages as a method for illustrating systems organizing approaches, the use of concept mapping in these examples is not meant to convey any inherent distinction over other systems organizing methods. Many methods are available—this is an extremely dynamic area. Each of them would likely contribute to and complement the results obtainable through concept mapping.

Case Study 1: Closing the Gap between Research Discovery and Program Delivery

The 2001 report of the Institute of Medicine,[110] which determined that the lag time from a scientific discovery to use in practice was typically 15–20 years, drove the motivation for closing the gap between research discovery and program delivery. NCI, the Center for the Advancement of Health, and the Robert Wood Johnson Foundation held a collaborative conference as a foundation for developing a more integrated effort to close the gap between research discovery and program delivery in cancer control.

To make the most of participants' time at the conference, the sponsoring organizations asked them to take part in a preconference collaborative project to help them understand the perspective of experts—practitioners, researchers, and others who work in health promotion, disease prevention, and cancer control. The focus was primary ways for major agencies affiliated with the U.S. Department of Health and Human Services (e.g., NCI, CDC, Agency for Healthcare Research and Quality, Centers for Medicare & Medicaid Services, Health Resources and Services Administration, and National Institutes of Health) and the national, state, and local partners to work together to accelerate adoption of cancer control research discoveries into practice. The results of the conference were then used to develop a logic model and related action plans for implementation. The same framework will subsequently be used to evaluate progress on these plans and to capture the individual and organizational learning that took place.

Thus, the example encompasses both the purposeful (vision and mission) and emergent (self-organizing and learning) principles of the systems organizing framework. Participants were asked to brainstorm online in response to the following focus prompt:

> One thing that should be done to accelerate the adoption of cancer control research discoveries by health service delivery programs is…

Approximately 55 people contributed more than 200 statements that were subsequently synthesized by the steering committee into 98 unique ideas. The statements were sorted by 19 members of the planning committee. The data were aggregated and analyzed with a sequence of multivariate analyses that included multidimensional scaling and hierarchical cluster analysis. The resulting map grouped the 98 ideas into 12 conceptual categories. The participants also were asked to identify clusters of clusters that seemed to belong together and provide a label for each such region of the map. Participants identified four major regions: (1) policy, consisting of policy issues that would enable more integration of research and practice, as opposed to policy that results from such efforts; (2) research; (3) practice; and (4) partnerships and support.

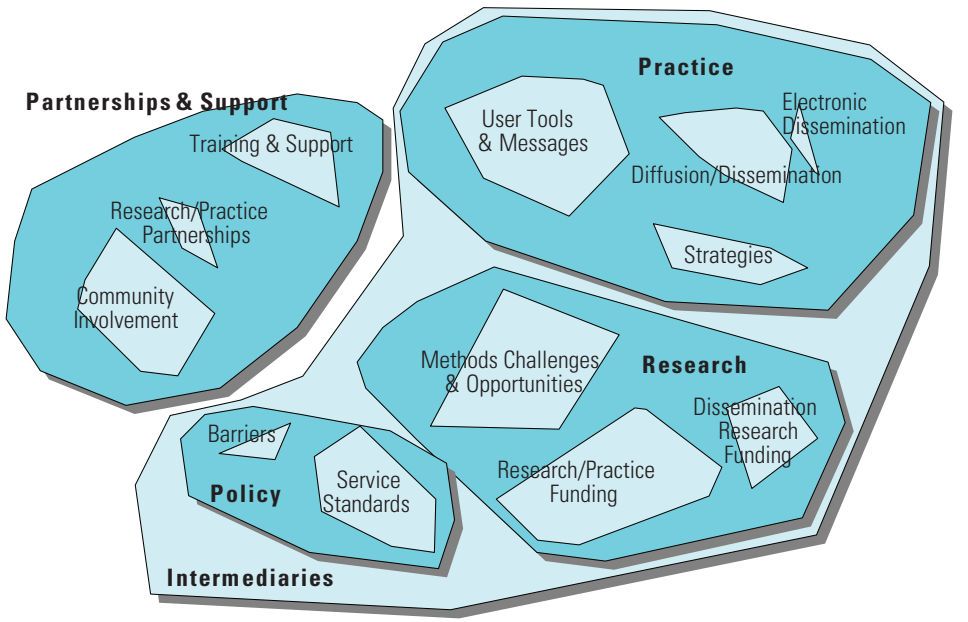
In addition, a broader region of intermediaries, both government and private, was defined by participants, encompassing the regions of policy, research, and practice. Figure 4.5 illustrates the final labeled concept map.

Figure 4.5 can be interpreted meaningfully beginning with the policy region. To enhance the integration of research and practice, begin with "policies" that promote such activities. Then move counterclockwise to "research," especially explicit funding for the integration of research and practice. Continue counterclockwise to "practice," where tools, messages, and dissemination mechanisms are critical. Intermediaries, both government and not-for-profit agencies, provide the "glue" for this process, advocating for policy change, supporting the research community, and helping to translate and disseminate research. This process relies throughout on partnerships and support that provide the network context needed and the input and feedback loop between researchers and practitioners, including the community of relevance.

Participants also were asked to rate each of the statements on importance and feasibility. Figure 4.6 shows the average importance ratings for all participants for each of the 12 clusters. More layers in a cluster signify higher average importance; fewer layers indicate lower importance. The figure shows several clusters with relatively high importance ratings: "diffusion/dissemination," "strategies," and "service standards." On the other hand, the "training and support" and "barriers" clusters were rated as having relatively low importance. Maps for rating clusters also were produced for different subgroups (e.g., practitioners and researchers) and for the feasibility ratings. Each of these cluster rating maps can be thought of as a "pattern" of the rating across the map.

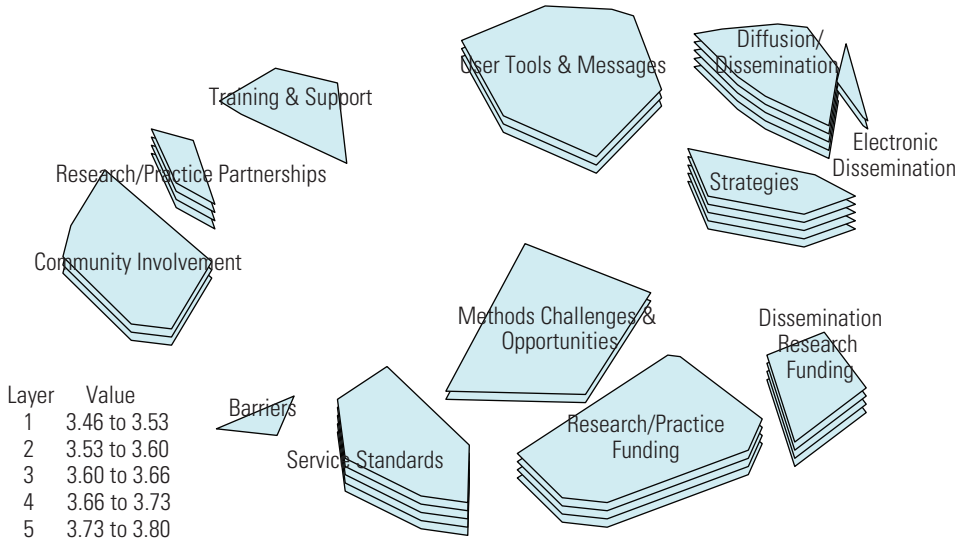
Figure 4.7 illustrates the pattern match comparing importance and feasibility ratings for these clusters. Importance is depicted on the vertical left axis, and feasibility is shown on the vertical right axis. Each horizontal line represents one of the cluster averages. The point at which the line hits the axis indicates a cluster's average value.

Figure 4.5 Final Interpreted Concept Map



Note. Map shows 12 clusters with labels provided by participants and 4 regions of clusters.

Figure 4.6 Cluster Rating Map



Notes. Map shows average rating for importance, by cluster, for all participants. Legend shows average ranges for clusters by numbers of layers in graph.

The correlation at the bottom of the pattern matching is a standard Pearson product-moment correlation, indicating the strength of the overall relationship. In a strong positive relationship, the lines would mostly be horizontal. In this case, there are a considerable number of crossover lines, suggesting that the relationship of importance and feasibility is relatively low. The lines that cross over most dramatically are the clusters most different in relative importance and feasibility. For example, "service standards" was considered to be one of the most important clusters and one of the least feasible. In contrast, "electronic dissemination" was judged to be most feasible but relatively low in importance.

The ratings of importance provided by practitioners and researchers are compared in figure 4.8. This match indicates considerable differences in what each group considers to be important. The correlation suggests virtually no relationship between the average importance ratings of these two groups. This result constitutes one of the most salient findings of this study, a finding with considerable implications for integration of practice and research in this context. It suggests that practitioners and researchers have markedly different priorities and indicates which areas are relatively more important for each group.

A major goal of this project was action planning to improve the integration of research and practice. Because pattern matching revealed fundamental differences in the perspectives of subgroups on the issues, the decision was made to address action planning separately for each major subgroup and to subsequently combine the separate subgroup plans into an integrated action plan. This is an excellent example of identifying individual and/or group needs to establish a mission for their daily action while also understanding the place of that mission among other missions and its linkage to the collective vision. To accomplish action planning, a "go-zone" bivariate plot is often used. Figure 4.9 shows the go-zone plot for the

Figure 4.7 Pattern Match for Relationship of Cluster Averages for Importance Versus Feasibility (correlation coefficient, *r*)

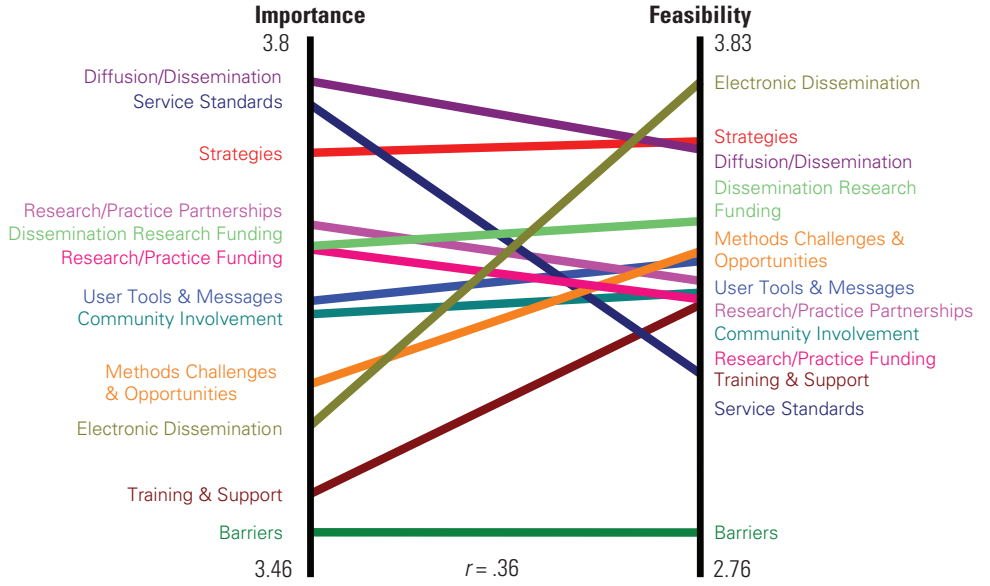
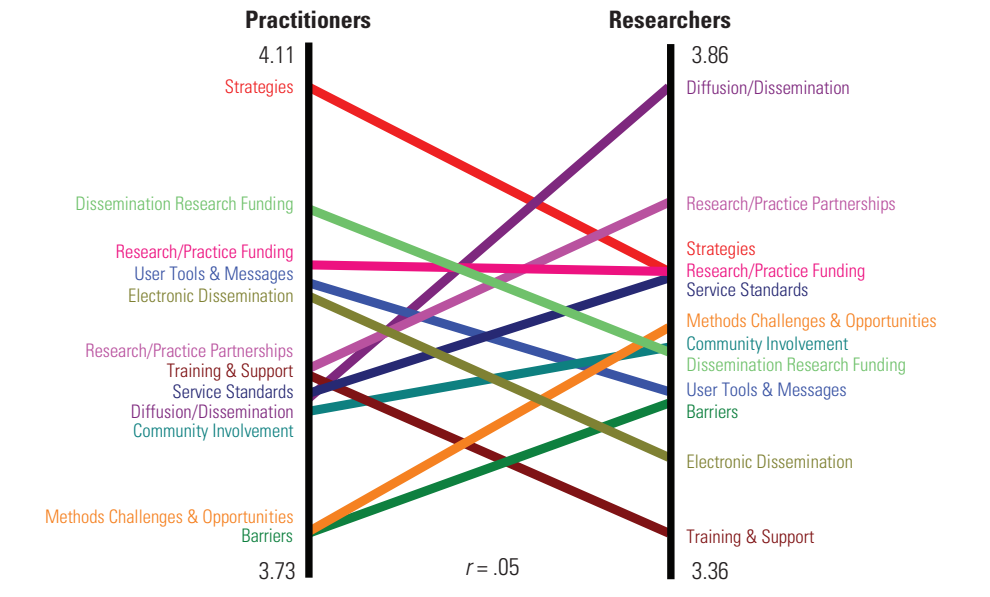


Figure 4.8 Pattern Match for Degree of Consensus between Practitioners and Researchers on Average Importance Ratings (correlation coefficient, *r*)

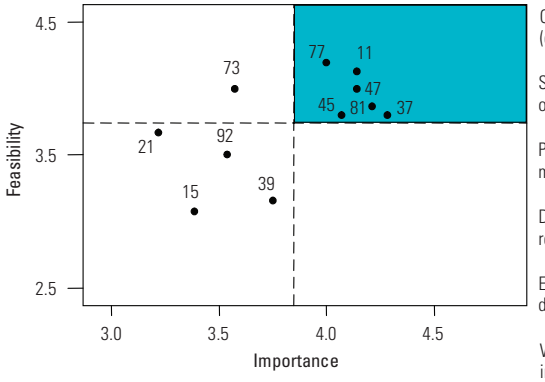


diffusion/dissemination cluster for the practitioner group. Ideas rated highly on both importance and feasibility are shown in the upper-right quadrant. The go-zone plot shows the data in finer detail, listing actual cluster statements as used in the analysis, and indicating which statements have high importance and feasibility at the statement level as opposed to the cluster level.

The go-zone plot helps point to potential action, but it does not prescribe it. One would not automatically proceed to implementing just the ideas that are in the upper right quadrant. Other factors may be critically important to decisions about action. For example, it is possible that an idea is high in feasibility and only moderately high in importance. Should it be implemented? The answer may very well depend on some other variable, such as cost. If the moderately important action costs almost nothing to implement (probably part of what contributed to its high feasibility rating), it might be implemented for that reason, even though there are statements that have higher importance ratings. Go-zones, like all of the products in concept mapping, are more useful for their suggestive power than as prescriptive mechanisms.

Across all analyses, results show that each group (researchers, practitioners, and intermediaries) holds different ideas about its own role and the roles of other groups in disseminating and implementing evidence-based interventions. Participants agreed that the responsibility for dissemination must be shared. The concept map acted as the foundation for development of action plans (missions) that would help the participants navigate more effectively toward a more integrated research and practice effort (vision). The ability of each individual or subgroup to establish this important link between mission and vision is critical, because this is the purposeful function of systems organizing. Meanwhile, because it is collaborative, bond forming, inclusive of

Figure 4.9 Bivariate Go-Zone Plot of Importance and Feasibility Ratings of Practitioners, for Diffusion/Dissemination Cluster



Create mechanisms to distribute practical information (e.g., procedural details) from research discoveries. (11)

Synthesize available research results to reduce the barrage of variable findings from each new "study of the week." (15)

Publish key findings in the form of inserts in targeted magazines. (21)

Develop inexpensive, nontraditional ways to disseminate research findings. (37)

Establish a central clearinghouse to evaluate new discoveries and place them in proper perspective. (39)

Work with the media to disseminate research results in a clear, nonconfusing manner. (45)

Annually publish NCI-funded interventions shown to be effective. (47)

Have NCI hire science writers who can translate research articles into practical advice for practitioners. (73)

Provide best practice examples of how programs adopt evidence-based interventions. (77)

Synthesize and communicate research results in ways that are understandable to practitioners. (81)

Encourage JNCI to publish dissemination studies in each issue. (92)

Note. JNCI = *Journal of the National Cancer Institute.*

diverse groups and individuals, and process oriented, the concept mapping activity reinforces many of the important qualities of self-organization. The very process is capacity forming.

Participants in the project agreed that ongoing interaction among researchers, practitioners, and intermediaries is essential to improving the effectiveness of activities for cancer control. Participants also noted that there are few incentives and opportunities to focus on these topics in the course of their daily work lives. Several groups suggested strategies to sustain the momentum begun at the meeting, and plans for follow-up were formulated. This result is fairly common in meetings of all kinds, but there often is not enough time to do all that is desired. Instead of developing initiatives, it might be more beneficial to search the system network to find local or small-scale examples of success. By adjusting the flow of resources or information to such initiatives, the systems organizer transfers leadership and planning functions, as well as the collective interests of the group (established in this process), temporarily to one part of the system.

Subsequent to the action-planning conference, a logic model[22] was developed to use the results of the concept-mapping project to integrate research and practice. The logic model is a key mechanism for assessment of both the implementation and outcomes of this effort to integrate practice with research. For each cluster, it is possible to develop one or more measures of performance that can be monitored over time. The map and corresponding logic model can be used to organize all these measures and as a graphic device to display evaluation results. This approach will help to determine whether certain clusters on the map are neglected in action planning or whether certain paths in the logic model are not achieved in practice.

Case Study 2: Empirical Conceptual Model of Strong, Cooperative Local and State Tobacco Control Programs

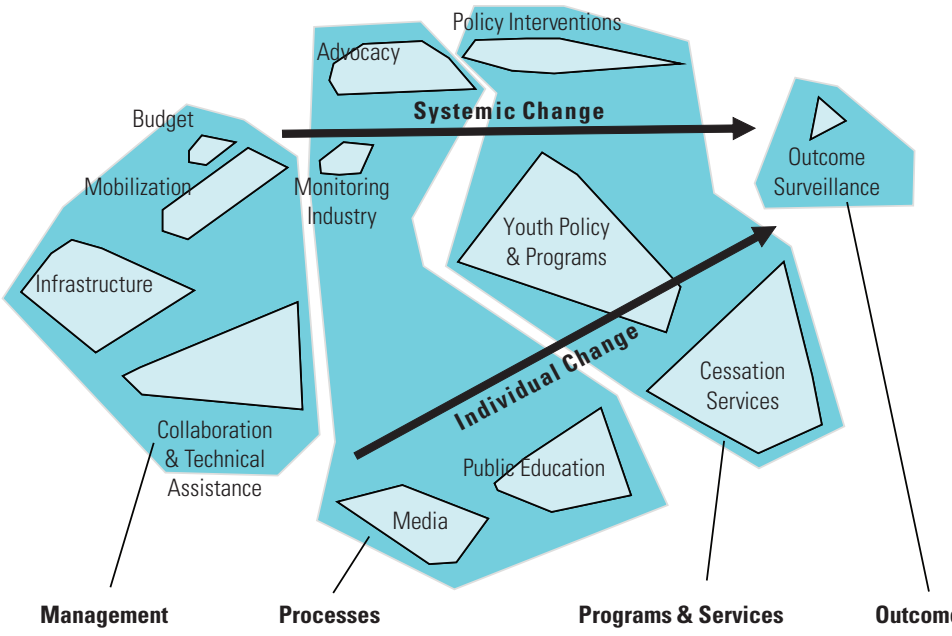
The objectives of this project were to describe the components of strong tobacco control programs and use the resulting framework to define optimal collaboration between state and local programs. Participants identified themselves as being associated with tobacco control at the state level, local level, or both levels. Participants were asked to respond to a focus prompt for brainstorming:

> One specific component of a strong tobacco control program is…

Two tobacco control experts from the Battelle Centers for Public Health Research and Evaluation and one expert from the Johns Hopkins Bloomberg School of Public Health synthesized the 145 statements into 73 unique ideas. Sorting input from participants was analyzed using concept-mapping analysis,[16] and the results arrayed the 73 statements into a 12-cluster solution. Figure 4.10 displays the final interpreted concept map. First, the map shows a distinct sequence from left to right. More immediate activities and processes are on the left, and longer term services and outcomes are toward the right. The map is divided into four regions (from more immediate to more long term): management, processes, programs and services, and outcomes. The map provides the framework for a process and outcome logic model of the components of process and outcome for strong tobacco control programs.

Second, there is a distinction between an upper and a lower track, from left to right (two arrows). The upper track encompasses more systemic (environmental) change processes, such as policy advocacy and industry monitoring. The lower track

Figure 4.10 Concept Map Showing Clusters, Cluster Labels, and Interpretations of Dimensions and Regions

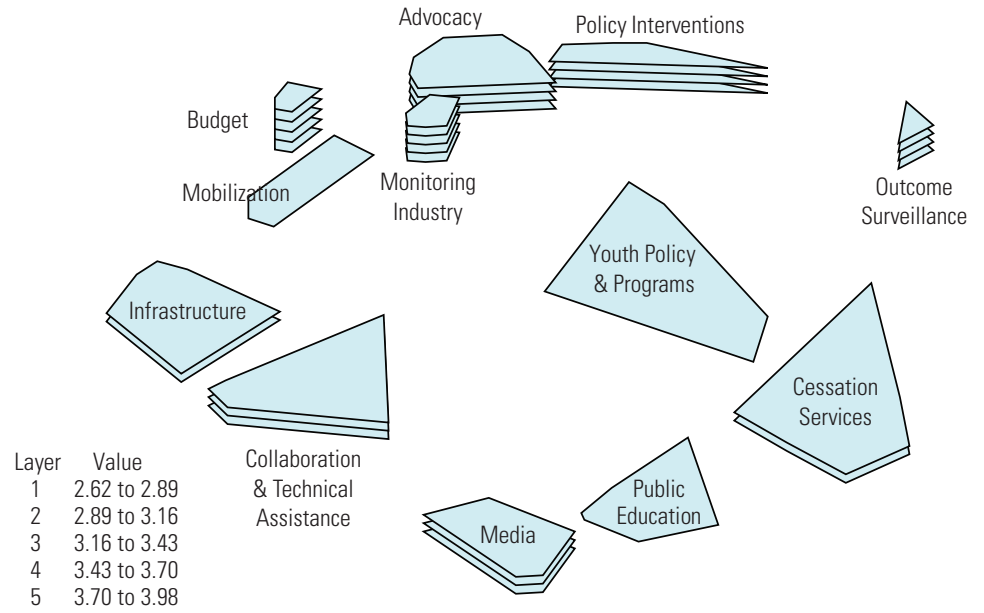


tends to focus more on efforts to change individual behavior, such as through media and education campaigns and services for smoking cessation. Finally, the cluster for youth policy and programs is in a central position. This position suggests that youth issues were felt to play a central role in tobacco control and that they span the full range of efforts from systemic to individual change.

Describing the components of strong tobacco control programs is a critical first step. However, it is important that the many organizations operating at different levels of the tobacco control system understand their roles and responsibilities relative to each other and to the collective vision. Participants also were asked to rate each of the program components for the degree to which it was a local or state responsibility. Figure 4.11 shows the average responsibility rating for each cluster of components of tobacco control. More layers signify greater state responsibility, and fewer layers signify more local responsibility. The areas most clearly considered to be the responsibility of the state are budgeting and monitoring industry, followed closely by advocacy, policy interventions, and outcome surveillance. The areas identified most often as local are mobilization, youth policy and programs, and public education. State responsibilities tend to be at the highest levels, with systemic change, and local responsibilities tend to predominate at the lowest levels, with individual change.

A critical question is whether subgroups of raters perceive local and state responsibilities differently. The results of the ratings suggest that there is a high degree of agreement between local and state participants about the relative responsibilities for various program components. A similar consensus is evident

Figure 4.11 Cluster Average Ratings of Responsibility



Note. Fewer layers indicate more local responsibility. More layers indicate greater state responsibility.

regarding ratings from participants who have less experience in tobacco control (≤5 years) and ratings from those who have more experience (>5 years). The results indicate a strong consensus across all subgroups about which components are state responsibilities and which are local responsibilities.

This project summarizes the components of a strong tobacco control program, as identified by the participating state and local stakeholders in the field of tobacco control. The basic map constitutes a conceptual framework categorizing 73 components into 12 categories that, in turn, are grouped into 4 major areas that suggest a natural progression from management and infrastructure, through processes and programs, to outcomes. The framework also identifies how strong tobacco control efforts address both systemic and individual change and that the tendencies are to address systemic change at the state level and individual change at the local level. Finally, the results show that across all the major identified subgroups (e.g., state and local, front line and research, and experienced and inexperienced), there is consensus about which components are local responsibilities and which are state responsibilities.

These results can be used in several ways. Tobacco control systems can benefit by examination of efforts at the state and local levels to determine whether each sector is addressing components in its respective realm of responsibility. To make such an assessment more feasible, it is essential to develop one or more instruments that can be used at the state and local levels to measure the success of tobacco control programs. Such instruments could build on the strength of tobacco control (SoTC) measure developed as part of the evaluation of the American Stop Smoking Intervention Study.[111,112] The results of the study presented here can inform the local adaptation of this instrument, originally designed to reflect state programs as part of

a national study. Furthermore, these results can be used to develop an appropriate short-form assessment instrument for rapid application at the local level that would yield results that can be linked to those of a more comprehensive assessment tool. For example, the map suggests that a simple 12-category assessment instrument may be feasible, highlighting which specific components of the larger domain need to be emphasized in a local SoTC measure.

Summary

This chapter describes a systems organizing approach to systems thinking, an alternative formulation of the traditional management model that, while encompassing it, goes significantly further. In place of the traditional linear progression of processes (planning, organizing, leading, and controlling), the systems organizing model is centered on four principles—vision, structure, action, and learning. These principles are enacted simultaneously and continuously in well-functioning systems. Tobacco control systems can benefit from incorporating these principles and using the many systems organizing methods that embody them.

Two case studies of tobacco control used structured concept mapping[16] to illustrate one of many methods that could be used in a systems organizing approach. The first case study focused on integration of research and practice in a project that was conducted primarily to create a logic model for actions to improve the dissemination of cancer research. The map constitutes a vision for members of the participant group, a model of their collective vision of the overall conceptual terrain for dissemination and integration of research and practice. The details on the map provide the basis for action and help the various participants construe the relationship of their roles to the broader vision. This example shows the sharp role differentiation between researchers and practitioners, revealing the implicit structure with respect to research dissemination. The map itself provided feedback to the participants, coupled with subsequent action through the logic model, suggesting a step in the evolutionary learning cycle.

The second case study focused on the components of strong tobacco control programs at state and local levels. As in the first project, the map constitutes a conceptual model, a vision of the participants' perceptions. The details of the map differentiate between participant groups, in this case, between state and local roles in the system. In addition, the map links these roles with different change processes, with states primarily responsible for systemic change and local efforts more directly responsible for change at the individual level. The map structure also suggests constructs for evaluation and how they might be organized into measures and collections of measures that can enhance system feedback and learning.

Together, both projects illustrate the integrated quality of the VSAL model. In both, participants left with a better understanding of local, microscale *action* and how it fits into the broader macroscale collective *vision.* Linking the multiple lines of the local participatory action of agents (missions) to the collective and emergent action of the system (vision) is critical in resolving the inherent tension between the purposeful nature and the adaptive nature of such systems. In both projects, the *structure* of the maps emerged from a simple rule-based process (brainstorm, sort, and rate) that was self-organizing. In both, there were clear implications for measurement and evaluation for the next round in an evolutionary cycle of feedback and *learning.* The examples provide working VSAL models that help to balance the tension between purpose and adaptation and

between organization and self-organization and to illustrate the link between the model components (vision, structure, action, and learning) and various methods that relate to these components (table 4.2).

Conclusions

1. Systems organizing implies a move away from the classical linear management processes of planning, organizing, leading, and controlling toward a more adaptive, participatory environment expressed here around the concepts of vision, structure, action, and learning:
   - Vision encompasses a move from an environment of leading and managing to one of facilitating and empowering.
   - Structure encompasses a move from organizing to self-organizing.
   - Action encompasses a move from delegation to participation.
   - Learning encompasses a move from discrete evaluation to continuous evaluation.
2. Two concept-mapping projects explored key areas of organizing as a system. One project, examining issues in accelerating the adoption of cancer control research into practice, yielded clusters of action items in areas of research, practice, policy, and partnerships. The other project examined components of strong local and state tobacco control programs and provided the framework for a logic model of process and outcome ranging from near-term to long-term objectives.

Appendix 4A. Description of Concept-Mapping Methodology

Concept mapping can help describe ideas[16] and represent them visually in the form of a map. The process typically requires participants to brainstorm a large set of relevant statements, sort them into groups of similar statements, rate each statement on one or more scales, and interpret the maps resulting from data analyses. Analyses typically include two-dimensional multidimensional scaling (MDS) of the unstructured sort data, hierarchical cluster analysis of MDS coordinates, and computation of average ratings for each statement and cluster of statements. The maps that result show the individual statements in two-dimensional (x,y) space. More similar statements are located nearer to each other. Statements are grouped into clusters that partition the space on the map. Participants are led through a structured interpretation session designed to help them understand the maps and to label them in a substantively meaningful way.

Procedure

Trochim,[16] who also gives examples of results of several concept-mapping projects,[109] describes the general procedure for concept mapping in detail. The process can be implemented in a variety of ways, taking place in a continuous period as short as a two-day meeting or divided in phases that occur over weeks or months. It can involve as few as 10–15 participants or incorporate input from hundreds or thousands of stakeholders. The procedure described here is for a typical Web-based implementation over several months. All analyses are conducted and maps are produced by using Concept System computer software* designed for this process.

Generation and Structuring of Conceptual Domain

Data are collected over the World Wide Web by using software designed for the purpose. Participants need only a standard Web connection and any standard Web browser. For those who may not have Web access, alternative mechanisms (e.g., manual mail in or faxback) also are made available as appropriate.

During the generation step, participants create statements by using a Web-based, structured brainstorming process[10] guided by a specific focus prompt limiting the types of statements that are acceptable. The focus statement or criterion for generating statements is operationalized as a focus prompt that guides the participants in brainstorming. A typical focus prompt might read:

> One specific issue that needs to be addressed in (insert topic) is…

*The Concept System computer software is used to consolidate and edit brainstormed statements, export and print these for sorting and rating, import and enter sorting and rating data, conduct the statistical analysis, including multidimensional scaling and hierarchical cluster analysis, and display a wide variety of map results.[113]

The general rules of brainstorming apply. Participants are encouraged to generate as many statements as possible (upper limit, 200). Because this is a Web-based process, participation is anonymous. Participants cannot challenge or question the statements of others. However, in subsequent steps, they are able to discuss the statements. The process takes approximately 10–15 minutes for each participant. Participants can return to the Web site repeatedly during the brainstorming period. Because participants work on the Web, they type statements directly on the computer and can immediately see their ideas along with everyone else's.

After the brainstorming session, the steering committee reviews the statements, editing them for clarity and grammar but *not* for content and ensuring that the statements are all syntactically "of a kind." In some cases, participants or a designated subgroup are asked via Web/e-mail to review the edited statements and make final revisions.

The structuring step involves three distinct tasks: providing demographic information and sorting and rating the brainstormed statements. As with brainstorming, this information is collected over the Web or through alternative mechanisms for people with no access to the Web. Participants are asked to provide demographic information about themselves or the organizations they represent. These data are used to identify participants for subgroup analysis. For the sorting,[114,115] each participant groups the statements "in a way that makes sense to you." The only restrictions in this sorting task are that there cannot be (1) *N* groups, with each group having one item; (2) one group consisting of all items; or (3) a miscellaneous group—any unique item is to be put in a separate pile. The Web software enables the participant to create, delete, and name new groups and to move statements from one group to another. Weller and Romney[115] explain why unstructured sorting ("the pile sort" method) is appropriate in this context:

> The outstanding strength of the pile sort task is the fact that it can accommodate a large number of items. We know of no other data collection method that will allow the collection of judged similarity data among over 100 items. This makes it the method of choice when large numbers are necessary. Other methods that might be used to collect similarity data, such as triads and paired comparison ratings, become impractical with a large number of items.[115(p25)]

For the rating task, each participant rates each statement on a five-point, Likert-type response scale. The specific rating variables are determined with the steering committee before the concept-mapping project is started. Typically, participants rate the statements for relative importance, where

1 = relatively unimportant (compared with the rest of the statements);
2 = somewhat important;
3 = moderately important;
4 = very important; and
5 = extremely important (compared with the rest of the statements).

Participants are unlikely to brainstorm statements that are totally unrelated to the focus. Therefore, rating should be considered a relative judgment of the importance of each item

in relation to all other items brainstormed. In addition, participants typically also rate the relative feasibility of addressing each issue, where

1 = not at all feasible;
2 = not very feasible;
3 = somewhat feasible;
4 = moderately feasible; and
5 = very feasible.

Other ratings of the statements may be developed and accomplished as the overall project unfolds.

Data Analysis

The concept-mapping analysis is handled automatically by the Concept System program, beginning with construction from the sort information of an $N \times N$ binary, symmetric matrix of similarities, X_{ij}. For any two items, i and j, a 1 is placed in X_{ij} if the two items were placed in the same pile by the participant; otherwise a 0 is entered.[115] The total $N \times N$ similarity matrix, T_{ij}, is obtained by summing across the individual X_{ij} matrices. Thus, any cell in this matrix could take integer values between 0 and the number of people who sorted the statements. The value indicates the number of people who placed the i,j pair in the same pile. The total similarity matrix T_{ij} is analyzed by using nonmetric MDS analysis with a two-dimensional solution. The solution is limited to two dimensions because, as Kruskal and Wish[116] point out:

> Since it is generally easier to work with two-dimensional configurations than with those involving more dimensions, ease of use considerations are also important for decisions about dimensionality. For example, when an MDS configuration is desired primarily as the foundation on which to display clustering results, then a two-dimensional configuration is far more useful than one involving three or more dimensions.[116(p58)]

The analysis yields a two-dimensional (x,y) configuration of the set of statements based on the criterion that statements piled together most often are located more proximately in two-dimensional space and those piled together less frequently are farther apart.

The x,y configuration is the input for the hierarchical cluster analysis using Ward's algorithm[117] as the basis for defining a cluster. Use of the MDS configuration as input to the cluster analysis in effect forces the cluster analysis to partition the MDS configuration into nonoverlapping clusters in two-dimensional space. There is no simple mathematical criterion by which a final number of clusters can be selected. The typical procedure is to examine an initial cluster solution that was the maximum desirable for interpretation in this context. Then successively lower cluster solutions are examined. A judgment is made at each level about whether the merger seems substantively reasonable. The pattern of judgments of the suitability of different cluster solutions is examined. The final number of clusters is selected to preserve the most detail and still yield substantively interpretable clusters of statements.

The Concept System program automatically graphs the MDS configuration of the statement points in two dimensions. This "point map" displays the location of all the brainstormed statements. Statements closer to each other generally are expected to be more similar in meaning. A "cluster map" also is generated that displays the original statement points enclosed by polygon-shaped boundaries for the clusters.

The one-to-five importance and feasibility rating data are averaged across people for each item and each cluster. This rating information is depicted graphically (1) in a "point rating map" showing the original point map with the average rating per item displayed as vertical columns in the third dimension and (2) in a "cluster rating map" that shows the cluster average rating by using the third dimension. The following materials should be available for use in the session on map interpretation:

1. List of brainstormed statements grouped by cluster
2. Point map showing MDS placement of brainstormed statements and identifying numbers
3. Cluster map showing cluster solution
4. Point rating maps showing MDS placement of brainstormed statements and identifying numbers, with average statement ratings overlaid
5. Cluster rating maps showing final cluster solution, with average cluster ratings overlaid

All the graphics are created interactively by the Concept System and projected onto a screen for participants to see.

Interpretation of Concept Maps

A preliminary interpretation of results is conducted by the project facilitation team and used as the foundation for subsequent use. At the meeting itself, the core group participants convene to review and interpret the results directly. This interpretation session follows a structured process described in detail by Trochim.[16] The facilitator begins the session by giving participants the list of clustered statements and reminding them of the brainstorming, sorting, and rating tasks performed earlier. Each participant is asked to read silently through the set of statements in each cluster and generate a short phrase or word to describe or label the set of statements as a cluster. The facilitator leads the group in a discussion, working cluster by cluster to achieve group consensus on an acceptable label for each cluster. In most cases, when people suggest labels for a specific cluster, the group readily comes to consensus. If the group has difficulty achieving consensus, the facilitator suggests hybrid names that combine key terms or phrases from several individuals' labels.

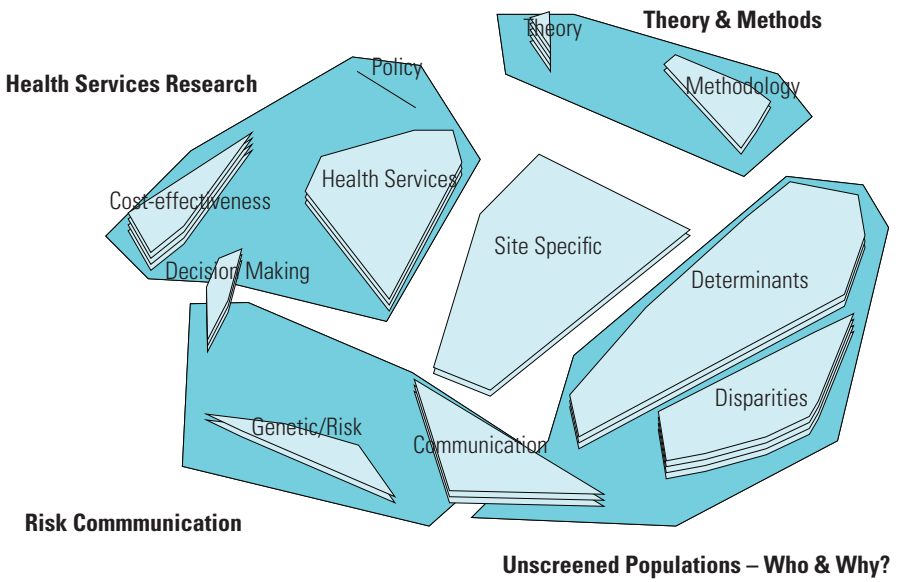
Once the clusters are labeled, the group is shown the point map and told that statements frequently sorted together generally are closer to each other on the map than are statements

infrequently sorted together. To reinforce the notion that the analysis placed the statements sensibly, participants are taken on a "tour" of the map by the facilitator, who identifies statements in various places on the map and examines their contents. After becoming familiar with the numbered point map, the participants are told that the analysis also organized the points (i.e., statements) into groups as shown on the list of clustered statements they already have labeled. The cluster map is projected, and participants are told that it is a visual portrayal of the cluster list. The agreed-upon cluster labels are shown on the final projected map.

Participants examine this labeled cluster map to determine whether it makes sense to them. The facilitator reminds them that, in general, clusters closer together on the map should be conceptually more similar than clusters farther apart and asks them to assess whether this seems to be true. Participants are asked to think of a geographic map and "take a trip" across the map, reading each cluster to assess whether the visual structure seems sensible. They are asked to identify interpretable groups of clusters or "regions." These are discussed and labeled on the map. Just as in labeling the clusters, the group arrives at a consensus label for each identified region.

The facilitator notes that all the material presented uses only the sorting data. The results of the rating task are then presented through the maps for point rating and cluster rating. It is explained that the height of a point or cluster represents the average rating for that statement or cluster of statements. Again, participants are encouraged to examine these maps to determine whether they make intuitive sense and to discuss possible implications of information on the maps in relation to the focus issue. Figure 4A.1 shows a concept map from a previous project.

Figure 4A.1 Final Cluster-Rating Concept Map for Strategic Planning



Note. Final cluster-rating concept map for strategic planning process shows clusters of statements and average importance ratings (as layers) for all participants.

Consensus Analysis

Pattern matching[105,106] is used for a number of purposes in this process. The most immediate use is exploration of consensus across different stakeholders or stakeholder groups. Pattern matching is both a statistical analysis and a graphic analysis. Graphically, a pattern match is portrayed by using a "ladder" graph consisting of two vertical axes (one for each "pattern"). The vertical axes are joined by lines indicating average values for each cluster on the concept map for any variable specified. Statistically, the two patterns are compared with a Pearson product-moment correlation displayed at the bottom of the ladder graph. Figure 4A.2 illustrates a pattern match describing the degree of consensus between two stakeholder groups.

In a "ladder" graph, strong agreement between patterns results in a set of near-horizontal lines that look like a ladder. The match in figure 4A.2 highlights discrepancies in cluster importance ratings between these groups. In addition, the pattern match enables immediate identification of cluster areas showing the greatest consensus or lack of agreement. Participants explore a number of such matches to ascertain the degree of consensus among stakeholders.

Action Planning

For detailed action planning, it is useful to partition the results graphically by cluster. Typically, go-zone plots of the type shown in figure 4A.3 are used. The bivariate plot displays the relative importance and feasibility of each statement in the cluster.

Figure 4A.2 Pattern Matching Ladder Graph of Degree of Consensus between Importance Ratings for Groups A and B for Concept Map in Figure 4A.1

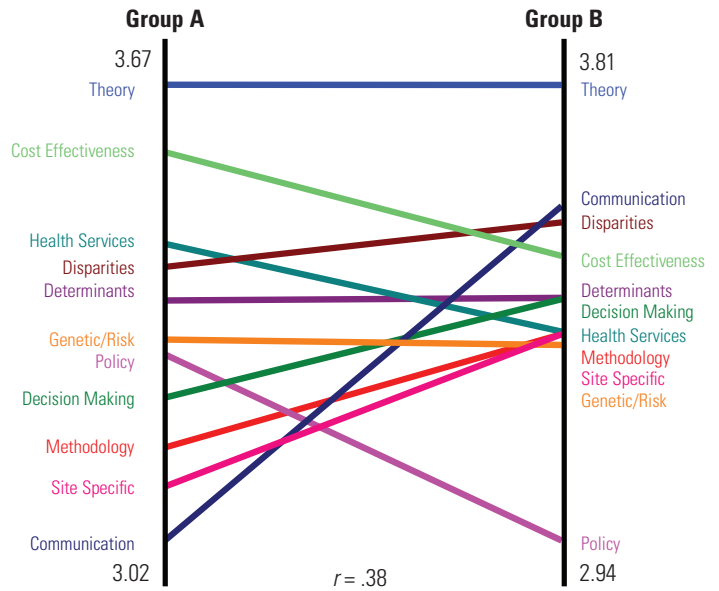
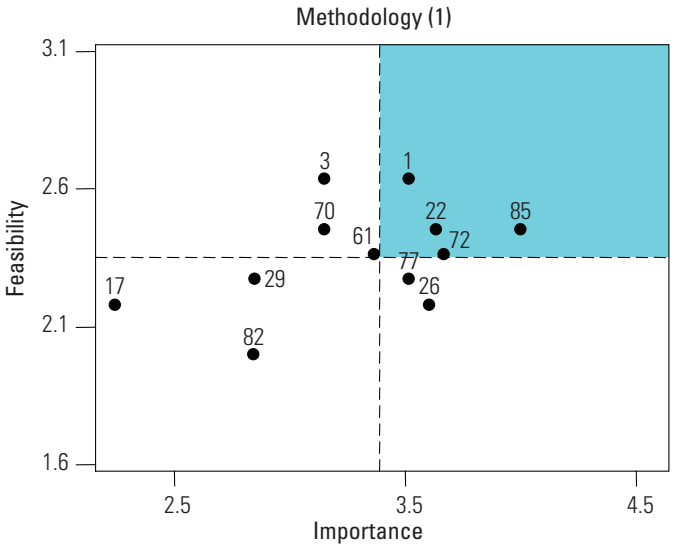


Figure 4A.3 Go-Zone Plot of Feasibility Versus Importance for Methodology Cluster in Concept Map (Figure 4A.1)



Each point represents a brainstormed issue. Each statement is shown with its identifying number. The upper-right quadrant indicates statements that have relatively high importance and feasibility. The plot takes its name from this quadrant, which is sometimes called the go-zone to indicate that these are the first issues one should "go" to when thinking about action planning. The participants review these plots and use them as the basis for an initial discussion about action planning.

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