Chapter 2
Mental Modeling Research Technical Approach

Sarah Thorne, Gordon Butte, Daniel Kovacs, and Matthew D. Wood

Introduction

The Mental Modeling research approach discussed in the following chapters is built on the foundational work in risk perception and risk communications at Carnegie Mellon University led by Dr. Baruch Fischhoff[1] and is well established in the fields of risk analysis and decision sciences (Atman et al. 1994; Bostrom et al. 1992; Fischhoff et al. 2011; Morgan et al. 2002). Mental Modeling is particularly well

This Guideline (subsequently revised in 2009 as Q850-87 (R2009) Risk Management: Guideline for Decision Makers) is also aligned with the US Presidential/Congressional Commission on Risk Assessment and Risk Management Process and the Australian/New Zealand Risk Management Standard. In addition, our work in strategic risk communications is aligned with the International Organization for Standardization's (ISO) 31000 Guidelines on Risk Management (2009), to which we provided input.

[1] Dr. Fischhoff is Decision Partners' Chief Scientist responsible for strategic research design, implementation, and analysis. He is also the Howard Heinz University Professor of the Departments of Social and Decision Science, and Engineering and Public Policy at Carnegie Mellon University.

S. Thorne, M.A.
Decision Partners, 1084 Queen Street West, #32B, Mississauga, ON, Canada L5H 4K4
e-mail: sthorne@decisionpartners.com

G. Butte (✉)
Decision Partners LLC, Suite 200, 313 East Carson Street, Pittsburgh, PA 15217, USA
e-mail: gbutte@decisionpartners.com

D. Kovacs, Ph.D.
Decision Partners, 1458 Jersey Street, Lake Milton, OH 44429, USA
e-mail: dkovacs@decisionpartners.com

M.D. Wood, Ph.D.
U.S. Army Corps of Engineers, Engineer Research and Development Center (ERDC) and Carnegie Mellon University, 696 Virginia Road, Concord, MA 01742, USA
e-mail: Matthew.d.wood@usace.army.mil

suited for generating the in-depth, evidence-based understanding of factors influencing decision making and behavior required to develop strategies, plans, and communications to effectively address people's thinking on complex issues. The process is *science-informed*, based on social science methodology, and *evidence-based* in that it facilitates the use of information systematically gathered from stakeholders themselves. Its purpose is to help decision-makers and communicators make informed decisions about how best to communicate risks, design policy, or develop behavioral interventions with the needs, priorities, and interests of the focal stakeholders in mind.

The central idea behind Mental Modeling is that people's judgments, decision making, and behavior about whether and how to adopt a new innovation, accept a medical procedure, or support a power plant or natural gas transmission line, are influenced by their mental models (Morgan et al. 2002).

Mental models are the tacit webs of beliefs that individuals draw upon to interpret and make inferences about issues that come to their attention. They develop over time based on a person's values, priorities, experiences and observations, formal education, and communications of all kinds. Where persons have no experience upon which to draw, they will draw inferences from existing mental models that seem relevant to them (Fischhoff et al. 2002). Information perceived as consistent with existing beliefs is readily incorporated into a person's mental model; information at odds with existing beliefs is not, and may even be rejected.

Overview of Mental Modeling Research Methodology

The concept of mental models has been the focus of extensive research in the field of psychology dating back to the 1930s. A person's mental model can be thought of as a complex web of deeply held beliefs below the surface of conscious thinking that affect how an individual defines a problem, reacts to information, forms judgments, and makes decisions. One's beliefs about a topic may be complete and correct, or they may have consequential gaps and misperceptions that negatively influence decision making and action—behavior. Mental models are not observable; they can only be determined with empirical research. They are typically represented using influence diagrams which depict the factors a person perceives as relevant to the issue at hand, with directional arrows showing how the value (or level) of one factor influences the value of another (Johnson-Laird 1983).

Decades of research and experience have shown that to effectively engage people through communications and enable changes in their beliefs and behaviors, one must first understand their mental models. Once these models are understood, one can then design strategies and communications that: reinforce what they know that is correct, address key knowledge gaps and misperceptions that are consequential, and use communications sources and methods that are credible and relevant to the focal stakeholders. Research into individuals' mental models reveals critical issues

and identifies gaps and alignments among the values, perceptions, decisions, and information needs of the various stakeholder groups.

An *expert model* is an important element in Mental Modeling. It is a formal, comprehensive graphic representation that summarizes and integrates the current knowledge and understanding of experts about the key factors of the topic being studied. It can be thought of as an "expert's mental model," as it typically comprises a composite of the knowledge and beliefs—mental models—of several experts. Expertise is often distributed throughout the stakeholder community and may be formal or informal. For complex situations or problems, an expert model captures the breadth of expertise that is often distributed across a number of *experts*, each with specific areas of expertise. As a depiction of experts' understanding of a topic, or their contribution to the topic, an expert model is expected to be relatively accurate and objective if the experts participating in the model development have the requisite expertise to address the major factors in the model being depicted. That said, as described in more detail later, the Mental Modeling approach is specifically designed to reveal the factors that stakeholders believe to be relevant even if those factors have not been anticipated by the research designers or participating experts. Often stakeholder interviews reveal factors that the experts have not considered. Such discovery is a benefit of the Mental Modeling approach that cannot be replicated with opinion surveys or other tools designed to assess how many people think the same thing about a set of prescribed factors.

Expert models are essential management tools used to ensure that a project team and key stakeholders are aligned on the understanding of the topic at hand and the project scope. They also serve as the analytical framework for the design, implementation, and structured analyses of mental models research. The focus of such research is to provide deep insight into nonexpert stakeholders' (laypeople's) mental models of the topic at hand.

Key Benefits of Mental Modeling

Mental Modeling is among the most robust of qualitative research methods. It yields rich, high-quality data on individuals thinking on complex topics, by intensive study of relatively small samples of strategically selected individuals (Morgan et al. 2002). Mental Modeling has been recognized within the U.S. Army Corps of Engineers (USACE), U.S. Department of Health and Human Services (HHS), the U.S. Food and Drug Administration (FDA; Fischhoff et al. 2011), along with many other federal agencies and other organizations, as providing a solid foundation for science-informed, evidence-based strategies and communications, as well as being a key part of an integrated risk management/risk communications approach (Standards Council of Canada 1997; ISO 2009).

Using an expert model as the analytical framework enables integration of data generated through other types of qualitative and quantitative research methods, such as focus groups, and surveys. The results of mental models research can be used in

risk assessment and risk evaluation methods such as multicriteria decision analysis and risk ranking.

The process of conducting mental models research treats stakeholder interests and priorities with respect and is well suited to engaging stakeholders on sensitive topics. In addition, the act of conducting the research often enhances the perceived trustworthiness and competence of the sponsoring organization.

Over the past 30 years mental models research has been applied to guide risk management and risk communications strategies and messages related to a diverse set of challenges. These include: sensitive public health and safety issues such as drug safety and drug efficacy, food safety, plastic surgery, obesity, health impacts of extreme heat events resulting from climate change, and childhood vaccinations; science and technology issues such as impacts of coal and nuclear power generation technologies; and environmental issues such as flood risk management, climate change, and environmental remediation.

The varied and complex needs of Decision Partners clientele has led to advances on the approach described in Morgan et al. (2002) through wide adaptation and customization. This can be observed through the Strategic Risk Communications Process™, which aligns with the Canadian Standards Q850-97 Risk Management: Guideline for Decision-Makers, and was adapted for Health Canada and the Public Health Agency of Canada in 2006 as the base of their Strategic Risk Communications Framework and Handbook (Health Canada 2006). It was further customized and tested as part of a 2008–2011 research challenge supported by the U.S. Water Environment Research Foundation (WERF) and adapted for use by WERF and its members (Chap. 10; Eggers et al. 2011; Beddow 2011). Decision Partners has also developed software support tools for Mental Modeling (Cognitive Science Systems 2012) that can be customized to enable more effective and efficient knowledge integration, management, and communication. Mental Modeling Technology™ is a unique, evidence-based, science-informed management process for developing programs, i.e., policies, strategies, and communications, for belief and behavior change. The technology comprises integrated methods and tools on a software platform. The applied cognitive behavioral approach enables systematic formulation of strategies and communications for shaping judgment, decision making, and behavior.[2]

Mental Modeling Core Technique

Mental Modeling Core Technique provides a basic illustration of the essential Mental Modeling approach, summarized in three phases (Fig. 2.1). The detailed 6-step process is described using a case study, beginning on the next page.

The Mental Modeling approach starts with developing a picture of the basic system related to the topic being studied. This model, called the Base Expert Model

---

[2] In February 2016, Decision Partners received a patent for its Mental Modeling Method. This patent reflects the essential intellectual property and software tools that comprise Mental Modeling Technology™.
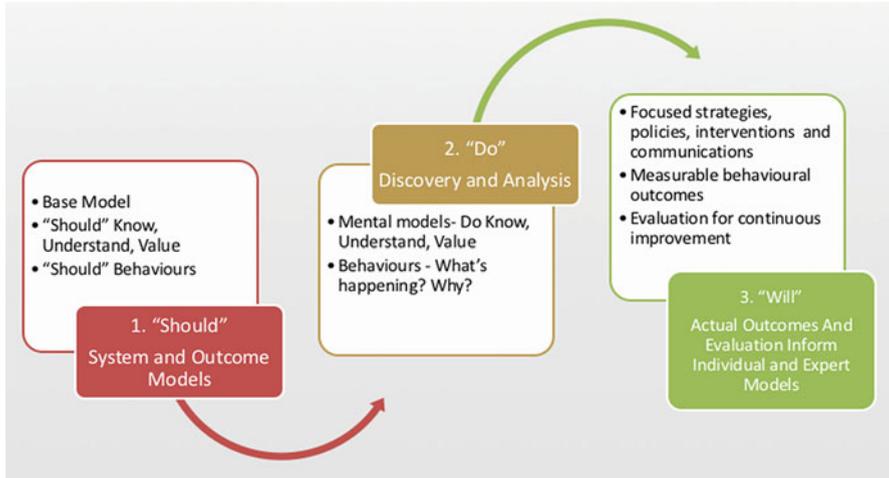
Fig. 2.1 Mental modeling core technique

and described in detail in the case study that follows, is developed based on the subject matter knowledge and experience of the experts who are often members of the client project team, along with other key internal and external experts. The resulting expert model provides a system picture of what the experts believe the stakeholders *should* know about the topic and what behaviors they *should* take as a result.

In the next phase, mental models research is conducted with the key stakeholders to discover what they *will do* based on their mental models of the topic, which can be characterized as what they know that is correct, what they misunderstand, what they want to know, and who they trust and what communications processes they trust. This information, collected through one-on-one interviews, is coded and analyzed against the expert model, revealing alignments and gaps between the experts' and stakeholders' mental models.

In the final phase, the insight from the mental models research is used to develop focused strategies, policies, interventions, and communications to enable stakeholders to make well-informed decisions and take appropriate actions on the topic at hand, in short, to guide what they *will* do. It also involves measurement and evaluation of the strategies, policies, interventions, and/or communications to ensure that they are producing the desired behavioral outcomes.

Key Steps in the Mental Modeling Process

The following are the key steps in the Mental Modeling process (Fig. 2.2). Each project is unique and not all steps are performed for every project. For example, for some policy or strategy challenges, an expert model is developed as the foundation. Sometimes Step 4 is conducted after Step 5. Some projects may follow an iterative,

Step 1: Define the Opportunity

Step 2: Develop the Expert Model

Step 3: Design, Conduct and Analyze Mental Models Interviews

Step 4: (Optional) Design, Conduct, and Analyze Qualitative and/or Quantitative Research, Building on Foundational Mental Models Research

Step 5: Use Research Results to Design and Pre-Test Strategies, Policies, Interventions and Communications

Step 6: Implement and Evaluate Strategies

Fig. 2.2 Key steps in the mental modeling process

multistage design, for example, where many rounds of stakeholder research are conducted. In some of the case studies that follow, the steps have been refined to reflect the focus of the project.

These steps are described later and are illustrated using content from a project conducted for the American Society of Plastic Surgeons (ASPS) to design a comprehensive communications strategy based on deep insight into potential patients' and consumers' mental models of plastic surgery and plastic surgeons. The mental models research phase was conducted in 2004 to define the strategy and content of the subsequent marketing campaign. The research was completed in 2005.

Step 1: Define the Opportunity

Mental Modeling begins by preparing an Opportunity Statement, which clearly defines the goals and desired outcomes of the project, including the desired behavioral outcomes resulting from the application of the research. This statement frames and focuses the mental models research and its end results and ensures the project team is aligned in its understanding of the project's scope and focus, and that team members understand their respective roles.

ASPS Opportunity Statement Example

The opportunity is to support the design and execution of a strategic, science-based campaign to encourage people considering plastic surgery to choose a Board Certified Plastic Surgeon. (Note: this project was conducted by Reingold,[3] Decision Partners and Penn Schoen Berland (PSB).[4] Here we focus primarily on the role of the mental models research in shaping the design of the campaign developed by Reingold and evaluated by PSB.) This will be achieved by:

- Characterizing expert knowledge of influences on decision making of prospective patients/customers, including perceived risks and benefits.
- Gaining in-depth insight into factors influencing prospective patient/customer decision making concerning having plastic surgery, including their perceptions and weighing of benefits and risks, their selection of a plastic surgeon and their judgment of the outcomes, along with understanding what information sources and communication methods are used and valued by potential patients/customers.
- Creating campaign strategies and messages addressing critical decisions prospective patients/customers face.
- Evaluating strategies and messages through empirical testing before deployment.
- Evaluating results, including communication design, messages, and channels, along with outcomes of strategies.
- Continuously improving by identifying and implementing improvements in communication processes based on evaluations.

Step 2: Develop the Expert Model

As described earlier, an expert model summarizes and integrates expert knowledge on the topic of interest, typically using graphic decision-modeling representations, which provides an analytical framework for the design and analysis of later in-depth mental models research with key stakeholders. This framework facilitates later direct comparison between experts' and stakeholders' mental models of the topic. The model-creation process usually starts with a review of literature or relevant materials provided by the client, followed by informal, but in-depth, one-on-one interviews with a small number of experts or a workshop with a group of experts. Notes, recordings, or transcripts of the expert sessions are used as needed to support development of the expert model, though they are not typically formally coded and analyzed.

---

[3] Reingold is a small, full service communications firm based in Alexandra, VA.

[4] Penn Schoen Berland is one of the world's premier strategic opinion research and communications consulting firms, and is based in Washington, DC.

A common form of an expert model is an influence diagram, which represents knowledge in terms of variables and the relationships among them, as they relate to the outcomes of interest. The key influences or variables in the system are depicted as nodes, typically ovals, with descriptive titles and subtext and can depict a number of different types of influences, including the potential outcomes associated with the topic, the people whose decisions and behavior influence those outcomes, factors that "drive" or provide the basic context of the situation being studied, and the factors that influence these stakeholders' decision making and behavior.

The nodes are positioned to create a logical flow, typically starting with driving or foundational contextual variables in the upper left corner and ultimate decisions or desired outcomes positioned in the lower right corner of the model. Relationships and primary direction of influence among the variables are illustrated with arrows with the node at the tail of an arrow "influencing" the variable at the arrow's head. Additional graphic design concepts can be employed such as using color to semantically group similar nodes. This is particularly helpful in enabling users to "follow" nodes through various models that may present the variables at different levels of detail. Other techniques to represent expert knowledge may include logic models, decision trees, fault trees, and multiattribute matrices.

Expert models are created iteratively and final models are often validated by reviewing them with the experts who participated in their creation. Expert models can also be refined over the duration of a project to represent the most up-to-date knowledge on the topic as it evolves. Expert models provide the analytical framework for the design and analysis of in-depth stakeholder interviews, allowing direct comparison between experts' and stakeholders' mental models of the topic.

Expert models are typically not used as primary communications tools; however, they do provide a useful foundation upon which to engage experts and often key stakeholders in dialogue about the initiative. The system perspective enables all participants to understand all of the influences on the decision making of the focal stakeholders and to come to a shared understanding of the system drivers and desired outcomes.

ASPS Expert Model Example

The *Base Expert Model of Influences on Potential Patient Decision Making Regarding Plastic Surgery* (Fig. 2.3) provides an overview of the context in which the decision to have plastic surgery is made by the consumer, as estimated by experts. Thirteen experts in cosmetic and reconstructive surgery were interviewed, and their knowledge was integrated to create an expert model illustrating their understanding of the key influences on individuals' decisions to have plastic surgery. Note the arrows or *influences* that link related *nodes* or variables that define the decision-making context. The experts believed that an individual's *Evaluation of Surgeon*, for example, would be a driving influence on their decisions. This Model

Expert Model – Influences on Potential Patient Decision-making Re: Plastic Surgery

Fig. 2.3 Base expert model of influences on potential patient decision making regarding plastic surgery

was then used to design the protocol for in-depth mental models interviews with potential patients and subsequent interview analysis.

The following narrative describes the Model.

Drivers

The prospective patient's (or prospective customer's) decision to have plastic surgery involves a dynamic mix of external influences and individually intrinsic motivations. Media, family, peers, lifestyle, and stage of life are believed to all influence a potential patient's understanding and perception of plastic surgery as a desired option for self-change.

Motivation for self-change is thought to develop from a sense that one's physical, emotional, or social well-being could be improved through plastic surgery. Experts believe there is a relationship between expectations for and appraisal of one's physical well-being and one's feelings and relationships with others. Physical health and attractiveness are related to feelings of self-confidence and self-esteem.

Once motivated toward having plastic surgery, potential patients are believed to begin a process of research and consultation about the procedure(s) of interest and about available plastic surgeons. The depth and breadth of this research is thought

to vary across individuals. Potential patients are believed to invest time speaking with plastic surgeons, other doctors, family and friends, and past patients. Referrals, consultations, and research about a surgeon's history and experience are believed to significantly influence patient selection of an individual plastic surgeon.

Practice marketing, such as print materials and surgeon websites, was thought to inform this research. The surgeon selection experience was considered to be an important part of the decision to have plastic surgery, and can be influenced by personal qualities of the plastic surgeon, as well as the degree to which he/she establishes rapport with the prospective patient and earns his or her trust.

Experts also thought potential patients' evaluation of a plastic surgeon is influenced by the quality of a surgeon's office, staff, and facilities. Additionally, potential patients considered surgeon experience, training and professional association, such as membership in the ASPS, in their selection of a plastic surgeon.

In making the decision to have plastic surgery, that is, an appraisal of risks and benefits associated with the procedure and surgery in general, experts said potential patients considered the associated costs, the plastic surgeon, and their confidence that their expectations will be met. At this point, potential patients may decide to have plastic surgery and may select a Board Certified plastic surgeon, or they may decide to pursue another option.

Outcomes

Here, the "quality of the surgery outcome" refers to the patient's personal evaluation of his or her experience. The surgeon's experience, training, and professional memberships were thought to be influences on quality. As well, pre- and postoperative care and the occurrence of complications or unexpected outcomes play a role in the quality of outcome. Patient satisfaction is related to the perception that the outcome has met individual expectations and goals. Positive experiences and satisfaction may then lead to future benefits for the plastic surgeon, such as repeat patients and patient referrals.

Step 3: Design, Conduct, and Analyze Mental Models Interviews

The next step in the Mental Modeling approach is designing and conducting one-on-one in-depth interviews following a semistructured interview protocol. The research sample of individuals representing the stakeholder population(s) of interest (or cohort) is the core of the Mental Modeling research approach. This sample is usually comprised of 20–30 individuals, each representing a focal stakeholder. This

stratified sampling is done in order to reveal the breadth of perceptions held. Research interviewees are selected from a larger pool of individuals to allow for random sampling and to provide a level of confidentiality. Subcohorts may also be used, or a matrix cohort design may be used to ensure representation of gender or other demographic factors.

Mental Models interviews follow a semistructured interview protocol designed to explore key topics identified in the expert model. Interviewers trained in the Mental Modeling approach are oriented to the project and trained on the interview protocol. Once the sample is developed, the interviews are conducted, typically over the phone, but sometimes in person if appropriate or required.[5] Interviews are recorded with interviewee's permission and transcripts are produced and used as the primary data in structured analyses.

Questions, particularly early in the interview, are typically structured to elicit people's mental models using a "what comes to mind when you think about approach," asking the interviewee to think freely about a general topic rather than respond to a more narrowly focused question. Interviewers will also use general prompts such as, "Can you tell me more about that?" or "Why do you say that?" to probe interviewee responses, encouraging them to speak at length. This approach is specifically designed to allow topics of interest to the interviewee to more readily emerge, using the language and terminology that they would normally use. As the interviews progress, more specific and directed questions will be used to ensure coverage of all relevant variables in the expert model.

The interview data are then coded and analyzed against the expert model in order to describe stakeholders' beliefs about the topic including: their values, interests, and priorities; what they know; what they don't know or misunderstand; what they want to know; and who and what communications processes they trust. Depending on the needs and complexity of the project, formal or informal coding approaches can be applied. For less complex projects where one simply needs to summarize the prevalence of perceptions and beliefs, a basic, one-pass direct coding process may be used linking interviewee responses to specific concepts.

For more complex challenges, where stakeholders' perceptions are likely to cover a broad spectrum of beliefs that are often more nuanced, or for projects that require application of more rigorous academic research standards for coding and analysis, a multiple-pass approach may be more appropriate. In a multiple-pass coding approach interviewee responses are first "tagged" to link responses to general topics (often expert model nodes or basic themes). This facilitates a more thorough exploration of the interview data than a linear, "by-question" coding process. In the second coding pass, responses are coded against more specific emerging themes. The prevalence of these themes is then enumerated and reported.

---

[5] In-person interviews can add considerable time and cost and may increase the potential for "please-the-interviewer" bias compared to phone interviews, which may be perceived as more equitable by participants.

The comparison of structured qualitative analysis of the interview results against the expert model enables identification of key areas of alignment and critical gaps between the expert knowledge and the thinking of stakeholders, identifying: what stakeholders know, what they don't know or misunderstand, what they want to know, and who and what communications sources and methods they trust. This analysis provides the requisite insight to develop precisely targeted strategies, policies, interventions, and/or communications materials with clear, measurable behavioral outcomes.

ASPS Protocol Example

Excerpt from ASPS Interview Protocol Our discussion will focus on your expectations and considerations about having plastic surgery. Later in the discussion we will discuss what is important to you when selecting a physician to perform the procedure(s). We'll conclude by talking about communications associated with plastic surgery. But again, I want to make sure I hear everything you have to say so if other topics or thoughts come to mind, please share them with me.

Section 1: Motivation for Plastic Surgery Option. Perceived Benefits and Risks

There are lots of reasons why people have plastic surgery. I'd like to hear about your interest in having plastic surgery.

1. Do you recall what first got you interested in having plastic surgery?

   - *(Probe as appropriate)* Can you tell me more about what interested you about plastic surgery at that time?
   - When was that?

2. In what ways do you hope to benefit from plastic surgery?

   - *(Probe for the following if not already mentioned)* What do you see as the benefits of plastic surgery to your physical appearance?
   - What do you see as benefits when it comes to how you feel about yourself?
   - What about when it comes to how others may feel about you and treat you?
   - Might there be any economic benefits as a result of having the plastic surgery procedure(s) you are considering?

ASPS Top Line Findings

The following textbox presents an example of select top-line findings of research conducted with 60 people who had either undergone plastic surgery within the past 18 months (37 % of the sample) or who were actively considering cosmetic surgery (63 %). One-on-one confidential interviews, averaging 35 min, were conducted by phone.

Select Top-Line Findings of People Who Had or Were Actively Contemplating Plastic Surgery

The research findings were contrary to many widely held beliefs and conventional wisdom about who had plastic surgery and why they had it. Results included the following:

- Interviewees were motivated to have plastic surgery because they were unhappy with some physical aspect of their bodies. Many had been thinking about it for a long time, some their entire adult lives.
- The journey for most, from initial interest to undergoing an actual plastic surgery procedure, took months or years. Interviewees started by actively seeking information from others who had undergone similar procedures, then proceeded to conducting Internet research on the specific procedure they were interested in, followed by conducting research on and consulting with two or three individual surgeons.
- The primary benefit interviewees anticipated was feeling better about the way they look, which they believed would result in feeling more confident. Most said they had or would have plastic surgery to suit themselves, not the interests of others.
- Few interviewees spontaneously mentioned risks. When prompted, the most critical risk mentioned was not looking the way they expected as a result of the procedure. Nearly all believed the benefits of plastic surgery results far outweighed the risks.
- Interviewees' trust in their surgeon was a critical influence on their ultimate decision to have plastic surgery. Potential patients believed they could minimize the risks by "doing their homework" and selecting "the right" plastic surgeon.

Figure 2.4 shows how the interview results were used to develop weighted mental models diagrams, graphically depicting the influences on interviewees' decision making. The shading of the Mental Models diagram reflects that importance: "Primary influences" (red) were raised by more than 60 % of interviewees; "secondary influences" (orange) were raised by 20–60 %; and "other influences" (yellow) were raised by fewer than 20 % of the interviewees.

Step 4 (Optional): Design, Conduct, and Analyze Qualitative and/or Quantitative Research, Building on Foundational Mental Models Research

Where needed, one can follow-up, supplement, or complement in-depth qualitative (mental models) interviews with other qualitative research such as focus groups, or quantitative research in the form of structured surveys with a large and representative
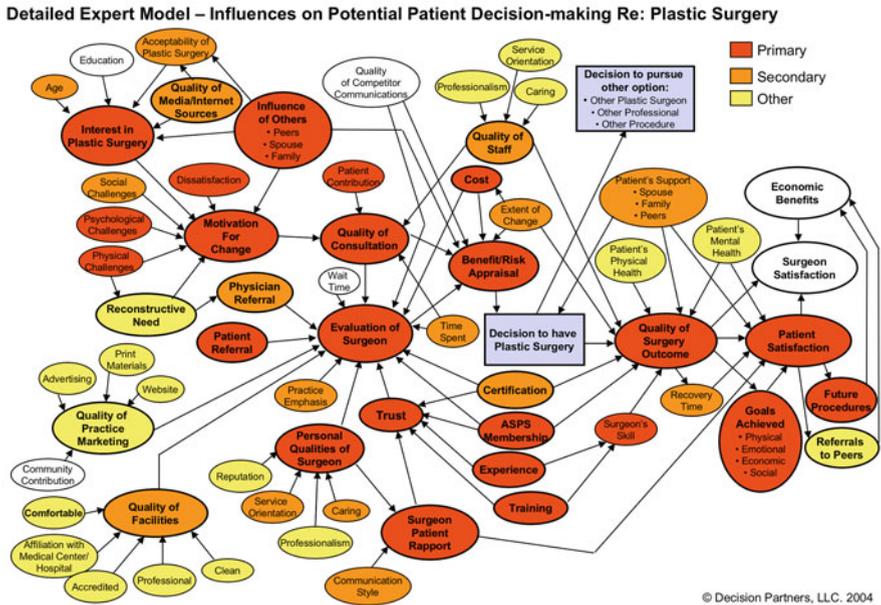
Fig. 2.4 Sample mental models diagram

sample of stakeholders, or other quantitative methods. Such research can be an efficient and economical approach to validate and extend the results of mental models interviews in differing social contexts and, in the case of representative surveys, can be used to quantitatively assess the prevalence of beliefs in that population.

Figure 2.5 presents sample results from a follow-on, quantitative web survey[6] with U.S. adults who said they were considering plastic surgery or another appearance-altering procedure in the next year or two. The mental models research protocol and results were used to design the web survey questionnaire. The open-ended Mental Modeling approach allowed for characterizing beliefs and influences relevant to the decision to have plastic surgery. The green bars in Fig. 2.5 show the relative importance of different considerations in these decisions regarding plastic surgery (which 19 % had undergone before) for the survey sample. The black bars show comparable ratings to the mental models interviews. With few exceptions, the results from the web survey and the interviews were very similar.

Step 5: Use Research Results to Design and Pretest Strategies, Policies, Interventions, and Communications

As described earlier, the mental models research results identify key areas of alignment and critical gaps between expert and nonexpert stakeholders. With this knowledge, precisely targeted strategies, policies, interventions, and communications
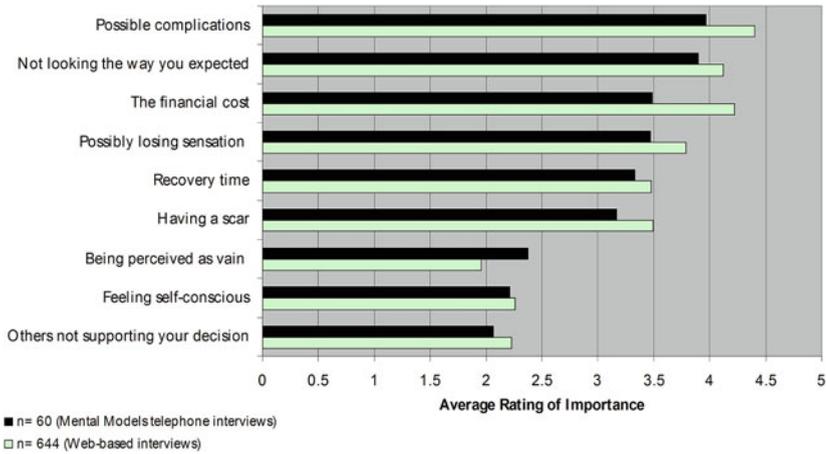
---

[6] Conducted by Penn Schoen Berland.

Fig. 2.5 Interview and survey participants' ratings of potential risks of plastic surgery

plans and messages can be designed to address the critical influences on stakeholders' decision making and, ultimately, behavior related to the topic at hand. Communications should be designed to: reinforce what people know that is correct, close critical knowledge gaps and correct misperceptions, and address specific questions that people expressed during the research. Strategies, plans, and messages should be designed to enable stakeholders—including the decision-makers—to make appropriate decisions and judgments and, where appropriate, take action. In some cases, an intervention is required immediately to address a potentially risky situation or behavior. Consequently, some or all of the desired outcomes are behavioral, that is, focused on measurable actions. Strategies should be designed to use sources and modes of communications in which stakeholders have expressed a preference, and in which they have expressed a level of trust and confidence.

Messages that are developed should be pretested before being implemented more broadly, to ensure they have the intended effect.[7] A number of techniques can be used to test messages and materials, from small-scale read backs, to message-focused mental models research, to self-administered surveys. Methods can incorporate online components and visual testing. Choosing an appropriate technique depends on the nature of the materials, the stakeholder or audience for whom it is intended, and the amount of time and resources available. There is no formula for selecting a pretesting technique, nor is there a perfect technique for pretesting. The method should be selected and shaped to fit the pretesting requirement and the time and resources available.

---

[7] Such testing can also be conducted to evaluate performance of current or past strategies and communications for purposes of identifying improvements to both.

ASPS Strategy Example

Building on the results of the mental models research and supporting web survey results, the challenge was to develop a brand and identity for ASPS that differentiated its members from the many other providers of plastic surgery procedures. At the same time, the brand and identity would need to focus on patient safety, how to choose an appropriate plastic surgery provider, and promote and advance the image of plastic surgery by highlighting the good work of ASPS surgeons. Focused benefit/risk communications plans, messages, and materials were developed to support plastic surgeons and prospective patients; shape industry association policies, procedures, and training related to conducting appropriate risk communications and informed consent dialogue with patients; and broaden industry outreach and dialogue with key stakeholders, including policy makers.

Key goals for the research-informed campaign included:

- Branding ASPS member surgeons;
- Differentiating ASPS member surgeons from other providers performing plastic surgery procedures, with emphasis on their training and board certification;
- Elevating the image of plastic surgeons among other medical specialists and the general public; and
- Educating the public and prospective patients about safe plastic surgery and the need to choose a Board Certified plastic surgeon.

Subsequent message testing research revealed that people considering plastic surgery and the general public were not knowledgeable about who could perform plastic surgery or what differentiated the qualifications of an ASPS board certified plastic surgeon. Communicating the key differentiator—5 years of surgical training with two additional years in plastic surgery—was key to the campaign and critical to helping prospective patients make well-informed decisions. An important component of this was providing tools to support prospective patients in "doing their homework" (as they called it in the mental models research) to select the best plastic surgeon most suited to working with them.

Step 6: Implement and Evaluate Strategies

Throughout implementation, strategies and communications messages and delivery channels are adapted, enhanced, and modified as necessary. For projects that extend over many years and/or require sustainable behavioral outcomes, frequent evaluation and refinement are critical to success.

ASPS Case: Implementation Results

A comprehensive campaign comprising advertising, video blogs, partner outreach, discussion forums, and decision support tools was developed, pretested, implemented, evaluated, and refined over several years. One example of the outreach materials developed to support patient engagement and decision making—the Find-a-Surgeon Tool—was improved based on testing and user feedback, is illustrated in Fig. 2.6.

Fig. 2.6 Example of outreach material—find a surgeon tool

In summary, the research-driven ASPS campaign was judged by the client to be very successful in achieving all its goals. Key measurements included the following:

- 350,000 online referrals per year;
- 46 % increase in awareness and value of the ASPS Member Surgeon brand; and
- 92 % increase in online engagement of potential clients of plastic surgery.

References

Atman, C. J., Bostrom, A., Fischhoff, B., & Morgan, M. G. (1994). Designing risk communications: completing and correcting mental models of hazardous processes, part I. *Risk Analysis, 14*(5), 779–788.

Beddow, V. (2011). *Conducting effective community outreach and dialogue on biosolids land application: Primer for biosolids professionals*. Alexandria, VA: IWA Publishing.

Bostrom, A., Fischhoff, B., & Morgan, M. G. (1992). Characterizing mental models of hazardous processes: A methodology and an application to radon. *Journal of Social Issues, 48*(4), 85–100.

Cognitive Science Systems, LP. (2012). ECASS: Expert modeling module of the cognitive analysis software suite (computer software). Retrieved May 10, 2012, from http://www.decisionpartners.com.

Eggers, S., Thorne, S., Butte, G., & Sousa, K. (2011). *A strategic risk communications process for outreach and dialogue on biosolids land application*. Alexandria, VA: Water Environment Research Foundation.

Fischhoff, B., Brewer, N. T., & Downs, J. S. (2011). *Communicating risks and benefits: An evidence-based user's guide*. Silver Spring, MD: US Food and Drug Administration.

Health Canada, Canadian Standards Organization. (2006). A framework for strategic risk communications within the context of health Canada and the PHAC's integrated risk management, 0-662-44597-X. Retrieved January 28, 2016 from http://www.hc-sc.gc.ca/ahc-asc/pubs/_riscomm/framework-cadre/index-eng.php.

ISO. (2009). *31000: 2009 Risk management–principles and guidelines*. Geneva, Switzerland: International Organization for Standardization.

Johnson-Laird, P. (1983). *Mental models*. Cambridge: Harvard University Press.

Morgan, M. G., Fischhoff, B., Bostrom, A., & Atman, C. (2002). *Risk communication: A mental models approach*. New York: Cambridge University Press.

Standards Council of Canada. (1997). *Risk management: Guideline for decision-makers*. Etobicoke, ON, Canada: The Canadian Standards Association.