

The Essence of Safety

What's in your mental model?

By William M. Montante

THIS ARTICLE is a written expression of the author's mental model of safety, shaped and honed over nearly 30 years in the engineering, safety and consulting professions, and motivated by a personal need to challenge prevailing perceptions and paradigms, stimulate thinking and dialogue, and heighten the pace of change in safety management and the control of hazard-related incidents. How I see safety may differ from your vision, and mine may suffer from one or more of the limitations described on pg. 37. In other words, I could be wrong. But right, wrong or in between, the following premise begs to be tested, debated and expectantly verified:

A single-minded model or vision of what safety is and how to manage it is not a certainty among SH&E professionals or among whom we serve. That uncertainty is a gap that needs closure—or at least bridging. It also represents an opportunity that might lead the safety professional and organizations to a higher level of capability, confidence and certainty in the quest to control hazard-related incidents.

Lowrance (1976) voiced concern that the notion of safety "has so far been poorly defined, widely misunderstood and often misrepresented." He went on to state, "Much of the wide-

spread confusion about the nature of safety . . . would be dispelled if the meaning of the term safety were clarified" (Lowrance, 1976).

Safety has come a long way over the past 30 years. Workplaces are now safer than ever. However, the confusion and misunderstanding surrounding how to define and manage safety persists, impeding practitioners' ability to achieve the levels of safety performance possible in today's technologically advanced world.

The question, "What does safety mean to me?" produces profoundly different answers among top management, supervision hourly workers and safety professionals. This perceptual difference is more than a barrier or a gap—it may take on the proportions of a chasm in many companies. This message echoes loud the opportunity for safety professionals to realign individual and corporate mental models regarding safety, and to close that gap between what it is and what others think it is.

Mental Models: At the Root

Variations in perceptions of safety stem, perhaps in large part, from our reliance on mental models. These are constructs of reality shaped over time by personal, cultural or professional experiences. They are influenced by what we learn and hear from others; are fortified by tested or untested facts; and are embellished by truths or myths, ultimately directing our belief structures, decisions, actions and behavior. In theory, mental models are internal pictures—"small scale models" (Byrne, 2000; Davidson, Dove & Weltz, 1999), sketches or sets of core beliefs of reality that we apply as a means to understand

ourselves, interactions with others, where or how we fit within the world around us, and how systems work (Davidson et al., 1999).

Mental models play a powerful central, unifying and predictive role in representing objects, states of being, sequences of events, cause-and-effect relationships, the social and psychological actions of daily life, and may form the basis for all reasoning processes (Holland et al., 1986).



Developing a grounded, intimate and uniform understanding of safety is at the very core of our professional essence, scope and responsibilities. So, too, is our responsibility to communicate more effectively, educate more thoroughly and direct more confidently those whom we serve so that we, as a profession (and our respective organizations), can evolve as a system toward a single-minded vision of safety and how to effectively manage it.

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Gonzalez (2003) described mental models as one of two strategic “search engines” that the brain employs to handle new, unfamiliar or complicated situations or problems. The other search engine is “emotional bookmarks”—the stored experiences of feelings that help direct logic and reason to a place where they can do useful work. These benchmarks may well be another form of mental model, as may safety, as a “state of being” embodying an array of emotions.

Cognitive scientists believe that the human brain constructs mental models “on-the-fly” (Davidson et al., 1999) from bits of knowledge derived from personal or others’ experiences, imagination, perceptions and problem-solving strategies. The building process may be akin to putting together a puzzle without advance knowledge or certainty of the final picture, or of how the pieces fit together. The picture takes shape as pieces are added, but it may never be complete.

Mental Model Limitations

While mental models help us negotiate within or frame our reality, they have drawbacks (Sterman, 1991; Johnson-Laird, 1983; Byrne, 2000):

- often incomplete and can be constantly evolving representations of an event or observable fact;
- often flawed because people frequently err in deducing the consequences of fundamental assumptions;
- dependent on feedback that itself can be generated from other mental models or emotions and, consequently, suffer in the absence of feedback;
- not easily understood and can be interpreted differently by others;
- based on assumptions usually difficult to examine, so ambiguities and contradictions within them can go undetected, unchallenged and unresolved (“garbage in, garbage out”);
- scant information and provide simplified explanations of complex sequences of events (Davidson et al., 1999);
- carry some degree of uncertainty about their validity—and even if incorrect, are still used (e.g., clinging to safety myths);
- representations of what is true, but not what is false (Byrne, 2000);
- composed of sets of cause-and-effect rules influencing linear or sequential thought processes.

The Problem of Linear Thinking

Culture, education and training condition people to think linearly—that is, A

leads to B and B to C, and so on. Yet, the real world is not linear. Mental models and linear thinking make the world easier to comprehend.

Nevertheless, grasping the true complexity of the natural world, business systems, accident causation and the complex, multifactorial and often chaotic intermingling of immediate and root causes, psychosocial factors and cultural influences—not to mention the role of chance—may well be beyond our mental capabilities. Even if it is not, it certainly tests our impatience for answers and action. (Those interested in learning more about the complexity of causation should research the disciplines of system dynamics modeling and systems thinking.)

Accepting our cognitive limitations, we may have no other choice but to use mental and other forms of descriptive, linear models. When properly applied, these models can help sharpen our questions and open our minds to greater comprehension and new possibilities. In contrast, rigid adherence to structure and unchallenged mental models can cloud or close our minds to other possible models of reality.

The safety profession has its share of mental models. These include:

- how accidents are caused (e.g., domino sequence of accident causation and myriad other models);
- Heinrich’s 1-29-300 premise (also known as the accident ratio study);
- 90% or more of accidents are caused by unsafe acts of employees (original ratio was 88% unsafe acts, 10% unsafe conditions and 2% unpreventable);
- frequency precedes severity (Manuele, 2003).

Manuele (2003) challenges these models: “Have we been reciting clichés, repeating the literature, without asking for substantiation? Do we docilely follow previously published premises, with no pretense at scientific inquiry as to foundation?” The confident safety professional and organizations that strive for certainty and wisdom not only must continuously improve, but also must continually test, challenge and refine prevailing mental models and those feedback mechanisms which influence individual and collective growth and improvement.

Test It Yourself: Assessing Mental Models

A revealing first step is to compare your mental model of safety to that of others. I have personally performed this exercise

many times, in groups and one-on-one, yielding a response sample that now likely numbers more than 1,000 data points. I suspect your results will mirror mine.

First, in 25 words or less—and without resorting to a dictionary or safety reference book—write your definition of safety. Next, ask a random sample of people in your office or company to do the same. Compile the responses and compare them to yours. Do they differ? To what degree?

Now expand the survey. At the next safety meeting or meeting with a group of managers, supervisors or hourly workers, ask each attendee to express what safety means to him/her. Write keywords on a flipchart. Do not be surprised if met with blank stares, nervous hesitation or no response at all. People may stumble, searching for the “right words.”

Observe body language and note how the eyes roll upward as people attempt to tap their databank of knowledge and experience—their mental models. You will certainly get a broad range of responses, many with an emotional undertone. You may also hear, “I can’t define it, but I know how to use it in a sentence.” In my experience with this exercise, about 10% of respondents cannot find the right words to define safety.

Common responses include:

- preventing accidents or injuries;
- freedom from harm or injury;
- being safe;
- being aware of your surroundings;
- not getting hurt;
- it’s number one;
- following procedures and rules;
- it is a state of being;
- looking out for each other;
- complying with OSHA;
- going home the same way you came to work.

Each response is an expression influenced by the person’s mental models and emotional benchmarks. The implication is not that these definitions are wrong; some do capture key aspects of the essence of safety. However, the across-the-board variability and uncertainty clearly echo the concern expressed 30 years ago by Lowrance (1976).

Next, ask those same managers and supervisors, “How do *you* manage safety?” This would seem a simple question for those with responsibility and perhaps accountability, yet meaningful responses are often as elusive. For some, it might be a troubling realization that “I really don’t know safety or how to manage it.” Others may deflect their uncertainty by saying, “You’re the safety guy, you tell us.”

Result of the Author's "Safety Is" Survey

The author surveyed 137 safety leaders from one company. These are their definitions of safety.

Keyword or Phrase	Percent Responding
Freedom from (or no) injury	26
Used the word safety or some form of it in their definition (e.g., safety is being safe)	22
Awareness of surroundings, hazards or others	17
Could not define	13
Going home in the same condition you came to work	6
Looking after yourself or others	5
Correcting/preventing hazards or injuries	4
Being cautious or careful	3
Preparing or planning	2
Good housekeeping	1
Following procedures	1

Repeating both exercises with a group of safety professionals will yield a range of responses as well, although perhaps less varied or uncertain, and with less hesitation and fewer blank stares.

So, if defining safety and expressing how we manage it are so varied or uncertain, how can we expect management, supervision and hourly workers to think, decide, act and behave consistent with our expectations? How can we expect safety performance to be any different? Reinforcing this premise, Grimaldi and Simonds stated, "Unless there is common understanding about the meaning of terms, it is clear that there cannot be a universal effort to fulfill the objectives they define" (Manuele, 2003). Manuele adds:

We must agree on what we mean when we use the word safety, as in the practice of safety. If we cannot, how can we assume we are communicating with each other when we use the term or with those outside our profession?

A Field Test

On one occasion, as a prelude to conducting training on accident investigation, I asked nearly 150 of one company's "safety leaders" (representing management, supervision and hourly workers) to write a definition of safety. The "Safety Is" sidebar (above) summarizes their responses, which were consistent with previous and subsequent surveys.

The justification for putting them through this reflective exercise was in part to confirm why the company was not

receiving acceptable and consistent quality in its accident investigations. If the safety leaders were not meeting management's expectations, suspicions focused on:

- lack of or ineffective training in proper accident investigation;
- lack of objective standards for who is to do what, when and how;
- expectations not effectively communicated or reinforced to those involved;
- no understanding of or training on industrial accident causation;
- failure to objectively measure, monitor or provide feedback on conformance to standards.

If some or all of these pitfalls existed, the logical conclusion was that they were lacking in fundamentals and really did not know safety. A brief sampling of their written responses confirmed these suspicions. During a break,

the host company agreed to revamp the training agenda to include instructional modules on the essence of safety and accident causation before returning to the original training objective.

Resetting the Foundation: Defining Safety

Dictionary definitions of safety are commonly referenced in the safety literature. Their use reinforces mental models of safety, or being safe, as "the quality of being safe, freedom from danger or injury, free from or not liable to danger, involving no danger, risk or error" (Manuele, 2003). We are never fully free or fully safe because safety is relative, and chance and risk are our constant companions.

The following definition, slightly modified from Manuele's, underpins the essence of what safety really is. From this definition flow a philosophy and structure for managing safety (another of my mental models) and an opportunity for improvement: "Safety is that state of being when risk and the hazards derived from it are judged acceptable or in control."

Simply put, safety is no more and no less than a condition or judgment of acceptable control over hazards and risks inherent to what one is doing at a point in time or chooses to do at some future point. That state of being can be personal or a reflection of the business culture.

Imada (1990) similarly defined safety as "a momentary and ongoing condition [state of being] where elements [hazards and risks] are under control because of the homeostatic [acceptable] conditions of

causes and preventions [controls]." Bird and Germain (1985) simplify that with their definition: "The control of accidental loss." ISO/IEC Guide 51, Safety Aspects: Guidelines for Their Inclusion in Standards, defines safety as freedom from unacceptable risk (Manuele, 2003). Lowrance (1976) defined safety "as a judgment of the acceptability of risk."

Common threads through all of these definitions are "control" and "acceptable," words likely to be interpreted differently and demanding definition. So, too, would Lowrance's use of "judgment." Nonetheless, in my mental model, achieving "acceptable control" is the defining construct of safety management and represents our true journey.

Stepping back from this line of reasoning, readers may be wondering, "What is control?" In a debate on the essence of safety, one trainee replied, "Control is an illusion. We are never in control." He may be correct, but "acceptable control" is definable and achievable: "Control is functioning within dictated, perceived and/or accepted standards, limits or boundaries."

Hazards inherent to the business process, especially those not controlled to an acceptable level, represent safety's challenge. The potential outcome from an uncontrolled hazard is harm—not just to people, but also to equipment, materials, production, property, environment and profits—as well as damage to company reputation, integrity or image.

Essential Functions of a "Manager"

Manager is in quotations to reflect its broadest scope, encompassing anyone who has a role in affecting the business process, regardless of job title, position or significance of his/her contribution to that process. In a traditional business model, all "managers" to some degree plan, organize, lead (sometimes self-directed) and control something, if nothing more than a tool or machine (Bird & Germain, 1985).

If "control" is a core function of all managers, safety is a fundamental, essential and functional responsibility of all engaged in managing the business process to an acceptable, controlled level. It follows that everyone—from the most senior manager to the newest employee—are in essence "safety managers" or more appropriately "hazard control managers." All have a fundamental responsibility to control hazards, risks, losses (e.g., claims management and other loss mitigation strategies) and other downgrading influences (e.g., loss of customer confidence, market share, intellectual capital or brand image) that have the potential to adversely affect the business process.

However, most "managers" have varied mental models of safety; are uncertain about their role of managing it; or do not realize and accept this role, and the

responsibilities and accountability that accompany it. This perception gap may well be a root cause of why safety professionals struggle for identity or influence. It may explain why safety initiatives sometimes fail to achieve the desired performance improvement and why incidence rates reach a plateau despite best efforts and intentions.

If all "managers" can accept this new role to control hazards, all gain a new job title, one that is critically important for continuous improvement. To realize that goal, hazard control managers must receive the requisite awareness, training and skills.

Essential Functions of a Hazard Control Manager

So what should a hazard control manager do (Bird & Germain, 1985; Manuele, 2003)?

- Anticipate or identify hazardous conditions, practices or loss exposures.
- Evaluate and set priorities using risk assessment methods that focus on the worst first (high potential). Some risks are more significant than others and not all hazards present equal potential for harm or damage (Manuele, 1997).
- Develop controls—programs, policies, procedures, standards and expectations.
- Implement, administer and advise others on hazard controls and hazard control programs.
- Monitor, measure, maintain or improve those programs and the business process to achieve an acceptable level of control.

When safety practitioners or senior managers—by policy or otherwise—make employees aware that they are "all responsible for safety," these essential functions represent what we really need them to embrace and do. Doing so creates that many more "champions for safety," and magnifies a company's ability to expand control from the limited capabilities of one titled "safety manager" to the entire organization. With so many more eyes looking for hazards and assessing risks—and so many more minds using the same mental model of safety, and with certainty of their responsibilities and abilities to manage control of their particular dimension of the business process—the potential outcome can only be measurably greater. Safety and the system become one.

Activities of Managing Control: A Structure

What does it take to get control? Whether managing the safety function, a task or the business as a whole, three opportunities arise to manage control—preloss, contact (e.g., PPE) and postloss. The following activities define a structure or strategy for continuous improvement (Bird & Germain, 1985).

- Identify what is necessary to achieve

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success or a desired level of control. This represents the collective body of traditional safety process elements (preloss/contact/postloss), procedures, regulatory requirements, and other hazard-specific controls and innovations deemed necessary to achieve acceptable control.

- Set standards of performance or expectation. Define objectively who does what, when, how, and with what level of quality and quantity.
- Communicate those standards/expectations to all who are affected or whose role it is to meet or fulfill the standards.
- Measure and evaluate performance to those standards and expectations. This activity represents the heart of control—what gets measured, gets done. Strive for a proper balance of upstream, activity-based metrics and traditional downstream (reactive) measures. This sets the stage for feedback.
- Commend or constructively correct performance to standards.
- Go back and make each activity better.

This is only one model. The AIHA/ANSI Z10 standard is another model for control that may well become the guiding construct for safety management in this century. Government regulations and consensus standards are other forms of "control," but these typically are minimum conformance or performance levels.

Seize the Opportunity: Realign Mental Models

Get back to basics. Testing (identifying and evaluating) the prevailing safety mental models in your organization is a good place to start. If those models are as varied as my experience and surveys suggest, view these mental models as high potential hazards needing control. Develop, implement and monitor ways to reshape those models to increase awareness of what safety is and how to manage it.

Enhance safety knowledge, hazards awareness and skills to achieve a single-minded vision and understanding that the safety responsibility of all "hazard control managers" is to function as one mind to control all potential hazards and downgrading influences, and to continue on the journey toward an acceptable level of control. Develop their abilities to see

potentials and prevent or control them before they take shape.

Shift focus from a traditional regulatory-driven, programmatic or promotional perception toward an open- and single-minded vision of "safety of the entire business process." Replace the traditional mantras of "Safety first," "Think safety" and "Safety is your responsibility" with "Control first. Think control" and "Control is your responsibility." Strive for the personal and organizational mastery where each "hazard control manager" can state with confidence and certainty that s/he intimately knows safety and how s/he and the company manage control.

In the research for this article, I found a potentially mental-model-shattering thought in *Leadership and the New Science* (Wheatley, 1999). Wheatley quotes Erich Jantsch (*The Self-Organizing Universe*): "In life, the issue is not control, but dynamic interconnectedness." Perhaps my mental model about control being the defining construct in safety is wrong. Yet, I can spin this to fit my model by rationalizing that "dynamic interconnectedness" is nothing more than a network and the dynamism in a network or system comes from a single-minded, self-organizing vision (of safety). That's the world as I see it. What's in your mental model?

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