Session No. 782

Integrating a Balanced Scorecard Approach to Risk Management in an OHSAS 18000/ANSI Z-10 Management System?

Paul Esposito, CIH, CSP, CPEA
President
STAR Consultants, Inc.
Annapolis Maryland

Introduction

In 1999 and 2000, the British Standards Institution (BSI) established the *Occupational Health and Safety Assessment Series, (OHSAS) Guideline*, based on a 1996 publication, BS 8800, 1996, G*uide to Occupational Health and safetymmanagementssystems.* This guide was designed to be compatible with ISO 9001:2000 (Quality) and ISO 14001:1996 (environmental) management systems standards.

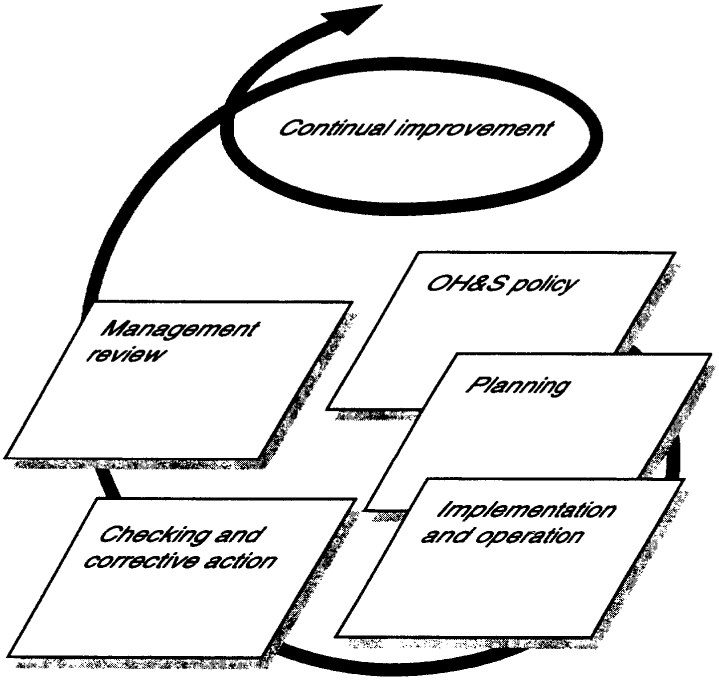

Figure 1. Elements of successful OH&S management

While never adopted by ISO, in part due to opposition from the U.S., OHSAS 18000 has been widely used by companies throughout the world as a guide in developing safety management systems (SMS). In the U.S., OSHA published its guide to safety management in 1989, as the *Program Management Guidelines*, which is also used as a template for OSHA's Voluntary Protection Program (VPP), California's *injury and illness prevention standard* as well as other OSHA initiatives. In 2005, after years of consensus building, the American National Standard Organization (ANSI) published its Z-10 standard, entitled "Occupational Health and Safety Management Systems." ANSI Z10, while organized similar to ISO standards, better bridges the gap between the OHSAS guideline and the more comprehensive Program Management Guidelines of OSHA. Since 1982, OSHA's Voluntary Protection Program (VPP) has been identifying leading companies and defining both safety management systems and culture. Thus, when faced with the task of risk assessment and risk management, elements of each are used to help define risk management.

The balanced scorecard concept (see Figure 2) was created by Robert S. Kaplan of the Harvard Business School and David P. Norton of Nolan, Morton and Company in 1992. Initially a concept to assist public agencies in better managing and measuring performance, it has further developed and is widely used by many organizations as a more integrated system of performance measures. They show how to use measures in four categories—financial performance, customer knowledge, internal business processes, and learning and growth—to align individual organizational and cross-departmental initiatives to identify entirely new processes for meeting customer and shareholder objectives. The balanced scorecard process provides not only the ability to measure current performance, but helps target future performance as well. The process translates strategy into action, a balance of short-term and long-term objectives, lagging and leading indicators, and internal and external perspectives. From a strategy perspective, the balanced scorecard enables scorecard measures to be tied together in a series of cause-and-effect relationships, eventually impacting the financial performance.

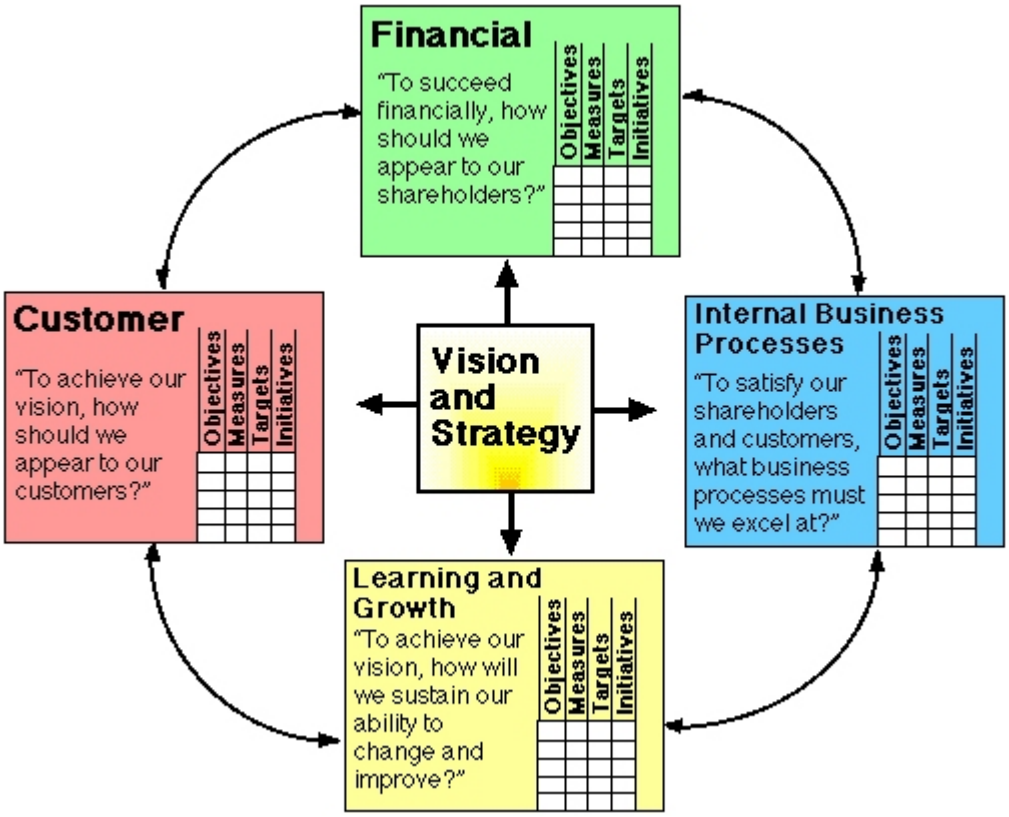

Figure 2. Balanced Scorecard

As you can see from Figure 2 above, the scorecard provides a framework to translate a strategy in to operational teams, supported by objectives, measures, targets and initiatives.

This paper is based on a real-life implementation of a risk assessment process within a Fortune 500 company, integrating elements of OHSAS 18000 and ANSI Z-10 to define and design risk management, while providing verification of risk management and reduction in the form of complimentary leading and lagging metrics, using the balanced scorecard concept.

What is Risk Assessment?

Within the OHSAS 18000 guidelines (see Figure 3), risk assessment is defined as:

- Scope, nature, and timing to ensure it is *proactive* rather than *reactive*;
- Identification of *hazards;*
- Determination/evaluation of *risks* with existing (or proposed) *control measures* in place (taking into account *exposure* to specific hazards, the *likelihood* of failure of the control measures, and the potential *consequences* of injury or damage);
- Description of, or reference to, the measures to *monitor and control* the risks, particularly risks that are not *tolerable;*
- Identification of any additional *risk control measures* needed;

- Evaluation of whether the risk control measures are *sufficient* to reduce the risk to a tolerable level;
- Where appropriate, the *objectives* and actions to *reduce identified risks*, and any *follow-up activities* to monitor progress in their reduction;
- Identification of the *competency* and *training requirements* to implement the control measures; and
- Necessary control measures should be detailed as part of the *operational control* element of the system

Policy	Planning	Implementation and Operation	Checking and Corrective Action	Management Review
Policy Statement	**Planning for hazard identification, risk assessment, and risk control** Legal and other requirements Objectives OHS management programs	Structure and responsibility Training, awareness and competence Consultation and communication Documentation Document and data control Operational control Emergency preparedness and response	Performing measurement and monitoring Accidents, non-conformance and corrective and preventive action Records and records management Audit	Management review

Figure 3. OHSAS Elements

Risk assessment is based on hazard identification, then determining the levels of severity and likelihood of an occurrence, and selecting the most appropriate controls. The remaining elements assist in using this information as part of the *system*, to become an effective part of the overall safety program. There were five basic steps in performing this risk assessment:

- Hazard Category and Aspect Identification (6 categories)
  - A. Chemicals/substances
  - B. Energy
  - C. Strain
  - D. Fall
  - E. Mechanical
  - F. Environmental
- Impact Scenario Identification

- Initial Risk Determination
- Control Principle Application and Communication
- Residual Risk and Tolerability Determination

It was not: Business continuity and facility risk assessment. Based on the hazards, the risk (severity and likelihood) is determined (as presented in Figure 4), which eventually determines the level of risk (Figure 5).

		Severity		
		Minor – 1	**Moderate - 2**	**Serious - 3**
Likelihood	**Unlikely 1**	Tolerable/ Low (1)	Tolerable/ Low (2)	Medium (3)
	Likely 2	Tolerable/ Low (2)	Medium (4)	Intolerable/ High (6)
	Very Likely 3	Medium (3)	Intolerable/ High (6)	Intolerable/ High (9)

Figure 4. Risk Matrix

High/ Intolerable Risks	Those risks which could represent imminent danger, and should be *stopped immediately* until alternate control mechanisms are determined and approved via concurrence among business level management, the SME and the user/operator to reduce the risk category.
Medium Risks	Those risks that should be prioritized for business-level risk reduction measures, either through implementation of more effective (see Hierarchy) control or through more detailed task-based assessment and identification of control. Control selection should include collaboration among business lines, users and the SME.
Low/ Tolerable Risks	Those risks considered controlled to minimize harm. Business levels can still consider risk-reduction strategies and objectives.

Figure 5. Risk Levels

Next, controls are selected based on the hierarchy as presented in Figure 6:

Protective Measure	Examples
Elimination or Substitution	☆ Eliminate human interaction ☆ Eliminate pinch points (increase clearance) ☆ Automated materials handling (robots, conveyors, etc.) ☆ Replace with less toxic compound, ☆ Replace/eliminate a reaction step, etc.
Engineering Controls	☆ Barriers ☆ Interlocks ☆ Presence-sensing Devices (light curtains, safety mats, etc.) ☆ Two-hand Controls, etc.
Training, Procedures and Awareness Means	☆ Safe work procedures ☆ Safety inspections ☆ Training ☆ Lights, beacons, and strobes ☆ Computer warnings ☆ Worker rotation ☆ Signs and labels ☆ Beepers, horns and sirens, etc.
Personal Protective Equipment (PPE)	☆ Ear plugs, gloves, respirators, ☆ Safety glasses, face shields, etc.

Figure 6. Control Hierarchy

Risk assessment occurred on two levels: first at the site level, where activities were classified by their most significant risks. Included in this approach were listing regulatory and internal guideline requirements to control these hazards and activities. Next, functional or task-based risk assessments were performed, using tools such as job hazard analysis (JHA), failure modes and effects analysis, or other analytical methods either in use within that organization or as required by regulation (e.g., biohazard levels). The overall concept was that the functional assessments would determine actual workplace controls, and that communication and verification of work instructions, principal investigation plans, training, department-specific SOPs, oversight and supervision, inspections, and *risk reduction goals*, were then the responsibility of the organization. Obviously, to assist the organization with this approach, feedback mechanisms would need to be developed; thus the need to adapt the balanced scorecard concept already in use by the organization to the metrics needed to verify the risk assessment process.

EHS professional staff was assigned as liaisons for each organization, and the departmental safety committees were chartered and educated as to the risk assessment process, and the expectations of the balanced scorecard metrics. The committee's responsibilities were to:

- ☆ Facilitate risk management as a site-wide EHS culture.
- ☆ Provide resources to assist the risk assessment processes.
- ☆ Assist in establishing business-level risk reduction objectives.
- ☆ Assist in monitoring the risk management process.

- Facilitate communication of the risk management process and objectives within the business level.

Risk was then determined based on the process above, where both initial risk (without controls) was measured, as well as the residual risk (with controls in place), as represented by Figure 7:

Activity (Hazard/Scenario)	**Initial**				**Residual**		
	S	P	**Risk**	Control	S*	P*	**Risk**
Exposure to a laser beam (Class IIIB)	3	2	**6**	**PPE**	**1**	**2**	**2**
Exposure to a laser beam (Class IIIB)	3	2	**6**	**Enclosure, Interlocks**	**1**	**2**	**2**
Fall from a height (10') (over concrete)	3	3	**9**	**Railing**	**3**	**1**	**3**
Handling of animals, bites, scratches (mice)	1	3	**3**	**Eng, Admin and PPE**	**1**	**1**	**1**

Figure 7. Activity-Based Risk Determination

The goal was twofold: the elimination of all high (red) level risks using control technology, and the reduction in the number of residual risks to the low (or green) levels as much as possible. There are at least two big assumptions: effective controls are selected, and controls are enforced. In order for this risk assessment process to yield effectively to the prevention of injuries and illness, we needed some method to validate control selection and enforcement. Thus, there is a need for integration of other elements within the safety management system, and the development of sound metrics that will provide validation of these two assumptions.

Risk Reduction

To take the risk assessment to the next level, and manage risk, some risk reduction strategies needed to be defined. Risk was broken down into its two elements, with organizations establishing objectives to better focus in the elements of risk, as listed below:

- Develop strategies to address risk factors, such as:
  - Severity (consequence)
    - Substitution
    - Automation
    - More engineering controls
    - Better tools and apparatus
    - Early warning
    - Etc.
  - Probability (likelihood):
    - Minimize number of people performing tasks
    - Improve work practices: reliability and knowledge

- Measure and address trends of inspection findings:
  - Conditions
  - Behaviors

By itemizing the individual risk elements, more focused improvement strategies would hopefully become department objectives.

Balanced Scorecard

In developing a balanced scorecard for safety, concepts were defined for each of the four quadrants:

Scorecard Quadrants	Initial Metric	Long-Term Metric
Customer (employees)		
☆ Worker Perception Surveys	No	Yes
☆ Injury and Illness Rates	No	
☆ IH Overexposures	Yes	
☆ Employee Involvement	No	Yes
Learning and Growth		
☆ Continuous Improvement (Closure Rates)	Yes	Expand
☆ Inspections, investigations, notices, hazard analysis, IH, SWOs, etc.		
☆ Training Retention	Yes	Expand
☆ Activities	Yes	Expand
☆ Training Completed, etc.		
☆ Programs performed		
☆ Trend Analysis	Yes	Expand
Internal Business Processes		
☆ Management Systems Assessment Scores	[1]	
☆ Process-Specific Implementation	"	Yes
☆ Risk Reduction	Yes	
Financial		
☆ Worker's Compensation	No	
☆ Program Implementation Budget	No	?

Figure 8. Applicable Safety Balanced Scorecard Metrics

The next step was to determine which of the above scorecard metrics (Figure 8) were most likely to be measured given existing data and resources. In addition, long-term metrics were identified from among this group to help the organization better determine where additional resources would result in the better verification of the risk management process. The goal is to add more defined metrics over the next three years, so the overall process of risk management is measured and improved, and that risk reduction can not only be demonstrated at a site level, but real-time at the department level.

[1] Scored at the H&S Division Level

Summary

Risk management thus supports the policy and philosophy of safety of people, property, and the community, in a focused, systematic and scientific manner. This process provided the following:

- Risk Assessment: Baseline
- Control Selection: Continuous Improvement
- Work Procedures Definition and Communication: Observations to Verify
- Goals and Objectives for Departments
- Verification Scorecards:
    - Process and Learning and Growth to start (2 Quadrants)
    - Eventually add Customer, maybe Financial (The other 2 quadrants)

In addition, this process drives the development of controls to a local (departmental) level, as well as the verification of these controls, empowering the organizations. Annual program audits, a requirement of SMSs worldwide, can then more easily validate the performance and quality of the risk assessment, control selection and management oversight performance. Ultimately, the reduction of risk translates to a reduction of exposure, both conditions and behavior, which is a more direct link to the goal of all safety programs: the reduction of injury and illness.

Bibliography

Bogan, C.E. and English, M.J. 1995. *Benchmarking for Best Practices: Winning Thorough Innovative Adaptation*. Columbus, OH: McGraw-Hill.

British Standards Institute (BSI). 2000. *Occupational Health and Safety Management Systems, Guidelines for the implementation of OHSAS 18001*. London: BSI.

Esposito, P. "Selling Safety to Management Using Metrics." *Industrial Hygiene and Safety News.* June 2002.

Esposito, P. "Safety & Health Management Systems." *ASSE Management Practice Specialty Newsletter*. Fall 2001-Volume 1, Number 1

Occupational Safety and Health Administration (OSHA). *Program Management Guidelines.* Federal Register of January 26th, 1989.

Petersen, D. "The Safety Scorecard." *Occupational Hazards Magazine*. May 2001.

Kaplan, R.S. and Norton, D.P. 1996. *The Balanced Scorecard: Translating Strategy into Action*. Boston, MA: Harvard Business School Press.