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The Balanced Scorecard

A Powerful Tool for Risk Management

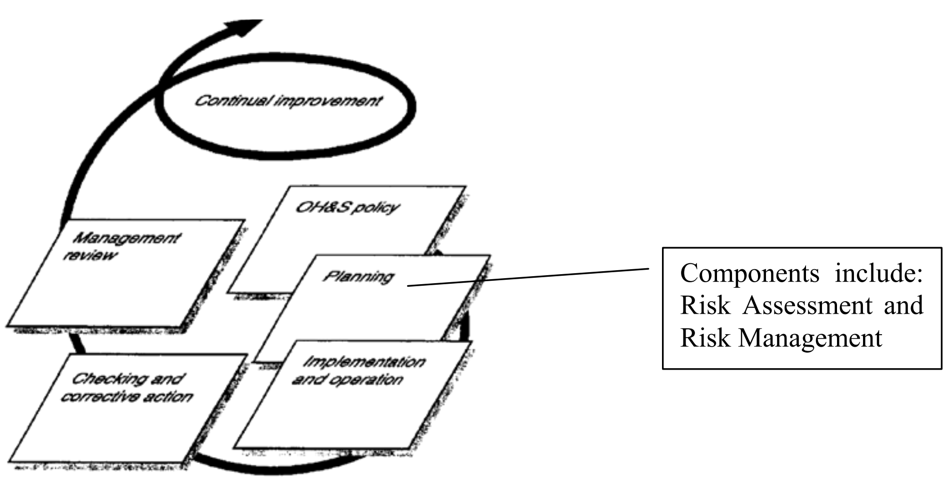
In 1999 and 2000, British Standards Institution (BSI) established the Occupational Health and Safety Assessment Series (OHSAS) Guideline based on a 1996 publication; BS 8800, 1996, Guide to Occupational Health and Safety Management Systems. This guide was designed to be compatible with International Organization for Standardization (ISO) 9001:2000 (quality) and ISO 14001:1996 (environmental) management systems standards. It has since been updated in 2007.

OHSAS 18000 has been widely used by companies throughout the world as a guide in developing safety management systems. 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, ANSI published ANSI Z10, Occupational Health and Safety Management Systems. While organized similar to ISO standards, ANSI Z10 better bridges the gap between the OHSAS guideline and the more comprehensive program management guidelines of OSHA. Since 1982, OSHA's VPP has been identifying leading companies and defining safety management systems and culture. Within the planning element of both OHSAS and ANSI Z10, risk assessment and risk management are key elements.

In 2011, ISO published 31000 (ANSI/ASSE Z690.2), Risk Management Principles and Guidelines, and 31010 (ANSI/ASSE Z690.3), Risk Assessment Techniques, along with ISO Guide 73, Vocabulary for Risk Management. These all refer to risk treatments that address negative consequences and are sometimes referred to as risk mitigation, risk elimination, risk prevention and risk reduction. Thus, one primary goal of risk management is to continually monitor and reduce risk. Measuring ongoing risk reductions and the sustainability of identified risk controls is imperative to good risk management.

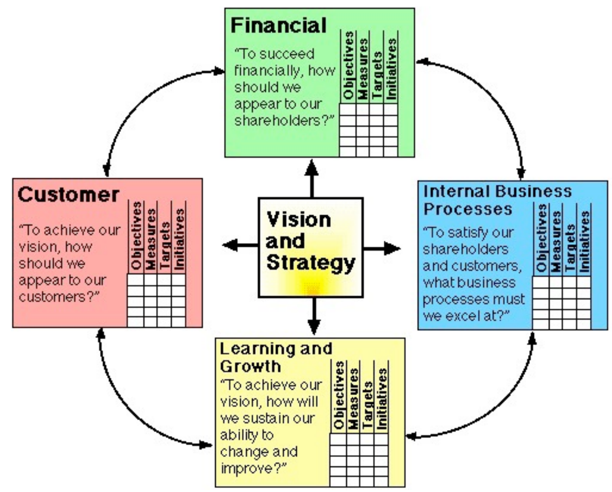
Figure 1 Elements of Successful OH&S Management



The balanced scorecard concept (Figure 2) was created in 1992 by Robert Kaplan of the Harvard Business School and David Norton of Nolan, Morton and Co. Initially a concept to help public agencies better manage and measure performance, it is now widely used as a more integrated system of performance measures. Kaplan and Norton 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 new processes to meet customer and shareholder objectives. The balanced scorecard process not only provides 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 affecting financial performance.

As Figure 2 shows, the balanced scorecard provides a framework to translate a strategy into operational terms, supported by objectives, measures, targets and initiatives.

Figure 2 Balanced Scorecard



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This article is based on an actual real-life implementation of a risk assessment process within a Fortune 500 company, integrating elements of OHSAS 18000 and ANSI Z10 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.

The following represents a case study of a risk management process implemented at customer locations.

Figure 3 Risk Matrix

Likelihood	Severity		
	Minor–1	Moderate–2	Serious–3
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 Levels

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

What Is Risk Management?

Within the OHSAS 18000 guidelines, risk management 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 and the potential consequences of injury or damage).

•Description of, or reference to, the measures to monitor and control 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 control measures.

•Necessary control measures should be detailed as part of the system's operational control element.

Risk assessment is based on identifying hazards, then determining the levels of severity and likelihood of an occurrence and selecting the most appropriate controls.

The remaining elements then help use this information to become an effective part of the overall safety program. Performing this risk assessment encompassed five basic steps:

1) Hazard category and aspect identification (6 categories).
   a) chemicals/substances;
   b) energy;
   c) strain;
   d) fall;
   e) mechanical;
   f) environmental.
2) Impact scenario identification.
3) Initial risk determination.
4) Control principle application and communication.
5) Residual risk and tolerability determination.

This risk assessment did not include business continuity and facility risk assessment.

Based on the hazards, the risk (severity and likelihood) was determined (Figure 3, p. 19), which eventually determined the level of risk (Figure 4, p. 19). Then, controls were selected based on the hierarchy shown in Figure 5.

Risk assessment occurred on two levels. First, site-level activities were classified by their most significant risks. Lists of regulatory and internal guideline requirements to control these hazards and activities were included in this approach. Next, functional or task-based risk assessments were performed using tools such as job hazard analysis, failure modes and effects analysis or other analytical methods 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 standard operating procedures, oversight and supervision, inspections, risk reduction goals and much more, was then the responsibility of the organization. To assist the organization with this approach, feedback mechanisms needed to be developed and the balanced scorecard concept already in use by the organization needed to be adapted to the metrics to verify the risk assessment process.

SH&E professional staff were assigned as liaisons for each organization, and the departmental safety committees were chartered and educated on 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 SH&E culture;

•provide resources to assist risk assessment processes.

•help establish business-level risk reduction objectives;

•assist in monitoring the risk management process;

•facilitate communication of the risk management pro-

Figure 5 Control Hierarchy

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

Figure 6 Activity-Based Risk Determination

Activity (Hazard/Scenario)	Initial			Control	Residual		
	S	P	Risk		S*	P*	Risk
Exposure to a laser beam (Class IIIB)	3	2	6	PPE	1	2	2
Exposure to a laser beam (IIIB)	3	2	6	Enclosure, interlocks	1	2	2
Fall from height (10 ft, over concrete)	3	3	9	Railing	3	1	3
Handling of animals, bites and scratches	1	3	3	Engineering, admin. & PPE	1	1	1

cess and objectives at the business level.

Risk was then determined based on the process outlined, with both initial risk (without controls) and residual risk (with controls in place) measured (Figure 6).

The goal was twofold. Using control technology, all high (red) risks were eliminated, and residual risks were reduced to the low (green) levels when possible. This process has at least two big assumptions: 1) effective controls are selected and 2) controls are enforced. For this risk assessment process to effectively prevent injuries and illnesses, the organization must validate control selection and enforcement. Thus, other elements were integrated within the safety management system and sound metrics were developed that provide validation of these two assumptions.

Risk Reduction

To take the risk assessment to the next level and manage risk, some risk reduction strategies were defined. Risk was broken into its two elements, with organizations establishing objectives to better focus on the following elements of risk:

- Develop strategies to address risk factors:
  - severity (consequence):
    - substitution;
    - automation;
    - more engineering controls;
    - better tools and apparatus;
    - early warning.
- probability (likelihood);
  - minimize number of people performing tasks;
  - improve work practices' reliability and knowledge;
  - measure and address trends of inspection findings:
    - conditions;
    - behaviors.

Itemizing individual risk elements promotes developing more focused improvement strategies as department objectives.

Balanced Scorecard

In developing a balanced scorecard for safety, concepts were defined for each of the four quadrants (Figure 7).

The next step was to determine which scorecard metrics were most likely to be measured given existing data and resources. In addition, long-term metrics were identified to help the organization better determine where additional resources would better verify the risk management process. The goal is to add additional and more defined metrics over the next 3 years so that the overall risk management process is measured and improved and so that risk reduction can be demonstrated not only at a site level, but real-time at the department level as well.

Figure 7 Applicable Safety Balanced Scorecard Metrics

Scorecard Quadrants	Initial Metric	Long-Term Metric
Customer (employees)		
• Worker Perception Surveys	No	Yes
• Injury & Illness Rates	No	
• Industrial Hygiene (IH) Overexposures	Yes	
• Employee Involvement	No	Yes
Learning & Growth		
• Continuous Improvement (Closure Rates)	Yes	Expand
o Inspections, investigations, notices, hazard analysis, IH, etc.		
• Training Retention	Yes	Expand
• Activities	Yes	Expand
o Training completed		
o Programs performed		
• Trend Analysis	Yes	Expand
Internal Business Processes		
• Management Systems Assessment Scores		
• Process-Specific Implementation		Yes
• Risk Reduction	Yes	
Financial		
• Workers' Compensation	No	
• Program Implementation Budget	No	

Risk Reduction

As a result, department-level metrics were also established, creating ownership and accountability at the department level (e.g., where the work is actually performed and the hazards exist). In Figure 8 (p. 22), a department scorecard concept was used to track implementation strategies on a month-to-month or quarterly basis.

For each department (in this case, Depts. A – H), five metrics were used to set targets and to monitor progress.

Metric 1: Validate Site-Level Risk Assessment

The first step is a one-time metric. Either the department has validated its risk assessment or not. Once the risk assessment is documented. internal champions, key management and subject matter experts from the safety office confirm that hazards are identified, risk is classified and controls are correctly determined. As a result of the risk assessment, some existing activities qualify for additional remedial action. These become risk reduction targets.

Metric 2: Identify Risk Reduction Targets

Each department was asked to identify at least two risk reduction targets. Until the two were identified, the target (green) was not reached. The next column used an arrow to indicate whether the number changed from the previous period.

Metric 3: Business Concurrence on Targets

Again, this is a one-time metric. Department heads not only needed to concur with these targets to achieve the target (Y= green), they also needed to document these in a publication to their entire staff acknowledging these targets to the department and to the leadership team.

Metric 4: Target (Objective) Status Complete

To reduce risk, additional controls were needed. For each risk reduction target, this could include several different actions and several different responsible parties. The status of action plan completion was monitored. To achieve 100% or green, all action plans needed to be completed and verified as complete. Additionally, at least one of the action plans needed to include an engineering, substitution or elimination control.

Metric # 5: Critical Control Verification Rate

As part of risk assessment, both high-risk and high-severity activities were annotated. Each department chose five of these annotations and added the identified controls to its quarterly inspection checklist. These were known as critical to safety (CTS) controls. Inspectors were required to use checklists to document whether CTS conformance was met in the workplace. These controls could have been engineering controls, PPE or knowledge of procedures.

A CTS conformance rate was calculated based on the number of CTS conformances observed over the total number of CTS observations. The green target was 95% or above. Yellow was 90 to 95%, while red was less than 90%. Each quarter, a CTS control could be replaced if two consecutive review periods documented 100% conformance.

In this regard, risk reduction efforts were personalized at the department level and integrated into senior leadership safety performance, and both awareness and safety conformance were enhanced and sustained.

Conclusion

Risk management 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, including observations to verify;

•Goals and objectives for departments

•Verification scorecards: process and learning and growth to begin (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 organizations. Annual program audits, a requirement of safety management systems worldwide, can then more easily validate the performance and quality of risk assessment, control selection and management oversight performance. Ultimately, the reduction of risk translates to a reduction of exposures related to both conditions and behavior, which directly links to the goal of all safety programs: the reduction of injury and illness. ✪

Figure 8 Risk Reduction Scorecard

Organization	Validate Site Level Risk Assess	ID Risk Reduction Targets		Business Concurrence on Targe	Target (Objective) Status % Complete		Critical Control Verification Rat	
	%	#	↑	%	%	↑	%	↑
A	100%	3		y	100%		N/A	
B	100%	2	↑	y	50%		97%	↑
C	100%	0		N	N/A		97%	↑
S	100%	1		y	0%		N/A	
E	100%	2	↑	y	50%		N/A	
F	100%	3	↑	y	67%		95%	↓
G	100%	1		y	100%		88%	↑
H	100%	2	↑	y	50%		N/A	
Total	**100%**	**3**		88%				

Notes: ↑ ↓ →

Insert an arrow (up or down or horizontal) indicating the direction of change (if any) since the last quarter.

Targets = Goals, Objectives and action plans

References

Bogan, C., English, M. (1995). *Benchmarking for best practices: Winning through innovative adaptation*. New York, NY: McGraw Hill.

British Standards Institution. (2007). *Occupational health and safety management systems, guidelines for the implementation of OHSAS 18001*. London, U.K.

Esposito, P. (2002, June). Selling safety to management using metrics. *Industrial Hygiene and Safety News*.

Esposito, P. (2001). Safety and health management systems. *The Compass, 1*(1).

Kaplan, R., Norton, D. (1996) *The Balanced Scorecard*. Boston, MA: HBS Press.

OSHA. (1989). Program management guidelines. Retrieved from: https://www.osha.gov/OshDoc/data_General_Facts/vol_safety health_mngt_.pdf.

Petersen, D. (2001, May). The safety scorecard. *Occupational Hazards.*

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A Day in the Life of the RM/I Administrator

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tion, which would create the vehicle for transparence in procurement as mentioned in the *New York Times* article. The beauty of ISO 31000 in comparison to ISO 45001 is that the risks it can address go far beyond operational risk management and occupational safety and health. I believe that the nonsafety and health risks will need to come before the needed safety and health measures.

Product safety and environmental safety through 9001 and 14001, respectively, are making headway in the international market with certification by third parties. In some parts of the world, 31000 is moving in that direction, but not in the U.S., and it is too early to tell how 45001 will be used. A prevailing idea exists among industrialists and lawmakers that workers have a choice whereas the public/consumers and the environment do not. Until policymakers establish a mandate in the U.S. to protect workers from unnecessary risks and hazards in the workplace, we are stuck in an economic dilemma—profit on the backs of workers and their families. It is unfortunate that industrialists and policymakers must look for the cheapest avenue to produce rather than emphasize responsible, efficient, productive, safe and green alternatives. In the inner circle of SH&E, we know that good safety and health, as well as environmental practices, can yield exceptional production and better profits. It just takes more effort through responsible management systems to establish the necessary controls, and not all organizations have the resources or drive to execute on this level. The U.S. could lead, but the way I see it, the commonwealth nations are far ahead of us, both in risk management and SH&E.

How has this been done in other countries? Have certain methods been especially successful? Have other strategies failed? Knowing the answers to such questions could help us proceed in a productive manner. My conversations with Institution of Occupational Safety and Health members in the U.K. on this subject indicate that bringing policymakers into the fold takes years and includes courting both them and the press. Thus, I am thinking this is not necessarily just an early 2014 objective, but one that needs to take place over the life cycle of the 45001 development period and beyond. A strategy should be developed, allies identified, outreach conducted with an action plan to achieve the mission and specific outcomes identified.