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Rochester Institute of Technology

HOW EHS MANAGERS CAN INFLUENCE ENVIRONMENTAL EXCELLENCE WITHIN THEIR ORGANIZATION

By: Joseph Mathew Whitaker
September 10, 2007

Graduate Thesis submitted in partial fulfillment of the requirements for the degree
of Master of Science in Environment, Health & Safety Management

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“HOW EHS MANAGERS CAN INFLUENCE ENVIRONMENTAL EXCELLENCE WITHIN THEIR ORGANIZATION”

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OBJECTIVE

“Investors define sustainability with a strong focus on improving internal operations rather than prioritizing community welfare or external charity” (Hamner 2005). The objective of this work is to evaluate the various management styles and systems applicable to the Environmental, Health, and Safety (“EHS”) profession; furthermore, it will present ways in which managers will discover how to understand and evaluate projects from a “business” point of view, allowing them to compete within their organization for capital and human resources. The author of the book *Managing Corporate Wealth: The Operation of a Comprehensive Goals System* states “the most critical choices top management makes are those that allocate resources among competing strategic investment opportunities” (Donaldson 1984).

This paper will also discuss various evaluations used to ensure proper buy-in from management – a process that will facilitate the allocation of human and financial resources to environment, health, and safety projects. The evaluation will focus on two primary elements. The first will be a literature review of established EHS management systems, presented in order to illustrate a basic understanding of associated management risks, recognized procedures, and observation techniques. The second element will confirm the efficacy of a new management concept and applicable management techniques. In this phase, it will analyze EHS programs and how they should be structured to facilitate these new techniques.

Graduate Project Focus

This thesis will investigate the various ways for EHS managers to compete for financial and human resources within the organization. It will propose methods and techniques that will elevate the issues to help prompt senior management to adopt proposed EHS goals and objectives. And it will define the appropriate presentation components necessary for inclusion in a business or project plan along with the required analytics to properly qualify and quantify the project to senior management.

For decades, the EHS department has been viewed primarily as a Cost Center (“CC”), focused on regulatory compliance and worker safety. These departments have not been widely accepted as contributors to the overall operation’s primary function or profitability. This paper will help EHS managers understand the differences and similarities between the traditional business functions of an organization and the EHS department.

The research questions for this thesis will focus on:

- ❖ Defining the current management system employed by EHS departments with regard to current operation within the overall business system;
- ❖ Defining how business managers evaluate projects and outline the decision methods used to “high-grade” projects to the point where financial and human capital is committed;
- ❖ Defining what drives organizational change; and
- ❖ Defining which business elements are necessary to quantify and qualify a project in terms that management will understand.

Environmental Management System (EMS) Overview

It is necessary to investigate the system that the EHS manager is in charge of in order to fully understand the scope of this study. An Environmental Management System (EMS) is defined as “a set of cohesive elements that an organization may use to minimize its impact on the environment” (Det Norske Veritas 2007). The successful manager will “borrow

many of the management systems inherent in an organization” (Det Norske Veritas 2007). Specific to the role at hand, the Environmental, Health, and Safety Management System is one which allows an organization to perform its commitments to all stakeholders; through the design and implementation of a comprehensive EHS management system, which follows best practices for the environment, health and safety system.

Finally, the role of the EHS department can and should expand in their current function within the organization. For instance, the integration of compliance with stewardship initiatives, their use, and automation and systems integration, will guide the organization towards environmental sustainability.

Chapter 1: INTRODUCTION

Traditionally, the role of the EHS department has served to regulate costs, wherein the primary responsibilities are the maintenance of, and compliance with, regulatory authorities; additionally, this role works to keep workers and the environment safe, without negatively impacting production speed or product quality. These functions are viewed by the organization, at best, as cost avoidance activities which have little affect on the organization’s recognized bottom line. As such, these duties may take a backseat to more salient issues; such as the implementation of processes to become more energy efficient due to the recent elevation in energy and raw material resource costs. Pressure on companies to reduce waste and emissions is higher than ever, which has brought about new technologies, more efficient materials, and better process equipment. In this case, the EHS manager has an opportunity to make the department a force within the organization, by transitioning its primary role from cost avoidance to profit maximization. But how does this manager re-

frame his or her worth within the organization and compete for resources (capital budget, added head count, etc.) to develop and fund these new technologies and projects?

An EHS manager must learn how to properly qualify and quantify projects that will result in the best overall return for the organization; next, she must present them in a way that her superiors will understand. Finally, the EHS manager must incorporate decision-making and decision-mapping skills which will assist in “high grading” potential projects.

The article “*Mapping Support for an EHS Management System*” published in the June 29, 2006 issue of Occupational Hazards Journal states that it is important that the “benefits of an EHS management system....be explained to management if you want proper funding and support” (Occupational Hazards Journal 2006). It is critical however, that prior to presenting the plan for funding and support, the plan be developed in a way that clearly illustrates “a roadmap for success” to management (Occupational Hazards Journal 2006). To accomplish this, one must include breakdowns of the relevant goals and objectives; these are the measures of success in any initiative, and is most easily defined with a Work Breakdown Structure (“WBS”), program milestones, and estimated costs. These items should be the basis for an investment presentation which will provide the best chances for management buy-in and success in one’s efforts to gain funding. The article states, “Program successes will build momentum and help drive the rest of the program” (Occupational Hazards Journal 2006). The article further points out a very important fact - that it is critical that one should not think of the program as merely “short-term,” because “a cultural change will be occurring” (Occupational Hazards Journal 2006). During this period there may be shifts in management and changes or transfer of employees, which is stated to

be “necessary to help exploit successes and gain momentum to take the program to the next level” (Occupational Hazards Journal 2006).

Overview of EHS Management within the Organization

The EHS manager must be an effective communicator and salesman, as she not only describes the need for safety and compliance to stakeholders and workers, but also sells management on new ideas for programs and funding. Naturally, financial requirements exist, specifically costs associated with non-compliance and worker injuries and, as well as with receiving a negative screening by stakeholders. In addition, the EHS manager must effectively motivate those within the organization to work in cohesion with management to excel in environmental, health and safety performance. This goal requires proper education and training throughout the organization. The EHS manager should work to establish training programs with expected results for her programs and then communicate the successes within the organization. This becomes the initial “measurement point” for program success and also provides a form of internal advertising.

Socially Responsible Investment (SRI)

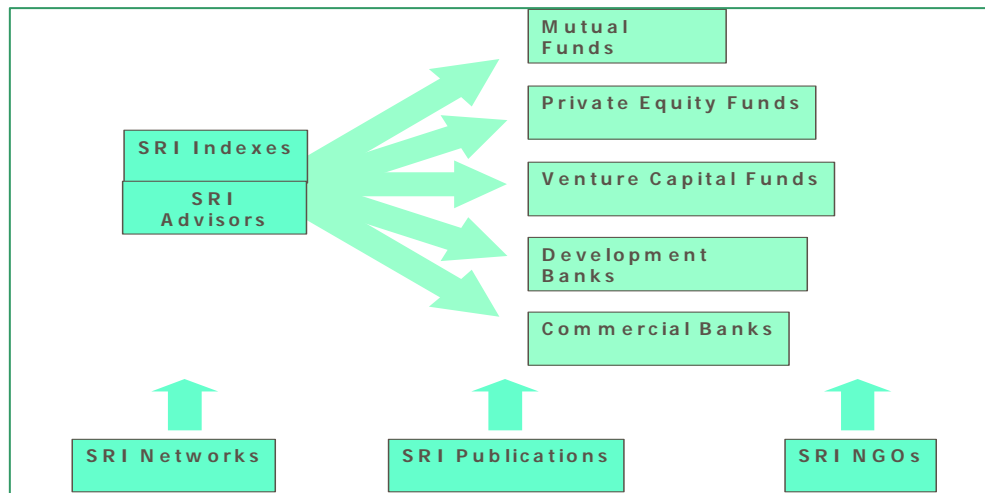
With most investments, decision-makers review the return on investment (ROI) or profit of the venture, those investments with the highest rate of return relative to risk are chosen. In ‘Socially Responsible Investment’ (SRI), profit and risk are used in combination with another factor – the investment’s impact on the environment and society. This movement is currently influencing senior management to consider similar principals within their organizations. The question asked is “which EHS projects do we invest in to achieve

or become more socially responsible?” This is creating an opportunity for EHS managers to gain funding for projects that result in better EHS performance, improved image and net returns for the organization. Burton Hamner, in his work entitled “Integrating Market-Based Sustainability Indicators and Performance Management Systems,” writes that SRI is the “use of specific social and environmental criteria, in addition to traditional financial criteria, to make investment decisions” (Hamner 2005). The author relates that traditional concerns have been the avoidance of “undesirable sectors such as tobacco, nuclear power, gambling, etc.” which are referred to as “negative screening in SRI.” However, over the past few years, “SRI has changed to a positive approach of looking for best practices among competitors” (Hamner 2005).

SRI funding uses positive screening criteria geared toward ‘Sustainability’ or ‘Corporate Social Responsibility’ (CSR) when evaluating possible investments. The screening criteria include “health and safety, corporate governance, pollution prevention, labor relations, indigenous peoples and more” (Hamner 2005).

One can gain from the recent growth and development of the SRI markets that business leaders are now held responsible for their environmental performance and are being graded for their successes and failures. To this end, market indexes provide lists of companies that are ‘responsible’ or ‘sustainable’, and their customers are inclusive of “a full range of financial market institutions...supported by information providers and advocacy groups” (Hamner 2005). Figure 1 illustrates the structure of the SRI Market.

Figure 1 SRI Market Structure

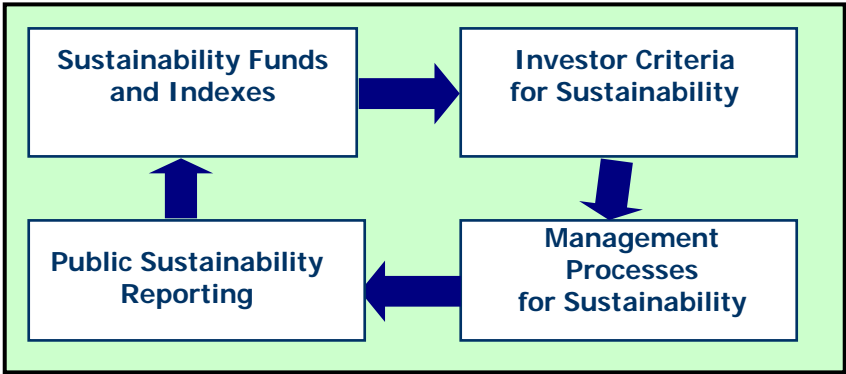


Source: *Hamner* (2005)

To date, there are more than 700 SRI mutual funds, and about a hundred SRI funds that are specifically focused on sustainable companies and not just negative screening for undesired sectors. This increased market focus will continue to place pressure on businesses to excel in their environmental performance and will ultimately pressure EHS managers to qualify and quantify projects that result in superior environmental performance and company profit.

The following figure shows the cycle of market-based sustainability development.

Figure 2: Development Cycle of Investor-based Sustainability Criteria



Hamner (2005)

Hamner further identifies the “core sustainability criteria used by the 12 SRI indexes that publish their methods”(Hamner 2005). The following table lists the positive criteria identified and according to their frequency.

Figure 3: Frequency Analysis of Criteria in Market Indexes of "Sustainable" Corporations

Frequency	Sustainability Criteria	Frequency	Sustainability Criteria
9x = 75%	Health and safety	4x = 33%	Communication Discrimination Legal compliance
8x = 67%	Corporate governance CSR performance reporting Labor and union relations Pollution prevention	3x = 25%	Contracts Codes of ethics Animal relations Risk management Environmental performance Relations to customers and suppliers Energy sources
6x = 50%	Training and education Quality Compensation Diversity	2x = 17%	Leadership and incentives Management Non-executive director remuneration Conduct of business Sustainability assessment Rights Management Profit sharing Family support Product safety Recycling Environmental management system
5x = 42%	Innovation Benefits Human rights		

Hamner (2005)

From this data, Hamner (2005) derives that

“...the most striking aspect of this table is its tremendous variety. **Investors define sustainability with a strong focus on improving internal operations rather than prioritizing community welfare or external charity. The most frequently mentioned sustainability element is employee health and safety, which indicates the focus of investors on internal management that drives sustainability.**”

Also valued by investors is “pollution prevention and resource conservation” (Hamner 2005). Investors also consider other financial, environmental and social issues, referred to

as the triple bottom line. This same concept is being willingly adopted within organizations that demand superior EHS performance and enhanced profitability.

Quality Management

The concept of quality management was developed by Edward Deming in the 1950s and adopted by Japanese firms in the 1960s. This management system is widely credited for the expansion of Japanese exports during the late 1960s.

The US Department of Commerce developed a system to promote quality as a competitive force for industry. In 1987 the National Institute of Standards and Technology (NIST) established the Malcolm Baldrige National Quality Program. NIST created an advisory group of experts in quality management and produced detailed guidelines for assessing quality in organizations. These guidelines make up the Baldrige Performance Criteria.

Hamner refers to the Baldrige Performance Criteria as a framework that “matches the specificity of the investor’s criteria for sustainability...”. The following chart illustrates the use of Baldrige Performance Criteria against Core Market Criteria for Sustainability. It is quite easy to imagine various themes such as water and energy conservation and waste prevention goals as one reads the through figure 4.

Figure 4: *Baldrige Performance Criteria against Core Market Criteria for Sustainability*

Baldrige Performance Criteria	Core Market Criteria for Sustainability
1.1 Organizational Leadership	
a. Senior Leadership Direction	Sustainability vision and policy
b. Organizational Governance	Good governance
	Leadership structure
c. Organizational Performance Review	

1.2 Social Responsibility	
a. Responsibilities to the Public	Responsiveness
	Beyond compliance
b. Ethical Behavior	Codes of conduct
c. Support of Key Communities	Philanthropy
	Consultation
2.1 Strategy Development	
a. Strategy Development Process	Sustainability in strategy development
b. Strategic Objectives	Risk management
	Environmental and social strategies
2.2 Strategy Deployment	
a. Action Plan Development and Deployment	Sustainability programs
b. Performance Projection	
3.1 Customer and Market Knowledge	Stakeholder knowledge
3.2 Customer Relationships and Satisfaction	
a. Customer Relationship Building	Customer relationships
	Supplier relationships
b. Customer Satisfaction Determination	Customer satisfaction
4.1 Measurement and Analysis of Organizational Performance	
a. Performance Measurement	Sustainability assessment
b. Performance Analysis	
4.2 Information and Knowledge Management	
a. Data Information and Availability	Public reporting
	Labeling and advertising
b. Organizational Knowledge	Networking
5.1 Work Systems	
a. Organization and Management of Work	Labor management and relations
b. Employee Performance Management System	Compensation
c. Hiring and Career Progression	Discrimination
	Diversity
5.2 Employee Learning and Motivation	
a. Employee Education, Training and Development	Training
b. Motivation and Career Development	Profit sharing
5.3 Employee Well-Being and Satisfaction	
Work Environment	Health and safety
Employee Support and Satisfaction	Non-mandated benefits
6.1 Value Creation Processes	Pollution prevention
	Innovation
6.2 Support Processes	Supplier sustainability
	EHS management systems
7.1 Customer -Focused Results	Sustainability benefits to customers

7.2 Product and Service Results	Resources use
	Waste and emissions
	Product certifications
7.3 Financial and Market Results	Profit distribution
	Taxes and subsidies
7.4 Human Resource Results	Health and safety results
7.5 Organizational Effectiveness Results	Certifications of processes
7.6 Governance and Social Responsibility Results	Compliance
	Awards
	Social and environmental impacts

Hamner (2005)

Figure 5 breaks down the perspectives into the following categories:

- (1) Financial;
- (2) Operational;
- (3) Customer and Stakeholder; and
- (4) Development Perspective as applied by the balanced sustainable scorecard.

Figure 5: Four Primary Perspectives of Sustainable Balanced Scorecard Management in EHS

Financial Perspective	Operational Perspective	Customer / Stakeholder Perspective	Development Perspective
Good governance	Leadership structure	Responsiveness	Sustainability vision and policy
Risk management	Beyond compliance	Philanthropy	Codes of conduct
Profit distribution	Environmental and social strategies	Consultation	Sustainability in strategy development
Taxes and subsidies	Sustainability programs	Customer relationships	Stakeholder knowledge
Profit sharing	Labor relations	Supplier relationships	Sustainability assessment
	Compensation	Customer satisfaction	Innovation
	Diversity	Product certifications	
	Training	Awards	
	Health and safety	Sustainability benefits to customers	
	Non-mandated benefits	Social and environmental impacts	
	Pollution prevention		
	Supplier sustainability		
	EHS systems		
	Resources use		
	Waste and emissions		
	Health and safety		

results
Compliance
Certifications of processes
Discrimination

Hammer (2005)

Chapter 2: Strategic Decision Making

Strategic Decision Making is an essential component in the success of any firm. However, the decision making process can be wrought with challenges. Focusing on factors such as risk tolerance and the cultural background that influence the decision making process are critical to understanding the challenges of change influence.

Strategic Decision Making and its Importance

Strategic decision-making is what differentiates successful companies. At every level of management, decisions must be made in order to guide efficiency and viability. That said, senior managers have an additional responsibility to directly affect the performance and direction of an entire company.

According to Klimoski and Zaccaro, models of strategic decision making and management assert that the effectiveness of an organization is dependent upon a co-alignment, a process that involves both the organization and the environment. Furthermore, it is the purpose of the senior management to develop and manage this co-alignment (Stephen J. Zaccaro 2001). Research in this area usually focuses on the strategic decision making activities of top executives (Stephen J. Zaccaro 2001). As a result, strategic management models illustrate the manner in which senior managers make the strategic

decisions that are supposed to make possible organization-environment co-alignment (Stephen J. Zaccaro 2001). In addition, researchers utilizing such an approach, focus on key leadership processes which are inclusive of sense making, sense giving, scanning of the environment, specifying strategic choices, and choosing and implementing appropriate strategies (Stephen J. Zaccaro 2001). The authors further explain that:

Some models within the strategic management tradition actually deemphasize the contributions of top executives to organizational effectiveness (Hannan & Freeman, 1977; Pfeffer & Salancik, 1978), arguing that organizational and environmental parameters (such as resource availability, the fit of the organization with its environmental niche, and the strategic predisposition of the organization) primarily account for organizational outcomes. Other theorists have adapted a contingency model (Gupta, 1984, 1988) in which effectiveness is a product of the fit between the organization's strategic orientation and the characteristics of its top managers. Thus, this approach defines strategy as a determinant rather than a consequence of executive selection and action.

In addition, it has been asserted that companies often hire executives that have the capacity to meet the strategies of the organization because it improves the overall performance of the organization. Therefore, in some cases it is apparent that CEO's are given a strategy and expected to carry it out as opposed to actually having to develop a strategy. (Stephen J. Zaccaro 2001) This becomes an important fact for the EHS manager to understand so she can develop and promote projects that fit within this strategy and are in support of the organizations goals.

The authors further assert that additional leadership models are based on the central role of senior managers, as it relates to thought processes of these managers (Stephen J. Zaccaro 2001). For instance, the rational and normative models assert that the responsibility

of senior management is to carry out strategic decisions that have been carefully analyzed. This relates to environmental contingencies in addition to organizational strengths and weaknesses. These models also assert that senior management must apply objective criteria to strategic decisions to establish the most suitable organizational strategy. Accordingly, strategic leaders — such as senior managers, are seen as rational individuals that optimize informational processors (Stephen J. Zaccaro 2001).

Finally, an alternative view adds upon the ways that managers make decisions; in this framework, personal qualities and characteristics of senior managers are thought to play a quintessential role in strategic decision making. For instance, some scholars have found that, when confronted with the multifaceted, infinite, and vague information, no two strategists will behave in the same way. In fact, top managers rarely choose the same options and, when they do, the manner in which they implement the options differs. In addition, factors such as biases, egos, capacity, previous experiences, and fatigue all impact the decisions made by top brass. Recent research has supported these theories, stating that “top management team processes and characteristics influence strategic decision making. Such research adds team processes and demographics to executive values and belief systems as primary determinants of the executive decision-making processes” (Stephen J. Zaccaro 2001).

Whether using individual models to determine the origin of decision-making, or a comprehensive approach that utilizes many models, predicting and guiding the decision-making process in a firm is extremely important. This is especially true because of the risk-

reward structure inherent to investment. Accordingly, managers not only internalize risk in their decisions, but also react differently to various levels of risk.

Risk Tolerance

Risk Tolerance has to do with the amount of risk that a business is willing to assume as a result of making certain strategic decisions. It is also known as “insurable risks” (Frame 2003). According to Frame, author of *The Risk Management Process*, the majority of owners and beneficiaries of a company’s risk management process usually work together to establish tolerances associated with the risks to which the company is exposed. The author explains that these risks go beyond those risks that are deemed to be ordinary business risks (Culp 2001). Instead, they are inclusive of risks that must not be fully realized to meet the business goals of the company. Frame also explains that risk tolerances can be expressed using one of two approaches - absolute or relative.

The former entails defining risk tolerances based on the type of risk across every exposure of the firm in aggregate. Whatever the risk tolerances are based on, they should satisfy the following criteria:

It should be defined in anticipation of the need to monitor, report, and target that tolerance level. Excessively ambiguous or immeasurable risk tolerances make no sense. It should ideally be comparable across different exposure types. If the beneficiaries and owners of the risk management process decide that aluminum price risk is excessive, that decision should also provide guidance on what amount of currency risk, say, is tolerable. An easy way to express absolute risk tolerances that satisfy the first but not the second criterion is in terms of nominal capital or quantity at risk. The firm might decide that more than 1 million troy ounces outstanding in aluminum purchase commitments is too much, but this does not facilitate any comparison between aluminum purchase commitments and exchange rate risk. (Culp 2001)

Examining the absolute risk in an organization is one manner in which a senior manager is influenced when making decisions. The senior manager's decision to use absolute tolerance as a mode of measurement may be dependent on certain factors, including the size of the company, the financial condition of the company, and the range of products that are offered.

In addition to absolute risks, companies also use a method of evaluating relative risk tolerance. Relative Risk Tolerance is used to describe a company's natural risk exposure; this includes the risk that a business must take to realize its primary business goals. Managers should identify both the types and amount of risk involved in each venture, and then determine the corresponding risk exposure relative to their company (Culp 2001). These risks include factors like market risks, financial risks, operational risks, project risks, environmental risks, regulatory risks, and the risks associated with the life cycle of a product. Again, the valuation of each risk is dependant on what type of organization the managers are running.

For example, in larger diversified companies, measuring risk tolerance based on specific risks may be more practical. This is true because large companies employ a larger number of people, operate certain segments of the business over the internet, have diversified areas of business, and may even have subsidiaries which will increase the overall risk exposures of the company. In essence, their very structure shields them from fluctuations better than that of small, niche organizations.

Also, assessing past risks and how the company was able to adapt is useful in determining the way a company will adapt in the future. In this way, risk tolerances can be calculated. Learning from past experiences can be a beneficial influence on the decision

making process of senior managers. This is particularly true if the company can also take into consideration the past experiences of other companies in the same industry. When management can examine a similar company that has experienced a similar project or market condition, the manager can better understand the risks that may arise if certain decisions are implemented as part of the overall strategy of the company. However, when managers assess risk tolerance using past events, they must not fall into the trap of believing that these past events are a clear indication of what will happen in the future (Frame 2003); this is because uncertainty is always present in future ventures, because the variables surrounding the new venture are different from that of the old.

Regardless of whether senior managers weigh risk tolerances based on absolute risks, specific risks, risk tolerances that are present and only relevant to other risk tolerances, or risks learned from past experience, they all influence the manner in which decisions are made. Frame explains that

In the final analysis, business management is about managing risk, because in running a business, the business professional is operating in an environment filled with uncertainty. Every decision made—choosing a project, hiring an employee, investing in a new product, upgrading operations—has risk implications that decision makers must take into account consciously. Will the chosen project be delivered on time and within budget? Will the new employee, who shined during the interviews, perform competently when on the job? Will anyone buy our new product once it is on the market? Will the benefits of the recently installed customer relationship management system offset its great expense? The point is that in the arena of business, nothing is certain. (Frame 2003)

Cultural Background

Along with risk tolerances, decision making is also a product of one's cultural background. Indeed, there is a great deal of research that suggests that managers from

different cultures have different methods of making decisions. It seems that the culture of a senior manager can also be one of the determining factors concerning their management style. Additionally, there is research suggesting that culture provides the framework on which many decisions are made. If an individual has a culture that fundamentally respects the environment, then that background will influence decisions to enhance environmental performance or promote change that supports environmental sustainability.

According to the article Avoid Decision Making Disaster by Considering Psychological Bias (Duchon 1991), there is a larger frame of reference that is present within any company. The authors explain that:

Organizational decisions are made against a background of history rich in traditions, rituals, and mythologies. A decision maker's interpretation of this history does two things: 1) it provides a context frame which helps create meaning for a given event and; 2) it provides a kind of goal reference for what the organization values. Thus history and cultures provide frames and points of reference, ways to understand and structure decision problems. Although traditions and cultural expectations serve as important anchors for understanding the world around us, these same anchors may also impart bias. And the bias is so value laden, so much a part of what is considered normal and routine, that it is difficult to notice its presence; we're most often unaware of its effects. (Duchon 1991)

The authors go on to explain that rituals, methodologies, and traditions all serve as backdrops for decision making within the organization; they assert that many of the decisions that managers make are preprogrammed, based on cultural norms and traditions that guide and inform them through the processes. As a result, organizations can make the same mistake continuously. Unless companies make a concerted effort to change the factors that influence their decisions, they will follow this redundant and destructive path. The

authors conclude that “organizational change is so very difficult to achieve because the frames of tradition have such a powerful hold on the collective psychology of the organization” (Duchon 1991).

Authors Harbison and Myers in their book *Management in the Industrial World* (1959) expound upon this definition of logic. Further, they state that it is based on the notion that the process of industrialization is based on certain factors that all societies must engage in if they desire industrialization to be successful. This is referred to as the ‘logic of industrialization’ (Harbison Frederick 1959). In addition, an important component in the logic of industrialization is the development of requisite organizations, in order to coalesce capital, technology, natural resources, and a workforce for the purposes of production. This development is also based upon a certain logic that involves the cultivation of management (Warner 2001). Warner contends that “there exist a general logic of management development which has applicability both to advanced and industrializing countries in the modern world” (Warner 2001).

Harbison and Myers (1959) argued that industrialization can create an increased specialization of functions within an organization. Therefore, the internal complexities of an organization can tremendously increase as overall size of the organization increases. Accordingly, factors such as internal complexity and specialization can generate problems associated with departmental coordination and, therefore, cause inefficiency within the organization (Warner 2001).

The authors further explain that the growth of the organization, in terms of size and complexity, also makes it difficult for decision-makers at the top levels of management

(Warner 2001). In addition, the style of management is also affected. In such an organization, style usually shifts from authoritarian to a more participatory style; there may also be decentralization, as specialists and experts become a part of the organization, causing the expectations of workers to increase (Warner 2001). In addition, management is often forced to increase both their competence and professionalism (Warner 2001). These organizational changes are instrumental in bringing about other alterations in the organization's structure, including increased specialization, dependence upon rules, and decentralization. Furthermore, this theory asserts that the logic of industrialization takes precedence regardless of the cultural setting (Warner 2001). Even though this theory of culture-free decision making does recognize that the culture plays some role in the decisions made by managers, it holds that the decisions made are primarily a result of the aforementioned industrial logic (Warner 2001).

On the contrary, the culture-specific argument takes into consideration that there are different distinctions made in different cultures that includes manners and thoughts. This culture is passed on from generation to generation; an obvious part of the way people learn a unique language, value system, and how to regard certain modes of behavior (Warner 2001). Accordingly, a culture-specific theory argues that, even when organizations in different societies are at similar stages in economic (or environmental) development, deep seated cultural beliefs will still determine how people behave and relate to one another (Warner 2001).

Finally, as stated - risk tolerances play a significant role in influencing decisions by senior managers. These tolerances are established by company owners, shareholders, and

other stakeholders. Research found that, in certain cultures, the decision-making process can almost be predicted by assessing cultural norms.

Chapter 3: Five Basic Models of Organizational Architecture

There are five basic ways organizations are structured. It is important for the EHS manager to understand the various structures and determine which is used within her organization. For an EHS manager, fully understanding these models is an important tool for competing for resources and influencing change within the organization.

- Centralized: All work is done out of a single, consolidated office. This model is best for small to medium-sized entities with homogenous local/regional operations and facilities, or as a temporary solution following a demonstrated inability of others to perform adequately.
- Decentralized: All work is pushed down to sites/units with limited or no oversight. While often the most cost-efficient, it may also present the highest risk because, as the staff is separated, overall skill sets at each office are thinned. This model works for any size company with the proper people, skills, and training; most often, it is seen in large, diverse entities or private equity firms.
- Hybrid: A combination of the first two, this often entails 2-3 levels of responsibility that is centralized for specialty expertise and entity-wide issues, such as legislative/regulatory affairs, auditing, remediation, and due-diligence. Responsibilities are decentralized for routine issues and operations, typically at operating unit and site levels. This model is most common in large, diverse entities.
- Matrix: May also be 2-3 levels with centralized services, where efficiency and expertise can be most efficiently utilized. Routine issues and operations may be conducted from regional 'service centers' that report to the central organization, though not always. They provide services to groups of smaller sites that do not have the critical mass or an economy of scale to provide their own services.
- Shared Services: May have any of the four above structures, but services are defined and delivered through written contracts, wherein the units/sites receive the services and the cost depends on the site. Used mainly to provide centralized services through a decentralized approach. This offers many advantages, though presents disadvantages such as the not having a dedicated back office to support a

project. This is really more of a funding structure than an organizational structure (Rice 2006).

Steven Rice, in the work entitled “*An Effective Environmental Policy Statement is Your Foundation!*”, states that “far too many companies have overlooked the influence that an excellent policy statement, and a company values statement, can have on providing a firm foundation upon which everything else – organization, objectives, programs, etc. – rest” (Rice 2006). A sound environmental policy is critical to organizational performance. This statement should be relevant, passionate, and credible so as not to do more damage than good.

Guidelines provided by Rice for the environmental policy statement include the following:

- (1) Brief: It should be no more than one page.
- (2) A Value Statement: This is included and states what the company believes in and the goals for operations and employees to achieve.
- (3) Visionary: The policy statement is clear.
- (4) Real and Relevant: Applicable to the company’s vision for goals and standards.
- (5) Motivational: Employees are excited by the statement as well as the public and other stakeholders.
- (6) Consistent: Rice states “It is consistent with what the company leadership *does*, not merely *says*. ‘The walk’ trumps ‘the talk’ every time” (Rice 2006).

(7) Responsibility: Clearly stated are the parties responsible for the policy and for implementation of the policy.

(8) Signed: The document is signed by the primary company executive and the highest level environmental leader, as well as any relevant business/division president if it is a business or divisional-specific statement. This joint commitment displays personal concurrence and commitment.

(9) Dated: This reveals that the policy statement is current which indicates and reinforces the policy's relevance.

(10) Current: The policy statement is reviewed regularly (on an annual basis) and is reviewed whenever a major change occurs in the structure of the company or the company's primary executive.

The work entitled: "Management Systems and Performance Standards" by (Det Norske Veritas 2007) states that the "root causes of most major accidents are found in organizational failing. Effective safety and environmental management therefore needs to be implemented through all stages of your projects and operations from concept studies, through design and operation, to abandonment and recycling" (Det Norske Veritas 2007). In order to focus efforts of management on operational features, the performance standards must be risk-based where the greatest hazard potential is identified. Management systems and performance standards include the following:

- (1) Process development,
- (2) Benchmarking,

- (3) Measurement and audit,
- (4) Legislative advice and liaison with regulators, and
- (5) Safety case management.

Benefits include the following:

- Systematic and effective risk control,
- Advanced management decision support,
- Improved safety, environmental and business performance,
- The ability to meet and exceed regulatory requirements,
- Improved behavior and commitment of personnel, and
- Continual business improvement (Det Norske Veritas 2007).

The work entitled “Management-Based Strategies for Improving Private Sector Environmental Performance,” written by Cary Coglianese and Jennifer Nash, states that “Improvements in environmental quality depend in large measure on changes in private sector management. In recognition of this fact, government and industry have begun in recent years to focus directly on shaping the internal management practices of private firms” (Coglianese and Nash 2005). New management-based strategies of various forms are being developed and implemented by the most progressive organizations. However, these are different from conventional regulatory approaches as they are “...linked by their distinctive focus on management practices, rather than on environmental technologies or emissions targets” (Coglianese and Nash 2005). The authors further state that “decision makers in government and the private sector are turning to management–based strategies for several

reasons. These strategies take advantage of the fact that private-sector managers have the best knowledge about how to bring appropriate changes within their organizations and industries” (Coglianese and Nash 2005).

In order to investigate the performance of management-based strategies, The Regulatory Policy Program (Harvard University), organized a research conference that brought some of the leading scholars and leaders together so that experiences with management-based strategies could be evaluated and lessons garnered for the future development of public and private sectors. Management-based strategies were defined as “the coordination of an organization’s operational activities toward a specified set of objectives”. These strategies considered the following:

- (1) Planning,
- (2) Goal-setting,
- (3) Staffing,
- (4) Training,
- (5) Analysis, and
- (6) Control

Management-based strategies are stated to be “attempts that require or encourage a set of targeted firms or organizations to use basic management practices in ways that align their actions and outcomes with broader social objectives” (Coglianese and Nash 2005).

Furthermore, the term is defined as strategies used externally in order to change the practices and behaviors of management inside of the organization.

Management-based strategies are further distinguished between those that are *government deployed* and those that are *non-governmental* in nature. There are two

recognized styles for implementing management-based strategies. One “mandates” management practices and the other “encourages” the adoption of improved systems. This is a significant point when considering which practice is most adoptable within a given organization. Programs to ‘coax’ (but not require) stakeholders to improve are referred to as management-based incentives. Management-based pressure is applied to others by the organization through actions meant to encourage improvement of management.

Coglianesi and Nash state that for “management-based strategies to work, management itself must be an important factor causally related to the outcomes.” Certain “firms exhibited different management styles reflecting managers’ attitudes toward environmental issues, their responsiveness to various pressures for environmental improvement, and the steps they took to implement environmental policies” (Coglianese and Nash 2005).

Chapter 4: Literary Review

Design of Management Systems

Management-based strategies represent several types of efforts that result in improvement of a company’s environmental management and performance. Potentially relevant differences in the design of management-based strategies and other design features include the following:

- (1) Planning versus Implementation,
- (2) Types of management actions,
- (3) Specificity of Actions,
- (4) Information Collection,
- (5) Auditing, and

(6) Stakeholder Involvement (Coglianese and Nash 2005).

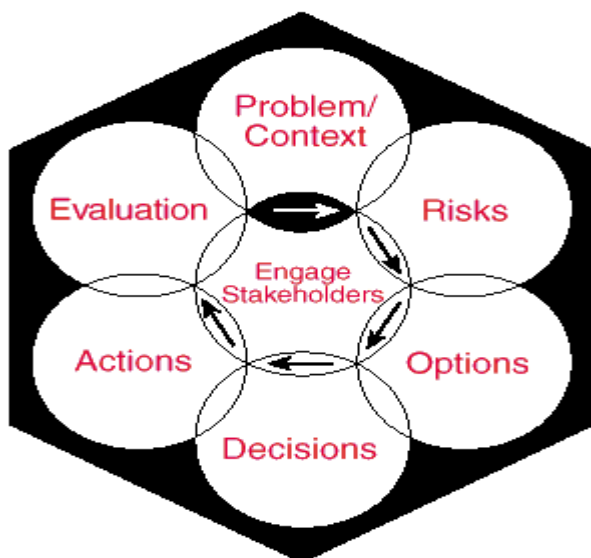
It is generally acknowledged among managers that community and organization involvement in environmental management “could deliver important, but perhaps intangible value to businesses” (Coglianese and Nash 2005). Managers in the private-sector are stated to “appear to be increasingly open to involving external stakeholders in their environmental management.” The author continues by stating “...that seek to institutionalize community involvement may succeed in creating ways to keep the pressure on firms to make continuous improvements. A further problem is that community and environmental organizations often lack the resources to make a meaningful contribution to the companies’ development and implementation of management systems” (Coglianese and Nash 2005).

Other problems that exist include (i) the lack of technical expertise relating to industrial operations, and (ii) the fact that large, national environmental organizations with greater expertise lack the organizational presence and staffing needed to help design and monitor the management at facilities across the country. “Management based strategies can be used both to help firms come into full compliance with existing regulations as well as to take steps that go beyond compliance” (Coglianese and Nash 2005). The authors offer other benefits of management-based strategies and state that they can lead to a firm’s improvement of compliance with conventional technology and performance-based regulations by providing encouragement to identify the regulations and then develop plans to meet and maintain compliance and enhance performance. This management system can also be used by companies to identify ways of reducing environmental impacts and identifying projects that improve overall sustainability.

Coglianesse and Nash state that there is much more to good management than a flowchart or a set of written procedures. Good management “reflects the dynamics of organizations made up of people and their relationships with each other” (Coglianese and Nash 2005). Finally, management style appears to shape the environmental performance of firms so that strategies that influence management can be considered at least plausible candidates for bringing about environmental improvements. This is an important fact for the EHS manager to understand as they identify and develop projects and procedure enhancements.

The Commission on Risk Assessment and Risk Management sponsored a Symposium on a Public Health Approach to Environmental Health Risk Management on August 8, 1997, in Washington D.C. They stated that “understanding the context of a risk problem is essential for effectively managing the risk” (Commission on Risk Assessment and Risk Management 1997). The Commission holds that “...a compelling public and ecological case can be made for modernizing our approach to environmental regulation” (Commission on Risk Assessment and Risk Management 1997). The following illustrates the framework for environmental health risk management as shown in the Risk Commission’s final report.

Figure 6: Framework for Environmental Health Risk Management



Source: (Commission on Risk Assessment and Risk Management in a 'Symposium on a Public Health Approach to Environmental Health Risk Management, August 8, 1997, in Washington, DC)

An approach to risk assessment is inclusive of the following elements:

- (1) Evaluates the adverse health effects experienced by a population, identifies possible causes of those effects, and seeks to determine the relative contribution of each cause to the effects;
- (2) Emphasizes prevention, to reduce future needs for environmental clean up; and
- (3) Focuses on the effectiveness of actions, instead of just compliance with prescriptive "command and control" regulations (Commission on Risk Assessment and Risk Management 1997).

Topics addressed in the symposium included the following:

- Defining a "public health approach" to environmental protection,
- Clarifying the advantages and disadvantages of a public health approach,
- Identifying current statutory, institutional, and other legal barriers to a public health approach,

- Identifying social or cultural barriers to a public health approach, and
- Identifying changes needed to adopt a public health approach” (Commission on Risk Assessment and Risk Management 1997).

According to Barry Levy (1997), panelist at the *Symposium on a Public Health Approach to Environmental Health Risk Management* and the president of the American Public Health Association (located in Boston, Massachusetts), an approach with a focus on public health to environmental protection is “highly feasible and highly desirable”. Levy notes that there are many advantages and “few, if any, disadvantages”. He further notes that over the past thirty years “there have been unfortunate schisms between environmental protection and public health, both conceptual and organizational”. Finally, the expert cites the following ten recommendations for the public health approach to environmental protection:

- (1) Surveillance: the ongoing, systematic collection, analysis, and dissemination of data to prevent disease and injury and to identify outbreaks and other disease or injury trends of public health significance. Businesses and communities need surveillance for exposures of public health concern and for adverse health events. Despite many advances in our capabilities for environmental and occupational health surveillance, there is a disturbing trend that the local and state public health infrastructure across the country is deteriorating, especially for surveillance systems.
- (2) Assessment, including evaluation: Public health professionals routinely use epidemiology, exposure assessment, and other sciences to characterize problems, identify ways to reduce or eliminate them, and determine the most effective control measures.
- (3) Prevention: a core value and principle of public health, especially primary prevention before adverse health effects occur.
- (4) Thinking globally and acting locally: Public health problems, including environmental public health problems, need to be seen in a broad geographic context. Pollutants cross not only state borders, but also national and continental borders.

(5) Sustainability: both in developing countries and for systems here in the United States. We must have the appropriate positive incentives, public involvement, and investment new environmental technologies and projects that return solid financial and societal returns.

(6) Population-based approaches: Emphasis should be placed on helping those most at risk; this is determined by those individuals who are most undeserved and in the most need. The widening of the gap for care relative to the 'have' and 'have-nots' needs to close.

(7) A holistic approach: There are multiple factors, multiple environments, and multiple disciplines that need to be coordinated if we want to assess and solve problems. We need to think of whole human beings, whole communities, entire populations, and physical and socio-cultural environments that support healthy attitudes, healthy behavior, and environmental health.

(8) A strong scientific base: to guide public health activities. Environmental public health depends on epidemiology, biostatistics, environmental chemistry, industrial hygiene--a whole range of physical, behavioral, and social sciences. All too often, decisions are based on ideology and not on science. Unfortunately, research illustrates more and more polarization based on ideology within the United States; this includes the increasingly litigious approach to solving problems, rather than a more cooperative approach to finding practical, sensible solutions that are based on science and core values.

(9) An evolving and dynamic nature: This year the APHA celebrates its 125th anniversary. Public health clearly has evolved considerably in many ways over that period of time, and not just the science base. Populations are becoming more diverse and aged and technology is evolving with the information and communications revolution. The biotech/genetics revolution impacts public health heavily, including environmental public health. Certainly the threats to environmental health and environmental protection are evolving as well. (Levy 1997) Society needs to deal both with the threats of both today and tomorrow.

(10) Put the public into public health: Public health is a societal function and not just what we environmental scientists or public health professionals do. Therefore, stakeholders need not only to communicate the environmental protection and environmental health messages to society at large, they need to really engage the public in public health, in environmental public health, and in the issues that affect them, their families, and their communities. All stakeholders need to actively reach out to individuals and communities, not only to communicate a message, but first to listen and then to work with communities and groups to develop policies and programs that serve the interests of public health (Levy 1997).

According to Levy, the following three ingredients are required for a public health approach to environmental health protection:

- (1) Values,
- (2) Vision, and
- (3) Leadership (Levy 1997).

The work entitled “*EHS Governance in a Global and Transparent World*” states that “Managing environmental, health and safety risks has become a relatively natural function. Most companies now recognize its importance and manage it as a business function – with a focus on increased efficiency, cost-savings, risk reduction and reputation management” (ICF Consulting 2002). EHS management has gained efficiencies during a time “...when most large, multinational companies have experienced significant restructuring due to acquisition, divestitures, or efforts to position the company for stronger competition and performance in the marketplace” (ICF Consulting 2002). Today’s organizations must not only talk the talk, but they must also walk the walk, as evidenced in the following:

“In this age of corporate transparency, it is not enough to simply inform stakeholders of limited company successes, improvements, or even persistent shortcomings and liabilities. Stakeholders (such as investors, business partners, nongovernmental organizations, and local communities) want actual improvements in the quality and consistency of performance.” (ICF Consulting 2002)

In order to respond to the demands as well as to maintain the gained EHS management efficiencies, the focus of many executives has been on the creation of “global EHS governance practices” (ICF Consulting 2002). Important questions whose answers are

necessary for establishing a “best of class” EHS department that can compete for resources are as follows:

1. Is the current EHS system being implemented consistently across the company, and is this system leading industry practices?
2. Is the EHS program designed and implemented in a manner to communicate to senior management actual performance across all operations? Do we really understand the basis of our EHS performance across all operations?
3. Is there an appropriate allocation of EHS resources (people and dollars) across the organization?
4. Is the company reporting performance in a manner that supports its external EHS global strategy position?
5. Is the company communicating with stakeholders in a consistent fashion? Does the company know who its key or evolving stakeholders are?
6. Does the company’s EHS strategy incorporate environmental stewardship practices, and social responsibility programs?

Assessment of EHS governance practices should adhere to the following steps:

Step One – Assess existing practices;

Step Two – Benchmark best practices;

Step Three – Dialogue with NGOs; and

Step Four – Implement improved practices.

The steps described in the report are as follows:

Step One - Assess existing practices through systematic interviews with key managerial and operational staff across all operations. Visit selected sites to get a feel for how practices are implemented, measured, and reported. The goal is to

identify key factors impacting EHS performance and EHS management system efficiencies.

Step Two - Complete an analysis to compare existing practices against industry norms relative to peer companies. Compare EHS and social accountability, management system, performance, internal communication systems, and stakeholder dialogue programs. Comparative analysis provides a benchmark as to how other organizations are designing and implementing EHS practices. This allows companies to determine points of differentiation and leverage.

Step Three – Communicating with non governmental organizations optional but highly recommended for organizations within the resources, energy, and chemical industries. Assess global opinions to determine issues important to those organizations.

Step Four - The final step is to formulate and implement actions to improve existing practices. Operationalize EHS—incorporate it into the way business is conducted on a daily basis. Improve the effectiveness of EHS management in line with best industry practices and align available resources with the company's EHS strategy and regional focus.

The following chart lists the Common EHS Governance Practices.

Figure 5: *Common EHS Governance Practices*

Leading Governance Best Practices	Lagging/Middle of the Road Practices	Company Rating
Executives and staff directly involved in developing and implementing the governance strategy agree on the issues that will drive the strategy and share a vision of the general direction in which EHS should head.	There are no formal or informal governance strategy documents, or if they do exist, they were the work of a few individuals and do not have broad company buy-in.	Established EHS governance strategy: __Yes __No
The audit program is implemented in a manner such that the resources necessary both to identify and, more importantly, to resolve problems have consistently been made available, with the result that the number and severity of audit findings continues to decrease over time. Corporate management demonstrates this commitment by its attention to repeat or unresolved audit findings.	The audit program is being implemented but may not consistently provide clear and objective information about performance year in and year out.	Senior management demonstrates a high degree of commitment to the audit program: __Yes __No
EHS programs have clear and demonstrable track records and external certifications. There are formal corporate EHS standards .	There are policies and guidance that address compliance with specific EHS laws. There are no formal corporate EHS management standards.	External attestations have been made regarding the formality of corporate EHS standards and programs: __Yes __No
Significant and consistent efforts have been taken to streamline but effectively manage risks within heavy industry, such as chemicals, energy, and resources through the development of risk management tools, retaining corporate memory, and creating internal circles of excellence to tap internal experts.	Efforts to manage risks are ad hoc and procedures are inconsistently implemented across the company. The operations are not specifically required to conduct periodic risk assessments.	EHS risks are being managed effectively and consistently across the organization: __Yes __No
The line organization drives EHS management, and individual managers behave as if EHS management is their personal responsibility. A formal performance management system for line managers addresses EHS performance. Corporate vs. business unit (or plant) roles and line vs. staff roles are well defined and well understood, and they are being implemented as defined.	Responsibilities for managing stakeholders and communicating to senior management have become somewhat diffused with acquisitions and in embedding EHS into the line organization.	The performance management system clearly includes EHS responsibilities: __Yes __No
Emerging EHS issues/risks are considered as part of the business strategic planning process. Industry/trade associations have been effectively leveraged and there is good coordination across all relevant parts of the company. Issues are identified across the entire product life cycle and have been managed to the clear benefit of the company.	Relevant issues/risks are discussed within the EHS staff function, and to an increasing degree among line management and company executives. For example: the company is in the process of understanding and quantifying its greenhouse gas (GHG) emissions; sustainable development is a well-understood concept but not yet operationalized.	Formal systems are in place for identifying and managing EHS issues/risks: __Yes __No __In progress
The EHS metrics and targets are well aligned with the company's risk profile, policy and business strategy. As a result, they allow management to obtain a comprehensive picture of EHS performance.	EHS metrics are, for the most part, still focused heavily on compliance-related EHS performance metrics instead of issue-driven (e.g., GHG emissions) or corporate brand-driven (e.g., sustainability).	EHS metrics and targets reflect the external positioning of the company and are aligned with risk profile: __Yes __No __For some, but not all metrics
There are explicit processes for identifying and engaging key stakeholders in regular two-way dialogue.	Engagement with external stakeholders is at the individual initiative of field personnel. Information provided externally reflects what the company wants external stakeholders to know.	Established processes are in place for engaging in consultation with key stakeholders: __Yes __No __Sometimes

Collaboration with Community Agencies and Cooperative Initiatives for Success

Management and Local Chapters and Trade Associations

The Occupational Hazards Journal states in its June 29th 2006 article entitled “Mapping Support for an EHS Management System” that support exists in the form of the two following safety and health management programs:

- (1) OSHA Voluntary Protection Program (VPP); and
- (2) Occupational Health and Safety Assessment Series (OHSAS 18001)

Both of these programs are “comprehensive,” while at the same time presented “with a certain fear of the unknown” (Occupational Hazards Journal 2006). Assistance with compliance and the positive and negative aspects of each of these programs may be found locally from the American Society of Safety Engineers (ASSE) and the Voluntary Protection Program Participants Association (VPPA). Another source is the American Chemical Council sponsored program, *Responsible Care*, geared toward improving safety conditions for workers. In addition, other trade associations provide support for safety and health management professionals and their organization; one such association is the American Petroleum Institute. Finally, it is of the greatest importance that leadership and responsibility are at the forefront of today’s corporate training.

In the work entitled “Developing Leadership and Responsibility: No Alternative for Business Schools” Bettignies (2004) states that leadership and responsibility are strategic dimensions of tomorrow’s management. This implies that investment is needed most in these areas. Promotion of Corporate Social Responsibility (CSR) is necessary for building trust, teaching the usefulness of the Triple Bottom Line, preaching Sustainable Development, and learning from Corporate Governance models (Bettignies 2004).

The work of Robert Pojasek entitled “How to Build Performance into the Responsible Care MSV Conformance Standard” states that the Management System Verification (MSV) is a “protocol-driven process used by the American Chemistry Council (ACC) and its member companies to evaluate five major management system elements that apply to all the Codes of Management Practices in Responsible Care” (Pojasek 2001).

Six specific codes that exist are as follows:

- Community Awareness and Emergency Response (CAER)
- Pollution Prevention
- Process Safety
- Employee Health and Safety
- Distribution
- Product Stewardship

These codes include 106 specific management practices. The protocol is designed with a structure for evaluation of five management system elements modeled after the ISO 14001, which are as follows:

- Policy and Leadership
- Planning
- Implementation, Operation, and Accountability
- Performance Measures and Corrective Action
- Management Review and Reporting

New Mexico's 'Green Zia' Program is introduced as an example of a performance-based EMS program. This program is voluntary and was developed by the New Mexico Environment department in collaboration with New Mexico's Pollution Prevention Advisory Council. This program is based on the Malcolm Baldrige Quality Model. Use of this model has shown it to outperform others (which are routinely used by companies in Standard & Poor's 500 index) by approximately 5 to 1. Addressed by MSV, is leadership in the policy and leadership management element. This is done through senior management, which sets policy and guidelines for performances that are clear; this enhances the value of "responsible care" in the organization. Management should also demonstrate leadership and commitment through active participation in, and the creation and implementation of, a clear and visible policy that:

- Involves a demonstration of a personal commitment and dedication to Responsible Care;
- Is relevant to the nature and scale of the organization's products and processes;
- Fosters openness in dealing with stakeholders and takes into account public and employee inputs;
- Sets a framework for reviewing and establishing Responsible Care and environmental, health, and safety goals, objectives, and targets;
- Includes a commitment to continual improvement of the management of chemicals;
- Includes a commitment to comply with relevant legislation and regulations;
- Reflects the company's commitment to the Guiding Principles of Responsible Care; and
- Is documented, maintained and communicated to employees.

Figure 6: Comparison between MSV and Baldrige Model

MSV Program	Baldrige Model
Protocol-driven; focus on external review	Application-driven; focus on internal preparation
Protocol questions not publicly available	Questions available to all on the Internet
Subjective anecdotal and case information	Rigorous, publicly available scoring methodology stressing performance
Five elements focus on "what?"	15 items focus on "how?"
106 management practices	119 management practices
10 Guiding Principles in Responsible Care	11 Guiding Principles in Baldrige
Rating performed on-site by independent examiners	Scoring performed off-site by independent examiners; on-site only to verify excellent scores
Examiners get 1 ½ day training	Examiners get 2 days training each year with practice scoring a case application
Feed Back Report with strengths and opportunities to improve	Feed Back Report with strengths and opportunities to improve

Environmental Leadership

It is reported by Lynn L. Bergeson in the work entitled “Environmental Accountability: Keeping Pace with the Evolving Role of Responsible Environmental Corporate Stewardship” that in the past decade, “stakeholders involved in the areas of

environment, health and safety (EHS) have witnessed an explosion of voluntary environmental leadership programs of one form or another” (Bergeson 2006). Voluntary programs have experienced growth, as well as new approaches that intend to enhance the environmental protection levels and levels of safety in the workplace. Each of these goals is a reflection of the complex nature of EHS issues presently as well as the “high visibility of these concerns and their relevance to the public” (Bergeson 2006). The authors state that it is clear that “diverse skill sets increasingly are required to manage these issues effectively” (Bergeson 2006). Additionally, “the growing number of EHS activities – and the sheer number of people needed to manage issues at the local, regional, national, and international levels have led agencies and private stakeholders alike to employ a wide range of techniques aimed at holding organizations accountable for their behavior, and seeking to encourage the development of more robust and innovative engagement in EHS stewardship initiatives” (Bergeson 2006). Agencies and corporations have recognized the value proposition and have willingly begun to fund projects that result in positive economic and social returns for environmental investment. Inclusively,

“A broad range of mechanisms that are intended to make the environmental behaviors and practices of organizations more transparent have subjected the organizations to greater public scrutiny. Transparency, in turn, is expected to ‘incentivize’ organizations to adopt more responsible corporate practices and programs that go well beyond mere compliance-oriented governance strategies.” (Bergeson 2006)

Chapter 5: Transitioning EHS Departments

Environmental, health and safety departments have traditionally been cost centers and integral to the efficient operation of any company. For the most part, operating without them is impossible. Nonetheless, it is not possible to run any coherent business without Cost Centers. Supporting this theory is The Hackett Group, a strategic advisory group that surveyed companies that were able to achieve success in their back-office functions while managing significant savings in their operations. The core operational areas covered in the research were information technology, human resources, finance, and procurement, in bigger companies that had utilized these departments effectively were able to save up to \$60 million from every \$1 billion they were generating. The research found that successful companies were able to deliver a higher caliber service, managed to augment their economic return, and mitigated exposure to risks. The research highlighted that “world-class performers demonstrate strength in five best practices categories: strategic alignment of business goals and operating procedures; complexity reduction; technology enablement; business processing sourcing; and cross-functional partnering (The Hackett Group 2006). “The best companies may differ in size, industry or regulatory environment, but what they share is their ability to use back-office functions, traditionally viewed as cost centers, to generate competitive advantage” (The Hackett Group 2006).

Problems Cost Centers Are Facing

What this demonstrates is CCs are integral to any company that needs to bring together the best in both human and capital resources. However, there are procedures that they have to follow in order to attract scarce and valuable resources from other important company functions. Most managers tend to believe that they lack appropriate funding for what they are tasked to accomplish, where senior management's orientation is towards underutilization of back office resources. Whether the normally appropriated amount is adequate depends on the level of accomplish attempted or recognized workload within the organization. Whenever additional funding is required, it has to come from allocations that are potentially used to generate greater revenues. This means they have to demonstrate the need for added resources, and that will depend on the type of projects they are proposing and the benefits to the organization. In the end, these departments must come up with more important functions that can be translated into a short or long term plan; this can entail a production increase by added productivity or efficiency. However, without measurable changes, they may face an impasse and may find it difficult to compete within the organization for resources. One of the setbacks of the back office is measuring their resource inputs, benefits, costs, and quantified performance in a way that is meaningful and practical to evaluate.

To improve their effectiveness, these departments must develop projects that actually contribute to the profitability of the company. In order to acquire proper funding for these projects, the EHS manager must learn to compete with other departments for human and capital resources. In addition, when a project is initiated, the department must be able to define the scope, cost and the return on investment to the organization. This is important because decision-makers will need to evaluate the returns involved in the project. Half the

battle is presenting the material in a way that allows decision-makers to easily assess the net result to the organization; this entails gathering information related to quality, implementation, and what the final project will accomplish in terms of hard and soft costs and benefits to the organization.

Work Breakdown Structure

It is imperative to develop a systematic method of defining the resources required to execute a project. This is best accomplished with the Work Breakdown Structure (“WBS”) approach. To prepare for a project, the team must quantify the value of all relevant inputs (labor, material, number of hours, and any other expenses) and qualify the value of the project. Management will also require a detailed master schedule, in order to show project sequence and “roll-out” timing of the budget. Management will also want to see the prioritized hierarchy of the project with a resource allocation schedule. Finally, the definition of project milestones will be important to identify the measures of performance.

Also any definition of the management system which will show the progress and systematically communicates this data to management should be included in the WBS section of the project proposal. This schedule should also attempt to forecast other required inputs not specifically attached to the EHS department. This procedure will allow all departments the ability to communicate the imperial benefits of the specific project to the technical decision makers, as well as other stakeholders interested in the project.

Past Performance as a Lever

Past performance offers an important advantage when dealing with decision-makers, since it can quantifiably demonstrate value. When departments meet or exceed company expectations, they tend to gain credibility and focus within the organization. This will lead to extended consideration for additional projects, and increased funding for project requests. “Executives benefit from the ability to compare and contrast time and resources spent on different projects to determine which were profitable and which were not” (Journyx 2007). The EHS manager should establish a project tracking system to capture past performance, which will assist the manager with future funding requests.

Management's Evaluation

Performance evaluation is part of all managers' jobs and, depending on frequency, each evaluation will reveal if projects and departments met their stated objectives. Those with high marks and successful project tend to attract better support and resources from management for future projects.

In many cases, it is possible to tell beforehand if a department has armed itself to succeed in its pursuit for more resources. As a result, if a given project or department has lagged, it should create detailed “lesson's learned” report and communicate that information to management. Future project requests should outline the identifiable benefits to the firm and propose mitigation efforts to eliminate the potential for making the same mistakes. In addition, a cost-benefit analysis should be generated to define valuation to the organization.

Using Result-Oriented Approaches

Departments competing for resources in the form of financial and human capital should familiarize themselves with various approaches to quantify their value to the organization. Organizations that provide products and services will find it easier to measure the specific performance of certain production departments (such as engineering, manufacturing or sales), but will face difficulty specifically quantifying the monetary benefits from traditional cost centers. Therefore, EHS departments will have to develop methods to make their contributions more measurable so they will be well armed to defend their position or explain their previous achievements.

There are exceptions though, especially where certain standards such as regulatory compliance or worker safety are required from a department. If the organization is willing to forfeit that attainment for cost savings and, if the cost savings is attained for the period it was required, then the department is well poised for future budget requests.

It is also possible to look at key departments, such as research and development or EHS, and come up with an efficiency matrix. If the goals of the department are not met though, the department will lose credibility within the organization. This will require the department manager to use positive action to gain future support. Such action may come from past positive projects, improved performance for compliance, safety or better efforts in controlling the overall EHS function within the organization.

Adjusting the Approach

Another issue to be cognizant of is the perspective of the decision-makers.

Analyzing how they may view a particular problem or issue may provide insight into the approach for added resources for the department. The other area that should be considered is the organization's outlook of departments sharing in the responsibility of defining strategic drivers for the organization. This suggests that their conception must be aligned exactly to the type of input needed for the organization's success. As long as the performance of the department has its focus on aspects that directly contribute to better performance, their chance of success for resource allocation is enhanced. The EHS department should also demonstrate the productive results of their project and communicate these successes throughout the organization.

Value as a Tool for Measurement

The first step in establishing project worth is to realize that a given project has inherent value when it shows tangible business results, which, in return, are direct measurable financial results on the bottom line. However, there are situations where that could only be attained when certain projects have independent profit and loss capability. There are other projects that contribute intangible results in the form of cost avoidance or improved efficiencies that are less evident. Measuring and calculating imputed returns are important considerations for the EHS department to perform as a way of quantifying actual value to the organization. This serves as a way to properly value projects and allows those projects to compete with other departments and influence decision-makers. This means some projects can only influence results indirectly and a value matrix should be created to establish project value.

Benchmarking

At times, decision-makers might choose industry benchmarking to measure performance and efficiency. Alternatively, they might evaluate performance for previous fiscal years and compare that to current performance. It becomes obvious that there is a problem when performance lags previous years or other industry participants. The critical aspect for consideration under this measurement scheme is that it can only measure common performance and in the case of EHS, does not measure profitability of projects or the cost avoidance associated with an efficient and successful department. The EHS manager should be aware of internal policies and procedures to determine if this matrix is used for project evaluation of resource allocation.

Human Capital Architecture

Department heads should be aware of the human capital architecture of the organizations, in the event there are clear guidelines for allocation. For example, there can be many restrictions for hiring, skill assessment, and talent allocation within departments. In addition, hiring and training of new employees is costly. These issues tend to define the human capital architecture. One of the advantages of this system is that it matches employee skills with an organization's strategy. It also helps managers optimize resources in the effort of creating, choosing, and assigning department process.

Types of Costs

When it comes to competing for capital resources, each department manager is responsible for differentiating controllable and non-controllable costs so that the project's performance will be evaluated according to their cost and resource allocation. "Because expenditure depends on the merits of projects in respect to the organization's strategy" (Smith 2002), the decision-making manager could use benchmarking as a way to approve a request for a particular project or a budget for a given period. In the case of manufacturing, it is possible to make a measurement based on what was a successful accomplishment in a given fiscal period; thus, arriving at the standard cost is imperative. Most EHS departments will find it difficult to use standard costing methods, simply because their output for the most part is intangible and difficult to quantify. Special projects must incorporate these standards and demonstrate the value to the organization in tangible terms. Proposed costs must be defined to management as controllable and non-controllable. Differentiating among the two will help management evaluate the risks associated with project budget and execution. The main advantage of this strategy is it allows the evaluation to occur on a "risk adjusted" basis.

Available Resources

Department leaders must be aware of the available financial resources of the organization and the other projects that are being considered for that capital. This is especially true when vying for resources with other departments. In other words, they have to know in advance what the organization is capable of, and what resources are required for a specific level of performance mandated by senior management. The EHS manager must also be aware of available human resources. The organization may have sufficient financial resources but be limited in the form of human resources. It is fairly common that the project may have an opportunity to “borrow” resources from other departments. Hand-in-hand with this is the process of keeping track of the organization’s quarterly financial results. Simply knowing the amount of profit or available cash on hand is not enough; knowing the general direction of the organization’s fiscal or annual expenditure, or the organization’s capacity to evaluate other opportunity, could save the EHS manager from making a project request that is destined to be denied.

Quality Cost and Profitability Data

One very crucial aspect that has the dual advantage of rendering companies profitable, and enabling them to track their projects is availing a means that will expose quality, cost and profitability data to the organization. Companies use ‘project tracking data’ to forecast project performance and profitability. Even if it is a known fact that the department or project will not have a direct input into the profitability, they will be in a better position to gain future funding if they start using a system that measures the achievements in the project. This empirical data will more likely sway decision-makers to

approve funding requests. Besides enabling the organization to have a much better handle on the projects that they are approving, using an empirical system allows them to track how the project is performing and better predict the future outcome. This system might be automated or manual. The automated method is much easier to access and makes forecasting easier. The main advantage of an automated system is that it can be undertaken by using “off the shelf” software applications readily available on the market.

There is a trend towards managing a business by project. The concept of *management by project* has allowed organizations of all sizes to compete on a more level playing field. Even small organizations can deliver an efficient project by having insight into their actual costs and resources being used across the company” (Journyx 2007). Regardless of whether the organization has an enterprise wide costing system, the EHS manager should establish her own tracking system to effectively quantify and qualify each project and calculate the current and future benefit(s) to the organization.

Evaluation Tools

Managers have always desired to identify analytical processes that would help them make cost-effective business decisions. This is true not only in the financial and operational area, but also for safety (EH&S) investments too (Jeffrey Chung 1999). Arthur Anderson, LLP and the Organization Resources Counselors (ORC) jointly developed a software tool that “provides a methodology to assist organizations in understanding, measuring, demonstrating and communicating how health and safety (H&S) investments impact H&S and business performance” (Jeffrey Chung 1999). The application is termed “Return on Health and Safety Investment”, or ROHSI. The process helps EHS managers facilitate decision making by answering:

- ❖ What EHS investments should we consider supporting?
- ❖ Which EHS investments create the greatest value to the organization?
- ❖ How can this value/return be demonstrated?
- ❖ Which EHS projects should we allocate our financial and human resources?
- ❖ When should we make this H&S investment?

The ROHSI methodology redefines EHS activities as an investment as opposed to expenditure. ROHSI also helps the building of a firm's business team by engaging the all departments (including EHS) into the group decision making process. This results in an internal system that integrates EHS into the business and communicates a common language that all disciplines understand.

Business Plan

It's almost always true that, when departments define a project, the development of a project or business plan is required. This is true even if the department is not contributing directly to a company's bottom line. A project plan should include the overall effort of the staff required to achieve a pre-defined goal, and one that describes, in part, the mission of the project. The EHS manager should make herself aware of the specific business goals and stated objectives of the company. The market position of the organization should be understood by the EHS managers and the project proposal (those outside of compliance or audit) should consider those business drivers. Even if the department's input will be an indirect advantage, it should parallel the goals and objectives of the company.

Senior management will expect the project proposal (or business plan) to clearly state the objective of the project. It must provide the background of the problem and then lay out the path for solving the issue. It should clearly state the financial and human resources required to execute the project and define both resources into internal and external

categories. A project schedule with cost roll-outs should be included in the proposal.

Finally, the EHS manager should outline how she proposes to track the project results and any follow-on maintenance required to confirm its efficacy.

Chapter 6: Methodology

Restatement

Environmental, Health, and Safety professionals are now asked to manage many aspects within organizations. The trend among leading firms, especially those with proactive EHS programs, is to fund and implement projects and initiatives that add real bottom-line value to the organization. However, this trend requires EHS professionals to operate from a very different perspective from that of years past. Today, one must approach projects not from a mere compliance point of view, but from the profit standpoint; additionally, these professionals are expected to act from a proactive standpoint, not reactive.

As companies have redefined EHS roles, they have also restructured their departments. The efforts to reposition the company for stronger competition and performance in the marketplace have become a leading factor in setting this vision and direction.

“In this age of corporate transparency, it is not enough to simply inform stakeholders of limited company successes, improvements, or even persistent shortcomings and liabilities. Stakeholders (such as investors, business partners, nongovernmental organizations, and local communities) want actual improvements in the quality and consistency of performance.” (ICF Consulting 2002)

In order to respond to the demands of stakeholders as well as to maintain the gained EHS management efficiencies, the focus of many executives has been on the creation of “global EHS governance practices” (ICF Consulting 2002).

Methodology Overview

The methodology for this thesis focused on two primary elements. The first was it provided a literary review of existing management systems, presented in order to illustrate a basic understanding of associated management risks, recognized procedures, and observation techniques. The second phase confirms the efficacy of new management systems and applicable techniques. Additionally, it analyzed ways that EHS programs could be restructured to compete for projects that add bottom line result to the organization.

Phase – Objective

The objective has provided a basic understanding of the current management systems and the view organizations have towards EHS departments and programs. It provides specific awareness to EHS professionals as to the required business skills and reporting techniques required to effectively communicate and compete for internal resources within the organization. The new standards and methods established will guide those professionals through the quagmire of corporate bureaucracy and allow her to effectively compete for human and financial resources.

The intended knowledge, understanding, and proficiencies that the professional should acquire will be the general competence, understanding, and heightened awareness of the

organization's business strategies, overall view towards enhanced EHS and the techniques to compete with other business units for development resources.

Phase II – Evaluation of the Efficacy

For any study, it is important to ensure efficacy of the findings. The author tested the effectiveness of the theory by enlisting a test group to review the material and findings, provide initial survey of current thoughts and attitudes towards the subject matter, and then report on the knowledge gained by review. This was done as follows: (1) provide material outline and expected outcome for review, (2) subject the specific data to group discussion, and (3) prepare a revision memorandum identifying necessary modifications. At the conclusion of the review, a closing survey was conducted to analyze the group's ending attitudes towards the subject matter and material presentation.

Chapter 7: Expected Results and Recommendations

Proper project development as it relates to increased resources being made available to the EHS department is a proactive and integrated management system that will define and “high-grade” the best opportunities for the company. It is shown that this system is easily implemented and has positive results for EHS professionals or others practitioners. The integrated system acts as a baseline management system. The EHS professional must diverge from the pure science in which she was trained and begin applying certain business acumen to her department. To properly compete for internal and external resources for projects that might appear to be a bit more obscure than a new product launch, the EHS

manager must quantify and qualify the project in terms that will compete with other business units.

As a comparison, one can look at the advent of the Information Technology (“IT”) department and see that what was originally a Cost Center has now become a major contributor to bottom-line profitability. It has gained such importance within organizations, that it has warranted the new senior position of Chief Information Officer (“CIO”). Companies are investing heavily in IT systems to improve efficiency and effectiveness for both internal and external customers. Much of the empirical research in business value of information systems focuses on the effect of IT expenditures on tangible measures of firm performance such as productivity or market value (Anandhi S. Bharadwaj 1999). Despite increasing anecdotal evidence that information technology (IT) assets contribute to firm performance and future growth potential of firms, the empirical results relating IT investments to firm performance measures have been equivocal (Anandhi S. Bharadwaj 1999). The same conclusion can be made for EHS investment. SRI indexes are now measuring EHS performance. Investors are considerate of environmental performance. And public opinion crucifies those companies that do not adhere to sound environmental practices. Environmental investment has become more common place within organizations, and EHS managers that present sound business reasons and thoughtful projects to the organization for consideration are getting the necessary approvals to proceed.

Within a few years, major corporations may have a Chief Environmental Officer (“CEO”), but in reality this might be a confusing acronym for the balance of the organization. So we might have to think of another name. Maybe we should have a Chief Sustainability Officer (“CSO”).

Chapter 8: Analysis & Conclusion

Much attention in the past decade has focused towards mere compliance. There is a growing effort of society to become more environmentally responsible. Business is now doing more than what is required as a baseline, but there is still progress to be made. The world's society has reached the environmental tipping point and social responsibility for the environment is expanding at a rapid pace. This work has reviewed various styles of EHS management, as well as skills needed by the EHS manager to effectively implement an EHS management system and compete for financial and human resources with other in departments within the organization. This task is becoming easier as even the non-progressive manager is becoming progressive. For those environmental leaders that find themselves within organizations that baulk at doing more than just compliance, core values continue to promote environmental projects that add value to the organization and to society. Progress can only be made as fast as the slowest participant and the speed to which society has improved our environment is remarkable.

EHS managers may always find it difficult to completely quantify their input; however, it is an important part of competing for resources within an organization. Yet since it is proven that there is not a single company that can attain an optimum outcome without effective back office functions, these centers must not lag in performance or the overall company will suffer. Therefore, EHS departments will have to continue their progression and function as a vital part of any company without much fan fair. Accordingly, they will have to adhere to the rules placed on them by management and explore possibilities to quantify their value, in order to succinctly present their efficacy to the organization.

Chapter 9 – Recommendations for Further Research

While this research focused on how EHS managers can influence excellence within their organizations, it also looked at ways to implement change, and caused new issues to be raised:

- ❖ What are the characteristics of current professional in the field?
- ❖ To what extent does the current group of EHS professional include individuals who have entrepreneurial tendencies and abilities?
- ❖ To what extent are the individuals in this group capable of identifying and illuminating the value of good EHS performance to the rest of the organization?
- ❖ And finally, do conflicts exist between the practitioner and the organization?

EHS professionals may lack the universal management perspectives that would allow them to maximize value to their organizations. Potentially, the “best and brightest” business and strategic minds are being utilized elsewhere in the organization due to misperception regarding the value that is available through the EHS department investment. It can be seen that many mega-multi-national companies today have well defined strategic plans that invest heavily in EHS projects that in and of themselves may not offer a solid financial return, but find inherent value from these projects in other areas of the corporation. One can look at the “alternate energy” initiative of British Petroleum and see that the value lies in the public perception of the project which translates into shareholder value. The by-product of this initiative is that these projects are really making a difference on the environment.

This demonstrates the fact that all EHS departments can be more successful with initiatives that promote strong environmental sustainability if they gain enhanced strategic planning and financial skills and learn to maximize the effectiveness of the department and gain an integrated perspective on the department’s role and business goal. EHS practitioners need to better understand critical business elements and be able to define how they can add value

beyond compliance. They need longer-term strategic vision and goals. How we influence growth in this area of personal development should be a point of further research.

Characteristics of the EHS Professional

Today, most EHS professionals find themselves in the “loop” of assess, audit, and fix. They follow a fairly common set of instructions to keep the organization compliant and its management free of prosecution or persecution. Regulations tend to be prescriptive and management generally only asks “are we compliant, and if not, are we acting responsible in our efforts to rectify the situation?” This role however may abdicate the primary responsibility of influencing better practices and functioning “beyond compliance”. It is clear however, that when regulation and procedure take precedent, strategy becomes unnecessary and value is elusive.

Due to the infancy of the profession and the eclectic background of those that have entered, the ranges of characteristics of EHS professionals are broad. The basic tenant is that most H&S professional are “cause and effect” minded. If a worker gets injured, then action is taken to prevent all future accidents of similar nature. They operate in “real time” and know the results of their actions immediately. The “E” professional operates in a more subtle world in that his actions (or inactions) are not immediately obvious in most cases.

This is an issue that should be further researched and recommendations should be developed regarding the appropriate characteristics of those in the field. It should be considered that there may be a distinctive difference for those operating in “health and safety” as apposed to “environmental”.

Further research should be given to the issue of a professional standard. Should EHS professional be required to adhere to an “oath of service” regarding performance? Many business managers have unequivocally stated that “letter-of-the-law compliance” is the prime determinant of corporate EHS responsibility. (MacLean 2003) In many businesses, the idea of regulatory compliance represents EHS excellence. That is a perspective of business that should be considered for further research. Many companies that are considered irresponsible today violated no laws at the time of their questionable activities. (MacLean 2003)

So, what does this say for the current crop of EHS managers? In 20 years, will we look back and criticize those companies that today are considered excellent performers and progressive thinkers in terms of EHS programs? Can the current system promote sufficient intellectual growth to proactively develop new systems and techniques to move us beyond what is considered excellent today? If we look back at history, only a few companies have successfully accomplished this over the past 20 years; Dow, 3M, Baxter, and a few others out of millions of businesses. Strategy and vision are the primary drivers for this success. And we should consider how to adopt and promote strong strategic, entrepreneurial and visionary skills in all EHS departments, large and small.

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Appendix I - Project Case Study

Background: Steel and aluminum foundries use sand molds for casting metals parts. These molds are made by forming sand with a binder comprised of urethane polymer and a urethane catalyst. The foundry molds are then formed by processes known in the industry as the "cold box" process or the no-bake process. The process is especially useful for casting non-ferrous metals, such as aluminum, magnesium, steel and other lightweight metals. The molds produced for casting metal parts exhibit excellent shakeout while retaining other desirable mold properties. The shakeout process separates the molded sand (spent foundry sand) from the metal part. Spent foundry sands used as molds in the casting process become solid wastes when the mold is broken and the casting are separated.

Issue: A steel foundry in northwest Louisiana has a shakeout system with a mechanical sand reclamation unit. The facility generated approximately 800 yards of spent foundry sand (about 20 roll-off waste containers) per month. Although spent foundry sand is not considered a hazardous waste, in Louisiana it is classed as an industrial waste and disposal fees were costing approximately \$25,000 per month. In addition to the waste sand, 800 yards of new sand needed to be added on a monthly basis. This represented about a 10% makeup ratio. The new sand purchases added another \$12,000 to the month foundry expenses.

Solution: A project was conceived to install a thermal reclamation unit that would capture the waste sand, process it through the thermal reclamation unit and return it to the new sand

silo. The capital requirements for this project were estimated to be \$550,000 with monthly operating and maintenance costs estimated to be in the \$15,000 per month range.

The Economics: The project was approved and the unit was installed over a six month process. The efficiency of the unit proved to reduce the amount of spent foundry sand and new make-up sand by 90%. This resulted in a month savings of about \$33,000. In addition, it allowed the re-deployment of two full time waste haulers tasked with the disposal of the spent foundry sand. So, the direct monthly benefit to the company was approximately \$39,000 when including the reduced labor and expense associated with the previous process. In addition to the monetary benefits to the foundry, it was determined that due to the higher efficiency of the combustion chamber of the thermal reclamation unit as compared to the emissions of the front-end loader that was used for sand handling, an improvement in net air emissions from the factory was gained.

Project Payback: Considering the \$39,000 per month savings against the new operating and maintenance cost of \$15,000, the bottom-line net return was \$24,000 per month savings. This resulted in less than a 29 month payback for this project. An unexpected result of the project was discovered in month three after integration. Due to the improved consistency of the sand and the overall higher sand quality, the molds became more stable and the parts required much less finish work to make them ready for delivery. It was estimated that the better quality of the poured parts represented a 10-12% efficiency gain in the department responsible for parts cleaning and finishing.

Appendix II – Sample Project Funding Request Form

Project Funding Request Form

Basic Project Information	
---------------------------	--

Date	
Project Title	
Region	

Project Manager

Title	
Name	
Division	
Address	
Phone/Fax	
Email	

Executive Summary:

Please type a brief summary.

Expected Project Timelines	
----------------------------	--

Phase 1	
Expected Start Date	
Expected End Date	

Describe Phase 1 Activities:

Phase 2	
Expected Start	

Date	
Expected End Date	
<u>Describe Phase 2 Activities:</u>	

Project Details

1. Project Description

a) Project Overview

--

b) Describe vulnerability addressed by the project.

--

c) Describe the project benefits should the project be implemented.

--

d) Project Definition

e) Resources

2. Project Management Strategy

a) Roles and responsibilities associated with the project.

b) Project Manager must ensure that part of the Project Management Strategy includes the following: implementation, monitoring, reporting, and preparing for any potential audits / evaluations.

3. Project Sustainability

a) **Briefly describe any measures being taken to ensure the sustainability of results beyond the life of the project (e.g. train-the-trainers approach, follow-up phase, multi-year initiative, and/or demonstrated buy-in from beneficiary department.**

--

Risk

1. Project Management Strategy

Any potential risks to the project and the appropriate mitigation strategy.

Risk	Risk Mitigation Strategy (RMS)

2. Legal Issues

Identify any risks or considerations, which may require the review or involvement of legal counsel prior to implementation.

Risk	Risk Mitigation Strategy (RMS)

3. Environmental Issues

Describe whether or not the project has potential impact (positive or negative) on the environment.

Risk	Risk Mitigation Strategy (RMS)

Appendix III – Sample Project Budget

XYZ Company

BUDGETARY CONSTRUCTION ESTIMATE

11-Nov-00
Rev. No. 2

PROJECT:
LOCATION:
Job No.

Account No. Description	Factored Manhours	TOTAL LABOR	TOTAL MATERIAL	SUBCONTRACT	TOTAL	Size	Remarks
ESTIMATE SUMMARY SHEET							
Gudgeon Thermal Reclamation	1,688	\$33,750	\$175,000	\$0	\$208,750		
H2O Chiller	575	\$11,500	\$5,300	\$0	\$16,800		
Electrical Control	1,025	\$20,500	\$14,260	\$0	\$34,760		
Electrical Distribution	323	\$6,450	\$63,850	\$0	\$70,300		
Sand Hopper - Reclaimed	358	\$7,150	\$6,550	\$0	\$13,700		
Sand Hopper - Processes	358	\$7,150	\$54,460	\$0	\$61,610		
Sand Conveyor	2,230	\$44,600	\$19,251	\$0	\$63,851		
Site/Civil Work	625	\$12,500	\$6,550	\$0	\$19,050		
Insulation	55	\$1,100	\$4,640	\$0	\$5,740		
Engineered Buildings	30	\$600	\$3,390	\$0	\$3,990		
Demolition	20	\$400	\$2,780	\$0	\$3,180		
Craft premium Pay					\$0		
DIRECT FIELD COST	7,265	\$145,700	\$353,251	\$0	\$501,731		
FIELD STAFF & LEGALITIES					\$19,500		
TEMPORARY SITE FACILITIES					\$7,500		
CONST EQUIP,TOOLS & SUPPLIES					\$2,500		
START-UP TESTING & TRAINING					\$15,000		
INDIRECT FIELD COST					\$44,500		
TOTAL FIELD COST					\$546,231		
ENGINEERING @ \$110/MH	200	\$22,000			\$22,000		
TOTAL FIELD & EPC ENGINEERING					\$568,231		
TAXES					\$0		
INSURANCE					\$2,500		
PERMITS					\$175		
IMPORT DUTIES					\$0		
OCEAN FREIGHT					\$0		
SITE SECURITY					\$0		
ESCALATION					\$0		
SUBTOTAL					\$570,906		
PROJECT CONTINGENCY	6%				\$34,254		
TOTAL EPC CONTRACT					\$605,160		

XYZ Company

BUDGETARY CONSTRUCTION ESTIMATE

25-Aug-00
Rev. No. 4

CLIENT:
PROJECT:
LOCATION:
Job No.

Account No. Description	Quantity	Unit	M/H UNIT	M/H Rate	Material Unit	Subcontract Unit	Cost factors Matl SC Labor	Factored Manhours	TOTAL LABOR	TOTAL MATERIAL	SUBCONTRACT	TOTAL	Size	Remarks
EQUIPMENT														
Gudgeon Thermal Reclamati	1	EA	675	\$20.00	\$175,000		1.00 2.50	1,688	\$33,750	\$175,000	\$0	\$208,750		
H2O Chiller	2	EA	115	\$20.00	\$5,300		1.00 2.50	575	\$11,500	\$10,600	0	\$22,100		
Electrical Control	1	EA	410	\$20.00	\$14,260		1.00 2.50	1,025	\$20,500	\$14,260	0	\$34,760		
Electrical Distribution	1	EA	129	\$20.00	\$63,850		1.00 2.50	323	\$6,450	\$63,850	0	\$70,300		
Sand Hopper - Reclaimed	1	EA	143	\$20.00	\$6,550		1.00 2.50	358	\$7,150	\$6,550	0	\$13,700		
Sand Hopper - Processes	1	EA	143	\$20.00	\$54,460		1.00 2.50	358	\$7,150	\$54,460	0	\$61,610		
Sand Conveyor	4	EA	223	\$20.00	\$19,251		1.00 2.50	2,230	\$44,600	\$77,004	0	\$121,604		
Site/Civil Work	1	EA	250	\$20.00	\$6,550		1.00 2.50	625	\$12,500	\$6,550	0	\$19,050		
Insulation	1	EA	22	\$20.00	\$4,640		1.00 2.50	55	\$1,100	\$4,640	0	\$5,740		
Engineered Buildings	1	EA	12	\$20.00	\$3,390		1.00 2.50	30	\$600	\$3,390	0	\$3,990		
Demolition	1	EA	8	\$20.00	\$2,780		1.00 2.50	20	\$400	\$2,780	0	\$3,180		
MH/UNIT MH/RATE AVG MAT UNIT								7,285	\$145,700	\$419,084	\$0	\$564,784		
SUB TOTAL MECHANICAL EQUIP.														

Appendix IV – Sample Project Performa

Sancti Reclamation Project Projected Financials																		
	Aug-06	Sep-06	Oct-06	Nov-06	Dec-06	Jan-07	Feb-07	Mar-07	Apr-07	May-07	Jun-07	Jul-07	Aug-07	Sep-07	Oct-07	Nov-07	Dec-07	5 months end 12 months end 12 months end
Invested Capital	250,000	100,000	255,560															605,560
Revenues (Savings)																		
Reduction in Labor (spent sand handling)																		
New Sand (savings)																		
Pest Cleaning Room																		
Total Revenues (Savings)	0	0	0	(24,500)	(24,500)	(24,500)	(24,500)	(24,500)	(24,500)	(24,500)	(24,500)	(24,500)	(24,500)	(24,500)	(24,500)	(24,500)	(24,500)	(285,500)
Input Material Cost																		
Land Fill Costs	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
Normal Gas	0	0	0	45	1,470	1,470	1,470	1,470	1,470	1,470	1,470	1,470	1,470	1,470	1,470	1,470	1,470	15,940
Power	0	0	0	250	750	750	750	750	750	750	750	750	750	750	750	750	750	9,000
Mixing Water	0	0	0	50	50	50	50	50	50	50	50	50	50	50	50	50	50	600
Waste water discharge	0	0	0	50	50	50	50	50	50	50	50	50	50	50	50	50	50	600
Total Input Materials	0	0	0	75	2,620	2,620	2,620	2,620	2,620	2,620	2,620	2,620	2,620	2,620	2,620	2,620	2,620	33,940
Overhead & Maintenance																		
General and administrative	0	0	0	500	500	500	500	500	500	500	500	500	500	500	500	500	500	6,000
Maintenance Reserve	0	0	0	750	750	750	750	750	750	750	750	750	750	750	750	750	750	9,000
Total Overhead & Maintenance	0	0	0	1,250	1,250	1,250	1,250	1,250	1,250	1,250	1,250	1,250	1,250	1,250	1,250	1,250	1,250	15,000
Total operating expenses	0	0	0	2,025	4,070	4,070	4,070	4,070	4,070	4,070	4,070	4,070	4,070	4,070	4,070	4,070	4,070	48,940
Project Cash Flow	0	0	0	22,565	20,520	20,520	20,520	20,520	20,520	20,520	20,520	20,520	20,520	20,520	20,520	20,520	20,520	246,200
Internal Rate of Return (IRR)																		
Payback (in Months)	39.5																	

Appendix V – Sample Project Presentation



Sample Presentation

Thermal Sand Reclamation Project Initial Overview August 2006

CONFIDENTIAL

Project Overview

Project Description

- Install a thermal sand reclamation unit that will capture the waste sand, process it through the thermal reclamation unit and return it to the sand silo for continued use.
- Capital requirements: \$600,000
- Estimated Yearly Savings: \$240,000
- Payback: Less than 3 Years

Project Benefits

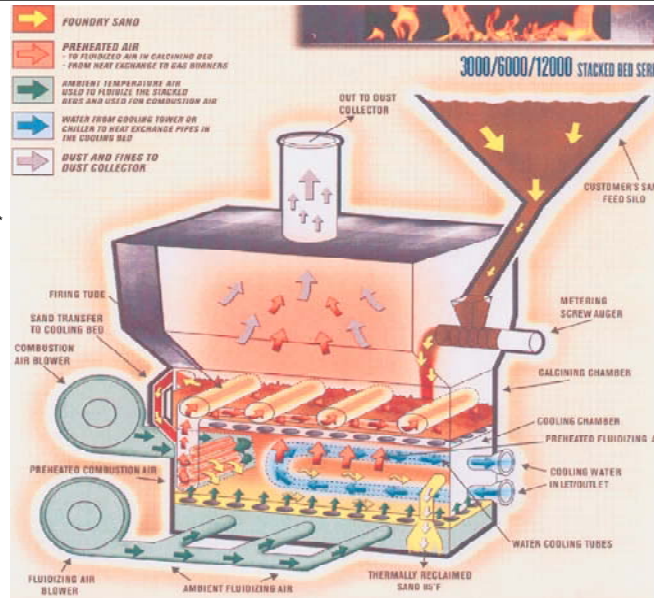
- Reduced Solid Waste
- Reduced landfill cost
- Reduced New Sand Cost
- Improved Casting Performance
- Reduced Emissions



Required Resources

- Capital
- Engineering (150 man hours)
- Construction Supervision/Project Management
- Foundry Maintenance Support
- Air Permits
- Construction Permits

Process Flow Diagram



3

Project reflects a lower risk profile

Sand Reclamation Project
Project Financials

	Aug-06	Sep-06	Oct-06	Nov-06	Dec-06	Jan-07	Feb-07	Mar-07	Apr-07	May-07	Jun-07	Jul-07	Aug-07	Sep-07	Oct-07	Nov-07	Dec-07	Financial Year End	Financial Year End	Financial Year End
																		12/31/06	12/31/07	12/31/08
Invested Capital	25,000	25,000	25,000															827,100	-	-
Revenue (Savings)																				
Reduction in labor (syrup sand handling)				(5,000)	(5,000)	(5,000)	(5,000)	(5,000)	(5,000)	(5,000)	(5,000)	(5,000)	(5,000)	(5,000)	(5,000)	(5,000)	(5,000)	41,250	41,250	41,250
Save Sand Storage				(15,000)	(15,000)	(15,000)	(15,000)	(15,000)	(15,000)	(15,000)	(15,000)	(15,000)	(15,000)	(15,000)	(15,000)	(15,000)	(15,000)	24,000	24,000	24,000
Power Savings (Savings)				(2,000)	(2,000)	(2,000)	(2,000)	(2,000)	(2,000)	(2,000)	(2,000)	(2,000)	(2,000)	(2,000)	(2,000)	(2,000)	(2,000)	4,000	4,000	4,000
Total Revenue (Savings)	0	0	0	(12,000)	(12,000)	(12,000)	(12,000)	(12,000)	(12,000)	(12,000)	(12,000)	(12,000)	(12,000)	(12,000)	(12,000)	(12,000)	(12,000)	69,250	69,250	69,250
Super Material Cost																				
Landfill Costs	0	0	0	0	0	500	500	500	500	500	500	500	500	500	500	500	500	500	6,000	6,000
Material Fee	0	0	0	425	1,475	1,475	1,475	1,475	1,475	1,475	1,475	1,475	1,475	1,475	1,475	1,475	1,475	1,895	17,940	17,940
Power	0	0	0	250	750	750	750	750	750	750	750	750	750	750	750	750	750	9,000	9,000	9,000
Slaking Water	0	0	0	10	10	10	10	10	10	10	10	10	10	10	10	10	10	100	800	800
Water water discharge	0	0	0	10	10	10	10	10	10	10	10	10	10	10	10	10	10	100	800	800
Total Super Materials	0	0	0	715	2,685	2,685	2,685	2,685	2,685	2,685	2,685	2,685	2,685	2,685	2,685	2,685	2,685	1,591	33,340	33,340
Overhead & Maintenance																				
General and administrative	0	0	0	200	200	200	200	200	200	200	200	200	200	200	200	200	200	2,000	6,000	6,000
Maintenance Reserve	0	0	0	750	750	750	750	750	750	750	750	750	750	750	750	750	750	1,500	6,000	6,000
Total Overhead & Maintenance	0	0	0	950	950	950	950	950	950	950	950	950	950	950	950	950	950	3,500	12,000	12,000
Total operating expenses	0	0	0	1,665	4,320	4,320	4,320	4,320	4,320	4,320	4,320	4,320	4,320	4,320	4,320	4,320	4,320	6,991	49,340	49,340
Project Cash Flow	0	0	0	70,250	25,250	25,250	25,250	25,250	25,250	25,250	25,250	25,250	25,250	25,250	25,250	25,250	25,250	41,859	24,240	24,240
Internal Rate of Return (IRR)	14%																			
Payback (in Months)	30																			

14% IRR

30 Month Payback

\$250,000 Annual Savings

4

Major Equipment Budget

XYZ Company

CLIENT:

PROJECT:

LOCATION:

Job No.

BUDGETARY CONSTRUCTION ESTIMATE

25 Aug 00

Rev. No. 4

Account No.	Description	Quantity	Unit	M/H UNIT	M/H Rate	Material Unit	Subcontract Unit	Cost factors Matl SC Labor	Factored Manhours	TOTAL LABOR	TOTAL MATERIAL	SUBCONTRACT	TOTAL	Size	Remarks
EQUIPMENT															
									0	\$0	\$0		\$0		
	Gudgeon Thermal Reclamat	1	EA	675	\$20.00	\$175,000		1.00 2.50	1,688	\$33,750	\$175,000		\$208,750		
	H2O Chiller	2	EA	115	\$20.00	\$5,300		1.00 2.50	575	\$11,500	\$10,600	0	\$22,100		
	Electrical Control	1	EA	410	\$20.00	\$14,260		1.00 2.50	1,025	\$20,500	\$14,260	0	\$34,760		
	Electrical Distribution	1	EA	129	\$20.00	\$63,850		1.00 2.50	323	\$6,450	\$63,850	0	\$70,300		
	Sand Hopper - Reclaimed	1	EA	143	\$20.00	\$6,550		1.00 2.50	358	\$7,150	\$6,550	0	\$13,700		
	Sand Hopper - Processes	1	EA	143	\$20.00	\$54,460		1.00 2.50	358	\$7,150	\$54,460	0	\$61,610		
	Sand Conveyor	4	EA	223	\$20.00	\$19,251		1.00 2.50	2,230	\$44,600	\$77,004	0	\$121,604		
	Site/Civil Work	1	EA	250	\$20.00	\$6,550		1.00 2.50	625	\$12,500	\$6,550	0	\$19,050		
	Insulation	1	EA	22	\$20.00	\$4,640		1.00 2.50	55	\$1,100	\$4,640	0	\$5,740		
	Engineered Buildings	1	EA	12	\$20.00	\$3,390		1.00 2.50	30	\$600	\$3,390	0	\$3,990		
	Demolition	1	EA	8	\$20.00	\$2,780		1.00 2.50	20	\$400	\$2,780	0	\$3,180		
				M/HUNIT	M/HRATE	AVG MAT UNIT				7,285	\$145,700	\$419,084	\$0	\$564,784	
SUB TOTAL MECHANICAL EQUIP.															

Project Budget

XYZ Company

PROJECT:

LOCATION:

Job No.

BUDGETARY CONSTRUCTION ESTIMATE

11 Nov 00

Rev. No. 2

Account No. Description	Factored Manhours	TOTAL LABOR	TOTAL MATERIAL	SUBCONTRACT	TOTAL	Size	Remarks
ESTIMATE SUMMARY SHEET							
Gudgeon Thermal Reclamation	1,688	\$33,750	\$175,000	\$0	\$208,750		
H2O Chiller	575	\$11,500	\$5,300	\$0	\$16,800		
Electrical Control	1,025	\$20,500	\$14,260	\$0	\$34,760		
Electrical Distribution	323	\$6,450	\$63,850	\$0	\$70,300		
Sand Hopper - Reclaimed	358	\$7,150	\$6,550	\$0	\$13,700		
Sand Hopper - Processes	358	\$7,150	\$54,460	\$0	\$61,610		
Sand Conveyor	2,230	\$44,600	\$19,251	\$0	\$63,851		
Site/Civil Work	625	\$12,500	\$6,550	\$0	\$19,050		
Insulation	55	\$1,100	\$4,640	\$0	\$5,740		
Engineered Buildings	30	\$600	\$3,390	\$0	\$3,990		
Demolition	20	\$400	\$2,780	\$0	\$3,180		
Craft premium Pay					\$0		
DIRECT FIELD COST	7,285	\$145,700	\$553,251	\$0	\$501,731		
FIELD STAFF & LEGALITIES					\$19,500		
TEMPORARY SITE FACILITIES					\$7,500		
CONST EQUIP, TOOLS & SUPPLIES					\$2,500		
START UP TESTING & TRAINING					\$15,000		
INDIRECT FIELD COST					\$44,500		
TOTAL FIELD COST					\$546,231		
ENGINEERING @ \$110/MH	200	\$22,000			\$22,000		
TOTAL FIELD & EPC ENGINEERING					\$568,231		
TAXES					\$0		
INSURANCE					\$2,500		
PERMITS					\$175		
IMPORT DUTIES					\$0		
OCEAN FREIGHT					\$0		
SITE SECURITY					\$0		
ESCALATION					\$0		
SUBTOTAL					\$570,306		
PROJECT CONTINGENCY	6%				\$34,204		
TOTAL EPC CONTRACT					\$604,510		

Key Value Drivers and Assumptions

Volumes	
Expenses	
Savings	
Other Input materials	
OP-EX/ CAP-EX	
Resource Allocation	
Emission Considerations	
Tax Considerations	

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