



5th Annual Symposium, Mary Kay O'Connor Process Safety Center  
"Beyond Regulatory Compliance: Making Safety Second Nature"  
Reed Arena, Texas A&M University, College Station, Texas  
October 29-30, 2002

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## **Automating Process Safety Management**

Mike Bearrow  
Data Systems & Solutions, LLC  
1900 West Loop South, Suite 300  
Houston, TX 77027, USA  
Phone: (713) 346-4200  
e-mail: ehs@ds-s.com

### **Executive Summary**

In February of 1992 the Occupational Safety and Health Administration (OSHA) promulgated the Process Safety Management Standard (PSM) for Highly Hazardous Chemicals. The stated objective of this standard is to prevent unwanted releases of hazardous chemicals especially into locations which could expose employees and others to serious hazards.

This federal requirement along with the EPA's Risk Management Program, The Chemical Manufacturers Association's Responsible Care(8) Program and ISO 9000, 14000 and 18000 have similar requirements and can be addressed in a more effective and efficient manner by automating core elements.

Although there is no explicit requirement to automate PSM there is a growing trend in the chemical process industry to do so. This paper discusses the requirements and benefits of software system integration for the purpose of PSM automation.

### **What is PSM?**

#### **Regulatory View**

The Process Safety Management Standard for Highly Hazardous Chemicals standard was authorized by Section 112 (r) of the Clean Air Act Amendments of 1990, and it was authorized by Congress in response to the chemical release disaster in Bhopal, India.

The primary objective of the process safety management of highly hazardous chemicals is to prevent unwanted releases of hazardous chemicals especially into locations which could expose employees and others to serious hazards. An effective process safety management program requires a systematic approach to evaluating the whole chemical process.

The various lines of defense that have been incorporated into the design and operation of the process to prevent or mitigate the release of hazardous chemicals need to be evaluated and strengthened to assure their effectiveness at each level. Process safety management is the proactive identification, evaluation and mitigation or prevention of chemical releases that could occur as a result of failures in process, procedures or equipment.

The fourteen elements aimed this objective are tabulated below.

<b>Process Safety Management Elements</b>
<b>Employee Participation</b>
<b>Process Safety Information</b>
<b>Process Hazard Analysis</b>
<b>Operating Procedures</b>
<b>Training</b>
<b>Contractors</b>
<b>Pre-Startup Safety Review</b>
<b>Mechanical Integrity</b>
<b>Hot Work Permits</b>
<b>Management of Change (MOC)</b>
<b>Incident Investigations</b>
<b>Emergency Planning and Response</b>
<b>Compliance Audits</b>
<b>Trade Secrets</b>

### **The Business View**

Process safety management (PSM) presents many challenges for plant managers. Complying with OSHA 's PSM standard, preparing for EPA's Risk Management Program, and meeting the requirements of The Chemical Manufacturers Association's Responsible Care® Program and ISO 9000, 14000 and 18000 can be a daunting prospect. However, if all of these are planned together, facilities can realize increased operating efficiency, long-term cost savings and improved process safety in one comprehensive program.

When initiating a PSM program, plant managers should consider two things. First, they should consider merging all loss prevention and process safety issues into one integrated system. If

tackled separately, duplication and/ or conflict can arise. Second, managers should realize that each of these programs represents an investment in improved **plant reliability**. Survival can depend on how well these programs are implemented because companies that improve their reliability will improve their competitive position.

The primary focus of an effective PSM program is not simply to meet compliance objectives, but to establish a system for improving all aspects of plant operations.

Process safety is not an intellectual exercise to keep us in work. It has real meaning to the safety of people and the environment. It helps keep our plants running reliably and it contributes to a higher quality output. Ultimately, an effectively implemented PSM program can be the foundation for staying in business.

### **Why Automate PSM?**

Process safety management is costly. Creative plant managers will get something more than just compliance for the money they've spent. A more reliable plant, with better steady-state operation, also will be a less costly plant to operate. The costs of PSM can be controlled and even largely recovered through reduced operating costs.

Most PSM costs come from building information files, conducting PHAs, writing operating procedures and training employees. These efforts produce valuable information and assets. If these assets are not maintained, a plant can expect to incur the same costs in three to five years. Management of change procedures are intended to keep records up-to-date, guard the investment and serve as a cost control measure.

Procedures to make changes should be kept simple. Valuable documents will remain "evergreen" if they are easy to update. One way to accomplish this is through the use of electronic data management system (EDMS), combined with careful planning for revisions.

The intent of PSM is to keep plants in good operating order without surprises or unplanned incidents. A PSM program should produce a more reliable plant, with fewer upsets. Improved safety is a result of PSM, not the focus.

When recommendations for the PSM standard were submitted to OSHA, the authors viewed cost effective implementation as an essential management exercise. There is nothing in the standard that says you can not look for ways to **save or make money**. The cost savings from improving operations and plant reliability through PSM will be realized in several ways, including:

- fewer equipment outages;
- more steady-state operation;
- improved product quality and less rework;
- less rework of mechanical change work orders;
- fewer emergency maintenance work orders and overtime to complete them;
- fewer customer complaints; and
- lower emissions to report.

## **What-If?**

Before automating PSM you might ask yourself these questions. What-If?

- You had a single system for managing all enterprise change?
- You had a single system to manage all ideas (recommendations, action items, commitments, etc) across the enterprise?
- You had one incident investigation system for the enterprise (EHS, reliability, PR, Quality...) eliminating many desperate systems performing the same business process?
- You could manage all time sensitive commitments (PSM, RMP, EHS, Inspections, Reporting, Reviews, Audits, etc..) and be automatically notified in advance of their due dates.

## **What can PSM Automation Accomplish?**

So we know we have to comply with the PSM standard and we are convinced we can leverage this “compliance“ activity to have a more reliable operation. Therefore, it stands to reason that the more efficient and effective we execute PSM the better our facility will function.

Automating the execution of PSM has the same kind of benefits that come from office automation, maintenance management, financial management, etc.. Automation is necessary because:

- Most organizations don't know what they know - their left hands (or brains) don't know what their right hands are doing
- As a result mistakes are repeated, good ideas are not used and money is frittered away as people struggle to find the information and knowledge they need. An automated PSM system is auditable with time/date stamped action throughout the PSM execution process.

An automated PSM system can:

- Automatically communicate Incidents and ideas (MOCs or other corrective action) which need to be addressed.
- Be configured to require management approval before close out of an MOC or Incident Investigation. This helps regulate the process.
- Has a backup and recovery plan established by IT department making data loss minimal. Paper is easy to lose, causing compliance issues.
- Will not lose Corrective Actions, Management of Change proposals or Incident Investigation paperwork. This helps reduce time chasing down paperwork required for compliance.
- Can allow management to track late and on time completion of tasks without leaving their desk. Completion of tasks is required to show proactive

approach to incident management and is essential if any process changes are to be made.

- Save lessons learned associated with incidents, MOCs and corrective actions for future learning.
- Can help a company avoid the future occurrence of incidents by taking corrective actions so costs associated with fines and penalties can be reduced and/or avoided.
- Can automatically generate incident reports and management reports, regulatory agencies and the public. The reports would show number of safe hours, number of injuries, number of OSHA regulated incidents, number of environmental incidents, etc.
- Can warehouse raw data to allow senior management to track trends in incident occurrences, i.e.. type of incidents, repetitive injuries.
- Can have political benefits, such as, making a proactive statement to the community, leading other plants in the area with safety initiatives, putting teeth in your promises to workers and the community regarding incident avoidance, etc.

### PSM Elements and Automation Requirements

The following table illustrates the fourteen elements of the process safety standard, the requirement and the requirement which should be addressed by automation. It is understood that all of these can , and indeed are, being accomplished manually.

The automation requirements presented below have some common themes. They are the need to view current information, execute or conduct one of the elements (PSM or contractor audits, incident investigations, PHAs...), communicate results or assignments (action items, PSSRs...), manage non-MOC recommendations (in-kind changes or ideas) and manage change.

The ideal PSM Automation would have the ability address each of these needs for no cost. That of course does not exist. However, automation is available and in use on each of these elements. The automation is being delivered in the form of custom electronic systems, commercial off the shelf products and combinations of both.

Element	Requirement	Automation Requirements
<b>Employee Participation</b>	Develop a written plan for how they will implement the employee participation requirements. They must consult with employees and their representatives on the conduct and development of process hazard analyses and on other elements of the standard.	<b>Available for viewing</b> and perhaps execute each of the requirements.

Element	Requirement	Automation Requirements
	<p>Employees and their representatives must have access to information developed from the standard, including process hazard analyses.</p>	
<p><b>Process Safety Information</b></p>	<p>Compile written safety information on the hazards of the chemicals used in a covered process as well as information on the process technology and equipment before conducting the hazard analyses required by the standard. Employers may use material safety data sheets (MSDS) to comply with the requirements for information on the hazards of the chemicals.</p>	<p>PSI needs to be <b>available for viewing</b> and needs to be kept current.</p> <p><b>Changes</b> to PSI must be <b>managed</b> using the MOC element.</p>
<p><b>Process Hazard Analysis</b></p>	<p>Employers must perform an analysis to identify, evaluate and control hazards involved in a process. The analysis must be appropriate to the complexity of the process. OSHA ' s standard specifies a number of issues that the analysis must address, as well as requirements for who must conduct the analysis, how often it must be performed, and responding to its findings.</p>	<p>PHAs must be <b>conducted</b> and available for <b>viewing</b>. Recommendations need to be addressed and addressed/managed.</p> <p><b>Changes</b> resulting from PHAs needs to be <b>communicated</b> to the affected employees and corrective action <b>managed</b> to closure.</p> <p>PHA <b>recommendations</b> need to be <b>managed</b> to closure.</p> <p>Changes that result from recommendations must be <b>managed</b> using the MOC element.</p> <p>Revalidate on a <b>schedule</b>.</p>

Element	Requirement	Automation Requirements
<b>Operating Procedures</b>	Employers must develop and implement written operating procedures that provide clear instructions for safely conducting activities involved in each process, consistent with the process safety information. The written procedures also must address steps for each operating phase, operating limits, safety and health considerations and safety systems and their functions .	<p>Need to be <b>available for viewing</b>, use and be kept current using the MOC element.</p> <p><b>Changes</b> to training must be <b>managed</b> using the MOC element.</p> <p>Re-certify on a <b>schedule</b>.</p>
<b>Training</b>	The proposal requires training for employees involved in covered processes. Initial training requires that all workers currently involved in a process as well as workers newly assigned be trained with an overview of the process and in its operating procedures. Refresher training must be given at least every three years to employees involved in the process. After training, employers must ascertain that workers have received and understood the training.	<p>Need to ensure Training material is <b>available for viewing</b>, current and accomplished on a <b>schedule</b>.</p> <p><b>Changes</b> to training must be <b>managed</b> using the MOC element or other corrective action system.</p> <p>Refresher training on a <b>schedule</b>.</p>
<b>Contractors</b>	Employers must inform contract employers prior to the initiation of the contractor's work at the site of the potential hazards of fire, explosion or toxic releases. Contract employers and host employers must ensure that contract workers are trained in the work practices necessary to perform their jobs safely and informed of any applicable safety rules of the facility.	<p>Need to make information <b>available for contractor viewing</b>.</p> <p>Need to ensure contractor training is <b>conducted</b> and <b>audits</b> are performed to ensure that training is understood.</p> <p><b>Changes</b> to safety information files must be <b>managed</b> using the MOC element.</p> <p>Audit <b>recommendations</b> need to be <b>communicated</b> and <b>managed to closure</b>.</p>
<b>Pre-Startup Safety Review</b>	Employers must perform a pre-startup review for new facilities as well as for facilities that have been modified to the extent that the process safety information	Must ensure PSSR <b>actions</b> are <b>communicated</b> , documented and accomplished before startup.

Element	Requirement	Automation Requirements
	has changed. The review is designed to make sure that certain important considerations had been addressed before any highly hazardous chemical was introduced into a process.	
<b>Mechanical Integrity</b>	Employers must ensure the initial and on-going integrity of process equipment by determining that the equipment is designed, installed and maintained properly. The proposed standard requires testing and inspection of equipment; quality assurance checks of equipment, spare parts and maintenance materials; and correction of deficiencies.	Ensure files are <b>current</b> and <b>available for viewing</b> by employees and contractors.  <b>Changes</b> to these files must be <b>managed</b> using the MOC element.
<b>Hot Work Permits</b>	Issue a permit for all hot work operations conducted on or near a covered process.	Work permits need to be <b>available for viewing</b> and use.  Ongoing <b>storage</b> may be a requirement
<b>Management of Change (MOC)</b>	Establish and implement written procedures to manage changes to facilities or to process chemicals, technologies or equipment, other than "replacements in kind." Workers must be informed and a number of issues must be addressed before the change is made.	All <b>changes</b> to process to facilities, process chemicals, technologies or equipment must be <b>managed</b> using this element.
<b>Incident Investigations</b>	Investigate every incident that results in, or reasonably could have resulted in, a catastrophic release of highly hazardous chemicals in the workplace. Investigations must be initiated no later than 48 hours after the incident occurs.	Results must be <b>communicated</b> .  Incident <b>recommendations</b> need to be <b>managed</b> to closure.  Changes that result from recommendations must be <b>managed</b> using the MOC element.
<b>Emergency Planning and Response</b>	Establish and implement a plan in accordance with the provisions in OSHA's emergency action plan regulation (29 CFR 1910.38(a) as a minimum for emergency	Response plan must be available for <b>viewing</b> and <b>training</b> must be <b>accomplished</b> .

Element	Requirement	Automation Requirements
	a minimum for emergency planning.	<p><b>Changes</b> to the ERP should be <b>managed</b> using the MOC element.</p> <p>Emergency Planning Response critique <b>recommendations</b> need to be <b>managed</b> to closure.</p> <p>Changes that result from recommendations must be <b>managed</b> using the MOC element.</p>
<b>Compliance Audits</b>	Certify that they have evaluated their compliance with all of the above provisions at least every three years.	<p>Audits need to be <b>available for viewing</b>.</p> <p>Audit <b>recommendations</b> need to be <b>managed</b> to closure.</p> <p>Changes that result from recommendations must be <b>managed</b> using the MOC element.</p>
<b>Trade Secrets</b>	Make all necessary information available to persons responsible for compiling process safety information, developing hazard analyses, developing operating procedures, conducting incident investigations, developing emergency planning and response and auditing compliance.	Information necessary must be <b>available for viewing</b> and used in the execution PSM.

There are some recurring requirements which should be noted. PSM automation needs to enable:

- Change Management (MOC and Non-MOC) Corrective Action
- Information access & viewing for employees and contractors
- Scheduling of activities
- Communication of status and results and
- Training.

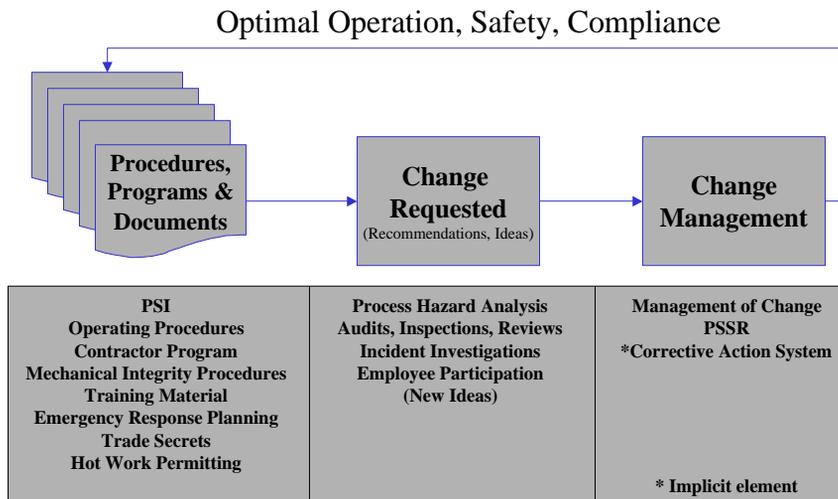
All of these requirements must be addressed if **complete** automation is achieved.

## Ideal Automation Diagram

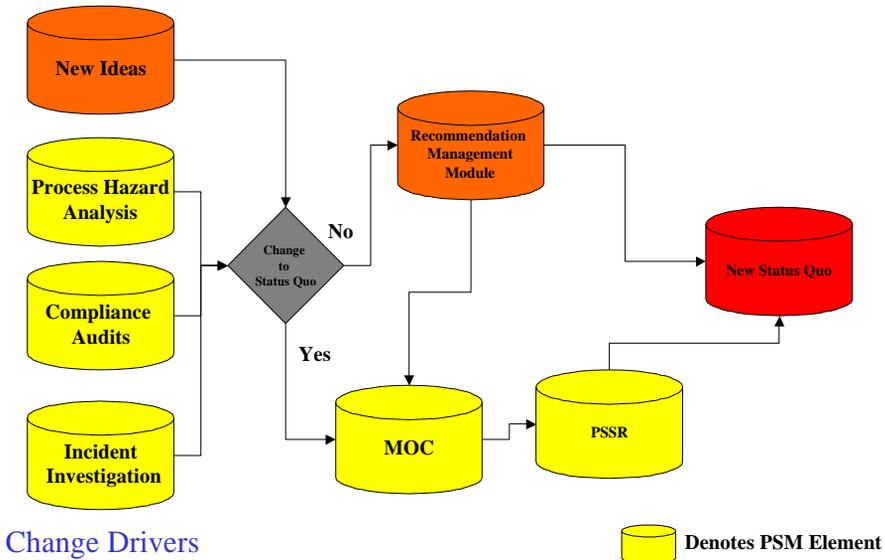
Process Safety Management is simple in concept. It assumes that plants were designed and are run in a safe manner. Problems, both operational and safety, arise when deviations or unexpected/unmanaged change occurs. So being in compliance is a 5 step process.

1. Define how the facility should operated using Policies, Procedures Programs, Specification, etc...
2. Then ensure people are trained and understand the facility should be operated.
3. Audit and Analyze, on an on-going basis that the plant is being operated in the designated manner.
4. Make corrections when necessary using Process Hazard Analysis Audits.
5. Finally, when things go wrong, investigate, generate corrective action and track to closure.

This process represented in the following diagram.



Notice the “corrective action” label under the Change Management box. Unless all change is managed under your MOC program, a non-MOC corrective action process is implicit in the PSM standard. A corrective action system should be automated with the following diagram in mind.



### Presently Strategies and Opportunities

The following outlines the common strategies that are employed in industry today and a recommendation for what could be accomplished. A single system that addresses all of these requirements does not exist and if created would be too expensive for purchase.

Element	Common Strategies	Opportunities
<p><b>Employee Participation</b></p>	<p>Written documentation of employee participation, likely MS Word, is usually stored on a "shared" drive on the local network and is read only. Updates are probably unusual.</p>	<p>Access to PSM documentation and key performance indicators is rapidly moving towards portalling technology. Reference documentation might be managed within an EDMS but access would be accomplished using an "EHS" portal in the companies intranet.</p>
<p><b>Process Safety Information</b></p>	<p>Much of PSI is stored as as paper or as text files and scanned images. These files can be stored, retrieved and managed on a read-only, shared drive on the local network.</p>	<p>Electronic Document Management Systems (EDMS) like FileNet can be used to control revision and maintain facility or enterprise documentation. Update of documents requires MOC in most instances. Using a document management system may improve the revision control and access to documents. In situations where the documents must be simultaneously available and used by multiple persons an EDMS will reduce mistakes</p>

Element	Common Strategies	Opportunities
<b>Process Hazard Analysis</b>	Although there are companies with internally developed PHA tools and documentation can be accomplished with spreadsheets and word processors, COTS (commercial off the shelf) products are definitely the norm. Several PHA tools are on the market to aide in the conduct and documentation of PHAs. Some of the best known are PHA Workshop, PHA Works, JBF Leader and PHA Pro. These tools are designed specifically for this purpose.	Using a COTS PHA tool that is integrated with a corrective action management tool will eliminate the manual step of entering recommendations into a corrective action tool or spreadsheet.
<b>Operating Procedures</b>	Operating procedures are normally documents created in MS Word and can be stored, retrieved and managed on a "shared" drive on the local network.	Electronic Document Management Systems (EDMS) like FileNet can be used to control revision and manage facility or enterprise documentation. Update of documents requires MOC in most instances.
<b>Training</b>	Much of today's training is paper-based and manual upkeep of training records utilizing spreadsheet technology to record required training and test scores.	Training can be created as CBTs, MS Word or a number of different ways. Training systems are available from many vendors. These systems can automate every aspect of the training requirements including course development, CBTs, Test generation, scoring and communication of results and reminder of impending training requirements. Updating of training materials requires MOC in most instances. Several systems are on the Market to automate training requirements including.....
<b>Contractors</b>	Contractor information concerning potential hazards of fire, explosion or toxic releases are usually is predominantly paper-based but is likely stored as a text file on a local drive on the LAN. Audits measuring whether contract workers are trained in the work practices necessary to perform their jobs safely and informed of any applicable safety rules of the facility are normally documented on MS Word and findings are tracked using spreadsheets or small database applications.	Required safety information should be readily available to contractor workers at the worksite in paper form. This PSI should be kept evergreen, possible maintained utilizing a EDMS. Audits can be conducted using electronic tools which record results, create corrective actions and manage recommendations to closure. Reporting contractor performance by contractor would be a useful safety tool.

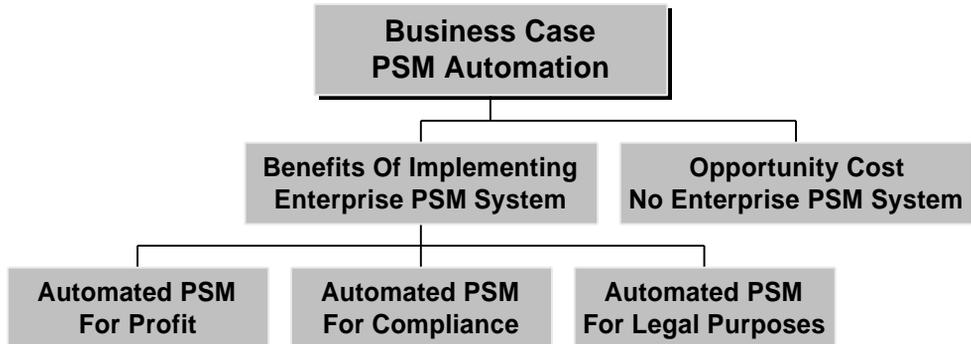
Element	Common Strategies	Opportunities
	applications.	
<b>Pre-Startup Safety Review</b>	A PSSR is predominantly a paper-based exercise, although systems for tracking PSSR assignments are growing in number.	<p>Systems are being used to track PSSR items. Maintenance Management System (MMS) and PSM tracking systems are widely available. PSSR should be integrated with management of change activities since it is a check or audit that the change as proposed and analyzed has been implemented as such.</p> <p>Automatic notification of PSSR assignment and the ability to complete and comment on their closure via the intranet would increase efficiency.</p>
<b>Mechanical Integrity</b>	<p>Information concerning the design, installation and proper maintenance is often stored as paper in folders and vendor catalogs . Scheduled testing and inspection of equipment is normally helped by the use a maintenance management system (MMS) like Maximo. Quality assurance procedures and programs including checks of equipment, spare parts and maintenance materials are normally electronic and maintained by the maintenance department.</p> <p>Correction of deficiencies is normally handled by the MMS.</p>	Software integration between the maintenance management system and an MOC process is uncommon but is becoming an efficiency issue. Corrective action identified during equipment inspection is being accomplished within the MMS.
<b>Hot Work Permits</b>	Hot work permitting is predominantly a paper-based exercise, although systems for tracking PSSR assignments are growing in number.	<p>Access to Hot Work documentation could be achieved using the company's intranet. Completed permits could be scanned for future analysis or other use and stored in the EDMS.</p>
<b>Management of Change (MOC)</b>	Management of Change systems are predominantly paper-based although some facilities do use spreadsheets to document what has occurred and electronically store drawings that may have been affected by the change.	<p>Very few automated systems are available for managing the requirements of MOC. An ideal MOC system would:</p> <p>Be integrated with a corrective action system</p>

Element	Common Strategies	Opportunities
		<p>Be integrated with your MMS</p> <p>Follow your existing MOC process (each site)</p> <p>Use your existing organization &amp; naming conventions.</p> <p>Enable each Site or Business Unit to have their own evaluation process or workflow &amp; PSSR checklists.</p> <p>Manage all action items and have the to retrieve and close them via the internet.</p> <p>Allow Serial and Parallel Workflow</p> <p>Allow for MOC prioritization, categorization &amp; Risk Ranking.</p> <p>Allow you to readily measure/report actions by due date, department and responsible person.</p> <p>Have a notification and reminder system for assignments (integrated with your mail system) to proactively communicate and remind persons of assignments.</p> <p>Enable analysis (graphs, Charts and Trending)</p> <p>Addresses Normal Changes, Temporary Changes &amp; Emergency Changes</p> <p>Allow for categorization by type of change (Chemicals, Technology, Equipment, etc...)</p> <p>Enable Category of Change to drive or automate the selection of Evaluation questions and PSSRs.</p> <p>Ability to attach and view any type of documents</p> <p>Enable you to assign and track all assignments including Reviewers</p>

Element	Common Strategies	Opportunities
		<p>and action items.</p> <p>Have a Keyword Search capability.</p>
<p><b>Incident Investigations</b></p>	<p>Several Incident tools are on the market to aide in the conduct and documentation of Incident and many in-house programs have been developed. These tools are designed specifically for the purpose.</p>	<p>Incident investigation systems should be applied to all loss prevention activities including Environmental, Health, Safety, and Security. Other departments or disciplines like Quality and Reliability can leverage an unwanted events tool for their purposes.</p> <p>Further optimization can be achieved by integrating a corrective action system with the incident tool.</p>
<p><b>Emergency Planning and Response</b></p>	<p>Written documentation of Emergency Planning and Response, likely in MS Word, is usually stored on a “shared” drive on the local network and is read only. Training is carried out using a training system or less formally. Updates are unusual but do occur. Changes to the ERP are MOC items.</p>	<p>Access to Emergency Planning and Response documentation could be achieved using portalling technology. Reference documentation might be managed within an EDMS but access would be accomplished using an “EHS” portal on the company’s intranet.</p>
<p><b>Compliance Audits</b></p>	<p>Compliance audits can be paper-based but are increasingly being conducted using tools similar to the PHA tools mentioned above.</p>	<p>Several tools exist for the conduct and documentation of audits. Maximum usefulness can be achieved by standardizing on audit protocols and leveraging an enterprise tool for the documentation. Integration of this tool with a corrective action/MOC tool would pay further dividends.</p>
<p><b>Trade Secrets</b></p>	<p>The Trade Secrets statement, will likely be an MS Word document stored on a “shared” drive on the local network and is read only. Updates are unusual.</p>	<p>Access to Trade Secrets for the purpose of PSM could be achieved using portalling technology. Reference documentation might be managed within an EDMS but access would be accomplished using an “EHS” portal on the company’s intranet.</p>

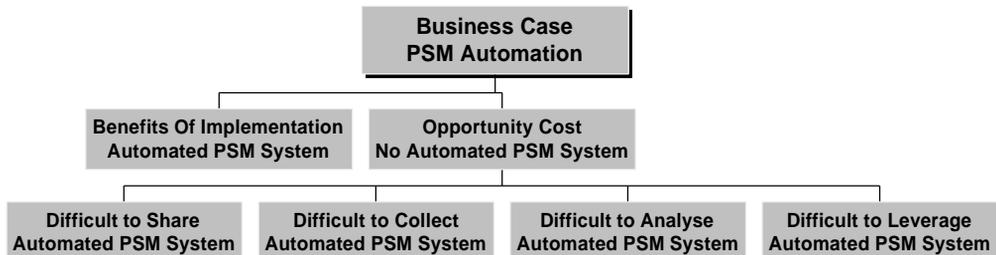
## PSM Automation Drivers

There are two primary business case drivers associated with automation of PSM. They are “Benefits” if automation is undertaken and the “Opportunity Costs” associated with not automating, or dollars which will not be made because of inefficiency. The logic tree below illustrates the basic business case relationships.



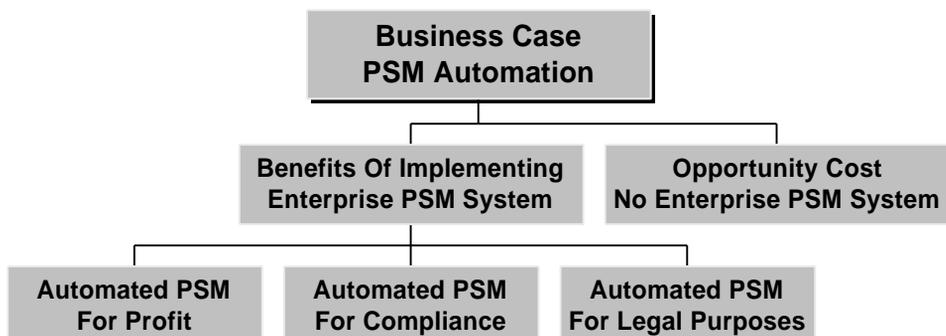
## Opportunity Cost

First the opportunity costs. The opportunity costs associated with having no PSM compliance will vary greatly by company. These costs are associated with the inability to share, collect, analyze and leverage PSM data, information or knowledge.



## Benefits of Automating PSM

There are three primary areas which will benefit from a PSM Automation System. Benefits will be derived through increased profits, improved compliance and better legal position. These three drivers will be developed more detail in the following diagrams.



## **PSM Automation for Profit**

PSM automation can be leveraged for optimizing operations, shorter time to revenue and increased reliability. The following bullets and sub bullets outline the areas which can be affected by PSM Automation.

- Efficient Idea Implementation - Recommendations & eMOC
  - Identifying Best Practices to optimize operations
  - Collecting the ideas that were not Implemented & Why
  - Sharing Best Practices Immediately to optimize operations
- Effective Idea Implementation - Recommendations & eMOC
  - Ensuring Change is Properly Analyzed and Implemented to optimize operations
  - Ensuring Change is Implemented as planned (PSSR)
- Auditing EHS Systems - Audit Documentation
  - Ensuring Identified Best Practices are Adhered to optimize operations
  - Generating Corrective Actions for optimum operations
- Managing Unwanted Events - Incident Documentation, Lessons Learned, Root Causes
  - Collecting Unwanted Event Info
  - Analyzing the Events
  - Identifying Lessons Learned
  - Identifying Root Causes
  - Event Costs
  - Generating Corrective Actions to optimize operations
- Analyzing the Facilities - PHA Documentation
  - Documenting the Hazards & Optimization Opportunities
  - Generating Corrective Actions to optimize

## **PSM Automation for Compliance**

Knowledge Management to ensure Optimal Compliance Systems, Maximum Safety, Health and Environmental Responsibility.

- Efficient Idea Implementation – Recommended Actions & eMOC
  - Identifying EHS Deficiencies
  - Documenting Actions Not Taken & Why
  - Sharing Corrective Actions Immediately, Possible Impact on Other Plants
- Effective Idea Implementation – Recommendations & eMOC (Corrective Action)
  - Ensuring Change is Compliant, Analyzed and Implemented
  - Ensuring Change is Implemented as Planned (PSSR)
- Auditing EHS Systems – Audit Documentation
  - Ensuring EHS Standards and regulatory standards are Adhered to
  - Generating Corrective Actions to comply with requirements
- Managing Unwanted Events – Incident Documentation, Lessons Learned, Root Causes
  - Collecting EHS Event Info
  - Analyzing the Events
  - Identifying Lessons Learned
  - Identifying Root Causes
  - Generating Corrective Actions to Comply
- Analyzing the Facilities – PHA Documentation
  - Documenting the Hazards
  - Generating Corrective Actions to Comply

### **PSM Automation for Legal Purposes**

Knowledge Management to Document the Companies intent to protect people, the environment and assets. Proof of Due Diligence is the only mitigating defense.

- Efficient Idea Implementation – Recommendations & eMOC
  - Identifying EHS Opportunities
  - Documenting Actions Not Taken & Why
  - Sharing Corrective Actions, Possible Impact on Other Plants
  - Fully Document Due Diligence
- Effective Idea Implementation – Recommendation& eMOC
  - Ensuring Change is Compliant, Analyzed and Implemented
  - Ensuring Change is Implemented as Planned (PSSR)

- Fully Document Due Diligence
- Auditing EHS Systems – Audit Documentation
  - Ensuring EHS Standard are Adhered to
  - Generating Corrective Actions
  - Fully Document Due Diligence
- Managing Unwanted Events – Incident Documentation, Lessons Learned, Root Cause
  - Collecting EHS Event Info
  - Analyzing the Events
  - Identifying Lessons Learned
  - Identifying Root Causes
  - Generating Corrective Actions
  - Fully Document Due Diligence
- Analyzing the Facilities – PHA Documentation
  - Documenting the Hazards
  - Generating Corrective Actions to ensure Safe Operations
  - Fully Document Due Diligence

## **Final Automation Thoughts**

**There is no substitute for good judgment. No amount of automation will eliminate mistakes or poor decision making.**

Many companies have been advised that PSM compliance is a document management or workflow problem or issue. This is not only wrong, it also can be dangerous. Process Safety Management (PSM) is not a document management exercise. PSM does have document management and workflow aspects. The objective of PSM is to know what the safety and health effects are, know that they are not a hazard, and insure that changes are accomplished as designed and analyzed. It isn't about documentation or paperwork. Efficient management of information, whether on paper or on EDMS, makes PSM more efficient, but the objective is smooth operation and improved safety, not filing and managing paper.

There are lots of vendors/consultants who will see your PSM automation needs in terms of their expertise. Training companies will see PSM as a training and procedures issue.

Enterprise Resource Planning vendors will perceive PSM automation as a “One-Time-Data-Entry” issue with a “One-Size-Fits-All” solution.

Electronic Document Management Systems (EDMS) vendors will think PSM automation is a document control, workflow or routing problem and some EHS consultants will see it as a “Compliance” issue. All of these views have some validity, but they miss the central objective.

An EDMS can only address the documentation of what is to be changed or what has been changed and the simple routing of those documents for approval and action.

Your PSM automation will probably be a combination of all of these approaches.

### **Summary**

PSM Automation is in use all over the Chemical Process Industry because automation can make being in compliance more efficient and effective.

While there is no known PSM or EHS system that can be purchased to achieve total PSM Automation, there are more offerings and opportunities today than ever before.

### **Bibliography**

Some of the information contained in this paper is paraphrased from speech given by Raymond L. Brandes to the Synthetic Organic Chemical Manufacturers Association (SOCMA) in Newark, NJ on June 23, 1993 and Charlotte, NC on July 23, 1993

Thompson Publishing published an article entitled “Getting Out in Front with Process Safety Implementation” by Raymond L. Brandes