



Rice Global E&C Forum
**Engineering &
Construction**

Beyond Compliance: Measuring Effectiveness in Safety Management Systems

Ajay A. Shah, P.E.

Director, Audubon Risk Management Services (ARMS)

audubon

Total Flexibility. Total Solutions.



Agenda



Rice Global E&C Forum
Engineering &
Construction

audubon
Total Flexibility. Total Solutions.



- Safety Management System – What is it?
- Importance – Why should we care?
- Compliance – What is compliance? How is it different from effectiveness?
- Measuring Effectiveness – Now what?
- Questions

Safety Management



Rice Global E&C Forum
Engineering &
Construction



- *Safety management*

- The reduction of risk to as low as reasonably practicable (ALARP)
- Safety = risk
- Risk = consequence * frequency
- So safety management = reducing either consequence or frequency

Safety Management



Rice Global E&C Forum
Engineering &
Construction

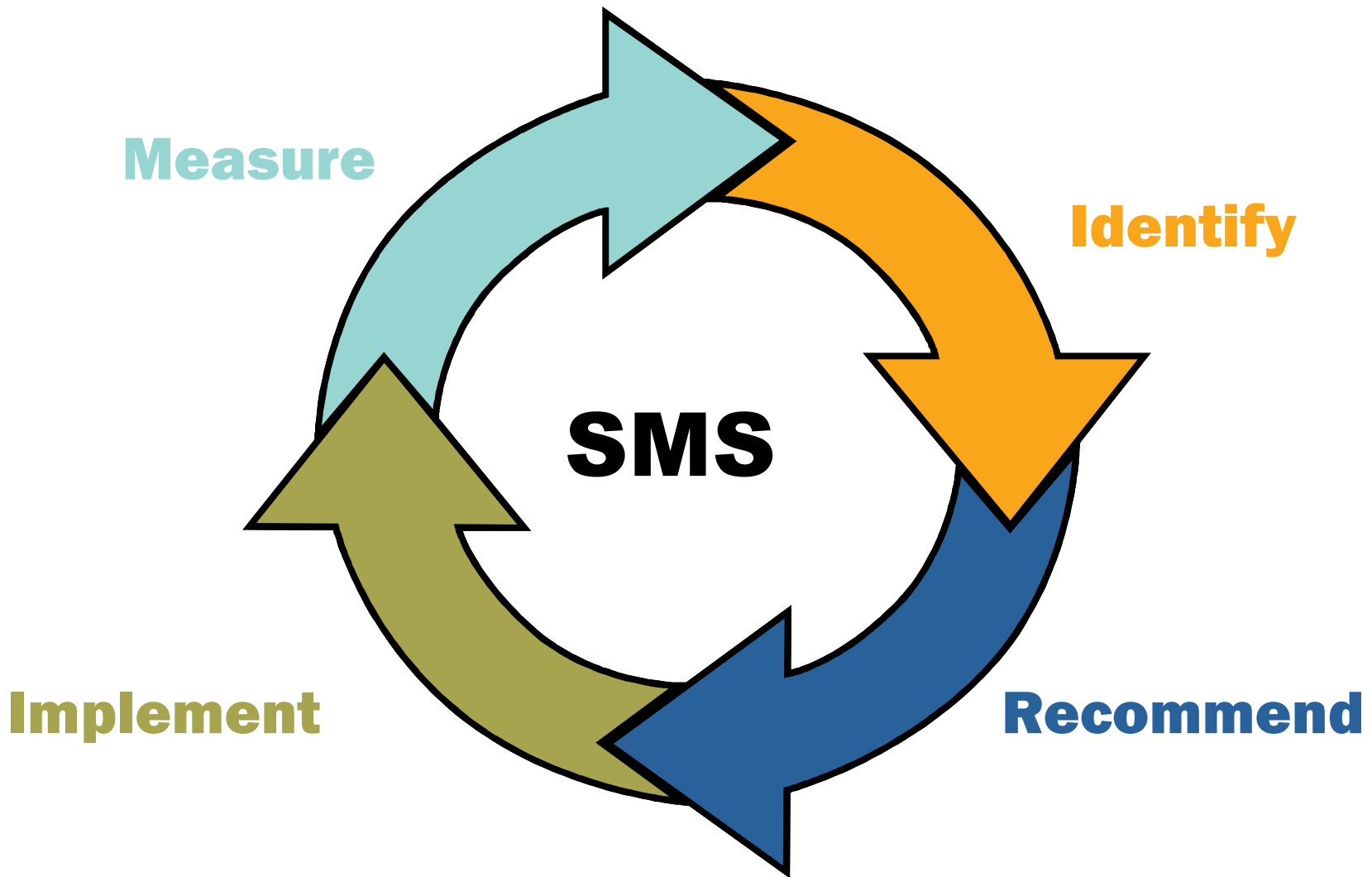


- *Safety management system (SMS)*
 - A systematic series of policies, processes, procedures, and practices that help achieve the desired levels of safety management
 - May be multiple SMS at the same organization
 - Focused on systematically reducing consequence (i.e. PSVs) or likelihood (i.e. operating sequencing)
- Most SMS share the same key components

Safety Management System



Rice Global E&C Forum
Engineering &
Construction



SMS: Identify

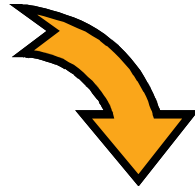


Rice Global E&C Forum
Engineering &
Construction

audubon
Total Flexibility. Total Solutions.



- Engage stakeholders
- Gather information
- Analyze and Identify Gaps
- Identifying gaps and opportunities for improvement
- Reducing risk and inefficiencies
- Consolidating information
- Helping establish a culture of compliance



SMS: Recommend

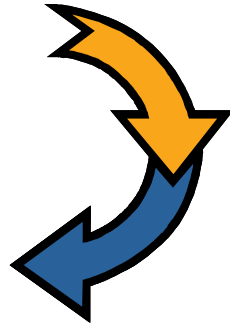


Rice Global E&C Forum
Engineering &
Construction

audubon
Total Flexibility. Total Solutions.



- Analyze possible solutions
- Get buy-in from key stakeholders
- Obtain resources
- Looking for most efficient solutions
- Setting priorities
- Engaging workforce directly – operational buy-in



SMS: Implement

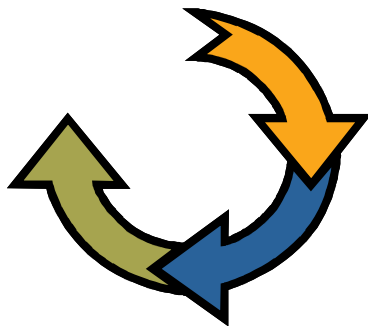


Rice Global E&C Forum
Engineering &
Construction

audubon
Total Flexibility. Total Solutions.



- Execute solutions
- Closing gaps to reduce risk and increase safety
- Demonstrating real change – employee buy-in



SMS: Measure

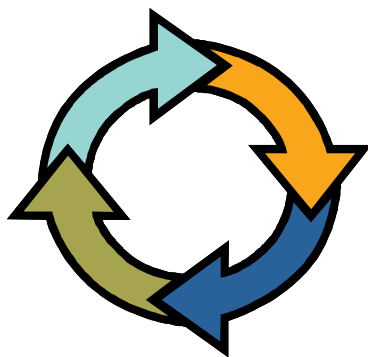


Rice Global E&C Forum
Engineering &
Construction

audubon
Total Flexibility. Total Solutions.



- Measure impact
- Assess improvement opportunities
- Assess performance



- Identifying and reducing inefficiencies in process
- Identifying best practices
- Identifying impact
- Communicating issues/successes to key stakeholders
- Planning for future work

Importance



Rice Global E&C Forum
Engineering &
Construction



- Safety management systems found throughout multiple industries under multiple guises:
 - PSM
 - SEMS
 - RMP
 - ISO
 - OSHA
 - ISM
 - CRM
 - ILO

Importance



Rice Global E&C Forum
Engineering &
Construction

audubon
Total Flexibility. Total Solutions.



- Properly structured, safety management systems can:
 - Reduce injuries
 - Reduce operational costs
 - LTA & operational considerations
 - Increase equipment reliability
 - Reduce downtime
- So how do you know if a system is properly structured?

Compliance



Rice Global E&C Forum
Engineering &
Construction

audubon
Total Flexibility. Total Solutions.



- *Compliance*
 - Conformity in fulfilling official requirements
 - The effort to ensure that personnel are aware of and take steps to comply with relevant laws and regulations
 - The state of being in accordance with established guidelines, specifications, or legislation or the process of becoming so

Measuring Compliance



Rice Global E&C Forum
Engineering &
Construction

audubon
Total Flexibility. Total Solutions.



- The most common way to measure compliance is through regular audits
- Almost always, a checklist approach at heart
 - You need to do “X” → Show me a procedure, process, practice or policy that says you will do “X” and 3 completed “X”’s
- Easy to score
- Objective

Problems with Compliance



Rice Global E&C Forum
Engineering &
Construction

audubon
Total Flexibility. Total Solutions.



- Focuses more on design than effectiveness
 - Audits are usually structured to verify the Safety Management System is compliant with the rule
 - Does not usually assess the quality of information, process, procedure, practice or policy
 - Does not usually verify how well SMS is actually integrated into the daily operational work processes

Problems with Compliance



Rice Global E&C Forum
Engineering &
Construction

audubon
Total Flexibility. Total Solutions.



- High potential to miss latent, low-level or underlying issues
 - Results-based, not performance based
 - Can only identify non-compliances
 - Does not evaluate operational issues

Problems with Compliance



Rice Global E&C Forum
Engineering &
Construction



- Not proactive
 - Cannot identify issues until after they have already happened
 - Usually does not help identify causes of issues or non-compliances
 - Data not usually analyzed to determine leading indicators

Effectiveness



Rice Global E&C Forum
Engineering &
Construction

audubon
Total Flexibility. Total Solutions.



- *Effectiveness*
 - The ability to produce the desired effect
- Effectiveness = performance + results
 - Good luck is no substitute for good work practices
 - Bad results are not effective
 - Performance = behavior + results
 - **Change the behavior, change the performance**

Measuring Effectiveness



Rice Global E&C Forum
Engineering &
Construction

audubon
Total Flexibility. Total Solutions.



- Measuring effectiveness is a more holistic approach to measuring performance of the SMS
- Involves many more discussions & interviews
- Reviews human performance
- Reviews organizational interfaces
- **Provides a framework, not a Recipe book**

Measuring Effectiveness



Rice Global E&C Forum
Engineering &
Construction

audubon
Total Flexibility. Total Solutions.



- Most common methodologies are subjectively objective
 - Involves more frequent uses of surveys, questions and field visits by independent agents
 - Same questions asked repeatedly throughout level to allow for data comparisons
 - Questions tend to be scaled rather than binary
 - Answers evaluated in a variety of ways

Measuring Effectiveness



Rice Global E&C Forum
Engineering &
Construction



Plant X Leadership Survey		Descriptive Statistics			HR & Staff 4	Chem 19	Design Eng 17	RP 21	Plant Mgt 4	Maint 63	Supply Chain 7	Projects 25	Security 52
Questions on the Survey		N	Mean	SD	Mean	Mean	Mean	Mean	Mean	Mean	Mean	Mean	Mean
1. Core Values		GM	4.82		4.79	4.91	4.93	4.38	4.47	4.85	4.60	5.12	4.37
48	Use of error reduction tools (procedure use, self checking, and three way communication) is reinforced by my supervisor	380	4.10	1.79	3.86	5.40	2.86	2.89	4.20	3.97	5.83	4.88	3.66
12	My supervisor reinforces high standards of work performance.	380	6.38	1.08	6.97	6.40	6.50	5.67	6.20	6.34	6.17	6.65	5.82
15	I am expected to follow established rules and behaviors.	380	4.68	1.59	4.76	5.00	4.64	3.00	4.40	4.48	3.83	4.47	3.95
19	Conservative decision making is evident throughout the plant organization.	380	5.65	1.39	5.72	4.60	4.79	5.33	5.20	5.72	5.67	6.24	5.54
21	Management behaviors align with written policies and procedures.	380	3.92	1.74	3.90	4.40	3.93	3.67	3.60	4.69	4.50	3.06	3.51
24	My supervisor ensures that there is appropriate understanding of issues prior to making decisions.	378	4.58	1.63	4.52	4.20	3.43	3.56	4.20	4.58	5.00	5.00	3.90
29	I am encouraged to bring forward problems with recommendations.	379	5.05	1.47	5.00	4.80	5.57	3.89	4.60	5.02	5.33	5.24	4.43
32	Most workers demonstrate buy-in for high standards and management expectations.	335	5.14	1.49	5.16	4.40	5.58	4.63	4.75	4.95	5.00	4.71	4.78
39	I am comfortable approaching my manager with a concern.	332	5.25	1.29	5.12	5.40	5.55	4.75	4.50	5.25	4.00	5.36	4.83
40	I believe that my input is valued by my supervisor.	334	5.00	1.43	5.12	6.00	5.00	4.63	4.25	5.38	5.20	5.36	4.98
42	Management and worker conflicts are resolved professionally.	335	4.29	1.74	4.12	3.60	5.08	3.88	3.50	4.03	3.00	4.50	4.41
45	Decision making authority for operational decisions is clearly defined.	328	3.78	1.60	3.12	5.00	4.75	3.88	3.00	4.51	3.60	3.36	2.54
46	Workers in my group perform activities in accordance with procedures.	333	6.03	0.90	6.38	6.80	6.67	6.63	6.75	6.46	5.40	6.54	5.96
47	Use of error reduction tools (procedure use, self checking, and three way communication) is reinforced in training settings.	333	4.45	1.68	4.64	5.80	3.75	3.75	4.50	4.52	4.60	4.50	4.35

Using Existing Tools



Rice Global E&C Forum
Engineering &
Construction

audubon
Total Flexibility. Total Solutions.



- How do we use existing compliance tools to assess effectiveness?
 - Change the questions to be more open-ended
 - Grade the questions on spectrum (or allow respondents too)
 - Compare the data across various work groups and various levels



Rice Global E&C Forum
**Engineering &
Construction**



audubon

Total Flexibility. Total Solutions.

QUESTIONS

Ajay A. Shah, P.E.
Director, Audubon Risk Management Services (ARMS)
ashah@aecno.com
(504) 535-2283