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CCPS

Center for Chemical Process Safety

REFLECTING ON THE PAST, ENVISIONING THE FUTURE: A VISION 20/20 PRIMER

Process Safety Management Mentoring (PSM^2) Forum

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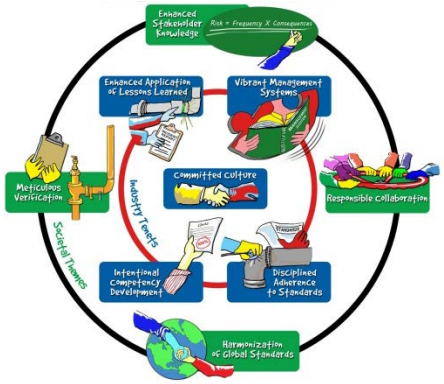
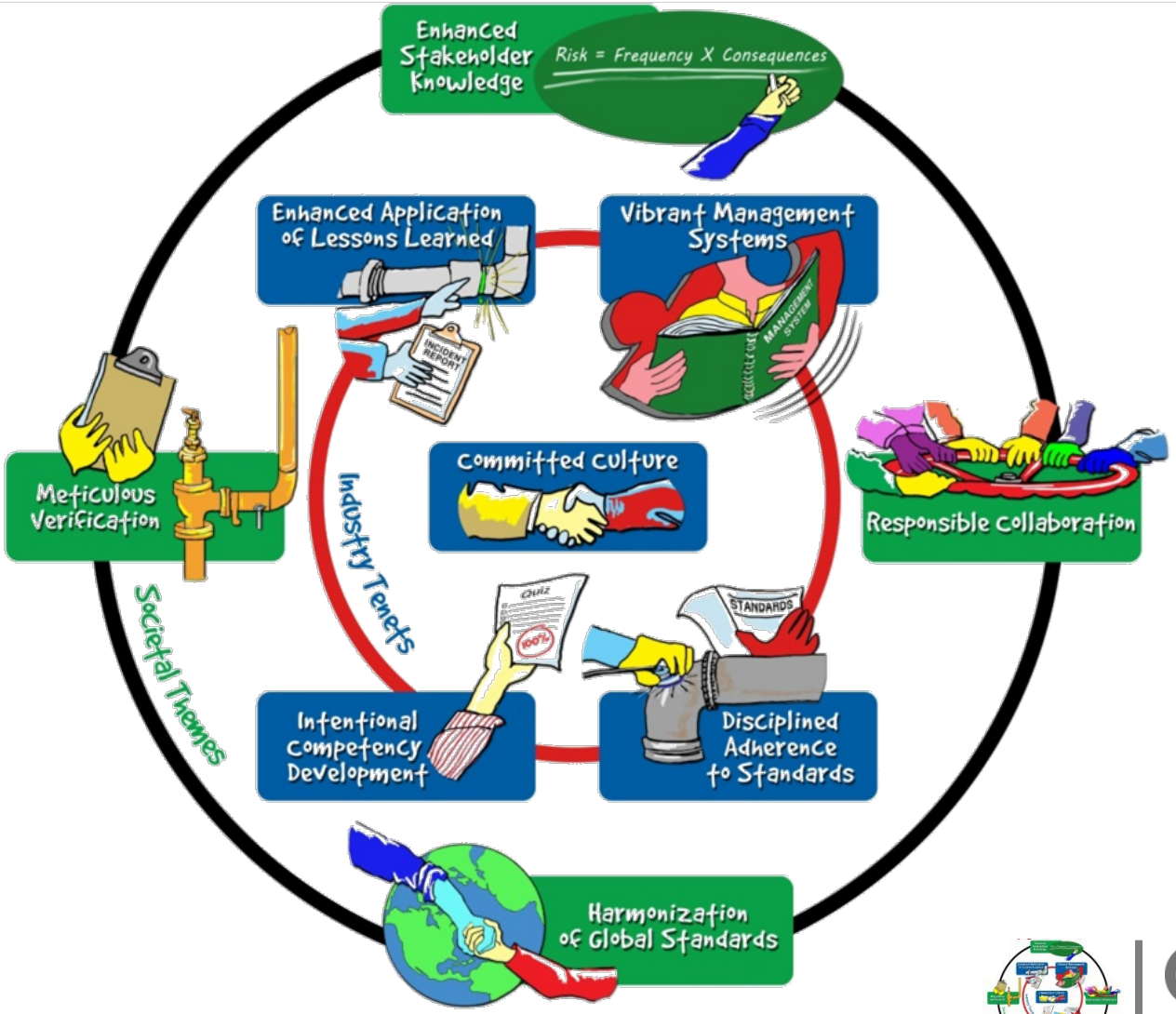


Vision 20/20


Enhanced Stakeholder Knowledge
Risk = Frequency X Consequences
Enhanced Application of Lessons Learned
INCIDENT REPORT
Vibrant Management Systems
MANAGEMENT SYSTEM
Meticulous Verification
Committed Culture
Responsible Collaboration
Industry Tenets
Societal Themes
Quiz
100%
STANDARDS
Intentional Competency Development
Disciplined Adherence to Standards
Harmonization of Global Standards

Committed Culture

EVENT DATE January 28, 1984

NASA Challenger

Country	USA
Location	Florida
Unit Type	Space Shuttle
Material	Rocket Fuel
Event	Explosion
Cause	O-ring failure
Fatalities	7

"The [Rogers] Presidential Commission concluded that ***the NASA organization contributed*** to the technical failures attributing the controversial decision to launch to a flawed decision making process."

"A separate report by the US House of Representatives ***did lay blame with managers***, without naming individuals, suggesting that they were unqualified for the positions they held."

From "Incidents that Define Process Safety"

In a **Committed Culture,** executives involve themselves personally, managers and supervisors drive excellent execution every day, and all employees maintain a sense of vigilance and vulnerability.

Photo reference: http://www.cbsnews.com/pictures/challenger-shuttle-disaster/2/

Committed Culture

EVENT DATE February 1, 2003

NASA Columbia

Country	USA
Location	Texas/Louisiana
Unit Type	Space Shuttle
Material	-
Event	Disintegration
Cause	Wing damage
Fatalities	7

The Columbia Accident Investigation Board (CAIB) "also examined similarities between the Columbia accident and the accident that occurred to Challenger some 17 years earlier. In the case of Challenger all of the ***arguments were made before lift off***, in the case of Columbia ***they were made after the launch***. However, in both cases, ***each decision in the long chain of argument***, taken by itself, did not appear to be influencing flight safety at that time. In retrospect, the cumulative effect was fatal."

From "Incidents that Define Process Safety"

In a **Committed Culture,** executives involve themselves personally, managers and supervisors drive excellent execution every day, and all employees maintain a sense of vigilance and vulnerability.

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Photo reference: http://i0.wp.com/www.spacesafetymagazine.com/wp-content/uploads/2014/05/reentry-breakup.jpg?resize=460%2C316

Vibrant Management Systems

EVENT DATE April 20, 2010

Transocean Deepwater Horizon

Country	USA
Location	Gulf of Mexico
Unit Type	Drilling Rig
Material	Oil
Event	Blowout
Cause	Barrier failure
Fatalities	11

API RP 75 –
Recommended Practices for Development of a Safety and Environmental Management Program for Offshore Operations and Facilities

In October 2015,
the original ***SEMS rule***, as known as the ***Workplace Safety Rule***, made the previously voluntary practices in the API RP 75 ***mandatory for all offshore oil and gas operations in federal waters***.

In June 2015,
the revised ***SEMS II rule*** became effective.

From BSSE's "SEMS Fact Sheet"

Vibrant Management Systems are engrained throughout the organization. Vibrant systems readily adapt to the organization's varying operations and risks.

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Photo reference: https://upload.wikimedia.org/wikipedia/commons/8/82/Deepwater_Horizon_offshore_drilling_unit_on_fire.jpg

Disciplined Adherence to Standards

EVENT DATE October 23, 1989

Country	USA
Location	Pasadena, Texas
Unit Type	Reactor
Material	Polyethylene
Event	Explosion/Fire
Cause	Open valve
Fatalities	23

"The company's ***corporate safety procedures*** and ***standard industry practice*** require back up protection in the form of a double valve, which can be locked in the closed position with the intervening space vented, or line blind inserted between flanges whenever a process line connected to operating plant in opened. However, at Phillips Pasadena, ***a local plant safety procedure for this work was in place*** that did not require this form of back up to be used."

From "Incidents that Define Process Safety"

Disciplined Adherence to Standards means using recognized design, operations, and maintenance standards. These standards are followed every time, all the time, and are continually improved.

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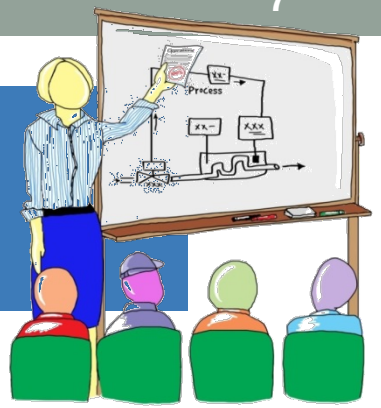
Photo reference: http://wtop.com/wp-content/uploads/2015/10/AP_8910240533-1880x1248.jpg

Intentional Competency Development



EVENT DATE August 6, 2012

Chevron Richmond Refinery

Country	USA
Location	Richmond, CA
Unit Type	Crude Distillation
Material	Diesel
Event	Fire
Cause	CUI
Fatalities	0

"As the firefighters were removing the sheathing of the 4-sidecut line, white hydrocarbon vapor visibly began to emerge from under the now-exposed insulation material. The firefighters ***continued to remove the sheathing despite the formation of hydrocarbon vapor***."

"***Directed by the operations personnel***, the Chevron Fire Department sprayed the insulation with hard, straight streams using the fire hoses in an attempt to knock the insulation off the pipe."

From CSB's Final Investigation Report on Chevron Richmond Refinery Pipe Rupture and Fire

Intentional Competency Development ensures that all employees who impact process safety are fully capable of meeting the technical and behavioral requirements for their jobs.

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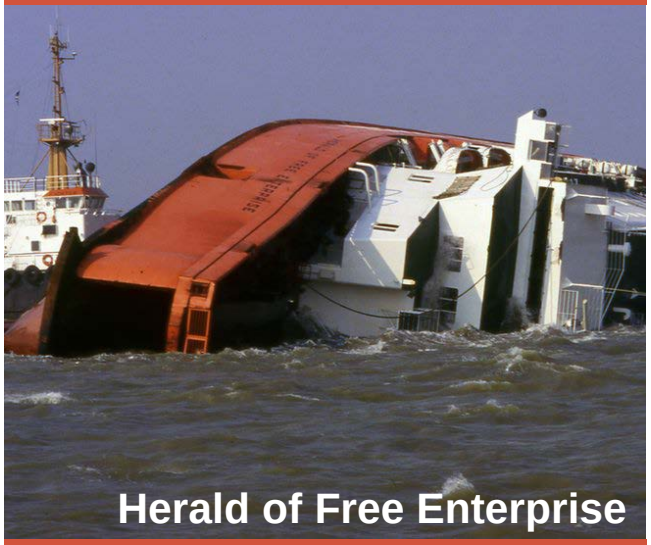
Photo reference: http://msnbcmedia.msn.com/j/MSNBC/Components/Photo/_new/pb-120806-oilFire-720p.photoblog900.jpg

Enhanced Application & Sharing of Lessons Learned

EVENT DATE March 6, 1987



Herald of Free Enterprise

Country	Belgium
Location	Zeebrugge
Unit Type	Ferry
Material	-
Event	Capsize
Cause	Water ingress
Fatalities	193

"Sailing with the bow or stern doors open had happened at least five times before, but the ships masters ***had not been made aware of these incidents*** by the shore management. These should have been identified as high potential near misses and investigated accordingly. Had this happened, then perhaps remote indicator lights showing door status may have been fitted some time previously."

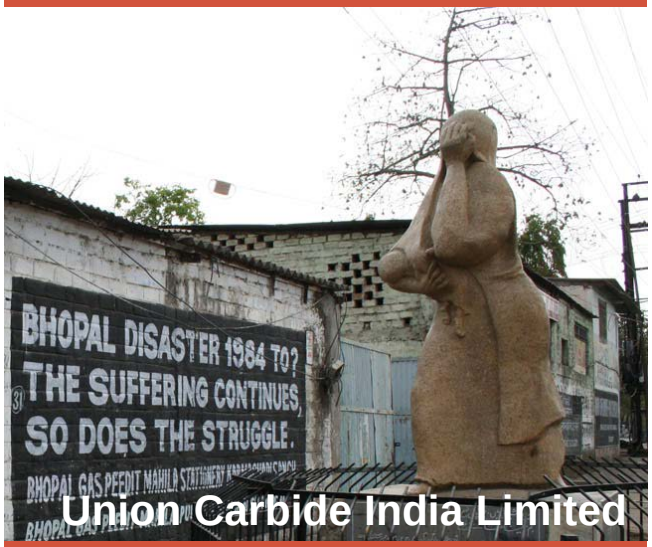
From "Incidents that Define Process Safety"

Enhanced Application & Sharing of Lessons Learned communicates critical knowledge in a focused manner that satisfies the thirst for learning.

Photo reference: http://www.bbc.co.uk/news/in-pictures-17270076

Harmonization of Global Standards

EVENT DATE December 3, 1984



Union Carbide India Limited

Country	India
Location	Bhopal
Unit Type	Reactor
Material	MIC
Event	Toxic Release
Cause	Exothermic rxn
Fatalities	3,787 to 20,000+

"A ***competitor plant*** that used MIC as an intermediate integrated the operation of the MIC and downstream plant so there was no inter-plant storage – all MIC produced was immediately used to manufacture the final product."

"This incident also raised questions on ***application of industry standards*** in countries where Local Authorities are not applying much scrutiny."

From "Incidents that Define Process Safety"

Harmonization of Global Standards for the safe design, operation, and maintenance of equipment streamlines practices, eliminates redundancy, and cooperatively addresses emerging issues.

Photo reference: https://upload.wikimedia.org/wikipedia/commons/3/37/Bhopal-Union_Carbide_1_crop_memorial.jpg

Enhanced Stakeholder Knowledge

EVENT DATE April 17, 2013

Country	USA
Location	West, Texas
Unit Type	Storage/Retail
Material	Ammonium Nitrate
Event	Explosion
Cause	Warehouse fire
Fatalities	15

"CSB determined ***that lack of knowledge and understanding*** of [Fertilizer Grade Ammonium Nitrate] detonation hazards at the [West Fertilizer Company] facility contributed to the emergency responder fatalities."

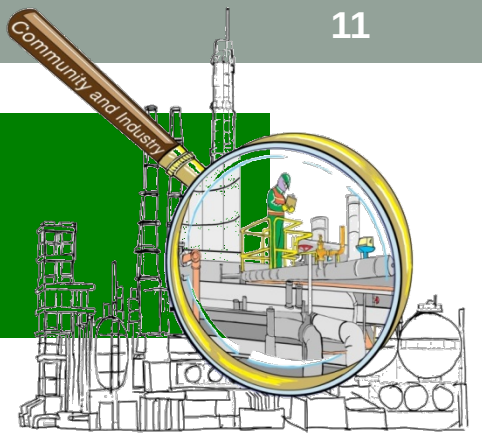
"…CSB found that ***none of the firefighter HAZMAT field training courses provide sufficient information*** on firefighter situational awareness and risk assessment that could help them make informed decisions while at the fire scene."

From CSB's Final Investigation Report on West Fertilizer Company Fire and Explosion

Enhanced Stakeholder Knowledge promotes understanding of risk among all stakeholders, including the public, government, and industry leaders.

Photo reference: http://i2.cdn.turner.com/cnnnext/dam/assets/130418211153-1-texas-explosion-0418-horizontal-large-gallery.jpg

Meticulous Verification



EVENT DATE July 6, 1988

Country	United Kingdom
Location	North Sea
Unit Type	Pump
Material	Condensate
Event	Explosion
Cause	Blind flange
Fatalities	167

"Occidental Petroleum had carried out regular safety audits of its facilities, but ***they were not performed well***. Few if any problems were ever identified, including serious issues with corrosion of deluge pipes and spray heads. ***When a major problem was found, it was sometimes just ignored***.

From "Incidents that Define Process Safety"

Meticulous Verification by knowledgeable independent parties helps companies evaluate their process safety programs from an independent perspective.

Photo reference: http://news.bbcimg.co.uk/media/images/68102000/jpg/_68102529_piper_alpha_fire.jpg

Responsible Collaboration

EVENT DATE August 1, 2003

EXECUTIVE ORDER 13650

"The Federal Government has developed and implemented numerous programs aimed at reducing the safety risks and security risks associated with hazardous chemicals. However, ***additional measures can be taken by executive departments and agencies*** (agencies) with regulatory authority to further improve chemical facility safety and security ***in coordination with owners and operators***."

From Executive Order 13650 – Improving Chemical Facility Safety and Security

Responsible Collaboration is a cooperative relationship among regulatory and investigative authorities, labor organizations, communities, research institutions, universities, and industries.

For more information, attend:

Process Safety Spotlight Session on Executive Order 13650 – Improving Chemical Facility Safety and Security: An Update
10:15 AM-11:45 AM
GRB: 362 A, B, D & E

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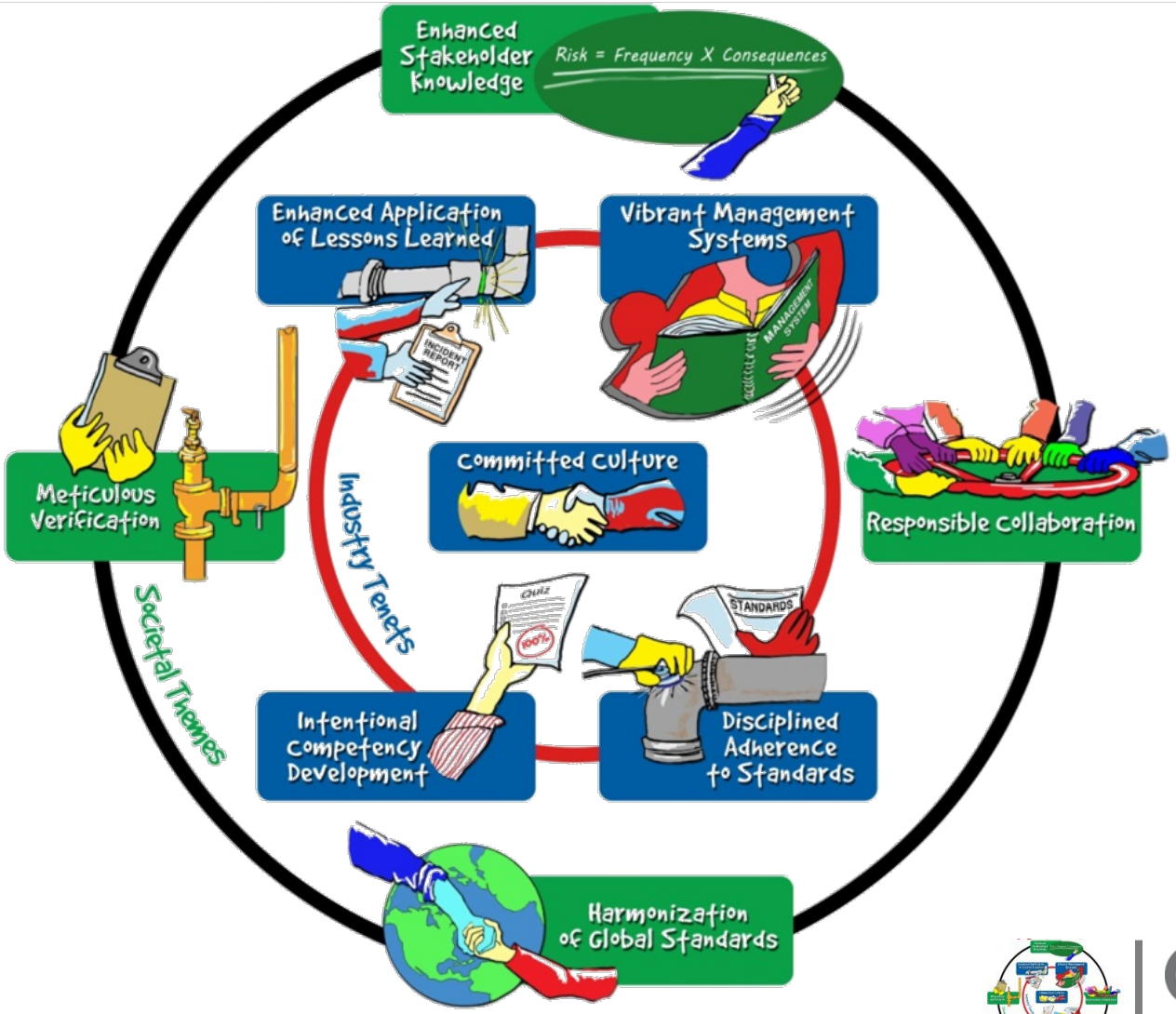
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References

Atherton, John, and Frederic Gil. *Incidents that Define Process Safety*. Hoboken, NJ: John Wiley & Sons, Inc., April 2008.

SEMS Fact Sheet. Bureau of Safety and Environmental Enforcement. Web. 9 March 2016.

U.S. Chemical Safety and Hazard Investigation Board. *Final Investigation Report – Chevron Richmond Refinery Pipe Rupture and Fire*. January 2015.

U.S. Chemical Safety and Hazard Investigation Board. *Final Investigation Report – West Fertilizer Company Fire and Explosion*. Report 2013-02-I-TX. January 2016.