

MANAGEMENT OF CHANGE (MOC)

Dallas AIChE Meeting

April 24, 2012

Don Abrahamson

Process Safety Consultant

Abrahamson Consulting LLC

Phone: 972-514-9718

eMail: don@globalprocesssafety.com

Acronym's in this Presentation

- ▣ CCPS – Center for Chemical Process Safety
- ▣ MOC – Management of Change
- ▣ eMOC – Electronic Management of Change
- ▣ PSSR – Pre-startup Safety Review
- ▣ SIS – Safety Instrumented System
- ▣ NEP – National Emphasis Program
- ▣ RFC – Request for Change
- ▣ KMS – Knowledge Management System
- ▣ SOP – Standard Operation Procedures
- ▣ PSI – Process Safety Information
- ▣ RAGAGEP – Recognized and General Accepted Good Engineering Practice
- ▣ PHA – Process Hazard Analysis
- ▣ HAZOP – Hazard and Operability Study (aka PHA)
- ▣ RIK – Replacement in Kind
- ▣ RCA – Root Cause Analysis
- ▣ CPI – Chemical Process Industry

Don Abrahamson

- Worked in the CPI for 45 years
- Retired from Occidental Chemical in 2006 as the Director of Risk Engineering and Process Safety to join Celanese
- Retired from Celanese in 2010 as the Global Process Safety Manager
- Formed Abrahamson Consulting LLC in 2010
 - AIChE - Center for Chemical Process Safety (CCPS) Staff Consultant
 - Clients include: BP; Occidental Oil and Gas; Olin; Invista; PAS; Enerkem; Cabot; Celanese; ABB; E.Vironment and API

Topics for Tonight

- Sustainable Process Safety Management Systems
- CCPS Risk Based Process Safety
- Management of Change MOC
 - Why manage change
 - MOC Overview
 - MOC Systems - MOC Procedures
 - Sources of change
 - MOC Challenges and potential solutions
 - Thoughts on MOC Metrics

Sustainable Process Safety Systems

Skilled /
Trained

People

Document & Standardize Knowledge

Tribal

Sustainable
(Operational Excellence)

Improved Metrics

Failures

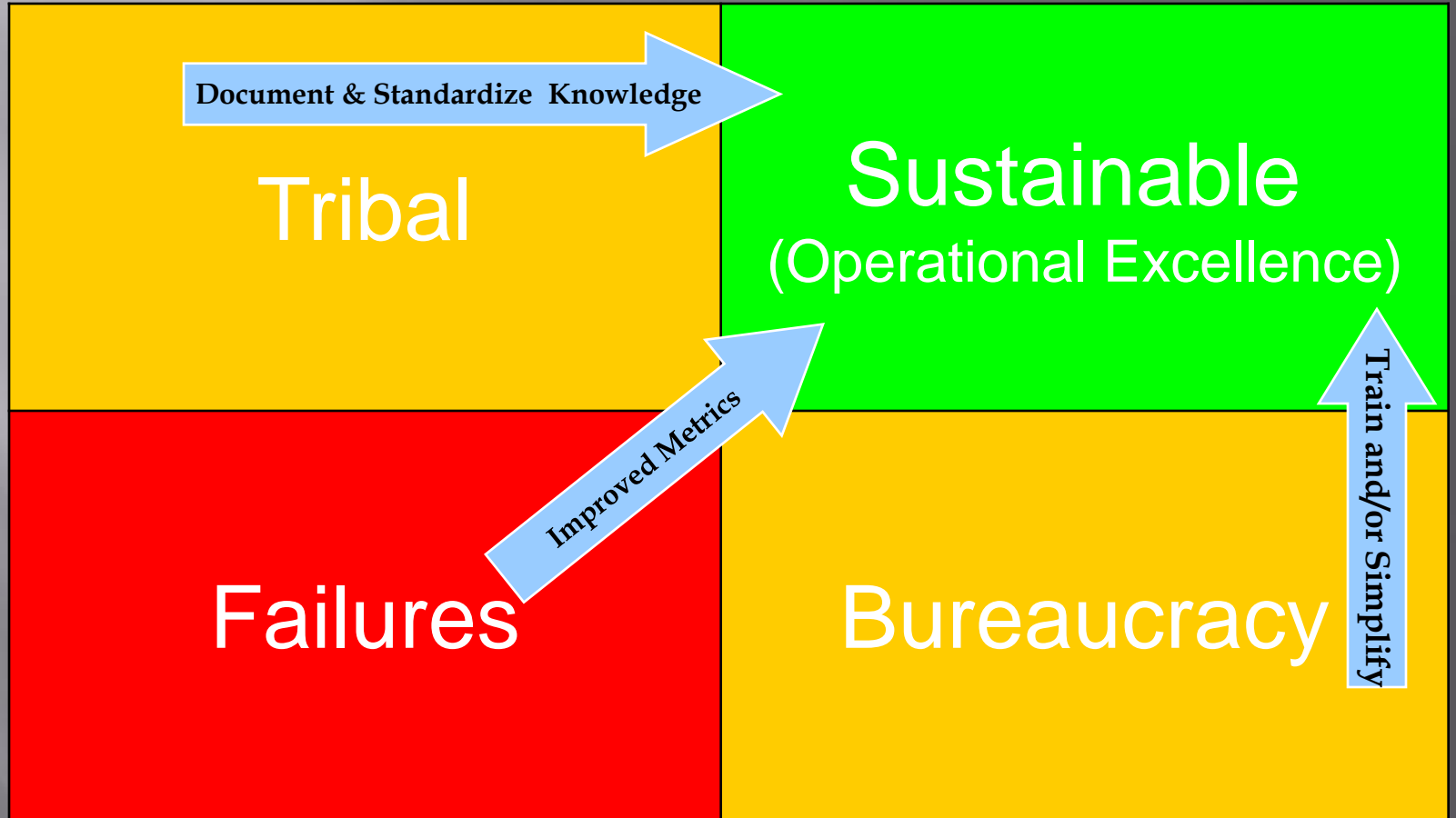
Bureaucracy

Train and/or Simplify

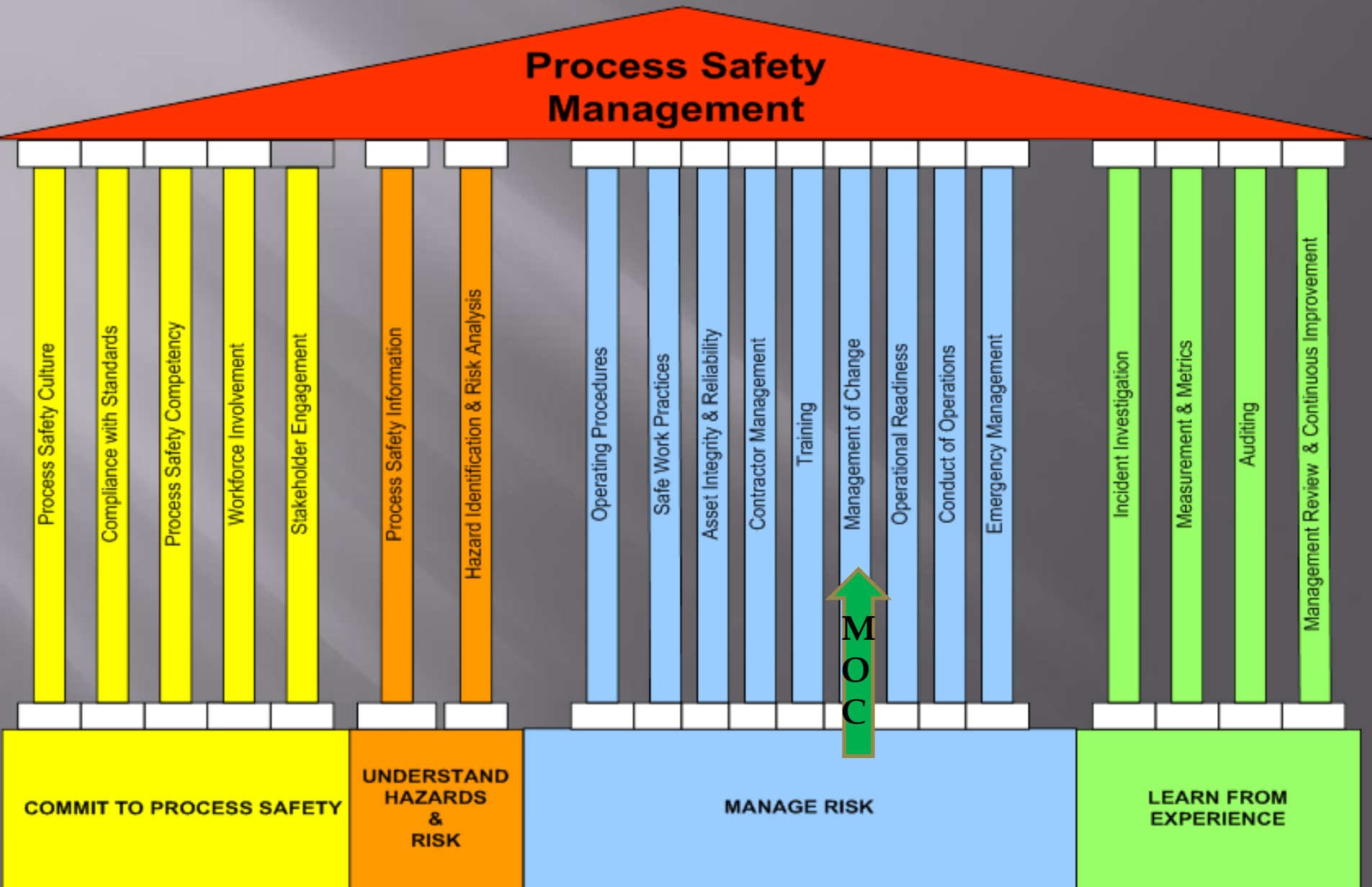
Weak

Management Systems

Documented



Risk Based Process Safety



Let's talk about MOC



Why Changes Need to be Managed



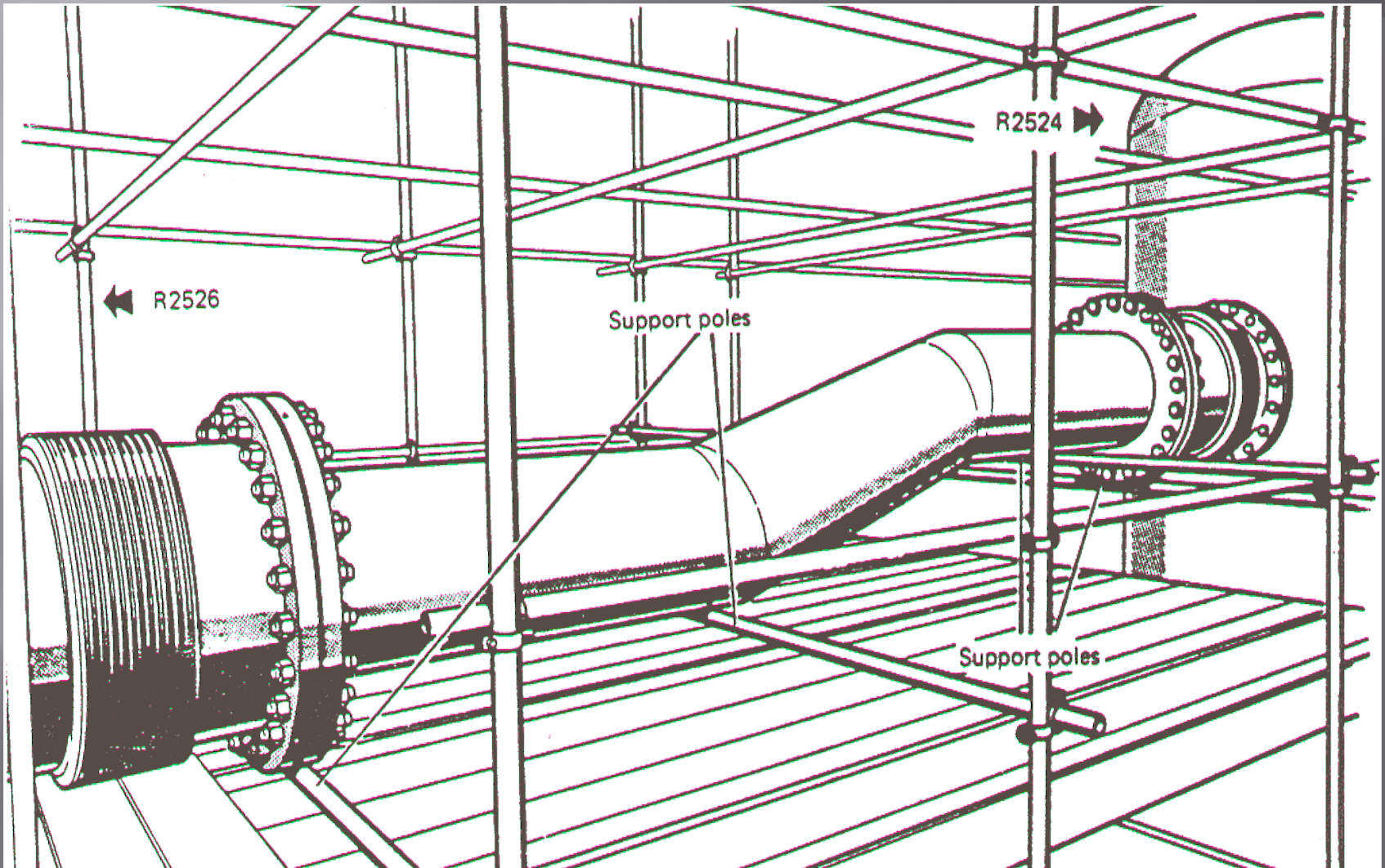
Non-PSM Areas



Flixborough 1974



Flixborough



What Happened

- Bellows failed after 3 months of service from torsional stresses
- 30 tons of cyclohexane released
- Ignition and vapor cloud explosion
- 28 fatalities and 87 injuries, some injuries off site
- Occurred on Saturday when only operating staff present

Lessons Learned

- Recognize that there is a change
- Include the right multidisciplinary expertise
- Use the right hazard analysis technique
- Authorize the changes at the level appropriate considering the hazards and risks
- Communicate the new operating procedures in writing including the hazards and safe operating limits
- Provide appropriate training

Definition

- Change — any change (modification) to process chemicals, technology, equipment, or procedures and changes to facilities that affect a covered process except
 - Replacement in kind (A replacement which satisfies the design specification)
 - Those that satisfy the design specifications
- Many companies apply their MOC system to all process and not just covered process

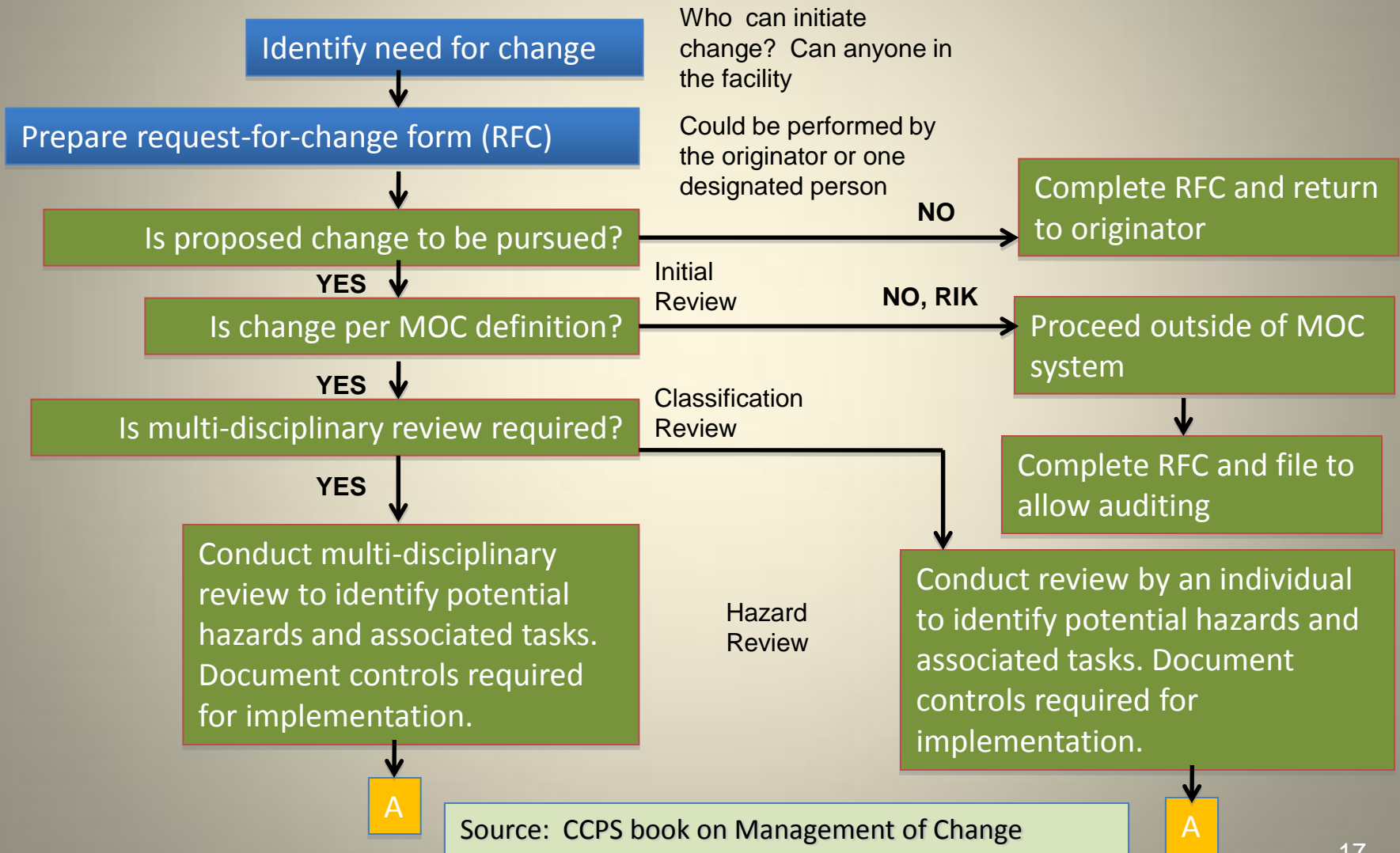
Management of Change

- Helps to ensure that changes to a process do not inadvertently introduce new hazards or unknowingly increase the risk of existing hazards
- Includes a review and authorization process for evaluating proposed adjustments to facility design, operations, organizations
- System to ensure that introduced changes are thoroughly scrutinized prior to implementation
 - More than 80% of large losses are related to change
 - 9% of OSHA Refinery NEP citations were for MOC

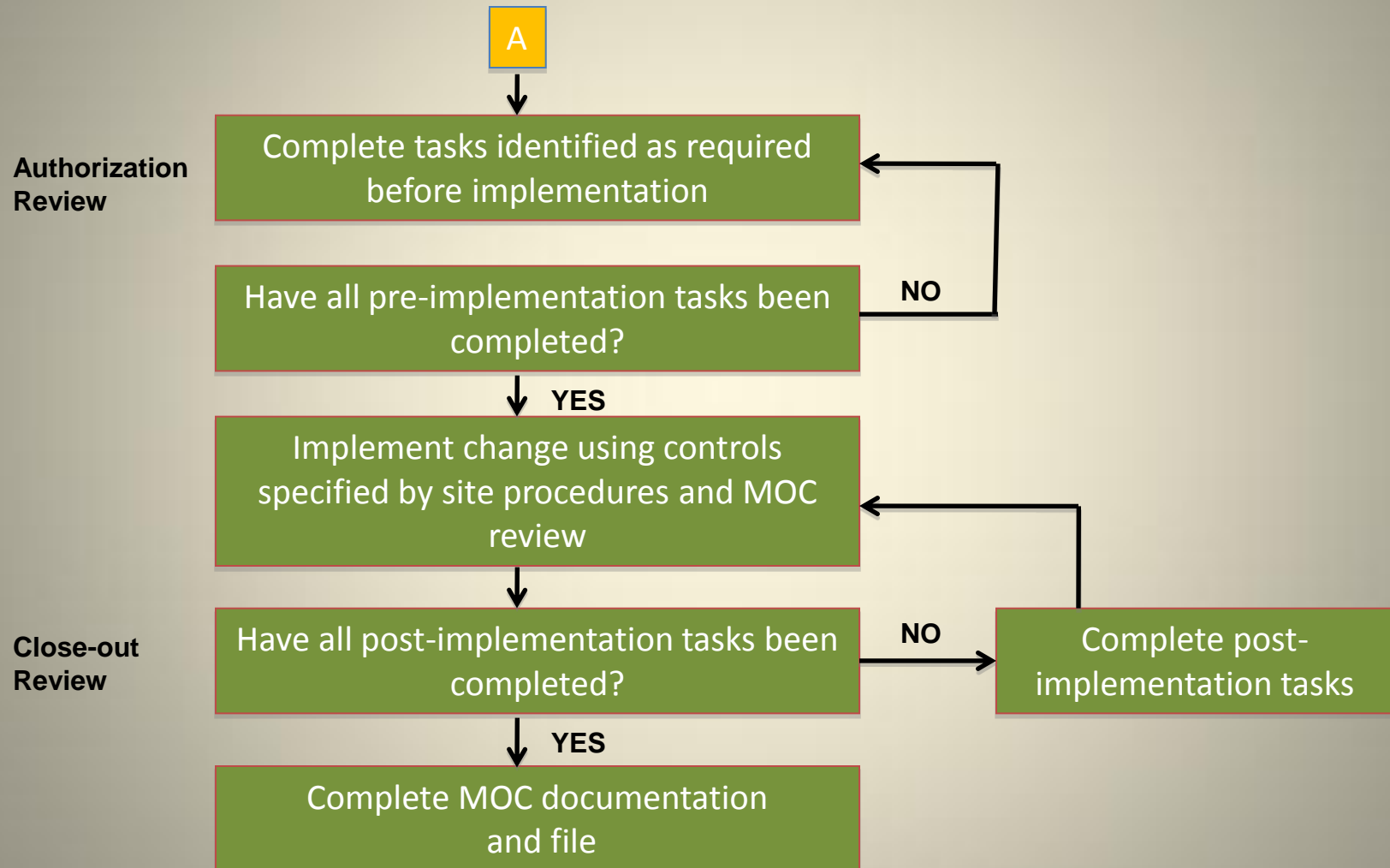
Management Of Change

- All changes must be evaluated, communicated and coordinated prior to execution
- Rational basis required to initiate the process.
- Applies to physical equipment, products, operating conditions, staffing, (Plus?)
- Includes organizational changes
- Includes these types
 - Permanent changes
 - Temporary changes
 - Emergency changes including bypassing of safety critical equipment
 - Personnel changes

Classic MOC Flowchart Example



MOC Flowchart Continued



MOC Procedures / Systems (Electronic or Paper)

- Common to see multiple MOC procedures (PSI, Procedure “SOPs”, Pipe Clamps, Facility, Personnel, Temporary Trailers, Temporary By-passes...)
- eMOC (Stature, KMS, Home Grown)
 - KMS is the eMOC system that I have seen the most (OXY, BP...)
 - Home grown systems (Celanese, Albermarle, Olin, BP)
- Hybrid systems
 - eMOC – PSM regulatory higher risk changes to PSI
 - Paper MOC – Non-PSI, non-PSM, lower risk...
- Chemical industry more risk driven
- Refining / Oil and Gas industry more regulatory driven

Companies often have more than one procedure for managing change:

- Classic PSM - changes to PSI (permanent, temporary and emergency)
- Procedure
- Interlock by-pass
- Leak repair
- Facility – Siting and temporary buildings
- Personnel
- Quality
- Non-PSM
- Rarely do sites capture all MOCs in one MOC system

Sources of Change

- Engineering studies (trouble shooting, capacity increase, new products, process improvements)
- Obsolete equipment replacement
- Failed equipment
- SIS By-pass
- Corrective actions from incident investigations (RCA)
- Corrective actions from audits
- Recommendations from Process Hazard Analysis (PHA)
- Other?

Common Challenges

- Technical Basis often not understood
 - Often people restate the purpose of the change
 - Engineering design basis
 - Company engineering standard
 - Recognized and Generally Accepted Good Engineering Practice (RAGAGEP)
- Determining the appropriate level of Hazard Review
 - Example tool – Simple 2 X 2 “Risk Matrix”
 - Training of affected employees
- Example MOC Metrics

Determining Level of Hazard Review

- Level of hazard review not always appropriate
- Review level should be commensurate with risk
- Level I – Completed for all MOCs (Basic check list to identify hazards)
- Level II (Expanded check list with “What If” brainstorming)
- Level III (HAZOP or equivalent)

Determining Level of Hazard Review



Hazard Review
Level

		Significance of Change	
		Low	High
Degree of Hazard	Low	Level 1	Level 2
	High	Level 2	Level 3

Training of affected employees

Four suggested types:

- Training – Class room with testing (~1%)
 - MOC Trainer prepares training material
 - Training materials presented
 - Employees are tested – test records are evidence of training
- Training / Notification – Presentation with no testing (~10%)
 - MOC Trainer prepares presentation
 - Presents material to employees
 - Employees sign attendance sheet, which is evidence of training
- Notification – Email with no testing (~80%)
 - MOC Trainer prepares and sends email with read receipt requested
 - Email read receipt is evidence of training
- Awareness – Email with no read receipt (~9%)
 - MOC Training prepares and sends email
 - Email is saved as evidence of training

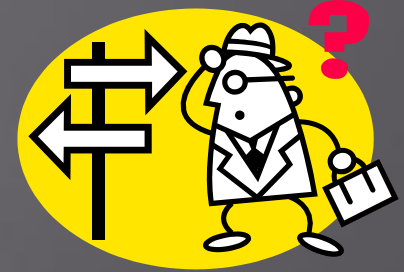
MOC Metrics

- Number of RIKs
- Number requests not initiated
- Number of MOCs initiated by type
- Number of MOCs by risk classification (Level I, Level II and Level III)
- Number of MOCs completed incorrectly
- Number of qualified Level III reviewers
- Number of Temporary MOCs
- Number of Emergency MOCs
- Number of PSSR completed incorrectly

MOC Metrics Continued

- Number of MOC implemented prior to completion of the PSSR
- Number of open MOCs
- Average length of time MOCs are open
- Number of MOCs in approval / review process
- Average time (days) to approve MOCs
- Average time (days) to close MOC after start-up
- Oldest MOC
- Number of times MOC are “touched” (opened, updated, reviewed, approved...)

Conclusions – Comments – Questions



Don Abrahamson
Process Safety Consultant
Abrahamson Consulting LLC
4013 Eastleigh Dr.
Plano, TX 75024
Work: 972-294-5711
Mobile: 972-514-9718

