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Recent Experience in Organizational Learning from Adverse Events in High Hazard Industry

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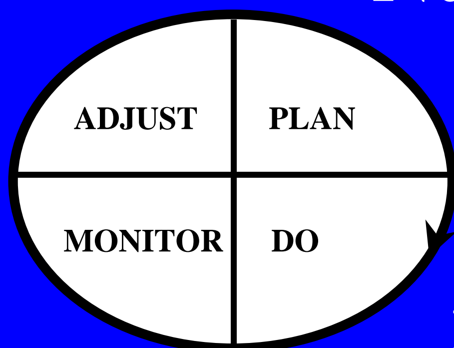

Presentation Objectives

- Variety of contexts
- Commonality of approach
- Commonality of influences
- Lessons to be learned
- Management messages

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Variety of contexts

- Natural gas distribution
- Electricity T & D
- Fossil generation
- PWR
- BWR
- Project management
- Site remediation
- Radwaste
- Uranium enrichment
- Procurement
- Regulation

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Objectives for Event Evaluations

- Identify all important influences- not just the obvious causes
- Find and fix/control root cause(s) to prevent consequences due to same causes
- Identify and fix/control business process weaknesses (sleeping dogs, time bombs, and land mines)
- Identify lessons to be learned.
- Communicate and apply results to other systems, programs, processes, and projects to prevent similar events

The Phoenix Approach

- Surgery before diagnosis is malpractice.
- Big mistakes are big opportunities.

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Methodology

How do You Find Out What Influenced the Consequences?

Many Investigation Tools are Available

Event and Causal Factoring

TapRoot ®

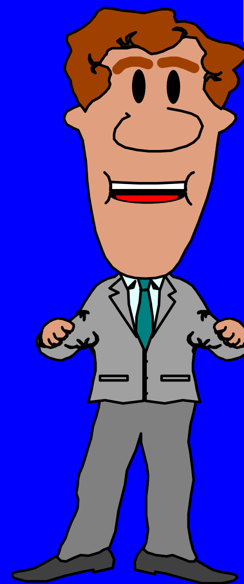
Barrier Analysis

Fishbone

MORT

Task Analysis

K-T Analytical Troubleshooting



Comparative TimeLine™

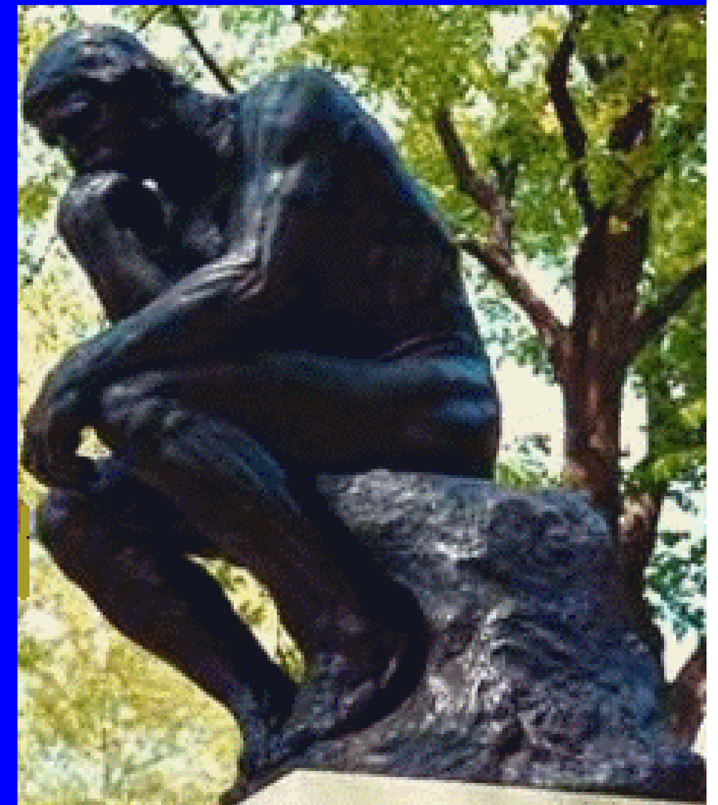
Improvement teams

Change Analysis

Missed Opportunity Matrix ™

Basic Organizational Learning Needs

- Attitude
- Tool kit
- Blue print



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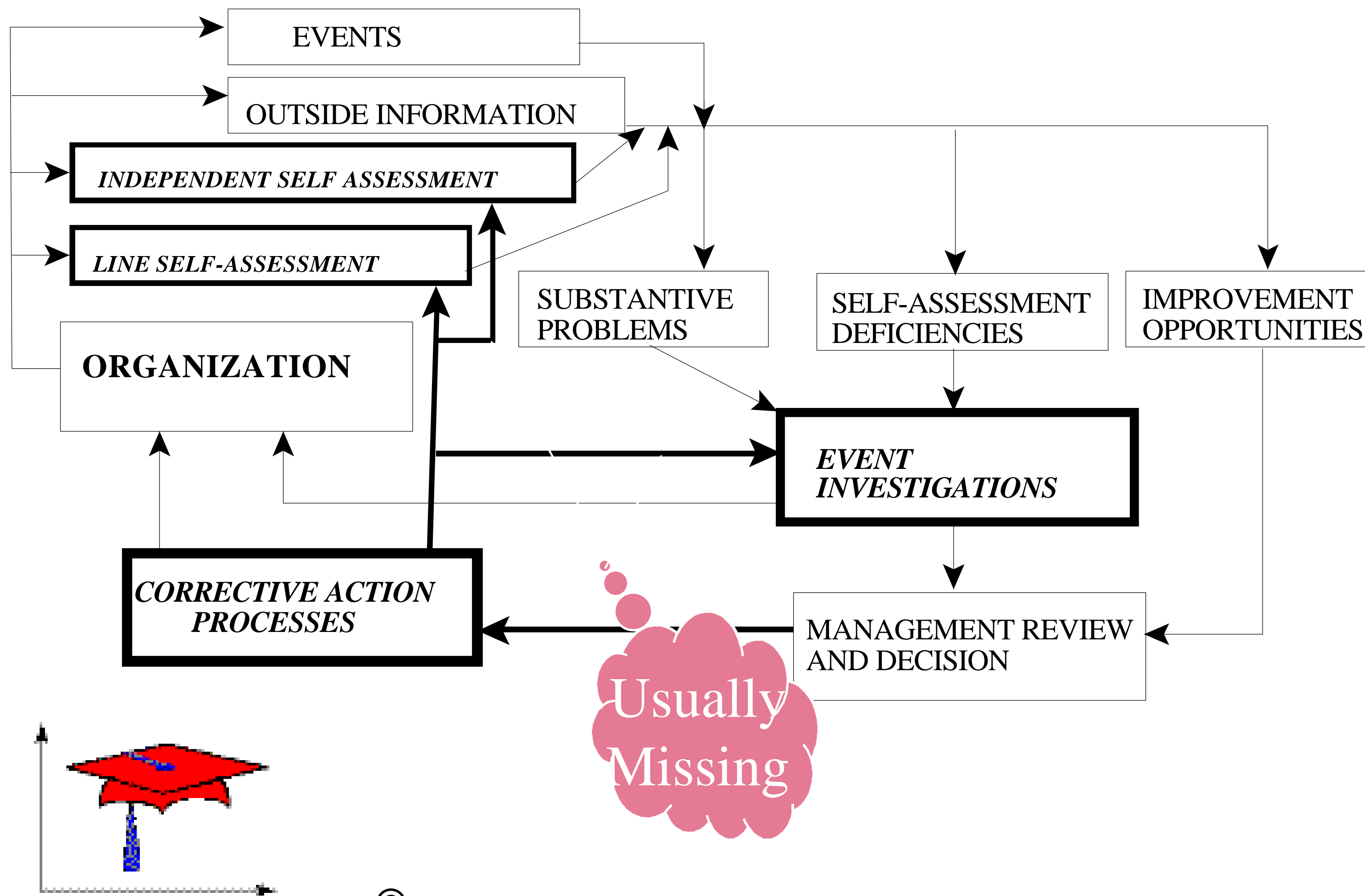
ORGANIZATIONAL LEARNING LOOP



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Flow Chart

The Phoenix Approach

- Used successfully at DOE, AEP, Commonwealth Edison, NU, BGE, BNFL Fuel Solutions,
- Business-oriented
- Consequence-focused
- Evidence-driven
- Cost-conscious
- Out-of-the-box
- User-friendly, management-friendly

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The Phoenix Approach

- Don't ask what caused the event.
- Ask what influenced the consequences.
- Business is about consequences.

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Consequences

- Types
  - Death, damage, dollars(of loss), dose, delay, disruption, discharge, disaffection(customers, employees, regulators), discredit, disgrace, demoralization, departure, ...
- Classes
  - 1) Actual, 2) expected (in the pipeline) , 3) potential (averted)

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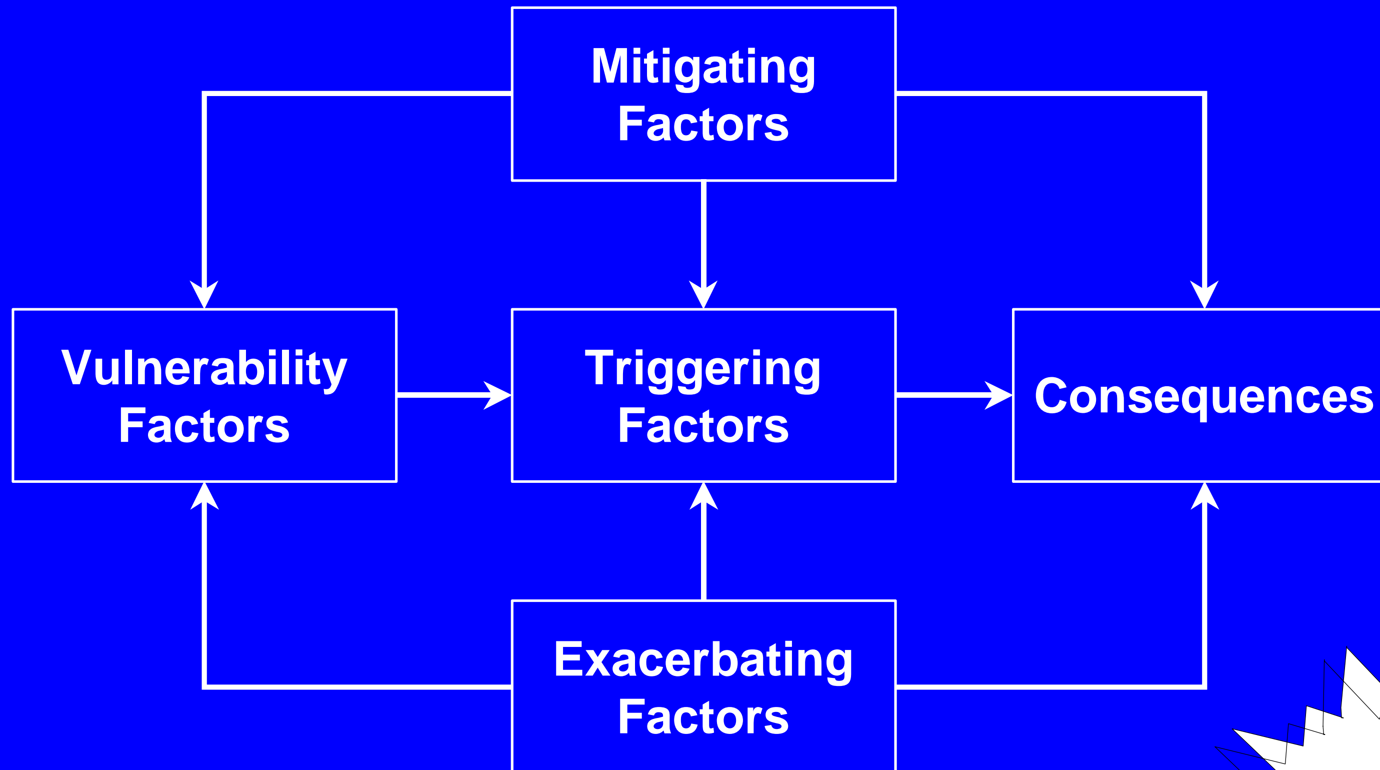
Four Types Of Factors



What influenced the CONSEQUENCES?

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EIGHT QUESTIONS FOR INSIGHT

Impact: What were the consequences of the event? What is the significance?

Causation: What set them up for it? What triggered the event? What made it as bad as it was? What kept it from being a lot worse?

Closeout: What should be learned from it? What should be done about it?

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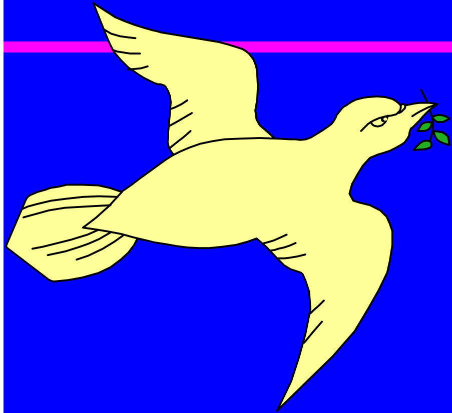
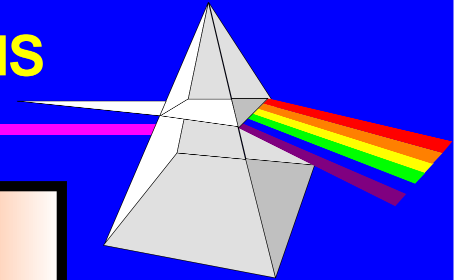
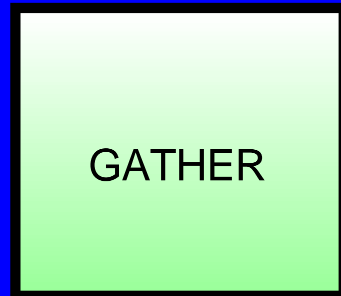
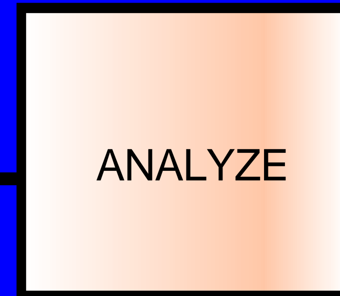
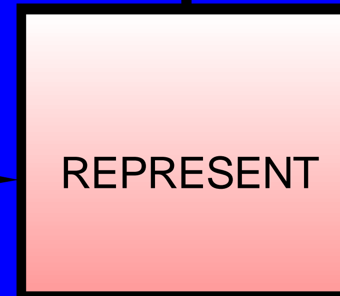
THE ITERATIVE LOGIC OF INVESTIGATIONS

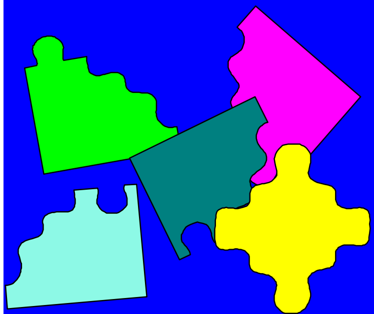


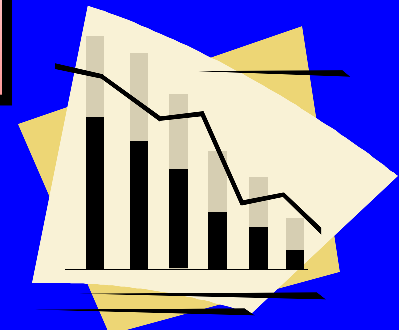












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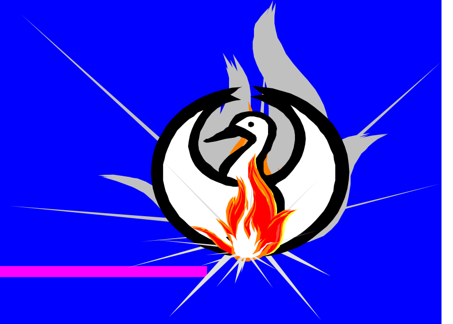
Phoenix Algorithm



- List & Quantify Consequences
- Select a consequence
- Determine what influenced the consequence
- Determine how to improve the influences (learnings, doings)
- Repeat for other consequences
- Determine significance
- Ask what's wrong with this picture

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Techniques

- Comparative TimeLine ™
- Narrative
- Eight Question Analysis
- Why Staircase Trees
- Barrier Analysis Flow Chart
- Missed Opportunities Matrix ™
- Barrier Analysis Flow Chart
- "Root Causes"

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Vulnerabilities (common)

- Employees not reinforced for finding problems.
- Unclear expectations for compilation of requirements (winging it).
- Expected emergencies not thought through.
- Informal system for collecting training req. and supervisor expectations.
- Schedule and budget are “acceptable excuses”.

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Triggers (common)

- Normal work and evolutions
- Changes
- Cutbacks
- Reorganizations and reallocations of work

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Exacerbating Factors (common)

- Overchecks (reviews, assessments, surveillance) are not upstream looking ,i.e., the requirements are not questioned.
- Emergency and back-up equipment does not work or is not used
- Anomalies are ignored or explained away

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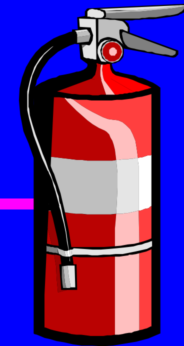
Mitigating Factors



- Happened at a propitious time:
  - no one in the line of fire
  - remote from other assets
  - sunlight available
  - personnel on site
  - much of the problem off the critical path
- Personnel response
- Automatic response (safety features)
- Consequential response (self-burnout)

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What Should Be Learned

- Expected emergencies should be thought through.
- Emergency and back-up equipment should be assured ready.
- Luck should not be expected to repeat itself.
- Precursors should be investigated as if they were consequential.

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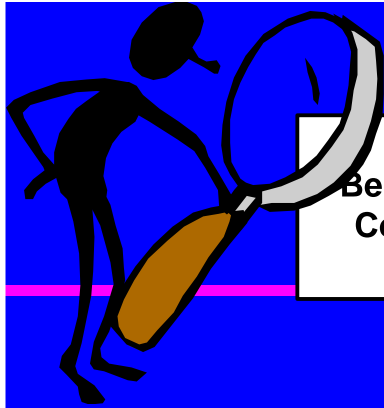


Behavior or Condition

Made the Event Happen?

No

Made the Consequences Worse?

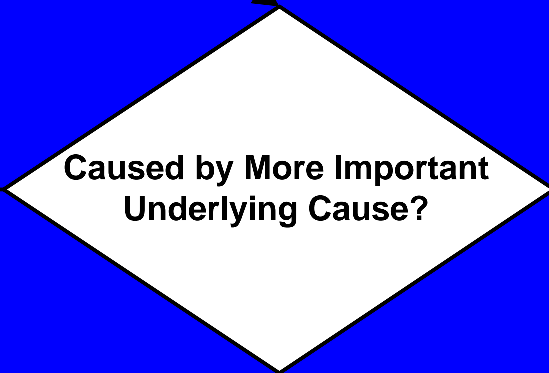
No

Is not a Cause

Yes

Yes

Is a Cause



Root Cause

No

Yes

Not Root Cause

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“Root Causes”

- Degrading and deteriorating standards.
- “It won’t happen on my watch” attitude.
- Line personnel relying on oversight.
- Ceremonial oversight (not really thinking about the process models).
- PM, training, and self-assessment considered ‘deferrable’.
- Taking the path of least persistence.

But why?

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$64,000 Question

- But why?
- Is the evidence to go further available or reliable?

If it is, do so!

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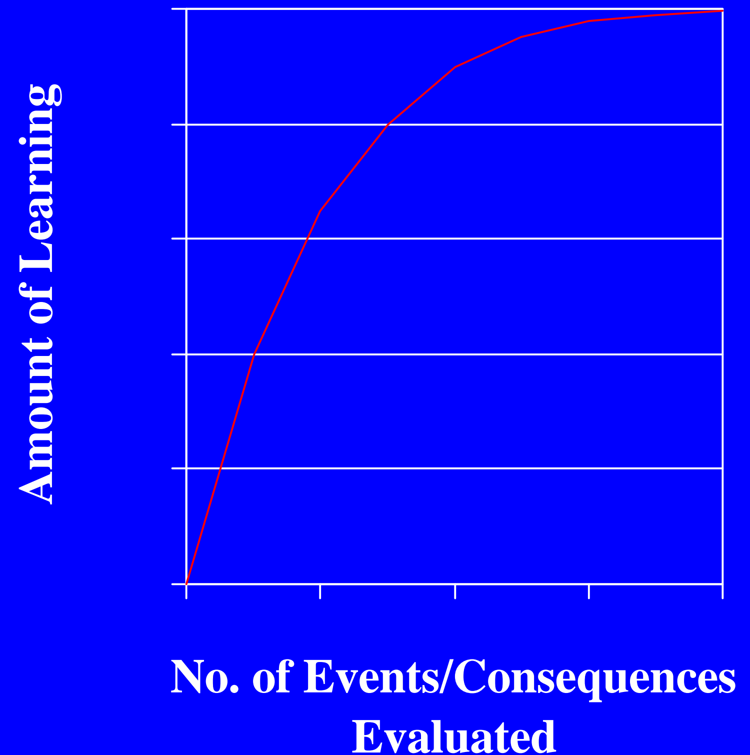
How Many to Analyze ?

- The most learning comes from the first event/consequence.
- Subsequent event/consequence RCAs confirm the first.
- Subsequent event/consequence RCAs have decreasing marginal utility.



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Management Messages

- The time to control the consequences is before the event.
- Expectations for overchecks (reviews, assessments, surveillances, etc.) are fatally vague if they are not supplemented by effective training and supervision.
- Schedule pressure increases error rates while attenuating the desire and incentive for finding and reporting errors.

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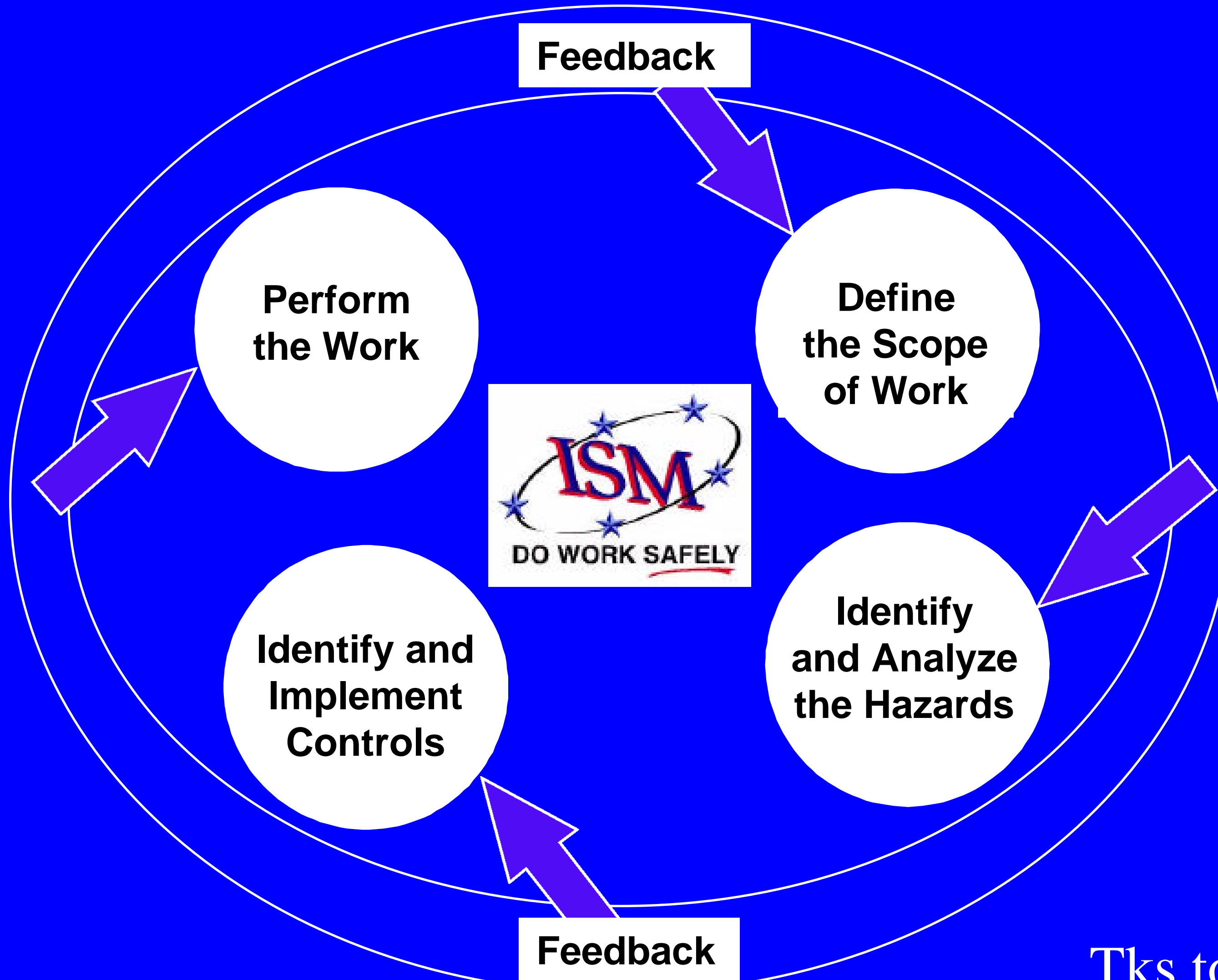
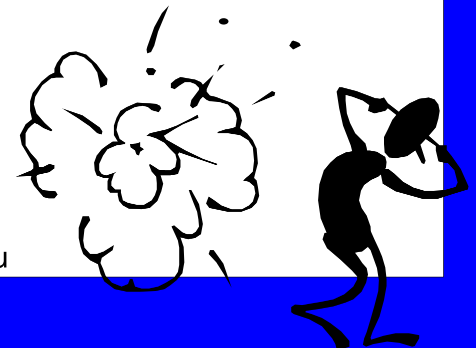
The Five Core ISMS Functions



Tks to RFETS

THE QUALITY IMPROVEMENT AXIOM

An organization's problems are the direct and inevitable result of the way it does business. If people want fewer and less consequential problems they must decide to change the way business is done.



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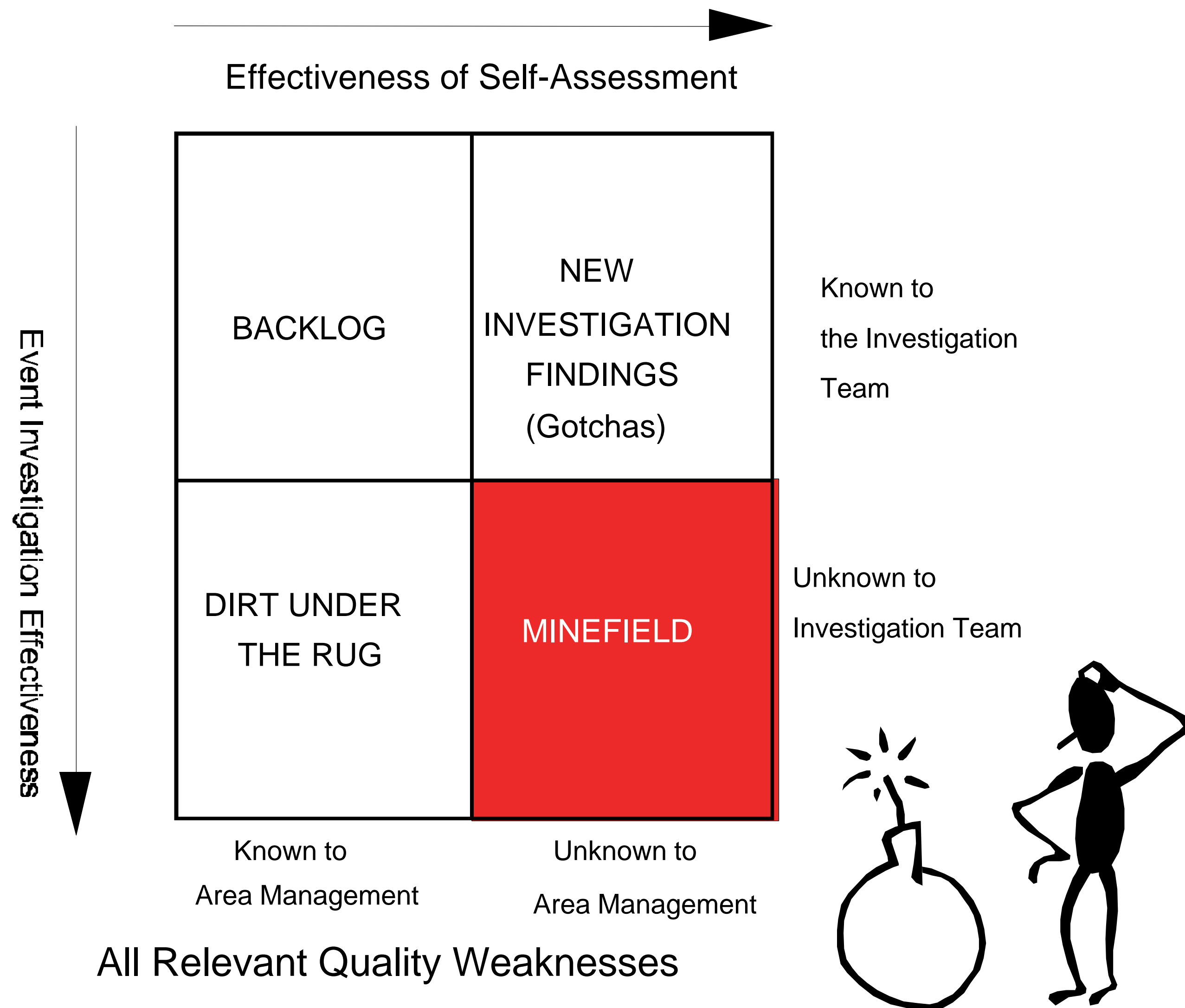

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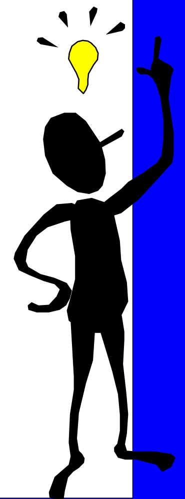
Venn Diagram

BUSINESS PRACTICES COME FROM THE WAY PEOPLE THINK.

If you want to change the way people do business you must get them to change the way they think. This involves changing the material they use in their thinking.



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Self-assessment Grid

Levels * down/ Phases across	Routine	Pre-emptive	Periodic	Reactive
1st LDQ Individuals & Work Groups	◆ Alertness to anomalies ◆ S.T.A.R. ◆ Shift turnover review ◆ 200% accountability at interfaces	◆ Pre-job brief ◆ 50.59 screen/eval. ◆ Procedure V&V ◆ ITE/PEST ◆ Tailgate discussion ◆ Closeout walkdown ◆ Predictive maint.	◆ Performance appraisal preparation	◆ Post-problem critique ◆ Trouble-shooting ◆ Problem identification forms ◆ Procedure enhancement forms
2nd LDQ Management & Supervision	◆ MBWA ◆ Field supervision ◆ Review of logs & test results ◆ Coaching	◆ Contingency planning ◆ Start-up review board ◆ Readiness assessment ◆ ORAM ◆ Mentoring ◆ Pause to focus	◆ Group self-assessment ◆ Pre-NRC ◆ Pre-INPO ◆ Performance indicator review	◆ Post-evolution critique ◆ Event investigation ◆ LER ◆ Responses to NOV ◆ Integrated reactive self-assessment
3rd LDQ Independent Assessment	◆ Audit ◆ Surveillance ◆ Observation	◆ Independent readiness assessment ◆ PORC overview mtg.	◆ Audit ◆ Integrated assessment ◆ QA self-assessment	◆ Independent event investigation
4th LDQ External Assessment	◆ Plant tour ◆ Interview ◆ Document review (per charter)	◆ Review SE w/ USQ ◆ Review TSCR & LAR ◆ Pre-review of major changes	◆ NRC IR review ◆ Post-PPR review ◆ Post-INPO review ◆ PI review	◆ Review of NOV responses ◆ Review of event investigations

* Level of defense of quality & safety

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