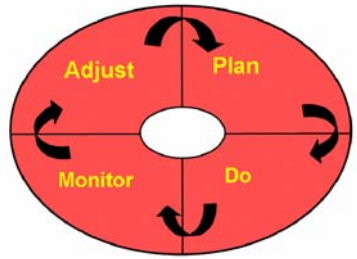
13th HPRCT Conference
Monterey, CA 2007

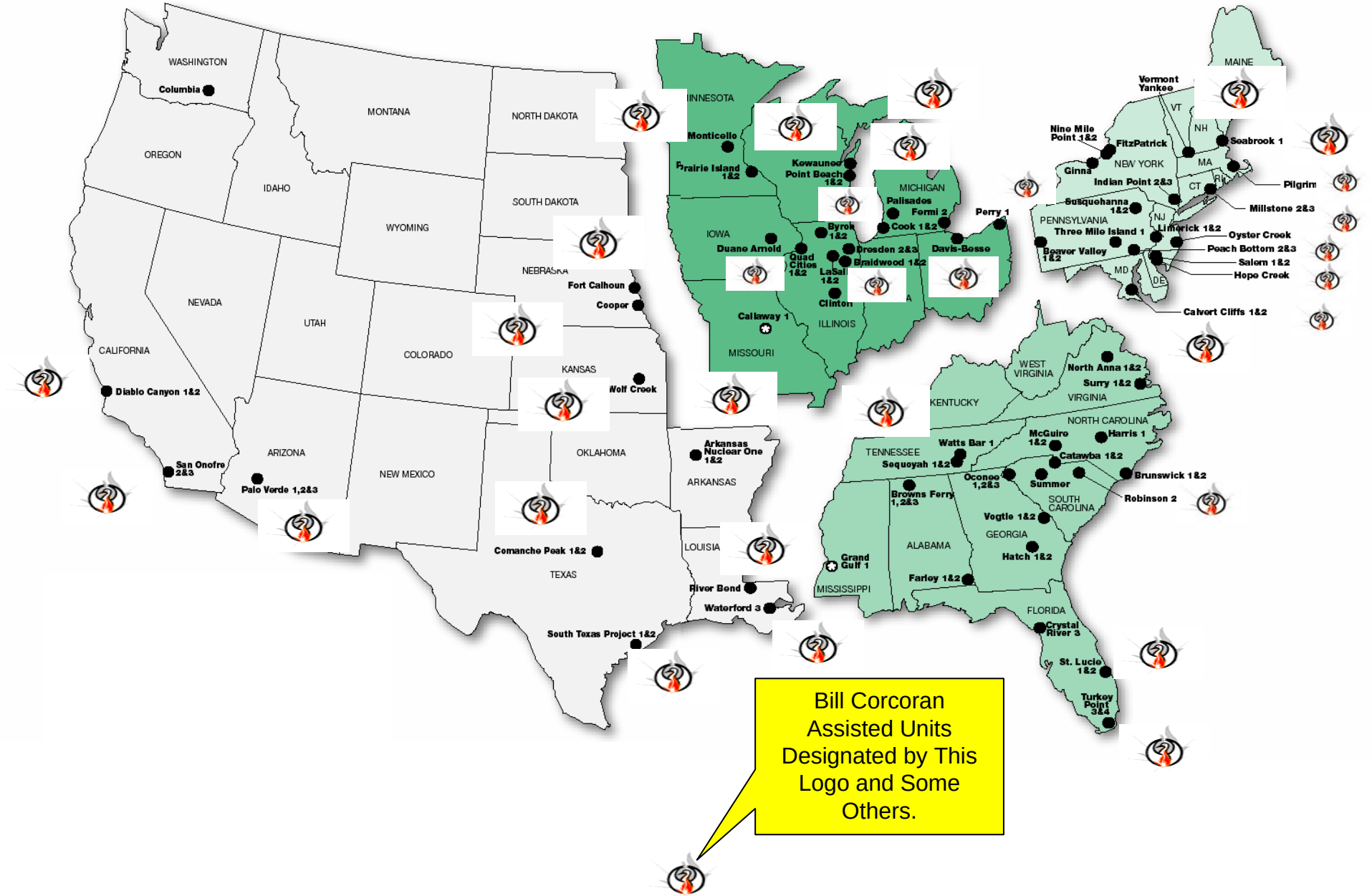


Safety Culture--Back to the Basics

Dr. Bill Corcoran, NSRC Corporation


NSRC Experience
NSP
Fluor Hanford
TVA
BWXT Pantex
MIT
massachusetts institute of technology
NEGT
National Energy & Gas Transmission
BNFL Inc.
BECHTEL
River Protection Project
Waste Treatment Plant
DURATEK
SAIC
Honeywell
Boston Edison
PALO VERDE
bp
Consumers Energy
Count on Us
PG&E
U.S. Generating Company
CP&L
BGE
Constellation Energy Group
PSEG
DRESDEN
LaSalle
Quad Cities
ComEd
BYRON
ZION
BRAIDWOOD
Exelon
Energy Delivery
American Society for Quality
ASQ
SIEMENS
TENERA ENERGY
InfraSource
M. J. ELECTRIC, INC.
FPL
Pacific Gas and Electric Company
WE DELIVER ENERGY
Florida Power
BECHTEL SAIC COMPANY, LLC
PECO NUCLEAR
A Unit of PECO Energy
TXU
Maine Yankee
FENOC
First Energy Nuclear Operating Company
AREVA
PORTS
Portsmouth Gaseous Diffusion Plant
Nebraska Public Power District
Nebraska's Energy Leader
Entergy
THE POWER OF PEOPLE
Dominion
Northeast Utilities System
CH2M•WG
IDAHO, LLC
WIPP
Waste Isolation Pilot Plant
Washington TRU Solutions
Reliant Energy
HL&P
ppl

Operating Commercial Nuclear Power Stations



Bill Corcoran Assisted Units Designated by This Logo and Some Others.


Hanford
INEEL
LLNL
NTS
YMP
RFETS
LANL
SNL
Pantex
WIPP
West Valley
Mound
DC
Fernald
Oak Ridge
SRS
Bill Corcoran
Assisted Facilities
Designated by This
Logo and Some
Others.

ACRS Safety Culture Comments

5/02 ACRS Meeting

MR. ROSEN: I don't want to be here three years from now with another plant, XYZ plant, that's had a serious incident, maybe even an accident, whose root cause was the same kind of safety culture deficiencies that happened at Davis-Besse.

MR. APOSTOLAKIS: Yes, of course.

MR. ROSEN: And that we didn't do something different. That we just saw Davis-Besse, knew what the root cause was and safety culture and said "Okay, we'll just keep doing the same regulatory stuff we have now."

CHAIRMAN BONACA: Exactly. Exactly.

MR. ROSEN: Because what that is is an embodiment of the commonest definition of insanity, right? Doing the same thing over and over and expecting different results.

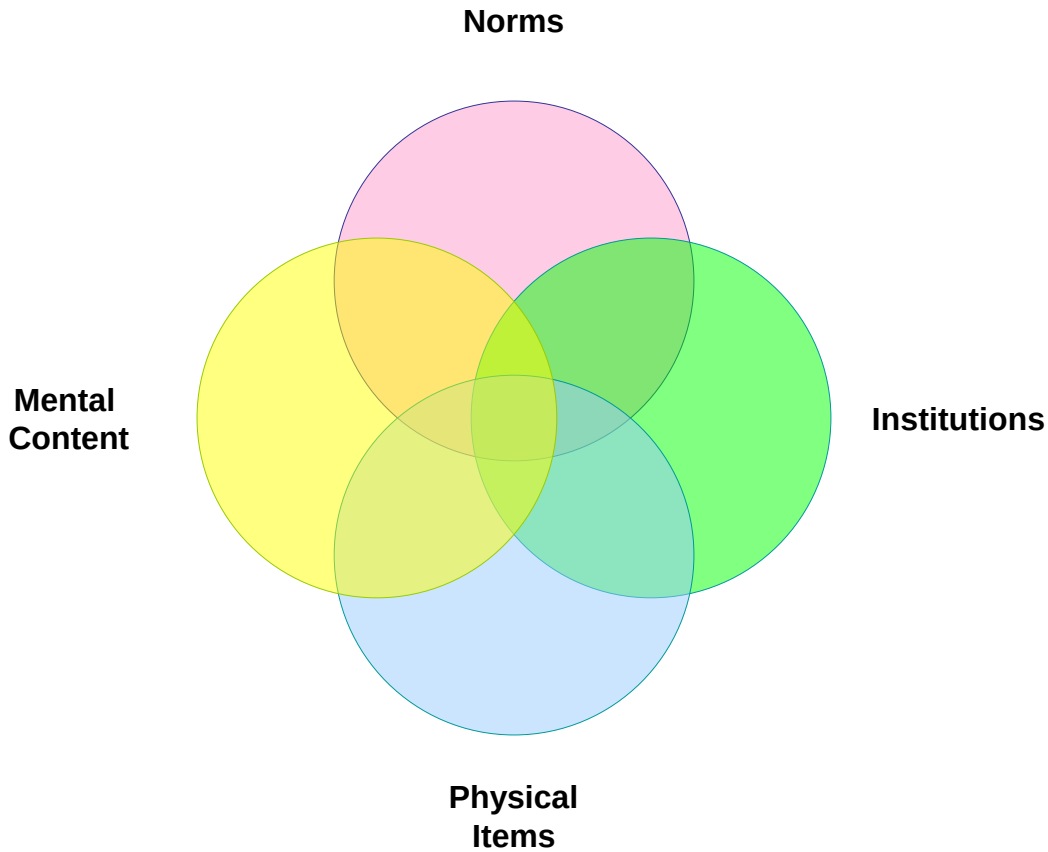
MR. APOSTOLAKIS: I'm with you. I'm with you.

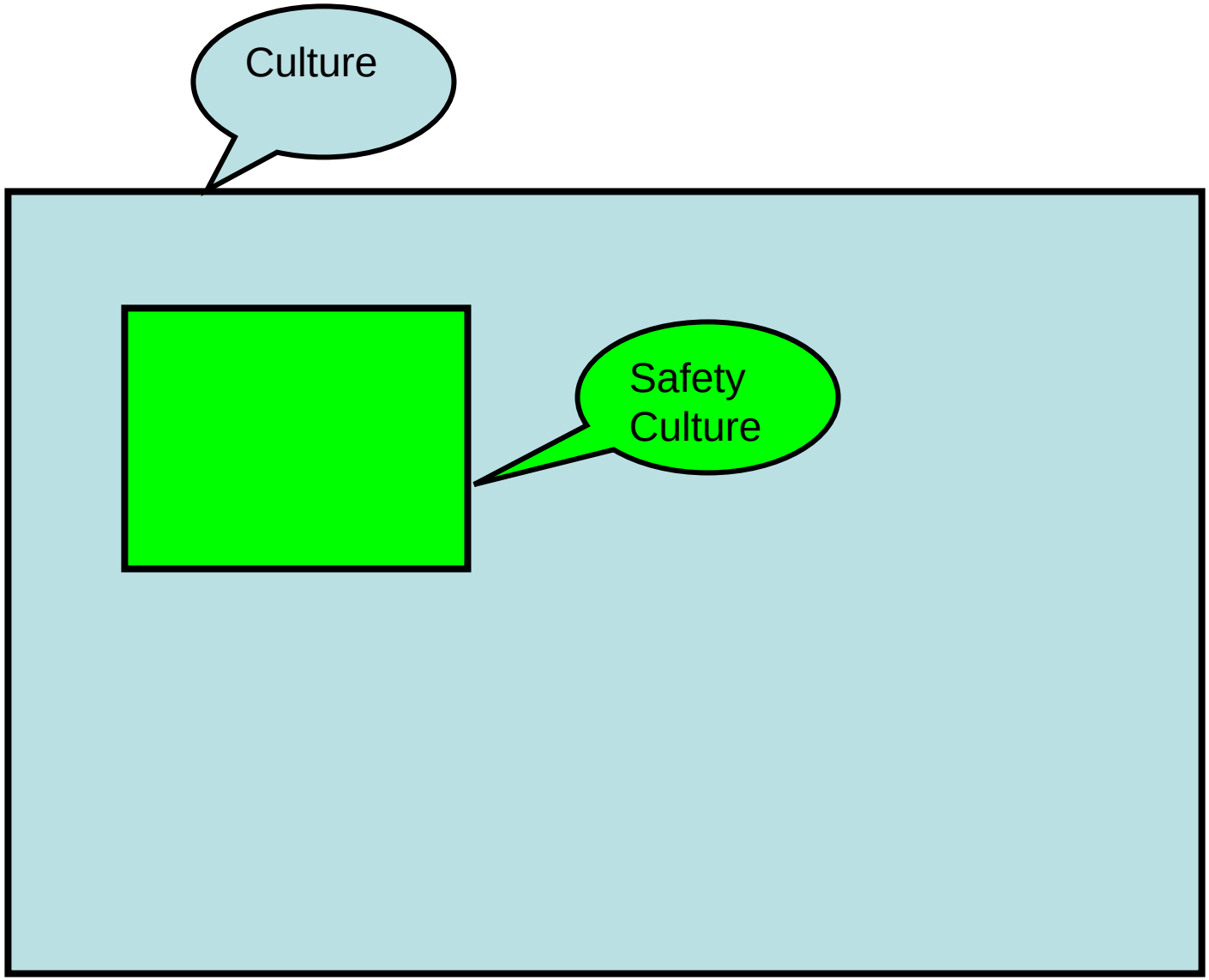
Thanks to Dave Collins, Dominion Energy

Distinctive Cultures We Know

- Submarines
- Fire Fighters
- Military Academy
- Amish
- Japan
- 1850’s Plains Indians
- Courts of Law
- Hospitals
- Aircraft Cockpit
- FedEx
- Quakers
- U.S. Congress
- UK Parliament
- NPP Control Room

The Elements/ Scope/ Components of Culture





Mental Content

- Attitudes
- Goals
- Knowledge
- Skills
- Abilities
- Professional Principals
- Algorithms
- Heuristics

- Mental Models
- Four-letter Reminders
- Three-letter Reminders
- Visions of Excellence
- Production vs. Adherence

The way we think around here.

Norms

- Self-checking
- Self-reporting
- “Do, sign” vs. “do, do, sign, sign”
- Pre-job Walkdown
- Pre-job Brief
- Use of Alarm Response Cards
- Expressing Opinions
- Pleasing the Outsiders
- Accountability Customs
- “Safety Minute”
- “Quality Minute”
- Low Biasing Significance
- QA Presence at Line Meetings
- Seating Customs
- Preparing Agendas
- Prompt Meeting Starts

What we do around here.

Institutions

- Management Team
- Plant Operations Review Committee
- Offsite Safety Review Committee
- QA Department
- Self-assessment Program
- Condition Screening Team
- Corrective Action Review Board
- Challenge Board
- Plan-of-the-day Meeting
- Event-free Clocks
- “Go To” People
- Emergency Response Organization
- Person-in-charge (PIC)
- Peer Checking Program
- “Wood Shed” Meetings

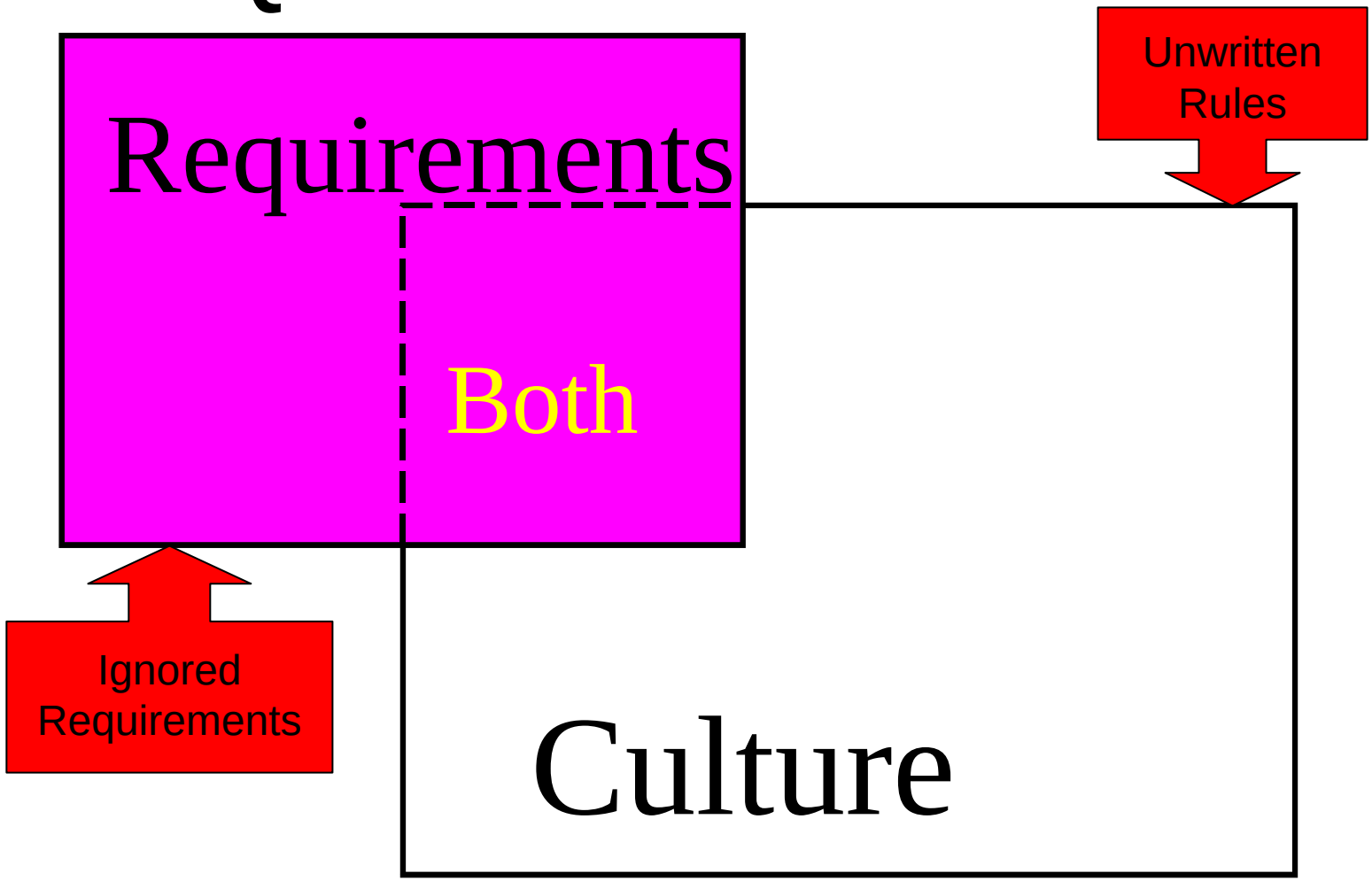
How things get done around here

Physical Items

- Signs
- Procedures
- Condition Report Form
- RCA Report
- Speed Bumps
- Design Bases
- Safety Analysis Report
- Hard Hats
- Key Cards
- Slogan Cards
- Meeting Minutes
- Safe Passage Stripes
- Human Factored Design

What you run into around here

REQUIREMENTS VS. CULTURE



What Good Safety Culture Looks Like

- Challenges and exposures to hazards are rare.
- Challenges and exposures to hazards are mild.
- Operation is further within the envelope.
- Safety and back-up equipment is ready.
- People are ready to back-up equipment.

How can an RCAR be a window into the Safety Culture?

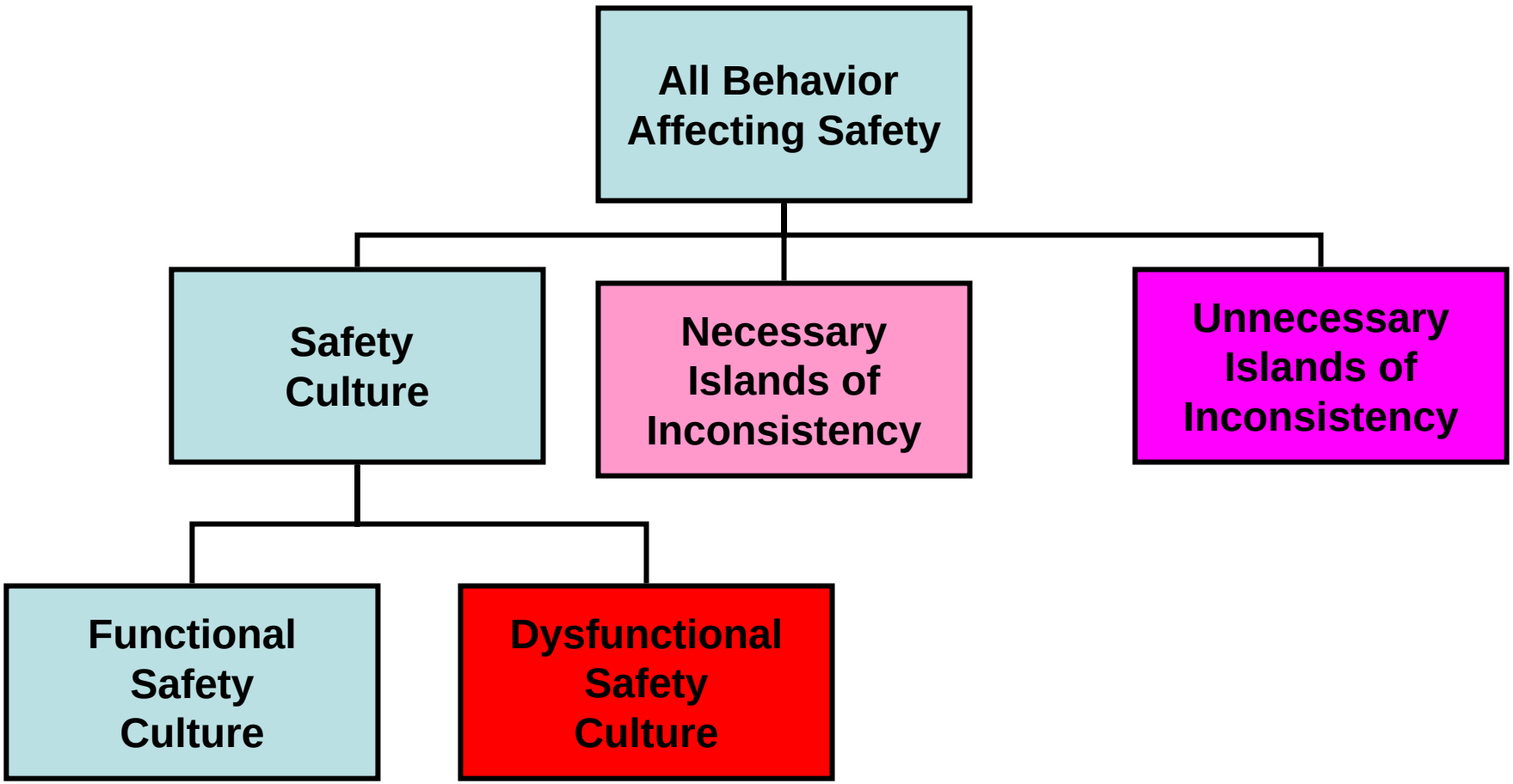
- What behaviors affected the consequences?
- Were they SC or aberrations?
- How were they characterized by the RCA investigators?
- Did the RCA investigators indicate an awareness of SC in the investigation?

(Partial) Cultural Attributes Table

Davis-Besse pre-2002

Situation	Actual, Normal or Likely Behavior	Quality Culture Behavior	Potential Quality Impact of Actual/Normal/ Likely Behavior	Comment//Evidence
Cleaning of RCPB Component	Acceptance Criteria not specified in writing.	Acceptance Criteria specified in writing.	Failure to achieve acceptance criteria	Criterion V, Sentence 2
Cleaning of RCPB Component	Work terminated if it interfered with production schedule.	Work not terminated before acceptance criteria met.	Failure to achieve acceptance criteria. Reduced assurance of prompt ID of CAQ.	Criterion XVI, Sentence 1
Corrective Actions for CAQ do not work.	Repeat corrective actions as for symptomatic relief.	Perform better RCA to identify actual causes and to find CATPR.	Problem recurs. Underlying causes not identified.	Criterion V, Sentence 1, 2; Criterion XVI, Sentence 1, 2, 3.
Information sent to government agency	Management does not effectively question information favorable to production.	All information is backed-up by reliable evidence.	Inaccurate information sent to government.	Criterion XVII, Sentence 1.
Audit of important program.	Audit does not find limiting weaknesses.	Audits always report the limiting weaknesses.	Limiting weaknesses persist to be involved in SCAQ.	Criterion II, Sentence 9, Criterion V, Sentence2, Criterion XVIII.

Islands of Inconsistency



Consequences Are a Function of Culture?

W. R. Corcoran

What's unusual about an "Unusual Occurrence?"

- The holes in the Swiss cheese lined up?
- The "accident" waiting to happen was left waiting too long?
- The cultural chickens came home to roost?
- The consequences were a natural and inevitable result of the way business is done?

Insights

- Behavior is a function of consequences.
  - B. F. Skinner
- Behavior is a function of structure.
  - P. M. Senge
- Consequences are a function of culture.
  - W. R. Corcoran
- Culture is a function of the reward structure.
  - W. R. Corcoran

Progression of Understanding-I

- Business as usual
- Occurrence (Event, Accident, Incident, Mishap, Adverse Discovery, or what-not)
- Consequences (Actual-Expected-Potential)
- Direct Factors that resulted in consequences.
- Behaviors and Conditions (deeper factors) that resulted in direct factors.
- Extent of behaviors, conditions.

Glossary

- Consequence (of an event): An adverse condition resulting from the event.
- Consequences can be:
  - Actual
  - Expected
  - Potential

Progression of Understanding-II

- Extent
  - Widespread, usual◊**culture**
  - Unusual◊aberration
- (Does the **culture** include the tolerance of islands of inconsistency?)

Glossary

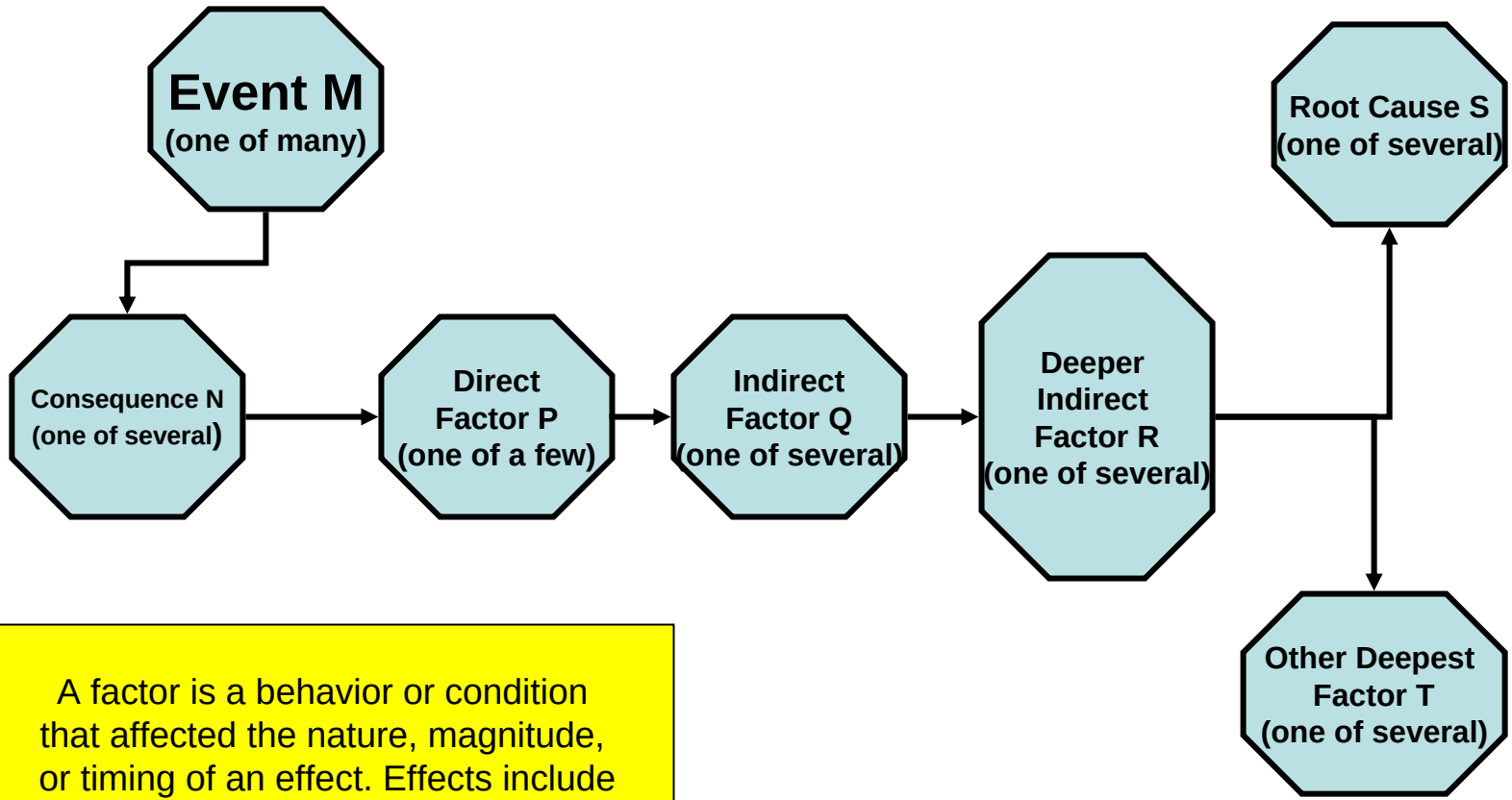
- Dysfunctional: not contributing to a function; contributing to the impairment of a function

(All behaviors and conditions in a situation of limited resources are either functional or dysfunctional, neutrality is excluded.)

Progression of Understanding-III

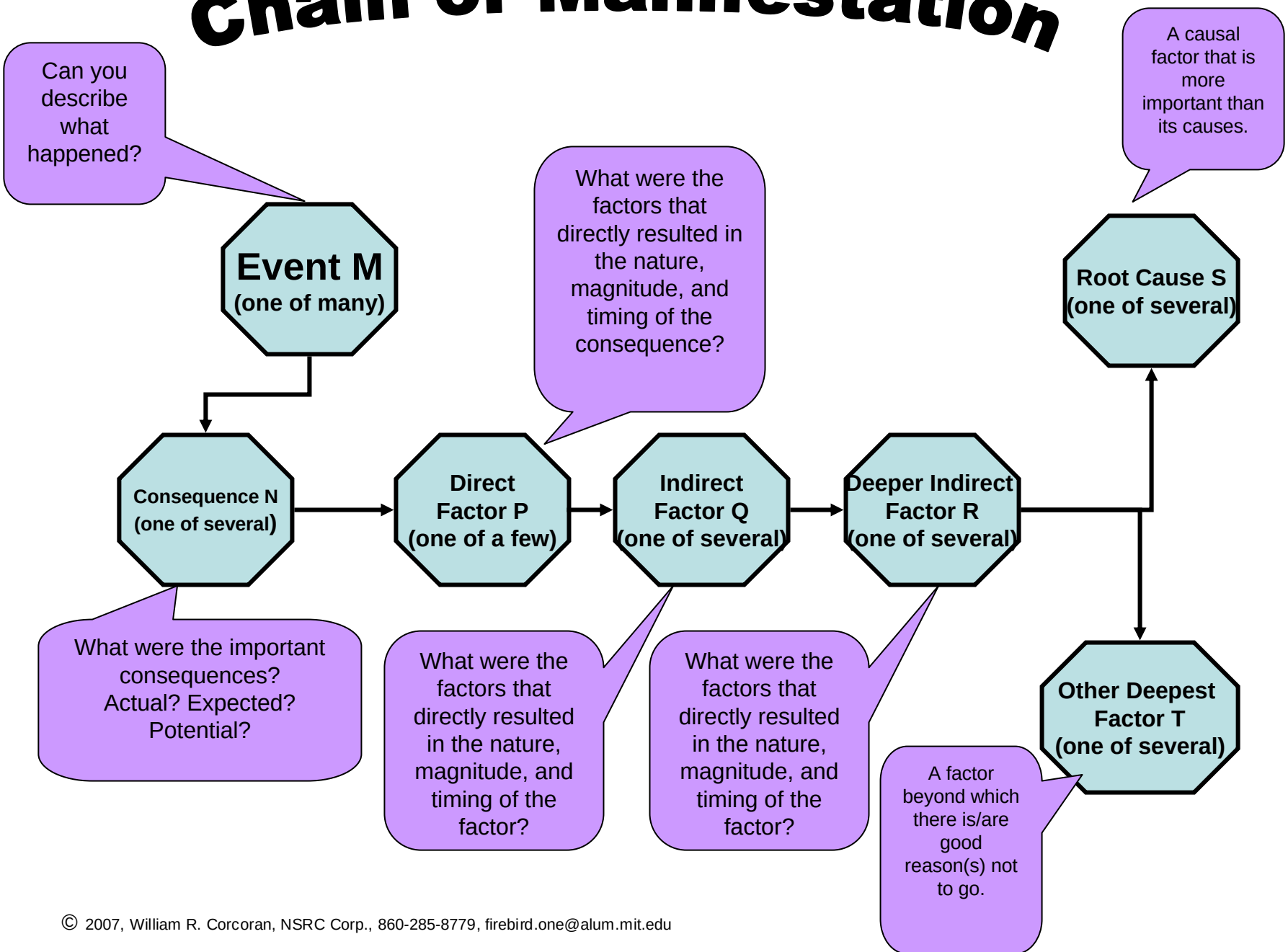
- Common Cultural Pathologies
  - Dysfunctional Transparency Culture
  - Dysfunctional Procedure Culture
  - Dysfunctional Regulatory Compliance Culture
  - Dysfunctional Use of Operating Experience
  - Dysfunctional Investigation of Consequential Events
  - Dysfunctional Investigation of Near Misses and Precursors
  - Dysfunctional Limitations of Extent Determinations
  - Dysfunctional Reinforcement of Espoused
    - Management Expectations
    - Core Values

Chain of Manifestation

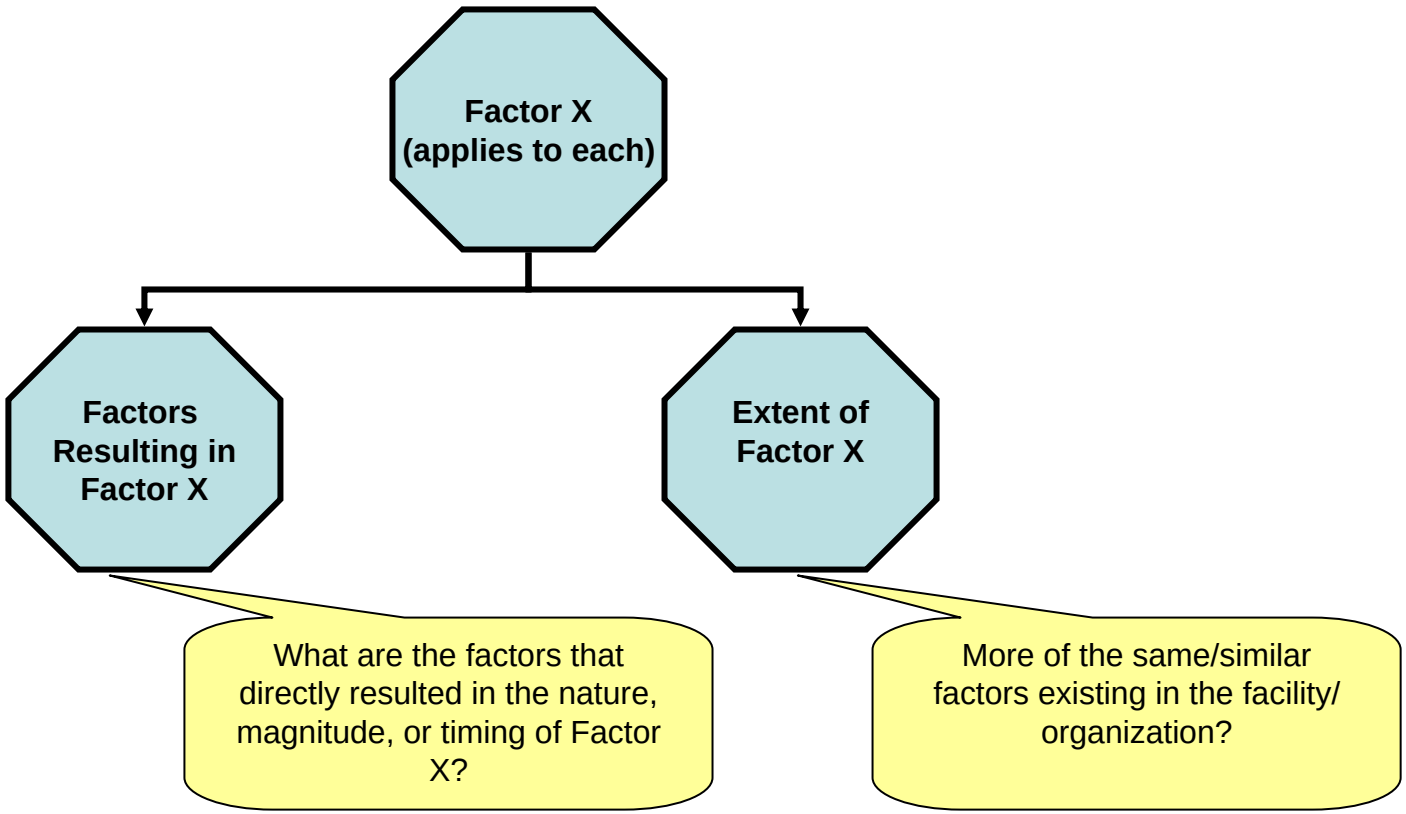


A factor is a behavior or condition that affected the nature, magnitude, or timing of an effect. Effects include consequences and factors.

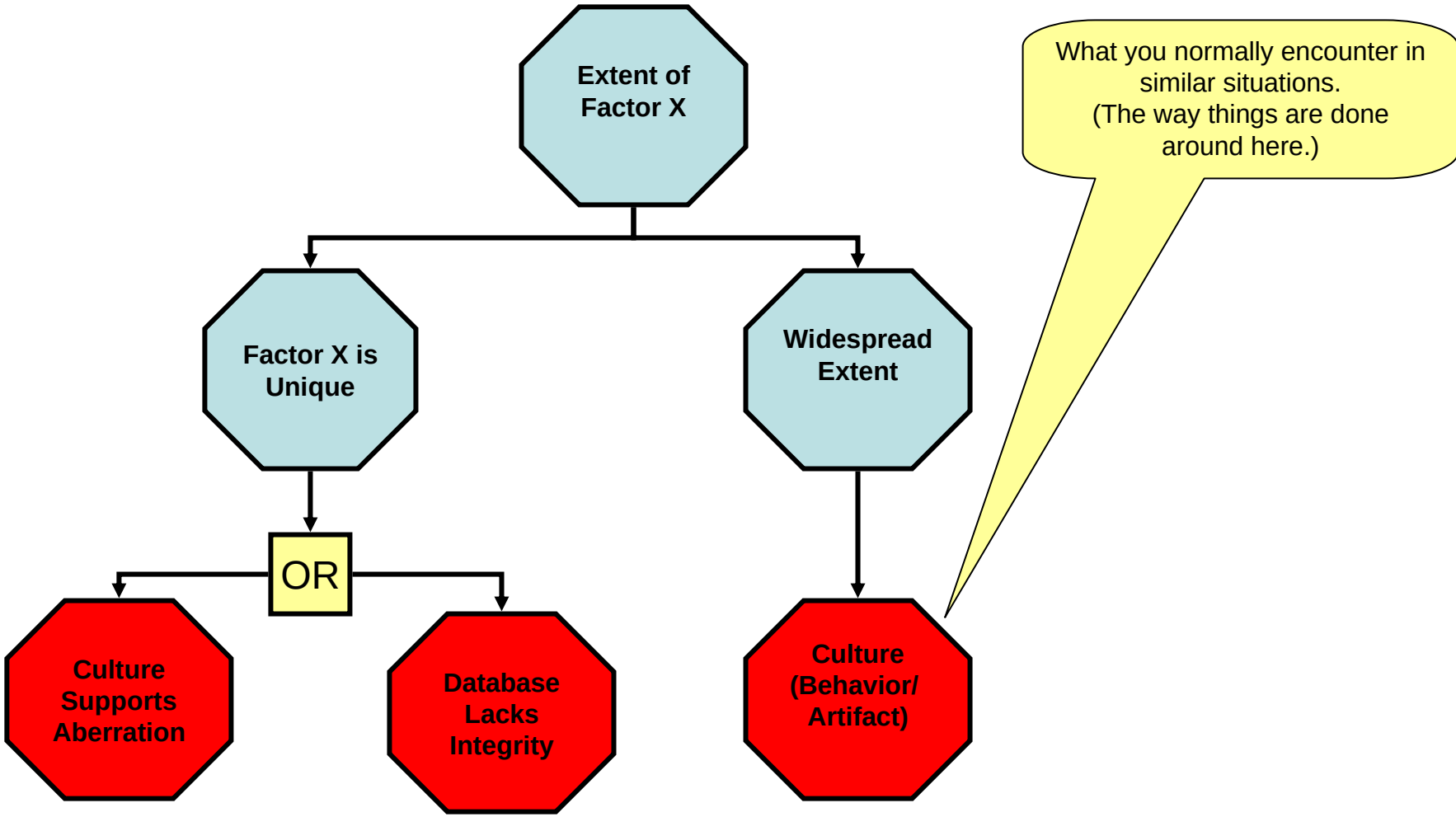
Chain of Manifestation



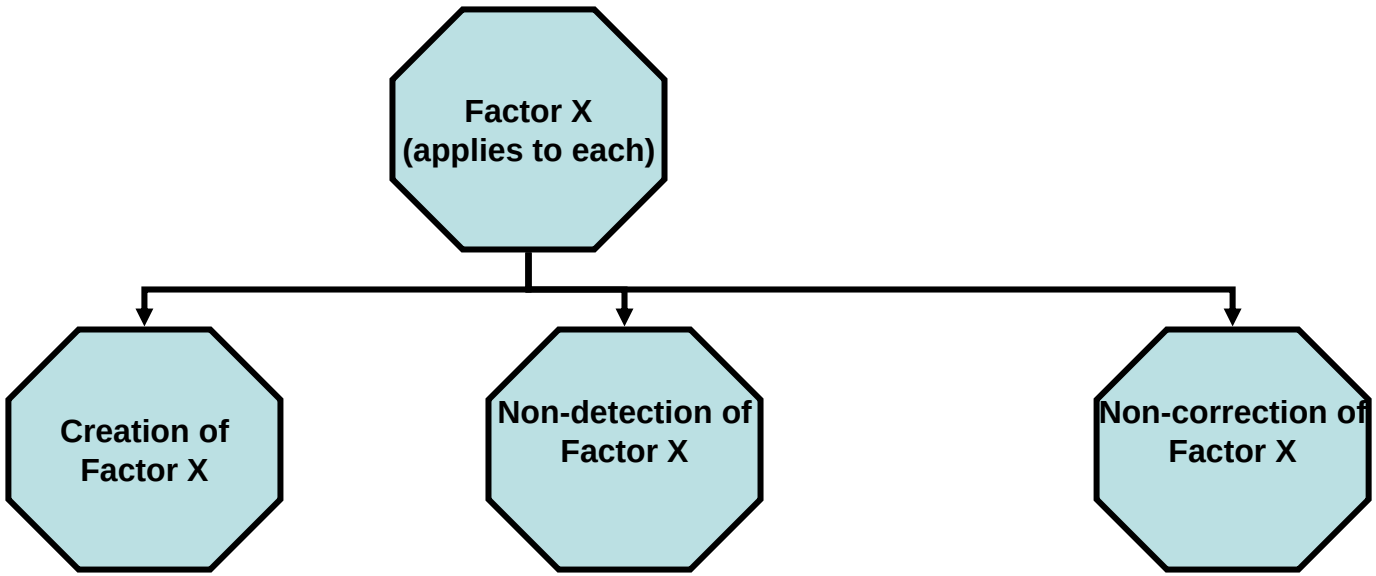
Drilling into a Factor



Drilling into Extent

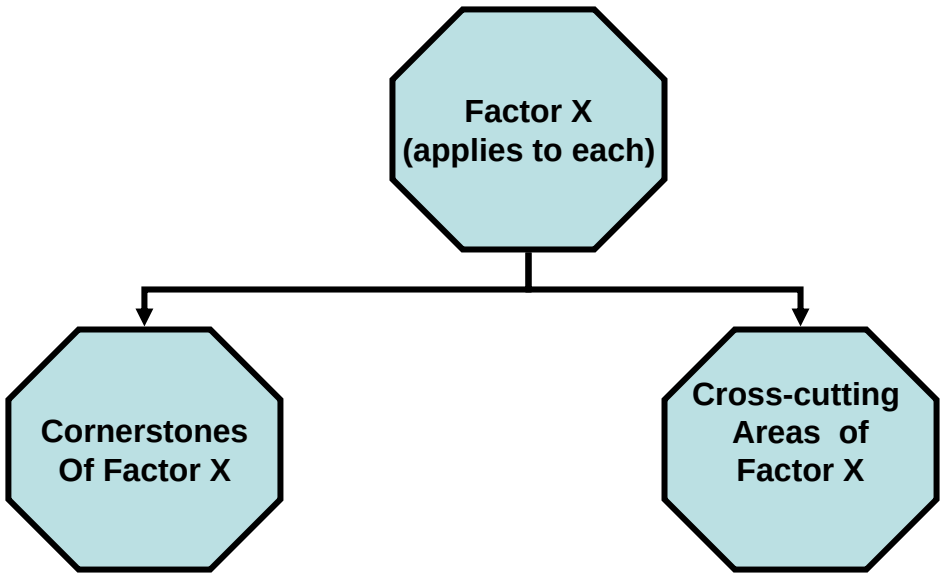


Microscoping a Factor



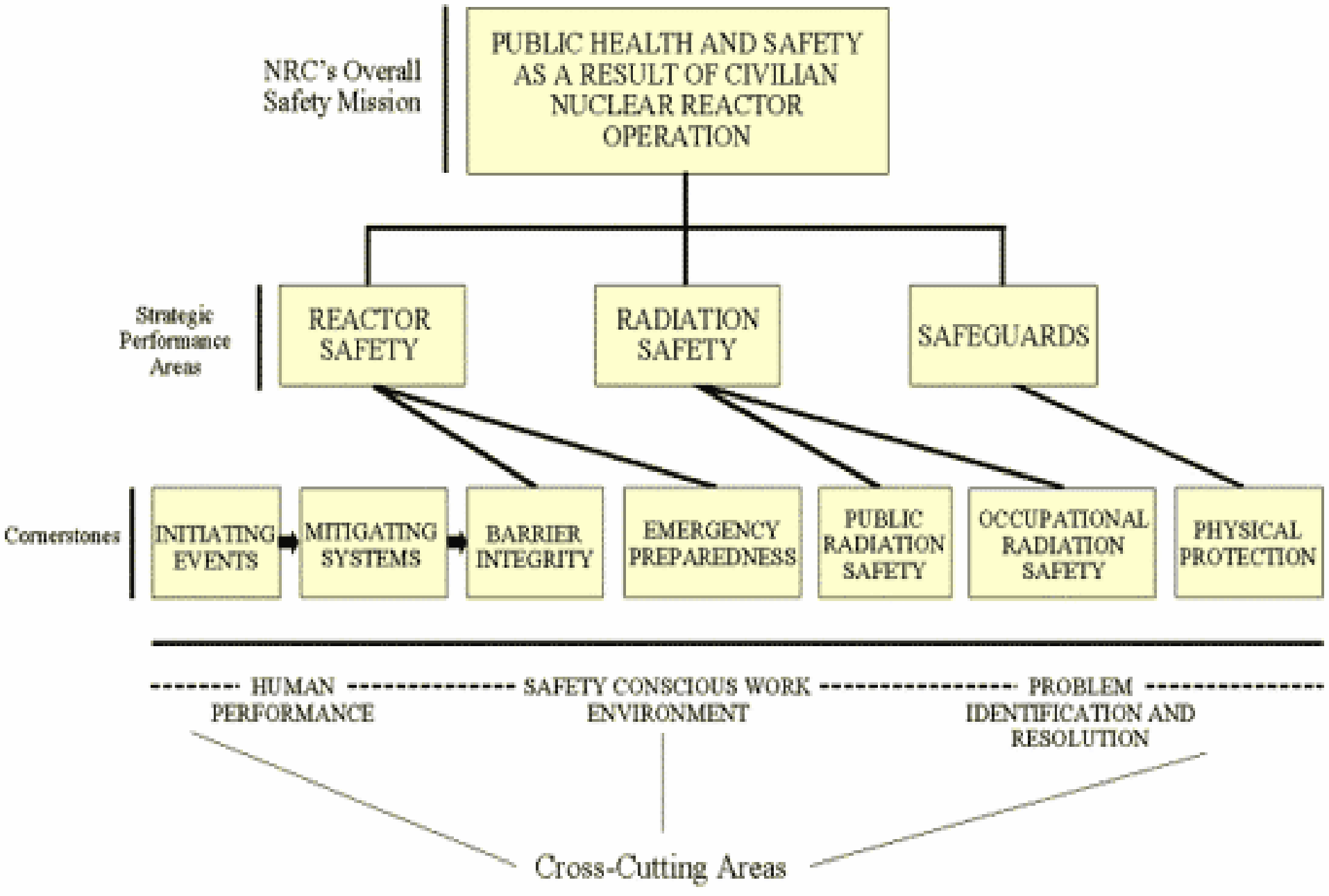
Factor X existed to be involved in the causation of the consequence because it was created and either it was not detected or it was not corrected.

ROPing a Factor

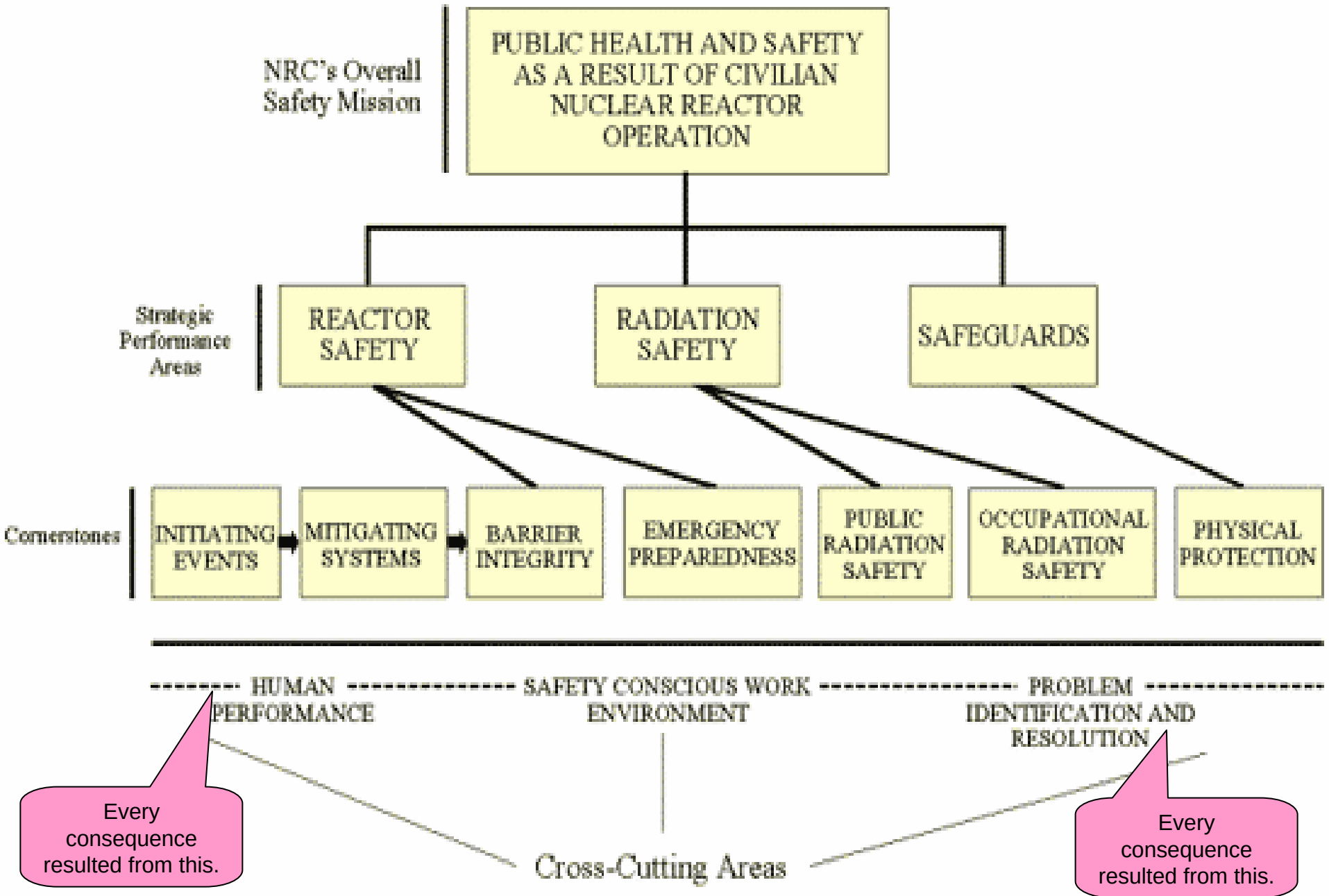


ROP= (NRC) Reactor Oversight Program

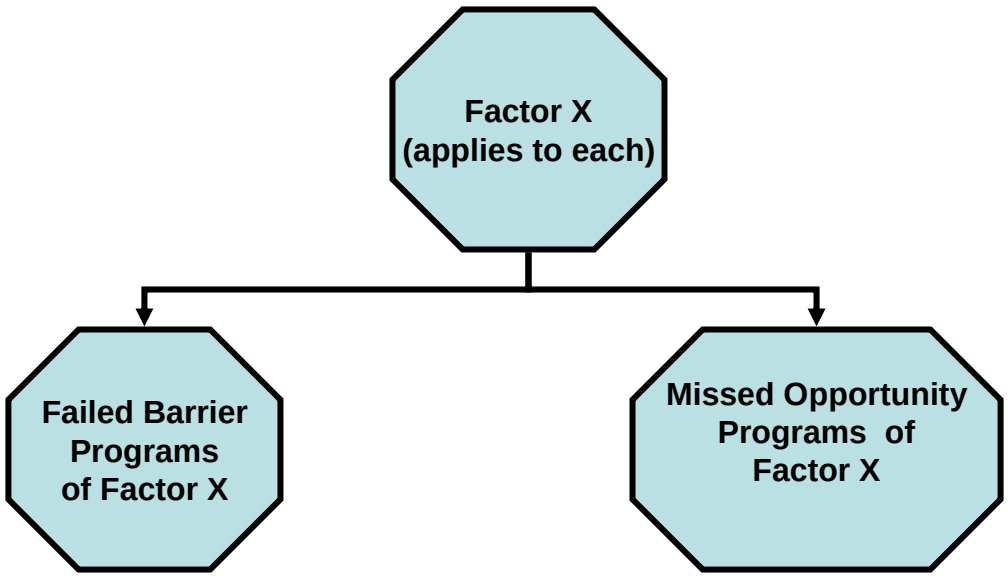
REGULATORY FRAMEWORK



REGULATORY FRAMEWORK



Programming a Factor

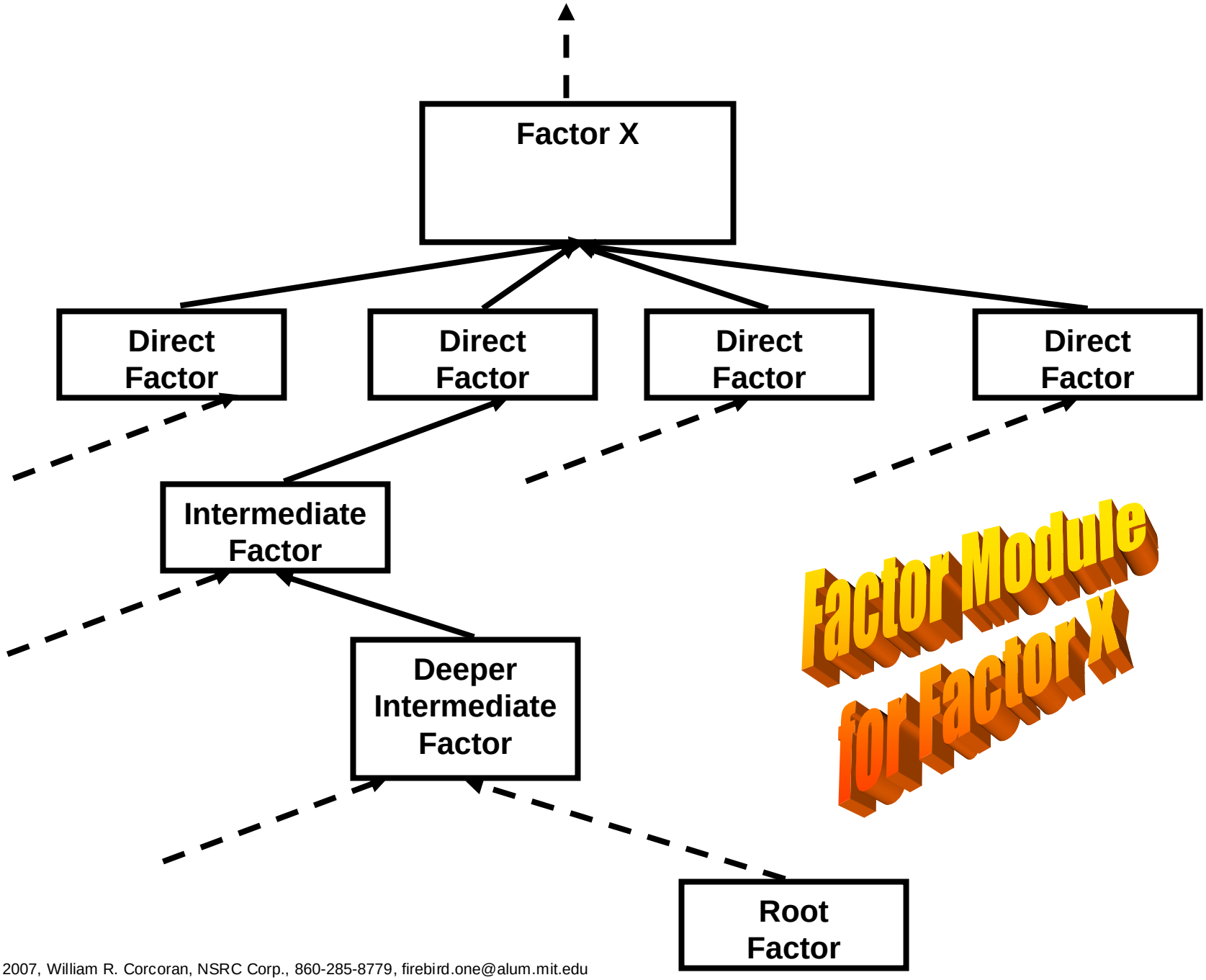


Glossary

- Line of Inquiry: A hypothesis or other investigative item for attention in an investigation.

Glossary

- Factor Module: A segment of a Factor Tree consisting of at least a top factor and its direct factors. (A Factor Module can be designed based on a Line of Inquiry.)



Lines of Inquiry (Partial List # 1)

- Creation of the Factor
- Longevity of the Factor
- Extent of the Factor
- Missed Opportunities involved in the Factor
- Barriers involved in the Factor
- Compliance that could have prevented the Factor
- Compliance that could have detected the Factor
- Management involvement in the Factor
- Accountability for the Factor
- Oversight involvement in the Factor
- Previous incomplete Corrective Actions involved in the Factor
- Previous Operating Experience that could have been favorably applied.

Lines of Inquiry (Partial List # 2)

- Culture involved in the Factor
- Fitness for Duty involved in the Factor
- Rules involved in the Factor
- Training involved in the Factor
- Activities involved in the Factor
- Safety Conscious Work Environment involved in the Factor
- Programs involved in the Factor
- Organizations involved in the Factor
- Individuals involved in the Factor
- Phenomena involved in the Factor

Lines of Inquiry (Partial List # 3)

- Change Management involved in the Factor
- Latent Organizational Weaknesses involved in the Factor
- Activity Planning involved in the Factor
- Self-assessment Weaknesses involved in the Factor
- Operational Readiness involved in the Factor
- Cultural Attributes involved in the Factor
- ISMS involved in Factor
- Prevention Opportunities involved in the Factor

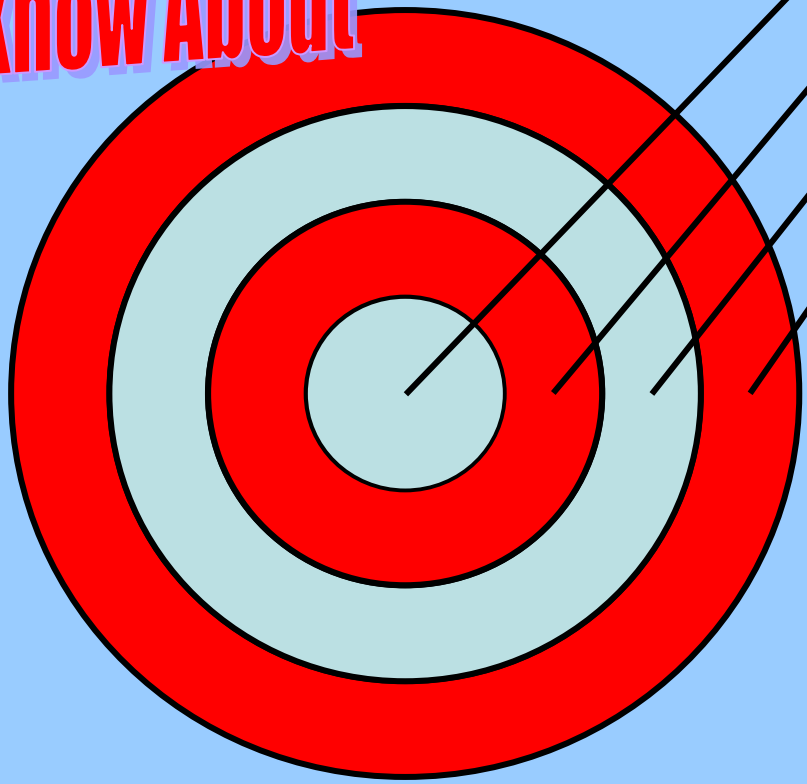
Sources of Lines of Inquiry

- Those that are implied by the event itself
- Evidence, e.g.,
  - "Personal Statements"
  - Interviews
- Picklists, e.g.,
  - MORT
  - Chet Rowe Cause Road Map
    - Change "observation" to "factor' and "LTA" to "involved."
  - Human Error Precursors (list)
  - Flawed Defenses (list)
- ROP Cornerstones and Cross-cutting Areas
  - NRC Safety Culture Components

Safety Culture Components

- **Problem Identification & Resolution**
  - Corrective Action Program
  - Operating Experience
  - Self and Independent Assessments
- **Human Performance**
  - Decision Making
  - Resources
  - Work control
  - Work Practices
- **Safety Conscious Work Environment**
  - Preventing and Detecting Retaliation
  - Willingness to Raise Concerns
- **Organizational Issues**
  - Safety Policies
  - Accountability
  - Organizational Change Management
  - Continuous Learning Environment

Events to Know About



My Job

My Specialty

My Organization

My Industry

The High Hazard Industries

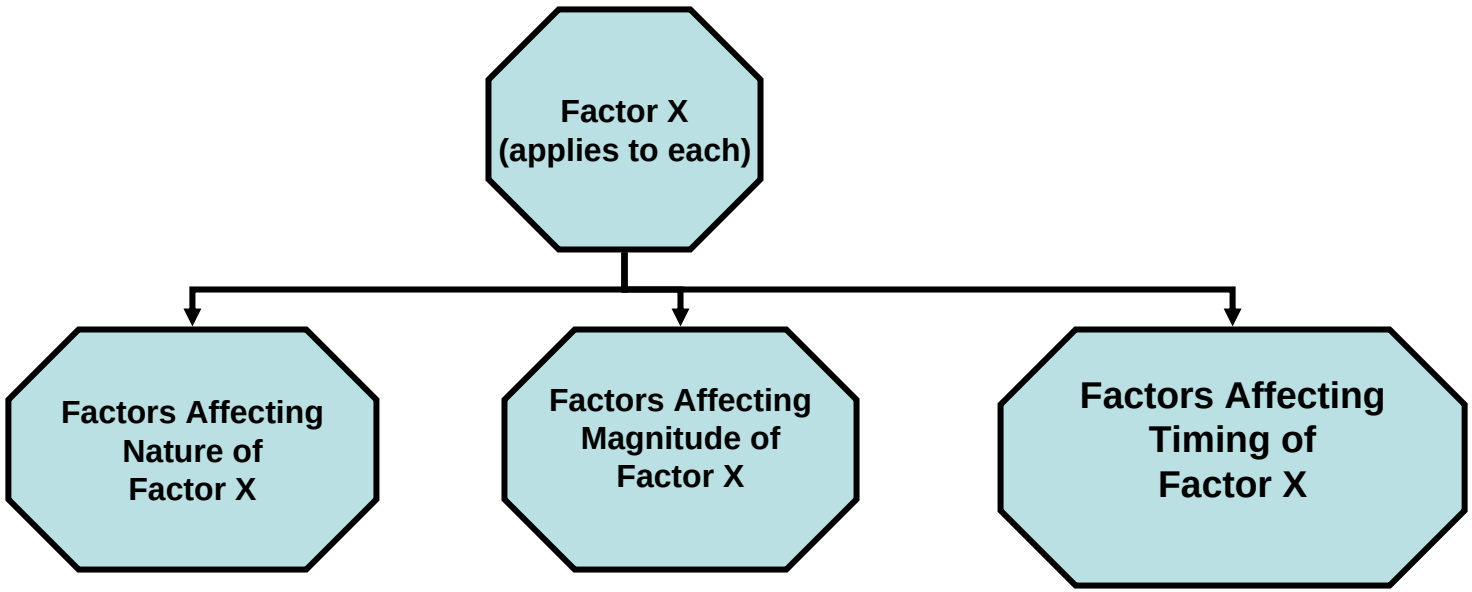
Factor Modules

(Factor Tree Building Blocks)

(Partial List # 1)

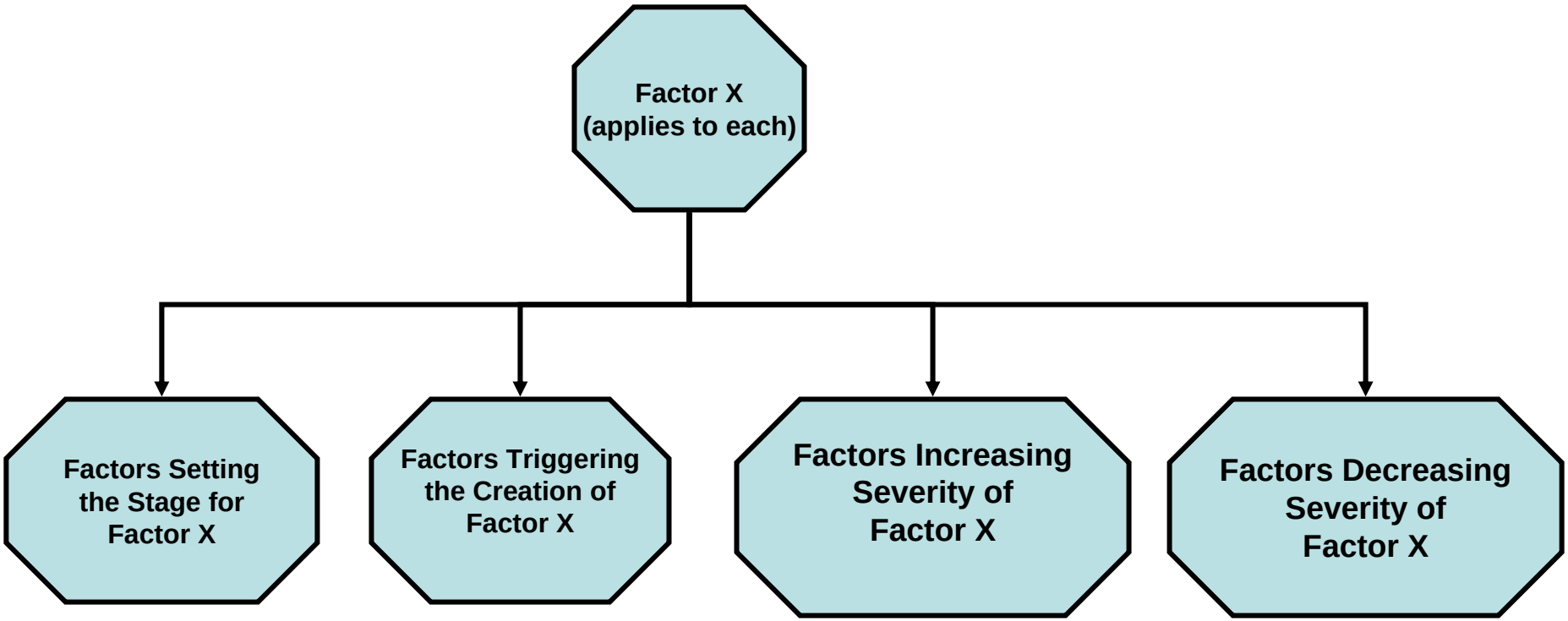
- Characterization Module
- Completeness Module
- Proximity Module
- X Line of Inquiry Module

Characterization Module



Factor X had a nature and a magnitude and existed at the time it was involved.

Completeness Module



Factor X was set-up for. It's creation was triggered. It was as bad as it was. It was not worse than it was.

Conclusions

- Safety Culture is easy to see and easy to describe.
- Functional Root Cause Analysis “outs” the dysfunctional aspects of the safety culture.
- Dysfunctional Root Cause Analysis ignores or “greenwashes” safety culture.

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Questions?