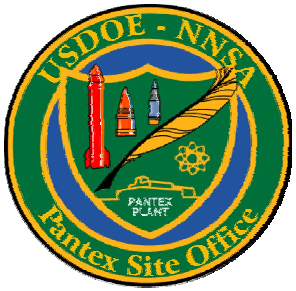
B&W Pantex
technical services



Causal Factors Analysis (CFA) a Tool to Assess the Effectiveness of the HRO

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&
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High Reliability Organization

- A High Reliability Organization (HRO) is one in which in spite of the fact that it deals with hazardous, high consequence operations, does so successfully

- A key attribute of being an HRO is to learn from the organization's mistakes
  - Causal Factors Analysis (CFA) key tool to systematically learn from events that occur when HRO efforts fall short

Pantex's HRO Journey

- **2007**
  - Senior Managers embarked on an HRO journey
  - Developed a new Causal Factors Analysis (CFA) Investigation Process
    - Explore "Information-Rich" Events provide feedback on HRO
    - Beta-tested CFA process using 4 investigations
- **2008**
  - Continue to hone HRO & CFA processes
    - Publishing HRO & CFA Texts
    - Developing HRO & CFA training for second level managers
  - Supporting DOE with safety culture initiatives

Why Is Being an HRO So Important?

Some types of system failures are so punishing that they must be avoided at almost any cost.

These classes of events are seen as so harmful that they disable the organization, radically limiting its capacity to pursue its goal, and could lead to its own destruction.

Laporte and Consolini, 1991

Let's Think for a Moment…

- We produce and fabricate high explosive components
  - Using some of the most powerful explosives in the world
- We disassemble weapons of mass destruction
  - With safety features disabled
- We will use lethal force to protect DOE assets
- Daily we wrap large amounts of high explosives around plutonium triggers for the world's most hazardous weapons
  - At the crossroads of America's Heartland!

Pantex has no choice except to be a
High Reliability Organization!

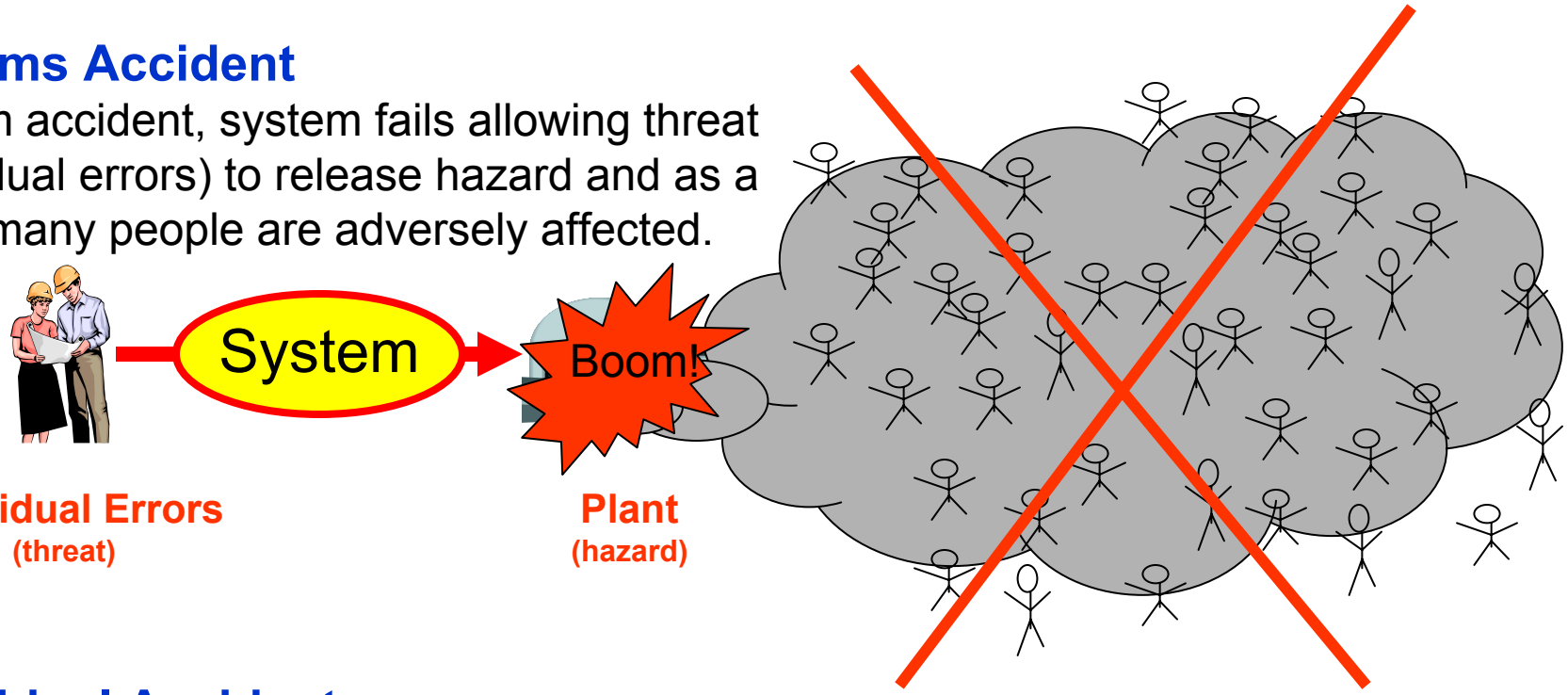
HRO-CFA Challenge - Goal

- Take HRO Attributes to fundamental level
- Develop a practical approach to HRO
- Use HRO framework to integrate HPI, ISM, SCWE, VPP, BBS
- Implement HRO program Plant-wide
- Refocus on systems accident
- Supplement with CFA to provide feedback

Systems Accident vs. Individual Accident

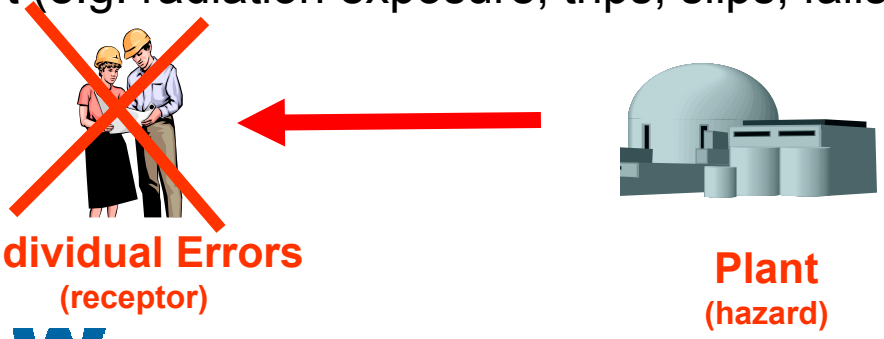
Systems Accident

System accident, system fails allowing threat (individual errors) to release hazard and as a result many people are adversely affected.



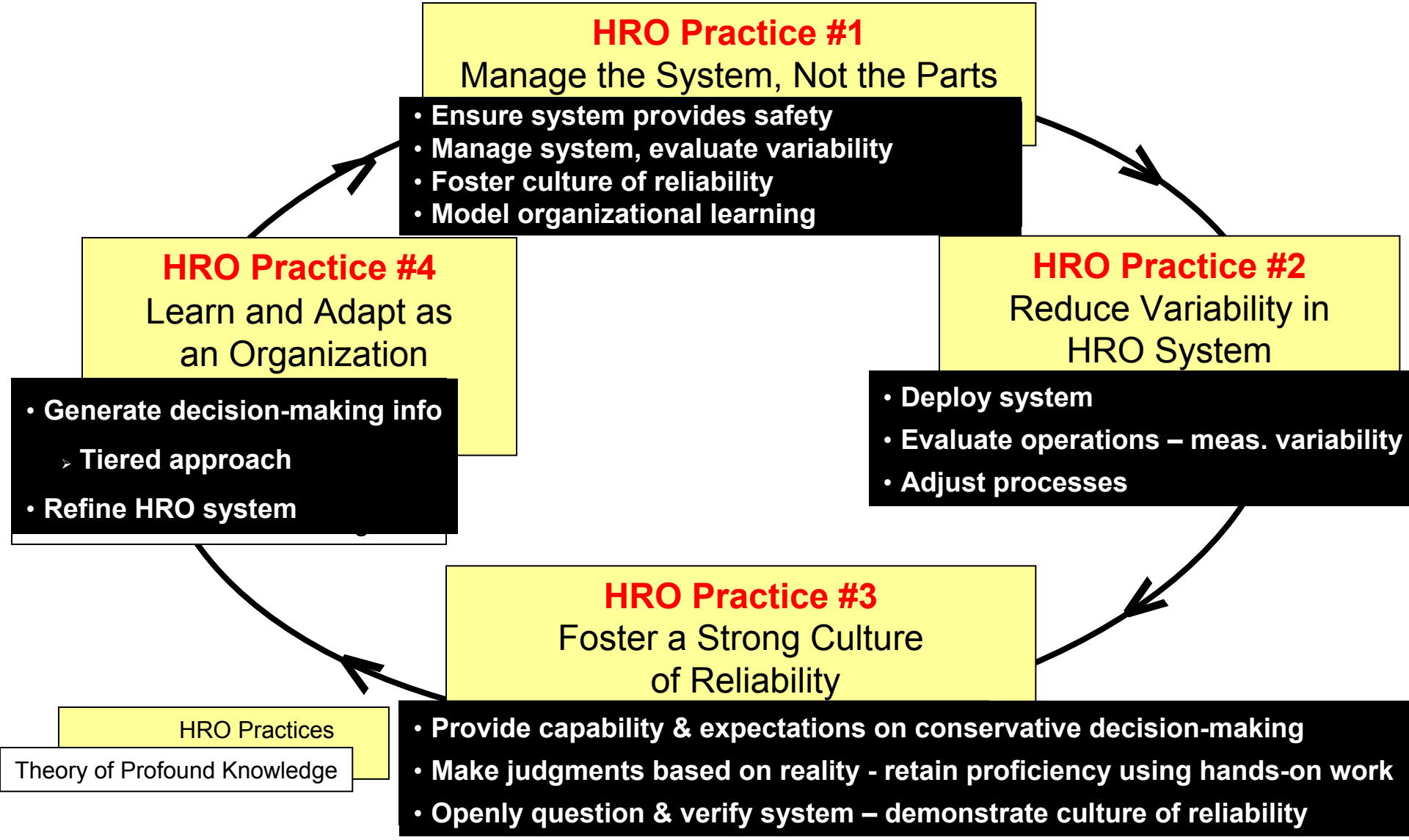
Individual Accident

Individual accident, the worker is not protected from the plant and the worker gets hurt (e.g. radiation exposure, trips, slips, falls, industrial accident, etc.).

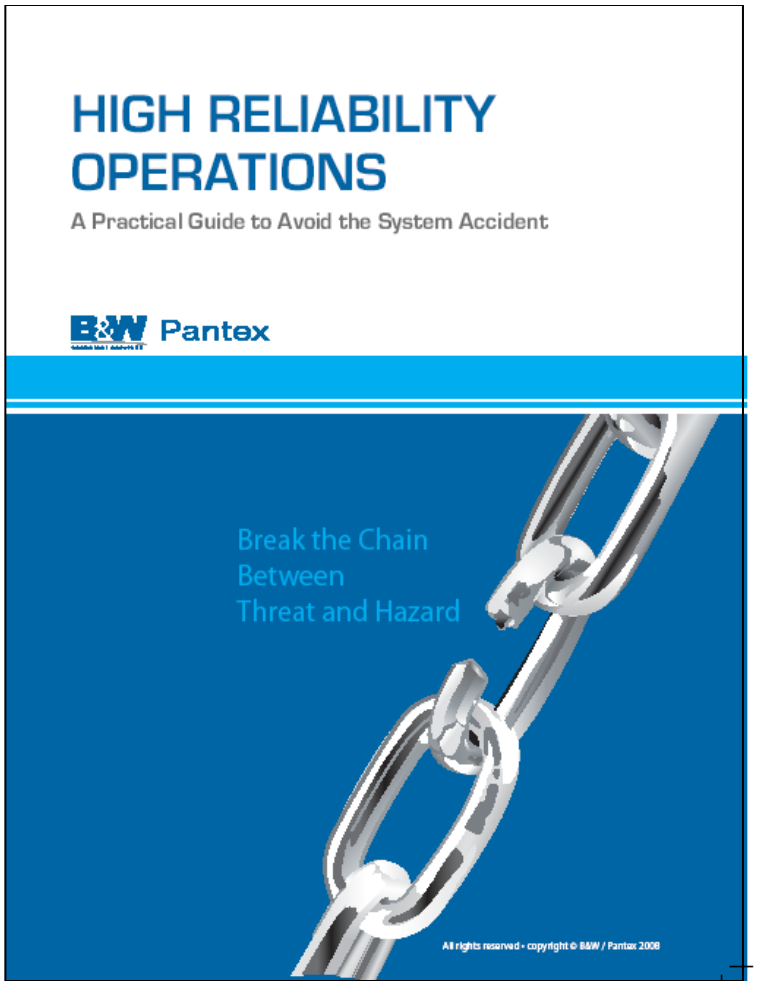


HRO at the Fundamental Level

Adaptation of Deming's Theory of Profound Knowledge to Frame the HRO



HRO Text



Practical guide to implement high reliability concepts.

Provides foundation for B&W Pantex CFA process.

Contains:

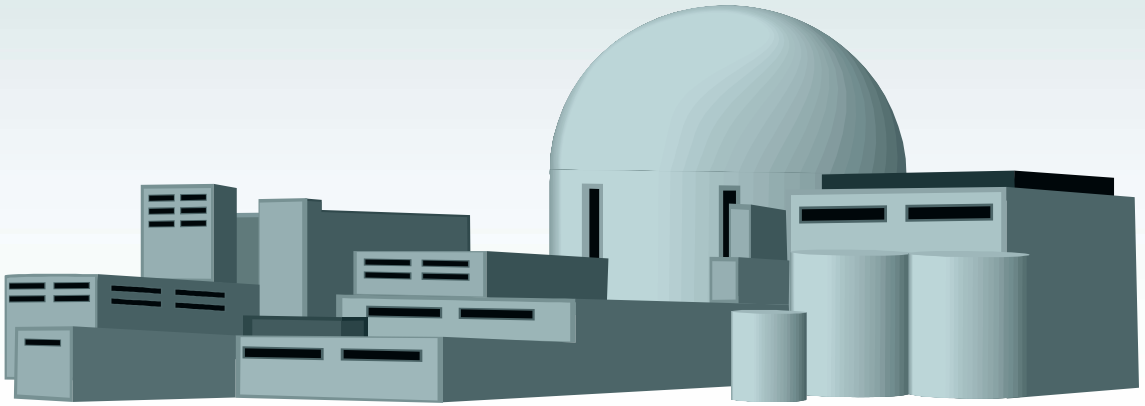
- High Reliability Theory
- Normal Accident Theory
- Break the Chain Framework
- How organizational accidents occur and how to investigate
- Ties CFA as feedback to HRO

HRO Improvements

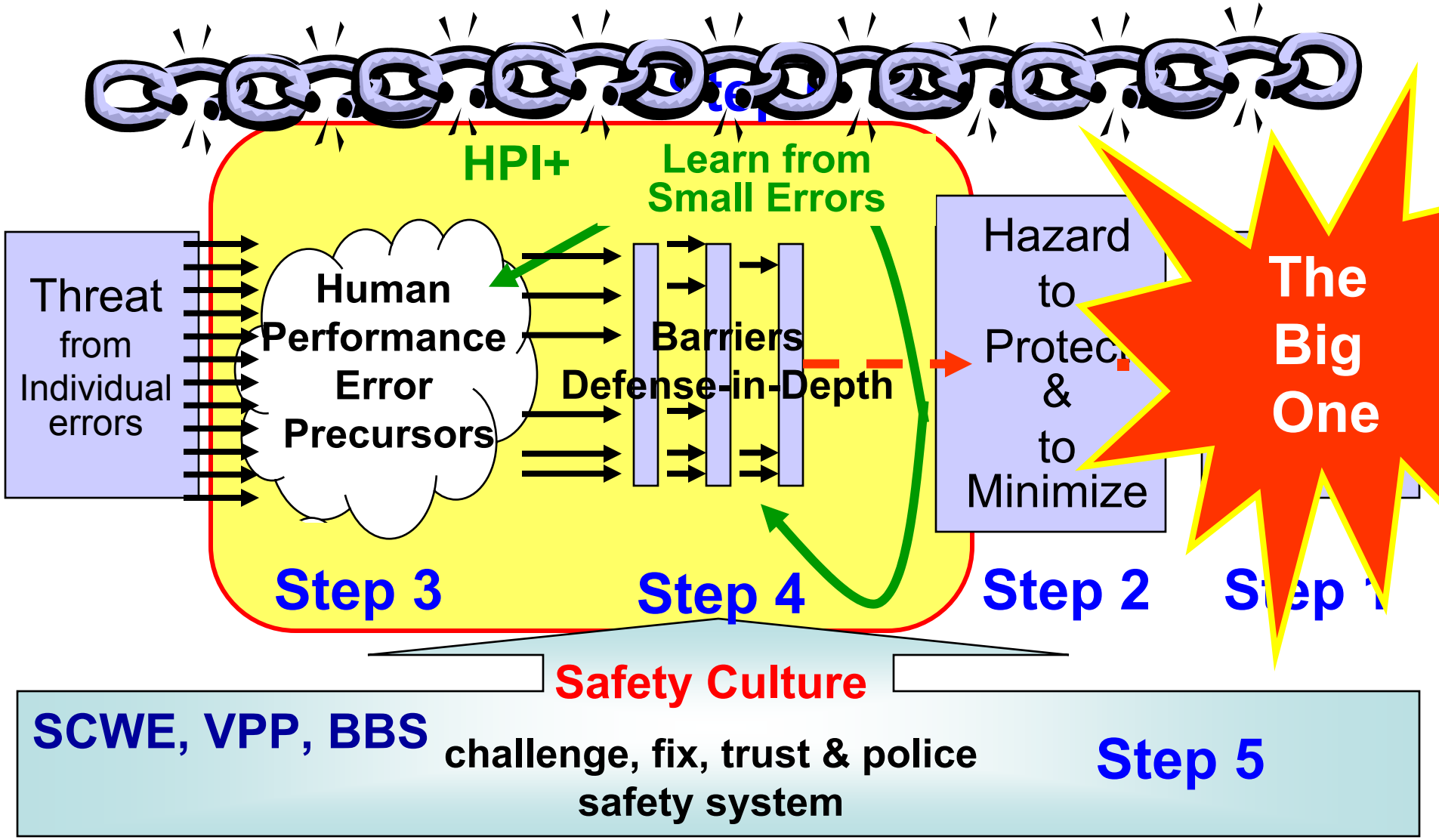
- Puts HRO into logical frame-of-reference
- Break the Chain framework minimizes consequences of systems accidents
- HRO process is physics-based vs. social science-based
- Requires a systems approach to gain consistency
- Neither systems nor people are infallible → optimize organizational learning
- DOE consequence reduction model, more than INPO's HPI
- Framework to integrate ISM, HRO, HPI, SCWE, VPP, BBS

High Reliability Theory

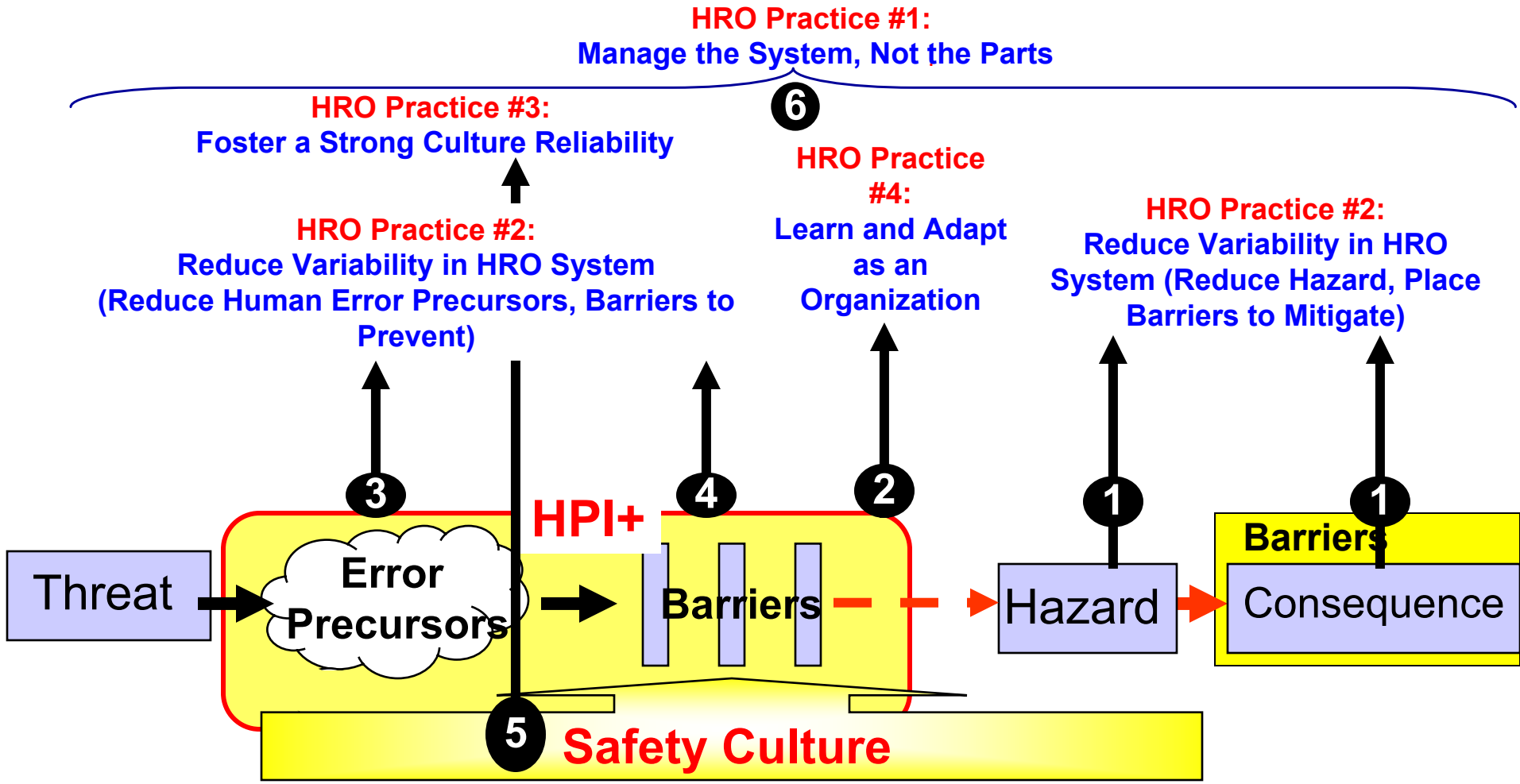
High Reliability Practicality



Break the Chain Framework



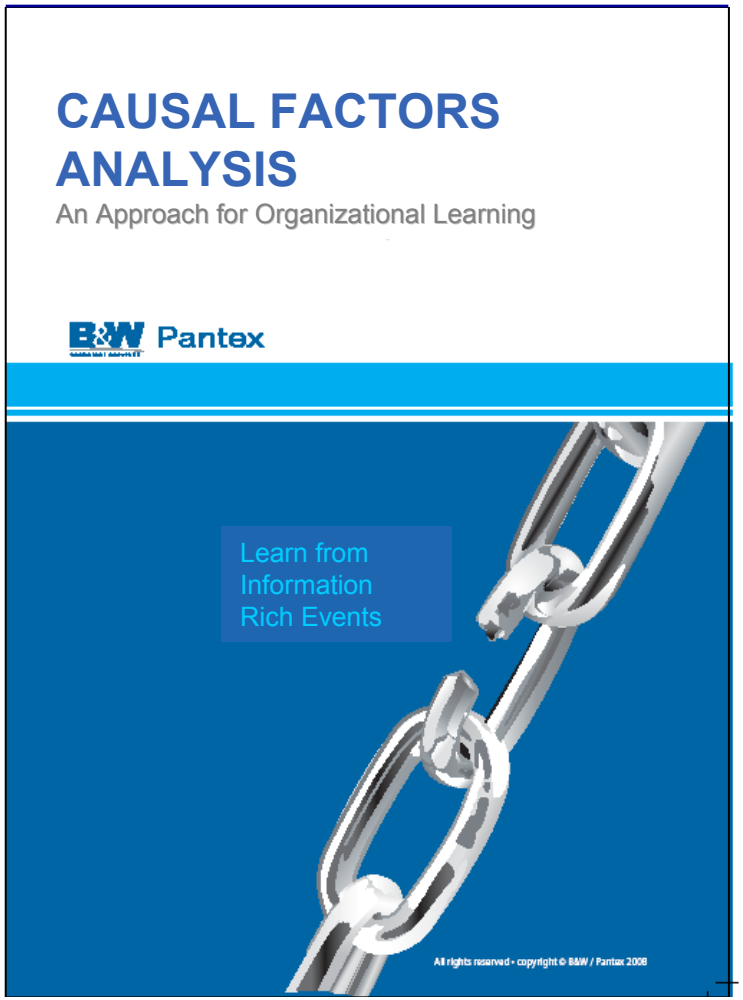
CFA Feedback to the HRO Practices



Steps in CFA Investigation

1. Identify Event
2. Determine gaps between "work-as-imagined" vs. "work-as-done"
3. Identify Human Performance Error Precursors
4. Identify Flawed Barriers
5. Identify Latent Organizational Weaknesses & Unhealthy Safety Culture
6. Review HRO Programs with insight gained from steps #1 - #5

CFA Text



Guide to conduct high quality & consistent CFA investigations to obtain root causes and understand organizational contributors.

Contains:

- Tools
- Step-by-step process
- Examples & templates
- Method to interpret results and provide feedback to HRO
- Provides outline for report
- Provides criteria for evaluating quality

CFA Improvements

- Stronger connection between HROs and CFA
- Documented and validated CFA process flow
- Facilitates consistently and understanding
- HPI fully integrated into CFA investigations
- Consistent quality*
- Provides feedback to HRO programs
- Standardized CFA report format
- Formal CFA report evaluation criteria
- Increased credibility of CFA investigations