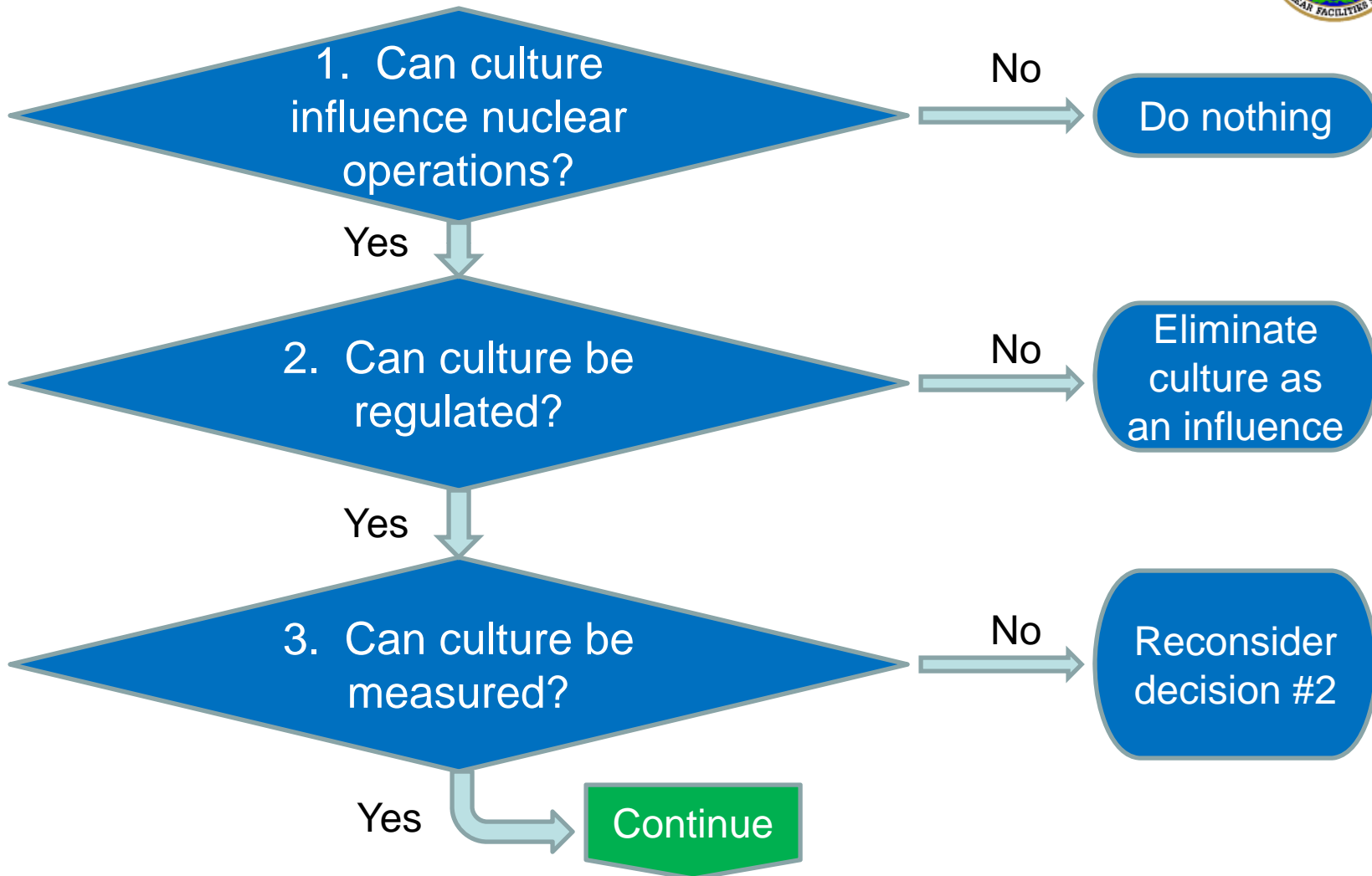# Measuring Safety Culture

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Defense Nuclear Facilities Safety Board

ANS Annual Meeting
Progress in Regulation of Safety Culture
June 16, 2009

Objectives

1. Can culture influence nuclear operations?
   - No → Do nothing
   - Yes ↓
2. Can culture be regulated?
   - No → Eliminate culture as an influence
   - Yes ↓
3. Can culture be measured?
   - No → Reconsider decision #2
   - Yes → Continue

Safety Culture

Safety culture is an organization's values and behaviors – modeled by its leaders and internalized by its members – that serve to make nuclear safety an overriding priority.*

- Dating back to SEN-35-91, it's DOE Policy;

- EFCOG/DOE ISMS Safety Culture Task Team; assessment tool is being developed.

- Acting DS Kupfer Memorandum on January 16, 2009 on Strengthening Safety Culture as a way of taking ISM to the next level.

*INPO, *Principles for a Strong Nuclear Safety Culture*, November 2004.

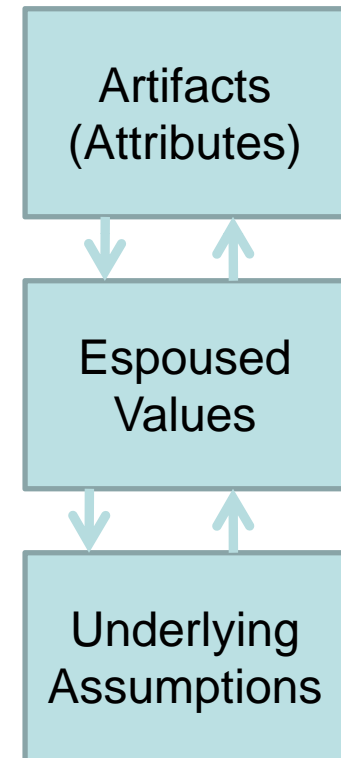# Do we know what a good safety culture looks like?

Well, yes:

- Leaders who put safety first – message, resources, & incentives.

- Workers who take responsibility for their safety and that of their co-workers.

- Workers who will "stop" or "pause work."

- Efforts to combat complacency; *status quo* questioned.

- Respect for nuclear hazards and trust in the workplace.

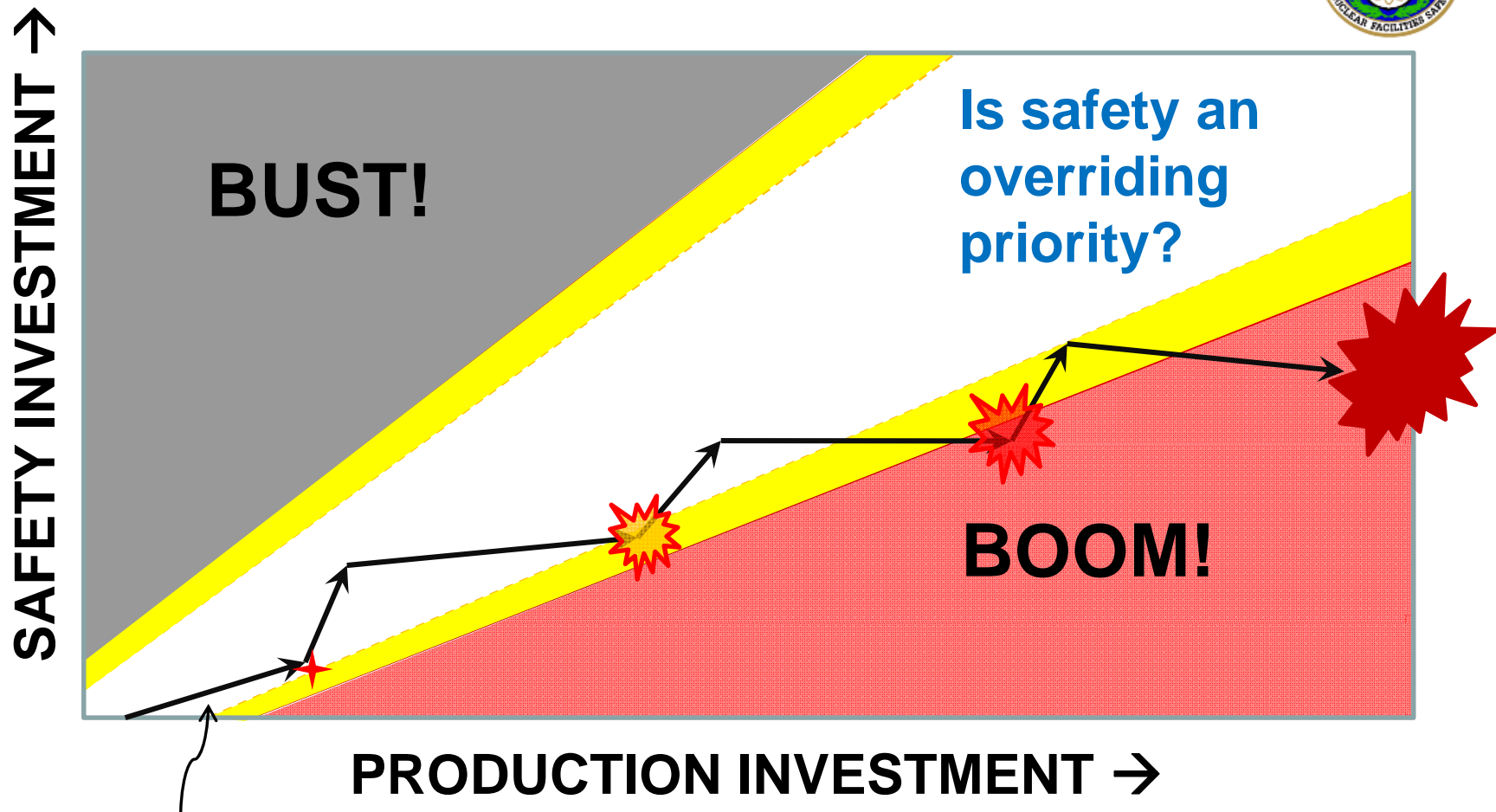- Performance metrics include leading indicators.

Committed leaders need to "talk the talk" and "walk the walk."

Empowered workers need to "get it."

Artifacts (Attributes)

Espoused Values

Underlying Assumptions

(E. Schein)

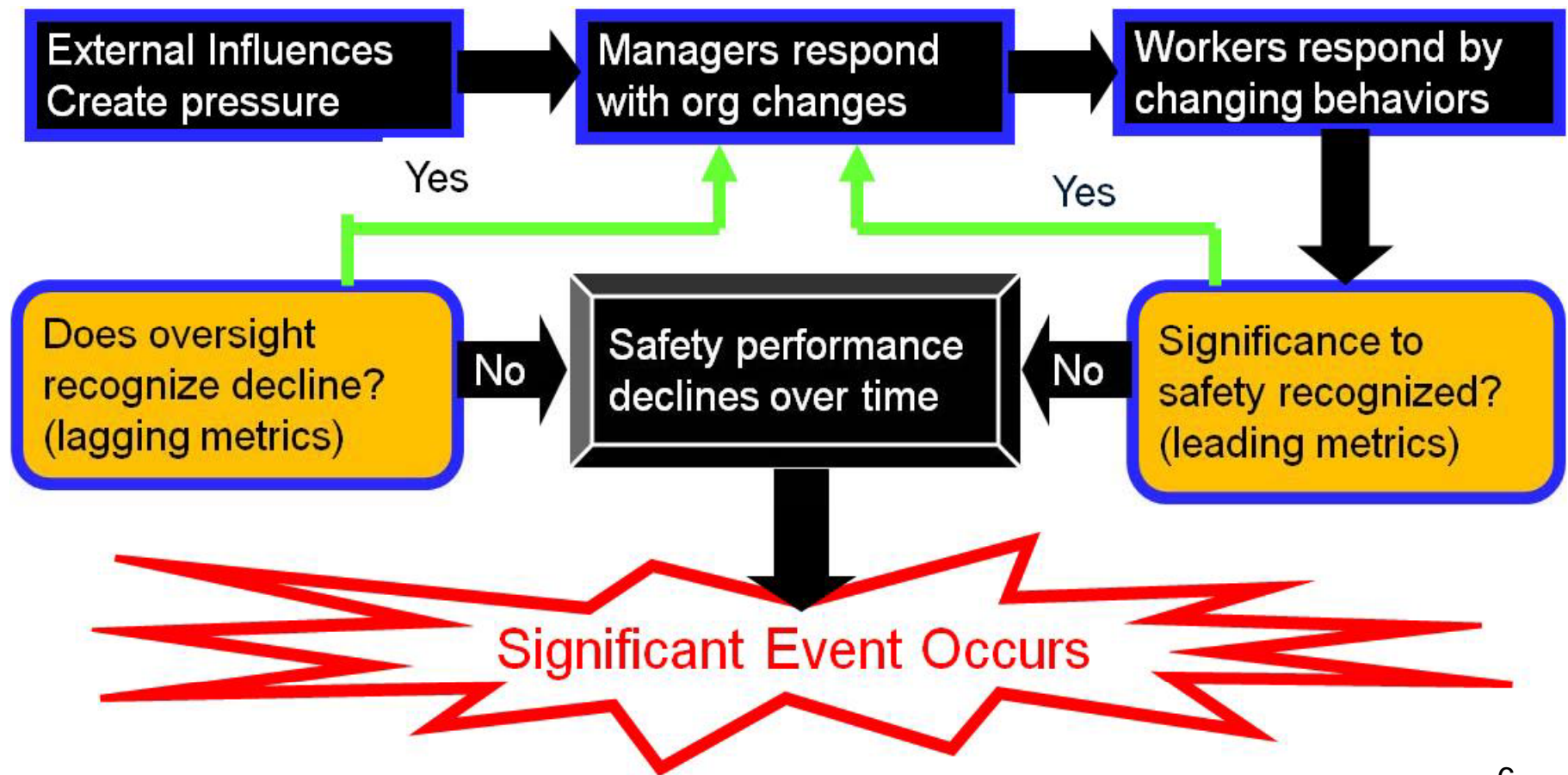Culture determines the balance between mission and safety

A modified "Reason Model" -- from Reason, 1997 and Starbuck, 1988.

Changes in culture often precede major accidents
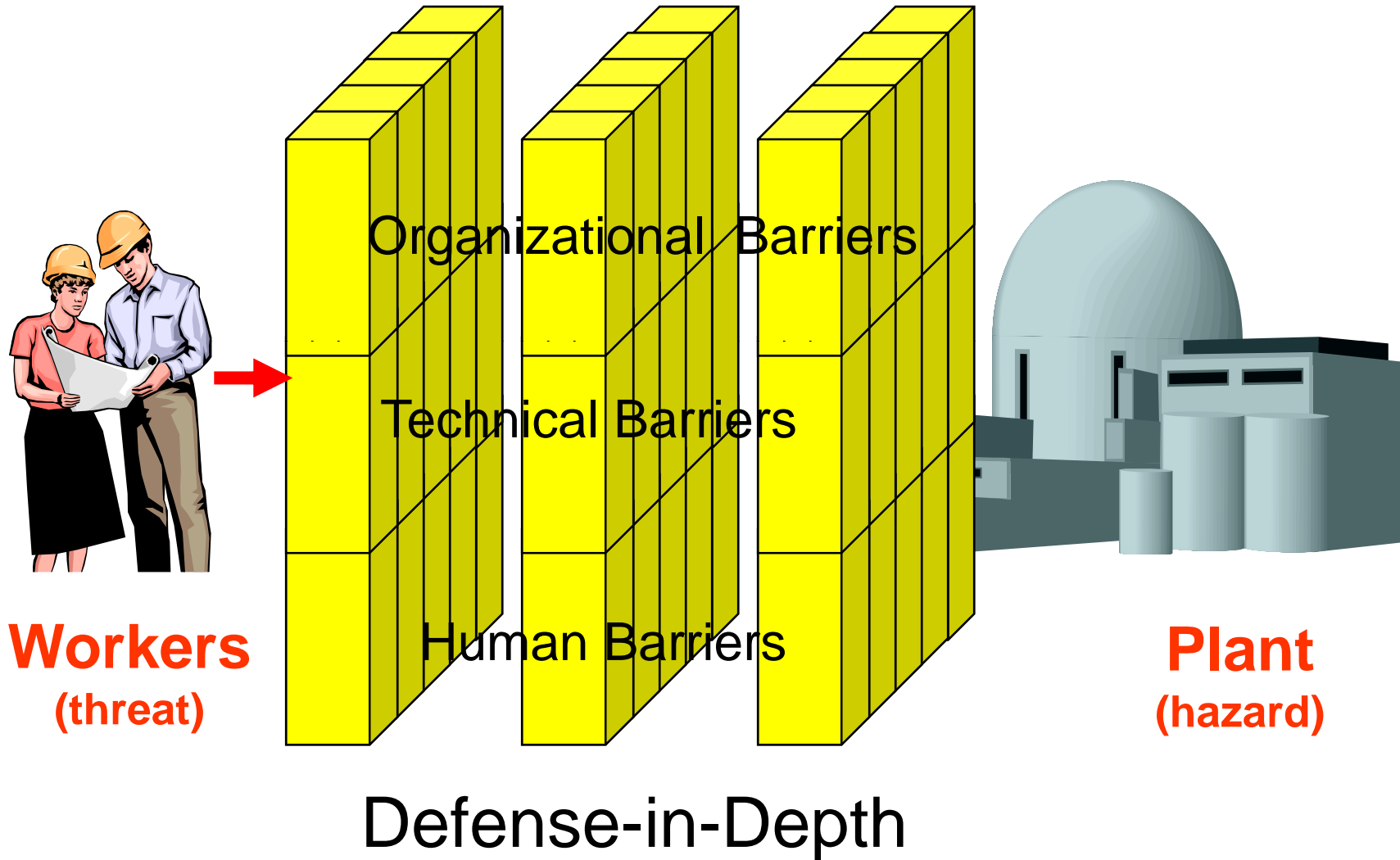
Leaders/managers create culture

Culture's Influence

- Safety Culture clearly influences nuclear operations.

- A key to improved performance is an improved organizational safety culture.

- It also helps to answer the question,

  -- "Why did a worker do that?" Or,

  -- "Should we expect a similar occurrence in the future?"

Barriers Between Workers and Plant*

Workers
(threat)

Organizational Barriers

Technical Barriers

Human Barriers

Plant
(hazard)

Defense-in-Depth

High Reliability Operations, Hartley, Tolk, and Swaim, B&W Pantex, 2008.

Efficiency-Thoroughness Trade Off

Workers are always faced with multiple, changing, and often conflicting goals in the workplace. They are constantly faced with the ETTO challenge:

> "How do I get the task done as thoroughly as practical but as efficiently as possible."

The ETTO decision can be seen in:

> "It looks OK to me"
> "It's not quite right but close enough"
> "This always works, no need to double check"
> "If it's not right somebody else will catch it"
> "Let's keep moving, we'll deal with this later"
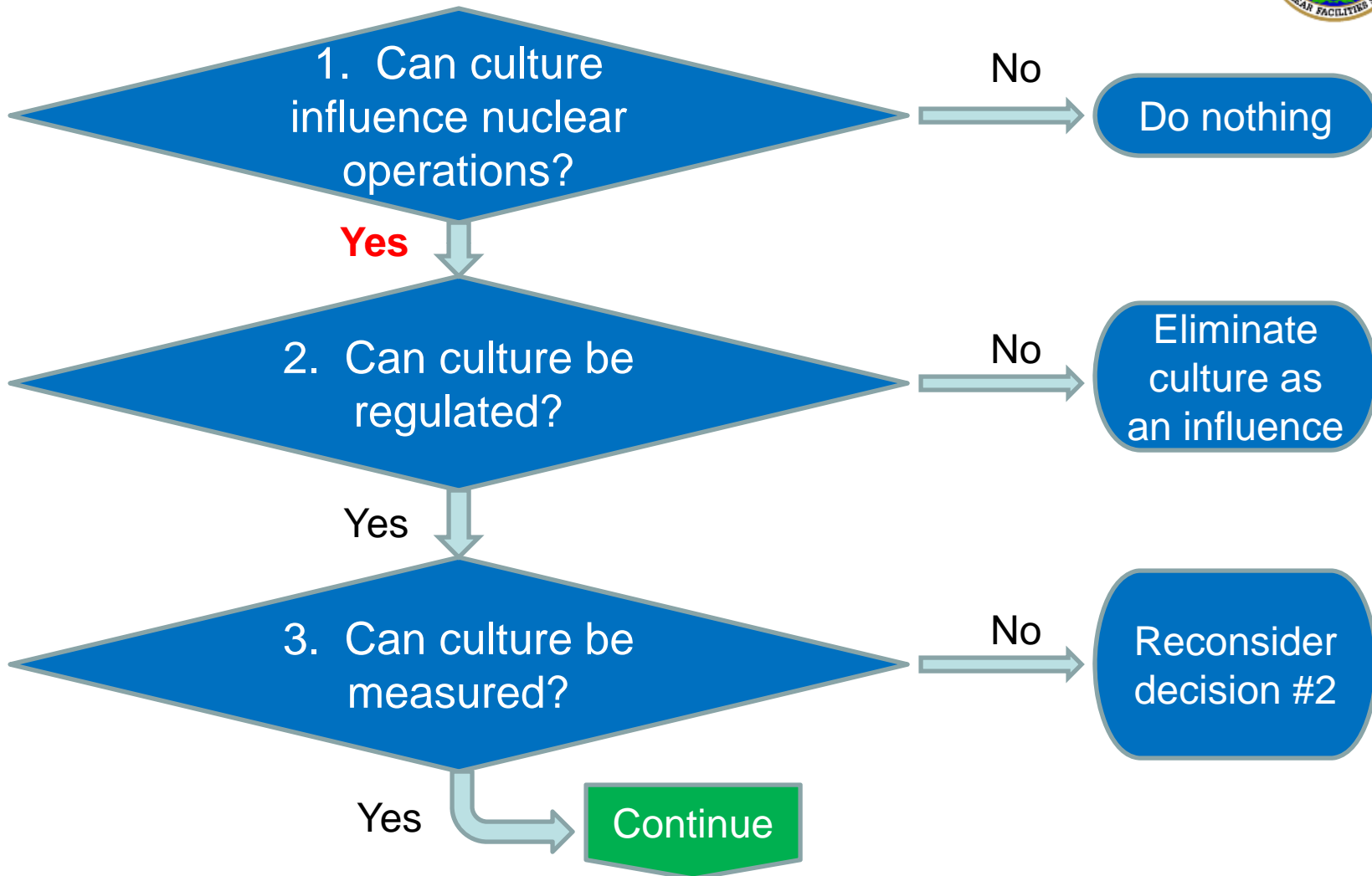> "Don't worry, nothing ever happens around here"
> "I'm not sure but I think this is the right way"

(E. Hollnagel)

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The Three Levels of Culture

Artifacts (Attributes)

Typical Artifacts: **MEASURE & REGULATE**
- High turnover rates in safety-related positions.
- Management meetings only discuss production goals.
- Number of ConOps violations
- Number of times workers "stop" or "pause" work

Espoused Values

Typical Espoused Values:
- "We value and reward team work."
- "Safety and security are our highest priorities."
- "Everybody at the plant has 'stop work' authority."
- "Our workers are always trained to the highest standards."
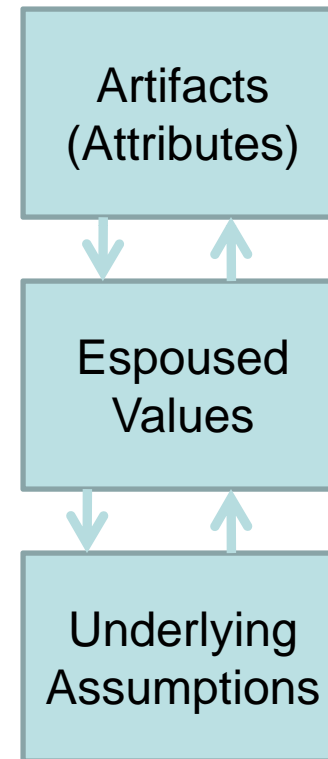
Underlying Assumptions

Typical Underlying Assumptions:
- "We know the job best because we do it."
- "I'd never do anything that would hurt me or my buddies."
- "We need to get the job done so that we'll get paid."
- "My bosses will keep me out of trouble."

(E. Schein)

Regulating culture

- We want to "regulate culture" and, if necessary, change it to support safety as an overriding priority.

- We can't regulate "attitudes, values, and beliefs" because they don't easily lend themselves to measurement.

- However, one can identify and regulate the artifacts and attributes (e.g., people, processes, equipment) that shape or *influence* the culture we seek.

- Prime candidate goals for regulatory focus could be:
  - Shape a safety culture
  - Create a safety-conscious work environment
  - Decision-making reflects safety first
  - Learn from safety concerns
  - Monitor the safety culture

- The proof of the pudding will be in the measurable attributes of the organization, most notably worker's behaviors.

Artifacts (Attributes)

Espoused Values

Underlying Assumptions

(E. Schein)

Regulating Culture (cont)

A goals-oriented approach helps to identify processes that change the underlying assumptions and values.

SHAPE A SAFETY CULTURE
- Incentives & rewards support safety
- Hiring & promoting support safety
- Balance mission and safety
- Leadership development
- Supervisor/manager values training

CREATE A SAFETY-CONSCIOUS WORK ENV.
- Employee concerns
- Minority opinions
- Questioning attitudes
- Budget prioritization for safety
- Safety organization independence

DECISION-MAKING REFLECTS SAFETY FIRST
- Clear expectations for safe conduct of mission
- Safety-integrated in procedures & process descriptions
- Transparency between management and workers
- Integrated Safety Management
- Training on efficiency-thoroughness trade-off expectations

Regulating Culture (cont)

LEARN FROM SAFETY CONCERNS
- Corrective action programs
- Occurrence reporting processes
- Event investigation processes
- Lessons learned processes
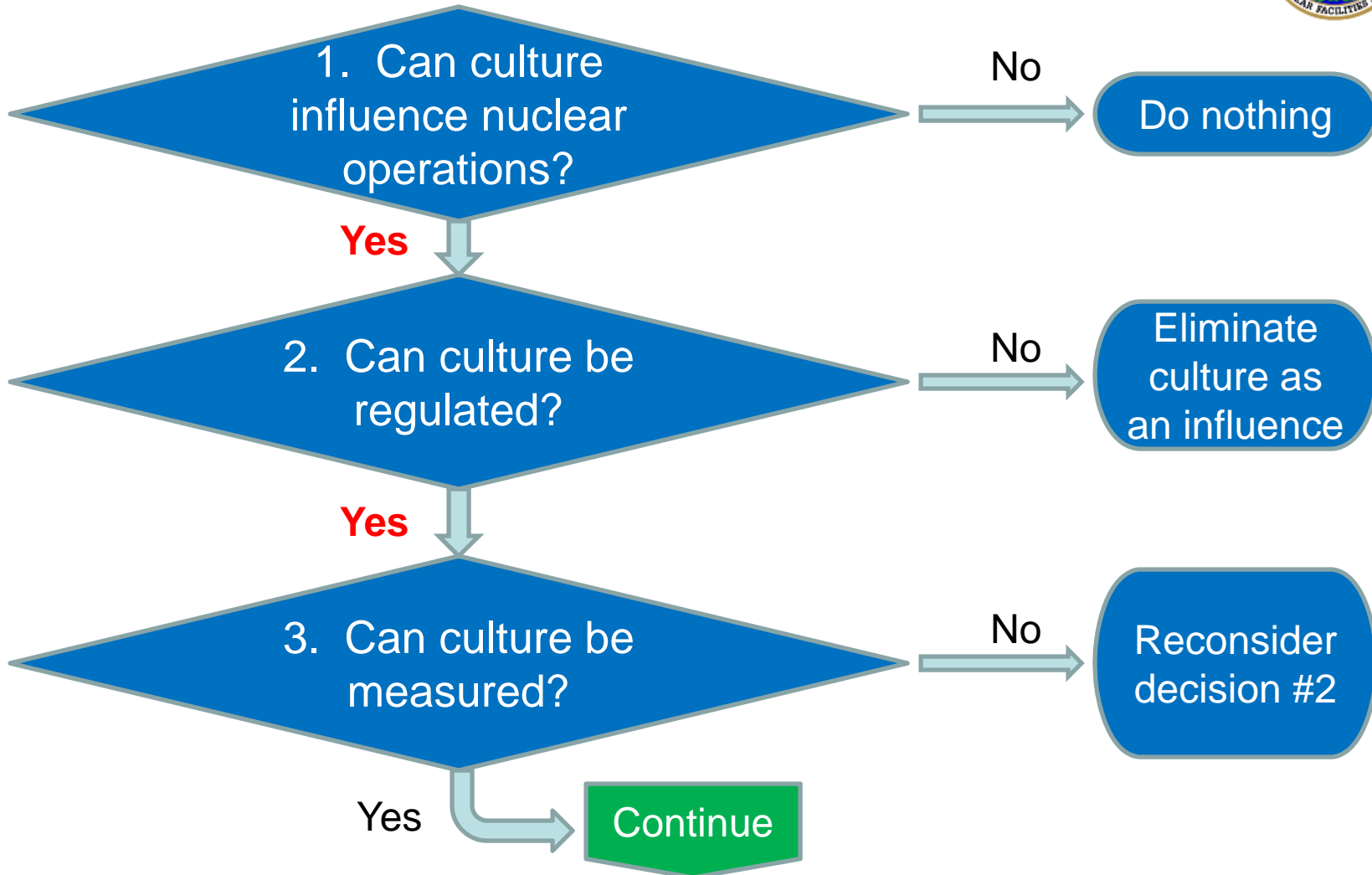- Fight complacency

MONITOR THE SAFETY CULTURE
- Audit/assessment processes
- Quality assurance & quality control
- Management by involvement
- Recognizing external influences
- Int./Ext. Independence of monitoring

A number of processes directly shape or perpetuate culture and are viable candidates for regulation.

Some processes are already regulated for other purposes and may need to be restructured to fit into this framework.

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Yes → Continue

Measuring Culture

Culture is manifested in the attitudes and behaviors of the workers and can be observed through the visible artifacts. A goals-oriented approach can identify artifacts that measure existing culture and changes to it; this can be a tailored process.

SHAPE A SAFETY CULTURE

Look for changes in
- Upward mobility of workforce
- Production demands – get 'er done
- Safety vs. non-safety resources
- Competing or distracting priorities
- Worker satisfaction with managers
- Aging of the workforce

CREATE A SAFETY-CONSCIOUS WORK ENV.

Look for changes in
- Rate & nature of employee concerns
- Rate & nature of minority opinions
- Turnover, retirement, & overtime rates
- Turnover in training organization
- Assigned responsibilities & authorities

Measuring Culture (cont)

DECISION-MAKING REFLECTS SAFETY

FIRST -- *Look for changes in*
- Identification of hazards
- Rate & nature of procedural violations
- Rates of deferred maintenance
- Rate of deferred/overdue training
- Currency of procedures & policies

LEARN FROM SAFETY CONCERNS

Look for changes in
- Rates of overdue corrective actions
- Effectiveness of corrective actions
- Quality of occurrence reporting
- Quality of investigations
- Rates of actions taken due to LL's

MONITOR THE SAFETY CULTURE

Look for changes in
- Rates of overdue/delayed/cancelled audits & assessments
- Number & quality of findings
- Turnover in audit/assessment staff
- Rate & nature of externally- vs. internally-identified findings
- Rate & nature of reportable events
- Housekeeping
- Use of leading indicators to prevent accidents

Measuring Culture (cont)

- Many of these metrics are ***leading indicators*** since, with proper interpretation, one can use them to predict the ability of a process to perform as desired and avoid unwanted outcomes.

- However, these trends should not be viewed in isolation but rather should be viewed in comparison with mission-based metrics.

- Inequalities between safety metrics and mission metrics may indicate the need to rebalance priorities and resources within the organization.

Conclusions

- Safety culture is driven by committed leadership and empowered workers

- Safety culture shaping processes can and should be regulated to improve the underlying assumptions and values that underpin safety culture.

- The behaviors of workers is the best measure of safety culture – it's the reality of the workplace.

- If it ain't measured, then it ain't regulated or managed. So, measure it!

- A leading indicator program prevents accidents, and helps ensure that processes are functioning well and priorities are balanced.

References

1. J. Reason; <u>Managing the Risks of Organizational Accidents</u>; Ashgate Publishing; 1997.

2. W. Starbuck & F. Milliken; "Challenger: Fine-tuning the odds until something breaks;" *Journal of Management Studies*, 1988. 25: 319-340.

3. E. Hollnagel; <u>Barriers and Accident Prevention</u>; Ashgate Publishing; 2004.

4. E. Schein; "Leadership and Organizational Culture;" in F. Hesselbien, et.al., <u>the Leader of the Future</u>; Jossey-Bass. 1996.

5. E. Schein; "Keeping the Edge: Enhancing Performance through Managing Culture;" 2003 INPO CEO Conference; 2003.