Human Error:
There is NO Root Cause

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Our Focus Today

- Our Definition of 'Human Error'

- Our Response to Failure

- Finding the 2nd Story in Investigations

- Ideas for Moving Forward

Key Learning Points

- Cause is Something We Construct

- Our Investigations are Biased

- How We Respond to Failure Matters

What We Know About Human Error

- It's Normal and Occurs in Everyday Operations

- Errors Result in Learning

- Errors are Not an Active Choice

- Error Likely Situations can be Identified, are Predictable and can be Redesigned

- Our response to failure matters

Exercise

- Think of an incident that you may have investigated recently.

- What was determined as the cause?

- What corrective actions were recommended?

What Caused These Incidents?

Let's Agree...

Human Error is the **Proximate Cause** of most incidents.

Is it the **root cause**?

Human Error ≠ Unsafe Behavior?

- Errors happen all the time while doing normal work

- Engaged in the moment, humans can't see what is about to happen

- In hindsight an error is easy to see and assign

- Errors are a problem when something "bad" results

W. Edwards Deming - On Behavior

"There would be no problems in production or service if only our production workers would do their jobs in the way that we taught.

Pleasant Dreams!

The workers are handicapped by the system, and the <u>system belongs to management</u>."

Work Is Variable

"As Imagined"

Vs.

"As Done"

Understanding Work & Variability

- Establishing **how work is actually done, how everyday performance takes place, and how things go right**, is a prerequisite for understanding what has or could go wrong.   (*Work As Done)*

- The reason why everyday performance goes right is that people – and organizations – know or **have learned to adjust what they do to match the actual conditions, resources, and constraints** - for instance by trading off efficiency and thoroughness.

Changing View of Human Error

Old View

| Human Error is a Cause of Accidents | To Explain Failure investigations must seek failure | We must find people's inaccurate assessments, wrong decisions and bad judgements |

New View

| Human Error is a symptom of trouble deeper inside the system | To explain failure, do not try to find where people went wrong | Instead, find how people's assessments and actions made sense at the time |

Linear Thinking

- "The Reformation of 1550-1750"

  - Scientific Principles - Rene Descartes

  - Deductive Reasoning

  - Cause and Effect

- How has this influence modern thinking about safety management?

Domino Theory
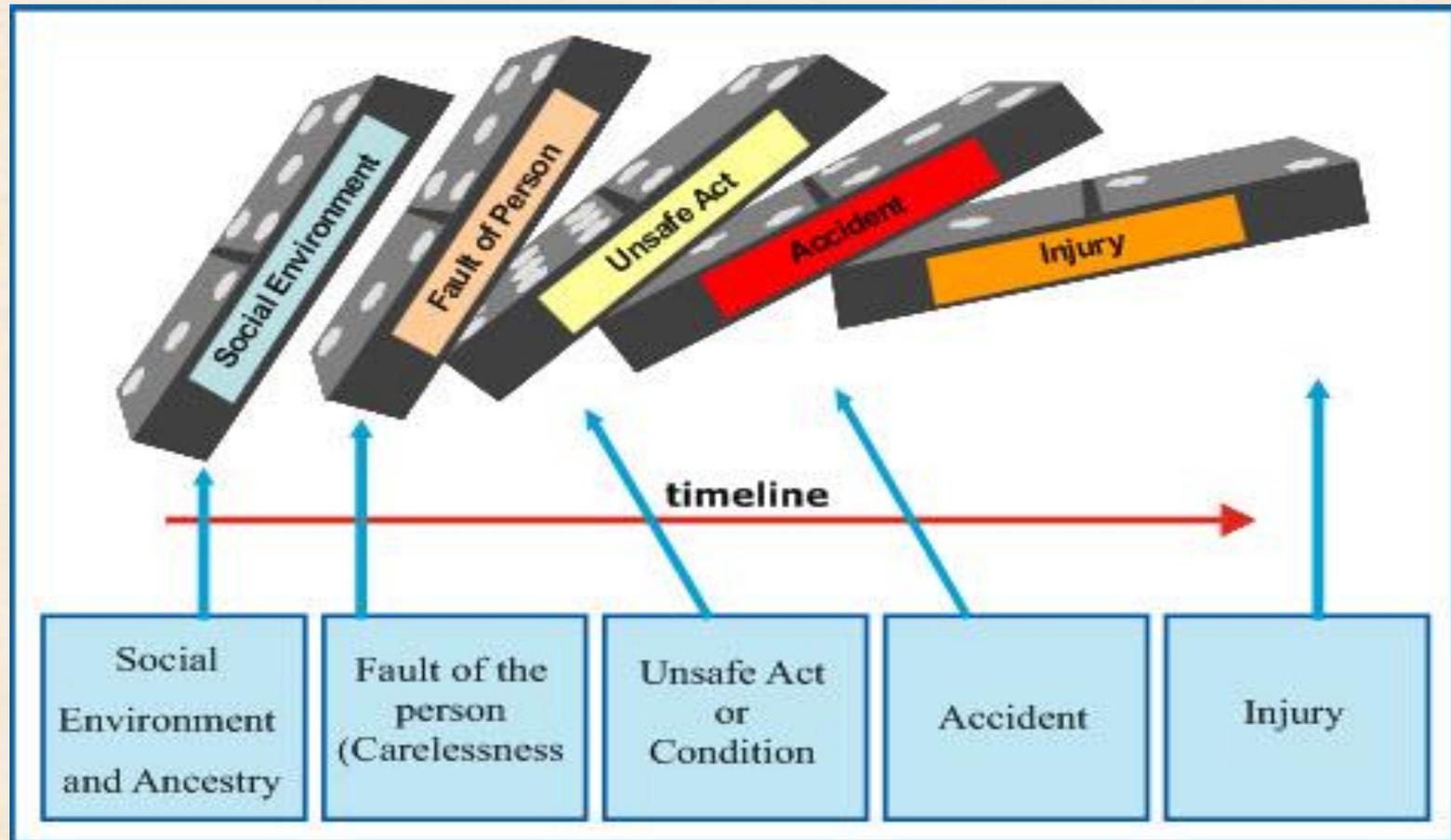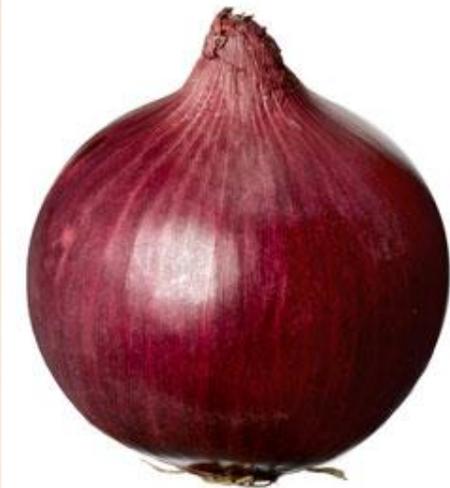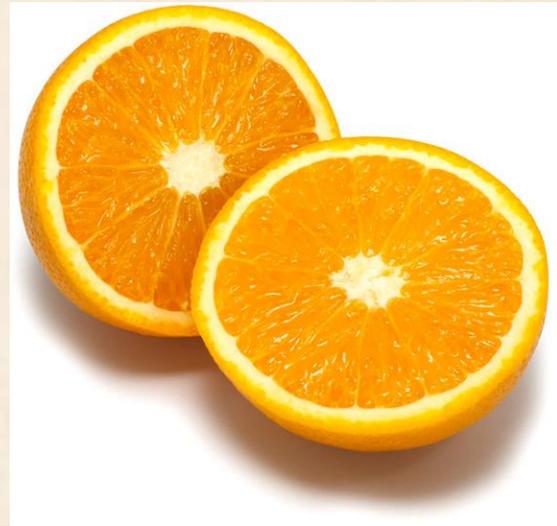
Finding The Root Cause

✓We look for what went wrong

✓We want to explain it and prevent recurrence

However, we are limited by

- Knowledge

- Experience

- Biases

- Pressure to find what went wrong

Sidney Dekker – Local Rationality

- Video omitted for pdf

…And With Hindsight It's Clear

- Video omitted for pdf

We Find Causes Everywhere

The causal Web quickly multiplies and fans out like a cracked window.

What we often call the "Root Cause" is simply the

place where you stop looking any further."

There Are Multiple Causes

- Work is complex and interrelated
- Many factors affect decision making on all levels throughout the organization
- Almost always, there are no accidents and work goes as planned
- "Drift" or deviations are common, difficult to recognize, and become <u>normal</u>
- Accidents happen from <u>normal work</u>

Error or Violation?

Cognitive Bias

- "Thinking Errors" that Humans Make in Processing Information – <u>Biases</u>

    - Results in the Exclusion of Related Factors

    - Leads to Blaming and Shaming

Local Rationality

"It seemed like the right thing to do at the time."
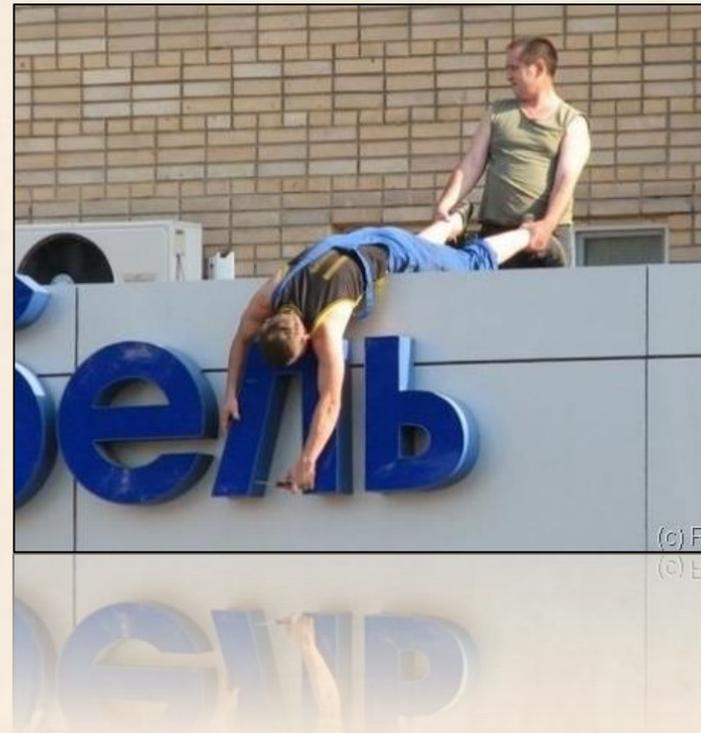
Fundamental Attribution Error

- We explain behavior by assigning **attributes**

- We see error or mistakes as **failures resulting from poor choice**

- The result is to project ourselves as **better than** the person who made the mistake.

  "We would never have done that!"

Hindsight Bias

- Those looking back on an event can see all the causal consequences coming.

- *But those involved and in the moment, armed only with limited foresight, see no such convergence.*

In Hindsight…..It Is Easy To See

- We see the **causal factor** necessary for the mishap to have occurred.

- We deem the cause **sufficient** to explain what we believe happened.

- Nothing else would have had to go wrong for it to occur.

Positive Train Controls - PTC
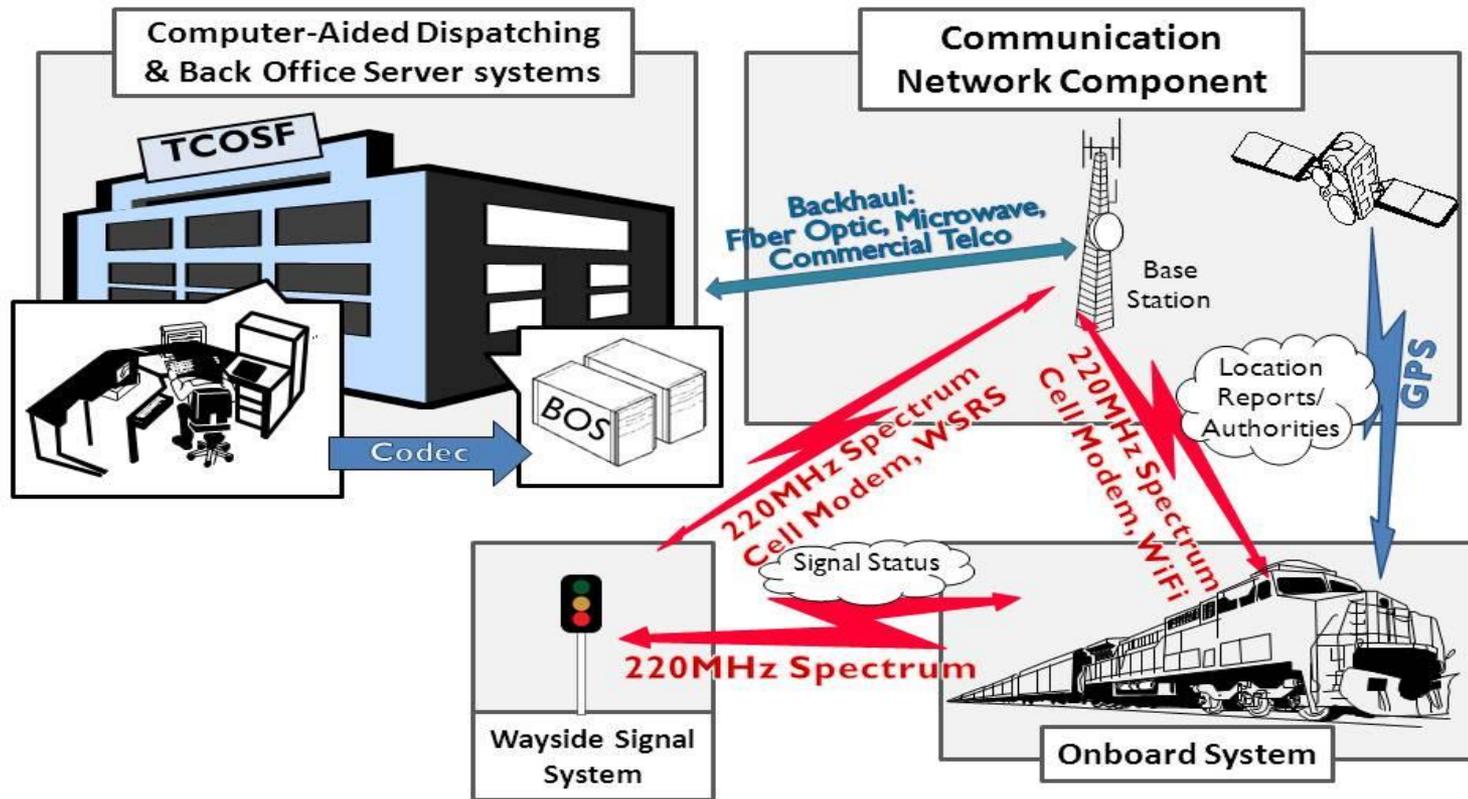
The Goal of Root Cause Analysis

- To find out *what* happened

- *Why* it happened

- *What can be done* to prevent it from
  happening again.

The "5 Whys" is Flawed

- **Confirmation Bias** –
  - Results in jumping to conclusions before alternatives are considered
- **Limited By Current Knowledge** –
  - Need to know the <u>cause and effect</u> chain to find it
- **Single Cause Issue** –
  - Follows one causal chain and misses alternatives

Mark Paradies

TapRoot®

787 Dreamliner

787 Dreamliner

Problem: "Burning back-up batteries"

- Investigated by more than 500 Boeing engineers and outside consultants

- More than 200,000 hours of analysis

- No **single root cause** of the battery failure was found!

- So **ALL potential causes** had to be addressed

Shifting the Paradigm

✓ **From "why" to "how"……**

✓ **Intent is to Learn……**

✓ **Understanding how work usually goes right…….**

Creating A Learning Culture

Finding the Path from "Why" to "How It Made Sense at the Time"…

- L'Oreal North America
- General Electric
- Republic Services

"The 5 Whys + How"

Evolving Culture – Valuing Safety

Unsafe Acts:
Errors vs. Violations
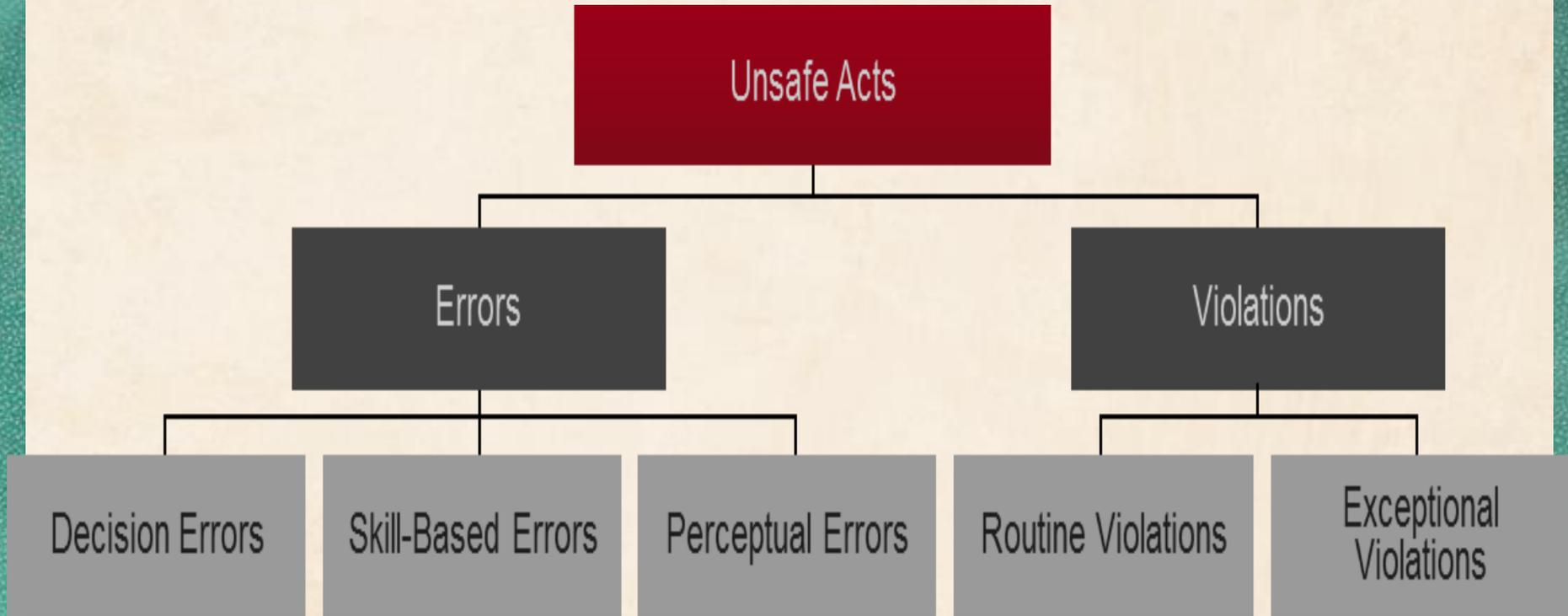
Human Preconditions
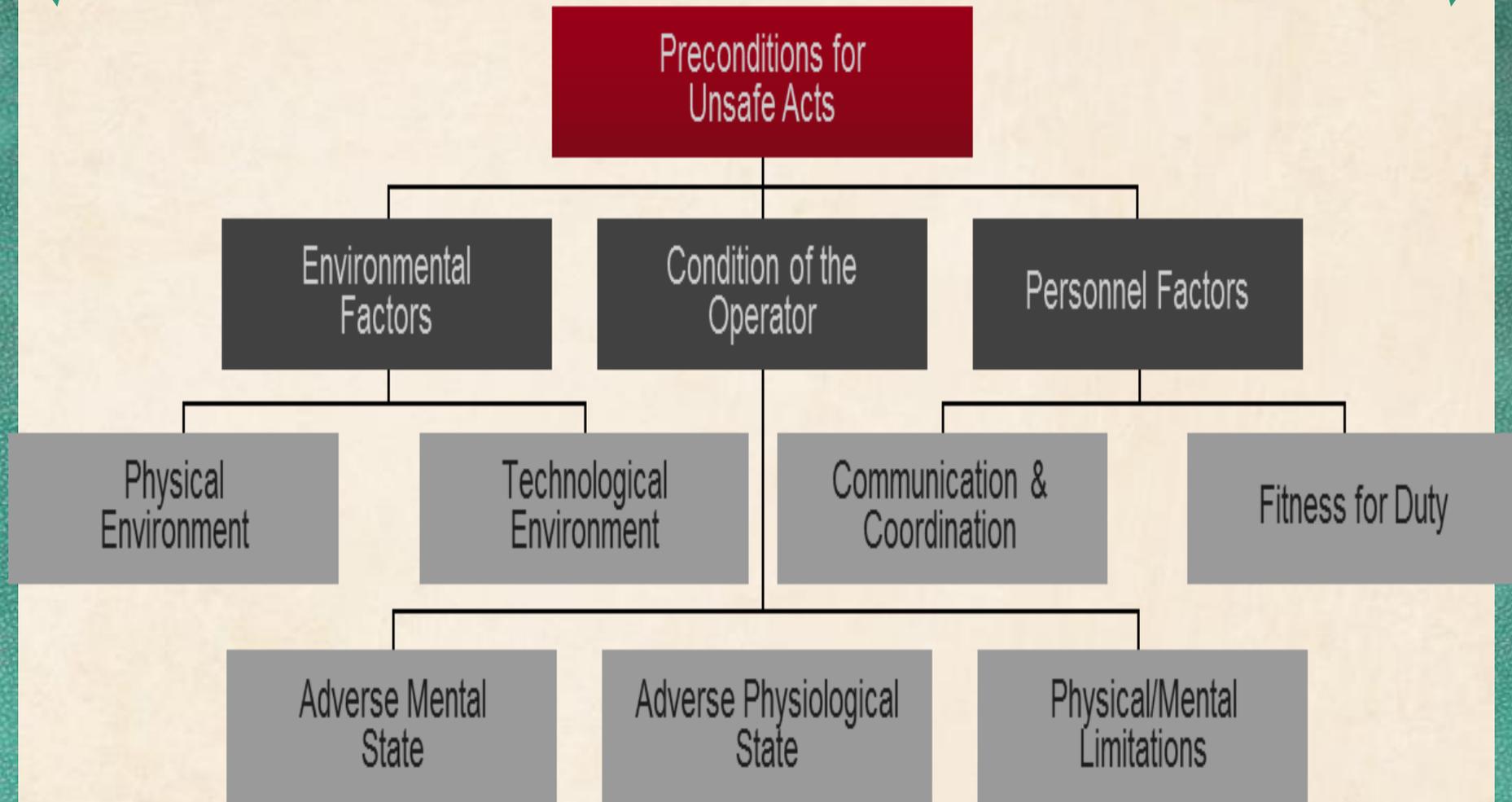
Management Influencers

Unsafe Supervision

Inadequate Supervision

Planned Inappropriate Operations

Failure To Correct Known Problem

Supervisory Violation
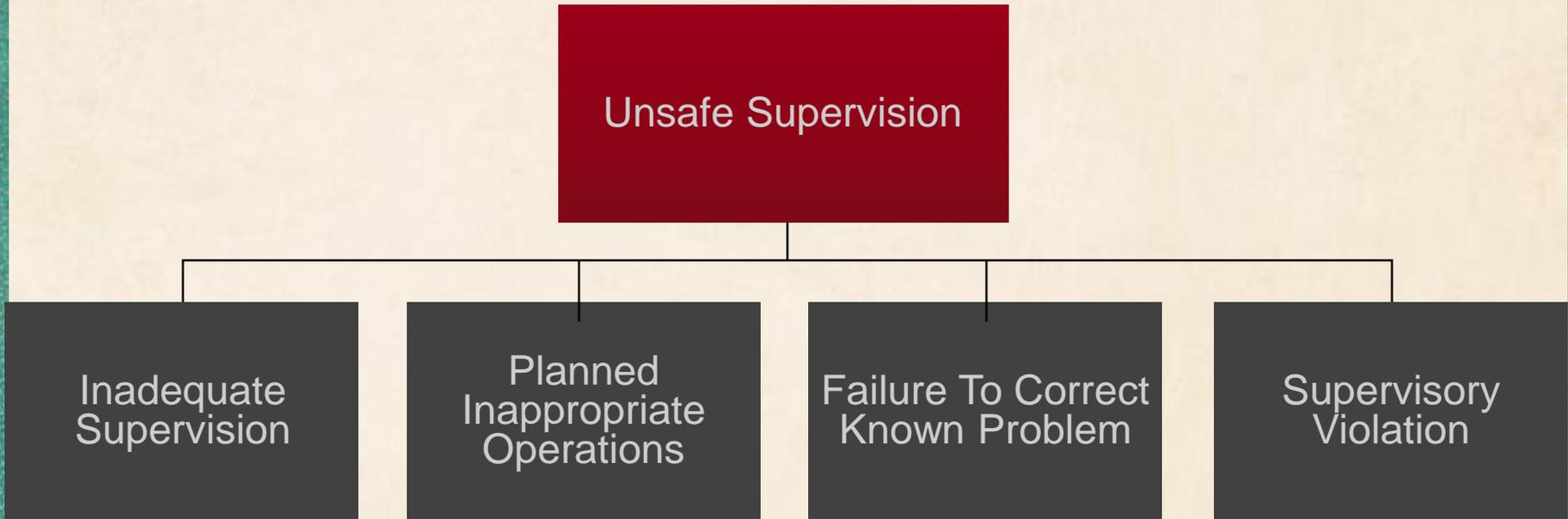
Organizational Influences

Finding 2nd Stories

✓How is work actually done?

✓What was the context of work in which the error or incident took place?

  ✓Find the story of what took place

  ✓Do not pre-judge

  ✓Look for what might have been different

  ✓Create an environment of trust, not blame

Erik Hollnagel
Safety I And Safety II

Human & Organizational Performance

HOP Fundamentals:

- People make errors
- Error likely situations are predictable
- Individual behaviors are influenced
- Operational upsets can be avoided
- Our response to failure matters

Human & Organizational Performance

HOP Knowledge and Skills:

- Understanding of Hazard Types
- Ability to Recognize and Discuss Hazards
- Fundamental Understanding of Risk
- Understanding of Hierarchy of Controls
- Ability to Discuss and Assess Degree of Risk
- Ability to Discuss Risk and Level of Control

HOP Learning Team Questions
(After an Incident or Discovery of Drift)

1 - What other similar task(s) do you do that could lead to the same (unwanted action)? Explain

2 - Do you feel you or others took a shortcut because the "proper" way to do the task doesn't make sense or is unnecessary? Explain

3 - What have you or others done differently in the past to avoid this same unwanted occurrence? Explain?

4 - What can we change to ensure this doesn't happen again?

5 - If you had a similar issue at your home, what would you do differently?

6 - What ideas do you have to get others who do this same task to concentrate and focus doing it the proper way?

7 - What was different about this time that lead to (unwanted occurrence)?

8 - If we gave you a blank check to fix this issue, how would you do it?

The HOP Investigative Approach

8 Questions to ask when
an event happens

1. Are the people OK? (not, why is the line down?)
2. Is the facility, equipment, process safe and stable?
3. Tell me the story of what happened?
4. What else could have happened?
5. What factors led up to this event?
6. What worked well? What failed?
7. Where else could this problem happen?
8. What else should I know?

Todd Conklin, 2012

HOP - Error Prevention Tools

- Self-checking

- Peer-checking

- Concurrent verification

- Independent verification

- Three-way communication

- Automation

- STAR – stop, think, act, review

- "A real-time job pause"

- Pre-job briefing

- Post-job briefing

- Procedure use & adherence

- Problem-solving

- Questioning attitude

- Conservative decision making

- Stop & collaborate

Final Thoughts - Safety 2.0

- **"Work as done"** is different than **"work as imagined"**

- Work is normally done **efficiently and safely**

- Look for what is "right" and learn how work is actually done, efficiently and safely

- Use this knowledge of how/why things go "right" to explain how things occasionally go wrong

Safety 2.0 – Investigation

- Look at the people involved as resources necessary for system flexibility and resilience

- Your people are not the liability or hazard (to themselves or others) as they can be seen

- Performance variability is inevitable and useful, and comes from positive resourcefulness

Exercise

- Would your conclusion(s) be different, based on this expanded view of causation?

- Would your corrective action(s) be preventative? Or just a short-term fix?

- What else might you have looked at that could have expanded your findings?