



Making Safety Real

The Journey to High Performing
Safety Cultures



Making Safety Real....

It's Not About Starting Over.....
It's About Building on Good Work



Organization Choices... Designed to Get the Results They Get





Making Safety Real....

The Best Systems Fail Without
a Robust Safety Culture

Organization Choices... Designed to Get the Results They Get

Critical Activities

- Risk Assessment
- Permit System
- Production

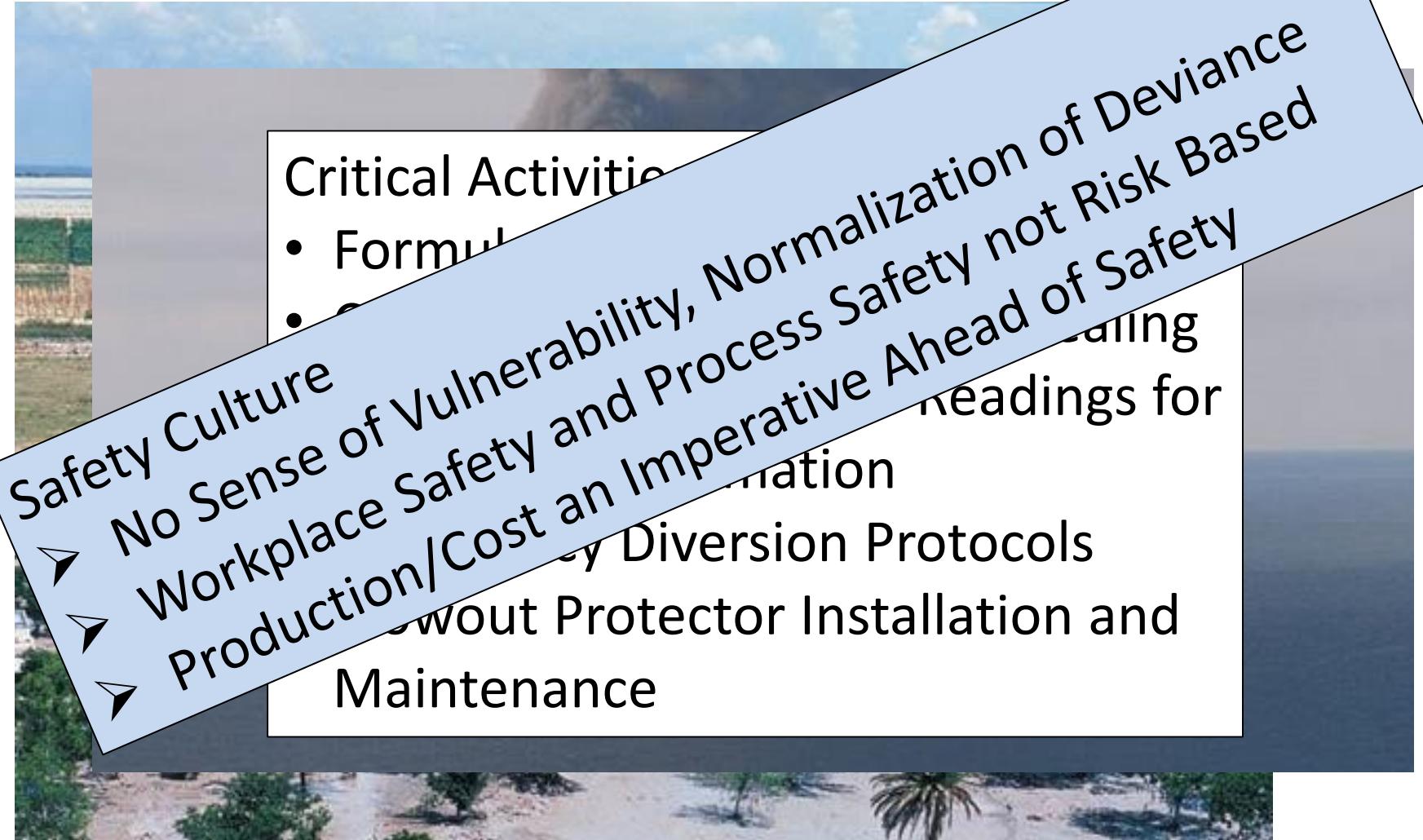
Safety Culture

- No Sense of Vulnerability, Normalization of Deviance
- Workplace Safety and Process Safety not Risk Based
- Production/Cost an Imperative Ahead of Safety
- Integrity
- Emergency Evacuation

Piper Alpha....31 years ago

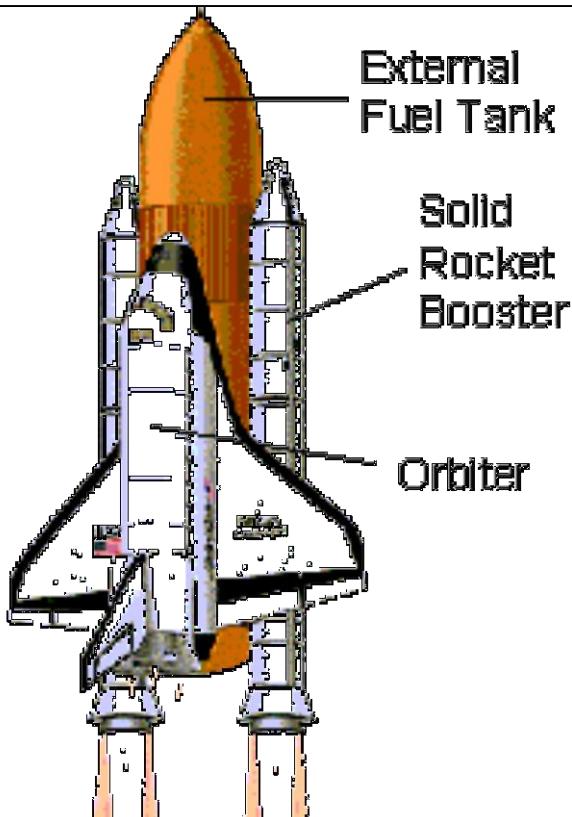
Organization Choices...

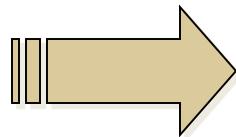
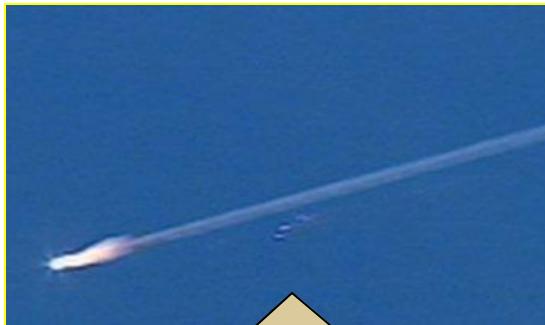
Designed to Get the Results They Get





January 28, 1986, the Shuttle Challenger Explodes





Another
Tragedy...
Columbia 2003

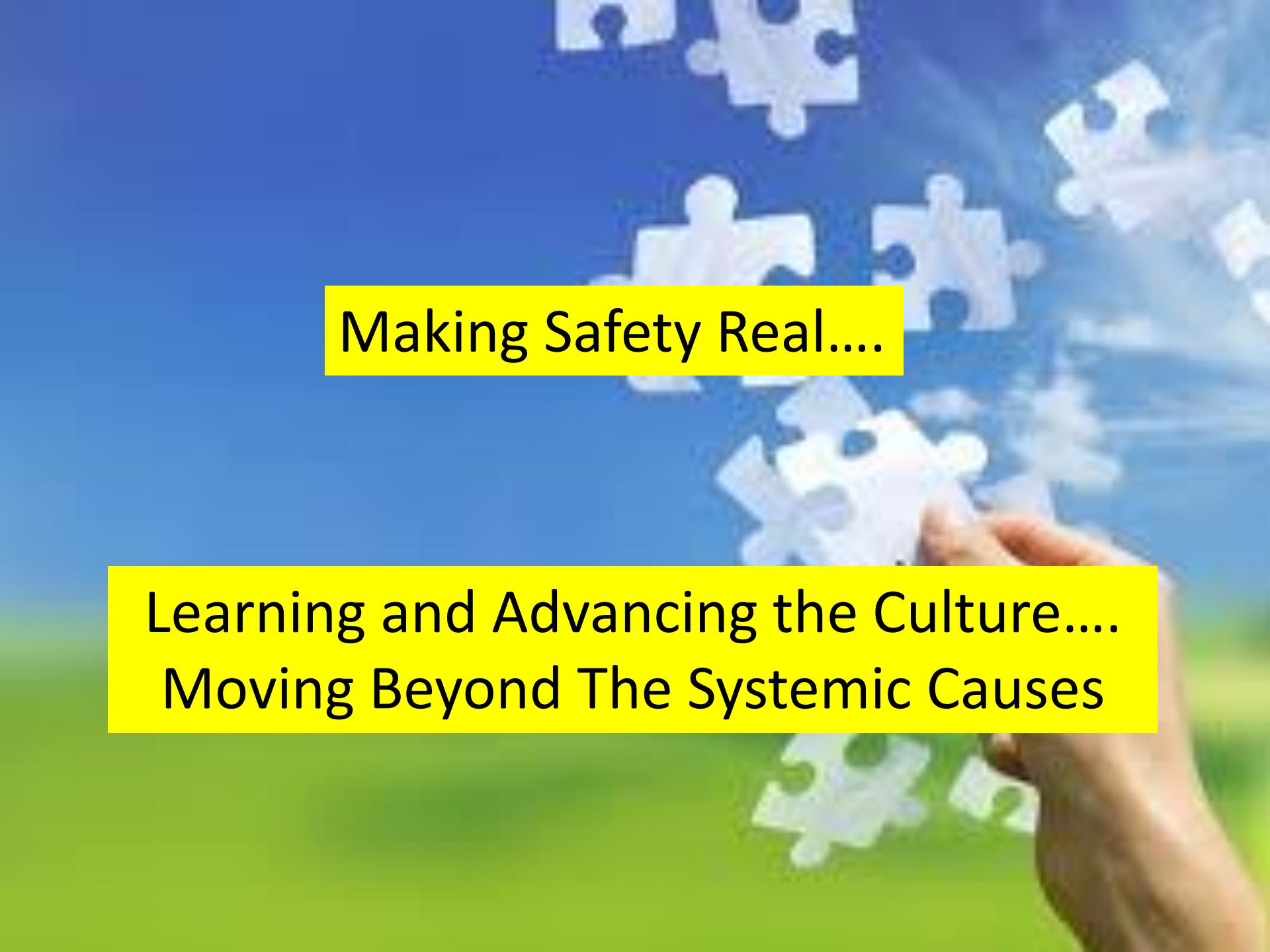


What the Organization Did Not Do.....

Key Organizational Culture Findings



1. Maintain Sense Of Vulnerability
2. Combat Normalization Of Deviance
3. Establish an Imperative for Safety
4. Perform Valid/Timely Hazard/Risk Assessments
5. Ensure Open and Frank Communications
6. Learn and Advance the Culture



Making Safety Real....

Learning and Advancing the Culture....
Moving Beyond The Systemic Causes

Leading Practice....Investigate to Systemic Roots

LOSSES		INCIDENTS -		IMMED. CAUSES		BASIC CAUSES		INADEQUATE CONTROL			
TYPE	NO.	TYPE	NO.	TYPE	NO.	TYPE	NO.	PROGRAM ELEMENTS	P	S	C
INJURY/ILLNESS		STRUCK AGAINST STRUCK BY FALL TO LOWER LEVEL FALL ON SAME LEVEL CAUGHT IN CAUGHT ON CAUGHT BETWEEN OVEREXERTION OVERSTRESS CONTACT WITH HEAT COLD FIRE ELECTRICITY CHEMICAL-CAUSTIC CHEMICAL-TOXIC NOISE PRESSURE RADIATION		SUBSTANDARD PRACTICES OPERATING WITH- OUT AUTHORITY FAILURE TO WARN FAILURE TO SECURE IMPROPER SPEED MADE SAFETY DEVICE INOP USED DEFECTIVE EQUIPMENT USED EQUIPMENT IMPROPERLY DID NOT USE PROT. EQUIPMENT SERVICED EQUIP. IN OPERATION ADJUSTED EQUIP. IN OPERATION HORSEPLAY UNDER DRUG/ALCOHOL INFLUENCE		PERSONAL FACTORS PHYSICAL INCAPACITY MENTAL INCAPACITY LACK OF KNOWLEDGE LACK OF SKILL PHYSICAL STRESS PSYCHOLOGICAL STRESS IMPROPER MOTIVATION		LEADERSHIP & ADMINISTRATION MANAGEMENT TRAINING PLANNED INSPECTIONS JOB/TASK ANALYSIS & PROCEDURES ACCIDENT/INCIDENT INVESTIGATIONS JOB/TASK OBSERVATIONS EMERGENCY PREPAREDNESS ORGANIZATIONAL RULES ACCIDENT/INCIDENT ANALYSIS EMPLOYEE TRAINING PERSONAL PROTECTIVE EQUIPMENT HEALTH CONTROL & SERVICES PROGRAM EVALUATION SYSTEM PURCHASING & ENGINEERING CONTROLS PERSONAL COMMUNICATIONS GROUP MEETINGS GENERAL PROMOTION HIRING & PLACEMENT RECORDS & REPORTS OFF-THE-JOB SAFETY			
PART OF BODY HARMED				SUBSTANDARD CONDITIONS INADEQUATE GUARDS INADEQUATE PROT. DEFECTIVE EQUIP. CONGESTION INADEQUATE WARN- ING SYSTEM FIRE HAZARD EXPLOSION HAZARD REACTIVE CHEMICAL HAZARDOUS ATMOS- PHERE NOISE RADIATION ILLUMINATION VENTILATION POOR HOUSEKEEPING		JOB FACTORS INADEQUATE LEADER- SHIP/SUPERVISION INADEQUATE ENGINEERING INADEQUATE PURCHASING INADEQUATE MAINTENANCE INADEQUATE TOOLS/ EQUIPMENT/ MATERIALS INADEQUATE WORK STANDARDS WEAR AND TEAR ABUSE OR MISUSE					
HEAD											
EYE											
HEARING											
RESPIRATORY											
TRUNK											
DIGESTIVE TRACT											
ARM											
HAND											
FINGER											
LEG											
KNEE											
ANKLE											
FOOT											
TOE											
SKIN											
PROPERTY											
MINOR (LESS THAN \$100)											
SERIOUS (\$100-\$999)											
MAJOR (\$1,000-\$9,999)											
CATASTROPHIC (OVER \$10,000)											
TYPE PROPERTY DAMAGED											
BUILDING											
FIXED EQUIPMENT											
MOTOR VEHICLE											
TOOLS											
MATERIALS											
MATERIALS HANDLING EQUIPMENT											
PROCESS LOSS											
MINOR (LESS THAN \$100)											
SERIOUS (\$100-\$999)											
MAJOR (\$1,000-\$9,999)											
CATASTROPHIC (OVER \$10,000)											

Management System Failure

But
Why?

P = INADEQUATE PROGRAM
S = INADEQUATE STANDARDS
C = INADEQUATE COMPLIANCE



Making Connections....

Management System Failure

- 1. Maintain Sense Of Vulnerability
- 2. Combat Normalization Of Deviance
- 3. Establish an Imperative for Safety
- 4. Perform Valid/Timely Hazard/Risk Assessments
- 5. Ensure Open and Frank Communications
- 6. Learn and Advance the Culture

Normalization
of Deviance

Lacking a Sense
of Vulnerability

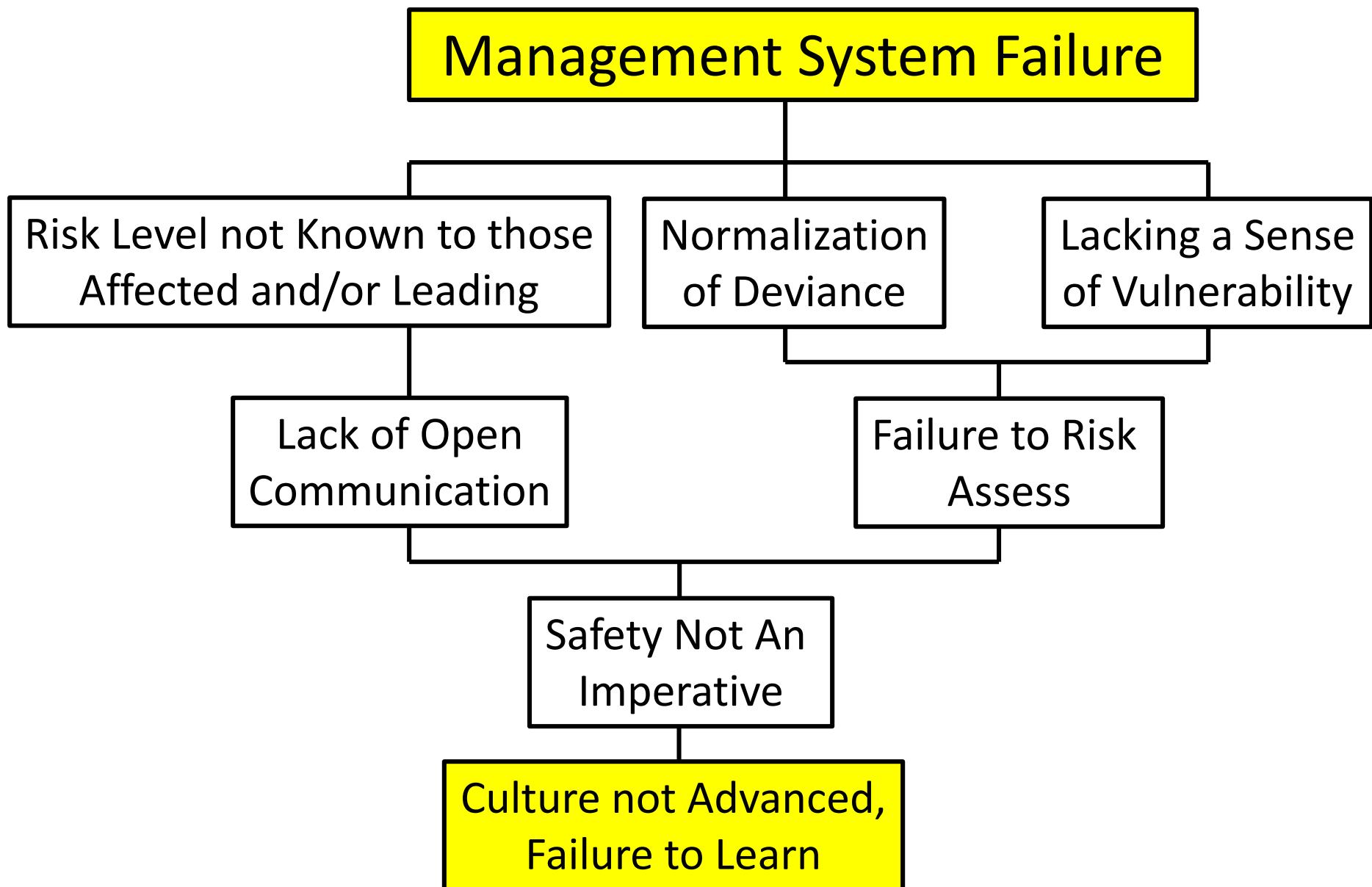
Lack of Open
Communication

Failure to Risk
Assess

Safety Not An
Imperative

Culture not Advanced,
Failure to Learn

Making Connections....



Making Connections....

Management System Failure

Unawareness

Lack of Open
Communication

Cultural
Failure

10 factors that
influence risk tolerance

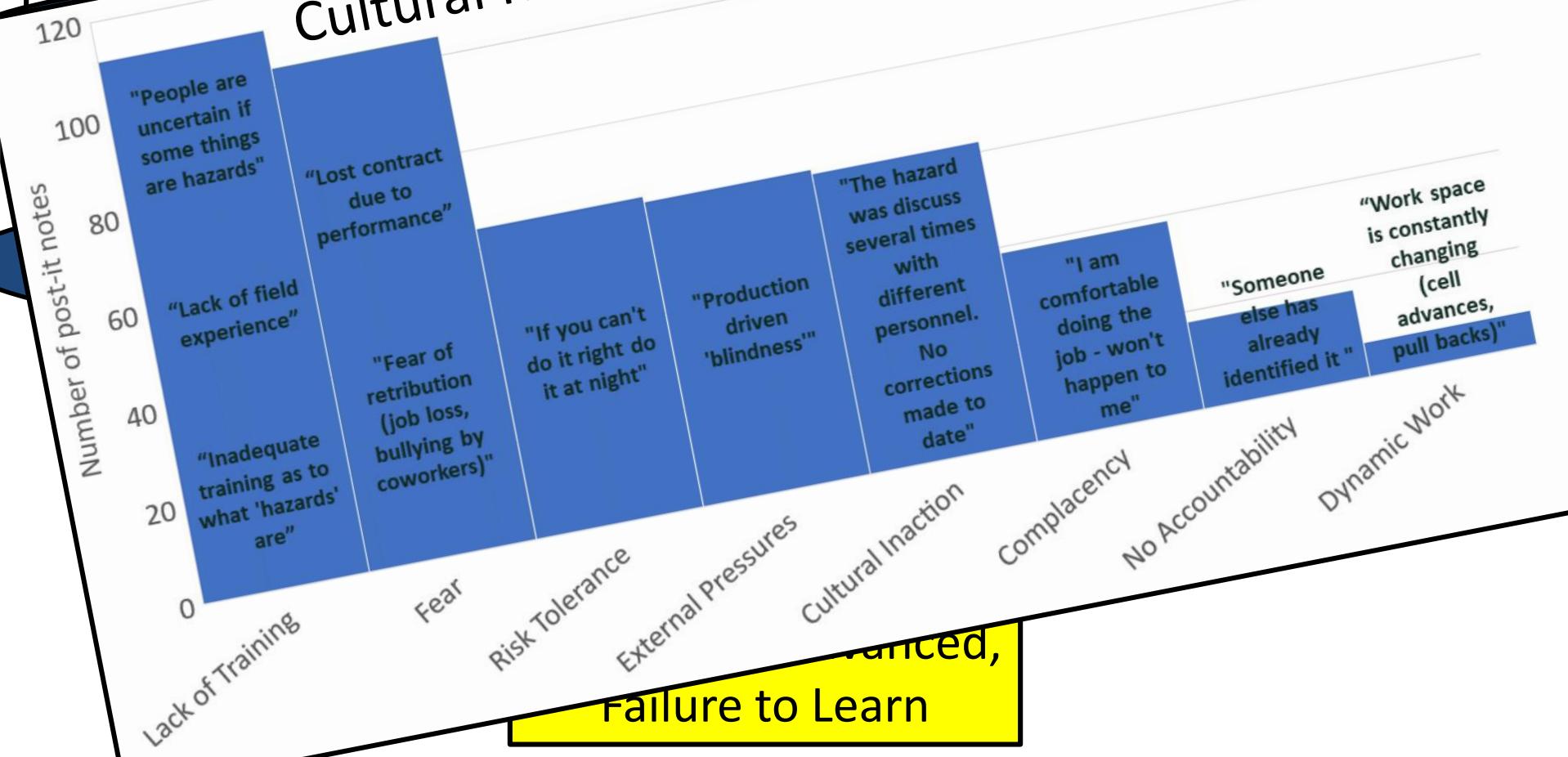
- 1. Overestimating capability/experience
- 2. Familiarity with the task
- 3. Seriousness of outcome
- 4. Voluntary actions and being in control
- 5. Personal experience with an outcome
- 6. Cost of non-compliance
- 7. Confidence in the equipment
- 8. Confidence in protection and rescue
- 9. Potential profit and gain from actions
- 10. Role models accepting risk

Risk

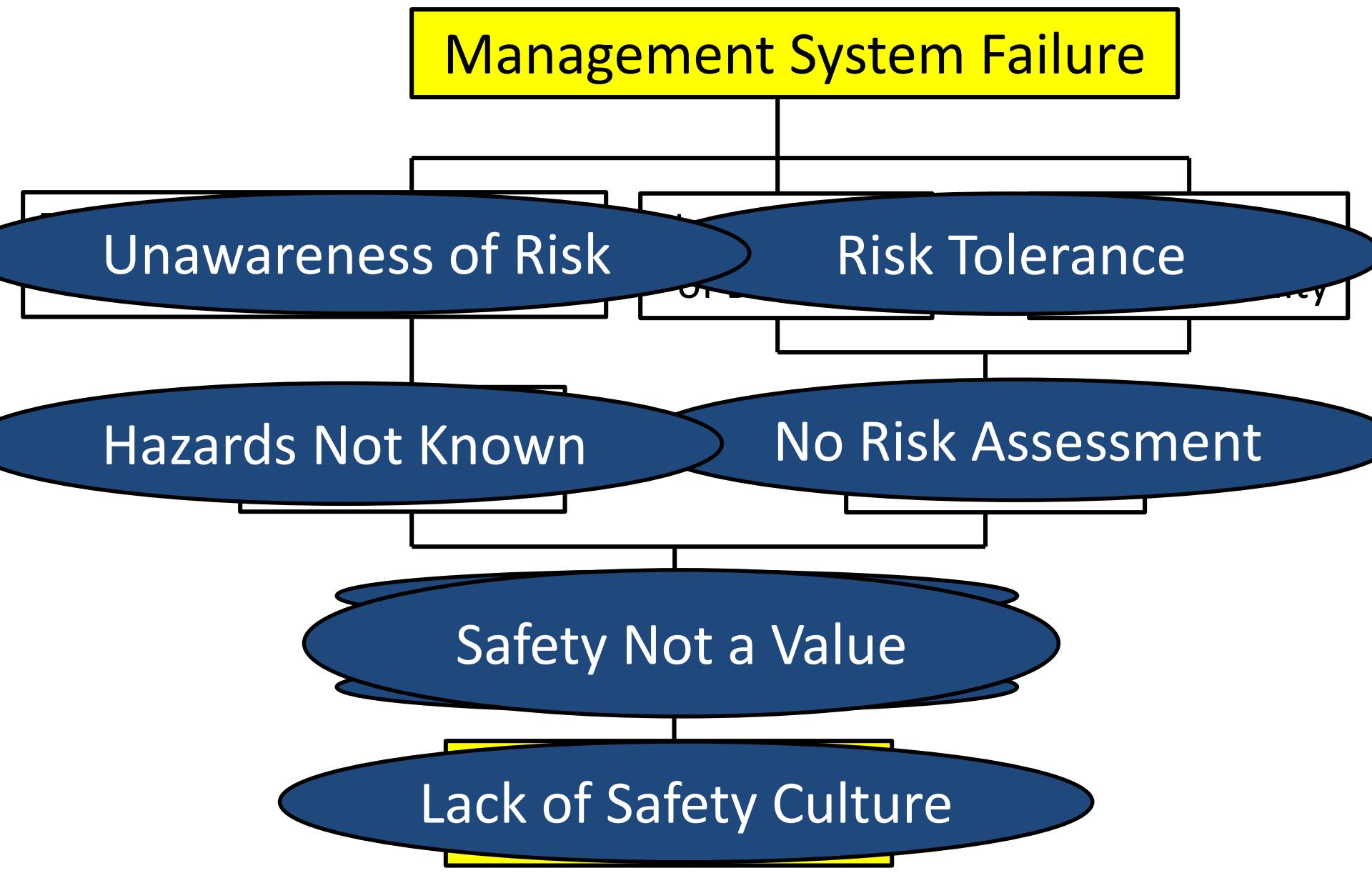
Making Connections....

Management System

Cultural Roots for Lack of Hazard Identification



Making Connections....



Making Connections....

Management System Failure

Unawareness of Safety

Safety Perception Surveys

Safety Improvement

Perception Surveys can reveal strengths and weaknesses
By Dan Petersen

Lack of Safety Culture

Making Connections....

Management System Failure



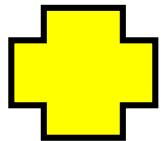
Safety Not An
Imperative

Culture not Advanced,
Failure to Learn

The Design View



A Systemic
Comprehensive Set
of Programs



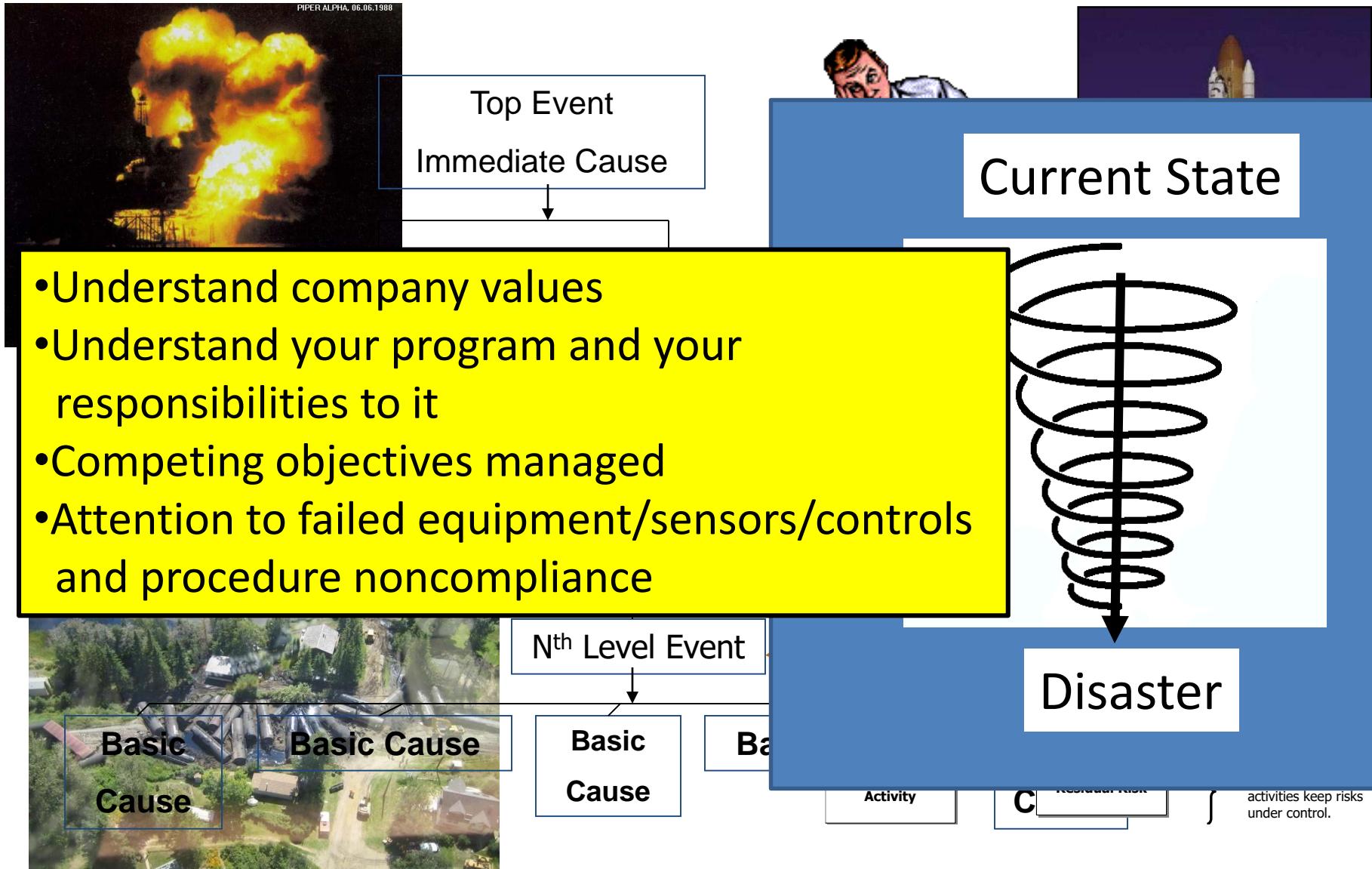
A Robust
Safety Culture

Process Safety Management Elements

1. Accountability: Objectives and Goals
2. Process Knowledge and Documentation
3. Capital Project Review and Design
4. Process Risk Management
5. Management of Change
6. Process and Equipment Integrity
7. Human Factors
8. Training and Performance
9. Incident Investigation
10. Company Standards, Codes and Regulations
11. Audits and Corrective Actions
12. Enhancement of Process Safety Knowledge

Leader
Planner
Worker
Incident
Observer
Emergency
Workplace
Codes
Permit
Individual
Personnel
Health
Risk Management
Change
Orientation
Group
General
Hiring
Material
Chemical
Wellness
Security
Equipment
Fire Protection
Housekeeping
Near Miss

The Engineer's Survival Guide



Making Connections....

Management System Failure

Unawareness of Risk

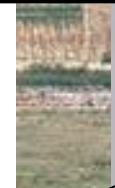
Risk Tolerance

Hazards Not Known

No Risk Assessment

Safety Not a Value

Lack of Safety Culture



Safety Culture



Risk Tolerance
No Risk Assessment
Safety Not a Value

Emergency Diversion Protocols

Swallow Protector Installation and

Maintenance

es...

The Results They Get

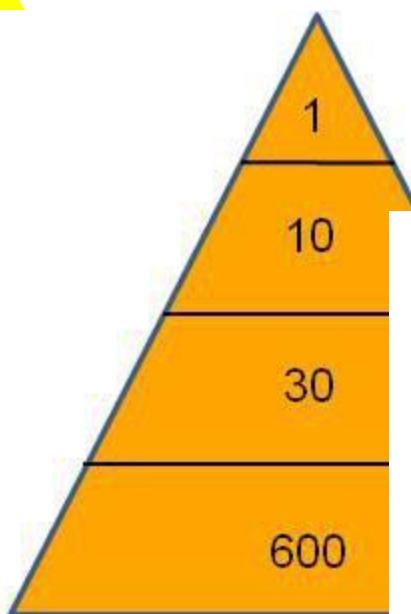
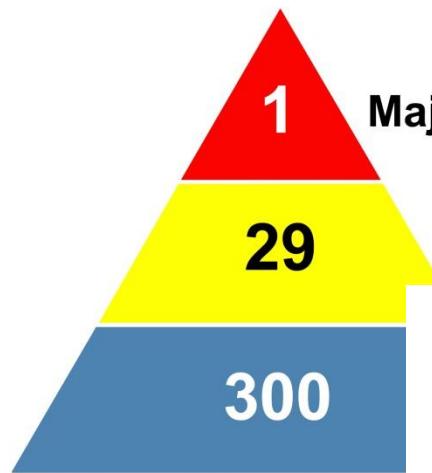
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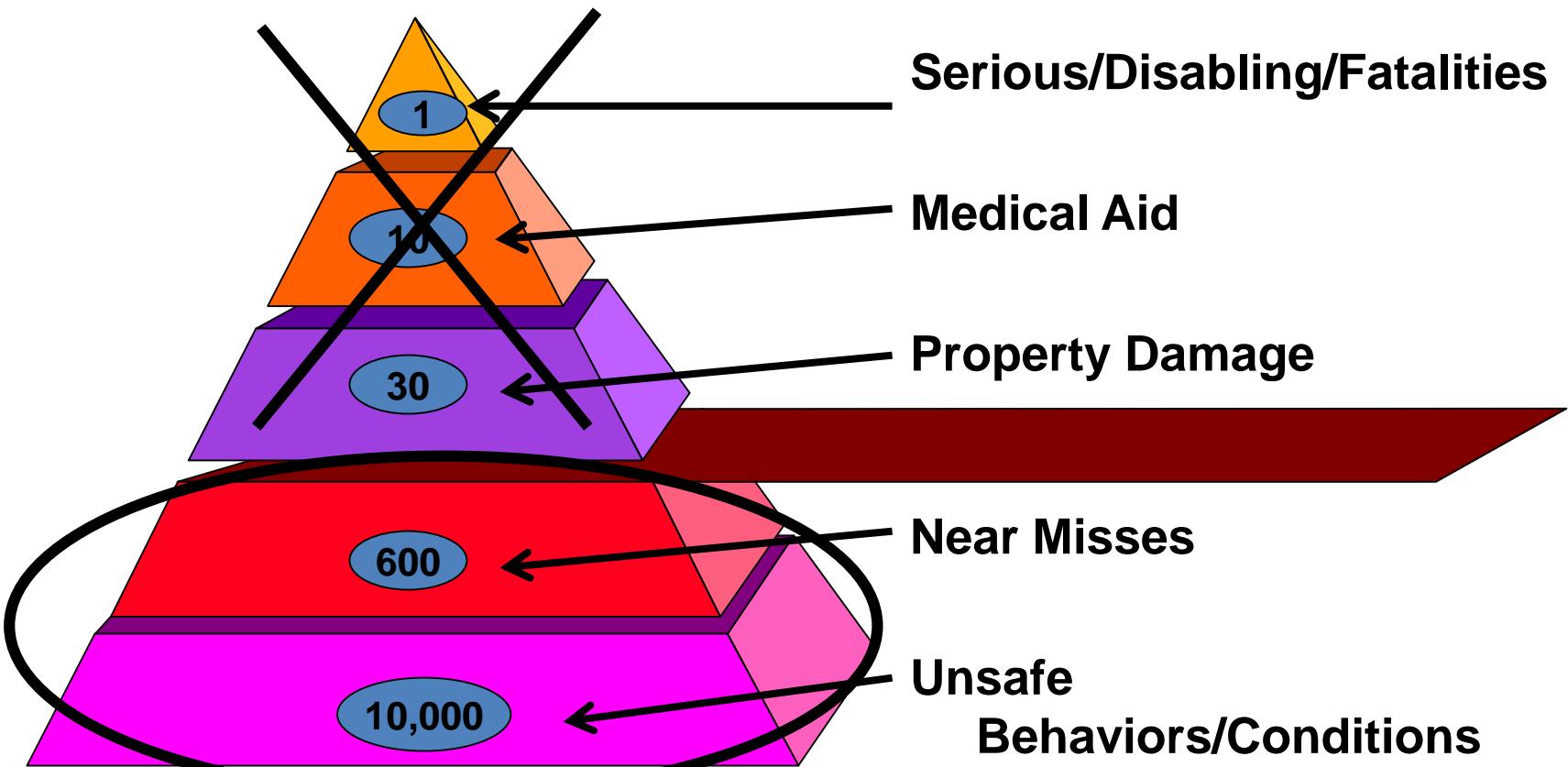


Making Safety Real....



For highly developed organizations,
It's not about more....
It's about different.





"We have seen some near misses that have had tremendous potential that



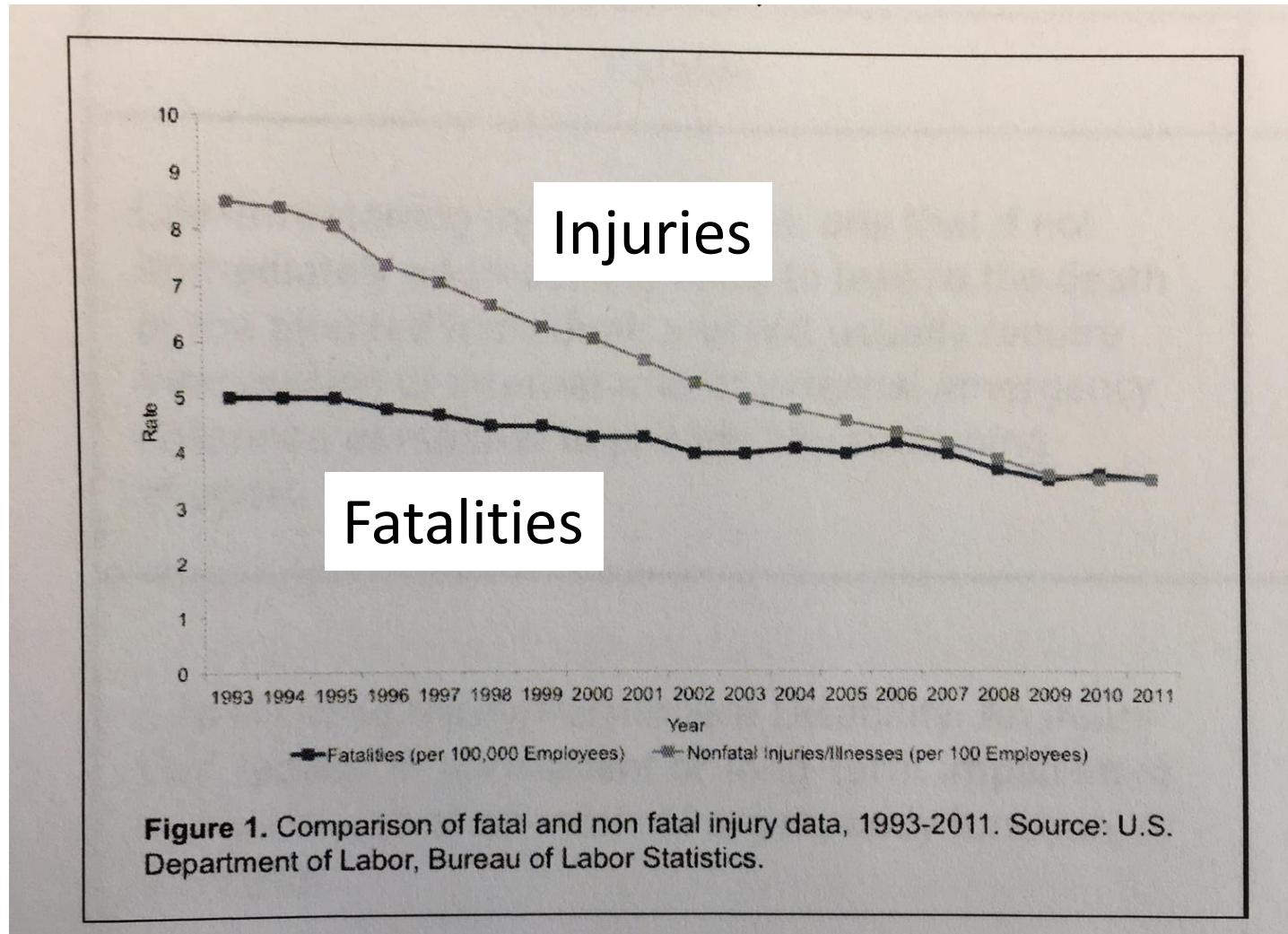
fo Our TRIF has been between the 0.15 and 0.4. We have enjoyed
in no Lost Time Incidents for the past few years. Our medical aids
re have been worse case scenarios (fractures and stitches) with no
in additional potential.

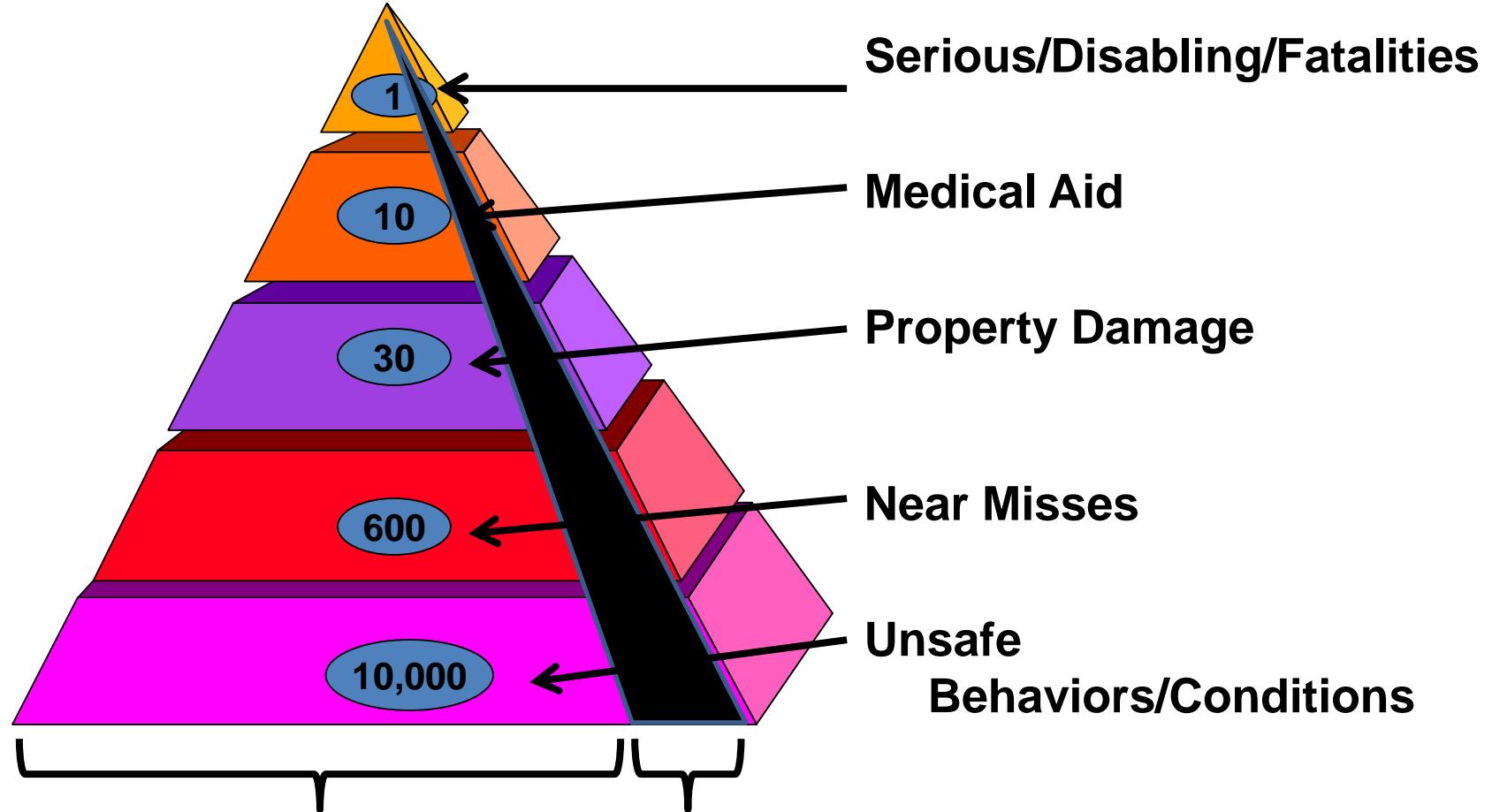
st *Industry Safety Leader*

Industry Safety Leader



Fatalities and Serious Incidents are Persisting in Industry





The System View

One misstep from fatality:

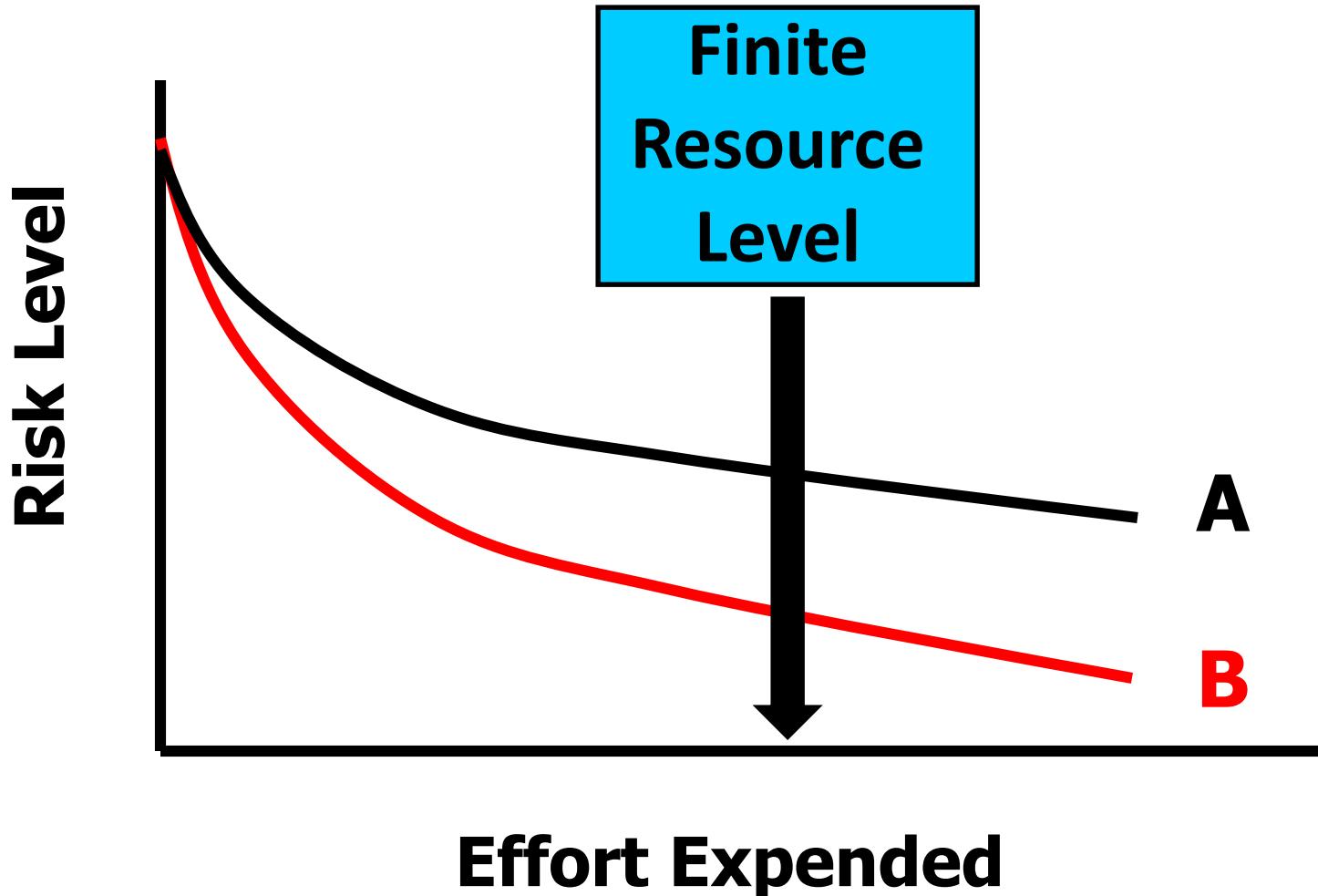
- Lack of Fall Protection
- No Field Level Risk Assessment
- Operator Fatigue

Risk Management Effectiveness....

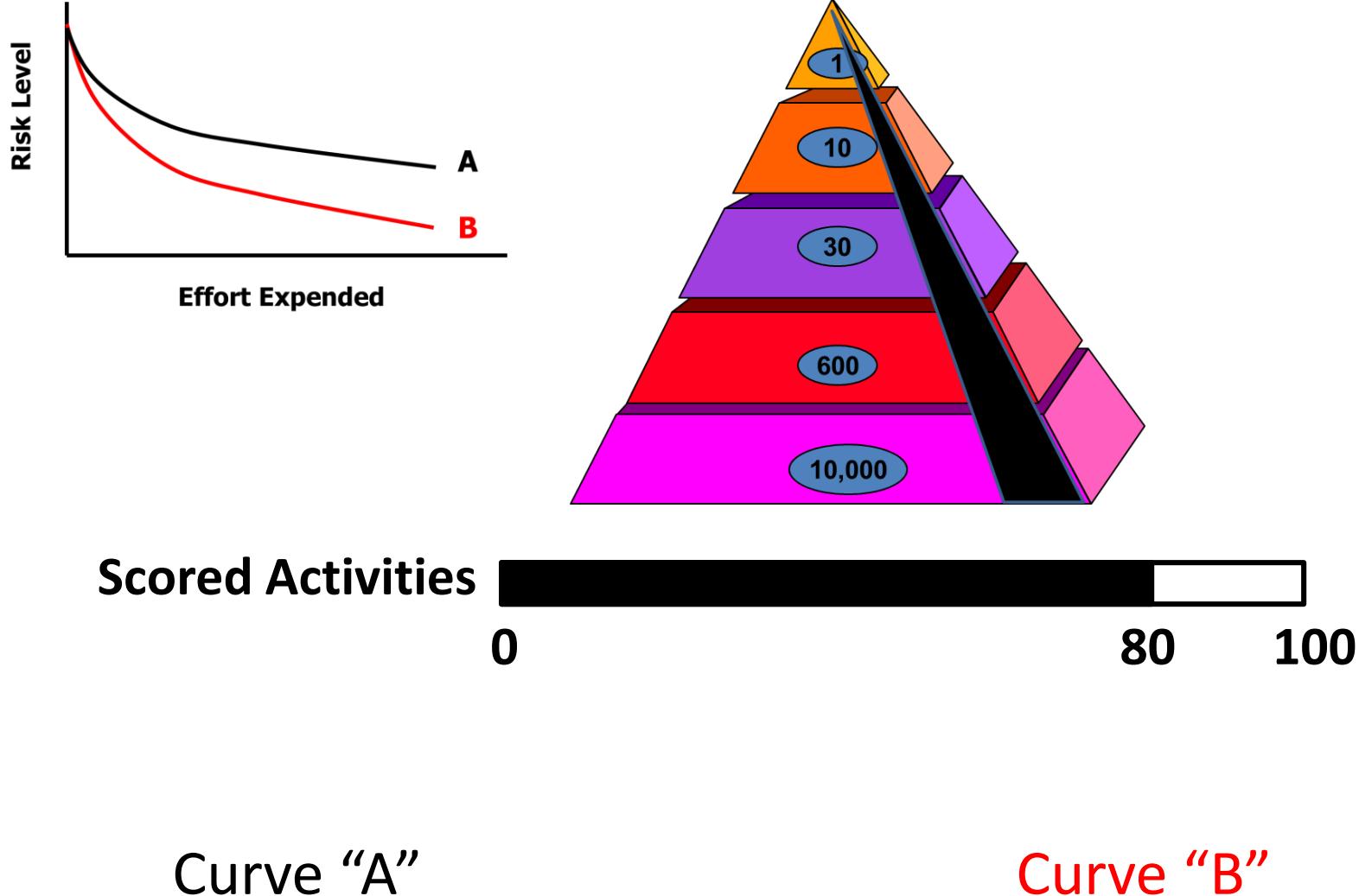


Optimizing Effort and Risk Benefit

Risk Management Effectiveness....

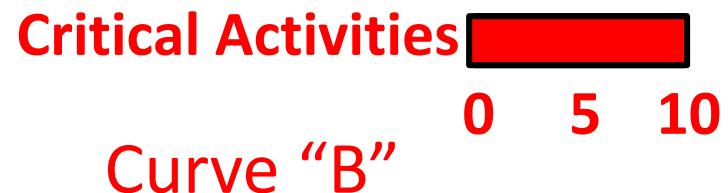
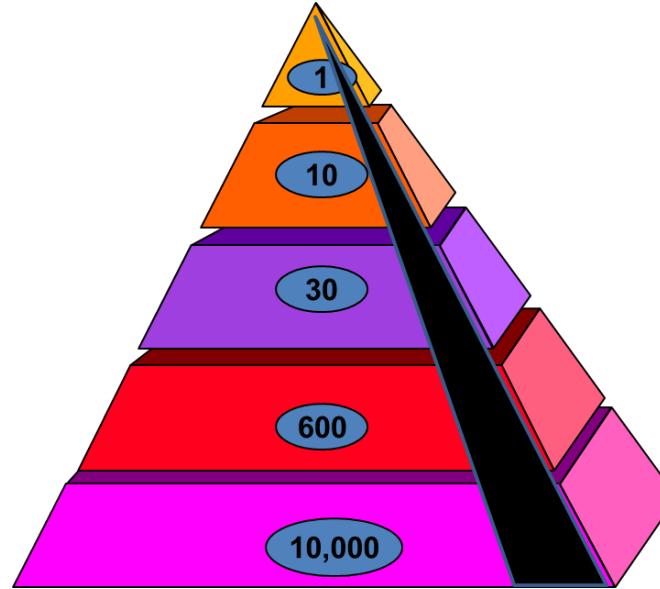
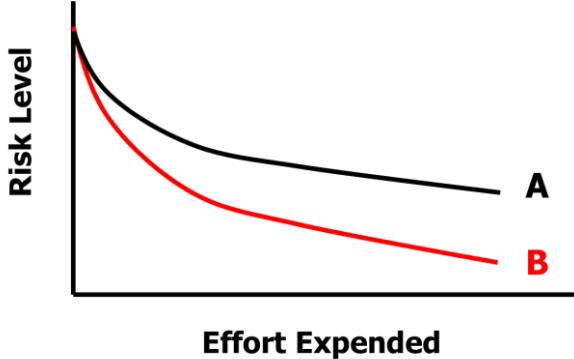


Auditing for Performance....



Risk Ranking....

Not All System Requirements are Equal



CAUTION

ALSO, THE BRIDGE IS OUT AHEAD

DO NOT TOUCH THE EDGES OF THIS SIGN



ALSO, THE BRIDGE IS OUT AHEAD



The System View

Safety as a Value

Life Saving Rules

Triggers

Critical Procedures

Critical Field Practice

Risk Ranking....

Not All System Requirements are Equal

Qualification Training

Facility/Task Training

General Safety Training

Risk Reduction Profile



Making Safety Real....

A Focus on Critical Controls

CONSTRUCTION ACCIDENTS

The Risks. The Facts. The Repercussions

Two construction workers die each day in the U.S., on average, and thousands more are seriously injured.

But the loss doesn't stop there. Construction accident injuries cripple entire families' ability to earn an income, care for their dependents, and sustain their quality of life.

The culprits? MEET THE FATAL FOUR



FALLS / 36.9%

COMMON FACTORS: Unprotected sides, wall openings, floor holes, Improper scaffold construction, Unguarded, protruding steel bars, Misuse of portable ladders.



STRUCK BY OBJECT / 10.3%

COMMON FACTORS: Vehicles, Falling/flying objects, Masonry walls.



ELECTROCUTIONS / 8.9%

COMMON FACTORS: Contact with power lines, LACK of ground-fault, Path to ground missing or discontinuous, Improper use of equipment & cords.

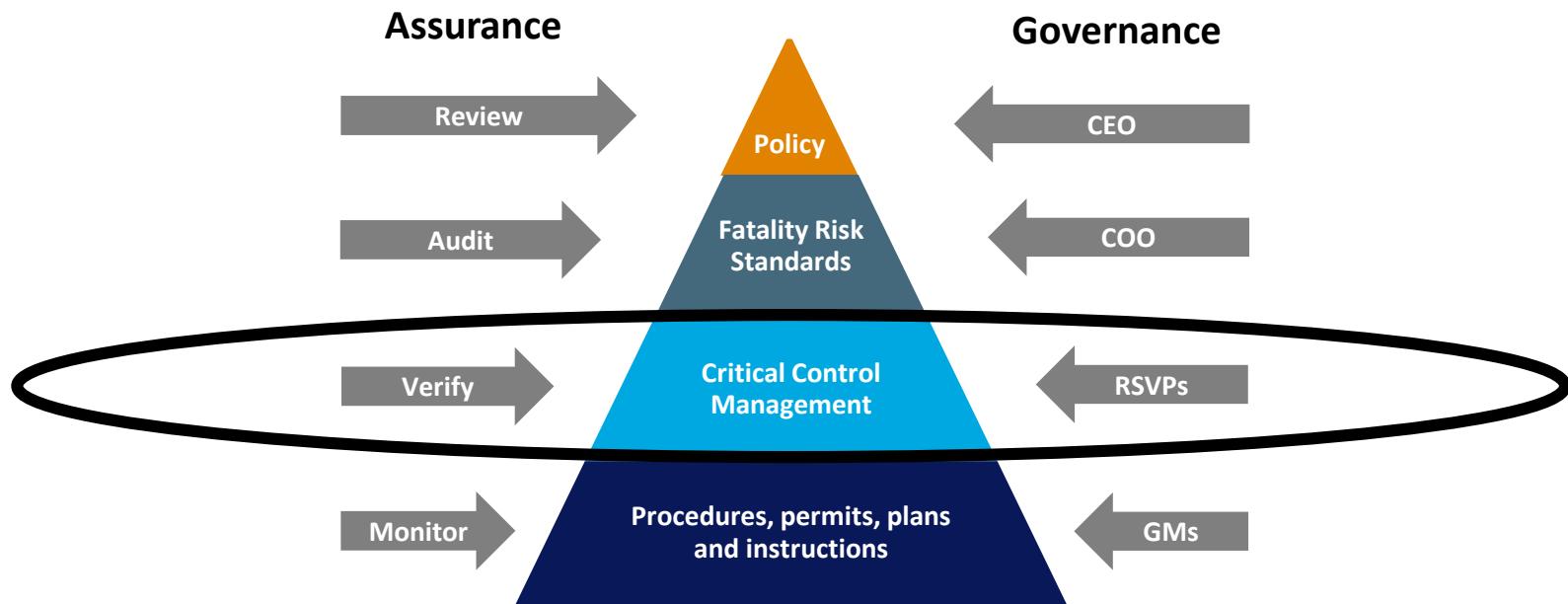


CAUGHT BETWEEN OBJECTS / 2.6%

COMMON FACTORS: Unsafe access/egress, Unsafe spoil-pile placement, Failure to inspect trench and protective systems, No protective system.



Fatality risk management process



16 Global Fatality Risks

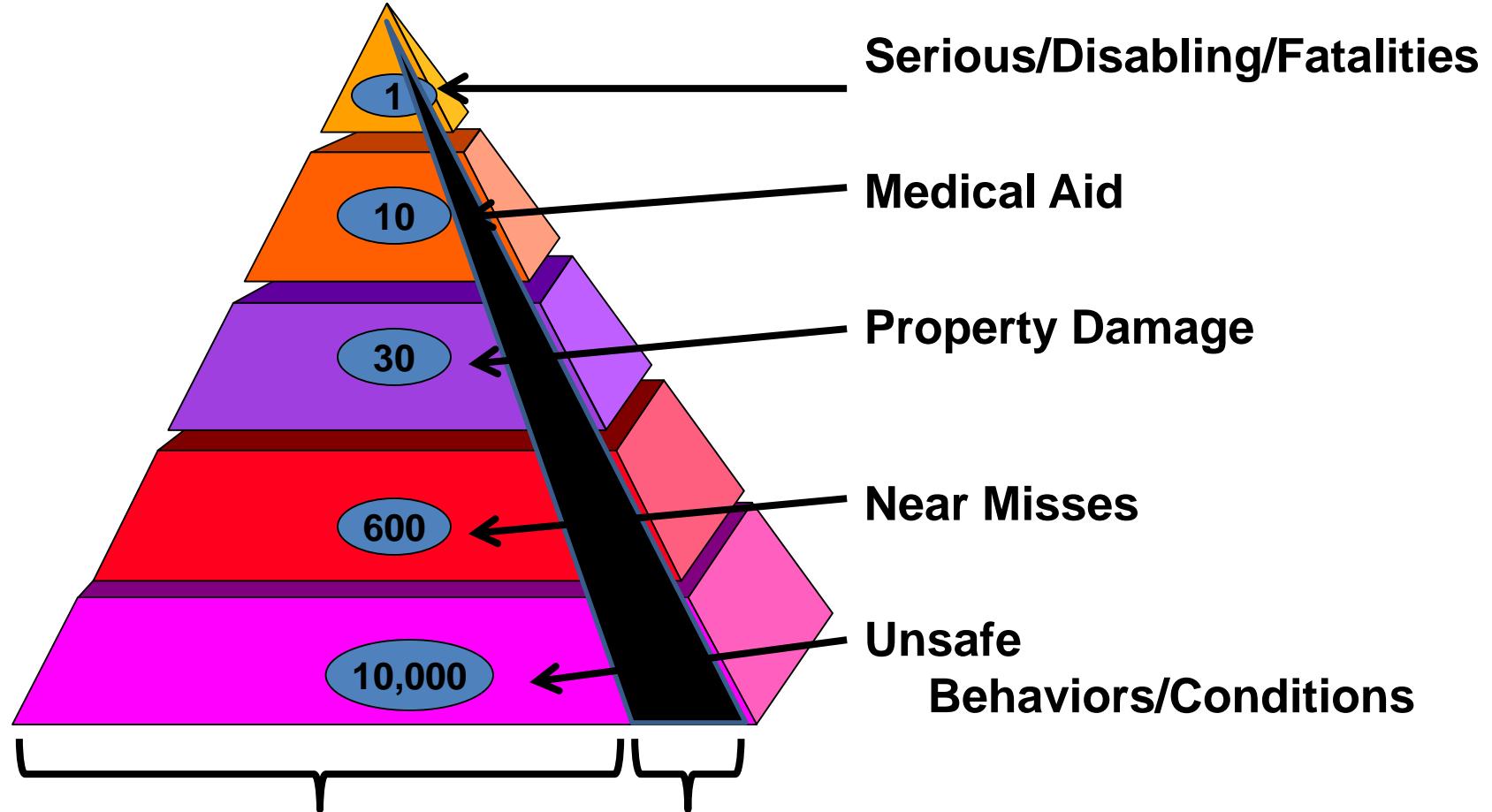
<ul style="list-style-type: none">• Event in a confined space• Contact with electricity• Fall from height• Uncontrolled release of energy• Fall of ground – surface• Fall of ground – underground	<ul style="list-style-type: none">• Vehicle/pedestrian interaction – underground• Vehicle/pedestrian interaction – surface• Vehicle interaction – offsite• Vehicle collision (heavy and light) – surface• Heavy Vehicle event – rollover, over edge	<ul style="list-style-type: none">• Uncontrolled load during lifting• Entanglement in rotating equipment• Underground fire and explosion• Incident during tire handling• Struck by falling object
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Critical Controls Identified for Action



Making Safety Real....

Hazard Management....
Innovation Through Leveraging Technology



The System View

One misstep from fatality:

- Lack of Fall Protection
- No Field Level Risk Assessment
- Operator Fatigue

The System View....

- Hazard Management...

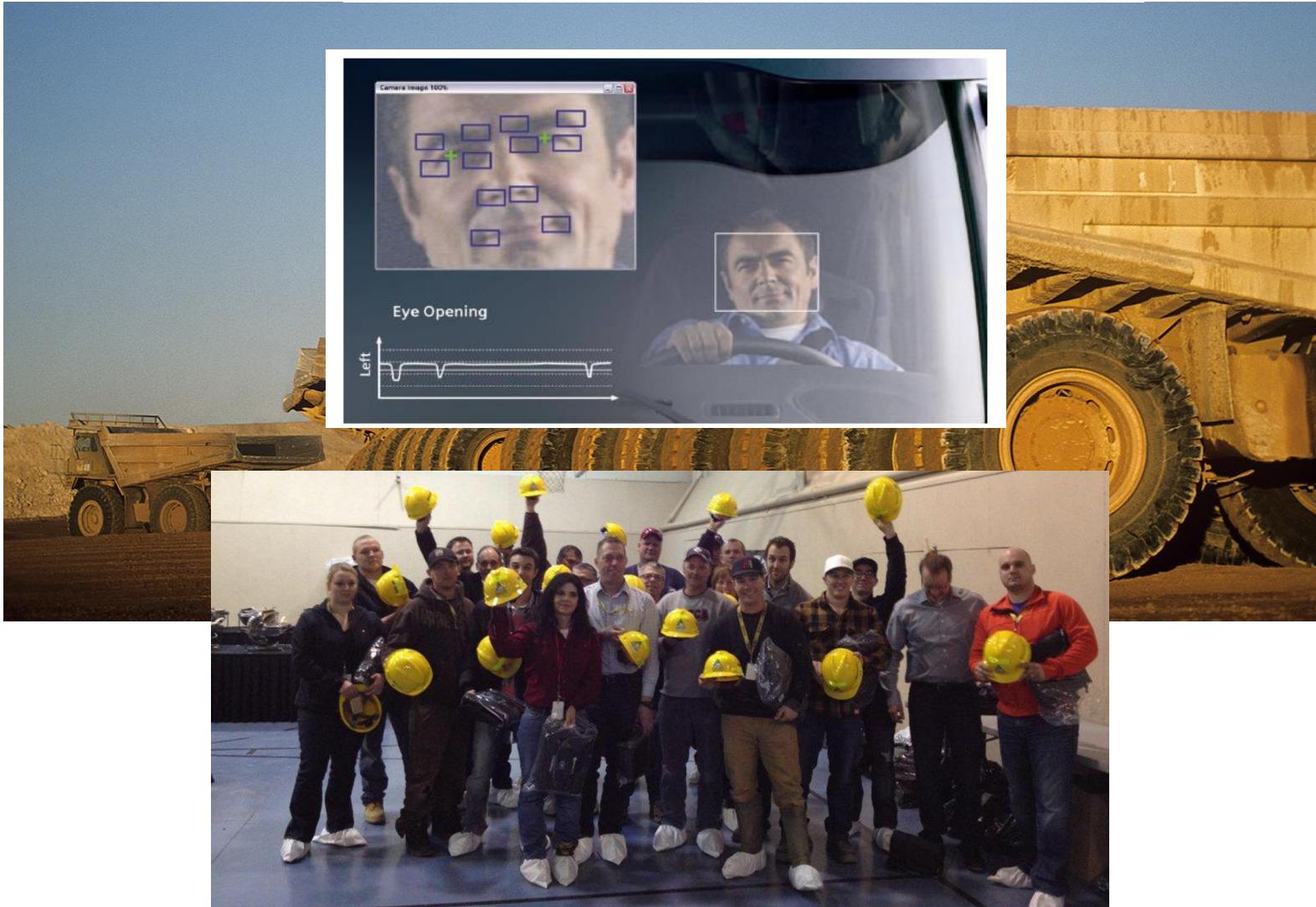
Where Technology Stops...

...People Take Over



The System View....

- Hazard Management...



Statistic	Phase 1	Phase 2	Phase 3 In cab Alarms active and Fatigue Intervention Plan (FIP) used
Overall reduction of 86% in fatigue events			
Total Mobile Hours			2,005
Average Fatigue Events (per mobile hour)	Reduction of 1.2 km of travel while fatigued		0.004
Distance Travelled while fatigued (metres)	1,611	922	369
Total Fatigue Events	63	31	9





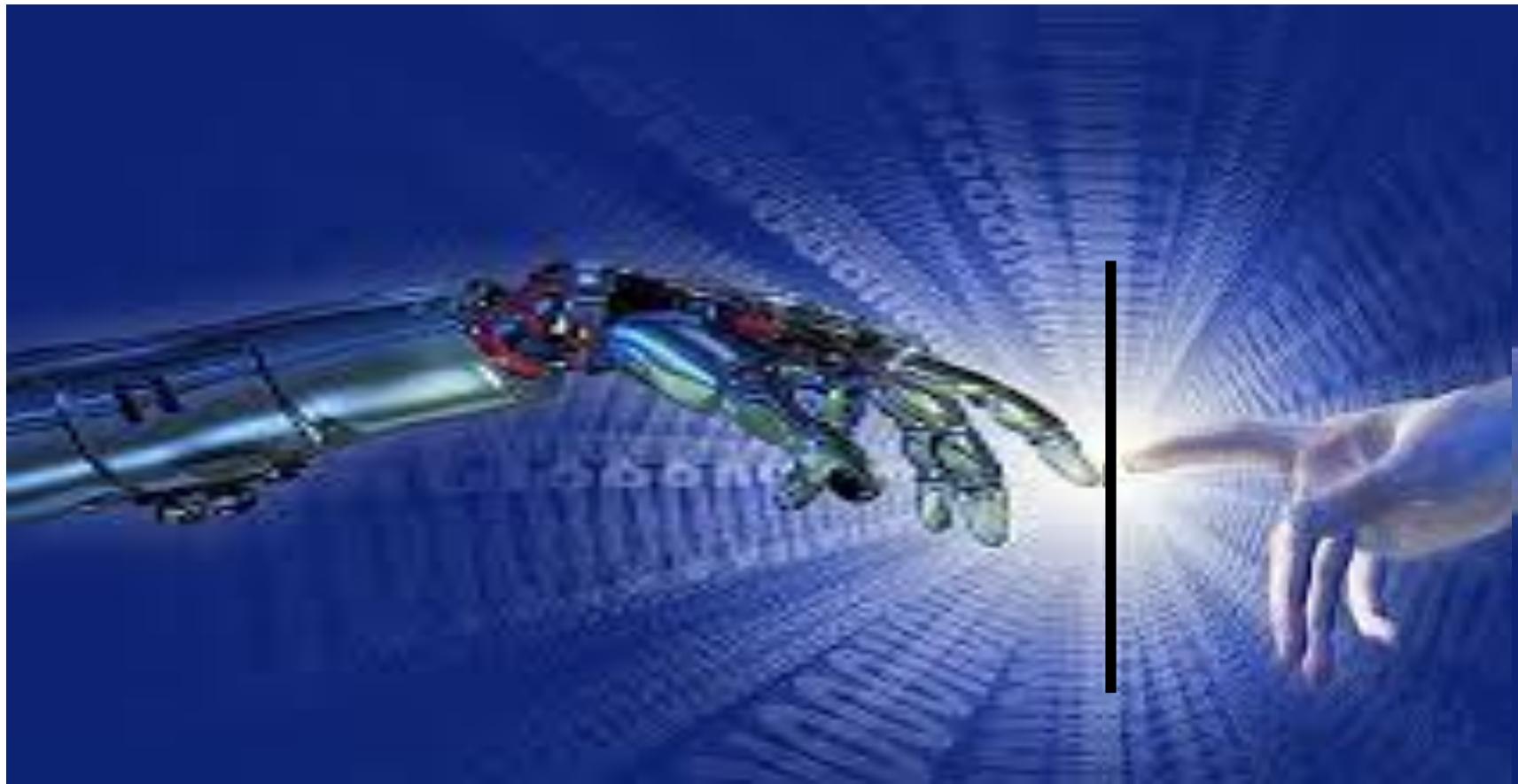
From 2014 to 2016, there was a 94% reduction in truck damage worth approximately \$500,000

From April 2017 to August 2018

- 9,500 fatigue events were prevented
- operators were prevented from driving approximately 295 km while asleep

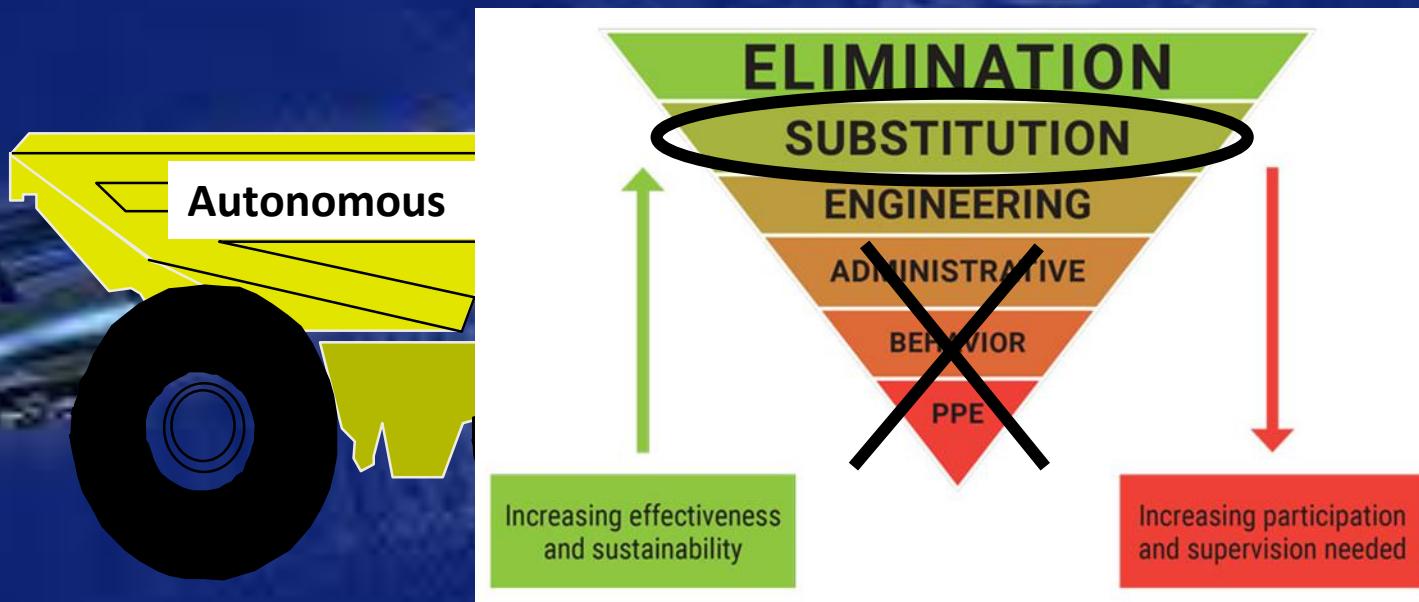
The System View....

- Hazard Management...



The System View....

- Hazard Management...
- Leveraging Technology





Making Safety Real

The Journey to High Performing Safety Cultures