Agenda

• Overview
• Accident Investigation
• Technical and Sociotechnical Elements of Safety
• Safety Management vs. Safety Leadership
Putting People in the Picture

SUBJECTIVE

INTENTION
VALUES
ATTITUDE
COMMITMENT
RESPONSIBILITY
EXPERIENCE

OBJECTIVE

BEHAVIOR
PLANS
ACTIONS
DECISIONS
PERFORMANCE
ACCURACY

INDIVIDUAL

CULTURE
SHARED VALUES
ETHICS
MORALE
MYTHS AND LEGENDS
JUSTICE
FAIRNESS
COVENANTS

GROUP

SYSTEMS
ORGANISATIONAL STRUCTURES
WORK PROCESSES
POLICY AND PROCEDURES
SHARED METRICS
CONTRACTS

An Integral Approach to Safety

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(Adapted from a model created by Ken Wilber)
Construction workers killed

Source: OSHA data for NYC (5 boros) by Federal fiscal year (10/01 – 9/30)
The diagram illustrates a matrix with outcomes ranging from positive to negative and predictability from very low to very high. The outcomes are divided into five categories:

- **Serendipity**: Positive outcomes with high predictability.
- **Good luck**: Normal outcomes that go right, with high predictability.
- **Normal outcomes**: Things that go right, with high predictability.
- **Accidents**: Negative outcomes with high predictability.
- **Disasters**: Disastrous outcomes with high predictability.

The matrix provides a visual representation of risk and predictability in various scenarios.
Work as Planned vs. Work as Performed

Work as planned Procedure, regulation, etc.

Work as performed

Normally Successful!

(Conklin / Edwards)
Our Response

• More code, procedures and rules
• Fix workforce through training
• Enforcement and Discipline
• Citations, Fines and Violation Notices
• Criminal Penalties
• Engineer, Educate & Enforce

• Bottom Line: HUMAN ERROR
The Heinrich 300-29-1 Model

- 300 Near Misses
- 29 Minor Injuries
- 1 Major Injury
Heinrich’s Safety Triangle

1930AC

Catastrophe

Fatality

Serious Injury

Minor Injury

Near Miss

1

10

100

1000

10000

collectionriskpartners.com
Heinrich's Triangle Theory

1 Fatality
400 Lost Time Injuries
20,000 Minor Injuries
240,000 Near Misses
2 Million Unsafe Acts
As Investigators:

Cognitive Bias

- **Cognitive Dissonance**: the mental discomfort (psychological stress) experienced by a person who simultaneously holds two or more contradictory beliefs, ideas, or values.

- **Fundamental Attribution Error**: You judge others on their character, but yourself (the organization) on the situation.

- **Hindsight Bias**: With knowledge of the outcome of the event, you exaggerate the knowledge of the probability of that outcome. (Complex things look simple, linear).

- **Outcome Bias**: Refers to the influence of the outcome knowledge on decisions that led up to that outcome.
Local Rationale Principle

• What people do makes sense to them at the time

• What they are doing right before an accident makes total sense to them; that’s why they are doing it

• WHY?
“If you don’t understand why it made sense for people to do what they did – then your perspective is off, not theirs.” - Jens Rasmussen
Systems Thinking

The process of understanding how things influence one another as a whole

Sociotechnical systems (i.e., a company) not as a structure consisting of constituent departments but as a complex web of dynamic, evolving relationships and transactions.
Mistake, mishap, and disaster are socially organized and systematically produced by social structures. (Vaughan, 1996)

Successful systems produce failure as a normal, systematic by-product of its creation of success (Dekker, 2008)
Complexity Systems

- Networked
- Interdependencies
- Relationships
- Nonlinear - a change in the size of the input does not produce a proportional change in the size of the output
- Emergence - traits of a system which are not apparent from its components in isolation but which result from the interactions
- Adaptive - capacity to change and learn from experience
“If we have a system of improvement that’s directed at improving the parts taken separately, you can be absolutely sure that the performance of the whole will not be improved. The performance of a system depends on how the parts fit, not how they act taken separately.”  Russ Ackoff
Construction Projects

- A complex, dynamic, resourced-constrained environment
- Teams must reconcile multiple opposing goals (cost, schedule, quality, safety)
- Constantly hunting for efficiencies
- Productivity gains by borrowing against safety margins in ways that are not measured or outcomes predicted
- All normal things to do
- Success and failure come from the same source
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Design (tools, roles, environment)

Work & production planning ("lean" - optimisation)

Safety management, investigations & auditing

Work-As-Imagined

Work-As-Imagined

Work-As-Imagined

Work-As-Imagined

Work-As-Imagined

Source: Erik Hollnagel
Objective

- Procedures
- Rules
- Process
- Standards
- Inspections/Audits
- Laws

Subjective

- Beliefs
- Values
- Intentions
- Points of View
- Perception
- Relationship
- Culture
  - Transformative
  - Adaptive Challenge
  - Complex, Non-Linear
  - Systems thinking
  - Capability Oriented
  - Possibility
  - Context
  - Adaptive/Resilient

- Transactional
- Systems & Processes
- Technical Challenge
- Focus on Doing
- Simple, Linear
- Work Execution Oriented
- Probability
- Content
- Control
**Socio**
- Beliefs
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- Procedures
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  - Content
  - **Control**
Perception → Action → Results
<table>
<thead>
<tr>
<th>Old View</th>
<th>VS.</th>
<th>New View</th>
</tr>
</thead>
<tbody>
<tr>
<td>People are a problem to control</td>
<td></td>
<td>People are a solution to harness</td>
</tr>
<tr>
<td>The world works because people follow rules</td>
<td></td>
<td>The world works because people adapt (resilience)</td>
</tr>
<tr>
<td>Safety is the absence of negatives</td>
<td></td>
<td>Safety is the presence of positives (how people create success; people create safety)</td>
</tr>
<tr>
<td>Human error is the “cause” of trouble</td>
<td></td>
<td>Human error is a “symptom” of deeper trouble; starting point, not a conclusion</td>
</tr>
</tbody>
</table>
Project Life Cycle Model – Safety Management Integration

Conceptual

Early Project Risk Profile
- Preliminary Project Risk Assessment
- Safety-critical task identification
- ID Safety in Design opportunities

Performance Improvement/Learning
- Reward/Penalty process
- Incident Findings & Lessons Learnt
- Contract Close-out/Post Mortem

Design/Engineering

Refine Risk Profile
- Detailed Project Risk Assessment
- Risk Control Strategy
- Safety Execution Guidance Plan
- Safety resourcing

Monitoring & Measurement
- Field Observations
- Submittal tracking
- Incident Investigations
- Planning meetings/events

Planning

Communicate Risk Profile
- CM/GC/Contractor Pre-qualification
- Contract Language Alignment
- Safety Performance Expectations
- CM/GC/Contractor Alignment

Time

Procurement

Cost to change

Construction

Close out

Results of change

• Preliminary Project Risk Assessment
• Safety-critical task identification
• ID Safety in Design opportunities

• Detailed Project Risk Assessment
• Risk Control Strategy
• Safety Execution Guidance Plan
• Safety resourcing
thank you