## Integrating Human Factors in Incident Investigations

Why Human Factors in Incident Investigations Matter

Traditional Root Cause Analysis (RCA) often stops at "human error," leading to corrective actions that are superficial and ineffective. In reality, human behaviour is influenced by system design, workload, procedures, training, and organizational culture. A structured Human Failure Analysis Framework helps uncover these deeper influences, ensuring that corrective measures address the true causes. This approach strengthens risk controls and reduces the likelihood of incident recurrence.

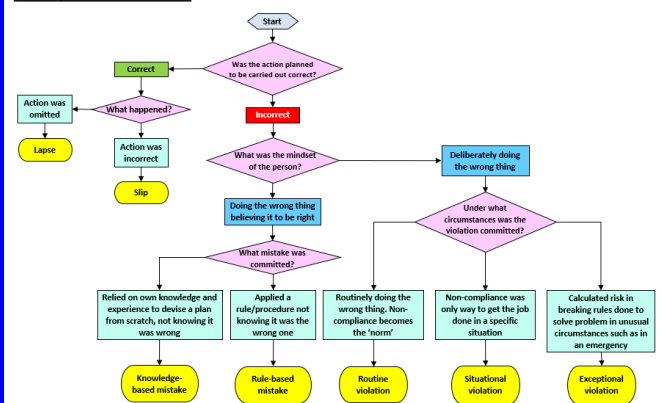Model of Human Factors Contributions to incidents:
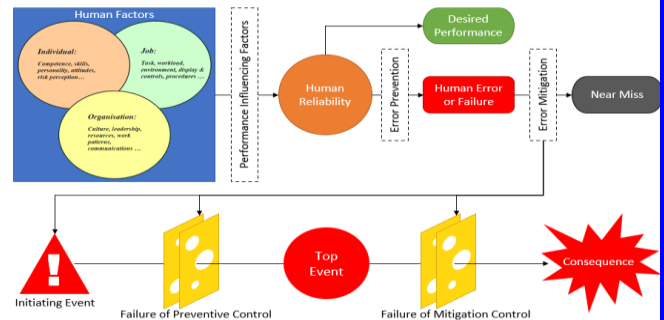
Investigation Workflow?

A structured five-step method is recommended:

1. **Classify the human failure** (slip, lapse, mistake, or violation)
2. **Identify performance influencing factors (PIFs)** such as unclear instructions, divided attention, poor procedures, or weak safety culture
3. **Conduct bow-tie analysis** to evaluate whether adequate barriers are in place to prevent human error
4. **Develop corrective actions** (engineering, procedural, cultural, or organizational)
5. **Implement and verify effectiveness** (through audits, inspections, MOC, and feedback)
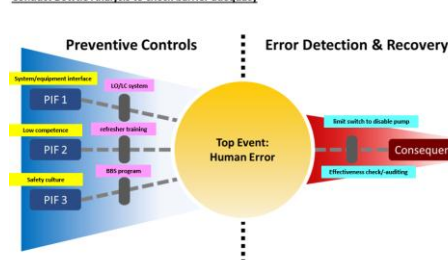

Classify the human failure

Identify Performance Influencing Factors (PIFs)

Conduct Bowtie Analysis to check barrier adequacy

Develop corrective Actions

Mapping of effective risk control against type of human failure

Safety Measures	Slips	Lapses	Mistakes	Violations
Control/display design	✓	✓	✓	✓
Equipment/tool design	✓			✓
Memory aids		✓		
Training			✓	
Work Design	✓	✓		✓
Procedures	*	✓	✓	✓
Supervision	*	*	✓	✓
Reducing distractions	✓	✓	✓	✓
Environment	✓	✓	✓	✓
Communications	*	*	✓	✓
Decision aids			✓	
Behavioral Safety			✓	✓

✓ Strong Improvement
* Possible improvement

Ref: https://www.energyinst.org/?a=697917&utm (see p.32)

Key Takeaways

- Human error should not be the "end point" in investigations.
- Determine **why** an error occurred by analyzing job, individual, and organizational factors.
- Strengthen barriers using the **hierarchy of controls**—automation, interlocks, improved procedures, supervision, and culture.
- Verify changes through structured follow-up to ensure long-term effectiveness.

References:
1. Energy Institute. (2008). *Guidance on investigating and analysing human and organisational factors.* London, UK: Energy Institute
2. Health and Safety Executive (HSE). (1999). *Reducing error and influencing behaviour* (HSG48). Norwich, UK: HSE Books
3. Health and Safety Executive (HSE). (2012). *Human factors in the management of major accident hazards.* Retrieved from https://www.hse.gov.uk/humanfactors
4. Reason, J. (1997). *Managing the risks of organizational accidents.* Aldershot, UK: Ashgate