An Introduction to Human Failure
Types of Human Failure

• Human failures are not random - there are patterns or types:
  • Unintentional
  • Intentional
  • Physical (decisions)
  • Mental (decisions)

• This is important because they:
  1. Have different causes
  2. Need to be managed differently
Human Failure

Unintentional Errors

- Slips/Lapses
- Mistakes

Intentional Errors

Violations
# Levels of Mental Working

<table>
<thead>
<tr>
<th>Skill-Based</th>
<th>Automatic</th>
</tr>
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<tbody>
<tr>
<td>Automated routines with little conscious attention</td>
<td></td>
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<table>
<thead>
<tr>
<th>Rule-Based</th>
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<tbody>
<tr>
<td>IF symptom X THEN cause is Y</td>
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<tr>
<td>IF the cause is Y THEN do Z</td>
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<table>
<thead>
<tr>
<th>Knowledge-Based</th>
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<tr>
<td>No routines or rules available for handling situation</td>
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Performance Influencing Factors

• Job factors
  – Equipment design, environment, etc

• Individual factors
  – Competence, fatigue, etc

• Organisational factors
  – Work planning, culture, communication, etc
Managing Human Performance

Error Analysis

Task Analysis

Safety Critical Task

Performance Influencing Factors

Prevention

Mitigation

Consider Main Site Hazards
Task Analysis

• Logical description of how to complete task.
  – Hierarchical Task Analysis (HTA)
  – Flow Charts
  – Lists

• Based on walk through.

• Consensus views sought.

• Multi-skilled team.
Human Error Analysis

• Human HAZOP guidewords
  – Action errors
  – Checking errors
  – Information retrieval errors
  – Etc

• Consider PIFs
Risk Controls

- Engineering
- Automation
- Prevention
- Mitigation
- Procedures
Summary of 7 steps

1. Consider main site hazards (e.g. LPG, chlorine)
2. Identify human activities for these (bulk transfers, maintenance, startup, reactor charging)
3. Outline key steps in these activities – remember to talk to operators!
4. Identify potential human failures for key steps – slips/lapses, mistakes and violations
5. Identify Performance Influencing Factors (PIFs) that make failure more likely – job, person, organisation
6. Use hierarchy of control – don’t rely on humans as last line of defense, but automation introduces new issues
7. Manage error recovery – make it more likely that errors will be detected by others or the system
Human Failure – Brief Review

• Different types of failure – different controls
• Managing human performance
• Optimise performance influencing factors