

Human Factors Issues in Turnarounds (TARs)

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Turnarounds (TARs)

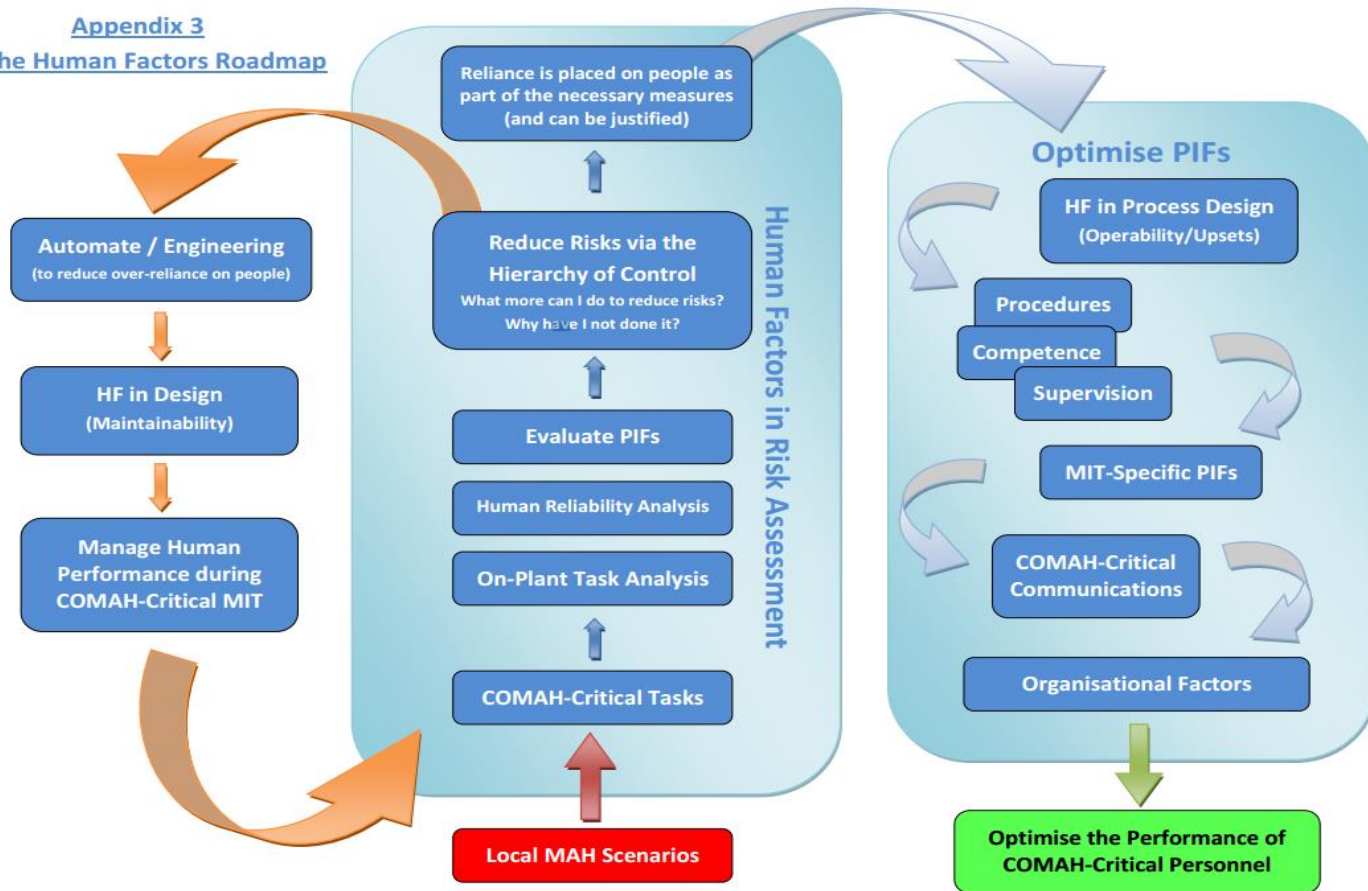
- Planned events where significant sections of a process plant are shut down to enable maintenance or projects to be carried out
- Increased risk of process safety incidents:
 - Process conditions not encountered in steady state conditions
 - Large number of maintenance operations increasing opportunities for failure
 - Requirement to test multiple systems on reinstatement

General HF issues in TARs

- High levels of workload
- Additional strain on supporting systems (e.g. permitry, isolation certification)
- More third party contractors onsite
- Maintaining situation awareness when multiple tasks happening in parallel
- Potential for time pressure

HF in control of Major Accident Hazards (MAH)*

Appendix 3 The Human Factors Roadmap



* From <http://www.hse.gov.uk/comah/guidance/hf-delivery-guide.pdf>

Practical issues in TAR analysis

- Infrequently performed, complex tasks
- Potential lack of experience (certainly recent experience)
- Potential difficulty in securing task-expert input at preferred times
- Given the likely scale of the TAR, screening is recommended

Example TAR screening process

Part 1 – Relationship to MAHs

- Low – No MAH potential (no further analysis required)
- Med – MAH potential (but impact confined to site)
- High - Significant MAH potential (impact beyond site or any other reasons)

Example TAR screening process

Part 2 – Further screening for MAH-related tasks¹

Degree of existing control

High (1) Should not lead to MAH (e.g. because of existing hardware controls – trips)

Med (2) Could lead to MAH (e.g. alarm warning of issue, planned opportunity for recovery)

Low (3) Could result directly in MAH (e.g. no associated control measures, relies entirely on the correct performance).

Vulnerability

Low (1) (e.g. very simple, one person, no interruptions)

Med (2) Assumed score unless strong reasons to change

High (3) (e.g. complex, multiple roles, multitasking, interruptions)

1. Based on process described in Energy Institute (2020) *Guidance on human factors safety critical task analysis*, 2nd Edition

Identifying HF issues related to TARs

- We have used Screening and Safety Critical Task Analysis (SCTA) to analyse TAR tasks
- The supporting paper includes a summary of HF issues identified by this process (and other experience)
- Use as a checklist to support TAR SCTAs (or as a standalone review if time is tight)
- Following slides include some examples

TAR issues 1 – Progress Tracking

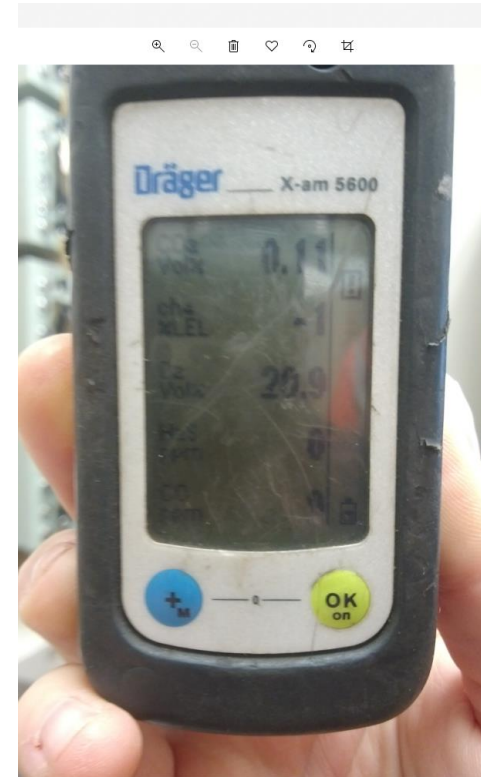
- Some form of shared progress tracking is important (e.g. Swimlane, Gantt Chart)
- Use signatures to allow progress (but consider supervisory resources)
- The timings of tasks may have an impact on workload
- Manage ongoing procedure actions (e.g. purges).

TAR issues 2 - Procedures

- Procedures may not have been written specifically for the TAR
- Make clear whether preconditions can be confirmed by checking paperwork or whether field checks are required.
- Wherever possible, procedures should minimise unnecessary operator movements.

TAR issues 3 – Gas / oxygen testing

- Ensure sufficient trained individuals and equipment to cope with the volume of tests
- Ensure that tests are performed at the correct time (e.g. prior to break of containment).
- Emphasise criticality of testing (e.g. specific headings in procedures, space for recording results)



Summary

- TAR preparation and reinstatement involves considerable interaction with processes, and, as such, are likely to be vulnerable to human failure
- Pre-analysis of TAR tasks (e.g. using SCTA) can help to make success more likely
- Checklists of known TAR issues can help to speed this process
- The supporting paper includes more detailed discussion of the issues raised in this presentation plus more.