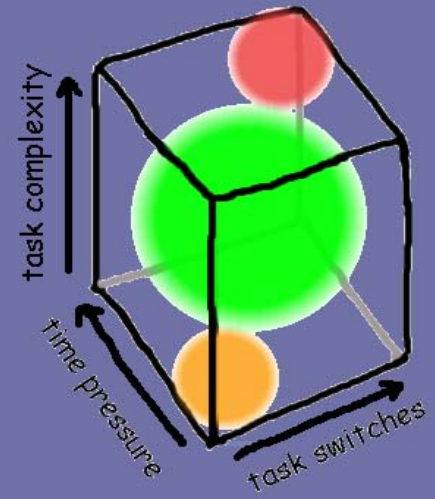


Critical Scenario Analysis

Workshop results group 1

TNO Human Factors



Situation Awareness Bottlenecks (task and context)

Time occupied

Case 8. Release of hydrocarbon vapour cloud

- Operators were too much occupied with the start-up of the tower. There was no time to check all the alarms

Case 11. Dock fire incident

Because of poor alarm panel design it took too much time to recognise the location of the event and the nature / severity of the fire

Level of information processing

Case 2. Chemical plant Frankfurt.

- The operator didn't know the mixer hadn't started up

Case 3. Unexpected toxic release

- The operator had a wrong idea about the substance due to a wrong label

Case 10. Train driver missing red light

- Driver fails to detect signal sequence due to poor vigilance or low arousal

Situation Awareness Bottlenecks (task and context)

Task-set switches

Case 10. Train driver missing red light

- Missing second signal because occupied with speed control

Case 11. Dock fire incident

- Fire alarm not noticed due to fatigue, low arousal or distraction

Other

Case 9. Gas release out of broken pipe in reactor

- Emergency response was disturbed because of bad communication as a result of high noise level

Case 11. Dock fire incident

- Poor and ineffective communication with response team was the cause of a wrong picture of the situation

Disturbance Assessment Bottlenecks (task and context)

Time occupied

Level of information processing

Case 8. Release of hydrocarbon vapour cloud

- The operators never expected any HC's in the tower. They didn't know that it could happen

Case 10. Train driver missing red light

- Driver only interprets the coding for the approaching conjunction, not the red light

Case 11. Dock fire incident

- The operator experienced ambiguity in the meaning / priority / urgency of the alarm

Disturbance Assessment Bottlenecks (task and context)

Task-set switches

Case 9. Gas release out of broken pipe in reactor

- Operators were disturbed in their work, because they had to inform the response group

Case 10. Train driver missing red light

- Driver forgets second meaning of yellow light (red light approaching)

Other

Case 9. Gas release out of broken pipe in reactor

- Emergency response was disturbed because of bad communication as a result of high noise level

Decision Making Bottlenecks (task and context)

Time occupied

Case 1. High temperature engine Navy frigate

- The commander has to decide under high time pressure whether to turn the engine off

Case 4. Lack of instructions

- Because there was not enough time the operator had no opportunity to acquire the knowledge needed to make the right decision

Level of information processing

Case 1. High temperature engine Navy frigate

- There are no clear procedures for this situation, so the commander has to make a difficult knowledge-based decision

Case 2. Chemical plant Frankfurt.

- It was a non routine situation. The operator didn't have the knowledge to make the right decision.
- The operator didn't consult others

Decision Making Bottlenecks (task and context)

Case 4. Lack of instructions

- Because there was no instruction the operator did not know what to do

Case 5. Non-routine situations

- To find solutions for non-routine situations the operator has to work on a knowledge-based level

Case 6. Two alarms simultaneously

- The lack of training and experience made it very difficult to handle the alarms

Case 9. Gas release out of broken pipe in reactor

- Emergency response groups didn't know what decisions to make

Case 11. Dock fire incident

- It was difficult to decide on a course of action because of inadequate knowledge or inappropriate application of rules
- The poor communication was the reason that the operator could not react to changing events when the situation got worse

Case 13. Runaway reaction in tank

- The operator made a wrong decision because he didn't have the knowledge of a possible reaction

Decision Making Bottlenecks (task and context)

Task-set switches

Case 6. Two alarms simultaneously

- Switching between the two alarms increased the operators task load

Other

Case 9. Gas release out of broken pipe in reactor

- Emergency response was disturbed because of bad communication as a result of high noise level

Direction and Control Bottlenecks (task and context)

Time occupied

Case 10. Train driver missing red light

- When the driver notices the red light there is not enough time to stop the train.

Level of information processing

Case 11. Dock fire incident

- First response team was send to wrong place to fight fire, because the operator couldn't identify the right location

Case 12. Chemical plant in Wiesbaden

- Operator had no experience with new (badly designed) control system

Direction and Control Bottlenecks (task and context)

Task-set switches

Other

Case 7. No means to communicate

- The operator could not execute his plan because the communication lines were occupied

Case 9. Gas release out of broken pipe in reactor

- Emergency response was disturbed because of bad communication as a result of high noise level

Other Bottlenecks (task and context)

Time occupied

Level of information processing

Task-set switches

Other

Case 2. Chemical plant Frankfurt.

- It might be possible that the operator did not warn other people due to the company culture

Extended Framework

	Review/Monitor	Situation Awareness	Disturbance Assessment	Decision Making	Direction & Control
Attention	Low arousal boredom				
Detection		Fail to see signal Due to poor sighting			
Perception		Fail to recognise signal			
Interpret			Fail to attribute full meaning		
Decision making / Planning				Fail to select correct plan	
Control					Pre-occupied with speed control
Interaction					
Communications					

Model Space

