

# Investigating Human Factors

Ann Mills, RSSB

Mark Young, RAIB

Emma Lowe, Network Rail

Huw Gibson, RSSB

## What caused this?

---

### Design of the SPT

*Loss of concentration*   **Environment - Low level light**  
Failing to check

Repetitive action

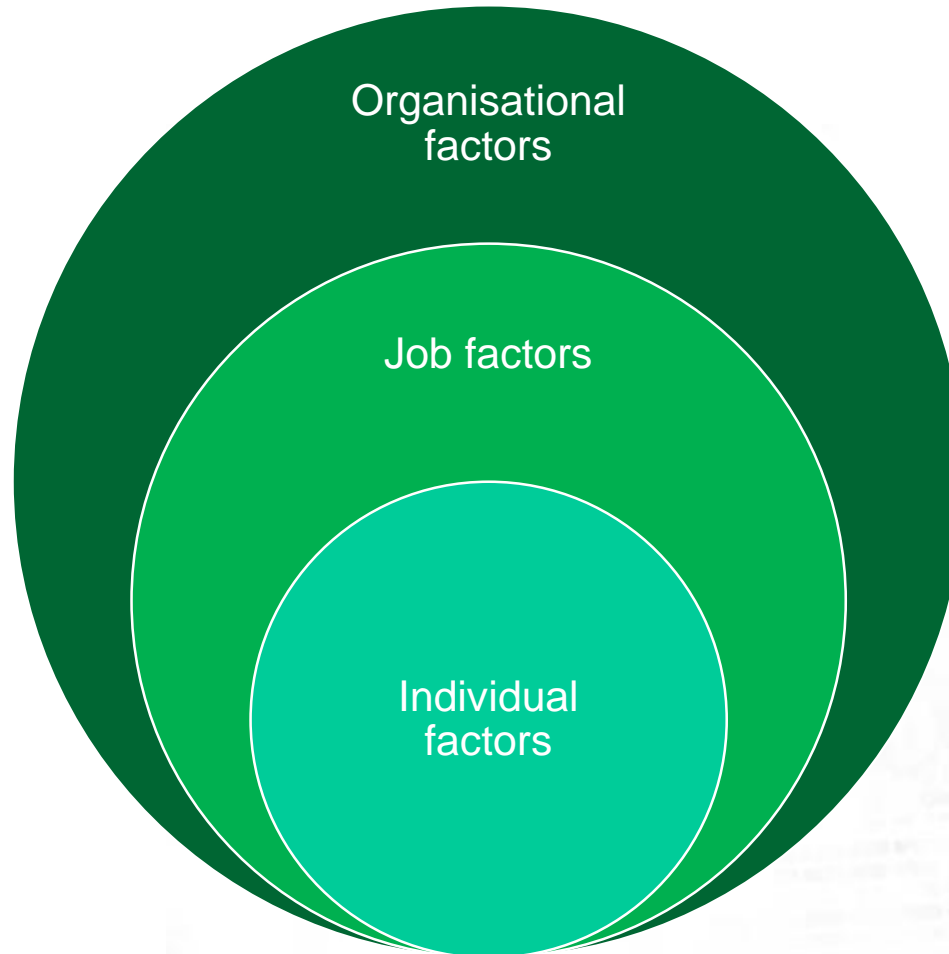
No labelling on phones   **Not the regular move**

Lack of train describers

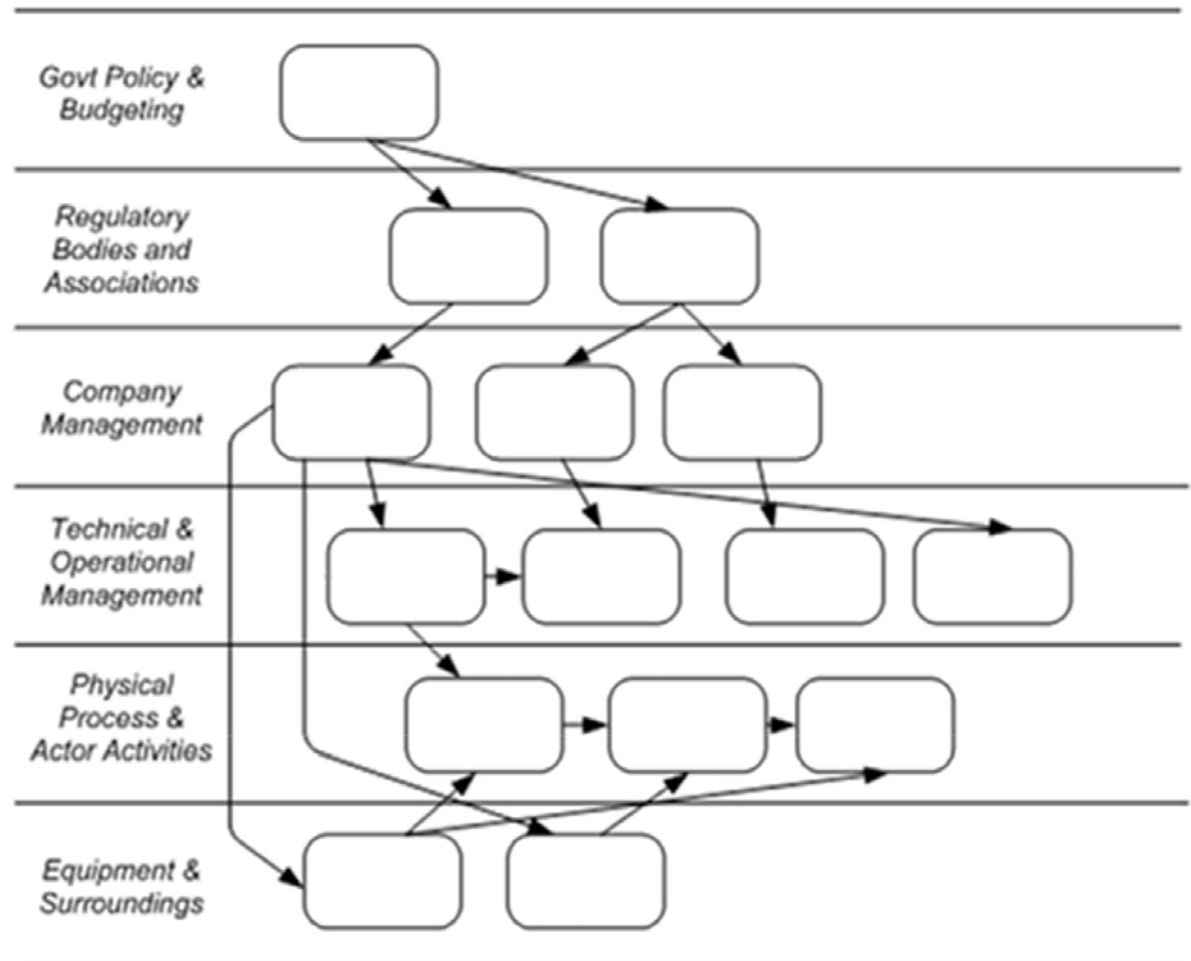
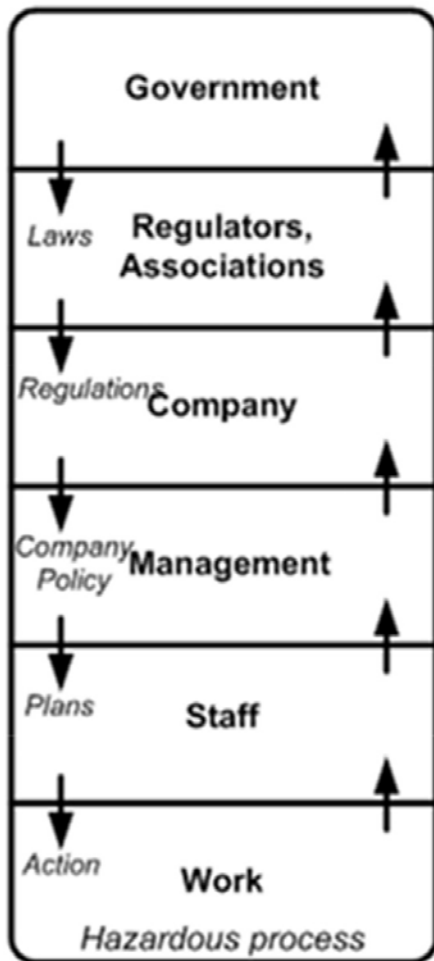
Train dispatch   Signaller verification



# Sociotechnical systems



# AcciMap (source: Goode et al., 2017)

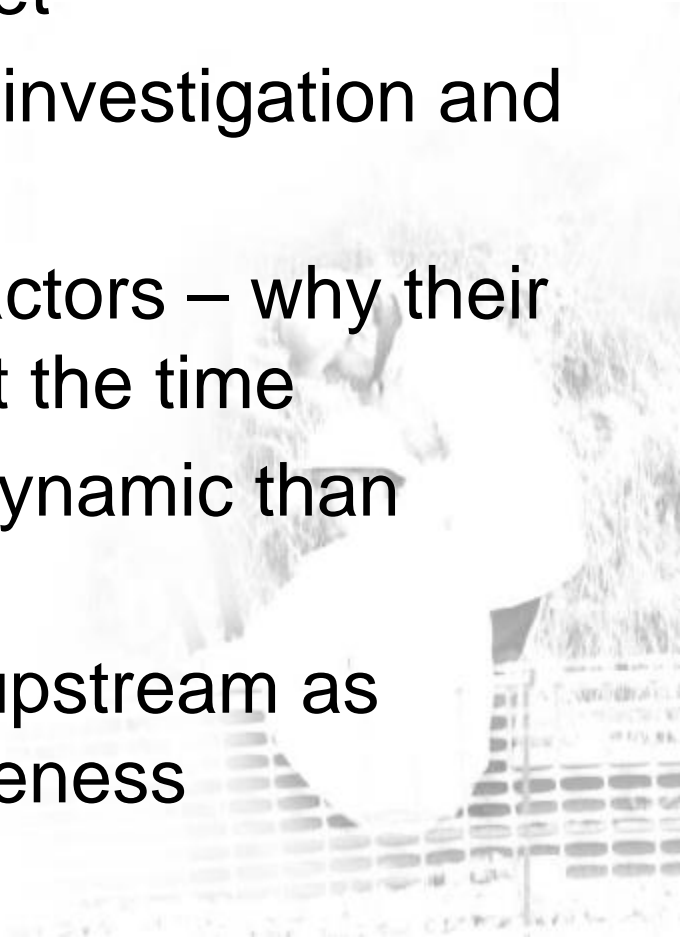




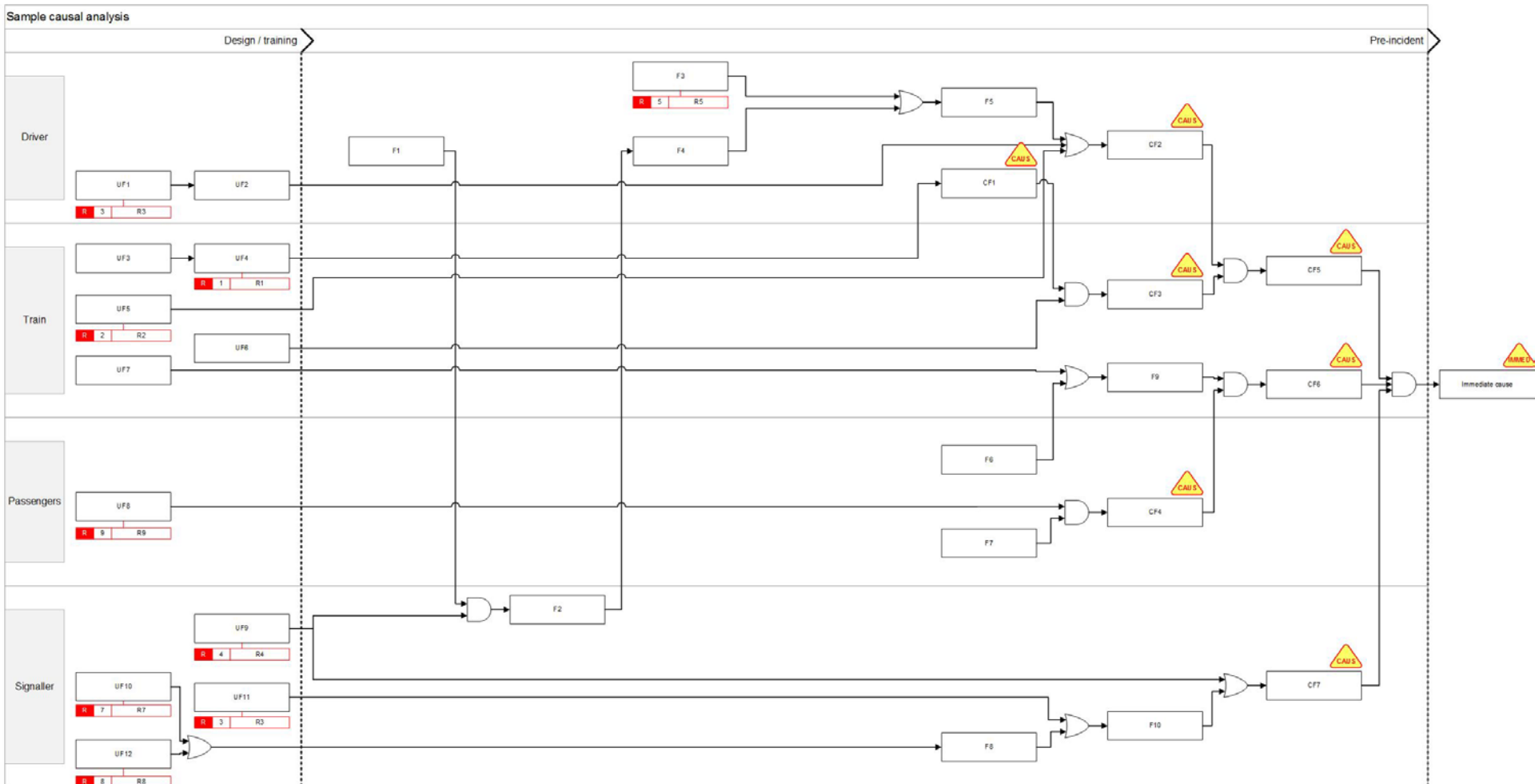


# The systems perspective

- To some extent, conducting a HF investigation is about adopting a systems mindset
- HF should be integrated into the investigation and analysis (there is no 'HF bit')
- Put yourself in the shoes of the actors – why their decisions made sense to them at the time
- Causality is more complex and dynamic than Swiss cheese
- Target recommendations as far upstream as practicable for maximum effectiveness

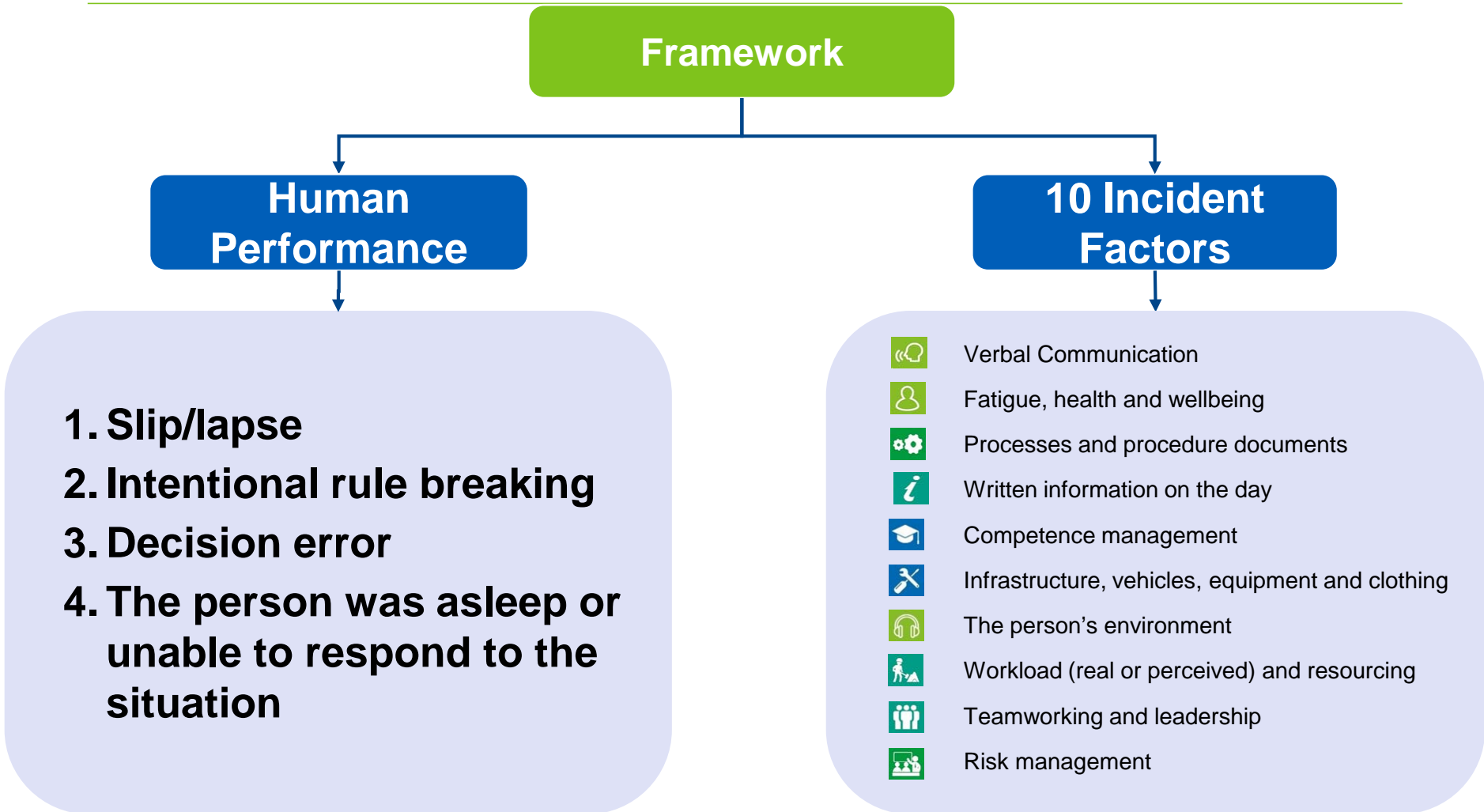


# RAIB causal analysis





# A common language for safety – from investigation through to safety reporting and change





# 10 Incident Factors



## Verbal communication

The exchange of spoken information concerned with how safety critical information is communicated between staff



## Fatigue, health and wellbeing

The individual's fatigue, health and wellbeing which is the joint responsibility of the organisation and the member of staff



## Process and procedure documents

Written rules, standards, processes and methods of working which guide and structure activities undertaken



## Written information on the day

Information that can be renewed day-to-day or week-to-week, and supports people in carrying out an activity or task



## Competence management

The company competence management systems regarding selection, training and assessment



## Infrastructure, vehicles, equipment and clothing

The infrastructure, vehicles, equipment or clothing used to undertake or support a task



## The person's environment

The environmental stressors such as lighting levels, noise and temperature which can affect the performance of a person



## Workload (real or perceived) and resourcing

Workload is the demands on a person which are influenced by the task, its context, the individuals who carry out the activity, and resourcing



## Teamworking and leadership

How people are organised to work together, and how they relate to and influence each other to undertake their work safely



## Risk management

The processes used to identify, assess, reduce and monitor potential safety concerns



Verbal  
communication



Fatigue,  
health and  
wellbeing



Process and  
procedure  
documents



Written  
information  
on the day



Competence  
management



Infrastructure,  
vehicles, equipment  
and clothing



The person's environment







Workload (real or perceived) and resourcing



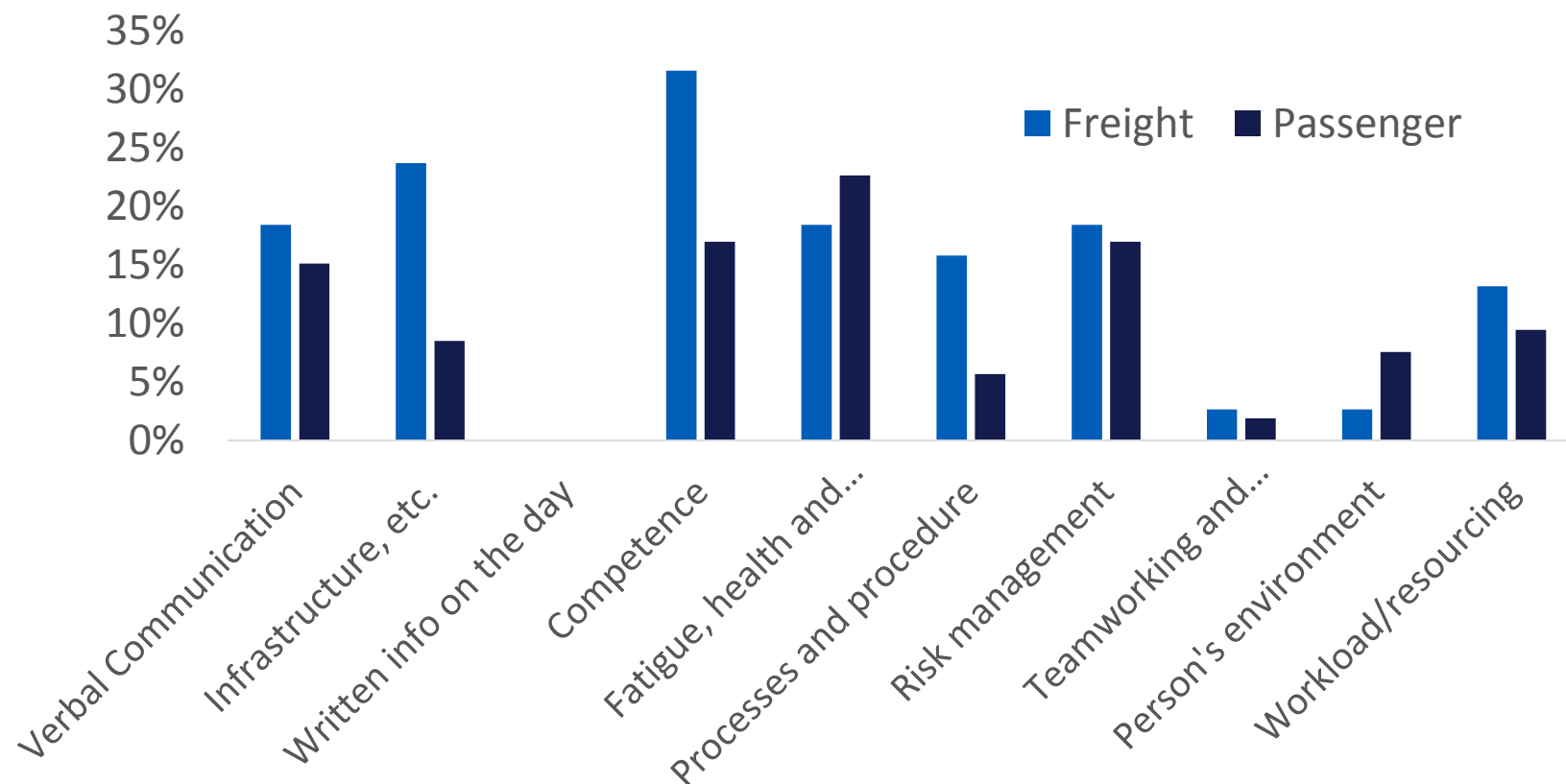


Teamworking  
and leadership

# Risk management



# OUTPUT: SPAD: Passenger Versus Freight 10 Factors (n=257)

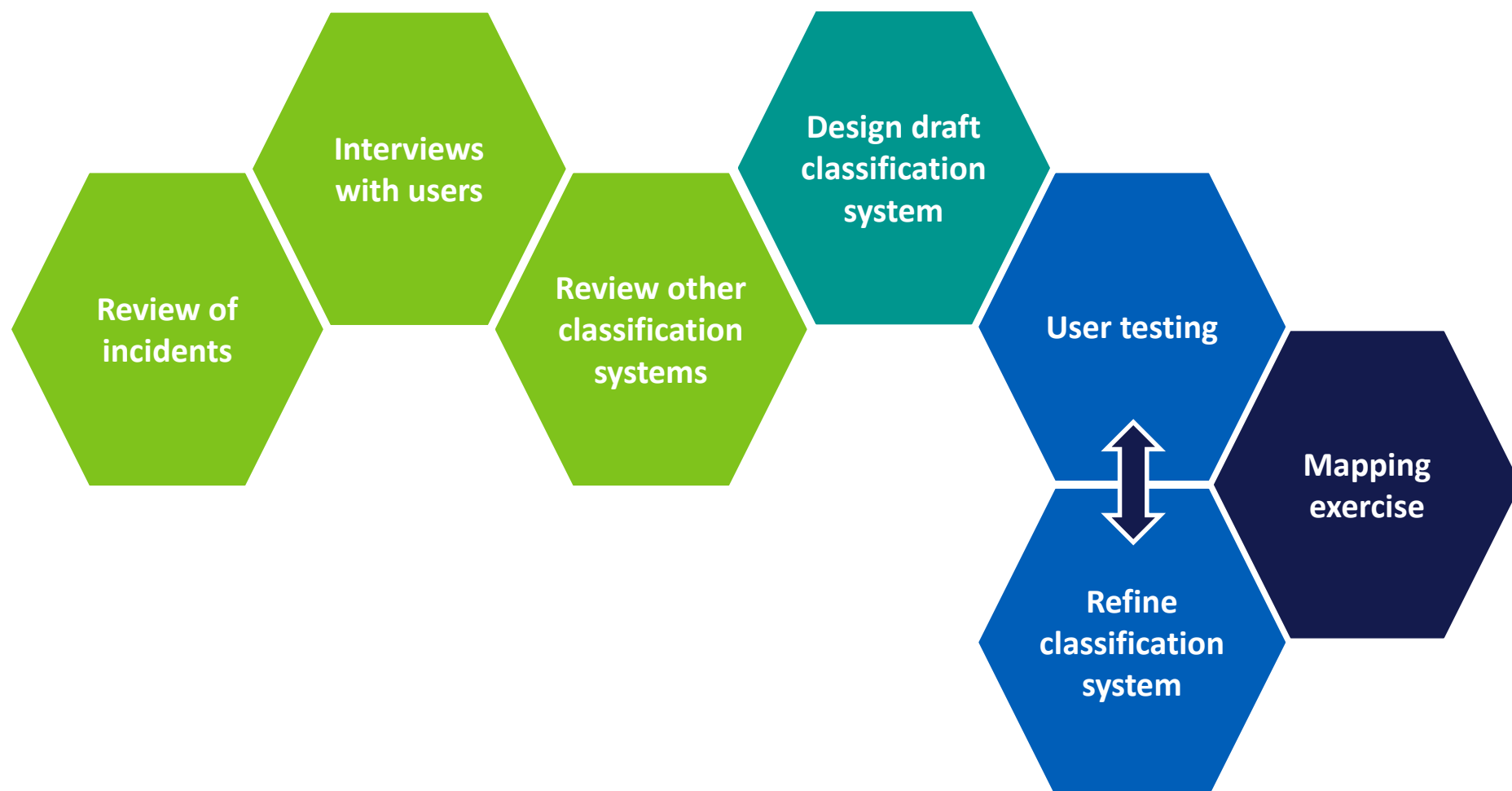


## Output: The 'TOP 5' things to deal with - Example

No	Passenger		Freight		Network Rail	
	Issue	Percentage	Issue	Percentage	Issue	Percentage
1	Fatigue, Health and Well-being	12%	Competence Management	22%	Infrastructure, equipment	15%
2	Competence Management	9%	Infrastructure, equipment	17%	Communication	7%
3	Risk Management	9%	Communication	13%	Processes and procedures	5%
4	Communication	8%	Fatigue, Health and Well-being	13%	Risk Management	5%
5	Workload	5%	Risk Management	13%	Work environment	2%

## How did we update to this version?

---



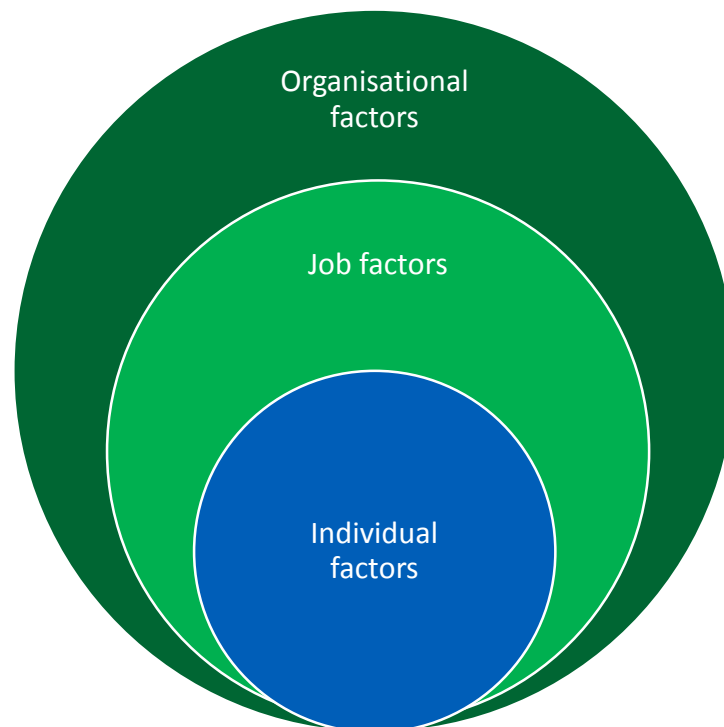
## Where is it going?

---

- Used within company investigations at NR, TOCs and freight companies
- Used as part of SMIS possible causes
- Planned for SMIS investigation module
- Included in RSSB investigation guidance
- Planned to form part of the update to RIS-3119-TOM “Accident and Incident Investigation” in 2018

# NTS and Investigation

- NTS provide a framework to understand the individual
- Help us to understand individual resilience
- Helps us describe why someone has done something wrong
- Some NTS appear to map directly to the 10 incident factors whilst other capture a range of issues that may influence a NTS....it doesn't matter!
  - NTS = individual analysis
  - 10 Incident factors = system analysis





## NTS and the Inverness SPAD

---

- What were the NTS issues?
  - Attention management
  - Conscientiousness
- NTS provide a way to explain the error
- But what if we stop at the driver's NTS?
  - we fail to identify all the factors that made that error more likely
  - we fail to identify why that driver had poor NTS on that day



*Attention  
Management*

## Another case study: user-worked crossings

---

### **A typical incident**

Signaller fails to make the right decisions about where a train is in relation to the crossing and gives permission for a user to cross even though there is a train approaching.

### **Typical NTS**

- Failure to check properly - attention management
- Failure to listen properly to which crossing the user was at – communications
- Failure to challenge the user about what they were crossing with – conscientiousness
- Too busy dealing with other operational activities - workload management

## NTS and Recommendations

---

- Investigations which just have recommendations relating to the individual and their NTS have not been systematic
- NTS recommendations should focus on how we can help individuals become more resilient to error
- What would a recommendation to address the driver's NTS from our Inverness case study looked like?
  - Recognising risky situations when they could be error prone
  - Education on factors that can affect attention/decision making/team-working
  - Checking strategies
  - Self fitness for duty checks
  - Distraction plans
  - Risk commentary driving and signalling

## HF myths – top ten (plus another one!)

---

1. They worked a roster that was under the Fatigue Index threshold, so fatigue wasn't an issue
2. Human factors wasn't involved because they didn't have any personal problems at home
3. They weren't distracted because they weren't on their mobile phone
4. They just didn't pay enough attention
5. They didn't follow the rules so it's clearly complacency or a violation
6. This was just a case of individual error / lapse in judgement, we don't need to change things
7. They had been trained appropriately, they're just clearly not competent
8. How could they not see the red signal?
9. The workload isn't high, I can cope with it so they should be able to as well
10. We can prevent this kind of thing happening again by rebriefing all staff on the importance of...
11. Human factors is all common sense anyway