



# International Railway Safety Conference

19-21 October 2020

Webinar Series

## The sum of its parts?

Exploring the structure & content of SPAD investigation pro formas

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## Acknowledgements

IRSC 2020



Dr Janine Chapman



Lorelle Bowditch

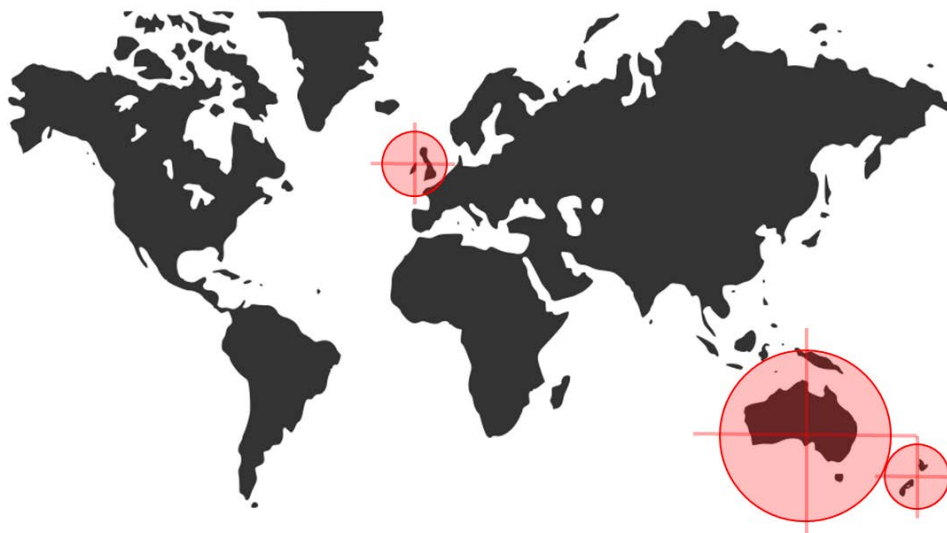


Prof Jillian Dorrian



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# Ireland and Australasia meet



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# What is a SPAD?



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# What causes a SPAD?

- **Human Factors**

- Scientific discipline of Psychology
- Understanding interactions among humans and other elements of a system
- Application of theory, principles, data and methods of design in order to optimize human well-being and overall system performance



- **Systems Thinking**

- Subdiscipline
- Philosophical view
- Focuses on the way that a system’s constituent parts interrelate and work over time
- Appreciation that changing one part of the system will affect other parts and the whole

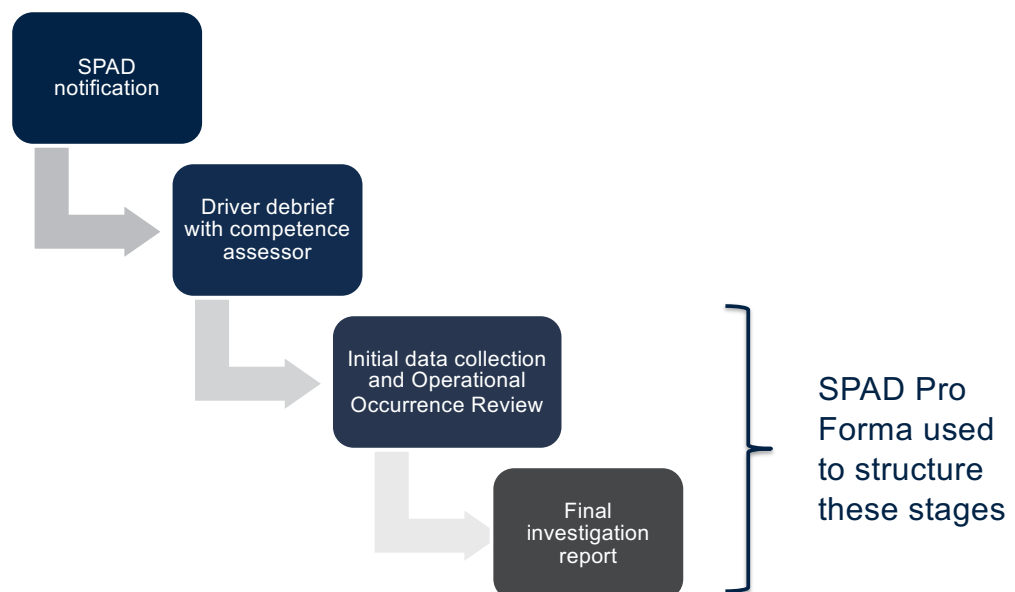
Example influences on SPADs:

- Fatigue
- Lack of understanding
- Sunlight/glare
- Equipment design
- Additional cues
- Time pressure
- ...

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# What is a SPAD Pro Forma?



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# What does a SPAD Pro Forma look like?

PART 8 - Cause - Immediate Cause (continued)			
Viewed correct signal - misread aspect <input type="checkbox"/>			
Viewed wrong signal - read through <input checked="" type="checkbox"/>			
Viewed wrong signal - read across <input type="checkbox"/>			
Misjudged environmental conditions <input type="checkbox"/>			
Misjudged train handling <input type="checkbox"/>			
Signal obscured or obstructed <input type="checkbox"/>			
R2 Term	Performance Shaping Factors	Driver	Other person
Sensory Error A failure during perceptual input on the senses.	Expectation	<input type="checkbox"/>	<input type="checkbox"/>
	Confusion	<input type="checkbox"/>	<input type="checkbox"/>
	Perception	<input type="checkbox"/>	<input type="checkbox"/>
	Tunnel Vision	<input type="checkbox"/>	<input type="checkbox"/>
	Overload of information	<input type="checkbox"/>	<input type="checkbox"/>
Memory Error A failure of recall from memory.	Distraction	<input type="checkbox"/>	<input type="checkbox"/>
	Confusion	<input type="checkbox"/>	<input type="checkbox"/>
	Overload - too much info to retain	<input type="checkbox"/>	<input type="checkbox"/>
	Distraction/preoccupation	<input type="checkbox"/>	<input type="checkbox"/>
	Insufficient learning	<input type="checkbox"/>	<input type="checkbox"/>
Decision Error A failure in judgement, decision making or planning.	Mental block	<input type="checkbox"/>	<input type="checkbox"/>
	Failure to integrate several pieces of info	<input checked="" type="checkbox"/>	<input type="checkbox"/>
	Not knowing long term effects of decision	<input type="checkbox"/>	<input type="checkbox"/>
	Mindset - sticking to a faulty plan despite the evidence.	<input type="checkbox"/>	<input type="checkbox"/>
	Knowledge problem	<input type="checkbox"/>	<input type="checkbox"/>
Action Error A failure when taking action, including speech.	Decision freeze	<input type="checkbox"/>	<input type="checkbox"/>
	Confusion - confusing information or objects of similar appearance	<input type="checkbox"/>	<input type="checkbox"/>
	Intrusive thoughts -	<input type="checkbox"/>	<input type="checkbox"/>
	When you do or say something unintended.	<input type="checkbox"/>	<input type="checkbox"/>
	Intentional Behaviour Situational Organisational benefit Personal benefit Reckless	Where it's impossible to do the task and be compliant	<input type="checkbox"/>
Where you think your behaviour will achieve what your manager wants		<input type="checkbox"/>	<input type="checkbox"/>
Short cuts for personal goals		<input type="checkbox"/>	<input type="checkbox"/>
Acts with blatant disregard for risk		<input type="checkbox"/>	<input type="checkbox"/>
Acts with blatant disregard for risk		<input type="checkbox"/>	<input type="checkbox"/>

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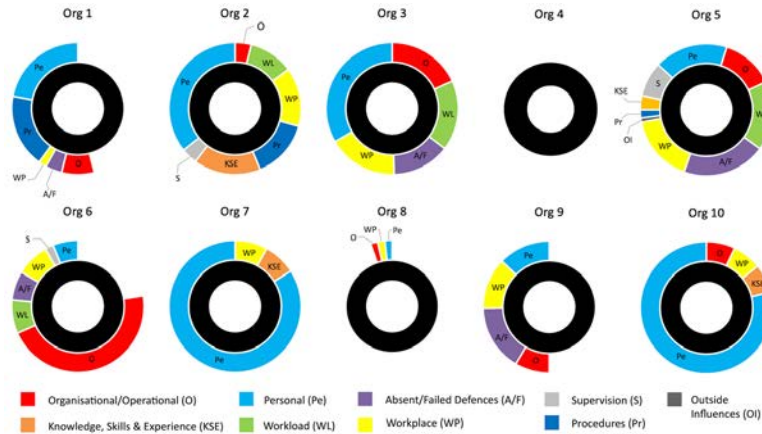
# What info does a SPAD Pro Forma feature?

Report Section	Overview of Content
1 Introduction	Detail of the event, e.g. date/time, brief description, purpose, summary of evidence, and investigator names.
2 Executive Summary	Overview of the contents of the full reporting.
3 Summary of Evidence	Assimilation of all data, facts and evidence gathered.
4 Summary of Events	Description of events, decisions and actions leading up to, and after the event; usually in the form of a timeline.
5 Factors for consideration	Identifies why the investigation came to its conclusions, describes thought processes, weighs up evidence and resolves conflicts.
6 Conclusions (including Causes)	Outcomes of deliberations and evidence evaluation; determines how all immediate and underlying causes link to evidence.
7 Recommendations	Contains proposed improvements that address the immediate and underlying causes.
8 Appendices (if needed)	Any additional information that allows for a full understanding of the report.

*RSSB Standard for Accident and Incident Investigation (2019a)*

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# Australasia Case Study



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# Australasia Case Study

Driver stated they were **distracted by personal issues & did not correctly observe or respond to signal aspect.**

Driver **misread signal.**

Driver was **distracted on signal approach. Distraction & at-risk/reckless behaviour** contributory factors.

Driver was **asked to drive additional service near end of shift, potentially contributing to loss of focus. Driver did not recheck signal. Train Manager distraction & environmental conditions led to giving right of way through red signal.**

Driver **not driving with due care due to complacency, lack of attention and a lapse in concentration failed to identify red signal.**

Driver was **distracted by track workers. Distraction & at-risk/reckless behaviour** contributory factors.

Driver was **not competent at location and was not being supervised. Driver forgot prior instructions & misread signal during shunting move.**

Driver was **distracted by schedule checking on signal approach. Distraction, loss of attention & at-risk behaviour** contributory factors.

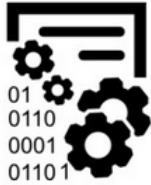
Driver **did not comply with rules, reset trip valve & continued. Attention, inexperience/lack of route knowledge** contributed.

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# Australasia & Ireland: Key Themes

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Objective data vs. subjective data



The design of a pro forma can coerce SPAD investigation & analysis



A pro forma is only as good as the investigator



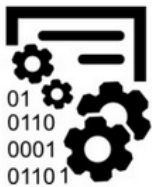
What are we really learning?

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# Australasia & Ireland: Key Themes

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## Objective data vs. subjective data

- An abundance of objective data is collected and permeates through the pro forma – both a blessing and a curse
- Subjective data relies on well-designed pro forma
- Subjective data relies on competency of investigator
- How heavily do the different types of data weigh in analysis and the calculus of decision making?

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## Australasia & Ireland: Key Themes

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### The design of a pro forma can coerce SPAD investigation & analysis

- The focus of the proforma determines the focus of investigations
- If some factors are more heavily referenced in the pro forma, that is the path the investigator will be led down
- If the proforma has a good spread across themes and levels of the system, the investigator might be more challenged, but the investigation should be more productive
- A poorly designed proforma is a contributing factor

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## Australasia & Ireland: Key Themes

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### A pro forma is only as good as the investigator

- Even well designed pro formas serve only to drive consistency in the type of information collected
- The real learning from investigations comes from the ability and willingness of investigators to pursue systems influences
- Investigator skill sets tend to focus on data collection and analysis, maybe not enough on systems and critical thinking

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# Australasia & Ireland: Key Themes



## What are we really learning?

- If the pro formas underpinning SPAD reports continually result in outputs that are focussed on driver errors, do they really support organisational learning?
- Good pro formas should be driving trend analysis of the systemic factors that need to be addressed to improve overall performance

# Australasia & Ireland: Observations

What do SPAD pro formas do well?	What could be improved?
Structure data collection	Incorporation of subjective evidence
Capture objective evidence	Provide/enhance narrative that explains the event
Lay out the facts of an event	Drive investigators more deeply into the systemic causes
Drive consistency between investigators	Facilitate good investigators to 'follow their noses'



## Next Steps




- SPAD Precursor Behaviours
  - Work schedules
  - Psychometrics
  - Dashboard categorisation
  - Systems influences
- SPAD Pro Forma
  - Developing a Pro Forma for Australasia
  - Extending the study – interested in participating?

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