



Rail Accident Investigation Branch

# Integration of a causal analysis process into RAIB

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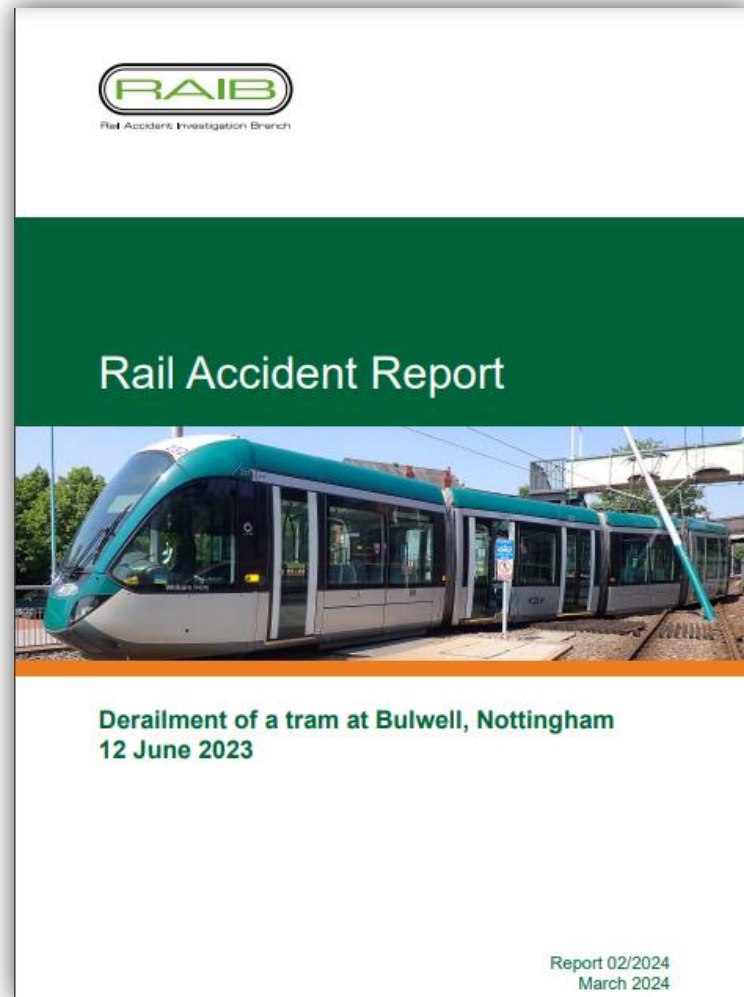
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# RAIB – Key facts

- **Independently** investigates accidents to improve railway safety, and inform the industry and the public
- Formed in 2005 as a result of Ladbroke Grove recommendation
- **No blame investigations – does not prosecute**
- Scope covers serious accidents involving moving trains and incidents that may have led to an accident. Includes mainline, metros, trams and heritage rail
  - Acts as lead agency for safety investigations
- Results are published as reports or safety digests on [www.gov.uk/raib](http://www.gov.uk/raib)
  - May also issue Urgent Safety Advice (USA)



# Improving safety



- Understand causes of accidents
  - Logical and structured approach
  - Supported by evidence, and thorough analysis
  - Traceable
- Making recommendations to industry to prevent them reoccurring
  - Linked to causes
- Securing industry buy-in
  - Regular liaison through investigation
  - Formal and informal consultation
- Clearly presented analysis and conclusions in published report

# The causal analysis process

*“Causal analysis is the process that guides and directs RAIB investigations in determining the factors that were causal to the accident.”*

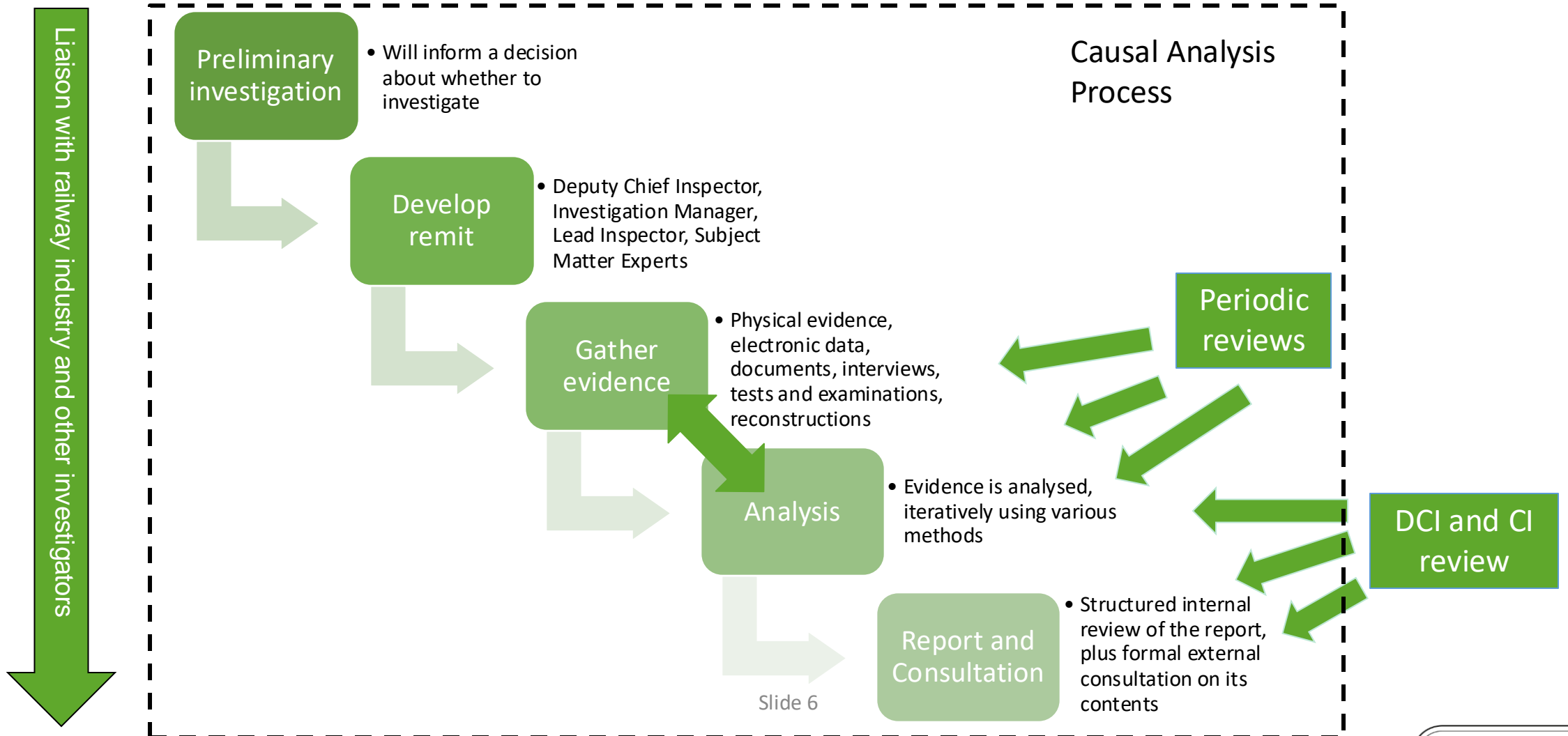
Causal analysis consists of several elements: definition of the accident title, definition of the system safety model, definition of the immediate cause, the sequence of events, and development of a fault tree.

How this is further refined and better integrated into the wider RAIB investigation process has been the focus of this work.

# Why was a change required?

‘Causal Analysis’ as a process to identify accident causes has been carried out at RAIB since the branch was set up, but it was not integrated into the wider investigation process.

# Investigation process



# Understanding the Causal Analysis process

- The aim of the interviews was to understand the inspector's attitudes to having a defined CA technique, what they were doing currently in terms of CA, the barriers to use, and what they felt they needed in terms of training and support
  - Interviews with 20 inspectors, and the DCI
- Six key themes identified from the interviews:

- Techniques
- Timing, personnel, and responsibilities
- Facilitated causal analysis workshops
- Review of the CA
- Presentation of findings
- Training

# Integration into the investigation process

## 1. Initial Strategy Meeting - NEW

Who is present?	IM, LI, and SMEs
What is done?	<b>This session may be run by a facilitator (independent to the investigation)</b> <b>Working together:</b> <ul style="list-style-type: none"><li>• <b>The accident title is decided upon and the immediate cause</b></li><li>• <b>A system safety model is produced</b></li><li>• <b>An initial sequence of events and outline fault tree is modelled</b></li><li>• <b>Evidence collection and interview strategies are developed</b></li><li>• <b>The remit is written</b></li></ul>
Outputs:	The system safety model; agreed upon by the IM, LI, and SMEs The initial sequence of events and outline fault tree
Key Points:	The LI must maintain ownership of the causal analysis at all times



# Integration into the investigation process

## 2. Causal Analysis Workshop – NEW (was done ad-hoc before)

Who is present?	IM, LI, SMEs, and facilitator
What is done?	<p><b>This session should be run by a facilitator (independent to the investigation)</b></p> <p><b>This session should build on everything already developed in the ISM, and take into account additional evidence which may have been collected in the meantime</b></p> <p><b>Aim is to confirm the system safety model and agree the emerging sequence of events and from these agree the fault events that were causal to the accident. On the basis of these to prepare a fault tree identifying possible causes and the evidence that needs to be collected to confirm or discount causal scenarios.</b></p>
Outputs:	Updated sequence of events Fault tree List of additional evidence / updated evidence strategy
Key Points:	Discounted factors should be identified and documented

# Integration into the investigation process

## 3. Subsequent review meetings

Who is present?	IM, LI, SMEs
What is done?	<p>This session should be a technical review of the emerging causal analysis and a review of progress against the remit. <b>The causal analysis / Fault Tree will be used as a basis for the discussion.</b></p> <p>It is the IM's role to:</p> <ul style="list-style-type: none"><li>• Challenge the logic and ensure it is sound and supporting evidence is present</li><li>• Review the discounted factors</li><li>• Challenge assumptions</li><li>• This session should build on everything already developed in the ISM, and take into account additional evidence which may have been collected in the meantime</li></ul>
Outputs:	A finalised fault tree detailing the immediate cause, the causal factors, and underlying factors
Key Points:	Evidence attribution should be checked at this stage

# Integration into the investigation process

## 4. DCI Review

Who is present?	IM, LI, SMEs, DCI
What is done?	<p>This session ensures that the DCI is satisfied that the remit has been completed and all lines of enquiry addressed. <b>The DCI also agrees at this stage the logic of the causal analysis</b>, and that it is broadly consistent with previous relevant investigations.</p> <p>Any proposed changes will need to be incorporated into the FTA to validate them.</p> <p>Recommendation areas will be discussed.</p>
Outputs:	A finalised sequence of events and fault tree diagram
Key Points:	Any changes to the causal analysis will need to be agreed between the LI and IM

# Integration into the investigation process

## 5. CI Final Analysis Review (FAR)

Who is present?	IM, LI, SMEs, DCI, CI
What is done?	<p>This session ensures that the CI is satisfied that the remit has been completed and all lines of enquiry addressed.</p> <p><b>The CI also agrees at this stage the logic of the causal analysis</b>, and that it is broadly consistent with RAIB policy and previous relevant investigations.</p> <p>The CI will also ensure that there are no objections to the causal analysis findings and that the causal analysis is a suitable template for the report.</p> <p>Recommendations will also be finalised.</p>
Outputs:	A summary report detailing the report title, immediate cause, causal factors and underlying factors, and recommendations.
Key Points:	After this stage, the report is written.

# Conclusions

- The causal analysis process has been developed into a defined framework that will be fully integrated into the Investigation process
- The ISM meetings have been used at the start of investigations and have been well received by inspectors
- Facilitated Causal Analysis sessions have been introduced towards the start of the investigation
- Guidance is being developed around facilitating sessions and definition of roles and responsibilities within the Causal Analysis Process
- Revised training material is being developed, and training of different Accident Analysis Techniques is being explored.

# Thank you!