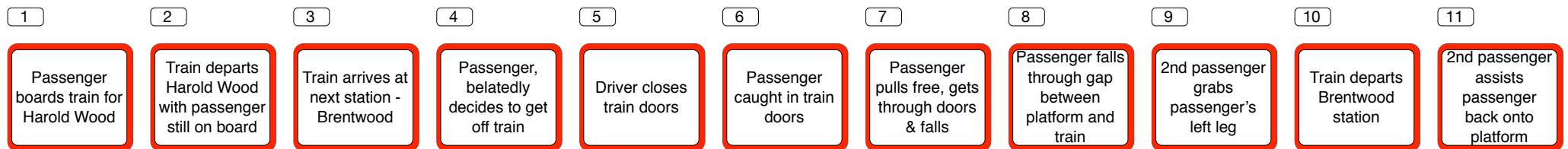


1. Introduction

1. The following report is based on the UK's RAIB report 19/2011, November 2011, Passenger accident at Brentwood station.
2. This Tripod Beta report in no way criticises the excellent RAIB report and is only provided as an alternative way of displaying their findings.
3. The numbers in the Tripod beta element correspond with the paragraphs within the RAIB report.
4. A glossary of terms is provided at the end of this paper

2. Timeline

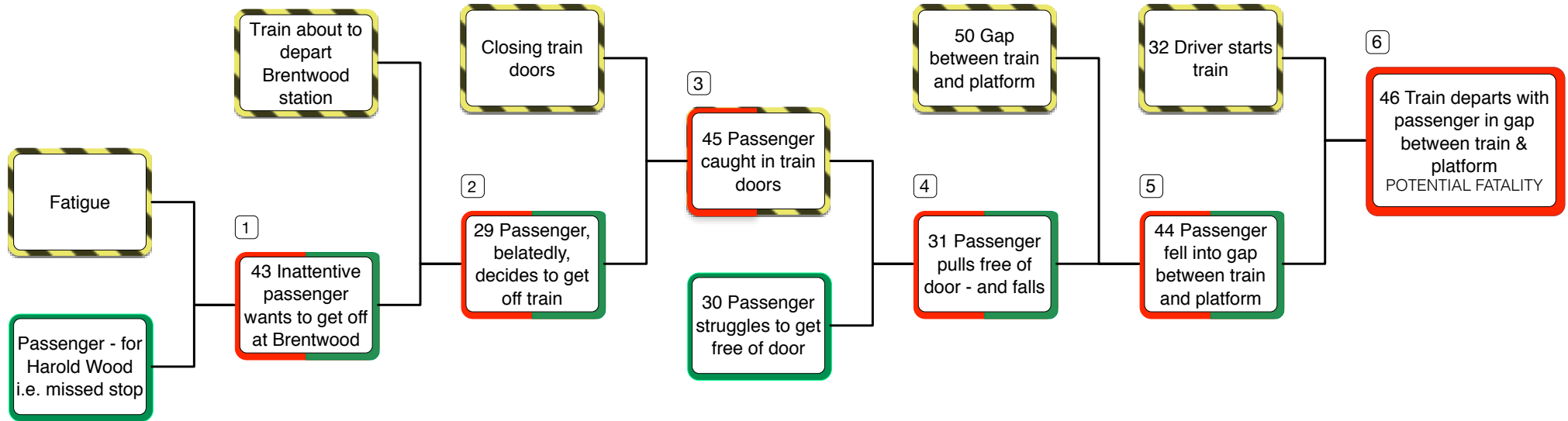
1. Key events are plotted in a timeline
2. Note: only events and decisions are plotted i.e. no conditions
3. The events have been numbered to help the reader link them to the Tripod Beta diagrams
4. Time moves from left to right



3. Tripod Beta core trios

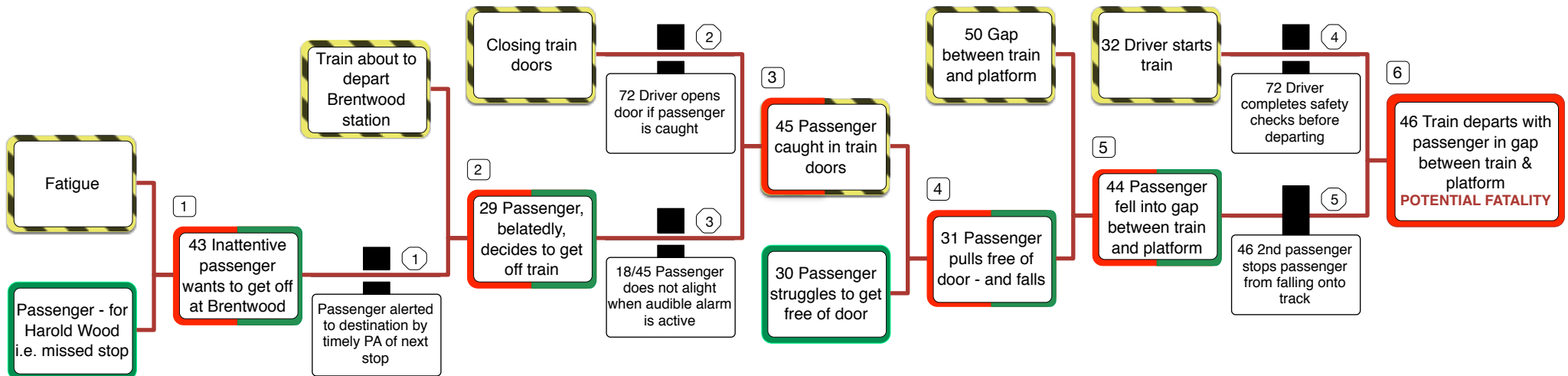
1. The timeline is converted into a string of Tripod Beta trios
2. The sentence "EVENT as a result of AGENT acting upon OBJECT usually helps in compiling the trios.
3. The AGENT is the thing doing the harm and the OBJECT is the thing being harmed
4. The OBJECT description describes the OBJECT prior to the AGENT acting upon it.
5. The EVENT description describes the OBJECT after the AGENT has acted upon it.
6. Diagrams always start with an AGENT and an OBJECT and always finish with an EVENT
7. In this case the final EVENT did not happen but it could easily have been a fatality so, to highlight the severity of the incident, the final EVENT is shown as a POTENTIAL FATALITY

Tripod Beta case study
Based on RAIB report 19/2011
Passenger accident at Brentwood Station 28 January 2011



4. Barriers

1. We examine each trio to see if the AGENT trajectory should have been blocked in some way i.e. with a control BARRIER
2. We do the same with the OBJECT leg to see if a defence BARRIER should be in place.



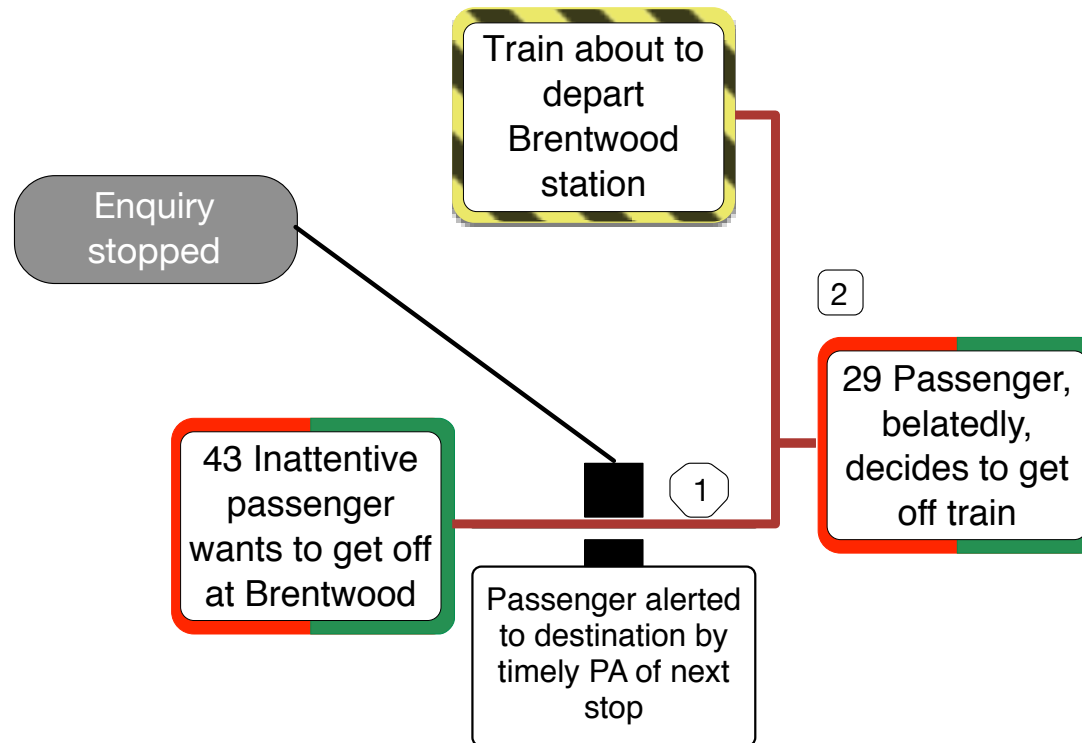
3. Barriers are described in such a way that, had they been effective, the next EVENT could not have happened.
4. In this diagram, not all trios have a BARRIER – this is not unusual.

5. Barrier failure causation path

1. Taking each barrier in turn we now define why it failed

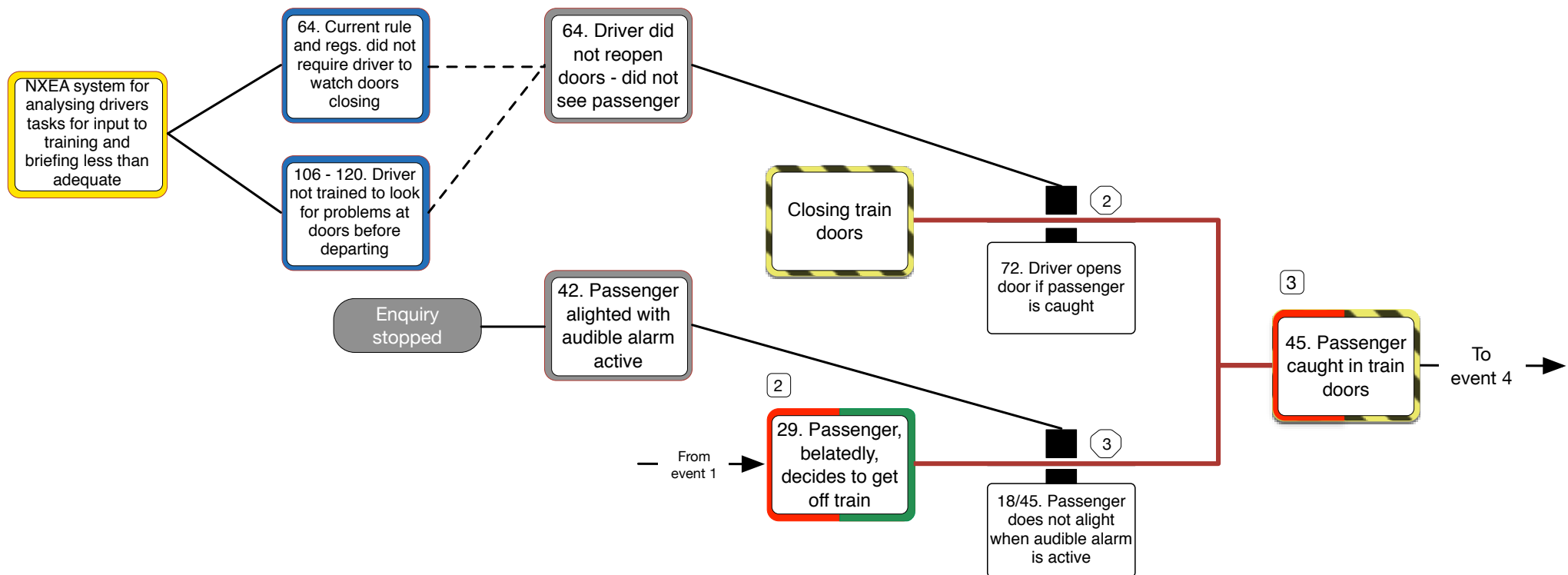
Barrier 1

1. In BARRIER 1 the RAIB did not pursue this line of enquiry but is shown here for completeness



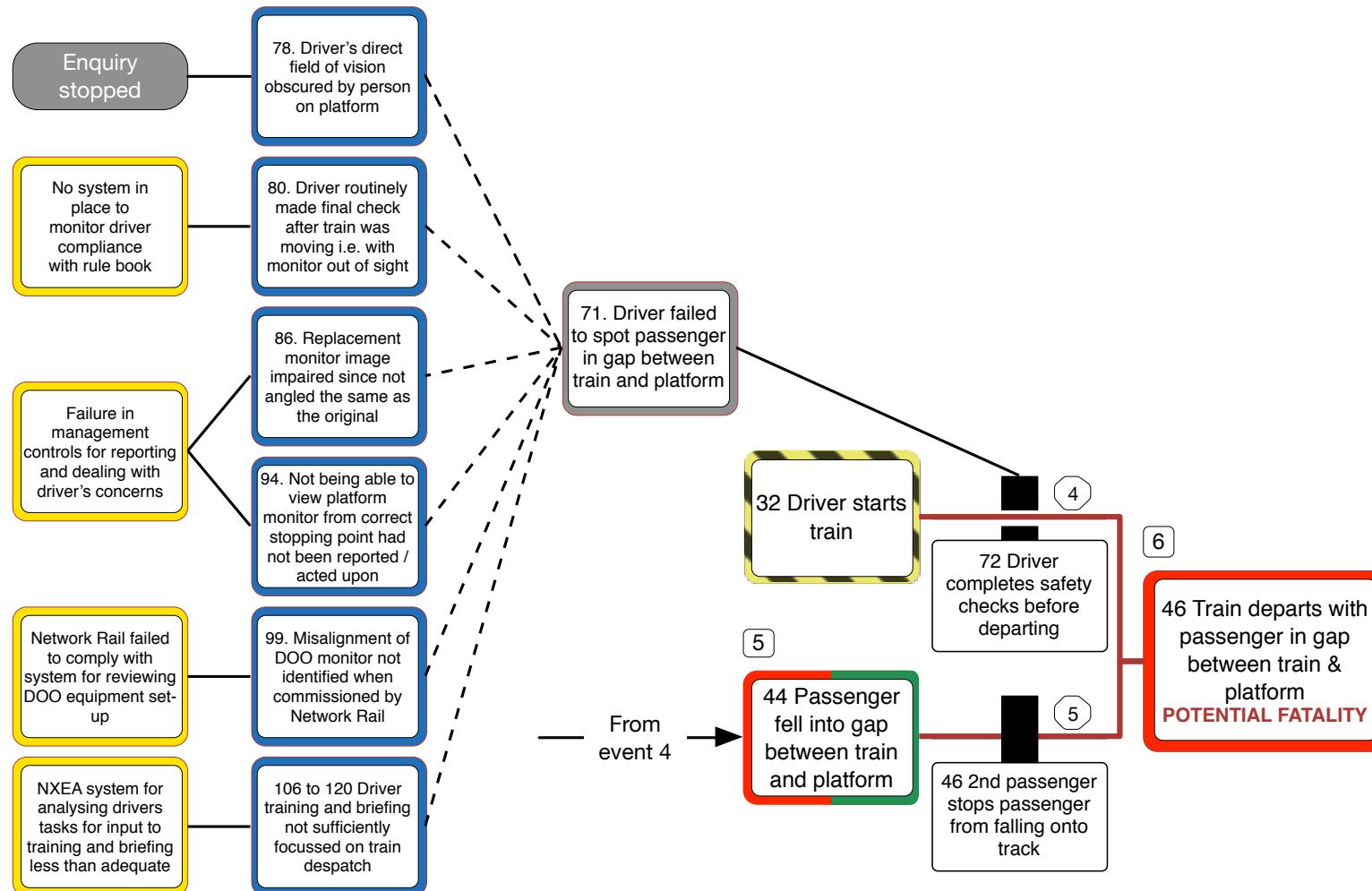
Barrier 2 & 3

1. BARRIERS are defeated by a single substandard act (or inaction) – this is the IMMEDIATE CAUSE and is shown in grey boxes on the diagram.
2. The description of the IMMEDIATE CAUSE clearly identifies the perpetrator of the substandard act.
3. Substandard acts are promoted or influenced by the conditions in the workplace and the physical condition or state of mind of the perpetrator.
4. These performance influencing factors are called PRECONDITIONS and are the blue boxes on the diagram.
5. PRECONDITIONS describe: conditions, situations, circumstances, and states that led to the substandard act.
6. Note the dotted line between PRECONDNTIONS and IMMEDIATE CAUSE this is to show that it is not a definite cause v effect relationship i.e. the PRECONDITION increased the likelihood of the IMMEDIATE CAUSE occurring.
7. The yellow boxes show the systemic flaws and management controls that caused the PRECONDITIONS; these are UNDERLYING CAUSES.
8. The failure of the audible alarm BARRIER (3) was not pursued in the RAIB report.



Barrier 4 & 5

1. The PRECONDITION relating to the person obscuring the driver's field of vision was not pursued further in the RAIB report i.e. statement 78.
2. Six preconditions are believed to have influenced the driver's performance in this one substandard act – this is not unusual. The number of preconditions is often determined by how thorough the investigation team are.



6. Glossary of terms and abbreviations

CCTV	Closed circuit television
DOO	Driver only operation
NXEA	National express East Anglia
OTDR	On train data recorder
RSSB	Rail safety and standards board
RAIB	Rail accident investigation branch