

Mapping the contributing factors associated with the Waterloo Underground station accident (2020)

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SUMMARY

This paper discusses the use of the AcciMap technique for the analysis of the Waterloo Underground station accident, where a 59 year old man has lost his life following a fall at the Platform-Train Interface (PTI). In addition to mapping the factual sequence of events, the AcciMap allowed us to reflect on latent risk-contributing factors that are worth exploring in view of developing and implementing secondary controls.

KEYWORDS

Platform-Train interface, AcciMap, Waterloo Underground station, accident, risk

Introduction

According to the Rail Safety and Standards Board (RSSB), the risk at PTI accounts for almost half of the passenger fatalities on the mainline railway network (RSSB, 2021). PTIs are recognised hot-spots across underground networks worldwide (Poirier et al., 2020). The Rail Accident Investigation Branch (RAIB) report on the Waterloo Underground station accident from 2020 (RAIB, 2021) was used to map the sequence of events preceding the accident using the AcciMap technique.

Method

Rasmussen's Risk Management framework (Rasmussen, 1997) distinguishes between six hierarchically organised system levels that can be used to visually illustrate the relationship between system characteristics and processes, actions and decisions that all contribute to an end state of the system or a specific event. For the Waterloo accident, we have used a modified version of the framework separating the factors that concern the main actors from the factors concerning their social and physical environment. This allows us to follow the journey of the main actors and their interaction with different system elements at a given point in time.

Results

A 59 year old man got caught in the gap between the train and the platform after alighting a northbound Bakerloo line train. He made attempts to climb out until the initial train departed and was hit by a second train that entered the platform, causing fatal injuries. Curved platforms, as is the case of the Waterloo platform, exacerbate the risk of PTI accidents due to the limited visibility of the platform edge. The AcciMap confirms the causal factors for the Waterloo accident as identified in the RAIB report:

1. **Passenger fell into the PTI gap while alighting the train.** Various measures have been considered by London Underground (LU) to prevent a person falling in the PTI gap (RSSB, 2021). The AcciMap links this factor not only to the size of the gap but also to any specific safety measures that may be in place for people with reduced mobility as the passenger had a previous leg injury.
2. **The train operator did not see the passenger while trying to climb back onto the platform.** It was not possible for the train driver to identify the passenger due to their position and the One Person Operation (OPO) monitors not being optimised to show the gap between the train and the platform. LU train operators are not required to continuously monitor the platform during prolonged stops and LU guidance is more focussed on training drivers to spot anomalies on and above the platform level (RAIB, 2021).
3. **The train operator of the second train did not see the passenger on the track on the approach to the station.** The second train entered the station at speed and may have failed to identify the passenger on the track while preoccupied by another recurrent issue. This suggests that any potential countermeasure should be examined in line with considerations of the driver tasks and cognitive abilities. The RSSB Safety Review (2021) points to similar incidents where trained drivers and instructors have failed to identify trapped passengers during dispatch.
4. **No-one saw the passenger on the track until it was too late to intervene.** Two members of the public joined the train while the passenger was actively attempting to climb out of the gap. A third member of the public likely identified the passenger on the track while preparing to join the second approaching train. It is not clear whether they were any passengers remaining inside the first train after the passenger alighted.

Discussion

It is understood that TfL is considering moving the platform nosing stones at various locations to reduce PTI gaps. OPO monitors have been upgraded to give a clearer view of the platform edge and a driver training programme has been rolled out to ensure consistent procedure for train dispatch is implemented. Some short term measures consisting in more surveillance of the platform through CCTV or dispatch staff during quiet periods have also been considered and implemented specifically at Waterloo platforms. These measures have the potential to reduce the risk of similar accidents and are in line with the risk contributing factors as identified by the AcciMap and the RAIB report. Given the variability of PTI layouts and characteristics (i.e. track curvature, passenger flow, platform dimensions, platform furniture and safety markings, train characteristics, dispatch procedures and associated safety equipment such as platform CCTV systems), it will be hard to implement a one size fits all solution for the whole of the network. Analysing previous accidents or near-misses in a similar way can help identify short-term and secondary solutions that could be implemented and tailored to specific locations considering customer characteristics and the context of the wider area. Customer awareness and educational campaigns along with train driver training would play a key role to the adopted risk reduction plans and programmes in the long term.

References

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