

Report KPT-webinar ‘Learning from disasters’

Date	September, 29th 2025
Time	12.00-13.00h
Location	digital
Participants	83

Opening and introduction to the KPT

Daan Seesing, team member of the KPT, opens the webinar and warmly welcomes all participants. After some housekeeping announcements, Daan introduces today's speaker: Dr. Iain Bowman. Dr. Bowman is a Mechanical Engineer with 34 years' global and North American experience in all aspects of fire and life safety and tunnel systems, currently based in the UK. Working for Mott MacDonald, he has a wide range of experience including tunnel ventilation systems design, analysis, inspection, testing and commissioning and Fire & Life Safety engineering. He is experienced in mechanical engineering design / analysis, 3D design, and management of large multidisciplinary projects. He currently serves on the Technical Committee for the NFPA 502 Standard and is a member of the Scientific Committee for the International Symposium on Tunnel Safety and Security, which we as KPT also had the opportunity to attend earlier this year.

After a brief introduction, Iain mentions that the paper he's presenting was originally delivered at the ISTSS-conference in Reykjavik in April, and is available in the conference proceedings via the ISTSS-website for those interested in further details. It is also available on the KPT-website (search in 'Kennisbank').

He reflects on how every disaster represents a profound failure, one that can cost lives and cause severe disruption. The only meaningful response is to learn from such events.

While safe infrastructure is the goal, hazards like fire can never be fully eliminated. Therefore, operational controls and safety processes are essential. By studying past events, planning and execution can be improved.

In his talk today, he focuses on three case studies: one disaster, one major incident that was contained, and one near miss.

After the presentation, several questions are asked. We thank Iain for the added written extensions on some of the given answers during the webinar. **Questions and answers**

- Question 1:

If you look at the outcome of your research, what would you advise tunnel owners to focus on?
Undertake a safety review on your safety system. Is the actual use conform the initial design intended use at that time? Monitor how you operate in comparison with your original design.

Extension of response 2025.09.26:

It would be advisable for tunnel owners and operators to maintain a program of regular reviews of safety in their asset operations. Such reviews should consider a variety of factors including, but not limited to:

- (i) is the facility still operating within its original design parameters, or has its usage changed such that safety systems may be stressed or inadequate for the current usage,
- (ii) are the facility safety systems fully operational and being maintained correctly?
- (iii) are the facility's safety plans and emergency response plans up to date and satisfactory for current operations?
- (iv) is staff training up to date and correct for current operations, and are staff fully aware of their responsibilities in emergency?
- (v) is there a need to revise, update, or upgrade any of the safety systems or plans?

This is just a sample of the sort of things that operators should be monitoring, reviewing and updating as needed.

- Question 2:

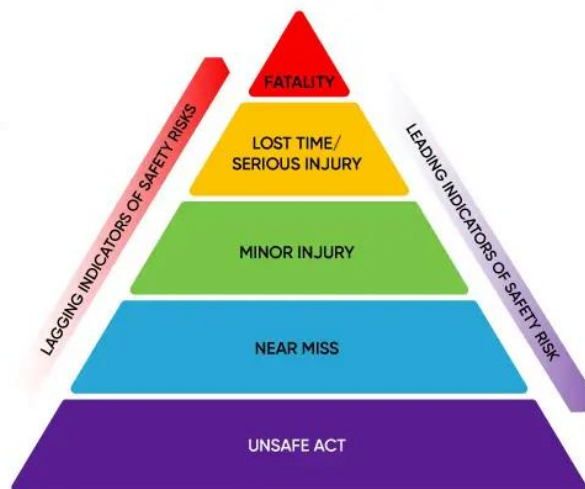
When analyzing this kind of events, couldn't it be 'human' (e.g. logical) to diverse to a lot of reasons and aspects if there is a large number of casualties? If the outcome is not as dramatic, the analysis process may be less sharp or deep?

This can be the case, but it is the responsibility of the tunnel operator. The level of transparency varies depending on the reporting. Maybe additional cases / further study can look into this.

Extension of response 2025.09.26:

For sure more severe incidents are likely to naturally attract a higher level of scrutiny than less severe incidents. However the operator should have an attitude that treats all incidents as equally worthy of in-depth review. They should be aware of tools such as the safety triangle, which illustrates the hierarchy of incidents and how near misses and minor incidents can be indicators of increased risk of more serious incidents if ignored. (see below.)

Heinrich's Triangle Theory



- Question 3:

This is a preliminary study in need to validate further. Is speaker also initiating this follow-up/validation to this study? Or does speaker know if somebody else is?

The speaker would love to do so, but has not currently got the available time and he is not aware of any follow-up. When he began this research, he couldn't find any comparable studies that answered his questions so he dove into this subject.

Extension of response 2025.09.26:

I would be more than happy to collaborate with someone else to extend the data set of case histories!

- Question 4:

The paper shows recurring organisational behaviours like poor planning, weak maintenance, and poor safety culture across disasters. But how do we avoid turning these labels into hindsight-driven blame, and instead understand why these behaviours made sense to organisations at the time?

There are many examples where issues were mentioned or reported in the past, but they were often ignored for commercial or political reasons. The difficult part is changing the organisational side of the system.

Extension of response 2025.09.26:

The presence of these behaviours in an organisation may arise for many reasons, including human nature, time pressures, cost pressures etc. However a conscientious owner/operator should be alert for the occurrence of such behaviours and should have zero tolerance for them, since they have been found repeatedly to be precursors to major incidents and to disasters. Such an attitude needs to be driven from the top of the organisation down and the organisation needs to be fully committed to having a good safety culture.

- Question 5:

How far do you go with the concept human behavior? Also many installation failures go back to design or installation (including testing) defects. So, it will always go back to defects in human behavior?

The focus on design is often obsessive in many situations, but the idea behind the design is frequently forgotten as staff changes over the years.

Extension of response 2025.09.26:

Nobody is perfect (least of all me!), but by being alert and aware of safety issues and emergent risks, it should be possible to minimise the probability of disaster. As noted in the response to comment #1, it is important to remember the original design parameters and be aware if current usage has exceeded those parameters, in which case mitigating measures for the changed usage likely need to be implemented, e.g. systems upgrades or replacement, operational controls to mitigate the increased risk, etc.

- Question 6:

What do you advice to tunnel owners in countries that commission their first modern road tunnel after many years operating 50 year old road tunnels when it comes to exclude human error?

The best approach is to consult with other tunnel owners and operators, as there is a wealth of knowledge in the underground industry. For those doing this for the first time, it's important to connect with experienced operators, emergency services, and fire departments to gain up-to-date, best-in-class insights.

There is ongoing discussion and concern among firefighters about how to handle battery electric vehicle (BEV) fires in tunnels. While these incidents are very rare, they are particularly challenging due to the risk of fire spreading to other vehicles, the possibility of battery reignition, and the difficulty of safely removing the vehicle from the tunnel. Firefighters are putting a lot of effort into developing effective response strategies, and they possess valuable expertise - so if you're concerned about fire hazards, it's important to consult and listen to them. It's always wise to involve firefighters, but also speak with other operators of new facilities to learn from their experiences. Gather as much knowledge from others as possible.

Extension of response 2025.09.26:

Such operators can also engage consultants and others who are experienced in the design, construction and operation of tunnel assets. I know of a highways authority who constructed a new, complex highway tunnel who hired the manufacturer of the tunnel SCADA system on an on-call basis to provide assistance when needed with the new, complex SCADA system.

The webinar concluded with a word of thanks from Daan to the speaker and participants.