Road safety's Vision Zero: applications to OH&S

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Researchers across Monash, including from Civil Engineering and the Accident Research Centre (MUARC), have long been involved in road safety. This has included advocating for wider adoption of the Safe System approach[1], in which there is an acknowledgement that human error is inevitable, and that it is road designers and managers, rather than users, who have primary responsibility for ensuring safe outcomes. Underlying this is 'Vision Zero': a philosophy that death or serious injury should never be the outcome of road system failures[2].

Are our current approaches to (non-road-related) OH&S matters aligned with Safe System principles? This Safety Day discussion explores these issues, and provides perspectives from road safety engineering, where death and serious injury remains a daily occurrence, on how (non-transport-related) safety management might be further improved.

The most recent Guide to Road Safety Auditing[3] includes a new risk assessment matrix (Figure 1). It is similar to most other risk-management approaches, with likelihood and severity combined to given a ranking of risk from negligible (white) to extreme (red). What is different, however, is the large black line separating 'moderate' crashes resulting in injury and presentation to hospital from worse outcomes (Figure 2).

This black line represents the threshold between crashes that result in Fatality or Serious Injury (FSI) outcomes and those that do not. Under the Safe System and Vision Zero the potential for such crash outcomes is **never** considered acceptable. It is **not** sufficient to reduce the likelihood of FSI crashes. Rather, hazards that might result in a FSI crash must be eliminated entirely, or treated in a way that reduces the severity of outcomes below the FSI threshold.

This has resulted in a change to the way that us Road Safety Auditors make findings and recommendations. The problem with previous approaches where auditors might recommend measures that only reduce crash likelihood[4] is that they **do not eliminate** FSI outcomes. When considering the amount of driving done across the population, even if crash likelihood is reduced a thousand-fold, at some stage someone is going to depart the traffic lane and impact something at speed that might result in death. Such likelihood-reduction measures still have their place, but the Safe System approach emphasises making even highly unlikely crashes survivable.

This is part of the reason that wire rope safety barrier, lower speed limits and other such measures that lower crash severity are now often recommended in Road Safety Audits, and installed along roads.

[1] Transport Accident Commission (TAC). Meet Graham. 2016. URL `http://www.meetgraham.com.au/`

[2] Mary Lydon and Blair Turner. Building a safe system for transport. In Alexa Delbosc and William Young, editors, *Traffic engineering and management*, chapter 20, pages 555–572. Monash University Institute of Transport Studies, Clayton, Victoria, seventh edition, 2017

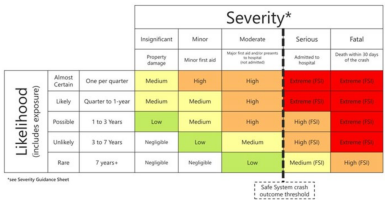

Figure 1: Austroads Road Safety Audit risk matrix

[3] P. Hillier. *Guide to road safety: part 6: road safety audit*. AustRoads, Australia, 2022. ISBN 9781922700223. URL `https://austroads.com.au/publications/road-safety/agrs06`

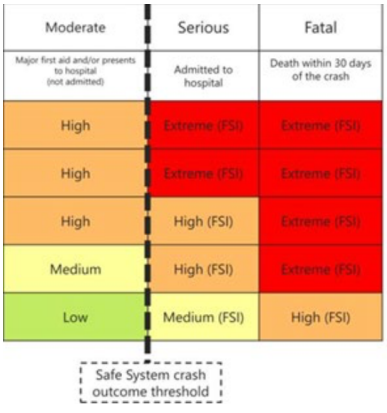

Figure 2: Austroads Road Safety Audit risk matrix - Moderate, Serious and Fatal

[4] e.g. linemarking, tactile pavement markers or better lighting.

An impact speed of around 70km/hr is the typical threshold for head-on crashes to result in serious injury or fatality[5] and so it is now common to see wire rope safety barrier in the centre of highways or freeway medians. Wire rope safety barrier will not reduce the likelihood of an errant vehicle, but it will prevent that vehicle from hitting someone coming in the opposite direction. Hitting wire rope safety barrier at high speed will still be a serious crash, but unlike a high-speed head-on, hitting a flexible crash barrier first can help to keep impact forces within the range that can be tolerated by a human body[6].

[5] 50km/hr for right angle crashes, 40km/hr for impact with roadside object, 30km/hr for crash involving pedestrian, cyclist or motorcyclist (see Hillier (2022) cited above). That said, a (1-2 ton) car can crush you even moving at low speeds.

[6] Transport Accident Commission (TAC). Meet Graham. 2016. URL `http://www.meetgraham.com.au/`

So what do we do in OH&S management? Figure 3 shows the risk matrix used in the SARAH system here at Monash. The highlighted location is a 'medium' risk, at the intersection of a 'probable' event that results in 'minor' injury (resulting in a need for first aid). This 'medium' risk level is **identical** to that for an 'unlikely' event resulting in hospital admission, or a 'rare' event resulting in fatality or permanent disabling injury. This contrasts to the 'Vision Zero' approach, where hospital admission or fatal outcome incidents would be separately categorised, identifying the need to reduce consequences below the FSI threshold or otherwise eliminate the hazard.

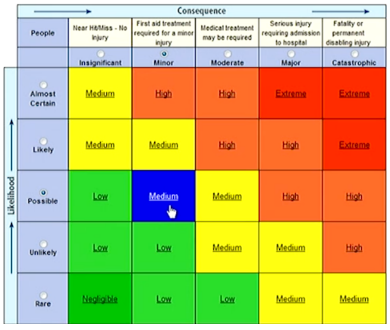

Figure 3: Risk matrix, SARAH

Thinking of a practical example from Clayton, Figure 4 shows a warning sign in Alliance Lane, related to forklifts being in use within a shared zone. The purpose of this sign appears to be to reduce the likelihood that a pedestrian and forklift collide, by warning pedestrians to be vigilant. However, both are apparently allowed to be in the same place at the same time, meaning that a pedestrian being crushed to death by a forklift is still a possible outcome[7], even though this would be an incredibly rare event. Contrast this to the warehouse space immediately before the checkouts at any IKEA. This area is used by both shoppers and forklifts, but never at the same time, eliminating the possibility of the public and a forklift colliding[8].

Figure 4: Alliance Lane warning sign

[7] Think of a child that gets away, someone who does not see or ignores the sign, or the countless times you might have walked down Alliance Lane when there were no forklifts active.

[8] Meanwhile...in the public loading bays outside IKEA...

In summary the key message from road safety engineering is to focus especially on hazards that might causes serious injury or fatality (no matter how unlikely). Reducing consequences or total elimination of these is at the core of the new(-ish) Vision-Zero-based thinking, although there is clearly a long way to go[9]. While the context in OH&S is different[10] the Safe System approach would imply the use of measures that reduce the severity of potentially fatal or serious injury outcome incidents (or to make these entirely impossible). In road safety we are shifting to acknowledge that human error is inevitable, and that systems need to fail safely. I recommend doing the same in you management of OH&S risks.

[9] 241 road deaths in Victoria in 2022 (Source: https://www.tac.vic.gov.au/)

[10] 66 workplace deaths in Victoria in 2022 (Source: https://www.worksafe.vic.gov.au)