



[Watch Webinar Recording Here](#)

Advances in Railway Safety

Thursday, 14th July 2022 | Technical Topic Webinar

Presented by Dr. Daniel Faraji, EIT Lecturer

We are dedicated to ensuring that you receive a world-class education and gain skills that you can immediately implement in the workforce.



Engineering Specialists

EIT is one of the only institutes in the world specializing in Engineering. We deliver professional certificates, diplomas, advanced diplomas, undergraduate and graduate certificates, bachelor's and master's degrees, and a Doctor of Engineering.



Industry Oriented Programs

Our programs are designed by industry experts, ensuring you graduate with cutting-edge skills that are valued by employers. Our program content remains current with rapidly changing technology and industry developments.



World-Class Australia Accredited Education

Our vocational programs and higher education degrees are registered and accredited by the Australian Government. We have programs that are also recognized under three international engineering accords.



Industry Experienced Lecturers

Our lecturers are highly experienced engineers and subject specialists with applied knowledge. The technologies employed by EIT, both online and on-campus, enable us to source our lecturers from a large, global pool of expertise.



Unique Delivery Model

We deliver our programs via a unique methodology that makes use of live and interactive webinars, an international pool of expert lecturers, dedicated learning support officers, and state-of-the-art technologies such as hands-on workshops, remote laboratories, and simulation software.



Dr. Danial (Daniel) Faraji

- BSc in Railway Engineering
- MSc of Disaster Management
- Doctorate of Business Administration (DBA)

- Member of Development Group of RISSB (Rail Industry Safety and Standards Board) – AS 7517, AS 7510.3, AS 1085.12
- Metro system project manager
- 15 years of experience in light/heavy rail transportation systems design and construction
- Joined EIT in November 2020

Agenda

1	Welcome and Introduction
2	Risk Management introduction and refresher
3	Emerging Threats and Technologies
4	Standards and standard organization briefing
5	Conclusion and Q&A



What is risk?

- Risk is the likelihood of an accident or incident arising from a hazard.
- The significance of risk depends on the potential worst outcome should such an accident or incident occur, combined with how likely it is to happen.

What is risk?

- Risk is the likelihood of an accident or incident arising from a hazard.
- The significance of risk depends on the potential worst outcome should such an accident or incident occur, combined with how likely it is to happen.

What is a hazard?

- A hazard is a source (an object, situation or behaviour) of potential injury, harm, or ill health to people. This definition may also include damage or harm to property or the environment.

The ARRM risk results

Incident trends within Australia

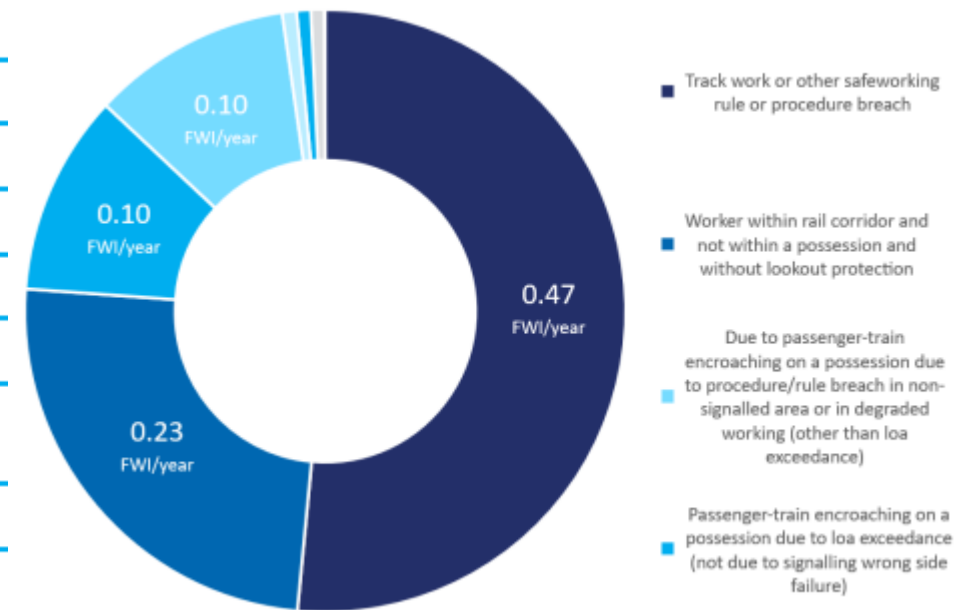
- Although track worker safety and that of people working in the rail corridor has been a key focus within the rail industry for many years the number of incidents involving work in the rail corridor has steadily increased over recent years.
- The Australian Rail Risk Model (ARRM) currently predicts that the greatest safety risk to workers in the corridor is being struck by a train on a running line, not at a level crossing. The national risk estimate given by ARRM for a train collision with a worker on a running line not at a level crossing is 0.92 fatality weighted injuries per year (FWI/year).

This equates to approximately:

- 0.9 fatalities per year (1 fatality every 13 months); or
- 9 serious injuries per year

The ARRM risk results

Consequence (as published in ARRM)	FWI/Year (Mean) - Sum
Train collision with worker on Running Line not at a level crossing	0.92
Train collision with other train/MV on Running Line (Where collision was caused by other train/MV)	0.39
Maintenance vehicle derailment on Running Line	0.28
Maintenance Vehicle collision with other train on Running Line	0.20
Worker slips, trips, or falls to/from moving train on Running Line.	0.06
Maintenance Vehicle collision with obstruction on Running Line	0.04
Maintenance Vehicle collision with other train/MV on Running Line (Where collision was caused by other train/MV)	0.03
Maintenance Vehicle Collision with infrastructure on Running Line	0.02
Worker slips, trips, or falls to/from moving train in Yard.	0.01
Maintenance vehicle derailment in Yard	0.01



Challenge

- What is the safest railway line in the world?

What is risk management?

- Risk management is the process of ensuring your organisation has the most appropriate safety controls in place to reduce the likelihood of a workplace hazard causing an accident or incident. Its purpose is to identify the potential risks a hazard presents before something happens, so plans can be put in place before it does.
- It's also about ensuring that should something happen, there are safety controls in place to mitigate the consequences.

Risk management process

- Identifying all of the things that could go wrong (**hazards**)
- Working out **how likely** they are to cause an accident or incident
- Establishing what the **potential consequences** could be
- Choosing and implementing the most appropriate **safety controls**
- Monitoring the effectiveness of those controls and upgrading as required

What is a safety control?

A safety control is something your organisation does or puts in place to:

- Eliminate a hazard,
- Reduce the risk of a hazard causing an accident or incident, and/or
- Mitigate the consequences of an accident or incident.

What is a safety control?

Category: Elimination

Examples:

- Remove a rail vehicle of a certain type from the operation,
- Stop performing an activity or practice (either partly or completely)

What is a safety control?

Category: Minimisation	
Substitution	<ul style="list-style-type: none">• Replace an item of machinery with a better one• Start performing an activity or practice a different way
Isolation	<ul style="list-style-type: none">• Prevent access to a hazard• Restrict the use of an item of machinery
Engineering controls	<ul style="list-style-type: none">• Upgrade a rail vehicle to make it safer• Implement automated technology (eg automatic brakes)

What is a safety control?

Category: Administrative controls

Examples:

- Adopt a new procedure
- Carry out training

Category: Personal protective equipment (PPE)

Examples:

- High visibility clothing
- Hard hats

AS 7471:2018

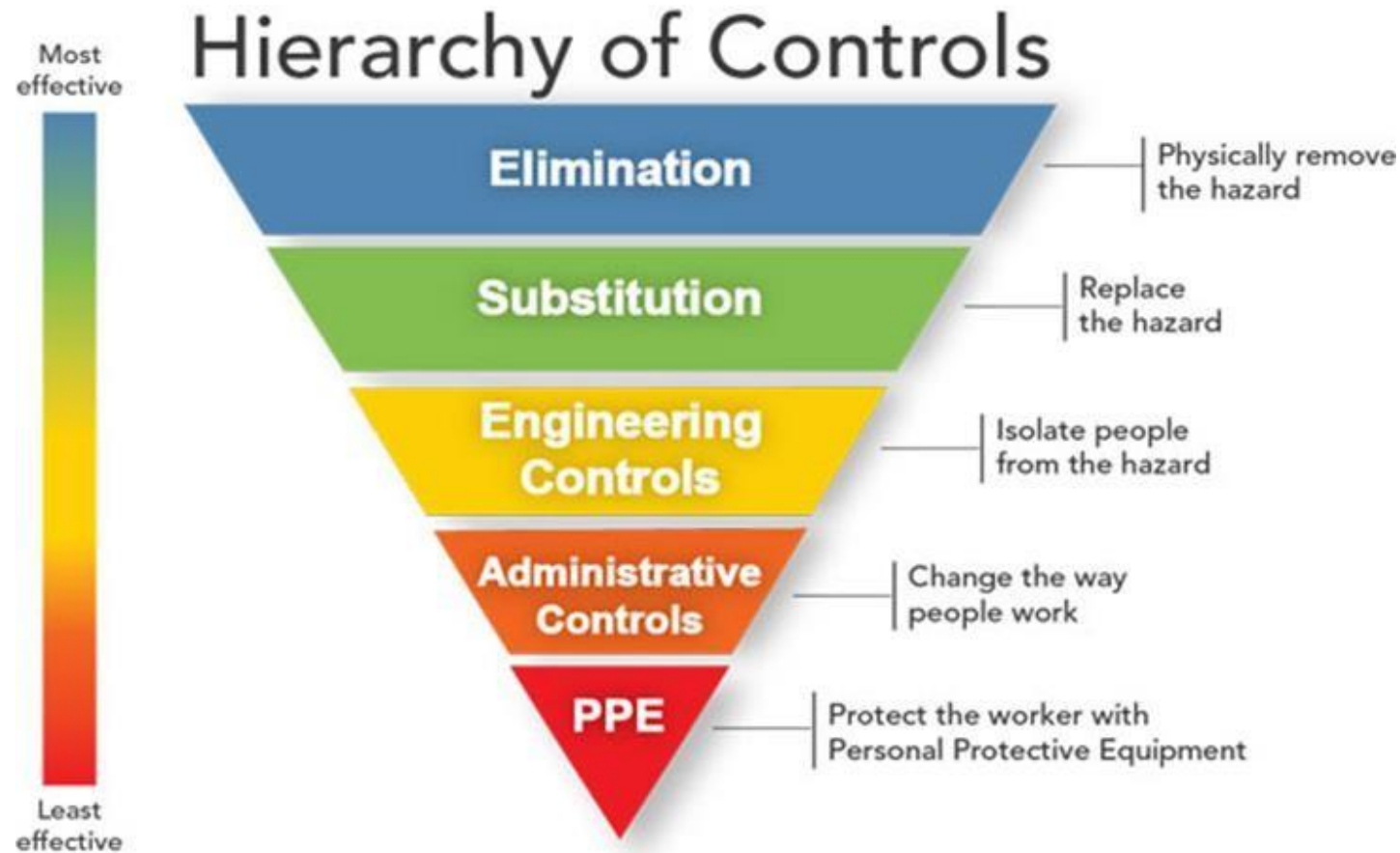


**Australian rail
Personal protective equipment
Minimum requirements**



Safety Standard

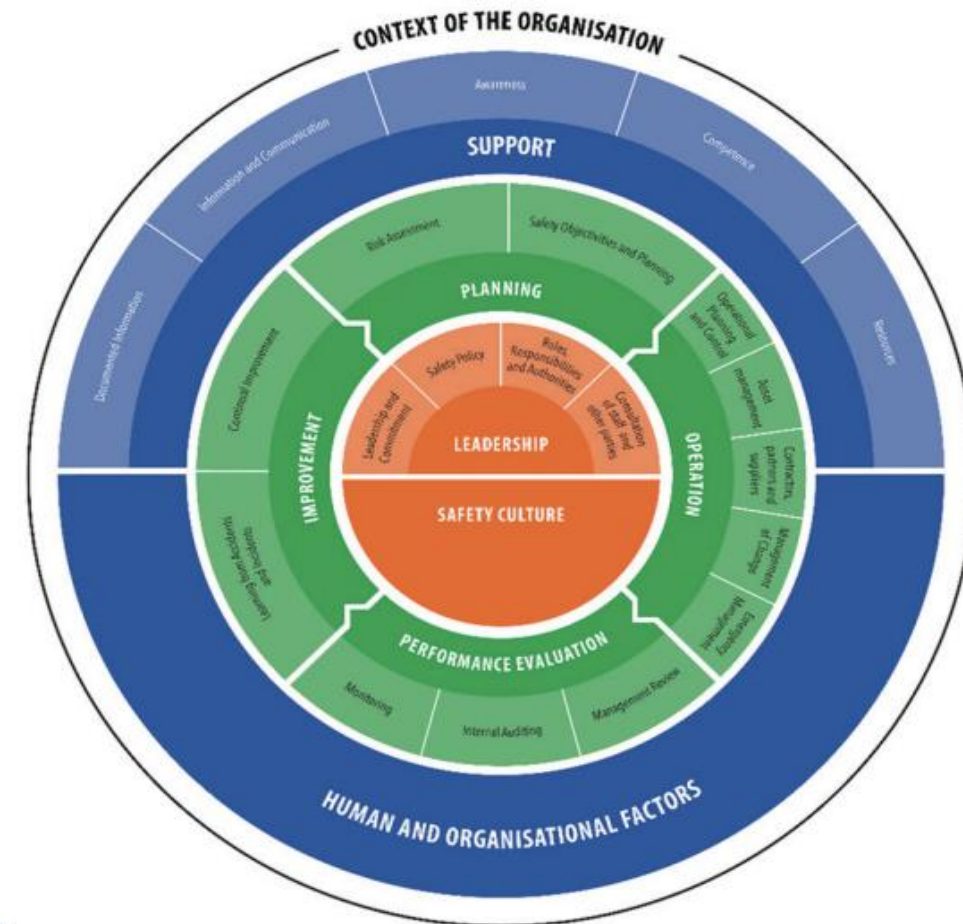
What is a safety control?



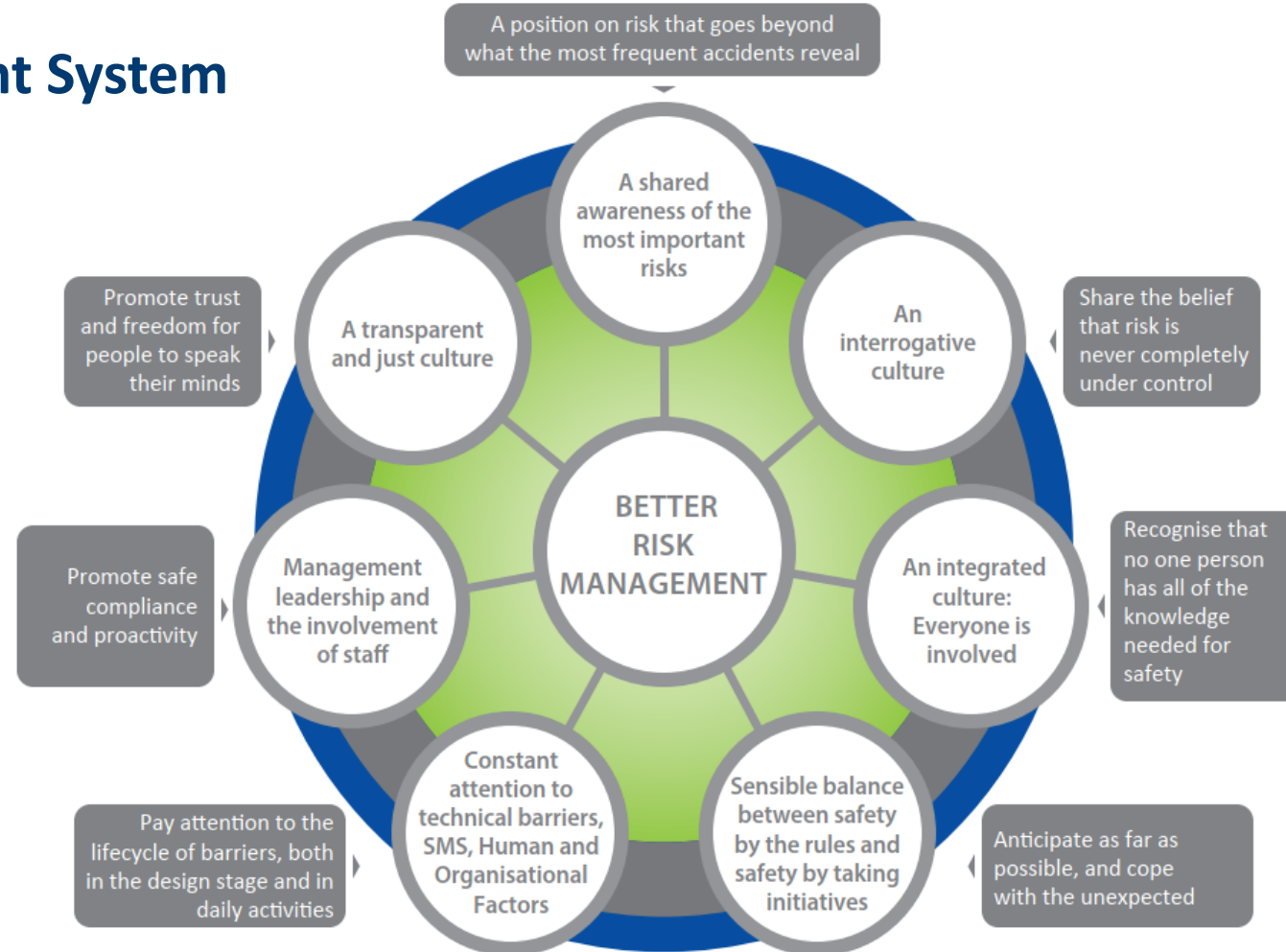
Safety Management System

The PDCA concept reflects the functional relations between the main SMS elements:

- ▶ **Planning:** identify risks and opportunities, establish safety objectives and identify processes and measures necessary to deliver results in accordance with the organization's safety policy;
- ▶ **Operation:** develop, implement and apply the processes and measures as planned;
- ▶ **Performance evaluation:** monitor and evaluate the realized performance of the implemented processes and measures with regard to the objectives and the planning, and report the results;
- ▶ **Improvement:** Take actions to continually improve the safety management system and the safety performance to achieve the intended outcomes.



Safety Management System



Safety Management System



Emerging Threats and Technologies

Safety is a top priority because of its importance in protecting human lives and property, especially in high-risk industrial sectors such as aviation, oil and gas, construction, transportation, steel production, and the mining industry.

- Through the accelerating rate of technological advancements, we are now seeing the rise of revolutionary **new technologies**.
- Even from an optimistic perspective, **many potential threats** can be foreseen.

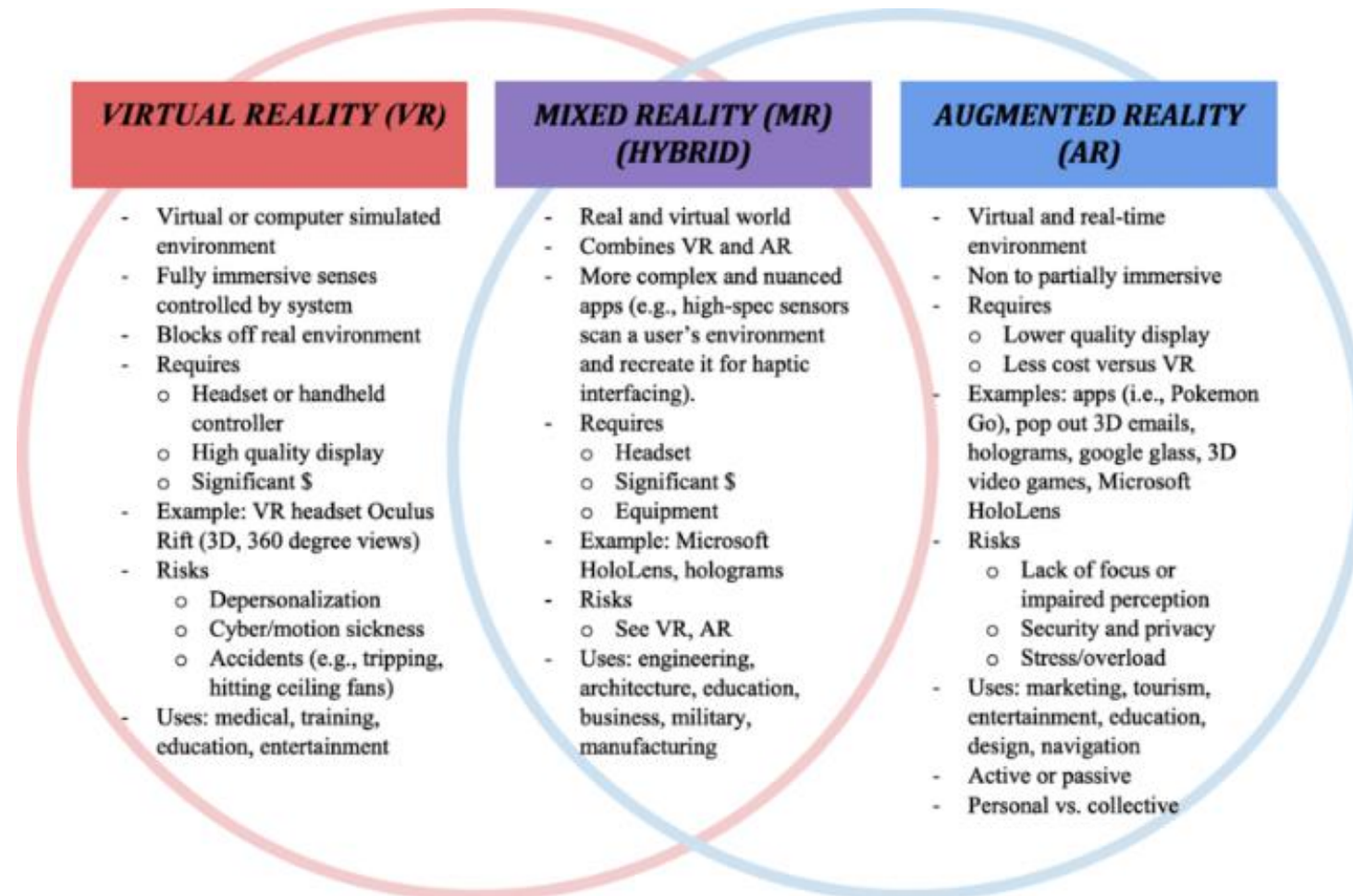
Facing ambiguous threats

- **Ambiguous threats** differ from threats with obvious causes for which the response is clear.
- New technologies could help us to face ambiguous threats.

Emerging technologies:

- Augmented reality
- Virtual reality (safety training through computer-aided technologies)
- Integrating BIM and safety – Digital Engineering (DE)
- Wearable sensing devices (hard hats that detect carbon monoxide)
- Site sensors (proximity detection devices)
- Stay safe app
- Drones
- Asset management and monitoring
- Artificial intelligence
- Big data

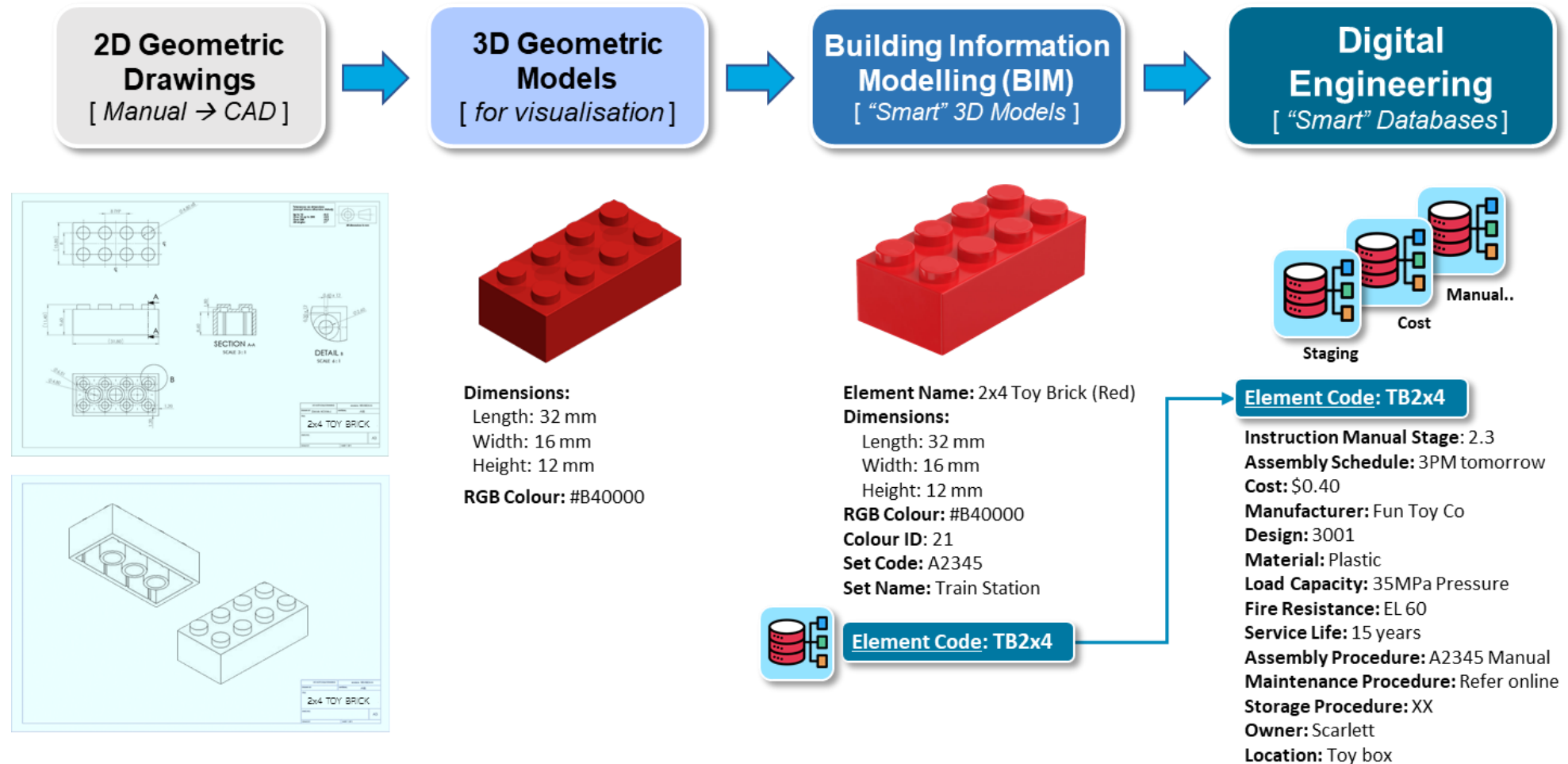
Characteristics of virtual, augmented, and mixed reality environments



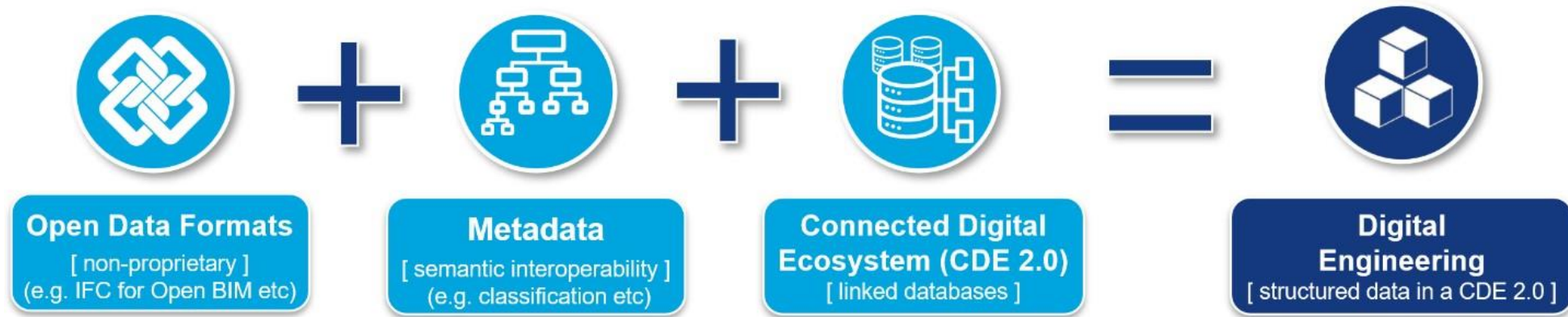
Safety features and integrate augmented reality



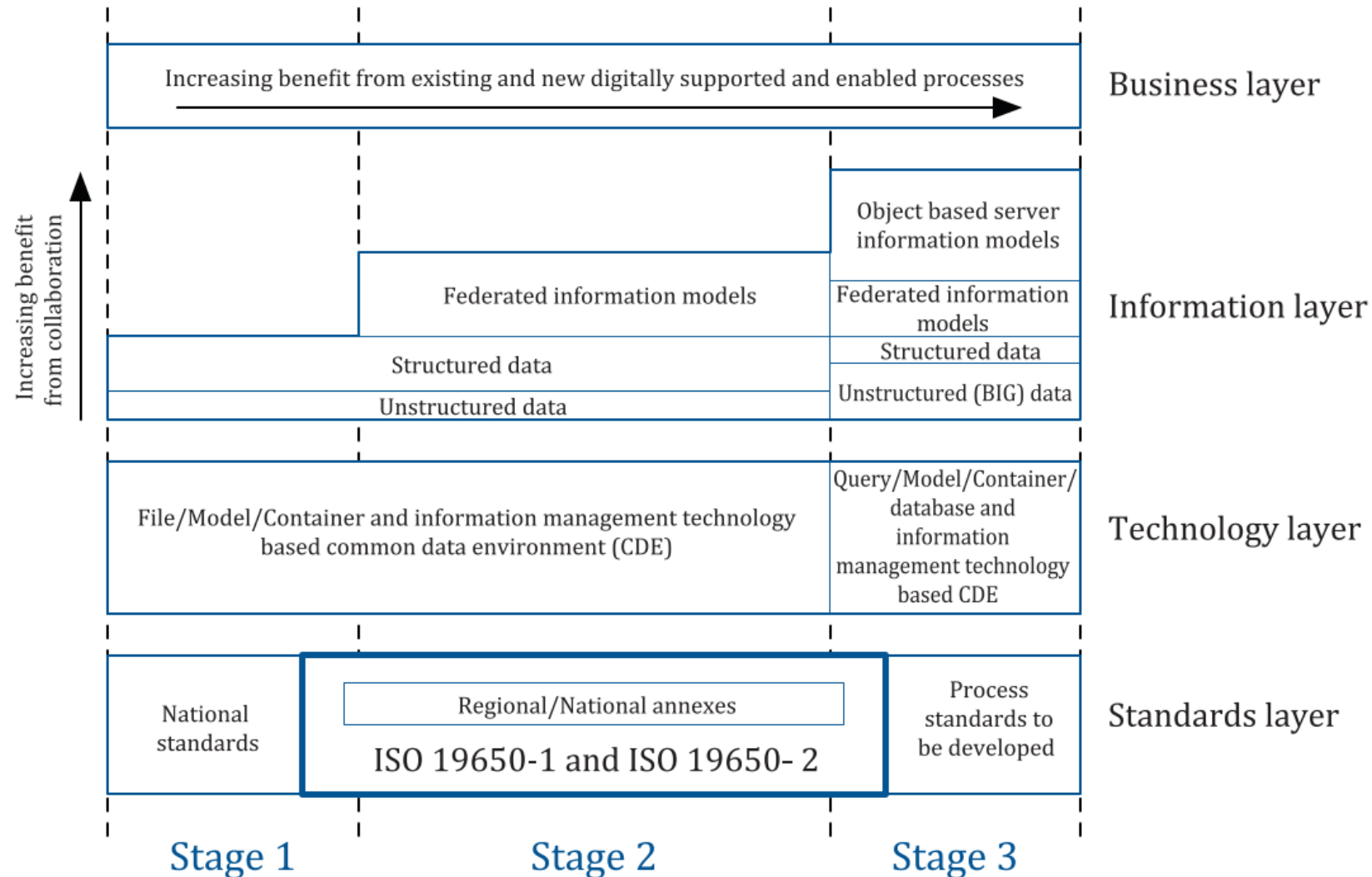
Integrating BIM and safety – Digital Engineering (DE)



Key Enablers for digital engineering



Advances in Railway Safety

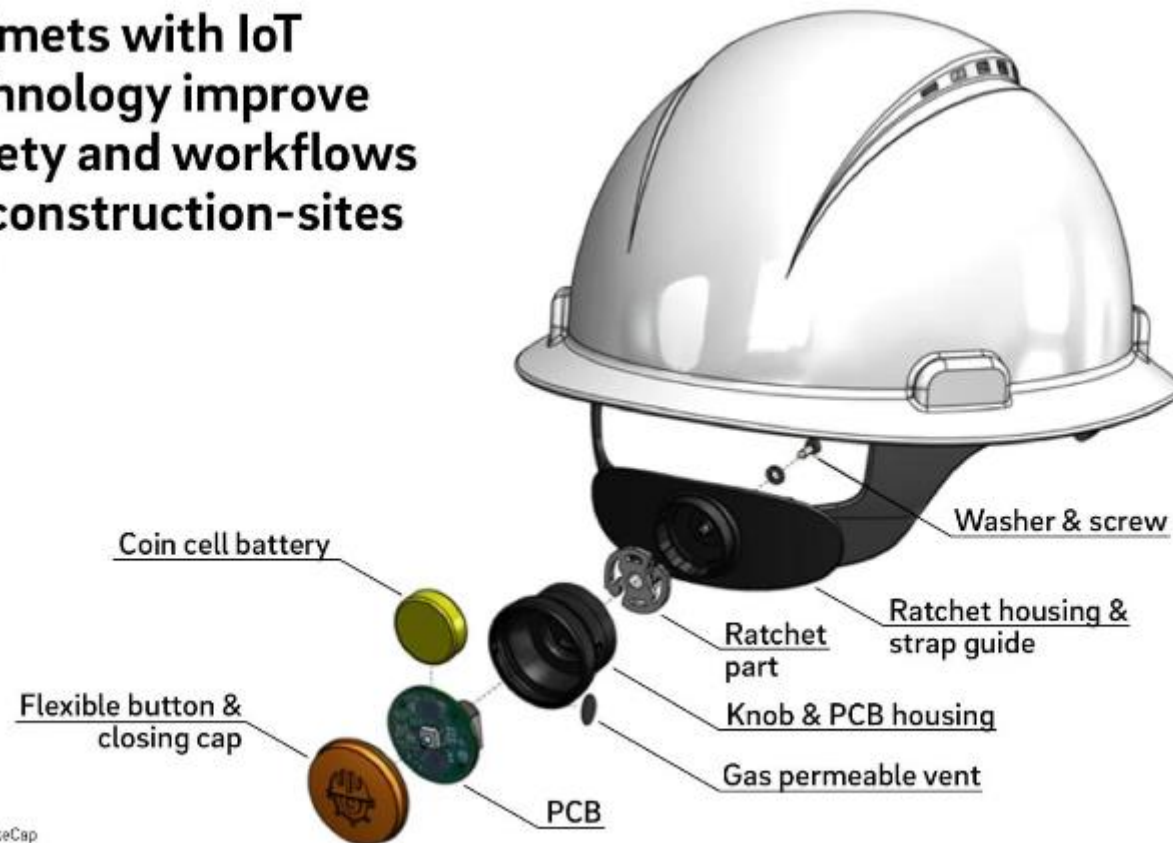


AS 7739.1:2022 Digital engineering for rail

- In the context of the ANZ rail industry, pioneering work is currently underway to build more advanced ways of working that closely align with Stage 3 digital maturity.
- Leading ANZ transport organisations have commenced programs of innovation, and are already developing new digital processes and frameworks, trialing emerging technologies, and building more advanced data management capabilities. In short, the ANZ rail industry is progressing rapidly, with digital standardization that extends well beyond the current stage 2 maturity of the ISO 19650 series.
- The AS 7739 series builds on the foundations established in ISO 19650 and introduces more advanced data management concepts and principles that collectively define best practice DE for rail infrastructure.

Safety features and IOT technology:

Helmets with IoT technology improve safety and workflows on construction-sites



Source: WakeCap

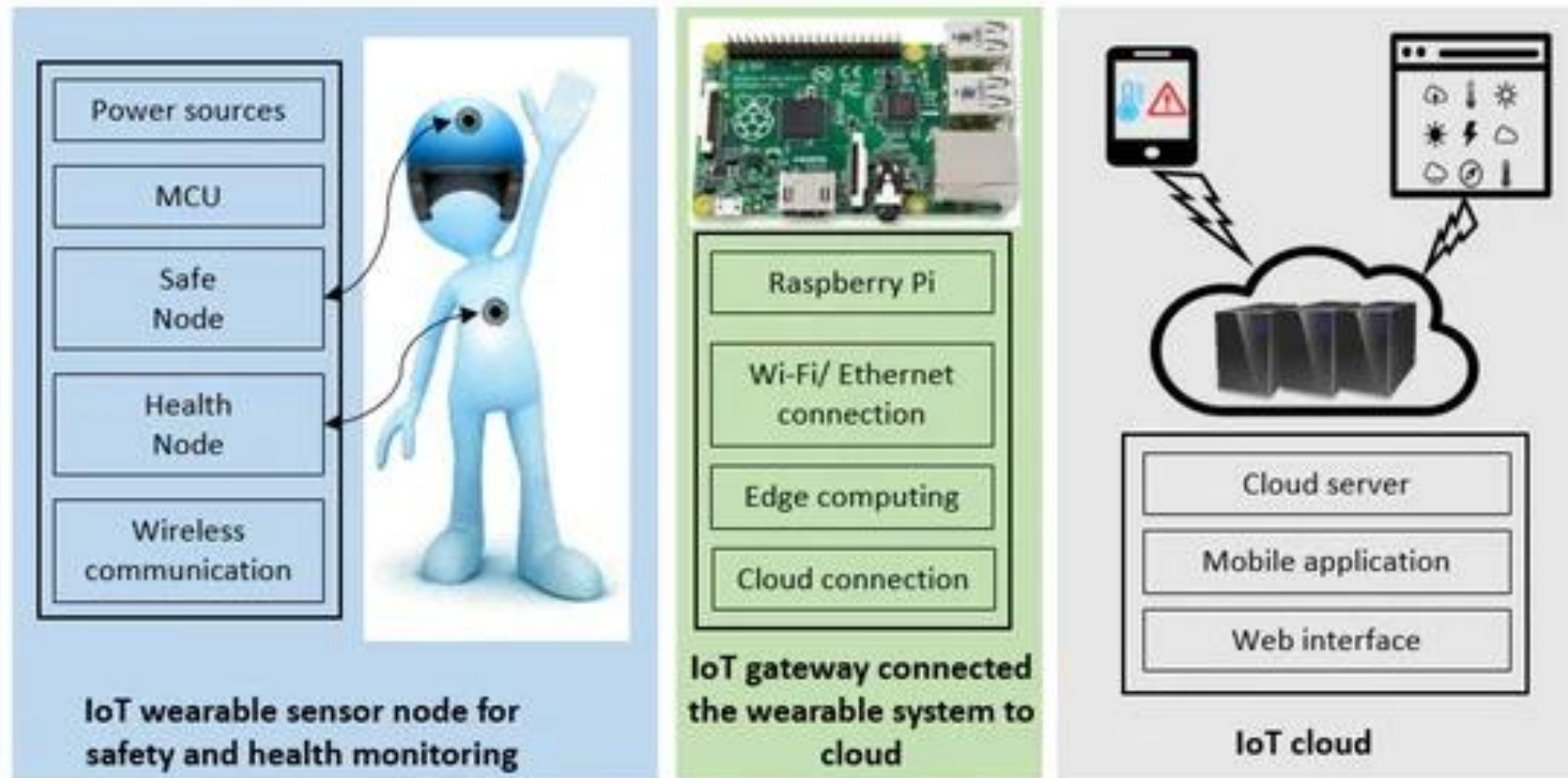
Roland Berger 

Safety features and wearable sensing devices:



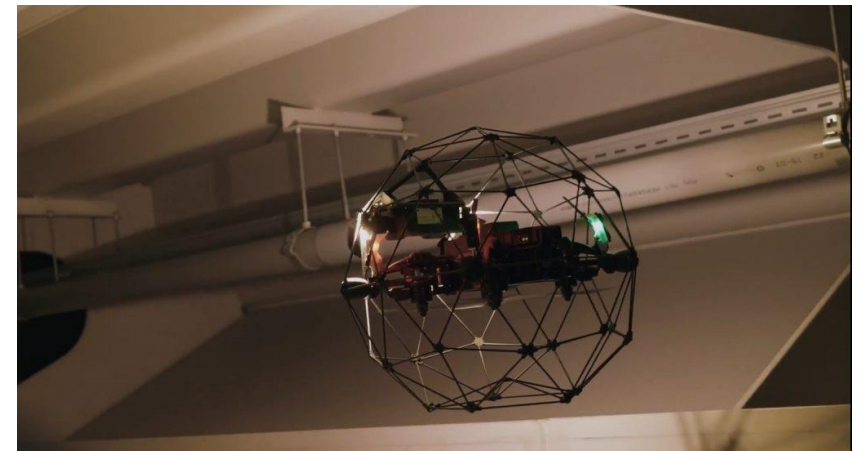
CRICOS Provider Number: 03567C | Higher Education Provider Number: 14008 | RTO Provider Number: 51971

Safety features and smart sensor technologies



Drones

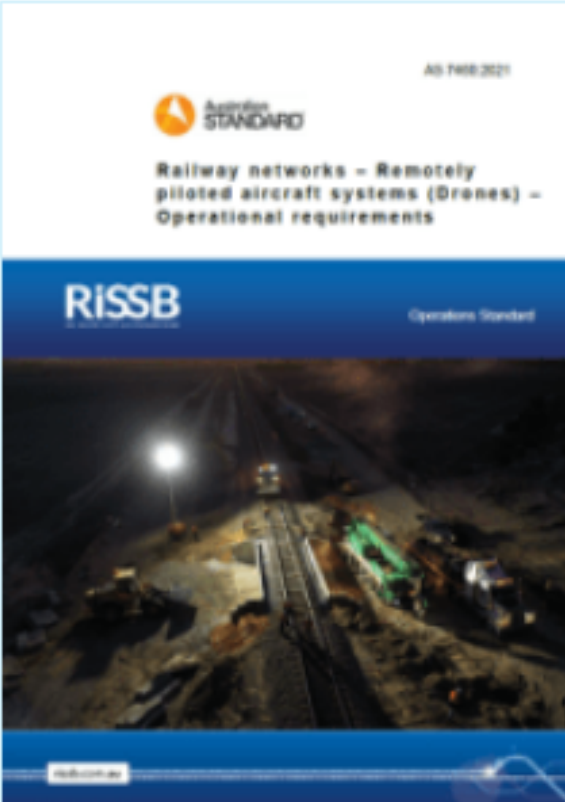
Drones in the Railway industry have become **a piece of necessary equipment for stable railway inspection systems.** They are employed to monitor significant railway infrastructures such as high-voltage electrical lines, railway catenary lines, and even tracks and switching points.



Drones

AS 7460:2021

Change Request Mar 23, 2021 Standards



AS 7460 - Railway networks – Remotely piloted aircraft systems (Drones) – Operational requirements

The objective of this Standard is to define the requirements managing risks and safety in the operation of remotely piloted aircraft systems (drones).

[Download](#) [Add to Download Queue](#) [Learn More](#)

Big Data

- The website for the Rail Industry Safety and Standards Board (RISSB) Australian Rail Risk Model (ARRM). Registered users may browse and query the ARRM.
- The ARRM is a model of the safety risk on Australian Railways (excluding light rail, heritage railways, and cane railways), built around hazardous events that occur on Australian Railways. Its risk estimates are informed by reports on occurrences provided by the Australian Rail Industry.



The logo for the Australian Rail Risk Model (ARRM) features the letters 'ARRM' in a bold, blue, sans-serif font. The letter 'A' is stylized with two white diagonal lines on its left side.

AUSTRALIAN RAIL RISK MODEL

A product of Rail Industry Safety and Standards Board

LEARN MORE AT

WWW.RISSB.COM.AU

Upcoming Webinars

Using Gaming Technology to Improve Industrial Digital Twins

Presented by
Mr. Greg Sevel, Sentient Computing
3:00PM - 4:00PM (AWST)
Thursday 21 July, 2022

[Register Now](#)

CRICOS Provider Number: 03567C | Higher Education Provider Number: 14008 | RTO Provider Number: 51971



The Importance of Systemic View in Accident/Incident Investigation

Presented by
Dr. Asieh Soltani - EIT Lecturer
3:00PM - 4:00PM (AWST)
Thursday 28 July, 2022

[Register Now](#)

CRICOS Provider Number: 03567C | Higher Education Provider Number: 14008 | RTO Provider Number: 51971



Upcoming EIT Courses



We have a range of courses in Civil, Electrical, Mechanical and Industrial Automation Engineering.

Course Type	Intakes/start date
Professional Certificate of Competency courses (short courses)	Throughout the year
Diploma & Advanced Diploma courses	Throughout the year
Undergraduate Certificates	13 February 2023
Bachelor of Science degrees	13 February 2023
Graduate Certificates	2 January 2023
Master of Engineering degrees	2 January 2023
Doctor of Engineering	13 February 2023
On Campus Bachelor's, Master's and Doctor of Engineering programs	20 February 2023

See our full course schedule here: www.eit.edu.au/schedule/

Certificate of Attendance

To receive your digital certificate of attendance for participating in this webinar, please fill out the form and survey here (or scan the QR Code):

qrco.de/bdAyCl

Please note that Certificate of Attendances will be sent out in the next 1-2 business days.



Q&A

Thank you for attending.

Contact Us:



Website
www.eit.edu.au



Email
webinars@eit.edu.au



Head Office
1031 Wellington Street West Perth
Perth, WA 6005



Courses
<https://www.eit.edu.au/schedule/>



Phone
Inside Australia: 1300 138 522
Outside Australia: +61 8 9321 1702