RISSB
RAIL INDUSTRY SAFETY AND STANDARDS BOARD

ARUP

Hackathon - Innovative solutions for level crossings

Tuesday 08/03/2022
12:00pm - 4:00pm (AEDT)

Introduction

This hackathon brought together those working in the rail sector and other related disciplines to explore level crossing challenges and their solutions in urban and remote contexts.

The event involved three activities where participants identified a unique challenge, considered perspectives of different sectors, and developed an an innovative solution to address the challenge.

The hackathon was run by RISSB, led by Jesse Baker.

The hackathon was facilitated by Arup Foresight and Innovation, led by Anne Kovachevich.

There were over 50 attendees who participated in the hackathon from over 25 organisations.

Jesse Baker
RISSB
General Manager Innovation and Major Projects

Anne Kovachevich
Arup
Australasia Foresight and Innovation Lead

Workshop Participants

Nick Collins - Transport VIC
Paul Murray - ACRI
Donna Rumley - Transport VIC
Nisarg Vasa - JVAT
Stephen Baxter - ARTC
Graham Jackson - RISSB
Anthony Bottrill - Pacific National
Cris Fitzhardinge - RISSB
Dawn Nelson-Furnell - Omnicrosoft
Mac Henshall - Transport VIC
Simon Chandler - Tasrail
Mark Campbell - ARTC
Kimberley Bracher - QR
Paul Pafumi - Metro Trains
Nathan Hines - NSW Transport
Nicholas Hughes - Rio Tinto
Sandra Thomas - Aurizon
Risharda Robertson - RISSB
Dagmar Parsons - Rail Safety Systems
Paul Hann - Rail Control
Gary Templeton - ARTC
Brian Murphy - ARTC
Matthew Costin - Omnicrosoft
Harish Lala - ARTC
Heather Neil - Track Safe Foundation
Mayank Jain - ARTC
Cole Casper - Viseo
Darren Quinlivan - Metro Trains
Jake Vanderlinde - Shoal Group
Aaron Watts - Rio Tinto
Abhi Pandey - MTIA
Liam Best - ARTC
Peter Feder - Rail Safety Systems
Peter Nelson-Furnell - Omnicrosoft
Nicola Belcher - Transport VIC
Matthew Costin - Unipart Group
Boris Gabai - Metro Trains
Aisling Twomey - ARTC
Jasminder Singh - Transport VIC
Nicholas Daly - Yarra Trams
Guillaume Paix - Systra
Sunand Sudhakaran - VIC Track
Anu Ivaraju - MTIA
Ashveer Malhotra - FNC Australia
Dhruba Das - MTIA
Sivapragasam Ravitharan - Monash
Rita Arrigo - FNC Australia
David Martin - Transport VIC
Mark Hopkins - Wabtec
Bryce McLaren - QR
Karunesh Naicker - Aurizon
Kate MONCRIEFF - Systra
Isaac Lim - Viseo

Group 1

Explored ideas for Urban level crossings and focused on ideas that provided a multi point solution to queuing and ignoring road barriers.

Facilitator - Anne Kovachevich

Jesse Baker
Donna Rumley
Dawn Nelson-Furnell
Jasminder Singh
Peter Feder
Simon Meiers
Bryce Mclaren
Peter Nelson-Furnell

Activity 1 - Exploring the Challenges

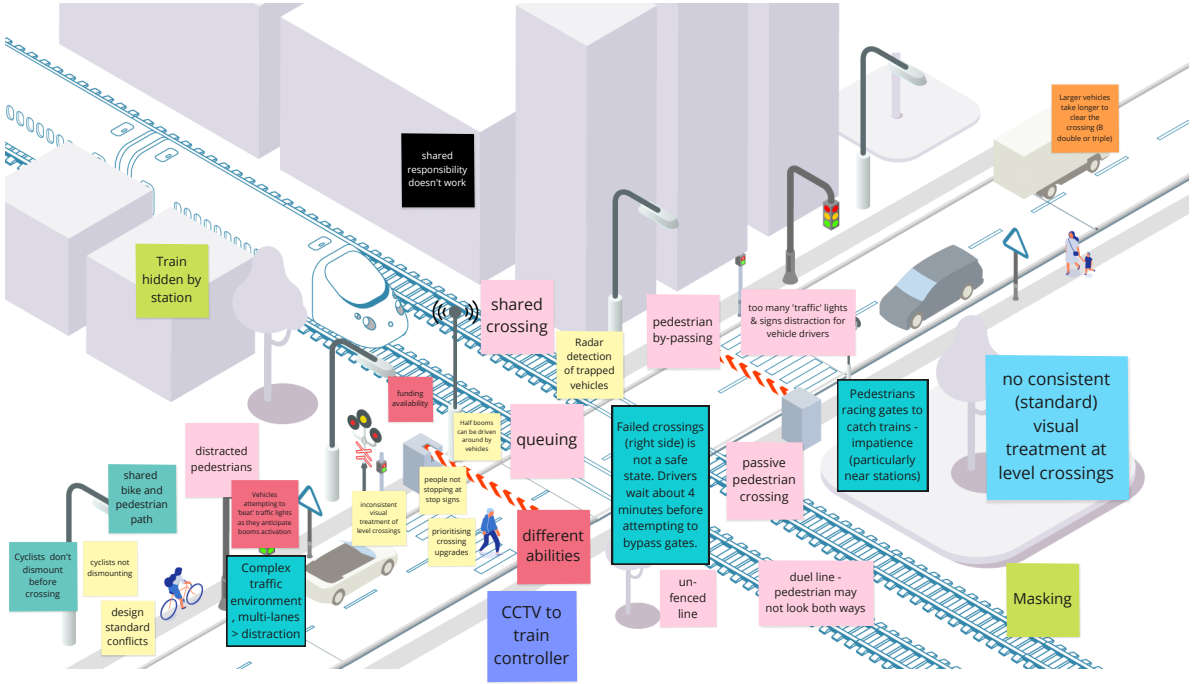
30 mins

Your team will be exploring challenges for **urban level crossings**. Below you will find an illustration of a typical urban level crossing.

Using post-it notes, annotate this illustration with the challenges being faced with safety at level crossings.

As a team, discuss each of these challenges and select **one challenge** you would like to address in this hackathon. Additionally, discuss and record on post-it notes, why this challenge is worth solving.

At the end of this activity, your team will have 2 minutes to present what challenges you identified, what challenge you have selected to explore further and why it is the challenge worth solving.



Selected challenge

queing | failed crossing indication | driving around booms ie half barrier

Why is it worth solving?

common problem with potential solutions | common problem-solveble | driving around booms ie half barrier

Activity 2 - Learning from other sectors, disciplines and innovative solutions

30 mins

Join group 1 call

Copy the post-it note with your chosen challenge from activity 1 and paste it in activity 2.

Identify three sectors, disciplines or innovative solutions from within or outside of the rail context that face this challenge or one similar.

Investigate and discuss how these sectors and disciplines manage or have solved this challenge.

Consider if aspects of their solutions are relevant for level crossings.

Copy your team's selected challenge here

- queing
- failed crossing indication
- driving around booms ie half barrier

poor driver behaviour

Sector/discipline/innovation 1

- full booms-europe (accompanied by obstacle detection systems)
- crossing timers on crossings
- escape option - glen iris
- I2V warning to road users using connected vehicle capability

Sector/discipline/innovation 2

- Integrate red light cameras with crossing protection - vic road trials
- navigation aids on google maps etc

Sector/discipline/innovation 3

- consistent visual aids
- integrate road traffic rail crossing activation (treat as a system)
- discourage users disobeying the crossing

Space to record discussion and findings

- parking close to crossing causes queing
- Maybe count down to the last few seconds and then go blank so as not to encourage last second rushing
- Road condition or speed warning
- four quadrant gates on xings

Space to record discussion and findings

- working more closely with road people to change road behaviour
- intercept mobile phones and radios with warnings about trains approaching
- need very immeditate data flows
- legal infringments are a big issue as cant prosecute
- level crossing enforcement cameras
- V2V V2I
- still breaking the law
- flashing lights on approach - QLD

Space to record discussion and findings

- education on safe driver behaviour at level crossings

Activity 3A - Idea development and validation - Development

25 mins

With consideration of your discussions and findings from activity 2, begin to brainstorm and develop a solution to your chosen problem.

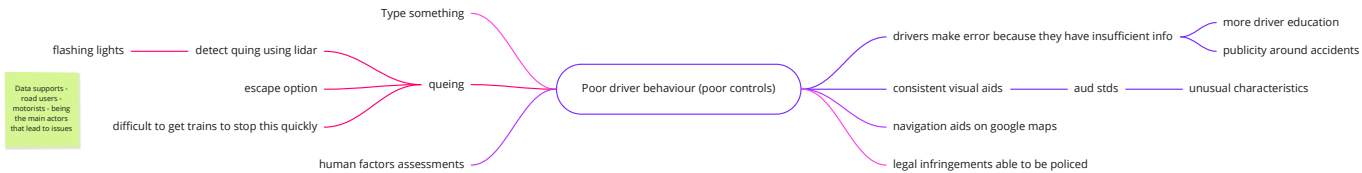
How you develop your solution is up to your team, but some methods we suggest include:

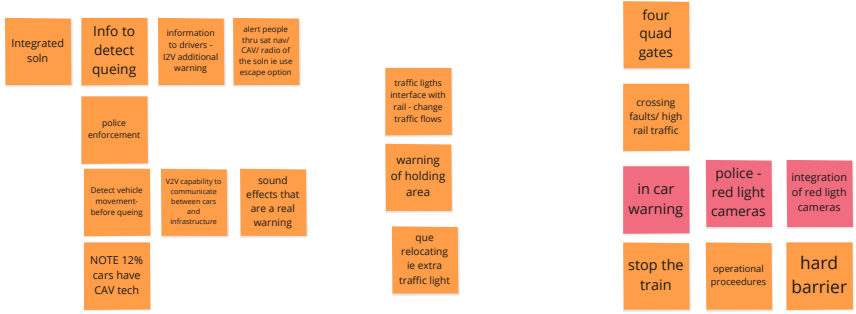
- Mind map your ideas using post-it notes. Start with your challenge in the center and expand out with all your ideas for how it can be solved.
- Get visual! Draw your solution and how it works. Either use pen/paper and drop in a photo of your drawing, or use the pen tool in Miro. You could draw your solution on the illustration you used in activity 1.
- Map our your solution as a system. Use shapes, post-it notes and connection lines to explain your solution and how it works.

If your team is getting stuck, think through some of these questions:

- Who are the stakeholders that shape or are impacted by your solution, and what are their needs?
- Consider what form your solution takes, and if it could be something else. Is it a product, system, policy or something entirely different?
- How does your solution directly address the uniqueness of your assigned urban or remote context?

At the end of the activity, your team will give a 5 minute presentation to the wider group. Prepare your presentation on the following sheet.



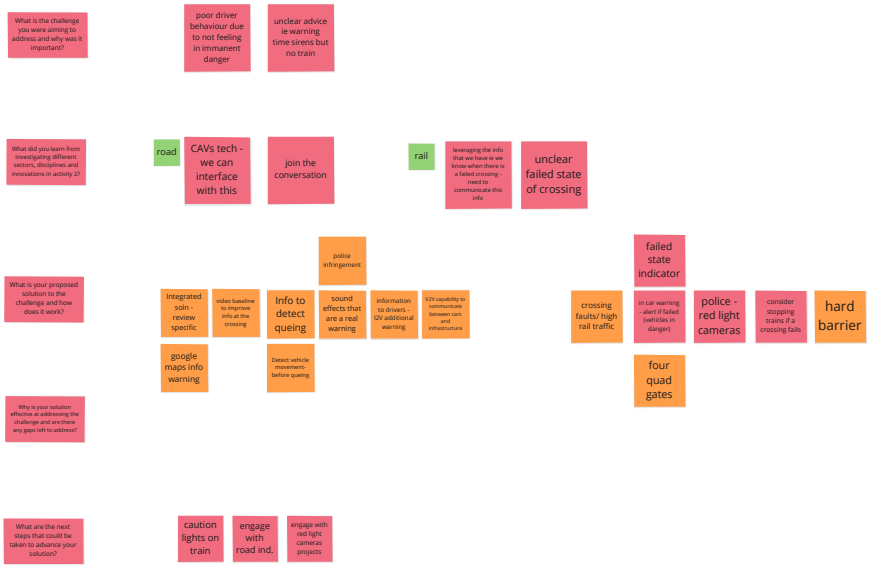


Activity 3B - Idea development and validation - Presentation

25 mins

At the end of the activity, your team will give a 5 minute presentation to the wider group. In your presentation, we suggest you cover the following points:

- What is the challenge you were aiming to address and why was it important?
- What did you learn from investigating different sectors, disciplines and innovations in activity 2?
- What is your proposed solution to the challenge and how does it work?
- Why is your solution effective at addressing the challenge and are there any gaps left to address?
- What are the next steps that could be taken to advance your solution?



Group 2

Explored ideas for Urban level crossings and focused on ideas that addressed situations when vehicles disobey signals at crossings.

Facilitator - Bryn Hearder

Darren Quinlivan
Anthony Bottrill
Dhruba Das
Paul Hann
Sunand Sudhakaran
Jake Vanderlinde
Robbie Filliponi
Nicholas Daly
Aaron Watts

Activity 1 - Exploring the Challenges

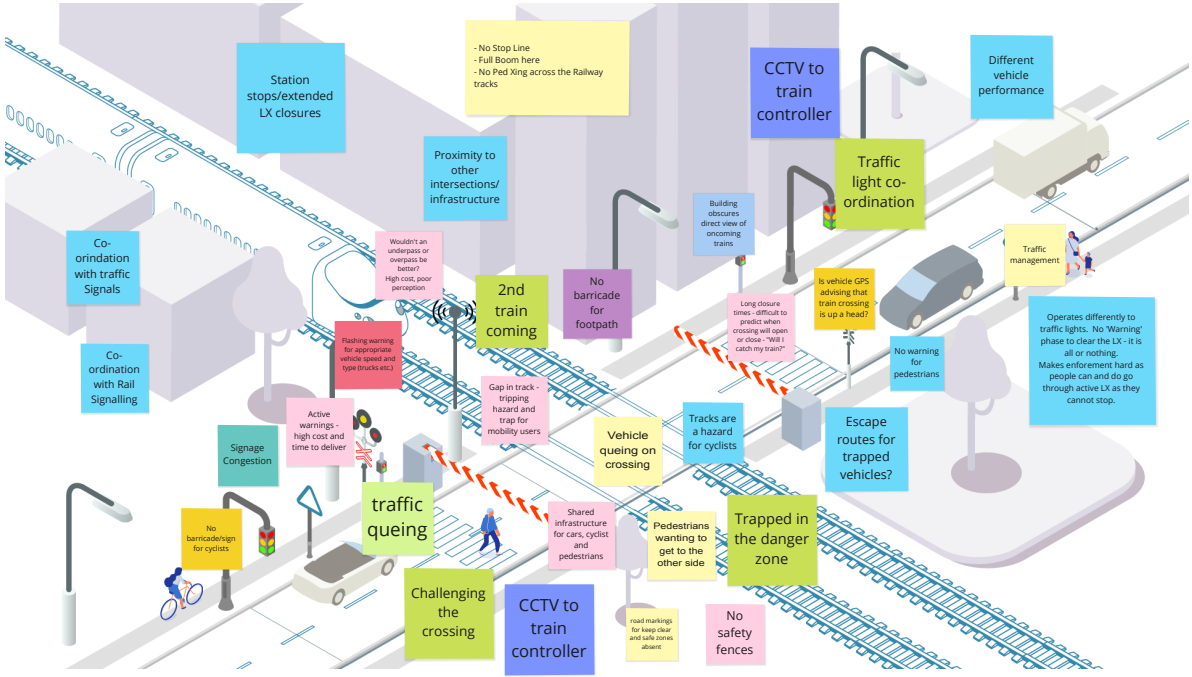
30 mins

Your team will be exploring challenges for **urban level crossings**. Below you will find an illustration of a typical urban level crossing.

Using post-it notes, annotate this illustration with the challenges being faced with safety at level crossings.

As a team, discuss each of these challenges and select **one challenge** you would like to address in this hackathon. Additionally, discuss and record on post-it notes, why this challenge is worth solving.

At the end of this activity, your team will have 2 minutes to present what challenges you identified, what challenge you have selected to explore further and why it is the challenge worth solving.



Selected challenge

discourage users disobeying the crossing

Why is it worth solving?

to change behaviour of users challenging the crossing - eg. the time to late

users challenging the LX leads to safety risks for train passengers as well as general public. Normalises risk.

help reduce congestion and accidents

Every time we have an incident relating to people challenging the LX we end up putting more controls in place - increasing cost.

users trusting the safety

30 mins

Activity 2 - Learning from other sectors, disciplines and innovative solutions

Join group 2 call

Copy your team's selected challenge here

discourage users disobeying the crossing

Copy the post-it note with your chosen challenge from activity 1 and paste it in activity 2.

Identify three sectors, disciplines or innovative solutions from within or outside of the rail context that face this challenge or one similar.

Investigate and discuss how these sectors and disciplines manage or have solved this challenge.

Consider if aspects of their solutions are relevant for level crossings.

One of the most safety critical in MTM network in my opinion that Level crossings or Ped crossings are positioned just about 5-10m from home signal at Platform. No protection to SPAD and No Super Control applied in the Signalling Interlocking

rail vs road

Should there be signalling system to protect Xing in the event of crossing failure?

Sector/discipline/innovation 1

technology

Sector/discipline/innovation 2

infrastructure

Sector/discipline/innovation 3

priority-safety

misbehavior from crossings failure

Space to record discussion and findings

timing, axel counters

Provide timing info to vehicle drivers and pedestrians

More reliable tech = less failures

minimise warning time

This type of Xing not looks to be for urban.
this is for low rail and road traffic area. Am i right in saying this?

predictors not for everyone

low cost solutions other than predictors

stop trains if the LX fails, (more effective with ETCS)

Space to record discussion and findings

Enforcing road users to obey LX warning - physical barrier

SHow videos of lx crossing crashes at the crossing

Tyre spikes

Alternative routes info on digital tech in the event of disruptions and crossing closures

influence directions to avoid crossings - alternative crossings?

alert/monitoring systems - auto vs manual?

red light cameras - $ penalties

Space to record discussion and findings

improving users reliability

fail opens vs close

account for growing populations

give the users more responsibility and aprreciation for trains

better viusalisation for user - eg a location tracker, real time updates

operating practices - systems are already up to date

develop interface - happens in northern WA for failures

fun interaction wile waiting for train to cross

25 mins

Activity 3A - Idea development and validation - Development

With consideration of your discussions and findings from activity 2, begin to brainstorm and develop a solution to your chosen problem.

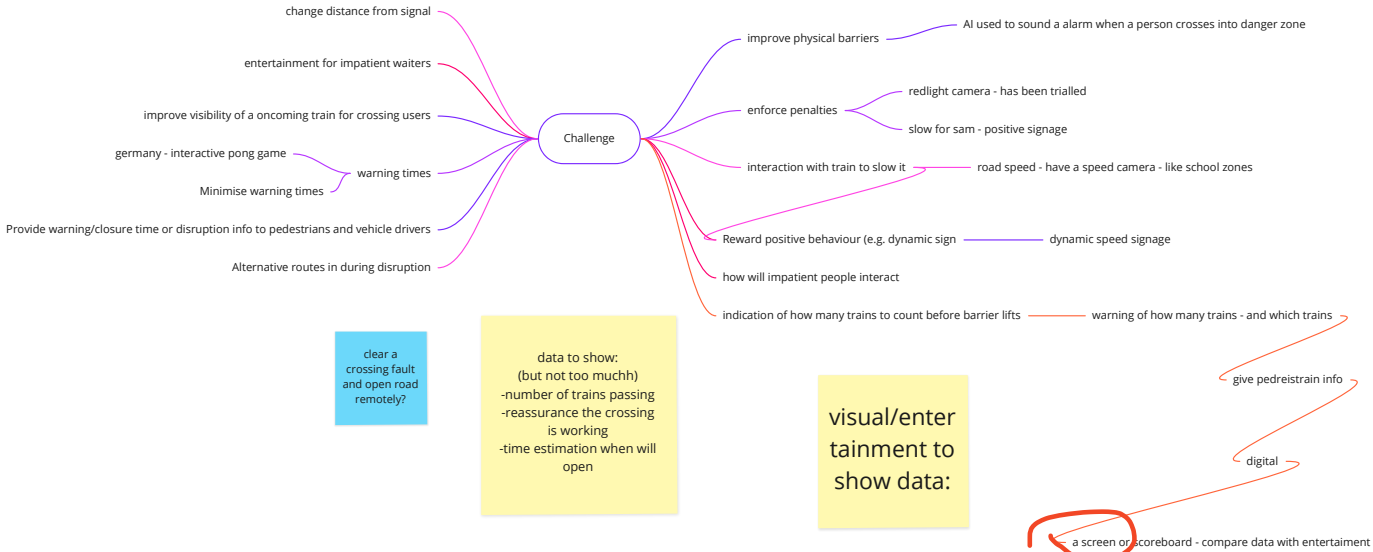
How you develop your solution is up to your team, but some methods we suggest include:

- Mind map your ideas using post-it notes. Start with your challenge in the center and expand out with all your ideas for how it can be solved.
- Get visual! Draw your solution and how it works. Either use pen/paper and drop in a photo of your drawing, or use the pen tool in Miro. You could draw your solution on the illustration you used in activity 1.
- Map our your solution as a system. Use shapes, post-it notes and connection lines to explain your solution and how it works.

If your team is getting stuck, think through some of these questions:

- Who are the stakeholders that shape or are impacted by your solution, and what are their needs?
- Consider what form your solution takes, and if it could be something else. Is it a product, system, policy or something entirely different?
- How does your solution directly address the uniqueness of your assigned urban or remote context?

At the end of the activity, your team will give a 5 minute presentation to the wider group. Prepare your presentation on the following sheet.



Activity 3B - Idea development and validation - Presentation

25 mins

At the end of the activity, your team will give a 5 minute presentation to the wider group. In your presentation, we suggest you cover the following points:

- What is the challenge you were aiming to address and why was it important?
- What did you learn from investigating different sectors, disciplines and innovations in activity 2?
- What is your proposed solution to the challenge and how does it work?
- Why is your solution effective at addressing the challenge and are there any gaps left to address?
- What are the next steps that could be taken to advance your solution?

What is the challenge you were aiming to address and why was it important?

What did you learn from investigating different sectors, disciplines and innovations in activity 2?

What is your proposed solution to the challenge and how does it work?

Why is your solution effective at addressing the challenge and are there any gaps left to address?

What are the next steps that could be taken to advance your solution?

concept of digital sign - user sees:

Time until gate reopens 01 minutes

number of trains left past 2

Safety Stats - this xing + other xings?

Reassurance that a train IS coming

Am I working Yes

Provides info to users to make better decisions

background improvemnts

Digital solution for pedestrians Connected vehicles

Screen for the Wait time
Safety improvement where Crossing immediately after the Platform
Remove Road congestion when Train is on Platform
Reduce Signalling interface and apply single control

Group 3

Explored ideas for Urban level crossings and focused on ideas that understood level crossings as complex systems and addressed communication between stakeholders.

Facilitator - Nicholas Kamols

Mark Campbell
Nisarg Vasa
Abhi Pandey
Nick C Collins
Liam Best
Brian Murphy
Paul Murray
Nathan Hines
Risharda Robertson
Heather Neil
Karunesh Naicker
Cole Casper

Activity 1 - Exploring the Challenges

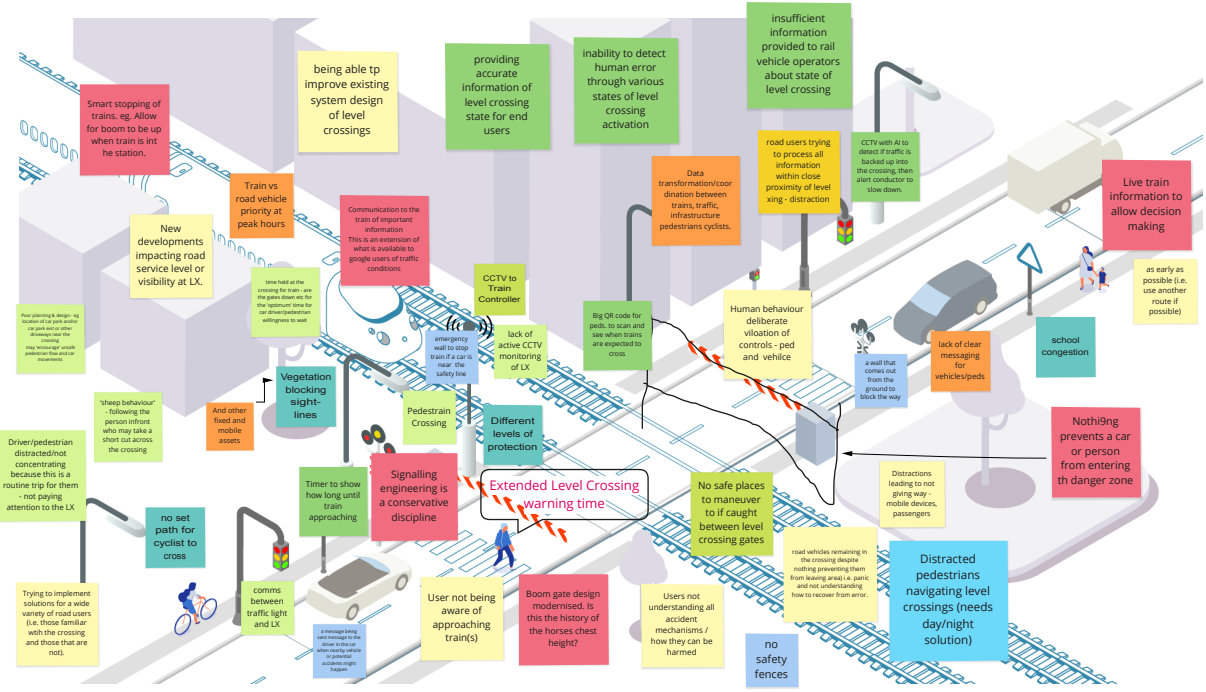
30 mins

Your team will be exploring challenges for **urban level crossings**. Below you will find an illustration of a typical urban level crossing.

Using post-it notes, annotate this illustration with the challenges being faced with safety at level crossings.

As a team, discuss each of these challenges and select **one challenge** you would like to address in this hackathon. Additionally, discuss and record on post-it notes, why this challenge is worth solving.

At the end of this activity, your team will have 2 minutes to present what challenges you identified, what challenge you have selected to explore further and why it is the challenge worth solving.



Selected challenge

LX as a system

Why is it worth solving?

Level crossings are a system and we are not treating it like a system
Manage users, components, manage energy
Addressing the communication
Driver and train control
Users and public
Elements
Preventative
Incident
Recovery

Activity 2 - Learning from other sectors, disciplines and innovative solutions

30 mins

Copy the post-it note with your chosen challenge from activity 1 and paste it in activity 2.

Identify three sectors, disciplines or innovative solutions from within or outside of the rail context that face this challenge or one similar.

Investigate and discuss how these sectors and disciplines manage or have solved this challenge.

Consider if aspects of their solutions are relevant for level crossings.

Join group 3 call

Level crossings are a system and we are not treating it like a system
Manage users, components, manage energy
Addressing the communication
Driver and train control
Users and public
Elements
Preventative
Incident
Recovery

Copy your team's selected challenge here

LX as a system

Sector/discipline/innovation 1

Data supports - road users - motorists - being the main actors that lead to issues

Sector/discipline/innovation 2

Centralised system by CASA (Civil Aviation)

Sector/discipline/innovation 3

Space to record discussion and findings

Cars - technology to assist drivers - such as lane assist and hazard detection - warning systems in general

tracking systems are used for cases such as ensuring a type of truck is on the right type of road.. this could be extended

Train location communication technologies

an existing physical warning system is - rumble strips in line markering on major roads

IF controls at crossing are obeyed - then they are likely going to be safe. Which leads to.. is is more information going to have the intended affect

Transport for NSW in road research for safety - connecting road vehicles with technology - dependant on tech being in vehicle - also, toll operators can get access into cars through the car's radio

Humans are fallible

Radio could be augmented by updates sent to mobile phones

Red-light cameras affect behaviour of road users

Why does LX focus on rail.. when it is a road crossing rail

Space to record discussion and findings

Have an online space for collaboration

Centralised repository for fault tree and event tree for level crossing occurences

Fault reporting - interesting to see how this plays out within aviation

Single source of truth

Regarding LX as a system - knowledge and expertise is distributed throughout Australia/world.. be congisant of how this can be inputted into RISSB

Central data 'gateway'

Bring disparate parts together in one space into one 'central data gateway'

Treat the system from the human perspective

Space to record discussion and findings

Activity 3A - Idea development and validation - Development

25 mins

With consideration of your discussions and findings from activity 2, begin to brainstorm and develop a solution to your chosen problem.

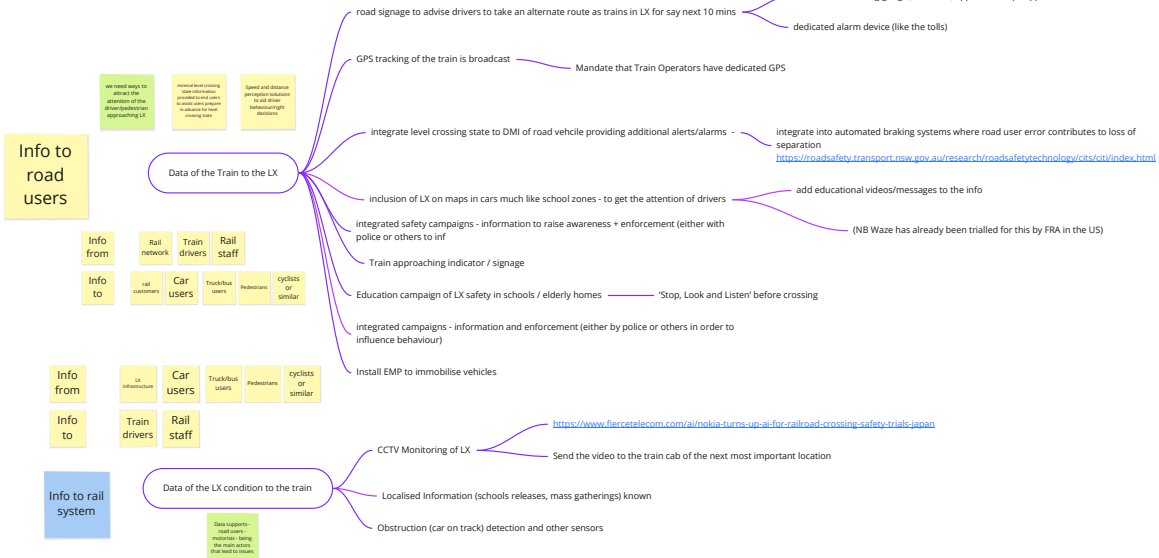
How you develop your solution is up to your team, but some methods we suggest include:

- Mind map your ideas using post-it notes. Start with your challenge in the center and expand out with all your ideas for how it can be solved.
- Get visual! Draw your solution and how it works. Either use pen/paper and drop in a photo of your drawing, or use the pen tool in Miro. You could draw your solution on the illustration you used in activity 1.
- Map our your solution as a system. Use shapes, post-it notes and connection lines to explain your solution and how it works.

If your team is getting stuck, think through some of these questions:

- Who are the stakeholders that shape or are impacted by your solution, and what are their needs?
- Consider what form your solution takes, and if it could be something else. Is it a product, system, policy or something entirely different?
- How does your solution directly address the uniqueness of your assigned urban or remote context?

At the end of the activity, your team will give a 5 minute presentation to the wider group. Prepare your presentation on the following sheet.



Activity 3B - Idea development and validation - Presentation

25 mins

At the end of the activity, your team will give a 5 minute presentation to the wider group. In your presentation, we suggest you cover the following points:

- What is the challenge you were aiming to address and why was it important?
- What did you learn from investigating different sectors, disciplines and innovations in activity 2?
- What is your proposed solution to the challenge and how does it work?
- Why is your solution effective at addressing the challenge and are there any gaps left to address?
- What are the next steps that could be taken to advance your solution?

What is the challenge you were aiming to address and why was it important?

Treating the LX as a system

Manage Energy

Manage Users

Manage Components

Addressing the communication
-Road User
-Train Driver

Preventative

Incident

Recovery

Importance

Incidents occur at level crossings causing harm due to human behaviors

Communicating directly with the road user and the train driver to influence the behaviour prior to the level crossing interface

What did you learn from investigating different sectors, disciplines and innovations in activity 2?

Different rail networks integrate with with road interface to provide information highlighting routes with level crossing that take additional time

Toll roads have communication systems to communicate directly to road users through radio based frequencies to communicate hazards en-route.

Australian Level Crossing Assessment Model - is an assessment tool used to identify key potential risks at level crossings

What is your proposed solution to the challenge and how does it work?

Info to road users

data to vehicle drivers about presence of LX, the current state of it, and the activity predicted for the forthcoming relevant period of time

alerting people approaching to alt routes

Including the existence/ presence of LX

both physical and digital (inside car inc radio and mobile device) (road infrastructure inc signage to alert)

Info to rail system

AI-assisted monitoring of LX - primarily CCTV and networks of sensors

infor provided back to rail system - particularly drivers

CCTV and hazard identification back to driver -

Why is your solution effective at addressing the challenge and are there any gaps left to address?

Info to road users

Better informed decision-making. Uncertainty and stress lead to less-rational actors

Includes behavioural science type approach inc addressing frustration of being stationary and leading to actors 'lashing out'

Info to rail system

Advanced warning regarding evolving hazards leading to better decision-making in a time-sensitive environment

Data fed into predictive modelling which can help identify trends and be supported by enforcement activities

What are the next steps that could be taken to advance your solution?

Info to road users

comprehensive assessment of the LX

Info to rail system

Further investigate the 'middle position' between LX data and rail staff

Group 4

Explored ideas for Remote level crossings and focused on ideas for providing real-time situational information to users in new ways.

Facilitator - Ryan Kennedy

Mac Henshall
Anu Ivaraju
Paul Pafumi
Rita Arrigo
Harish Lala
Sandra Thomas
Kimberley Bracher
Mark Hopkins
Cris Fitzhardinge
Sivapragasam Ravitharan
Aisling Twomey

Activity 1 - Exploring the Challenges

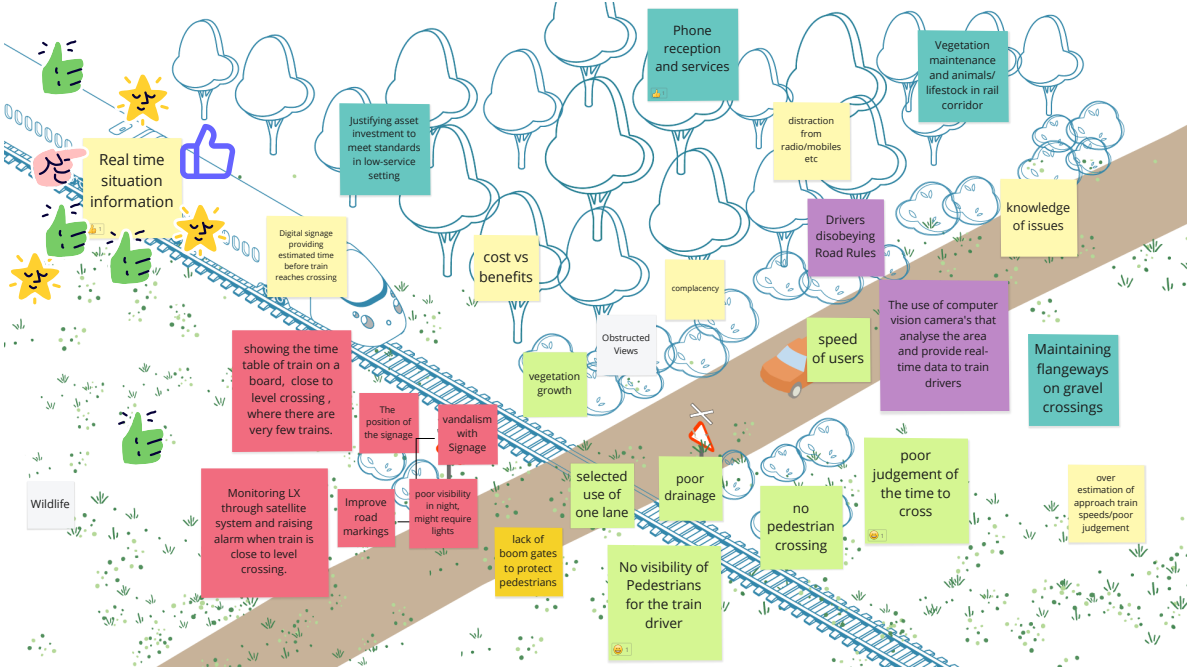
30 mins

Your team will be exploring challenges for **remote level crossings**. Below you will find an illustration of a typical urban level crossing.

Using post-it notes, annotate this illustration with the challenges being faced with safety at level crossings.

As a team, discuss each of these challenges and select **one challenge** you would like to address in this hackathon. Additionally, discuss and record on post-it notes, why this challenge is worth solving.

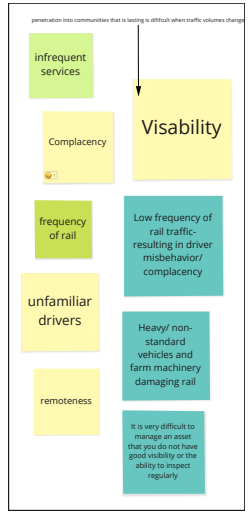
At the end of this activity, your team will have 2 minutes to present what challenges you identified, what challenge you have selected to explore further and why it is the challenge worth solving.



Selected challenge

Real time situation information

Why is it worth solving?



30 mins

Activity 2 - Learning from other sectors, disciplines and innovative solutions

Join group 4 call

Copy the post-it note with your chosen challenge from activity 1 and paste it in activity 2.

Identify three sectors, disciplines or innovative solutions from within or outside of the rail context that face this challenge or one similar.

Investigate and discuss how these sectors and disciplines manage or have solved this challenge.

Consider if aspects of their solutions are relevant for level crossings.

Copy your team's selected challenge here

Real time situation information

Sector/discipline/innovation 1

connected vehicles

Sector/discipline/innovation 2

Lidar, GPS Tracking, Insar

Sector/discipline/innovation 3

rail traffic update app integration

App - train info (private LX)

Space to record discussion and findings

Vehicles talking to each other and informing each other can reduce risks

How long does a vehicle have to be on the crossing before triggering an alarm

Space to record discussion and findings

Could the level crossings be monitored by a satellite system - images could be sent to the driver

Ravi is working on a LiDAR system which may be suitable in this setting - could be used to notify the train drivers early

Alarm system linked to traffic controller? - alarm alerts the road user that the train is very close

Use a trackside magnet to activate warning horn on train

Insar

Road user is primarily responsible for avoiding accident but train drivers can reduce speed with early warnings

Lidar can be picked up a few km's out - if it notifies 500m's out then a clash will occur

Trains can take up to 2 km's to stop - cars need to give way not trains

Provide timing instead of just red light saying a train is coming

what obstruction dimensions trigger the alarm? Kangaroo vs Human

Data would go to the train drivers - a receiver will get the info from the Lidar

Knowing the time could cause trouble if people think they can drive through in time but also provide notice for people to act on the situation before they visually see the train

all these ideas are heading towards active level crossings... which needs to be fail safe

Can be linked to AI work here

Space to record discussion and findings

SMS or Bluetooth for pedestrians for warning

Operators would need to allow their data to be accessed/ open data

Activity 3A - Idea development and validation - Development

25 mins

With consideration of your discussions and findings from activity 2, begin to brainstorm and develop a solution to your chosen problem.

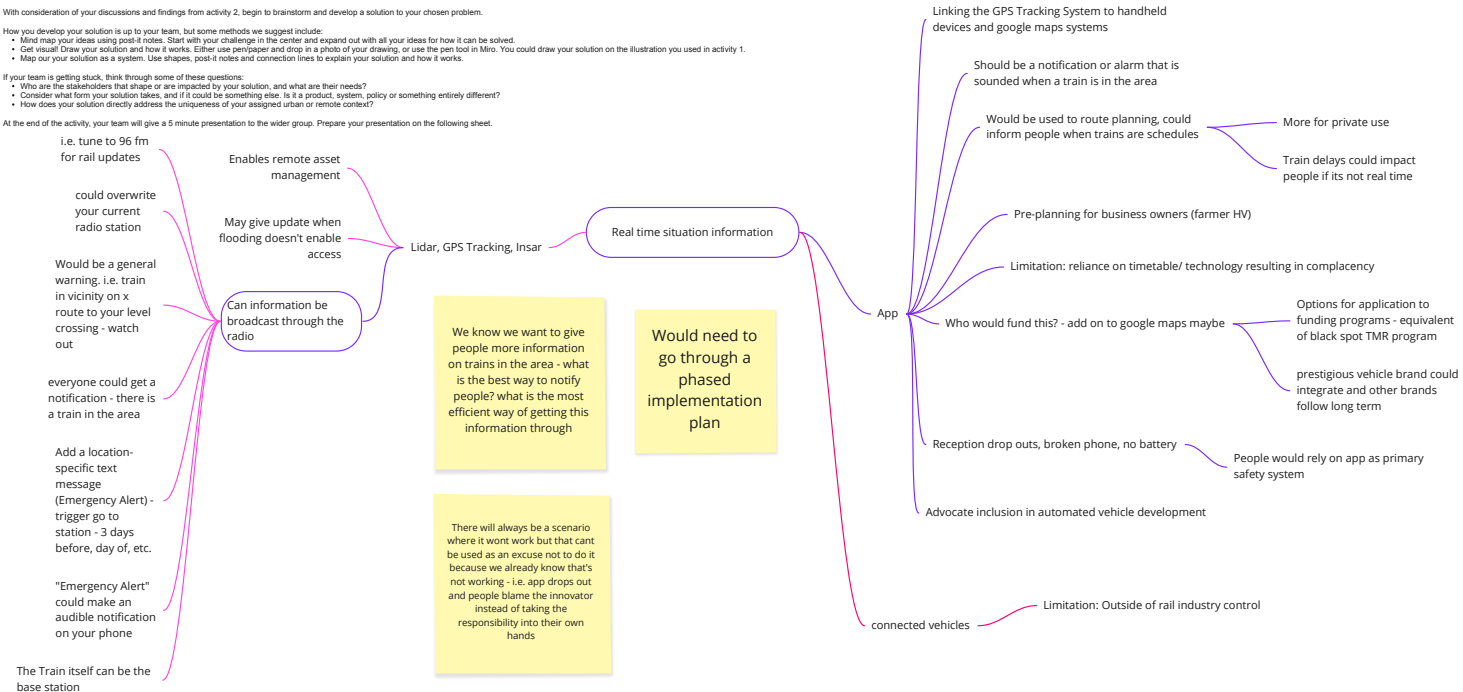
How you develop your solution is up to your team, but some methods we suggest include:

- Mind map your ideas using post-it notes. Start with your challenge in the center and expand out with all your ideas for how it can be solved.
- Get visual! Draw your solution and how it works. Either use pen/paper and drop in a photo of your drawing, or use the pen tool in Miro. You could draw your solution on the illustration you used in activity 1.
- Map our your solution as a system. Use shapes, post-it notes and connection lines to explain your solution and how it works.

If your team is getting stuck, think through some of these questions:

- Who are the stakeholders that shape or are impacted by your solution, and what are their needs?
- Consider what form your solution takes, and if it could be something else. Is it a product, system, policy or something entirely different?
- How does your solution directly address the uniqueness of your assigned urban or remote context?

At the end of the activity, your team will give a 5 minute presentation to the wider group. Prepare your presentation on the following sheet.



Activity 3B - Idea development and validation - Presentation

25 mins

At the end of the activity, your team will give a 5 minute presentation to the wider group. In your presentation, we suggest you cover the following points:

- What is the challenge you were aiming to address and why was it important?
- What did you learn from investigating different sectors, disciplines and innovations in activity 2?
- What is your proposed solution to the challenge and how does it work?
- Why is your solution effective at addressing the challenge and are there any gaps left to address?
- What are the next steps that could be taken to advance your solution?

What is the challenge you were aiming to address and why was it important?	Real time situation information	A high % of crossings in regional do not have active warnings	complacency - locals not expecting trains					
What did you learn from investigating different sectors, disciplines and innovations in activity 2?	connected vehicles	Lidar, GPS Tracking, Insar	App - train info (private LX)					
What is your proposed solution to the challenge and how does it work?	We know we want to give people more information on trains in the area - what is the best way to notify people? what is the most efficient way of getting this information through	app, phone & radio Information system (Secondary System) - Needs to be pitched as an information system not a warning system	An informative system which overwrites your current radio station or you can tune in. Would be a generic message saying a train is in your vicinity - train itself could be the base station	A phone notification could be sent out similar to "Emergency Alert" which informs people of oncoming trains - if it speaks out it would be beneficial	The app solution could be used for Pre-planning for business owners (farmer HV)	Would need to go through a phased implementation plan	Should be a complimentary part of a larger campaign - not a stand alone fix which will fix everything by itself	
Why is your solution effective at addressing the challenge and are there any gaps left to address?	Gap - cell phone coverage is getting better but people arent confident to rely on the technology	Limitations - Phone reception, not all trains have GPS Monitoring, Dead phones, not all private operators will invest in this, maintenance of tech, funding?,	cant be forced adoption through legislation but could be built into contracts	Real world push back is - risk associated with providing this information and road users relying on it to make decisions - perception that rolling out this system will cause the innovators to take on more risk				
What are the next steps that could be taken to advance your solution?	An understanding on what has already been done and where the researchers landed on this work (And needs to be refreshed) - Technical review of pros and cons, cost and benefits etc.	Consider university collaboration (student literature review)	Business influencer support	Trials of possible technologies & innovation	Explore funding options			

Group 5

Explored ideas for Remote level crossings and focused on ideas that addressed the inattention of road users of oncoming trains.

Facilitator - George Quezada

Stephen Baxter
Isaac Lim
Gary Templeton
Nicola Belcher
Simon Chandler
Dagmar Parsons
Matthew Costin
PAIX Guillaume
Ashveer Malhotra
Nicola Belcher
Kate Moncrieff

Activity 1 - Exploring the Challenges

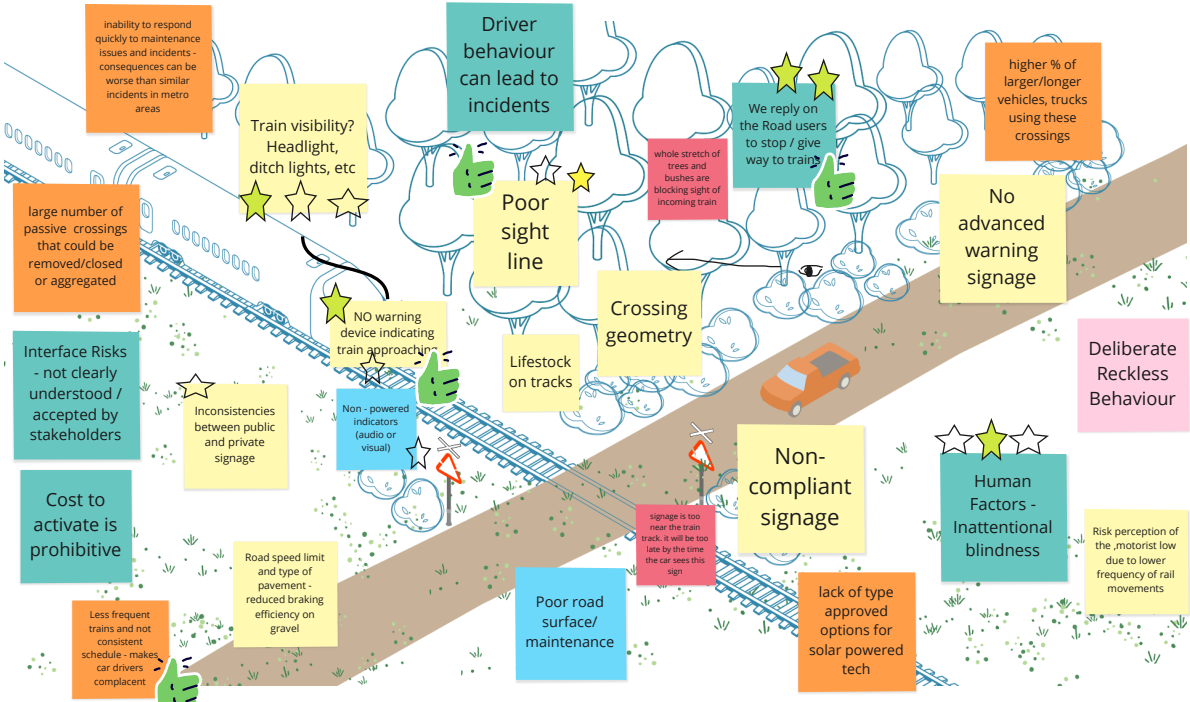
30 mins

Your team will be exploring challenges for **remote level crossings**. Below you will find an illustration of a typical urban level crossing.

Using post-it notes, annotate this illustration with the challenges being faced with safety at level crossings.

As a team, discuss each of these challenges and select **one challenge** you would like to address in this hackathon. Additionally, discuss and record on post-it notes, why this challenge is worth solving.

At the end of this activity, your team will have 2 minutes to present what challenges you identified, what challenge you have selected to explore further and why it is the challenge worth solving.



Selected challenge

Drivers/other users not aware of coming train (inattention)

Why is it worth solving?

Too expensive to put active signaling at crossings

To prevent accidents

Rural driver attention can be poor due to infrequent trains

Could lessen manpower onsite to prevent accidents

Poor line of sight in some situations

car and train drivers can drive at ease/ without worries

solutions can make up for the poor line of sight

30 mins

Activity 2 - Learning from other sectors, disciplines and innovative solutions

Copy the post-it note with your chosen challenge from activity 1 and paste it in activity 2.

Identify three sectors, disciplines or innovative solutions from within or outside of the rail context that face this challenge or one similar.

Investigate and discuss how these sectors and disciplines manage or have solved this challenge.

Consider if aspects of their solutions are relevant for level crossings.

Join group 5 call

Copy your team's selected challenge here

Drivers/other users not aware of coming train (inattention)

Connected autonomous vehicles

Sector/discipline/innovation 1

Road safety interventions

Space to record discussion and findings

Road tunnels use your radio

Road condition or speed warning

Road Works speed limiting

School crossings

Harder-to-drive-on roads to limit car speed

Driver fatigue detection - CCTV looks at eyes and alerts

Dynamic bend lighting

Sector/discipline/innovation 2

Human factors

Space to record discussion and findings

Crossing user information requirements - and how they are different for different users

Effectiveness of interventions and unintended consequences

Visual alerts inside the vehicle?

Rumble strips on road before crossing

Providing messages in navigators at start of journey

Cases where roads are unsealed

What distance from the crossing? How many?

Challenge of different nav providers

Signs about high risk zones (dangerous crossing)

Sector/discipline/innovation 3

Industry standards - cross over between jurisdictions

Space to record discussion and findings

Rail interface agreements aren't working?

How to prioritise which crossing to fix?

Conflicting priorities between RIM snd RM

Activity 3A - Idea development and validation - Development

25 mins

With consideration of your discussions and findings from activity 2, begin to brainstorm and develop a solution to your chosen problem.

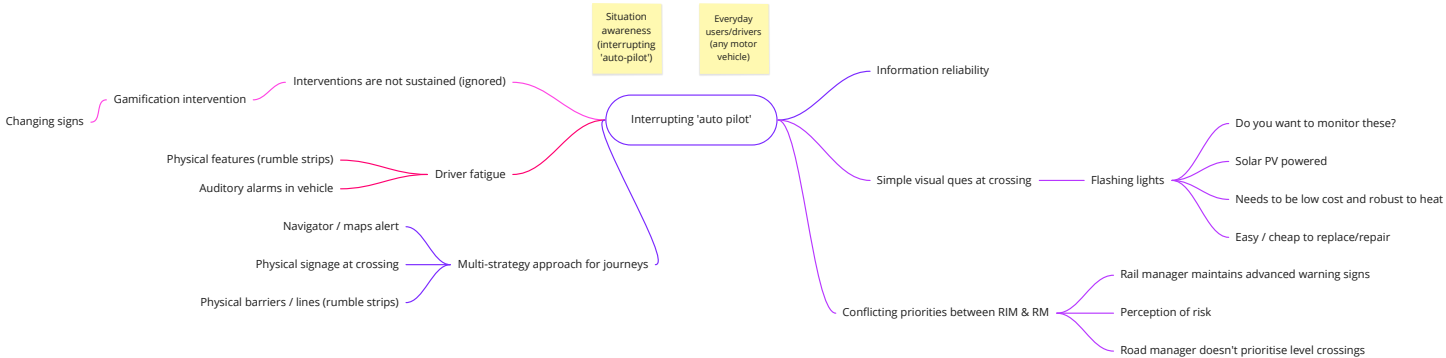
How you develop your solution is up to your team, but some methods we suggest include:

- Mind map your ideas using post-it notes. Start with your challenge in the center and expand out with all your ideas for how it can be solved.
- Get visual! Draw your solution and how it works. Either use pen/paper and drop in a photo of your drawing, or use the pen tool in Miro. You could draw your solution on the illustration you used in activity 1.
- Map our your solution as a system. Use shapes, post-it notes and connection lines to explain your solution and how it works.

If your team is getting stuck, think through some of these questions:

- Who are the stakeholders that shape or are impacted by your solution, and what are their needs?
- Consider what form your solution takes, and if it could be something else. Is it a product, system, policy or something entirely different?
- How does your solution directly address the uniqueness of your assigned urban or remote context?

At the end of the activity, your team will give a 5 minute presentation to the wider group. Prepare your presentation on the following sheet.



Activity 3B - Idea development and validation - Presentation

25 mins

At the end of the activity, your team will give a 5 minute presentation to the wider group. In your presentation, we suggest you cover the following points:

- What is the challenge you were aiming to address and why was it important?
- What did you learn from investigating different sectors, disciplines and innovations in activity 2?
- What is your proposed solution to the challenge and how does it work?
- Why is your solution effective at addressing the challenge and are there any gaps left to address?
- What are the next steps that could be taken to advance your solution?

What is the challenge you were aiming to address and why was it important?

Auto pilot of drivers at private crossings

What did you learn from investigating different sectors, disciplines and innovations in activity 2?

Need to consider redundancy and multiple strategies

Cost is significant

Opportunity to provide access to mobile network?

What is your proposed solution to the challenge and how does it work?

Box on a stick with solar PV - very simple to install and replace

Sign says 'look for train' and light flashes as vehicle approaches

ways to monetise solution to cover cost

Getting driver attention with a simple passive solutions

Priority crossings can be more sophisticated

Sell advertising on back?

Why is your solution effective at addressing the challenge and are there any gaps left to address?

Low cost solution

Does not need long approvals

What are the next steps that could be taken to advance your solution?

Look at availability of existing tech

Crowd funding for prototype

Set criteria for solution - low cost, doesn't require maintenance and monitoring

Assess approval requirements

ECOWITT
Display w
7-in-1 W
Rain Gau
Direction
panel)
Brand: ECOWIT
#1 Best Seller
$219.99
Secure

Presentation recording

A recording of the group presentations at the end of the hackathon can be accessed here.

If you have issues accessing this recording or have any questions about the event, please contact James Macken (James.Macken@arup.com).

Arup Facilitators

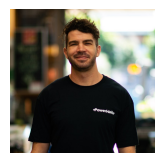
Anne Kovachevich
Australasia Foresight and Innovation Lead

James Macken
Foresight and Innovation Consultant

Ryan Kennedy
Planner

George Quezada
Australasia Foresight and Innovation Manager

Bryn Hearder
Consultant



Nicholas Kamols
Researcher