Reducing railway suicide: An open-systems Approach

Final Report QUT Workplan – ARC Linkage Project (LP160100910).

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28 December 2022

ACKNOWLEDGEMENT OF TRADITIONAL OWNERS

QUT acknowledges the Turrbal and Yugara, as the First Nations owners of the lands where QUT now stands. We pay respect to their Elders, lores, customs and creation spirits. We recognise that these lands have always been places of teaching, research and learning.

QUT acknowledges the important role Aboriginal and Torres Strait Islander people play within the QUT community.

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Executive Summary

Railway suicide is a tragic, yet common occurrence on public rail networks globally. This report presents the findings of a series of research studies undertaken to aid in the prevention of railway suicide.

While other teams in our program of research are examining the boundaries of automated suicide risk detection and response strategies, this report presents the findings of four complementary studies that sought to develop better organizational and community capabilities in response to railway suicide risk, including: (1) how the operational environment contributes to the challenge of an effective organizational response; (2) the efficacy of an evidence-based training intervention for gatekeepers and bystanders; (3) communication strategies to persuade the general public to undertake suicide prevention training; and (4) calculating the cost-benefit of interventions for reducing railway suicide.

Drawing on an open-systems approach to capture the dynamic and unpredictable nature of suicide events, the first project used a service design methodology to show how different stakeholders interacted to impact the identification and response to suicide risk.

The second project developed and tested a pilot training intervention for frontline rail staff (gatekeepers) and the general public (bystanders), showing the importance of creating a focus on ends (empathy) as a precursor to means (self-efficacy).

The third project then focused on strategies for engaging the general public via marketing communications. Using a taxonomy for public health promotion, the project evaluated the efficacy of different framing strategies for posters and a campaign website.

The final project presented a tool that could be customised to evaluate the cost-benefit of investments in suicide prevention interventions.

Building on these key findings, 17 recommendations are presented below to guide the research partners on how best to proceed.

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Contents

Abbreviations used in this report

ANU: Australian National University
ARC: Australian Research Council
CCTV: Closed circuit television
EMS: Emergency services
LAC: Local area command
NIM: Network incident manager
OPS: Internal operations
SCC: Security control centre
SMF: Security monitoring facility
SMG: Senior management group
REMS: Rail management system
TLS: Transport location system
TSDM: Train service delivery manager
UC: University of Canberra
VKG: NSW Police radio dispatch

Introduction

This report presents the findings of a series of research studies undertaken to aid in the prevention of railway suicide.

Suicide prevention is a major concern for railway operators internationally. In response, this program of research proposed to develop the World's first automated risk detection system, and then draw on open-systems theory to embed this system within a complex, real-world operating environment. The key aims of this project were to:

Aim 1. Develop information systems for the detection and reporting of suicide risk;

Aim 2. Investigate how different interventions focused on gatekeepers and bystanders can help to reduce suicide risk; and

Aim 3. Disseminate the findings widely so as to reduce incidence of railway suicide.

This report presents the findings of five projects related to Aim 2. Information on the findings in relation to Aim 1 are available via separate reports from the University of Canberra and ANU. In addressing Aim 2, we also contribute to Aim 3.

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Background

The Australian Bureau of Statistics (2020) reports that suicide is the leading cause of death for people aged between 15-45 years. Increasing by more than a third over the last decade, around 3,318 Australians died from intentional self-harm in 2019. These figures are also likely to be conservative due to some deaths being incorrectly classified as accidental or of an indeterminant nature.

The most significant concern, however, is that despite concerted efforts to reduce the incidence of suicide, including the establishment of a Senate Inquiry into Suicide in Australia and increased government investment, the rate of suicide in Australia has actually increased from 10 to 13 deaths per 100,000 people over this time.

Railway suicides remain a major cause for concern, accounting for around 2.5% of total suicides in Australia, with the majority found from Coronial data to be associated with psychological risk factors (Tracksafe, 2021). And while the absolute numbers are still very small by comparison to other forms of suicide such as hanging and poisonings, the violent and public nature of railway suicide has more far-reaching impact. Krysinska and Leo (2008) assert that a single railway suicide incident has detrimental consequences on the psychological well-being of hundreds of people, including train drivers, station staff, and bystanders.

Given the magnitude of this problem, it is not surprising to find that the issue of railway suicide has attracted considerable research attention since the first reported incident in England in 1852 (Clark, 1984). In our review of prior research, we identified a significant body of research dealing with suicide prevention.

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The focus of this research has largely been on understanding the different suicide prevention strategies that have been employed. These studies can be classified, broadly, into three sub-groups based on the nature and focus of the intervention.

- **Organisational interventions** relate to training of railway gatekeepers who can identify at-risk persons and intervene to prevent an incident. A popular example of an organisational intervention is the training of customer facing staff in mental health first aid to enable them to better identify suicide warning signs (Debbaut et al., 2014).

- **Servicescape interventions** relate to changes to the physical service environment. The goal of these interventions is to inhibit or prevent suicidal actions. An example of a servicescape intervention is the use of platform barriers or changes to other environmental conditions such as lighting or sound (Havarneanu et al., 2015).

- **Communication interventions** are similar to organisational interventions in that they aim to interrupt suicide plans, however, the target of such interventions is the commuter rather than railway staff. An example of a communications intervention would be the use of public address announcements, or the award winning "Dumb Ways to Die" social media campaign by Metro Trains in Melbourne (Salm & Hommers, 2013).

Notwithstanding the many contributions of this prior research, there are, nevertheless, some very specific gaps in our understanding of railway suicide. For instance, we presently rely on human monitoring to identify persons at-risk of suicide. Mishara (2016) asserts that humans are intuitively capable of sensing when something doesn't seem right. This approach has limitations, however, as it requires someone to be looking at the exact location at a given point in time. With a small team of staff monitoring security feeds from 200+ stations, the probability of Sydney Trains staff being able to observe an incident and respond quickly is small.

While other teams in our program of research are examining the boundaries of automated suicide risk detection and response strategies, this report presents the findings of four complementary studies that sought to develop better organizational and community capabilities in response to railway suicide risk, including: (1) how the operational environment contributes to the challenge of an effective organizational response; (2) the efficacy of an evidence-based training intervention for gatekeepers and bystanders; (3) communication strategies to persuade the general public to undertake suicide prevention training; and (4) calculating the cost-benefit of interventions for reducing railway suicide.

This program of work was undertaken using an open-systems approach.

Open-systems approach

While railway services appear chaotic and complex on the surface, these services are quite predictable and manageable. The problem is that railway suicide does not conform to a schedule.

Railway operators such as Sydney Trains can model consumer demand and effectively manage the resourcing of their operations as if they were a closed-system. By definition, a closed-system is one that operates in isolation, where inputs and outputs can be reliably predicted and controlled, services can be easily scheduled, and operations management centres can monitor and control network performance. Accordingly, the main focus of Sydney Trains is on improving efficiency and removing incidents that have the potential to cause delays.

Drawing on the work of Keating and colleagues in the context of mental health services (Anderson et al., 2014), we can see that the complex and unpredictable nature of suicide requires a flexible and adaptive organizational response. This concurs with Suicide Prevention Australia (SPA 2015, p.22) who argue that the most

effective response to suicide will not come from the study of discrete interventions, but rather, from a "multi-level, multi-factorial, systems-based approach." To capture the interplay between the key service functions and processes that impact the delivery of a more complete response to railway suicide, we adapt Fitzsimmons et al.'s (2014) open-systems view of service operations management (see figure on next page).

From this model, we see that the role of operations management is central to delivery of an effective response to railway suicide. In sum, suicide prevention requires timely and accurate information sharing in order to manage the human and physical resources needed to respond to this challenge, while also meeting normal service delivery goals. In particular, this report presents findings in relation to the considerations in the lower half of the model.
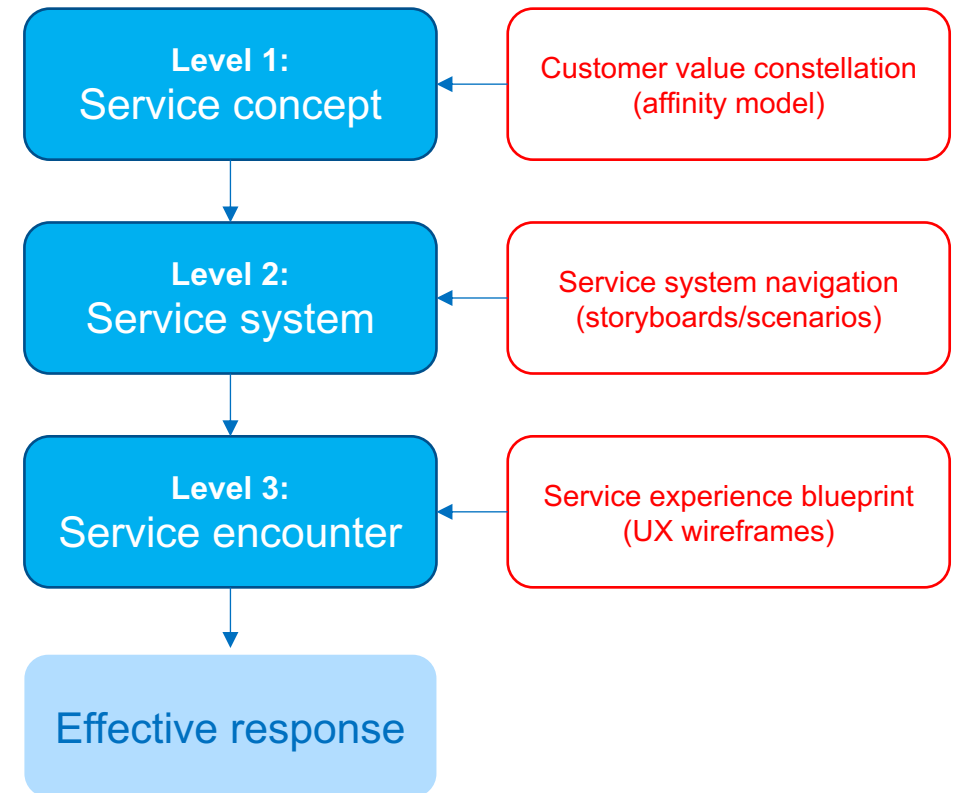
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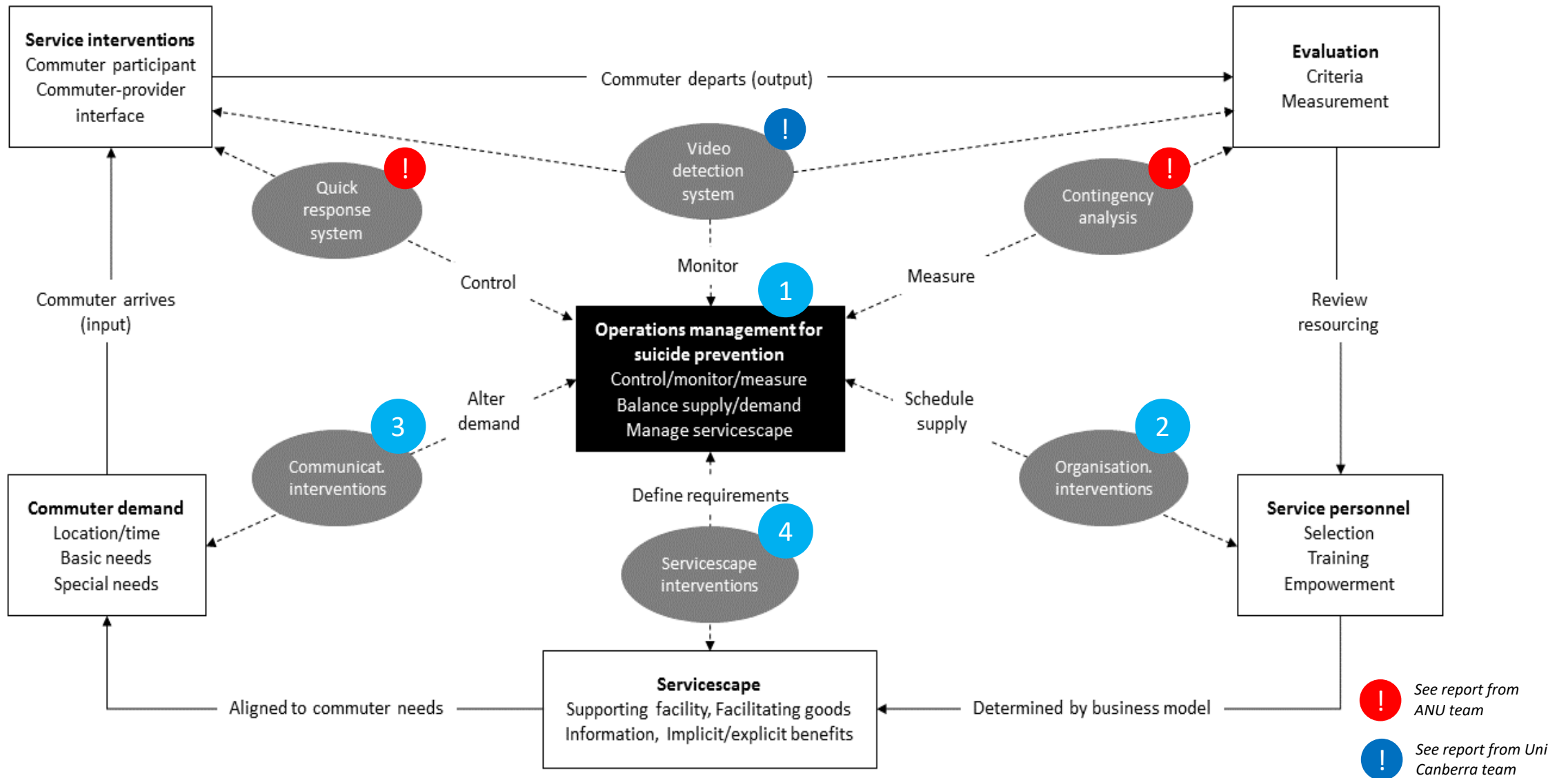
Chapter 1: Designing an operational response

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1.1 Chapter overview

This chapter of the report presents the findings of research undertaken to examine how "new information" about suicide risk is received and used in response to persons at risk of suicide in a railway setting.

This research is complementary to the work undertaken to develop an information systems for the detection and reporting of suicide risk. The goal of this chapter is to design an effective operational response after an incident is identified. It is noteworthy that the operational response presented here can apply to risks identified through any means (e.g., CCTV, emergency services, help point alarms, etc.).

This work is guided by the MINDS method for service design (Grenha-Teixeira et. al., 2017) which draws on interaction design theory and computer science modeling to highlight how explicit design decisions at three distinct levels of abstraction impact on an effective operation response. Information on the three levels is shown in the figure to the right and elaborated upon in the different sections of this chapter.
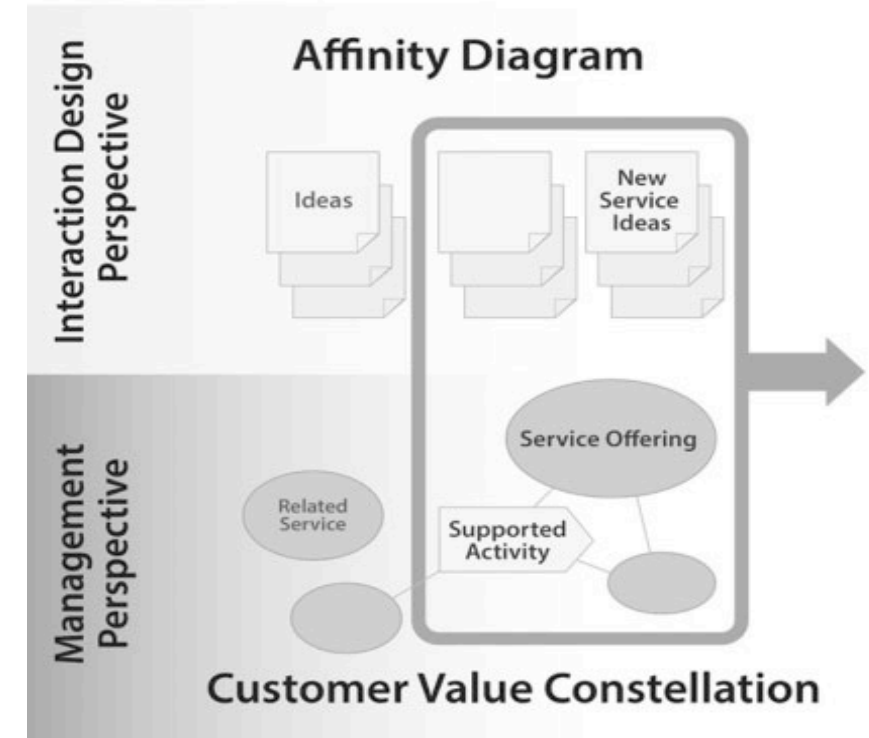
Level 1:
Service concept — Customer value constellation (affinity model)

Level 2:
Service system — Service system navigation (storyboards/scenarios)

Level 3:
Service encounter — Service experience blueprint (UX wireframes)

Effective response

# 1.2 Designing the service concept (Level 1)

Level 1 is focused on understanding how those with operational responsibility work with other key stakeholders in response to railway suicide. This involves four steps:

- Step 1.1: Identify key stakeholders, resources

- Step 1.2: Map value constellation to establish lines of interaction between stakeholders

- Step 1.3: Identify key tasks specific to railway suicide prevention and decide what is in/out of scope

- Step 1.4: Overlay value constellation with affinity diagram to identify key responsibilities for different stakeholders
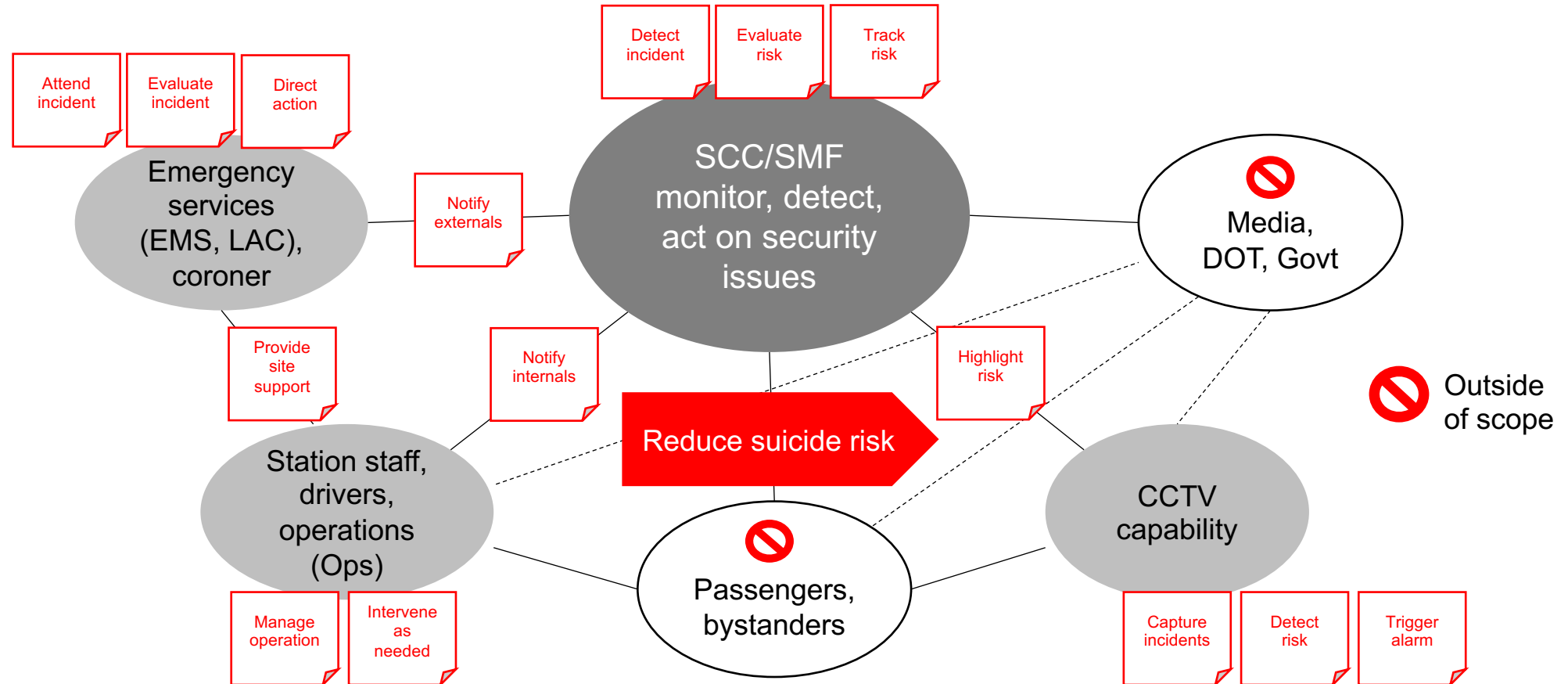
The data for level 1 was collected via a workshop with security monitoring staff at the Sydney Trains Rail Operations Centre (ROC) on 11 March 2019.

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1.2.1 Mapping the value constellation (Steps 1.1-1.2)
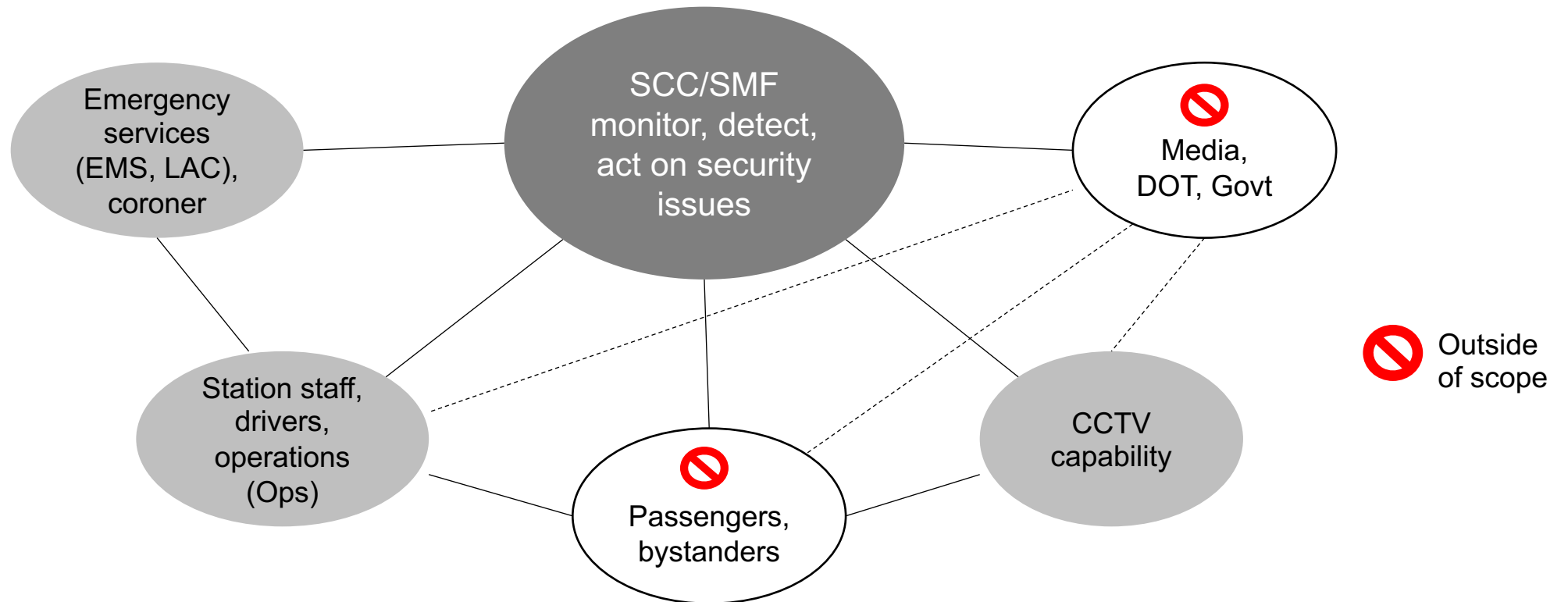
1.2.2 Overlay affinity model (Steps 1.3-1.4)
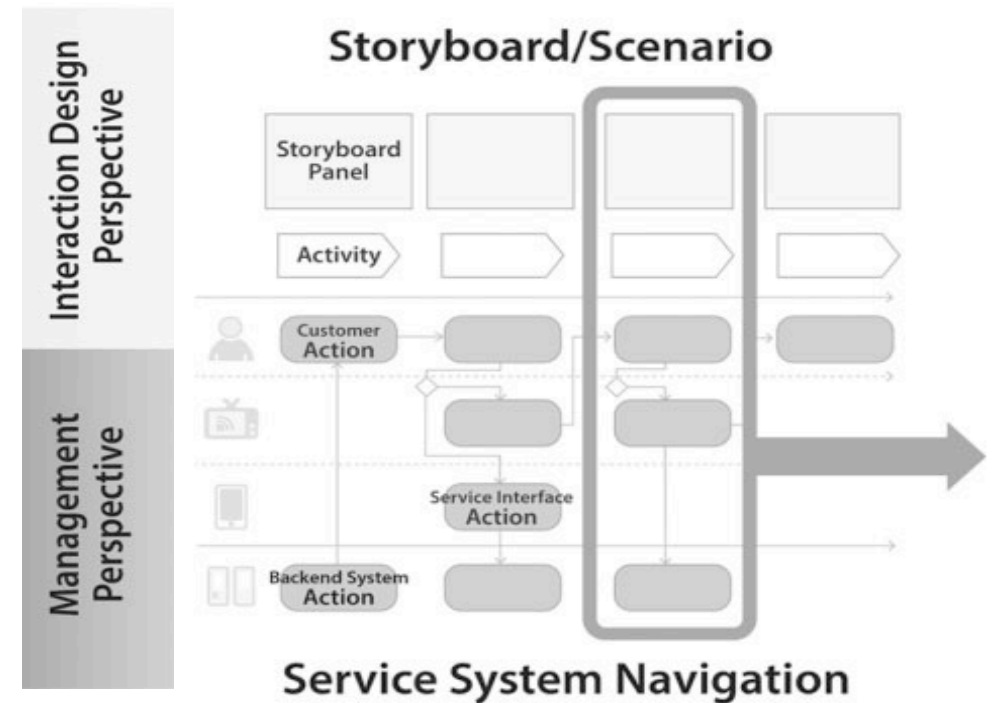
Final Report – ARC Linkage Project (LP160100910) – Workplan 1.

1.3 Designing the service system (Level 2)
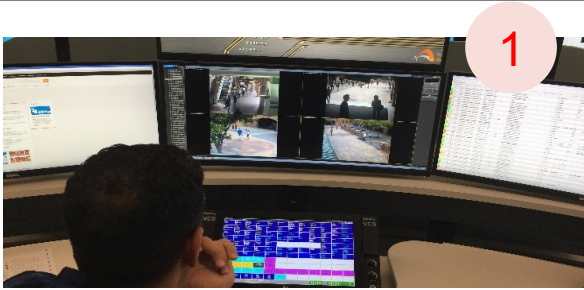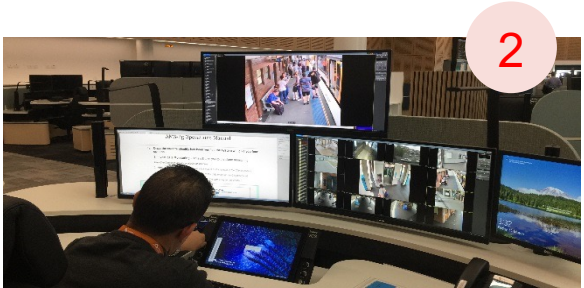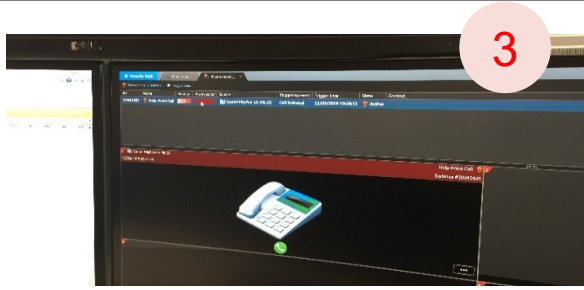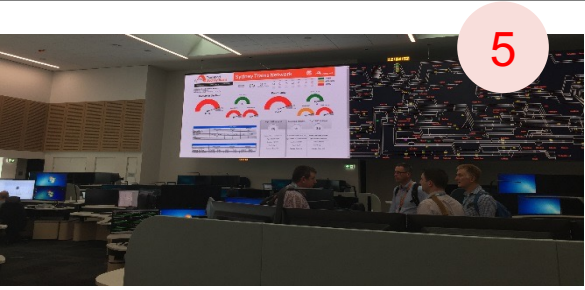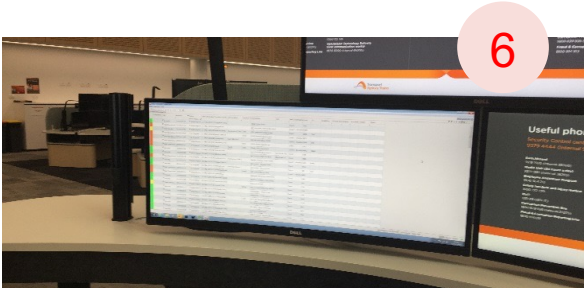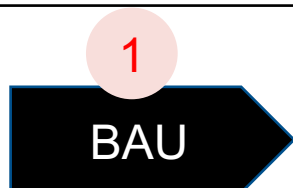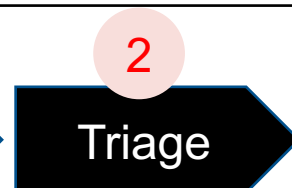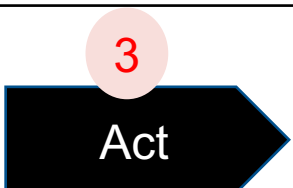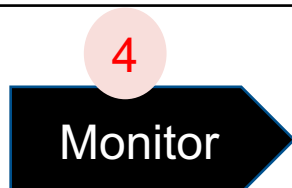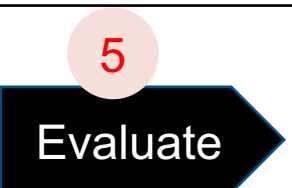
Level 2 is focused on documenting the service system related to SCC/SMF's responsibility to monitor, detect, and act:

- Step 2.1: Use storyboards to identify workflow for different suicide risk scenarios

- Step 2.2: Identify main activities related to key responsibilities over time (i.e., before, during, after incident)

- Step 2.3: Identify and map internal user/s to activities (SCC/SMF)

- Step 2.4: Identify and map external stakeholders (station staff, emergency etc.) to activities

- Step 2.5: Identify support processes related to activities (CCTV, REMS etc.)

The data for level 2 was collected via a workshop with security monitoring staff at the ROC on 14 March 2019.

1.3.1 Storyboards and activity (Steps 2.1-2.2)

	Before	During	After
Storyboards/scenarios	1 2	3 4	5 6
Activity	1 BAU 2 Triage	3 Act 4 Monitor	5 Evaluate 6 Report

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1.3.2 Service system navigation (Steps 2.3-2.5)

Activity	Before		During		After	
	1 BAU	**2** Triage	**3** Act	**4** Monitor	**5** Evaluate	**6** Report
Internal (SCC supervisor)		Review Risk	Decide Action	🚫		Liaise SMG
Internal (SCC)	**Review CCTV** (Starting Point)	Identify Risk	Liaise Internals		Review Outcome	Prepare Report
Internal (SMF)	Tour Setup		Manage Risk			
Internal (Rail OPS)			Review Ops	Liaise EMS		Notify LAC
External (VKG/Coroner)			Liaise LAC			LAC Liaise Coroner
Backstage	CCTV Capability	TLS Check	REMS/ Log		Retrieve CCTV	REMS/ Log

Classify Risk

Alter Ops

Deploy Resources

Type of report

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1.4 Designing the service encounter (Level 3)

In the final phase (Level 3), we focused on designing the key service encounters relating to the use of information related to either the risk detection system or some other source:

- Step 3.1: Elicit information requirements from the key user groups

- Step 3.2: Develop a prototype service interface based on feedback from users and information requirements

- Step 3.3: Present information on anticipated interactions by users

- Step 3.4: Document the potential backstage support processes (emphasis on opportunities for robotic process automation)

The data for level 3 was collected via a workshop with security monitoring staff at the ROC on 1ˢ March 2019.

UX/Wireframe Sketch

Interaction Design Perspective

Interaction Flow & Presentation

Management Perspective

Customer Action

Service Interface Action

Backend System Action

Service Experience Blueprint

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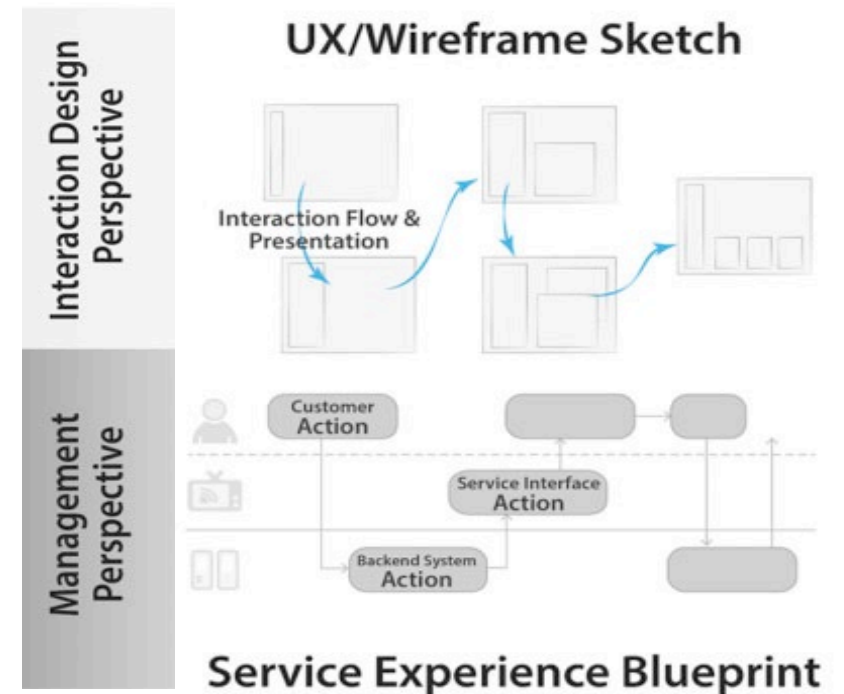
1.4.1 Information requirements (Step 3.1)

The workshops elicited information on the requirements of users. Following were the essential informational requirements identified along with a summary of the key operational considerations and concerns.

Essential information:

- Incident location (station, platform/concourse, camera, GPS, cross street, closest help point);

- Incident information (date and time, live video feed – play/rewind/ forward, tagged person, reason for alert);

- Contextual information (weather).

Operational considerations/concerns:

- Presentation and false positives,

- Impact on system and job performance (particularly liability);

- Psychological impact, increase chance of operator viewing incident;

- Adequate training/induction on use of the system.

Key questions arising from the process: What do we need the system to do? Can we take advantage of existing system features (before)? Can we streamline internal/external consultation (during)? Can we automate some of the reporting requirements (after)?

1.4.2 Interaction presentation (Step 3.2)

Activity	Focus of service encounter design				After	
	Before		During			
	BAU	Triage	Act	Monitor	Evaluate	Report
Internal (SCC supervisor)		Review Risk	Decide Action	🚫		Liaise SMF
Internal (SCC)	Review CCTV	Identify Risk	Liaise Internals		Review Outcome	Prepare Report
Internal (SMF)	Tour Setup		Manage Risk			
Internal (Rail OPS)			Review Ops	Liaise EMS		Notify LAC
External (VKG/Coroner)			Liaise LAC			LAC Liaise Coroner
Backstage	CCTV Capability	TLS Check	REMS/ Log		Retrieve CCTV	REMS/ Log

Starting Point · Classify Risk · Alter Ops · Deploy Resources · Type of report

1.4.3 Interaction design (Step 3.2)

Service Experience Blueprint: Classifying and responding to an incident					
Interaction design	①	②	③	④	⑤
SSC user	Review CCTV *Starting Point*	Watch incident	Check train loc.	Examine indicators	Classify risk → Notify stakeholders
Video detection system		Trigger pop-up	Location info	Indicator info	Triage options → Response options
Support processes	VDS		TLS		Update VDS Initiate REMS

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1.4.4 Prototype service interface (Step 3.2)

The interface would pop-up on the user's computer screen based on either a human or system-based trigger.

1 Captures live feed from time of risk detection (feed can be controlled by operator).
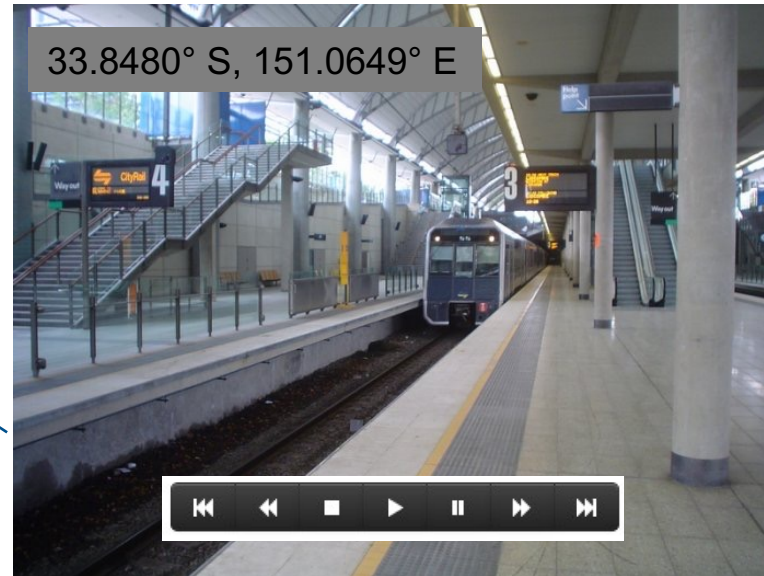
5 **Triage:** Based on current alert levels. Selection triggers automated notifications to internal and external stakeholders. Trains the AI algorithm.

DD-MM-YYYY HH:MM:SS   OLYMPIC PARK – PLATFORM - CAMERA
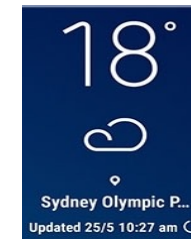
33.8480° S, 151.0649° E

| Certain | Expected | Probably | Possible | Not expected | Return to pool |

Risk factors

- Factor 1
- Factor 2
- Factor 3
- Factor 4
- Factor 5
- Factor 6

18°
Sydney Olympic P...
Updated 25/5 10:27 am

3 Factors within risk detection algorithm as captured by CCTV analysis.

If risk identified by a source other than the CCTV system, an incident form would capture risk factors.

Links to GPS coordinates. Can add other information (e.g., hospital indicator).

2 Links to TLS and Help Point (reverse call).

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1.4.5 Backstage support processes (Step 3.4)

Triage category	Immediate action		Monitor		No action	
	Certain	**Expected**	**Probable**	**Possible**	**Not likely**	**Return**
Internal (SCC supervisor)	Support action	Confirm action	Advice only	N/A	N/A	Advised of availability
Internal (SCC)	Notify NIM and LAC	Notify TSDM and VKG	Notify TSDM and VKG (advice only)	Call station staff to check history (if applicable) – escalate or not	N/A	Someone else in team actions
Internal (SMF)						
Internal (Rail OPS)	NIM monitor TSDM action	TSDM take action	TSDM on alert	N/A	N/A	N/A
External (VKG/Coroner)	LAC monitor VKG request	VKG notified (take action)	VKG on alert	N/A	N/A	N/A
Backstage	VDS + Process Automation	VDS + Process Automation	VDS + Process Automation	VDS only	N/A	N/A

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1.5 Summary

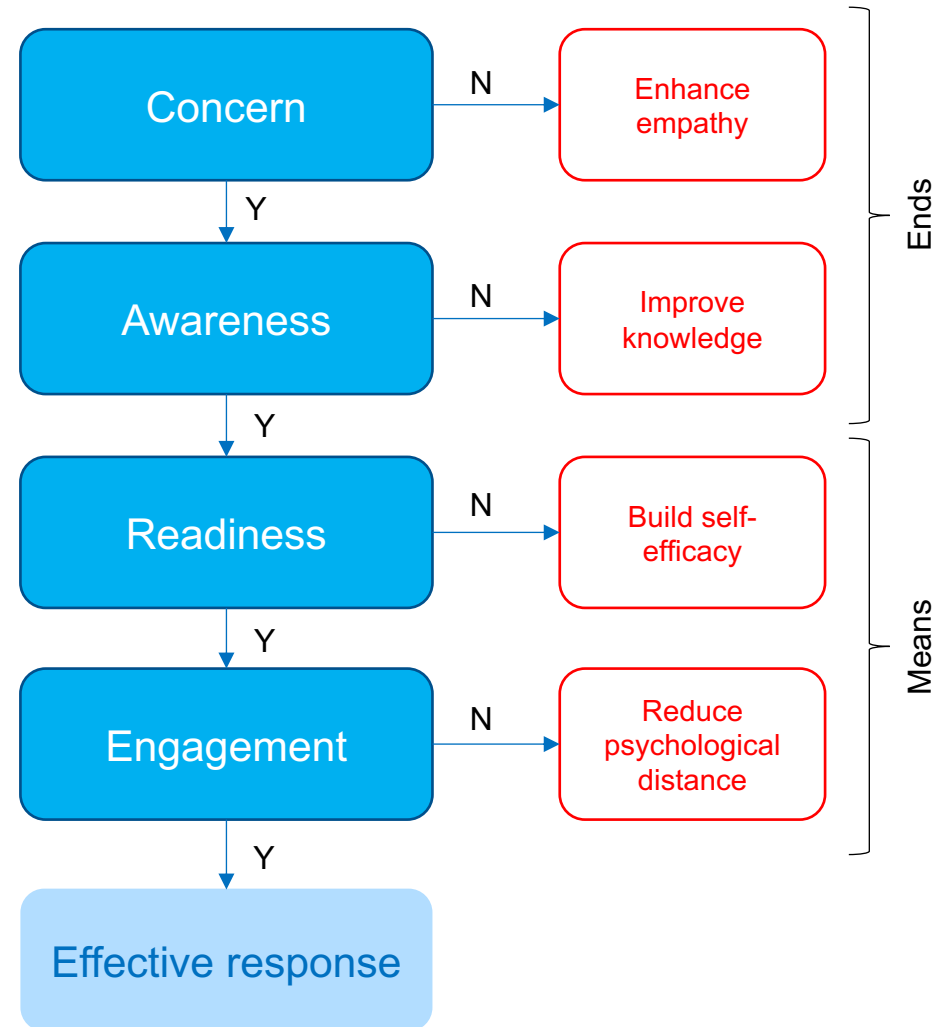| Key findings	Recommendations
Using the MINDS service design method, we present an overview of the service concept (Level 1), service system design (Level 2), and a prototype interface and support processes for assisting the Sydney Trains security monitoring team to make better use of available information in an effort to improve their response to suicide risk (Level 3).	1. Use the methodology and expand the service concept to include out-of-scope stakeholders (e.g., general public) and map additional tasks and responsibilities in relation to railway suicide prevention. 2. Introduce a risk categorization schema (even if not as part of an information system) to enable safety risk assessment. This will help to build the evidence base regarding suicide risk and assist with triaging the response of emergency personnel.
The resulting materials provide a useful, point-in-time summary of an organizational response to a relatively complex social issue with many interdependencies.	3. Make use of these resources for internal training and to educate new staff about the key workflows around suicide (and other security risks). 4. Use the materials to conceptualize and model possible improvements to the service system for suicide (and other security risks). 5. Explore the applicability of the process, method and resulting materials to other jurisdictions. This could assist with identification of a "best practice" model for the management of suicide risk.

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Chapter 2: Training people to identify railway suicide risk

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2.1 Chapter overview

This chapter of the report presents the findings of a program of research undertaken to evaluate a training intervention designed to support frontline staff and the general public to identify and respond to persons at risk of suicide in a railway setting.

Notwithstanding the important work being undertaken to directly influence suicidal ideation among at-risk persons, this project focuses on strategies for activating internal (security monitoring and frontline staff) and external stakeholders (emergency services and general public) to help prevent railway suicide.

This work is guided by the CARE Framework to the right. This framework was developed by the researchers following a meta-analysis of prior training interventions targeting gatekeepers and bystanders. The framework is informed by construal level theory (Trope & Liberman, 2012) which highlights the importance of creating a desire to act (ends) and removing barriers that can impact the feasibility of achieving a desired outcome (means).

Concern —N→ Enhance empathy
Concern —Y→ Awareness
Awareness —N→ Improve knowledge
Awareness —Y→ Readiness
Readiness —N→ Build self-efficacy
Readiness —Y→ Engagement
Engagement —N→ Reduce psychological distance
Engagement —Y→ Effective response

Ends
Means

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2.2 Understanding suicide risk factors

A key content requirement of any training intervention is providing information on the specific risk factors unique to railway suicide.

Drawing on prior research analysing of CCTV footage of railway suicide incidents in Canada (Mishara et al., 2016), we undertook three experimental tasks in order to validate the importance of 13 railway-specific suicide risk factors in the Australian context, and to test the ability of security monitoring staff to effectively detect suicide risk. The first task presented respondents with seven choice sets where they were asked to rank three videos in each choice set in terms of suicide risk intensity. Each video depicted different combinations of the 13 risk factors based on data related to co-occurrence. *A sample video is shown to the right.*

The second task asked respondents to identify the risk factors present in the videos, and the third task requested that respondents evaluate 22 choice sets comprised of six risk factors each, and to indicate which were most and least likely to be associated with railway suicide. Analysed using the maximum-difference scaling method, the choice sets for the first and third tasks were created using balanced and incomplete block designs. The three tasks were undertaken by 36 staff (55% of population) between 7 Jul and 7 Aug 2022.

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2.2.1 Testing ability to detect suicide risk

The findings for tasks 1 and 2 (shown in the table to the right) provide initial support for the ability of security monitoring staff to correctly identify increasing levels of suicide risk.

The normalized scores for task 1 show that respondents identified the video with the greatest number of risk factors to be the most concerning. In line with the results of prior research where the act of leaving an object behind was identified as the only suicide-specific risk factor, respondents ranked the two videos involving this risk factor more highly than other combinations of behaviours. The negative raw scores suggest that these were the combinations of behaviours least likely to trigger concern about suicide. By converting these raw scores to a relative index (normative scores) we can that the top-rated video in terms of risk was 10 times more likely to raise alarm than the video with only pacing.

The findings from task 2 provide further validation of the capacity of security monitoring staff to accurately detect suicide risk factors. Staff were able to accurately detect the displayed risk factors between 84-97% of the time.

Raw score	Description	Relative index	Accuracy
50	Pacing, depressed, bag left, agitation	100.0	96.9
37	Pacing, depressed, bag left	85.6	93.8
7	Pacing, agitation	52.2	90.6
4	Pacing, sits	48.9	84.4
-27	Pacing, depressed	14.4	96.9
-31	Pacing	10.0	96.9
-40	Stands on line	0.0	96.9

(!) **The findings of this section of the chapter provide endorsement for the operational response proposed in the previous chapter, and in particular, the importance of using security monitoring staff to triage and train any risk detection algorithm.**

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2.2.2 Relative importance of risk factors

After establishing that security monitoring staff were able to accurately identify the risk factors, we then sought to measure the relative importance of these factors.

Similar to task 1, the negative scores suggest that these risk factors were least likely to trigger concern about suicide. Likewise, the relative index (normative scores) help to understand the relative importance of the different risk factors. From this data we can see that displaying anxious or agitated behaviours (e.g., psychomotor agitation) is a clear warning sign for railway suicide around twice as likely to raise alarm than someone that just stands on the yellow line for a long time. Other significant risk factors include exhibiting depressed behaviour, looking glum, pacing, and leaving objects behind.

Interestingly, sitting on the platform was not a major concern. This was a significant departure from the Canadian data. Security monitoring staff were also not particularly concerned with persons under the influence of alcohol or drugs. Understandably, these negatively rated risk factors are also common among persons not at risk.

Raw score	Description	Relative index
86	Anxious or agitated	100.0
68	Depressive behaviour	92.8
61	Walks back and forth between wall and yellow line	90.0
47	Leaves objects behind on the platform	84.4
23	Looks glum (shoulders hunched, head lowered, looks at ground)	74.8
19	Paces on the yellow line	73.2
17	**Other strange/unusual behaviour**	**72.4**
0	Looks down the tunnel	65.6
-3	Practices jumping	64.4
-32	Stands on the yellow line for a long time	52.8
-59	Stares at the tracks	42.0
-63	Seems under the influence of alcohol/drugs	40.4
-164	Sits on the platform	0.0

2.3 Developing the training

The content in the training intervention was based on the findings of a meta-analysis of prior research reporting the outcomes of suicide prevention training programs targeting gatekeepers and bystanders.

The training was structured into six sections that mapped to the CARE framework:

- *Importance of concern:* highlighted the need for empathic concern and encouraged people to put themselves in another person's shoes.
- *Suicide in Australia:* provided some background statistics about suicide rates and demographics in Australia.
- *Risk factors:* this was a key section of the training, with information provided on general and railway specific risk factors discussed earlier in this chapter.
- *Taking appropriate action:* guidance was provided on what response strategies are available when confronted by an at-risk person.
- *Building self-efficacy:* emphasized the importance of having confidence and intention to act.
- *Reducing psychological distance:* the final section discussed the bystander effect and encouraged engagement rather than leaving it to someone else.
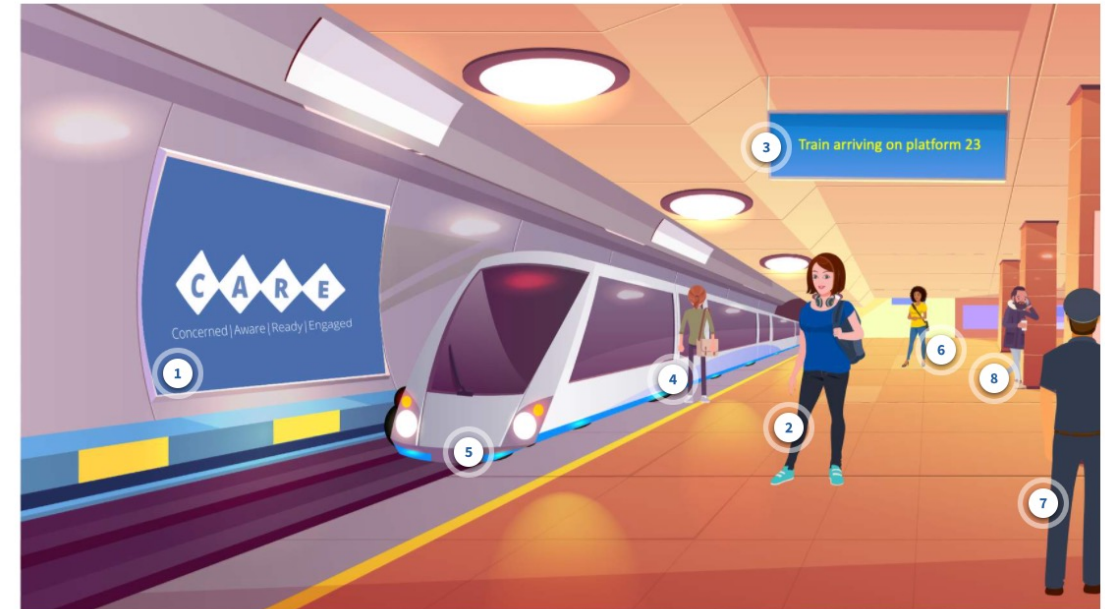
The training intervention was designed to take about 10 minutes and was available either in an [interactive format](#) or as a [static factsheet](#).

2.4 Evaluating the training

The training was evaluated using two randomized experiments:

- *Research design:* a randomized single factor, three-level (interactive, static, control) between-subjects design was used t to gather the data needed to evaluate the training intervention from a sample of frontline staff and from a general public sample.
- *Measures:* two outcomes were measured (i) confidence and intention to intervene (CITIS) and helping attitudes (HAT). Other measures included the four components of the CARE framework (concern, awareness, readiness, engagement), and controls relating to different chronic dispositions (mindfulness, altruism, basic empathy, general self-efficacy).
- *Data collection:* data was collected via two online surveys. Frontline staff employed by TfNSW were surveyed 24 Nov - 3 Dec 2021, and a representative general public sample obtained from Dynata was surveyed 31 Mar - 25 Apr 2022.

The evaluation sought to answer three questions (i) was the training effective, (ii) what cognitive processes were used, and (iii) did personal characteristics influence these processes.

2.5 Gatekeeper study (frontline staff)

While 298 people responded to the survey invitation (18%), the final sample was reduced to 89 after screening and removal of cases that failed the attention checks.

- *Treatment:* Respondents were randomly allocated into one of three groups: control (23%), interactive content (35%), static content (factsheet) (42%).
- *Age:* 18-24 (13%), 25-34 (18%), 35-44 (31%), 45-54 (31%), 55-64 (4%), 65+ years (1%).
- *Gender:* male (56%), female (28%), other (1%), didn't answer (15%).
Education completed: less than high school (12%), higher school certificate (8%), vocational qualification (25%), some university (8%), associate degree (2%), bachelors degree (25%), masters degree (6%), didn't answer (15%).
- *Experience:* less than 10-years (27%), 11-20 years (34%), 20+ years (25%), didn't answer (19%).

The study excluded people aged less than 18 years, people that had witnessed or been a first responder to a suicide in the past 3 months, and people with severe depression or thoughts of suicide in the past 3 months.

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2.5.1 Was the training effective?

- No statistical difference was observed between treatment modes (interactive vs factsheet). We therefore combined the data for the two treatments for the remaining analysis.

- Those completing the training (either option) were observed to be **1.7 times** more likely to have improved concern, awareness, readiness, and engagement (CARE), and **1.2 times** more likely have improved confidence and intention to intervene (CITIS). Following is a breakdown of the areas of improvement for the staff that completed the training intervention.

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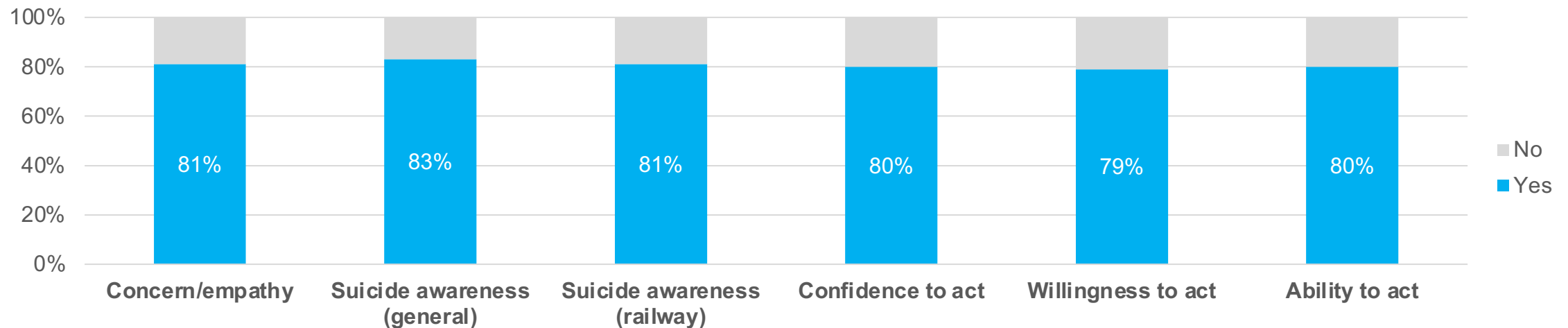
2.5.2 What cognitive processes were used?

- The data supported the hypothesized model, with the training observed to positively influence CARE, which in turn influenced CITIS, which then influenced helping attitude. Results confirmed the indirect influence of training on helping attitude via CARE and CITIS (B=.07, 95% CI: 0.01, 0.17). We also tested the influence of different moderators (results discussed on next slide).

Mindfulness, Altruism, Involvement, Empathy, Self-efficacy.

QUT
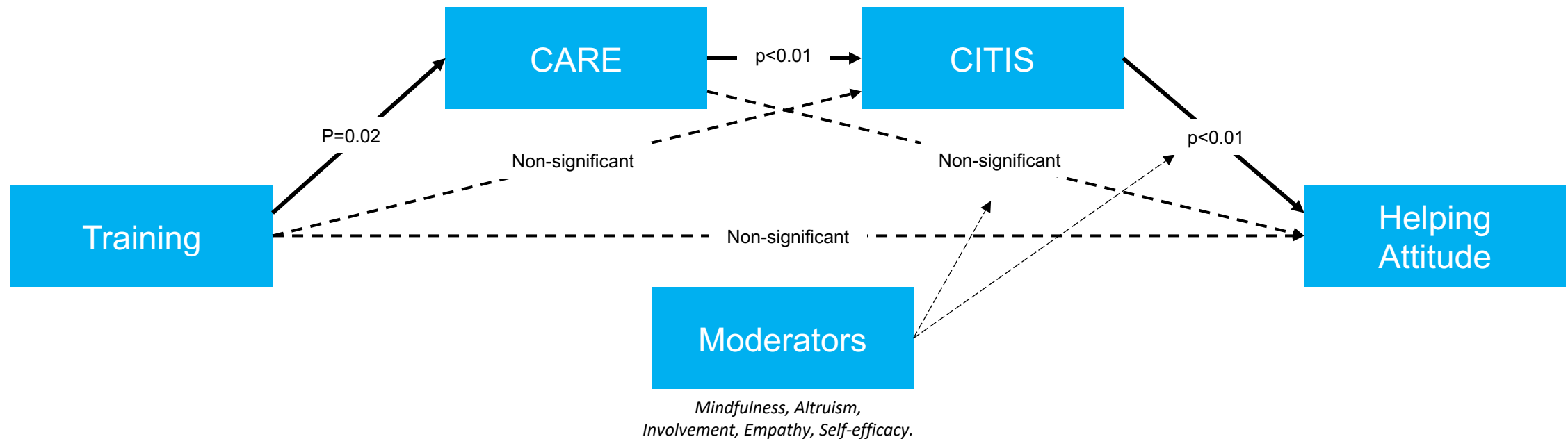
2.5.3 Role of personal characteristics?

- Results of separate moderation analyses for different personal characteristics are provided in the table.

- In terms of demographics, only gender was observed to have an influence with the relationship between CITIS and helping attitude stronger for females (vs males). Age was also observed to fall just short of the threshold for significance (i.e., marginal effect).

- Of the five chronic dispositions, only altruism was found to statistically influence the relationship between CITIS and helping attitude with more altruistic respondents more likely to help and more likely to overcome the bystander effect and convert intention into action.

	Direct (Moderator)	Indirect (*CARE)	Indirect (*CITIS)
Age	NO	NO	NO
Gender	**YES**	NO	**YES**
Education	NO	NO	NO
Mindfulness	NO	NO	NO
Altruism	**YES**	NO	**YES**
Involvement	NO	NO	NO
Basic empathy	NO	NO	NO
Gen. self-efficacy	NO	NO	NO

Note: YES = $p<0.05$

QUT

2.6 Bystander study (general public)

**The final sample after screening and removal of cases that failed the attention checks was 164.**

- *Treatment:* Respondents were randomly allocated into one of three groups: control (64%), interactive content (18%), static content (factsheet) (18%). After consolidation this resulted in two groups: training (36%), control (64%).
- *Age:* 18-24 (2%), 25-34 (22%), 35-44 (12%), 45-54 (21%), 55-64 (16%), 65+ years (7%).
- *Gender:* male (38%), female (62%), other (0%), didn't answer (0%).
Education completed: less than high school (9%), higher school certificate (12%), vocational qualification (27%), some university (6%), associate degree (6%), bachelors degree (30%), masters degree (8%), other (2%), didn't answer (0%).
- *Experience (using train):* less than monthly (74%), monthly (6%), fortnightly (2%), weekly (2%), more frequent than weekly (10%), didn't answer (7%).

The study excluded people aged less than 18 years, people that had witnessed or been a first responder to a suicide in the past 3 months, and people with severe depression or thoughts of suicide in the past 3 months.

2.6.1 Was the training effective?

- No statistical difference was observed between treatment modes (interactive vs factsheet). We therefore combined the data for the two treatments for the remaining analysis.

- Those completing the training (either option) were observed to be **2.4 times** more likely to have improved concern, awareness, readiness, and engagement (CARE), **2.2 times** more likely have improved confidence and intention to intervene (CITIS), and **1.2 times** more likely to help than those in the control group. Following is a breakdown of the areas of improvement for the people that completed the training intervention.

QUT
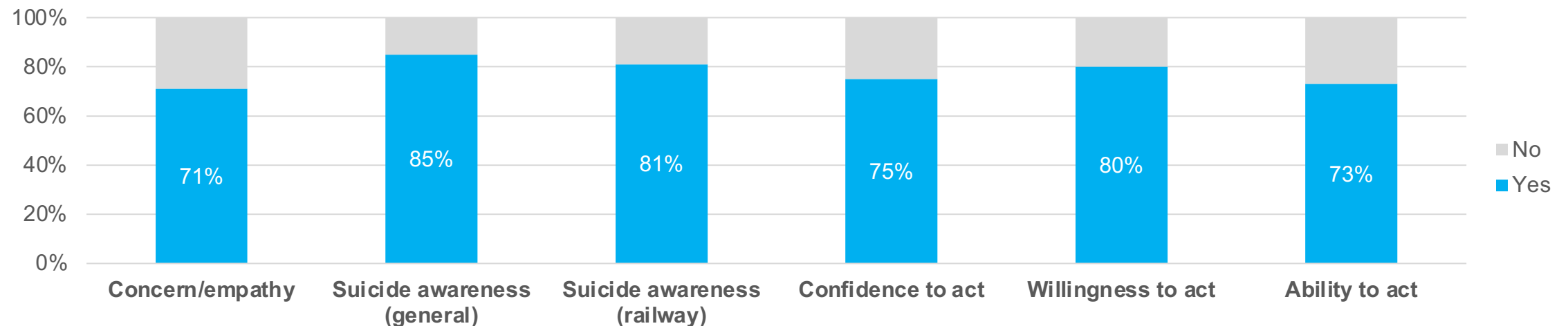
2.6.2 What cognitive processes were used?

- The data supported the hypothesized model, with the training observed to positively influence CARE, which in turn influenced CITIS and helping attitude. Results confirmed the indirect influence of training on helping attitude via CARE (B=.07, 95% CI: 0.02, 0.15) and helping attitude via CARE and CITIS (B=.10, 95% CI: 0.04, 0.18). We also tested the influence of different moderators (results discussed on next slide).
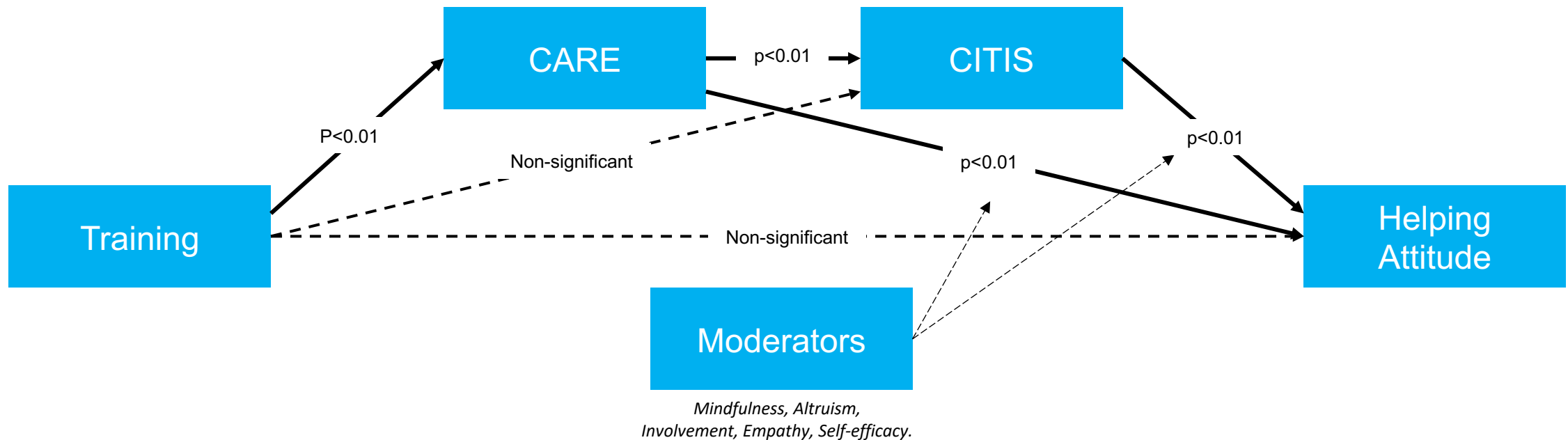
2.6.3 Role of personal characteristics?

- Results of separate moderation analyses for different personal characteristics are provided in the table.

- In terms of demographics, none of the variables (age, gender, education) were observed to moderate the influence of either CARE or CITIS on helping attitude.

- Similar findings were observed for the five chronic dispositions, with no statistically significant indirect effects observed. The results do suggest, however, that mindfulness, altruism and basic empathy are important drivers of helping attitudes even though they don't moderate the influence of the training as measured by increased CARE and CITIS.

	Direct (Moderator)	Indirect (*CARE)	Indirect (*CITIS)
Age	NO	NO	NO
Gender	NO	NO	NO
Education	NO	NO	NO
Mindfulness	**YES**	NO	NO
Altruism	**YES**	NO	NO
Involvement	NO	NO	NO
Basic empathy	**YES**	NO	NO
Gen. self-efficacy	NO	NO	NO

Note: YES = $p < 0.05$

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2.7 Summary

Key findings	Recommendations
The research establishes the value of the CARE framework by showing how a focus on building empathy (ends) is a necessary and important precursor to building the self-efficacy (means) needed to overcome the psychological distance that prevents action.	6. Shift the focus from suicide as an operational issue to highlight the need for understanding and empathy. This could be accomplished with a dedicated internal marketing campaign highlighting stories of successful intervention. 7. Extend existing staff training (largely focused on Mental Health First Aid) to include a focus on at-risk commuters, making use of relevant content from the pilot training program.
The findings of the studies provide good support for the importance of gatekeeper and bystander training as a tool for increasing confidence, intention and helping attitude with regards to rendering support to at-risk persons. The findings were also observed to persist in the face of a range of demographic differences and chronic dispositions.	8. Building on the findings of the Victorian Royal Commission into Mental Health, consideration should be given to provision of suicide prevention training to bystanders with an emphasis on understanding the risk factors and appropriate response options. 9. Ensure that training evaluation approaches (for both gatekeepers and bystanders) include measurement of attitudes, intentions and behaviours.

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# Chapter 3: Persuading people to undertake the training

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3.1 Chapter overview

The general public is a relatively untapped resource in relation to railway suicide prevention. The findings from the previous chapter confirm that bystanders can be trained to provide assistance to rail operators in the prevention of suicide. This chapter of the report presents the findings of a program of research undertaken to evaluate communication interventions designed to engage the general public to help reduce the risk of suicide in a railway setting.

Drawing on regulatory focus (Higgins, 2012) and regulatory mode (Higgins et al., 2003), we are interested in understanding how ends (prevention vs promotion) and means (locomotion vs assessment) influenced their concern, awareness, readiness and engagement (CARE), and intention to intervene (CITIS).

In this study, we test whether priming (gain vs loss) an individual's regulatory focus and mode will elicit hope, and whether this feeling hope will contribute to increased intentions. As hope is based on a reciprocally-derived sense of purpose and a path forward (Snyder et al., 1991), it is expected that fit between regulatory focus and mode (promotion-locomotion, prevention-assessment) will motivate a greater sense of awareness and motivation to act (Pham et al., 2022).

This will be tested using three studies. Study 1 - regulatory focus (awareness), Study 2 - regulatory mode (action), and Study 3 - fit between focus-mode.

QUT
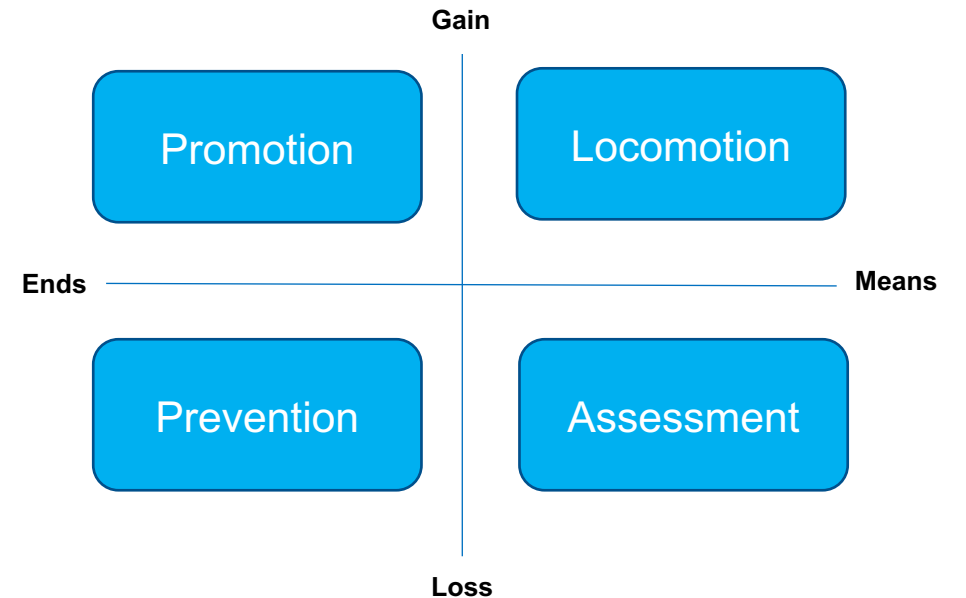
3.2 Designing the interventions

The posters and website were designed using a taxonomy developed by the research team from analysis of print-based communication used to promote public health messages.

Using this taxonomy (see table to the right), we searched the "Ads of the World" website and various stock image databases to identify print-based media focusing on "suicide." This enabled us to create design guidelines for the treatments to be used in the present study:

- *Colour:* a common design style emphasized dark, monochrome colours (black/white) consistent with the serious nature of the subject matter
- *Typography: most used sans font, white text on a dark background, some evidence of bolding and uppercase, varied alignment and size.*
- *Composition:* the background was most often a photo depicting a person with a range of foreground objects (logos, text, footers).
- *Strategy:* awareness and action were the most common objectives and the reviewed material tended to use positive framing and emotional appeals targeted at both primary and secondary audiences.

COLOUR	TYPOGRAPHY	COMPOSITION	STRATEGY
Tone - Cool - Warm - Achromatic	**Font** - Serif - Sans - Script	**Background** - Block colour - Photo - Drawing	**Objective** - Awareness - Preferences - Action
Harmony - Complement - Monochrome - None	**Style** - Bold - Italics - Uppercase - Highlighted - Underlined	**Foreground** - People - Text - Icons - Footers - Logos - Other	**Framing** - Positive - Negative **Appeal** - Rational - Emotional
	Alignment - Left/Right - Centred - Justified		**Target** - Primary - Secondary
	Size - Large/Small		

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3.3 Evaluating the poster interventions

The resulting posters were evaluated using randomized control experiments:

- *Research design:* two poster studies were undertaken, both used a randomized single factor, three-level (1: promotion, prevention, control; 2: locomotion, assessment, control) between-subjects design.
- *Manipulations:* A common design style emphasized dark colours (black/white), bold sans font layered over a photo of a young man that looked depressed, and the language and imagery emphasized an emotional appeal targeted at secondary audiences. The objective was to encourage further training via either an awareness or action framing. Message framing was manipulated using the experimental design.
- *Measures:* The outcome measure was intentions ("the advertisement made me more interested in learning more about railway suicide"). We also examined the impact of emotions by asking "In general, how do you feel after viewing the poster?" and presenting a variety of emotions (happy, sad, fearful, angry, surprised, disgusted, hopeful).

Message manipulated as part of experiment

3.3.1 Study 1 treatments

3.3.2 Key findings from study 1

- The final sample consisted of 59 respondents after data cleaning: 54% female, 42% aged 18-24, 36% bachelor's degree, 39% less than monthly train use. Cross-tabulations were initially undertaken to examine the influence of the different framing of manipulations in relation to an awareness objective. In Study 1 the promotion-framed posters were **4 times** more likely to increase hope and **1.2 times** more likely to increase intention to undertake further training. Conditional regression modeling was used to test the hypothesized mediating effect (see below).

- Results confirmed the indirect influence of promotion-framed messaging (B=.77, 95% CI: 0.06, 1.54) and prevention-framed messaging (B=.71, 95% CI: 0.06, 1.14) on intentions via hope.

- **The promotion-framed effect was stronger in relation to the awareness objective.**

Hope

Promotion: p=0.04
Prevention: p=0.06

p<0.01

Framing

Non-significant

Intentions

Non-significant

Moderators

Involvement, Intrinsic/extrinsic motivation.

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3.3.5 Study 2 treatments

3.3.6 Key findings from study 2

- Final sample consisted of 90 respondents after data cleaning: 50% female, 44% aged 18-24, 40% bachelor's degree, 39% weekly train use. Cross-tabulations were initially undertaken to examine the influence of the different framing of manipulations in relation to an action objective. In Study 2 the locomotion-framed posters were **4 times** more likely to increase hope and **1.9 times** more likely to increase intention to undertake further training. Conditional regression modeling was used to test the hypothesized mediating effect (see below).

- Results confirmed the indirect influence of locomotion-framed messaging (B=.57, 95% CI: 0.12, 1.11) and assessment-framed messaging (B=.61, 95% CI: 0.20, 1.10) on intentions via hope.

- **The assessment-framed effect was stronger in relation to the action objective.**

Hope

Framing

Locomotion: p<0.01
Assessment: p<0.01

p<0.01

Non-significant

Non-significant

Intentions

Moderators

Involvement, Intrinsic/extrinsic motivation.

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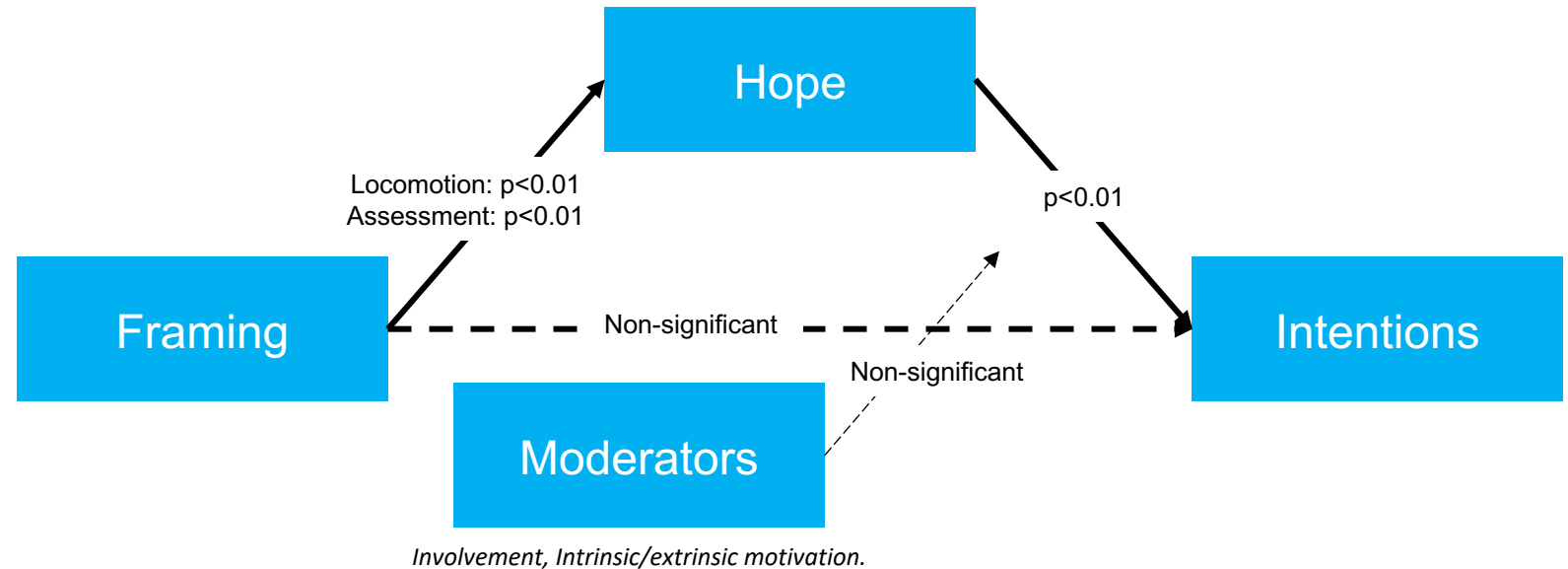
3.4 Evaluating the website interventions

The resulting websites were evaluated using randomized control experiments:

- *Research design:* used a randomized 2 (promotion vs. prevention) x 2 (locomotion vs. assessment) x control between-subjects design.
- *Manipulations:* The design style used for the posters was adapted for the website. The objective was to improve CARE (concern, awareness, readiness, engagement) and CITIS (confidence and intention to intervene). All respondents received the same content (awareness of barriers, risk factor videos, useful response actions. The framing of this content was manipulated using the experimental design.
- *Measures:* The outcome measure was the same CARE and CITIS scales used in the previous chapter of this report, and the emotions scale that we used in the poster study.

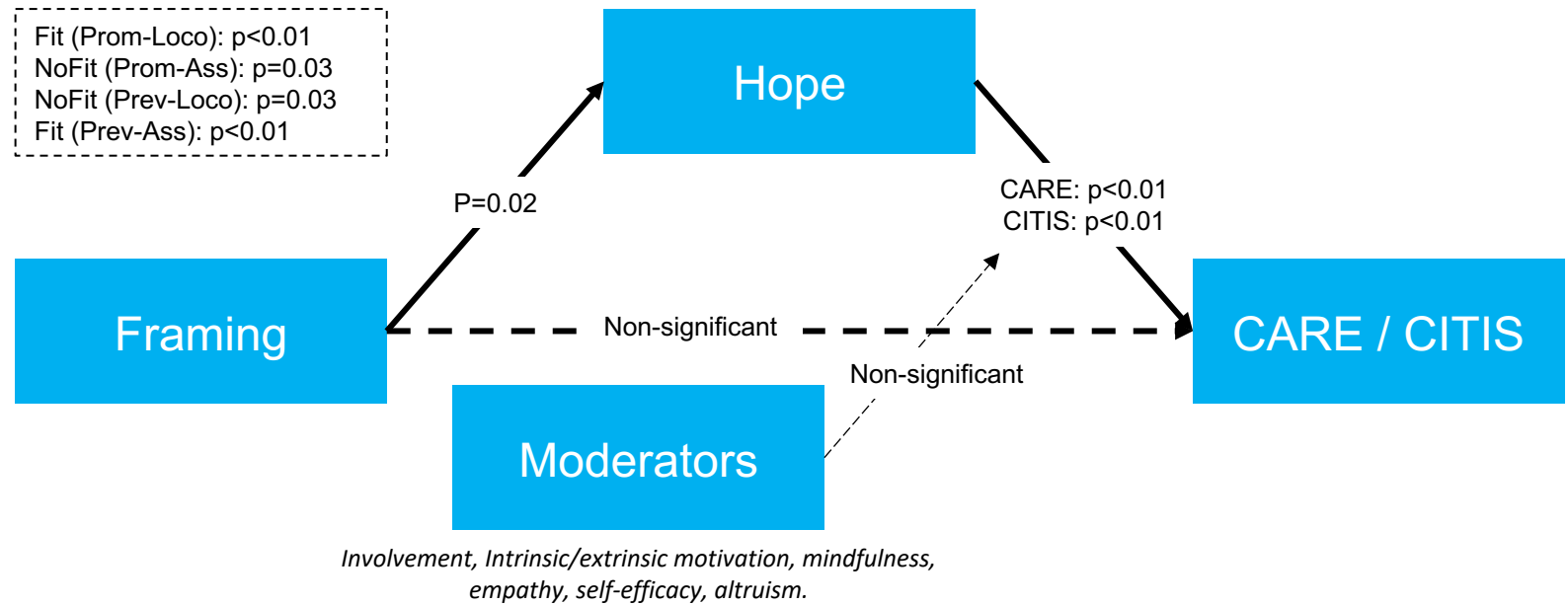An example of the content available to participants can be viewed here.

Website content based on treatments from Study 1 & 2 and videos from previous chapter.

3.4.1 Key findings from website study

- Final sample consisted of 137 respondents after data cleaning: 53% female, 31% aged 18-24, 42% bachelor's degree, 37% weekly train use. Cross-tabulations were initially undertaken to examine the influence of the different framing manipulations. In Study 3 the websites with regulatory fit were **1.8 times** more likely to increase hope and **1.5 times** more likely to increase CARE and **1.2 times** more likely to increase CITIS.

- Initial modeling indicated that the two fit websites had a greater influence than the non-fit websites on CARE / CITIS via hope.

- **Subsequent modeling confirmed the indirect influence of regulatory fit (vs. no-fit) messaging on CARE (B=.19, 95% CI: 0.02, 0.42) and intentions (B=.23, 95% CI: 0.03, 0.50) via hope.**

Fit (Prom-Loco): $p<0.01$
NoFit (Prom-Ass): $p=0.03$
NoFit (Prev-Loco): $p=0.03$
Fit (Prev-Ass): $p<0.01$

Hope

$P=0.02$

CARE: $p<0.01$
CITIS: $p<0.01$

Framing

Non-significant

CARE / CITIS

Non-significant

Moderators

Involvement, Intrinsic/extrinsic motivation, mindfulness, empathy, self-efficacy, altruism.
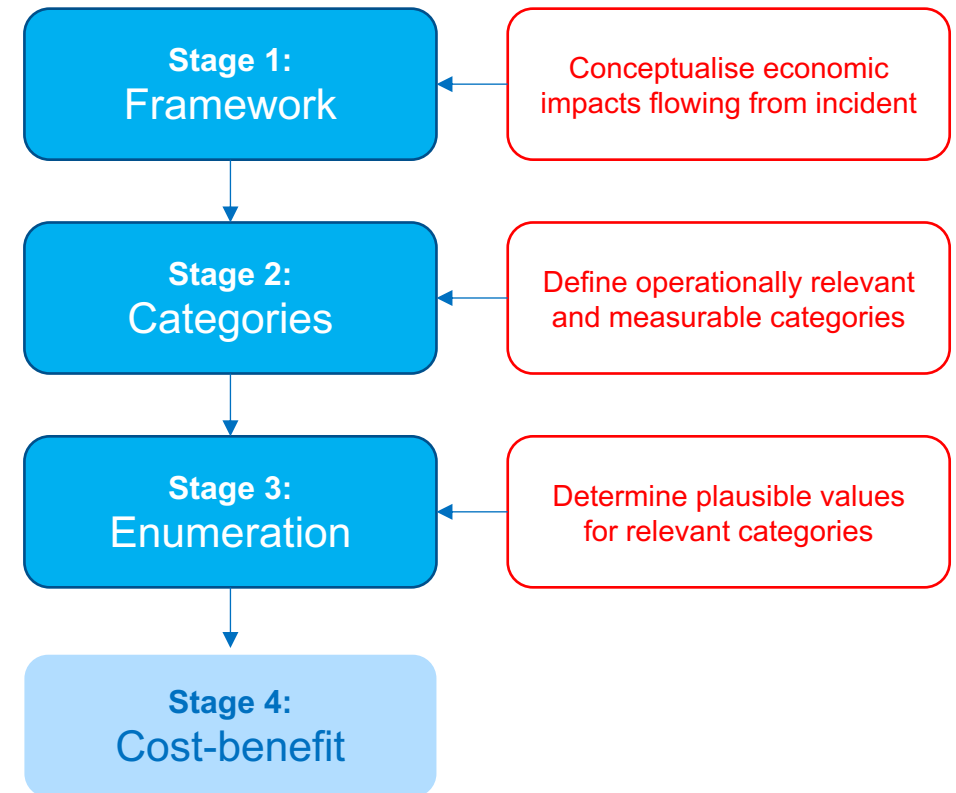
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3.5 Summary

Key Finding	Recommendations
When designing marketing communications campaigns, the findings show that use of colour, typography, and composition can complement strategic considerations.	10. The taxonomy for public health promotions provides a useful framework for designing communication campaigns to engage bystanders.
Experimental findings highlight the importance of framing bystander communications in terms of ends (promotion vs. prevention) and means (locomotion vs. assessment), with outcomes improved by use of promotional ends and assessment means.	11. Promotional campaigns seeking to improve bystander awareness should focus on what can be achieved (i.e., lives saved) rather than preventing negative outcomes (i.e., deaths). 12. Promotional campaigns focused on bystander action should emphasize a more cautious and considerate approach so as to avoid acting prematurely.
Greatest increase in hope and best outcomes were observed when there was fit between regulatory focus and mode (promotion-locomotion, prevention-assessment).	13. Hope is an important intermediate outcome, with more hopeful bystanders more likely to act. 14. Campaign content and support materials (e.g., website) need to emphasize consistency between means and ends and avoid mixed messages.

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Chapter 4: Cost-benefit analysis of interventions

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4.1 Chapter overview

This chapter of the report presents information on a methodology and tool for calculating the cost-benefit associated with investments for the prevention of railway suicide.

- It is noteworthy that this research program was undertaken by Cameron Gordon (ANU) in place of a program of work to evaluate the efficacy of a more comprehensive servicescape interventions.

- Due to changes in personnel and delays caused with the transfer of the project from ANU to QUT and following some secondary analysis by the ANU team on the efficacy of corridor fencing, it was decided that further research on servicescape interventions was not necessary.

- Based on the recommendations of the project advisory team, we developed a cost-benefit methodology and tool that could be used to support the preparation of a business case for servicescape investments in the future.

- An overview of the methodology is presented in the figure to the right.

Stage 1:
Framework — Conceptualise economic impacts flowing from incident

Stage 2:
Categories — Define operationally relevant and measurable categories

Stage 3:
Enumeration — Determine plausible values for relevant categories
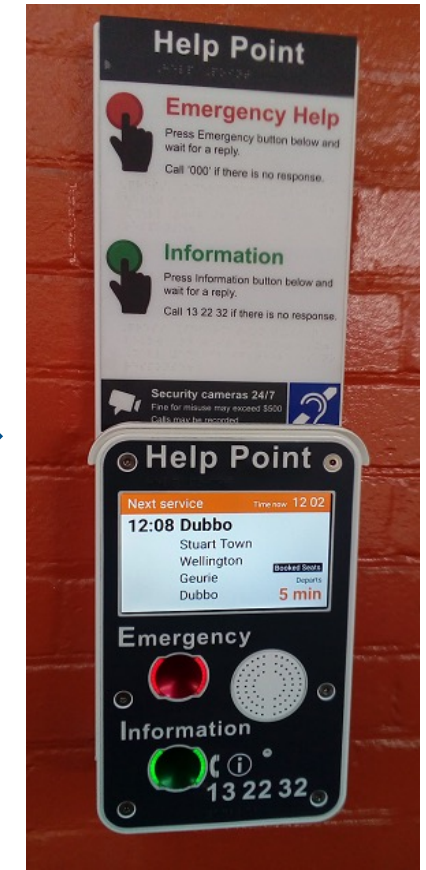
Stage 4:
Cost-benefit

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4.2 Conceptual framework (Stage 1)

A review of the suicide prevention literature identified 15 types of suicide interventions. A decision support tool was developed to explore the cost-benefit of these different interventions. The tool consists of three spreadsheets that capture: (1) intervention cost input; (2) benefit flows input; and (3) cost-benefit calculation.

- **Spreadsheet 1:** The first spreadsheet requires inputs from the user on estimated intervention costs.

- **Spreadsheet 2:** The second spreadsheet allows for estimation of the benefits (savings) associated with the prevention of a suicide.

- **Spreadsheet 3:** The final spreadsheet shows a netting out of the benefits and costs associated with a particular intervention.

An illustrative application of the tool is provided in the next few pages based on a proposed investment to upgrade station help points across the Sydney Train Network. The data for this example is fictitious and serves only as an example of how such analyses could be undertaken.

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4.3 Intervention costs input (Stage 2)

- The screenshot to the right provides a simple example related to investment in station help points. A fabricated figure of $20,000,000 for the year has been used to illustrate a total, network-wide investment.

- As the help points serve a number of security-related purposes (i.e., not all of this expenditure is spent with the aim of suicide event prevention), an apportionment needs to be made. An estimation of the relevant costs related to suicide prevention is estimated to be 1% of the total for that year, which yields a total allocated cost of $200,000.

- On the next page we capture the benefits associated with this investment (Spreadsheet 2). This includes benefits at three levels: (1) internal costs for Sydney Trains (scope 1); (2) travel time savings for customers (scope 2); and (3) reduction in societal costs (scope 3).

- The parameters used in the example on the next page are illustrative only but have been drawn where possible from appropriate sources. For instance, values for travel time, delay multiplier and train load were based on data from NSW Treasury. In the example, the prevention of an incident would result in a benefit (to the NSW economy) of around $4.46 million.

INTERVENTION COST ESTIMATION PARAMETERS (real dollars, undiscounted) (a)

INPUT SHEET VERSION 1 – ANNUAL COSTS ONLY, NO DISCOUNTING , SINGLE-CRITERIA (*)

Suicide intervention cost inputs

Organisational	Total Annual Costs	Allocation Factor (b)	TOTAL Allocated costs (c)
Cooperation with public health and not-for-profits	$0	0%	$0
Education programs for staff	$0	0%	$0
Increased staff/police presence	$0	0%	$0
Security monitoring services	$0	0%	$0
Research and development	$0	0%	$0
Servicescape			
Help points	$20,000,000	1%	$200,000
Fences and barriers	$0	0%	$0
Use of distractions (e.g., lighting, sound)	$0	0%	$0
Surveillance devices (e.g., cameras)	$0	0%	$0
Train management systems (e.g., speed reduction)	$0	0%	$0
Installation of pits	$0	0%	$0
Modification to trains	$0	0%	$0
Communication			
Signage	$0	0%	$0
Social media	$0	0%	$0
Public announcements	$0	0%	$0

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4.4 Benefit flow inputs (Stage 3)

Suicide intervention benefit inputs (costs avoided) – per incident

INTERVENTION FLOW-ON ESTIMATION OF BENEFITS (=COSTS AVOIDED) PARAMETERS (*)	INPUTS	COSTS AVOIDED (OUTPUT)
SCOPE 1. INTERNAL COSTS FROM INCIDENTS (FOR SYDNEY TRAINS) (f)		
_x005F Organising relief train crew and getting them to the incident site (NUMBER OF STAFF HOURS INVOLVED)	100	
- Average hourly staff WAGE RATE	$50	
		$5,000
Vicarious trauma impacts		
- Staff hours lost (NUMBER OF STAFF HOURS LOST)	50	$2,500
- Staff remediation costs (counselling etc) TOTAL COSTS FOR INCIDENT	$10,000	$10,000
Other scope 1 costs		
_x005F Availability of screening products to conceal the crime scene to aid partial recovery TOTAL COSTS FOR INCIDENT	$0	$0
_x005F Information provision to customers to prevent secondary issues, e.g. crowding TOTAL COSTS FOR INCIDENT	$0	$0
_x005F Electrocution on top of train - requires electrician to attend and inspect overhead wiring TOTAL COSTS FOR INCIDENT	$0	$0
_x005F Management of multiple incident sites (e.g. where impact train is unaware of struck person) TOTAL COSTS FOR INCIDENT	$0	$0
_x005F Site decontamination; particularly when there are multiple incident sites TOTAL COSTS FOR INCIDENT	$0	$0
_x005F Debriefs (not conducted for all fatalities - key lessons may not be captured) (7) TOTAL COSTS FOR INCIDENT	$0	$0
		$17,500
SCOPE 2. TRAVEL TIME SAVINGS FOR DELAYS AND DISRUPTIONS AVOIDED (FOR CUSTOMERS) (a), (e)		
Value of travel time (for customers) per minute: (b)	$0.3012	
Delay multiplier per minute for unexpected delays (c)	3.2	
Average train load (number of passengers per car): (d)	212	
Number of train cars delayed	40	
Minutes of delay	30	
		$245,201
Other scope 2 costs		
- Passenger injury costs (e.g. from train evacuations) per passenger	$0	
- Number of passengers affected	0	
		$0
SCOPE 3. SOCIETAL COSTS		
Value of a statistical life (average) (g)	$4,200,000	
Number of lives saved	1	$4,200,000
Other scope 3 costs		
Wider economic costs (e.g. lost GSP etc.) not estimated in this analysis.	$0	$0
TOTAL OVERALL BENEFITS (COSTS AVOIDED)		$4,462,701

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4.5 Cost-benefit analysis (Stage 4)

- The final spreadsheet draws on the data from the previous two spreadsheets. From this integration, we can see that the estimated benefit from investment in upgrading the help points would be around $4.26 million.

- This figure includes the societal benefits (Scope 3) associated with value of life. A more conservative estimate of net benefit would be $62,701, which excludes the scope 3 impacts.

- The benefit-cost ratio for the more optimistic estimate would be around 22.3, whereas the more conservative estimate would be around 1.3.

Cost Benefit Analysis

COSTS AVOIDED (BENEFITS)		Share of benefits
TOTAL INCIDENT TRAVEL TIME COST	$245,201	5.49%
TOTAL INCIDENT INTERNAL COSTS	$17,500	0.39%
TOTAL OTHER PASSENGER COSTS	$0	0.00%
VALUE OF A STATISTICAL LIFE	$4,200,000	94.11%
NOT COUNTED – WEB	$0	0%
Total Benefits	$4,462,701	100.00%

COSTS INCURRED (COSTS)		
Organisational		Share of costs
Cooperation with public health and not-for-profits	$0	0%
Education programs for staff	$0	0%
Increased staff/police presence	$0	0%
Security monitoring services	$0	0%
Research and development	$0	0%
Servicescape		
Help points	$200,000	100.00%
Fences and barriers	$0	0%
Use of distractions (e.g., lighting, sound)	$0	0%
Surveillance devices (e.g., cameras)	$0	0%
Train management systems (e.g., speed reduction)	$0	0%
Installation of pits	$0	0%
Modification to trains	$0	0%
Communication		
Signage	$0	0%
Social media	$0	0%
Public announcements	$0	0%
Total Costs	$200,000	100%

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4.6 Summary

Key Finding	Recommendations
The cost-benefit decision tool provides a simple methodology for capturing and communicating the value associated with investment in suicide prevention interventions. The example provides a useful demonstration of the methodology.	15. The methodology (and tool) can be helpful in thinking about the organizational implications of suicide prevention interventions, but any recommendations would need to be based on reliable input data, as well as guidance from Sydney Trains regarding an acceptable benefit-cost thresholds for suicide prevention investments. 16. The tool can be easily extended to include additional input categories, model interactions among inputs, include consideration for multi-year investments, and to incorporate risk and uncertainty via sensitivity analysis. 17. Additionally, the methodology could also be extended to incorporate other types of outcome measures (e.g., cost-effectiveness).

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Discussion, recommendations & conclusions

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General discussion

This report presents the findings of four research projects undertaken to aid Sydney Trains in the prevention of railway suicide. Following is a summary of the key findings and recommendations.

	1. Designing a service system response	2 Training gatekeepers/ bystanders	3. Persuading bystanders	4. Cost-benefit analysis
Key findings	Research provides a useful, point-in-time summary of how TfNSW/Sydney Trains manage suicide risk and response.	Reinforces the value of the CARE framework by showing it isn't enough to focus on why (ends) or how (means), you need to consider both in order to change attitudes.	Demonstrates that fit between ends (promotion vs prevention) and means (locomotion vs assessment) delivers the best results.	Simple methodology for capturing and communicating the value associated with investment in suicide prevention interventions.
Implications	Resources useful for internal training and to conceptualize and model possible improvements to the service system.	Training can be incorporated into induction programs, and as a complement to existing mental health first aid training.	Framing can be adapted in marketing campaigns to engage bystanders to help reduce railway suicide.	Tool can be used to support the development of a business case in relation to suicide prevention interventions.

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Summary of recommendations

Recommendations	1. Designing a service system response	2. Training gatekeepers/ bystanders	3. Persuading bystanders	4. Cost-benefit analysis
	1. Expand the service concept and map additional tasks and responsibilities. 2. Introduce a risk categorisation process. 3. Use resources to educate new staff about the key workflows. 4. Conceptualize and model possible improvements to the service system. 5. Explore applicability to other jurisdictions.	6. Shift focus from suicide as an operational issue. 7. Extend staff training to focus on at-risk commuters. 8. Consideration should be given to training bystanders (general public). 9. Training evaluation approaches should include measurement of attitudes, intentions and behaviours.	10. Use taxonomy for public health promotions for designing campaigns. 11. Campaigns should focus on what can be achieved (i.e., lives saved) and emphasize caution. 13. Focus initially on building hope, and consistency between means and ends.	15. Base recommendations on reliable data and guidance from operators. 16. Consider extending tool to include additional categories and multi-year investments. 17. Extend tool to incorporate other types of outcomes.

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Conclusions

This report presents the findings of four projects undertaken to investigate how different interventions focused on gatekeepers and bystanders can help to reduce suicide risk (Aim 2).

- The first project used a service design methodology to show how different stakeholders interacted to impact on the identification and response to suicide risk.

- The second project developed and tested a pilot training intervention for frontline rail staff (gatekeepers) and the general public (bystanders), showing the importance of creating a focus on ends (empathy) as a precursor to means (self-efficacy).

- The third project then focused on strategies for engaging the general public via marketing communications. Using a taxonomy for public health promotion, the project evaluated the efficacy of different framing strategies for posters and a campaign website.

- The final project presented a tool that could be customised to evaluate the cost-benefit of investments in suicide prevention interventions.

The findings of these four projects suggest opportunities for rail operators to better integrate suicide prevention within their security monitoring options, and the enormous potential of training frontline staff and the general public to be more concerned, aware, responsible, and engaged. Key findings are also presented on strategies to engage bystanders as a valuable new source of intelligence about suicide risk. Supporting these findings a new is presented to help operators to calculate the cost-benefit of suicide prevention interventions.

Building on these findings, 17 recommendations are presented to help operators to apply and extend the findings of this research in an effort to reduce railway suicide.

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