INDEPENDENT SAFETY EVALUATION OF THE NEW INTERCITY FLEET

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GLOSSARY

Term/Acronym	Description
ASDO	Automatic Selective Door Operations
A-Set	Warratah train
CCTV	Close Circuit Television.
CSG	Customer Service Guard the new role for the Guard on the D-Set.
Crew Compartment	An area on a train where Train Crews perform their duties.
DOO	Driver Only Operations
DTRS	Digital Train Radio System
D-Set	The railway designation for the NIF train
GOA	Grade of Automation
HRC	Hyundai Rotem Corporation
MEA	Mitsubishi Australia
NIF	New Intercity Fleet (D-Set)
NSWT	NSW Trains or TrainLink
OIM	Operator Instruction Manual – D-Set specific procedures.
ONRSR	Office of National Rail Safety & Regulation
PSBD	Passenger side body door – saloon doors
PTI	Platform Train Interface
RailConnect	The consortium delivering and maintaining the D-Set.
RoW	Right of Way - The dispatch of a train from a station platform
SFAIRP	So Far As is Reasonable Practical
STN	Special Train Notice, the alterations to the Standard Working Timetable – Passenger Services.
TWP	Train Working Procedure
TI	Traction Interlock
TfNSW	Transport for New South Wales
UGL	United Group Limited
V-Set	The railway designation for legacy intercity fleet

EXECUTIVE SUMMARY

An independent safety evaluation of the proposed operating model for the New Intercity Fleet (NIF) undertook an assessment of the following:

- NSW NIF and RTBU's NIF Operating Models,
- Hazards in the current and proposed operating models,
- Industry Good Practice, and the
- Metcalfe report.

It should be noted that verification testing and assurance process have not been completed on both the train and the procedures. In addition, requested existing key documents have not been provided at the time this report was prepared.

Five questions were asked of the assessment:

1. ***Is the NIF Operating Model safe?*** NIF project does not identify all material hazards and fails to assess them to the degree necessary, hence the NIF operating model is not safe So Far As Is Reasonably Practical (SFAIRP). Particular concerns are raised with the CCTV view being obstructed by the open saloon door, shortcomings with the CCTV technology and the lack of monitoring of the platform gap.
2. ***Is the NIF Operating Model as safe as the current procedure?*** Current procedures for Guards produce a safer SFAIRP outcome when combined with ASDO and Sensitive door edges than the NIF Operating Model. Because the Guard and Right of Way station staff observe the platform and platform gap from approach to departure from the station.
3. ***How does the NIF Operating Model compare with the industry norms?*** The NIF operating model does not address Good Practice in the industry for similar InterCity operations with comparable hazards and risk tolerability. It is reasonable practical to address the risk or at least somewhat mitigate the apparent hazards of the CCTV approach in the NIF operations using an existing resource that is already trained and proven to be effective in the role of the Guard.
4. ***How does the NIF Operating Model compare with the RTBU proposal?*** My concerns with the NIF operating model previously detailed are concerns that I share with the RTBU's alternative model as both models fail to address the shortcomings of the CCTV technology and the hazards to passengers, trespassers and staff on track. Also, from the Network Rules it is imperative that the Driver is not distracted from keeping a proper Look Out of the track ahead and any such distractions should not be introduced to the driving environment.

5. ***Any other matter you consider relevant.*** Consultation should be based upon a hazard approach to demonstrate a safe SFAIRP outcome using the expertise of the SME staff as far as practical.

   The introduction of the train into service should be preceded with an operating trial of the NIF operating procedures as the operating procedures need further development and assessment to identify and mitigate the hazards identified.

1 INTRODUCTION

RMAus was approached by Michael Doherty Legal (MDL) to assist them in providing advice to their client the RTBU NSW. MDL requested that RMAus undertake an independent safety evaluation of the proposed operating model for the New Intercity Fleet (NIF). In undertaking the evaluation, I was asked to:

a. Review the design of the NIF including but not limited to the traction interlocking on the crew cab door, the configuration of the driver's cab and the proposal for sole usage of CCTV for the departure process.
b. Consider the Metcalf Rail Safety Report of the NIF Operating Model.
c. Undertake a physical inspection of the NIF, if possible, in both static and dynamic testing modes.
d. Review relevant Transport for New South Wales (TfNSW) documents, including but not limited to:
    i. work, health, and safety factors relevant for the operation of the NIF;
    ii. controls in place to ensure the safety of both staff and commuters on the NIF;
    iii. policies and procedures for the operation of the NIF;
    iv. human factors studies; and
    v. any other relevant documents.
e. Review and consider the RTBU's alternative operating model and compare this with the NIF operating model, to determine which provides the safer method of working compared to the current operating model.
f. Consider train radio black spots in the network and the interaction with the DTRS; and assess whether these black spots could result in issues with driver only operation?
g. Any relevant risk assessments that have been undertaken; for example, risk assessments on safety-related matters:
    - Workload or changes to the electronic device usage policy;
    - The position of the cameras, (halfway down) and whether the positioning causes blind spots? (including where there is variability in platform lighting).
h. When inspecting the NIF train, please view it "dynamically" through the platform train interface (particularly at night and when using the CCTV monitors).

1.1 Matters Considered

NSW Trains (NSWT) and the RTBU NSW have an MOU on the NIF project that provides for each party to have an Independent Safety Validation of the project. The author has been nominated as the ISV for the RTBU. Pertaining to ISO26262, safety verification is defined as the determination of completeness and correct specification or implementation of safety requirements at various levels including functional, technical, software, and hardware.

In assessing the information provided I was asked to consider the following matters:

a) Is the NIF Operating Model safe?
b) Is the NIF Operating Model as safe or safer than the current train fleet operating conditions for guards, when monitoring the platform train interface?
c) How does the NIF Operating Model compare with the methods used by the international train operating community?
d) How does the NIF Operating Model compare with the RTBU's proposed operating model for the NIF?
e) Any other matter you consider relevant.

1.2 Code of Conduct

I have read the Code of Conduct for expert witnesses, Attachment A. I agree to comply with this Code. The evidence in my statement is within my area of expertise, except where I state that I am relying on the evidence of another person. I have not omitted to consider material facts known to me that might alter or detract from the opinions I express.

1.3 Scope & Limitations

I was provided with documents relevant to the findings, as well as several internal RTBU documents provided to me by the instructing solicitor, Michael Doherty Legal. These are listed in Attachment B.

Assumptions I have been directed to make in the letter of instructions are listed here:

i. With the introduction of the NIF, NSW Trains intends to change how these trains operate when leaving a train station. The proposed new model is called the New Intercity Fleet Operating Model (NIF Operating Model).

ii. Before the NIF was completed, TfNSW commissioned Metcalfe Rail Safety to undertake a desktop review of the NIF Operating Model. Mr. Metcalfe did not physically inspect the NIF when he undertook the review of the NIF Operating Model as the trains had not been built. Mr. Metcalf delivered his report on its desktop review to TfNSW in December 2019 (Metcalfe Report). Mr. Metcalfe concluded that the NIF Operating Model was safe.

iii. TfNSW subsequently asked Mr. Metcalfe to revisit his report by inter-alia physically inspecting the NIF.

iv. The RTBU has engaged in extensive discussions with NSWT regarding the NIF Operating Model. They were provided with a copy of the Metcalf Report. The Union is generally concerned about the NIF Operating Model. The RTBU has specific concerns about the design of the train including, but not limited to, traction interlocking on the crew cab door, the configuration of the driver's cab and the sole usage of CCTV for the departure process.

v. Arising out of those discussions, the RTBU's formulated an alternate NIF operating model and provided TfNSW with a detailed comparison regarding which model would provide the safest method of working compared to the current operating model.

vi. The NIF was constructed overseas. It is currently undergoing testing. To date, the manufacturer has not consulted with the RTBU.

vii. The RTBU entered into an MOU with NSW Trains regarding the introduction of the NIF and the NIF Operating Model. They also had a commitment from TfNSW to facilitate a validation review including providing that entity with relevant documents, (subject to appropriate protections regarding confidentiality, proprietary and intellectual property matters), and encouraging their interaction with Mr Metcalfe.

Assumptions I have made in this report are detailed in the report.

NSW Trains provided documents listed in Attachment B.

This report is limited by the Non-Disclosure Agreement imposed by TfNSW upon the author consequently several sections of the report are redacted per the confidentiality agreement which states that:

> "Confidential Information is any information relating to the Project (including, without limitation, information contained in proposals) in any form which has come to the knowledge of the Recipient by any means and which is given to the Recipient either directly or indirectly by the Principal or by a person on behalf of the Principal, but does not include:
> (a) information which, at the time of disclosure, was in the public domain;
> (b) information which, subsequent to disclosure, enters the public domain except through breach of this deed poll or any other obligation of confidence; or
> (c) information which the Recipient is required to disclose by law or the listing rules of the Australian Stock Exchange."

Several key documents were not made available for my review. Limitations on this report are as follows:

i. I was not provided with the opportunity to meet with RailConnect Safety Assurance personnel.
ii. The latest Metcalfe report was not provided for my review.
iii. The responses by NSWT to the first Metcalfe report recommendations were not provided.
iv. Training material was not provided for my review as it is not ready.
v. NIF procedures (OIM's) provided were not completed and are currently being validated.
vi. NIF - train is at SVR [redacted] has not been achieved.
vii. [redacted] is by TfNSW has not yet been achieved.
viii. Project Deed provided on TfNSW website has been varied but these have not been provided me. I requested the changes as they relate to the role of train crew.
ix. Location specific Stations NIF risk assessments for platforms have not been completed.
x. RailConnect are still to prepare the Hazard Transfer documentation for NSWT.
xi. [redacted] assessment not completed.
xii. [redacted] assessment for drivers not completed.
xiii. Pilot training course feedback has not been received.
xiv. I was not provided with the assessments of Train Radio performance.
xv. I was not provided with assessments of the changes in the role of train crew.

Meetings attended in preparation of this report are detailed in Attachment H.

1.4 Experience & Qualifications

My name is Klaus JE Clemens. I am a Director of RMAus, Australia. I undertake due diligence reviews for a wide range of industries and purposes. I have more than 25 years experience as a consultant and executive manager in Australia's largest passenger railways. I have been involved in rolling stock design and repair, rail safety and rail operations.

I have an MBA (Technology Management) from Monash University; an Engineering degree from Swinburne University, and a Diploma in Science (Chemistry) from Victoria University. I am a Member of Engineers Australia (MEA) and a member of the Railway Technical Society (RTS).

Relevant studies include detailed in my CV are; System Safety Accident Investigation Course, Qantas accident investigation course, specific subjects in Industrial Engineering related to Human Performance.

Relevant experience to this assessment detailed in my CV are; Professional Photographer, Independent Verifier of Australian Railway Standards, forensic engineering reports in personal injury matters before the Supreme Court of NSW, Workload and Human Performance reviews and reports for RailCorp, Train Operating Standards for MTM Melbourne, and management of Driver only rollingstock issues in the Melbourne MET Trains.

Previously employed as the General Manager Organisational Development of the former State Rail Authority NSW in the period 1998 to 2000 where I was responsible for:

- Corporate Environment & Safety departments;
- Train Planning department;
- Oversight of several Train Crewing projects;
- Safeworking (Rail Safety) department; and
- Emergency Services department.

I lead the State Rail investigation into the Glenbrook accident and provided evidence to the Commissioner at the Inquiry. At the conclusion of my evidence the Commissioner thanked me for my evidence:

> *"I am indebted to you for your evidence. It has been most helpful and it comes from a deep knowledge of the issues that I am dealing with and I thank you. You have given me considerable enlightenment on the matters you have discussed and I thank you very much."*

I assisted the SCOI Commissioner of the Waterfall Inquiry for some three years.

Prior to working in the rail industry I worked as an engineer and executive in the automotive industry and before this in the petrochemical industry as an engineer and industrial chemist.

A complete resume is provided in Attachment C.

2 FACTUAL INFORMATION

In this section I have produced summaries of the various reports and evidence provided that I required to make the assessments requested of me.

2.1 NIF Project Deed

The NIF project deed is a publicly available redacted document in three volumes.

The NIF project involves at least two key procurement types:

1. Design, Build, & Maintain contract for 55.5 New Intercity Fleet (NIF) trains estimated value of $2.3B, and

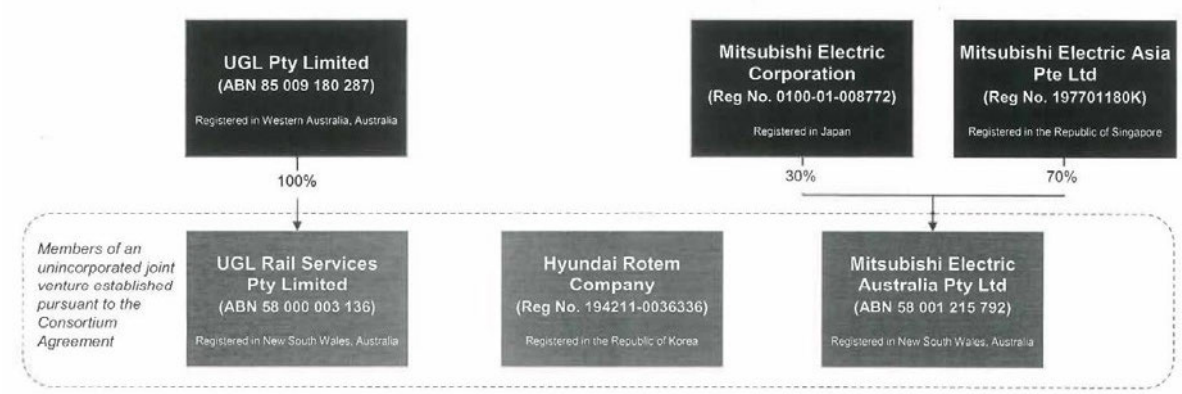
2. Design & Construct contract for the Maintenance Facility.

RailConnect JV has yet to commission the maintenance facility installation works. UGL's portion of the contract is expected to generate revenue of $570 million, primarily in relation to maintenance and asset management services including the initial maintenance facility installation works.

TfNSW is the lead agency on the NIF project and the procurement client. They are also the single point of contact for the NIF project. RailCorp as the asset holding company will own the Rolling Stock and the other Assets. NSW Trains (TrainLink) will operate the Rolling Stock.

RailConnect NSW secured the contract with TfNSW for the delivery of the NIF trains. RailConnect NSW is an unincorporated joint venture between Hyundai Rotem Company (HRC), United Group Limited (UGL) and Mitsubishi Electric Australia (MEA).

Figure 1: Supplier Group Structure from Project Deed.



The project deed provides for the design, manufacture, test and commission by Hyundai Rotem Company, with Mitsubishi Electric Australia as technology systems provider and UGL supporting design, testing and maintenance of the fleet. To achieve this HRC became an accredited Rail Transport Operator for Rail Operations utilising seconded NSWT staff to operate the train.

NSW Trains are the operator under the project deed. NSW Trains is an accredited RTO that is to incorporate the NIF train and operations into it's accreditation.

Photo 1: D-Set otherwise known as NIF train set.

TfNSW's strategic objectives related to safety listed in the Project Deed are to achieve the following outcomes:

i. the provision of reliable, safe and high quality rail services to Customers with a level of amenity comparable with best global practice;
ii. be capable of driver-only operation in passenger service, and also to allow enhanced Customer service from other on-board staff, including the capability to control passenger doors from any door location within the Train; and
iii. developing a long term collaborative relationship between TfNSW, the Operator and the Supplier.

Design Stages from the Project Deed are defined as:

1. System Definition Review (SDR);
2. Preliminary Design Review (PDR);
3. Detailed Design Review (DDR);
4. Test Readiness Review (TRR); and
5. System Verification Review (SVR).

NSW Trains advise the trains development by HRC is currently at System Verification Review (SVR). According to the Project Deed[1] the project has achieved Test Readiness Review (TRR) which included:

a) the 'Implementation Process' of AS/NZS ISO/IEC 15288 has been completed;
b) the 'Integration Process' of AS/NZS ISO/IEC 15288 has been completed;
c) 'Phase 7: Manufacturing' of EN 50126-1 has been completed;
d) 'Phase 8: Installation' of EN 50126-1 has been completed;
e) all required inputs to support completion of 'Gate 4 - Ready for testing' of T MU AM 04001 PL have been submitted and Confirmed (as applicable);
f) all Supplier's Activities defined as required for TRR in the Project Plans have been completed;
g) all requirements of this deed relating to TRR have been achieved;
h) all Confirmed Project Plans are being maintained and implemented;
i) all Technical Documents and Project Plans required for TRR, including those

[1] Schedule G - Scope and Performance Requirements; 3.5. Test Readiness Review

defined in Appendix 07, have been Submitted and Confirmed (as applicable); and

j) all hazards have been mitigated SFAI RP.

According to Project Deed then TfNSW will consider the Test Readiness Review to be complete when:

i. TfNSW has considered the Detailed Design Review to be complete in accordance with section 3.4(b);
ii. all objectives described in section 3.5(a) have been achieved; and
iii. the Supplier has submitted a Test Readiness Review certificate signed by an authorised representative of the Supplier who is accountable for technical authority under the AEO accreditation, stating that all the objectives of Test Readiness Review have been achieved.

2.2 NIF Intercity Rail Network

Intercity services operate to a distance approximately 200 kilometres from Sydney, bounded by Dungog in the north, Scone in the north-west, Bathurst to the west, Goulburn in the south-west and Bomaderry to the south.

The NIF trains will operate services on the Central Coast & Newcastle, Blue Mountains and South Coast Lines as illustrated in the following figure. Electric services extend from Sydney north to Hamilton (Newcastle), West to Lithgow and south to Port Kembla and Kiama. Most NIF services originate from or terminate at Central using the Sydney Trains network.

Figure 2: NIF trains InterCity Network which passes through the Sydney Trains Network.

As part of the introduction of the new fleet, stabling sidings and platforms have been lengthened to accommodate the 10 car trains, especially at stations where the trains will begin and end services.

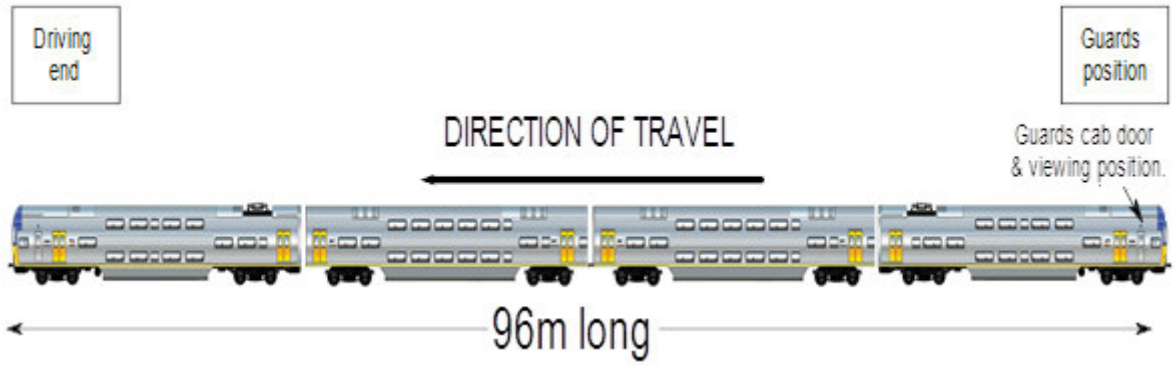
Photo 2: Typical curvature of station platforms.

2.3 V-Set Train (Existing Fleet)

I am familiar with the existing trains known as V-Sets from my time as GM Organisational Development at the former State Rail Authority as well as my expert witness testimony in the successful personal injury case before the NSW Supreme Court in the matter between *Fuller-Lyons v State of New South Wales (No 3) (2013).*

Both the leading and trailing carriages have a crew cab which alternates between a Guards station and Drivers cab depending on the direction of travel as illustrated in the following figure.

Figure 3: Four car V-Set train.

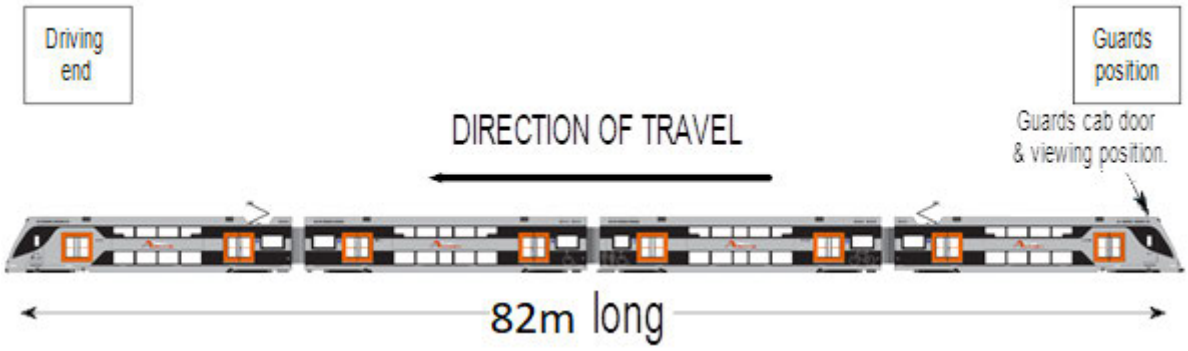


A four car V-set is some 96 metres long with eight sets of double leaf cavity slider saloon doors for the passengers to alight from on each side of the train. Each saloon car is connected to the adjoining vehicle via an enclosed walkway which is encapsulated in a very solid rubber material known as a diaphragm or bellows the platform gap at this location on the train is much larger.

2.4 D-Set Train (NIF Train)

I undertook a static & dynamic view of the D-Set train as well as the simulator, which are detailed in Attachments F, G & I. Features and some operations of the train were explained to me by a NSWT person familiar with the draft OIM procedures.

Figure 4: Four car D-Set train.



The NIF (D-Set) will replace the current V-Set trains and see the reallocation of the Outer Suburban H-Set trains to suburban services, the fleet will consist of a 55-train fleet with 554 new carriages.

The trains are formed as either 4 and 6 car Units, which will be formed into 4, 6 or 10 car train Sets in service measuring 82m for four car set, 123m for an 6-car set or 204 metres for a 10 car-set. The trains are designed to be operated with or without guards, with tender documents stating the trains must support one-man operation.

The D-sets are medium body profile whereas the V-sets they replace are narrow body consequently requiring modifications to be made to parts of the Blue Mountains line route to create sufficient clearance from adjacent structures. But more importantly reducing the step-gap between the train and platforms to the same as the OSCAR trains.

They are being designed and manufactured by HRC, and maintained by UGL.

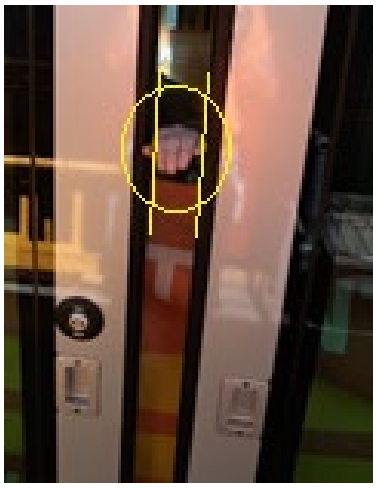
The first two 10 car trains were delivered in December 2019 and began testing in January 2020. They are expected to enter service in late 2020 or early 2021 on the Central Coast & Newcastle Line, followed by the Blue Mountains Line in 2022 and South Coast Line in 2023.

UGL will undertake the maintenance for the D-Set fleet. The maintenance centre is at Kangy Angy on the Central Coast, New South Wales to maintain the D sets.

The train features are:

a. Pre-recorded Digital Voice Announcements, which warn passengers that doors are about to close, is clearer and more predictably related to the start of the doors closing.
b. Sensitive door edges are provided on saloon cars to prevent passengers from being injured by closing doors or being trapped in closed doors. The doors do not force closed and return to the open position after three attempts at closing.

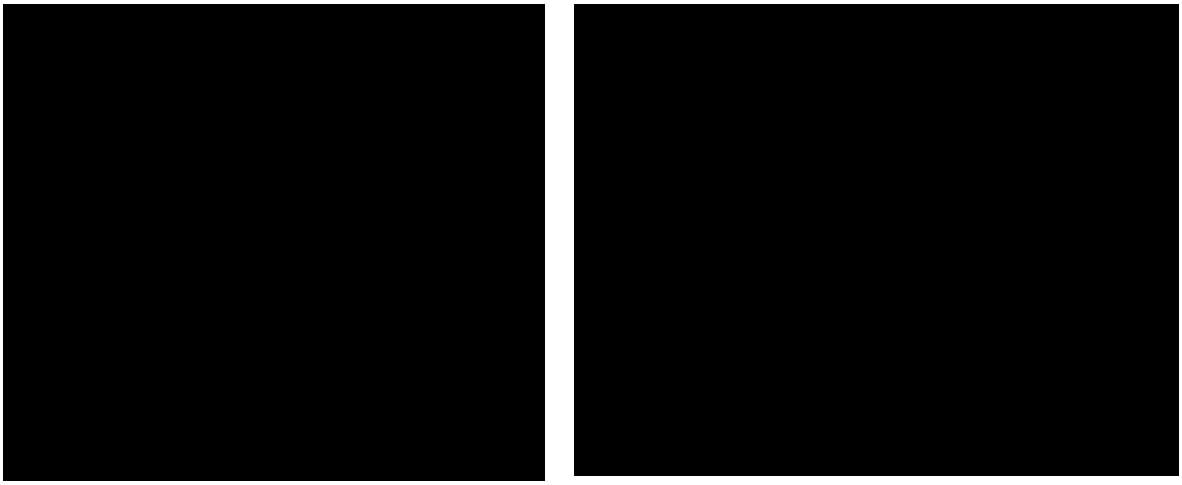
Photo 4: External view of saloon car doors demonstrating edge sensitivity from static view.



c. Traction Interlocking (TI) reduces the risk of being dragged by disabling traction power for the period from when doors start to open, until the doors prove closed. If the doors don't fully close, traction power is not abled and the driver receives a warning.
d. Internal and external CCTV cameras cover the front of the train (driving direction) inside the crew cab, each saloon area and the platform from each saloon car. External cameras are mounted on the leading and trailing ends of each saloon so that the view is as if the viewer is standing at a train door looking back or alternatively forward of their position.

Door controls and a monitor are provided at the crews desk as well as door status indications on the Train Management System (TMS) screen. As in the V-Set a bell is provided for the Crew to communicate succinctly.

Photo 3: NIF train crew desk from static view.



Saloon car external CCTV cameras have a constrained view of the platform compared to the view of a crew member standing in the crew door or standing on the platform. The advantage of the CCTV view is that the cameras provide a more convenient and quicker view of the platform and platform gap for each carriage than the current methods. That is four views for a four car train up to ten views for a ten car train. Each view can be toggled to increase the size of the image as

well as being able to toggle between the front and rear facing cameras.

Photo 5: Train crew desk – Door monitor 6 car unit CCTV views from static view.

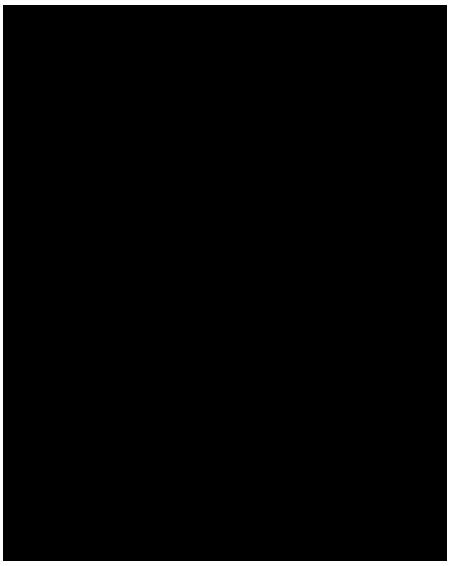
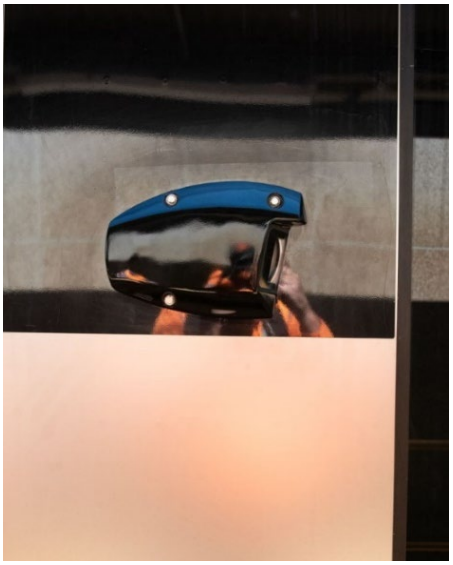


Photo 6: External platform view cameras mounted on each end of each saloon car from static view.



2.5 Train Crew

RailCorp Network Rule NGE232 (Responsibilities of Train Crew and track vehicle crew) states:

> *"The primary responsibility of Train Crew … is to operate trains … for safe and efficient transit of rail traffic through the RailCorp Network".*
>
> *"be responsible for the safe operation of rail traffic and the safety of other crew and passengers,"*

The Driver and Guard work together to manage the train and passengers depending upon the mode of operations they find themselves in.

Train Drivers are responsible for the safety and operation of the train and the train Guard is responsible for the passengers. After a train stops at a platform the Guard opens the doors to allow passengers to alight and then once the saloon doors are clear of passengers he announces the "doors closing" and closes the doors from the local control panel. All the time watching that passengers are clear of the doors. If located on a curved platform that prevents the Guard from seeing the length of the train the Guard after closing the doors steps out onto the platform to check the doors are clear of passengers. Sometimes station staff are present to assist the Guard in clearing the train from the platform. Then the Guard checks to see the Guards indicator light on the platform is lit indicating the signal ahead is cleared. With that they then indicate to the Driver to proceed by a short bell signal.

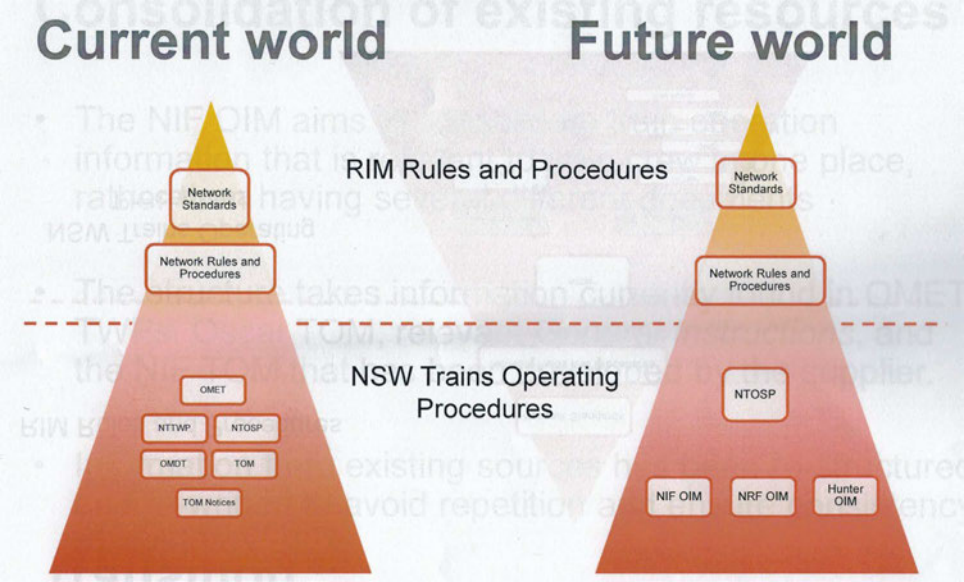
At locations where the curvature of the platform prevented the Guard from seeing all the saloon doors it would not be unusual for platform station staff to assist with observing the saloon doors at the furthest points away from the Guards location at the end of the train.

3 NIF OPERATING PROPOSALS

3.1 NSW NIF Operating Model

I was provided with access to a number of presentations that represented some of the consultation with the HSR's. Within those documents there were a number of descriptions of the proposed operating model which I summarise as follows.

Figure 5: Development of OIM procedures from NSWT PP.



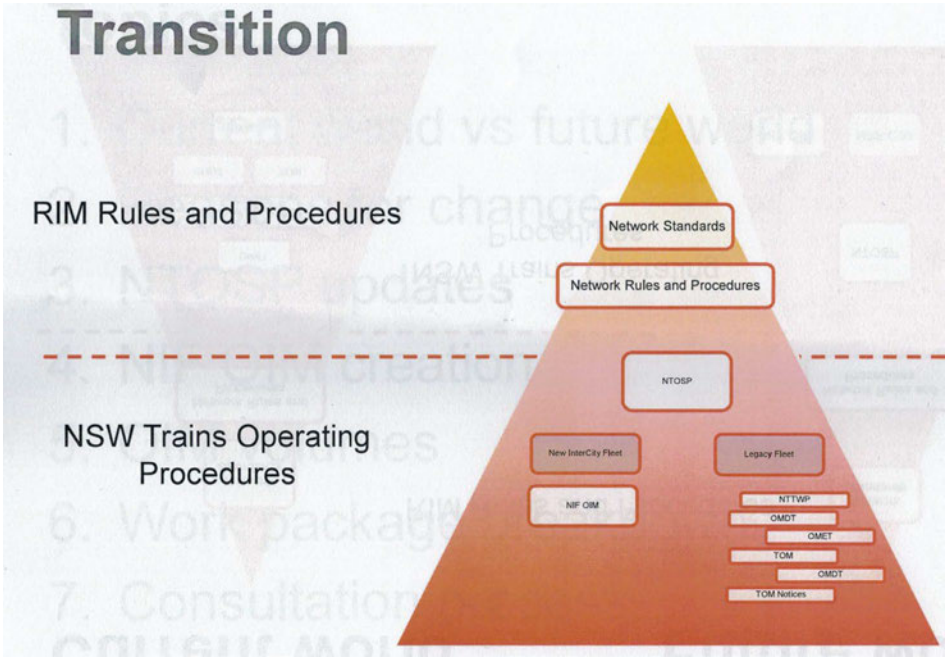
Key changes of operating model:

- Paper transposition slips will be transitioned out over time and replaced with automation and will go directly to the Driver.
- Boarding assistance will still be provided by Station Staff.
- Luggage will no longer be checked in and loaded in the crew cab. Passengers will load luggage onto train themselves and store within saloons.
- Assessments are underway to confirm flags will be visible on the CCTV displays in both day and night lighting conditions.
- Assessments are underway to confirm visibility on the CCTV displays in all lighting conditions and environmental conditions is Fit for Purpose.
- Repeater station staff may not be required to support the CSG and Driver.

Train Departure - PTI will be managed by:

- Driver using the CCTV prior to doors closing
- Drivers will close Customer doors
- Driver will be responsible for conducting a final safety check once doors are closed and ensuring that they have the required authority to depart
- Station staff may support dispatch procedure using flags.
- CSG will support the Driver by viewing the platform through CCTV both prior to and on departure.
- On-train repeaters will not be required to support the CSG and Driver.
- CSG will alert Driver to any hazard during departure from platform instead of Driver being given an all clear.

Figure 6: Transition to OIM procedures from NSWT PP.



Degraded & Emergency Operations:

- No change.
- CSG gives 'Safe to Proceed' (RoW) if CCTV functionally fails.

Repeaters:

- Repeaters displaced.
- Some repeaters perform other duties including manning of stations for peak hour and afternoon business Leura / Wentworth Falls / Hazelbrook / Bullaburra / Linden / Faulconbridge and Katoomba.

In considering these documents and the draft OIM. I note a number of undocumented assumptions & premises relevant to my report:

1. CCTV system is fit for purpose.
2. PTI hazards are managed SFAIRP.
3. The NIF operating model is safer than current procedures.
4. The Driver is better placed with CCTV than a Guard on the platform to Keep a Lookout for passenger hazards wrt PTI.
5. Driver Workload is not so great that they cannot complete their tasks safely and completely.
6. Driver better placed than CSG to keep a look out for PTI hazards.

I have concerns with the OIM and training with respect to:

1. CCTV technical limitations compared to direct observation as a hazard not identified.
2. The conflict between the drivers instructions to manage the train (keep a look out of the track ahead) and observe the PTI on departure of the platform are not addressed.
3. Driver distraction in using the CCTV and driving the train is not addressed.

3.2 RTBU's NIF Operating Model

The RTBU provided a document describing their alternative NIF operating model, Attachment E, which is summarised as follows. My concerns with the NIF operating model detailed in the previous section are concerns that I also have with this alternative model as both models fail to address the shortcomings of the CCTV technology.

RTBU NIF Operating Model - Driver

The driver has the primary accountability for the safe movement and operation of the NIF train across the electrified Suburban and Intercity network with the responsibilities of:

- Operating the NIF train across the network in adherence to all Network rules and Procedures.
- Train door operations during arrival and train dispatch using Automatic Door Selection (ASDO).
- Managing the platform train Interface and door closing utilising external CCTV in conjunction with the Customer Service Guard.
- Train fault detection and management with the assistance of the Customer Service Guard.
- Train preparation and stabling.
- Delegation of duties to the Customer Service Guard during the journey as required
- Provide manual announcements in exceptional circumstances where this cannot be provided by the Customer Service Guard, NSCC or station staff.

Draft RTBU NIF Operating Model - Customer Service Guard

Customer Service Guard is to provide quality customer service for customers travelling on the NSW Trains NIF services with the following responsibilities:

- The Customer Service Guard will have safe working competencies appropriate to the role.
- Utilising the PCI to receive live data from the train and communicate with customers, the Driver, NSCC and Network Control etc.
- Increased focus on customer service and information requirements.
- Utilising the PCI to support customers.
- Utilising CCTV for platform train interface monitoring during arrival and departure.
- Proactive planning and assistance to support customers with boarding and alighting positions for their destination utilising the TMS alerts.
- Pre-boarding customer service support on the platform if required.
- Manage customer anti-social behaviour where safe in line with current procedures and policies.
- Boarding assistance for customers when station staff are unavailable.
- Conduct fault rectification under the direction of the driver.
- Reporting train faults and delay related information.
- Provide manual customer announcements as and when required.
- Manage customer calls from the help points and utilise the NSCC if required.
- Assist the driver, incident commander and customers when operating in degraded mode/emergency/evacuation.

4 HAZARD IDENTIFICATION

In this section I have produced those assessment that I made in considering the matters requested of me.

4.1 Hazard Identification

Following on again from the work of James Reason in his book titled "Managing the Risks of Organizational Accidents" (1997) is to consider dangerous failure of the four key elements of all socio-technological systems:

A. Organisational Failure

Organisational failures that have been described by others as Generic Failure Types[2] of socio-technological systems are:

1. Incompatible goals;
2. Poor planning;
3. Design failures;
4. Inadequate Communications;
5. Poor procedures;
6. Poor training;
7. Inadequate Controls & Monitoring;
8. Organisational Deficiencies.

B. Procedural Failure

Procedural failures[3] relate to the various work methods and processes being applied:

1. Incorrect procedures;
2. Wrong procedures;
3. Incomplete or missing procedures;
4. Procedures that require performance outside of normal human performance levels.

C. Engineering Failure

Technical failure[4] of equipment and processes can be inadvertently designed into the system (latent) or as a result of direct failure of a component (active):

1. Incorrect specifications of the system, hardware or software;
2. Omissions in the safety requirements specification (e.g. failure to develop all relevant safety functions during different modes of operation);
3. Random hardware failure mechanisms;
4. Systematic hardware failure mechanisms;
5. Requires performance outside of normal human performance levels;
6. Environmental influences (e.g. extreme of weather).

D. People Failure

Human performance can be characterised by describing Mental Characteristics, Physical Characteristics, Motivation and Training. James Reason[5] describes Human Performance at three levels:

1. Skill based: routine, highly-practised tasks largely completed automatically;
2. Rule based: application of memorised or written rules;
3. Knowledge based: trial and error learning.

I make detailed observations of these four areas in the following sections.

[2] Figure 7.3, p136, Managing the Risks of Organisational Accidents; James Reason (1997) Ashgate
[3] Page 74, Managing the Risks of Organisational Accidents; James Reason (1997) Ashgate
[4] IEC 61508 Functional Safety: General Requirements, 2010
[5] Figure 4.7, p69, Managing the Risks of Organisational Accidents; James Reason (1997) Ashgate

4.2 Organisational Hazards

Section 7 Rail Safety, of the Project Deed, sets out the safety arrangements between RailConnect as supplier and maintainer, TfNSW as procurement agency and NSW Trains as the accredited operator.

- *Project Deed, Schedule G: SPR: 3.3. Preliminary Design Review & 3.4. Detailed Design Review:*

  "The Detailed Design Review must achieve the following objectives: (vii) input from User Groups and other stakeholders has been addressed to the satisfaction of TfNSW";

The arbitrator of consultation then on the project is TfNSW and not the accredited parties i.e. HRC, NSWT and Sydney Trains. It was observed to me by several NSWT HSR's that consultation on the NIF project did not resemble that undertaken on the last 2 train types (A-Set & OSCAR) and that they were ignored with no engagement other than dictated statements being read to them by NSWT. This approach appears to have overshadowed the design and input on key safety decisions from subject matter experts in User Groups and undermined the Safety Leadership on the project.

The project deed states plainly that the role of the Guard and Driver now relies on the operations of the CCTV as follows.

- *Project Deed, Schedule G: SPR: 5. Crew environment, 5.1. Crew roles*

  a) "Each Train must support Driver and guard mode of operation; the guard's NIF duties will include monitoring the Train-platform interface using the CCTV system, control of the doors, observation of internal CCTV, management of emergency egress, responding to passenger intercoms, passenger information and passenger assistance".

  b) "Each Train must support Driver only operation; the Driver will be responsible for monitoring the Train-platform interface using the CCTV system, control of the doors and initial set-up of the passenger information".

But then fails to specify the functional performance in the safety critical tasks being undertaken using the CCTV.

- *Project Deed, Schedule G: SPR: 3.15.2. External bodyside cameras:*

  a) "Each Train must incorporate external bodyside cameras to enable the Train-platform interface to be monitored by Crew to assist Train dispatch procedures".

  b) "The external bodyside CCTV must allow for detection of persons (including children of 1.1 m height) by Crew along the full length of each Car at a detection rate of greater than 95%".

These CCTV requirements are wholly inadequate in describing the functional performance required of a train that is supposed to be Driver Only ready. In comparison another recent projects CCTV requirements which are extensive and I have only extracted a few examples for comparison:

- Each HCMT shall provide a camera minimum light performance of no less than 0.5 Lux Colour.
- Each HCMT shall provide a camera minimum light performance of no less than 0.2 Lux black and white.
- Each HCMT shall enable the Train Operator to identify whether or not there are any passengers or obstacles at the train-platform interface, including small children.
- Each HCMT should present external CCTV images to the Train Operator in the natural seated position, whereby a small child at the train-platform interface subtends no less than 20 minutes of arc measured at the Train Operator's eye.
- Each HCMT shall automatically deactivate the surveillance display(s) when not required subject to human factors analyses.

I note that the above CCTV requirements to perform at extremely low light levels much less than moonlight on a railway experienced with DOO that has the highest standard of platform lighting in Australia.

Consultation with relevant staff stakeholders occurs at HRC as an accredited operator for testing and NSWT as the accredited operator for passenger services. There was no evidence of HRC consulting with test crew. NSWT created a Test Crew 'Working Group' consisting of three HSR's from the seconded staff at HRC. NSWT also created a NSWT NIF HSR 'Working Group' consisting of future revenue train crew and station staff HSR's.

I met with two of the NIF Test Crew HSR's (seconded to HRC from NSWT) on 7 October, 2020 where they advised that they were involved in hazard identification but are not provided with the assessments or the proposed controls to those hazards. To be participating in a consultation process it would be expected that treatment of the hazards would be conveyed to the HSR's. Attachment D details my meetings with HSR's.

HSR's further advised that:

- Adverse weather and dirt on cameras had not been tested and as an issue remains unresolved.
- Drivers screen glare was 'OK'.
- CCTV turned off unless extended at 13kph.
- They are not provided with instructions on the use of using the CCTV when departing a platform other than "depart a platform safely".
- The driver advised there were thirty eight outstanding hazards that they had reported since January this year.

I was provided with three years of management presentations to the NSWT HSR Working Group. Of particular note on those presentations were the following:

- 29 April 2020: "NIF Project not consulting per TOR", "NIF Project not adhering to WHS Act", and "Fragmented consultation which prevents holistic approach in sharing information"

- 10 June 2020: "NIF Project team have been unwilling to discuss the risks or any of the proposed controls suggested by HSR's".

I was shown by the NIF Project HSR facilitator the following documents:

- DDR issues register current as of 13 October 2020.
- NSWT NIF Project Hazard Register as of 13 October 2020.
- NSWT NIF project consultation minutes and action notes.
- NSWT NIF Project consultation feedback form from individual HSR's and provided regional HSR committees.

In reviewing these documents it was apparent that a great many hazards and issues raised by HSR's remain unaddressed by NSWT, TfNSW, HRC or RailConnect to the degree necessary to satisfy 'consultation' required under RSNL. That is key stakeholders that are SME's in the operations of trains have identified hazards and not received plausible answers. Namely the validation or not of the hazard, and the treatment of the hazard. Rather than reflecting on the project it appears to be a failure of Safety Leadership by primarily NSWT but also TfNSW and RailConnect.

The project has past TRR and is currently completing SVR according to the Project Deed then at Schedule G: SPR: 3.5. Test Readiness Review:

"(x) all hazards have been mitigated SFAIRP."

But to have actually achieved this, all hazards would have to have been validated as identified and a verification method put in place. But as already explored above those hazards raised by User Groups remain unaddressed and the documents presented to me showed no method of validation or verification of those hazards.

4.3 Procedural Hazards

Even on straight platforms it is difficult to see the furthest doors because of the oblique angle over the length of the train as illustrated in the following figure. On platforms even slightly curving away from the Guards position it requires the repositioning of the Guard to reliably decide that the doors are closed and that there are no obstructions in the door.

Photo 7: View from platform standing at Guards door on 4 car V set on a straight platform.

An open or failed saloon door in these circumstances can be described as a "hidden failure". That is, this safety-critical fault is unreliably detected by the process used to prevent a train from departing a platform with an open door. This was the

subject of a personal injury claim *Corey Fuller-Lyons vs The State (2013)* which I gave expert evidence at.

I note here the requirements, from the Project Deed, and subsequent hazard identification, from the NIF hazard log, and SVR tests that I consider safety critical to the development of OIM procedures and crew roles as currently documented:

1. As noted in the NIF [redacted] – CCTV shall ensure that it can allow crew to detect persons of >1.1m along the full length of each car at a detection rate of >95%. Fails to address the hazard of discernment in low light and low contrast environments particularly on CCTV with it's inherent deficiencies. [redacted] the safety critical task completed currently by Guards and does not address the hazard of a person fallen in the platform gap.
2. Also, at [redacted] – hazards cancelled. [redacted]
3. [redacted] Dynamic range required for discernment and poor lighting and adverse weather hazards not addressed.

A safe outcome for the NIF Operating Model now largely relies on effective Safety Leadership by NSWT to address procedurally and by training, if possible, the shortcomings of the train's performance. I expect this shall centre on the functional performance of the CCTV system and the resilience of the NIF Operating Model which has not been demonstrated. In particular in this regard I note the extensive list of unaddressed hazards documented by the HSR's from both RailConnect (Test) and NSWT HSR's.

4.3.1 Keeping a Look-Out

It is not possible to drive a train safely, or keep a train under control, without regard to all relevant conditions of the track ahead. A reasonable train driver knows they must at all times maintain a proper 'look-out' by sight and hearing, as well as by all available means appropriate in the prevailing circumstances and conditions so as to make a full appraisal of the situation and the risks of collision and/or derailment. The requirements to keep a proper look-out rely heavily on common sense and good train management (keeps the train under control).

A driver, or guard, keeping a proper look-out, therefore, gathers all the information needed to achieve a 'safe and efficient transit' of the network. If the information collected by the crew is insufficient, then they must intensify their look-out efforts by turning on the headlights or reduce the need for information by for example slowing the train.

The response to an indiscernible object is not only to apply the emergency brake, rather it depends on what other means there are to fill the information gap e.g. Listen.

4.3.2 Occurrence of Incidents

NSWT incident statistics were provided with a short note "NSWT FP & ST SHEM to cover all Intercity Operations. Potential for duplicate events". From that data I prepared the following charts and analysis which covers a 7 year period and 101,424,004 Pass/km.

Table 1: NSWT frequency of incidents related to PTI.

Long Description	Freq Per 1M Pass km
[redacted]	1.36
	1.01
	0.72
	0.51
	0.49
	0.42
	0.24
	0.21
	0.16
	0.09
	0.09
	0.08
	Not recorded in dBase

I note from the latest Rail Safety report by ONRSR 2017-18 that for the industry the range of serious injuries and fatalities is in the order of <0.02 to <0.15 per million passenger Km. While I do not have the consequences of the incidents we can take these to be potential serious injuries and some potential deaths. An assessment of the data shows then that assaults on Guards as being of concern together with PSBD door operations and trespasser near miss.

Based upon the documents provided I have made an assessment of the changes in the controls to those hazards that resulted in the incidents documented above.

Table 2: Assessment of NIF controls to incidents.

Short Description	Total Inc.	NIF Ops Procedural Control	NIF Eng. Control
[redacted]	[redacted]	Door closed	Door closed
		-	Nil
		Insufficient NIF doc. (?)	ASDO
		Insufficient NIF doc. (?)	ASDO
		CCTV monitored	Sensitive PSBD Edges
		CCTV monitored	Sensitive PSBD Edges
		-	N.A.
		-	N.A.
		-	N.A.
		Cab door closed	Cab Door Interlock
		Driver monitors PTI	Nil
		-	N.A.
		Monitor CCTV	CCTV

NSWT incident frequency data demonstrates the key issues as:

[redacted]

The assessment of the NIF project shows that it deals somewhat with the assaults and PSBD door hazards. I am concerned that the project increases the likelihood of a trespasser and staff being struck by a train with the conflict in the NIF operating procedures presented to the driver.

4.3.3 PTI Risk assessment factors

UK Rail Industry Standard RIS-3703-TOM titled 'Passenger Train Dispatch and Platform Safety Measures' Part 3, Appendix B Assessment Factors, sets out the risk assessment factors with respect to staff performance.

Table 3: PTI risk assessment factors –procedures.

Description	Observations of NIF OIM
i. To what extent do staff apply the same method to dispatch all trains from the platform? ii. Is the responsibility for undertaking the train safety check clearly described and understood? iii. How does the dispatch plan describe the way passengers will be managed during arrival to departure of trains? iv. To what extent does the dispatch process fully support staff to undertake their duties? v. Do any other procedures within the rest of the station affect train dispatch?	• Improved consistency in methods of dispatch. • Responsibility with driver. • Dispatch procedures fails to address the limitations of the CCTV view of the PTI and the reduced visibility as a result of lower Dynamic Range of CCTV. • Procedure does not address the hazard of CCTV obstruction by open train door. • Process does not address the distraction of the driver on departure by the CCTV monitor.

CCTV as highlighted in the table above raises new hazards and is a new latent failure path that should not be deployed in its current intended use as described in the OIM's.

4.4 Engineering Design Hazards

General system safety design requirements[6] for technological systems relevant to this assessment are:

a) Eliminate identified hazards or reduce associated risk through design.

b) Design to minimize risk created by human factors in the operation and support of the system.

c) Consider alternate approaches to minimize risk from hazards that cannot be eliminated. Such approaches include interlocks, redundancy, fail safe design, system protection, fire suppression, protective clothing, equipment, devices and procedures.

d) When alternate design approaches cannot eliminate the hazard, provide safety and warning devices and warning and caution notes in assembly, operations, maintenance, and repair instructions.

[redacted]

problems with the PSBD door operations. However, in so doing it has introduced hazards that have not been assessed or in the case of reduced visibility and discernability not identified. The target detection methodology currently being employed to demonstrate meeting of requirements [redacted] the task which raises the question of how the safety [redacted]

Driver distraction and workload is currently being assessed, at this late stage of the project delivery it seems unlikely the design can accommodate any issues in

[6] Section 4.3 System Safety Design Requirements, p.9, US Military Standard 882C System Safety Program Requirements

this respect. Therefore, it is more likely the practical solution is to return the role of monitoring the PTI to the Guard/CSG and leave the Driver to manage the train and in particular watch for persons on the track ahead.

4.4.1 Visibility & Discernability

The Oxford Dictionary defines visibility variously as:

- *the state of being able to see or be seen.*
- *the distance one can see as determined by light and weather conditions.*
- *the degree to which something has attracted general attention; prominence.*

The visibility of a passenger depends on several factors[7] such as the colour of their skin, clothing worn, light from the train and the platform, ambient lighting, glare, as well as the attentiveness of the crew, and the condition of their vision.

Unlike CCTV monitors, the human eye has the ability to see in a wide range of lighting conditions otherwise known as high dynamic range of vision. However, the human eye takes time to adjust to different light levels, and its dynamic range in a given scene is actually quite limited due to optical glare. A human can see objects in starlight or in bright sunlight, even though on a moonless night objects receive 1/1,000,000,000 of the illumination they would on a bright sunny day.

In practice, it is currently difficult to achieve the visual dynamic range of a person using CCTV systems. A good quality LCD has a dynamic range limited to around 1000:1 and a professional camera like a NIKON D810 image sensor has a measured dynamic ranges of about 24,000:1 a small fraction of the dynamic range of a person considered typically to be 32,000:1.

A driver at night who may have two bright lights from signals, against a largely black background, facing her, as she departs the train from a platform would take some brief time for her eyes to adjust from the CCTV screen to the lights to darkness as she passed the signal. In this scenario it appears impractical and potentially negligent for a driver to observe the PTI as the train departs as a safety control.

An important related topic to visibility is discernibility which means mentally perceptible or distinguishable, capable of being "discerned" by understanding and not merely by the senses. Or as described by Bernard S. Abrams [8]:

> *"a vehicle operator can only discern that there is an object on the highway which requires his or her attention when certain visual and human factors are satisfied by the stimulus given off by that object".*

CCTV is only suitable for discerning safety critical information in the most favourable of conditions which is not representative of current platform lighting and in all environmental conditions on the NSW Trains network.

[7] Franck, Harold (2012-12-20). Forensic Engineering Fundamentals (Page 110). CRC Press.
[8] Loumiet, James R.; Jungbauer, William G. (2007-04-03). Train Accident Reconstruction and FELA and Railroad Litigation, Fourth Edition. (CH12.7 Human Factors of Railroad Visual Warning Devices.)

4.5 People Hazards

UK Rail Industry Standard RIS-3703-TOM titled 'Passenger Train Dispatch and Platform Safety Measures' Part 3, table 1 of appendix A lists the people hazard events relevant to the NIF PTI which I have abbreviated.

Table 4: Passenger Train Dispatch and Platform Safety Measures

People Hazards	NIF Observations
1. Struck by train when on platform.	CSG no longer watches train arrive.
2. Fall from platform (not struck).	Driver monitors PTI.
3. Fall from platform and struck by train.	Driver alone watches train into platform.
4. Trapped in stationary train doors.	Sensitive door edges.
5. Trapped in train doors and train subsequently departs.	Sensitive door edges.
6. Fall between stationary train and platform.	[redacted]
7. Fall between train and platform, and train subsequently departs.	
8. Fall in platform gap as train arrives/departs.	
9. Struck by (closing) train door while on platform.	Sensitive door edges.
10. Passenger injury while boarding or alighting train.	Carry luggage into gondola.
11. Passenger alighting or falling from train onto track.	ASDO
12. Workforce injury while helping passenger.	No change.
13. Workforce and/or passenger assault at the PTI.	No change or CSG stays in cab?
14. Person on train exterior at the PTI.	No change.
15. Workforce musculoskeletal disorders.	No change.
16. Train is not fully aligned with platform and stop board.	ASDO or no change?
17. Train stops short and saloon doors released.	No change?
18. Wrong side saloon door release.	ASDO
19. Right of Way against a signal at stop.	**Driver distracted by CCTV.**

This assessment also demonstrates the importance of the sensitive PSBD edges and the ASDO in terms of safety improvement. CCTV as highlighted in the table above raises new hazards and is a new latent failure path that should not be deployed in its current intended use as described in the OIM's.

4.5.1 Persons on Track

Edmund J. Cantilli[9], Ph.D., describes how people are more likely to be found on track near stations:

> *"a person may be on an active track before a train enters a station, or, as the train is entering the station, a person may fall, be pushed, or jump to the tracks. A*

[9] Loumiet, James R.; Jungbauer, William G. Train Accident Reconstruction and FELA and Railroad Litigation, Fourth Edition (Ch 17.2 A: Reasons for people on tracks).

person already on the tracks may be homeless, mentally impaired, or intoxicated, and may wander and collapse onto the tracks in an otherwise empty station, and not be discovered in time to be removed from the tracks before the train enters the station".

"In other cases, passengers may be victims of crimes, who are beaten and then thrown or pushed onto the tracks. These crimes typically occur during late-night periods when stations are deserted, or in daytime in low-use stations during low-use periods".

"Also, people who move close to the platform edge to check on an approaching train may faint or collapse, get pushed by others or, in some cases, attempt suicide".

In the Rail Industry Safety Report of 2010-11 by the Independent Transport Safety Regulator (ITSR) NSW reported in section 2.1 Passengers, that:

"The main cause of passenger fatality in more recent years remains individual accidents. Six of the past eight passenger fatalities were the result of falls from platforms into the path of trains. The remaining two fatalities were the result of assaults".

The same report again but in section 2.4 Trespassers (including suicide), stated that:

"There were 28 fatalities associated with acts of trespass or suspected suicide in 2010–11. Based on the initial description of incident circumstances at the time of notification, about 80% of these incidents appeared to be acts of suicide".

"Twenty people required transport to hospital for injuries associated with trespass or attempted suicide in 2010–11 (Figure 8). Eight of these occurrences involved persons being struck by a train. The remainder involves injuries associated with falling or jumping on/from rail premises".

In terms of the matters considered there is evidence that it is more likely to encounter trespassers in the immediate vicinity of the station as the train departs and arrives. It is not practical or safe for a driver to be presented with the CCTV monitors to observe the PTI from the moment they intend to release the brakes.

4.5.2 *PTI Risk assessment factors*

UK Rail Industry Standard RIS-3703-TOM titled 'Passenger Train Dispatch and Platform Safety Measures' Part 3, Appendix B Assessment Factors, sets out the risk assessment factors with respect to staff performance.

Table 5: Risk assessment factors with respect to staff performance

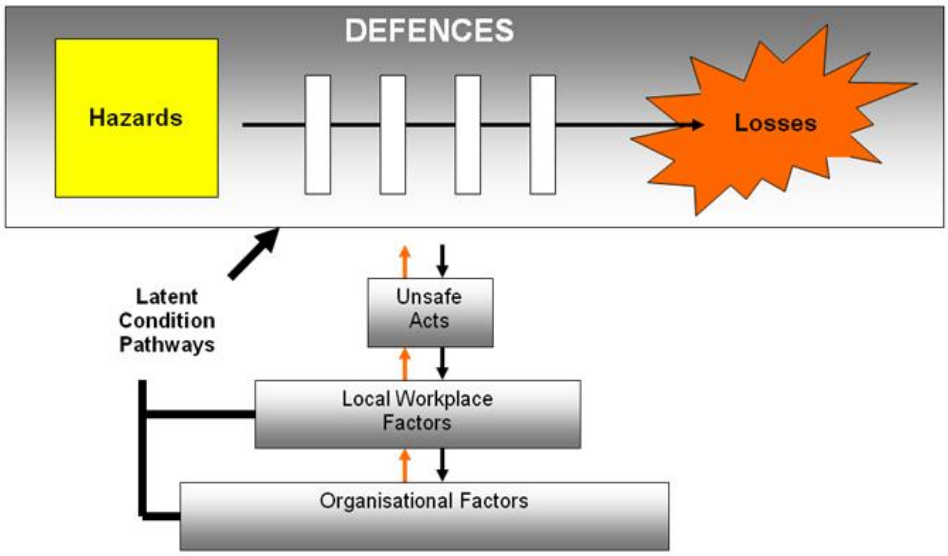
Risk Factor	Description	Observations of NIF OIM
Workload & Distraction	i. Is staff workload (high or low) such that it is likely to lead to fatigue, errors or workarounds (violations)? ii. Are suitable breaks provided? iii. Are dispatch staff required to perform any other duties, such as managing passenger behaviour, that may lead to distraction or increased workload? iv. Conflict situations, such as managing passengers, may lead to staff becoming distracted; what support is provided to preserve the integrity of the train safety check?	• Driver workload is high and Policy and Procedures conflicting with respect to prioritising tasks when departing a platform. • CCTV cameras not technically suitable for observing platform gap with door obstructing view and low dynamic range. • Driver potentially distracted by PTI/CCTV on departing platform from primary duty to keep a look out of the track ahead. • Non-interlocked DRA provided to driver. • Training procedure for self enforcement of train safety check.
Human Error	v. What typical errors do or could dispatch staff make? vi. Are there behaviours and/or characteristics of the individual that can contribute to the occurrence of errors? vii. Are any conditions likely to increase or induce staff error? viii. Are there risks of miscommunication between staff? ix. What controls are in place to reduce the risk of miscommunication?	• ASDO removes errors by staff in opening doors to platform. • Driver distraction while driving by use of CCTV monitor. • CSG not on platform to address hazards. • Near miss/strike railway staff on departing platform • Trespass hit on departing a platform • Trespass near miss on departing a platform
Ergonomics & Injury	x. Could completion of dispatch tasks increase risk of injury to staff?	• Guard assaulted in saloon • Guard Slips/Trips & Falls walking through train

Again the assessment highlights the CCTV procedures as shortcomings to a safe outcome. ASDO and the sensitive door edges provide a positive improvement in safety of passengers. CCTV provides a new latent failure path and is being used to remove the current measures that are more effective in monitoring the hazard of a passenger in the platform gap and other PTI hazards dealt with by both station and CSG staff on the platform.

5 HAZARD ASSESSMENT

James Reason in his book titled "Managing the Risks of Organizational Accidents" 1997, described the assessment of accidents as illustrated in the following figure X. This was the well documented framework used in both the Waterfall and Glenbrook SCOI.

Figure 7: Stages[10] in the development of an organisational accident.



Latent Conditions are those arrangements that permit the accident to occur and have been in place for a long time before e.g. insufficient lighting standard for the platform train interface. Good safety is largely achieved in operations by diligent consideration of Latent Condition pathways. This involves diligent audit and review of incidents and processes with staff engagement.

In reviewing the documents provided I found little evidence of investigation and assessment of Latent Pathways leading to the vulnerabilities of the defences in the OIM proposal. Latent conditions that in my experience are material to the PTI hazards that have not been considered or not considered adequately are:

- RoW (driver) person unable to provide undivided attention to PTI because of driving priorities.
- Lighting standard of platforms deficient for managing the PTI.
- CCTV image limitations because of door obstruction, lighting and technical limits of dynamic range in low light and high contrast.
- Curved platforms practically preventing RoW (Guard or Station) staff from completing the procedure.

The few risk assessments provided and the hazard logs (which is a summary of the assessments) reviewed are essentially requirements based assessments in their objectives rather than an assessment of safety hazards however they may

[10] Figure 1.6 p7, Managing the Risks of Organisational Accidents: James Reason (Ashgate) 1997

be characterised by the organisation. Again this is not unusual in my experience but leaves the end outcome for the project vulnerable to not achieving the project objectives.

5.1 Risk Management

The key safety principles as listed in the Australian Standard for Railway Safety Management[11] relevant to this assessment are:

a) Identification and management of risk.
b) Protection of passengers, workers and public health and safety.

In reviewing the documents provided I formed a view that while these were the objectives of the assessment those assessment were not complete and not to the degree necessary commensurate with the hazards.

In particular I did not see documented the experience and qualifications of the assessors. Assessments appeared wholly to not involve current drivers and guards who I consider subject matter experts in identifying the hazards, as well as verifying and validating the assessments undertaken. This deficiency appeared to be the result of organisational issues at the commencement of the project.

It is not unusual in my dealing with similar large organisations that industrial and project objective concerns overshadow the safety process and that this can only be overcome by executive safety leadership. I am concerned that Safety Leadership has not been displayed on the NIF project.

5.2 Risk Assessment

The Australian Standard for Risk Analysis[12] provides pertinent methods for analysis of risk. It provides guidelines for selecting and implementing risk analysis techniques.

In reviewing the documents provided I am drawn in particular to the guidance provided in that standard with respect to the choice of technique and the way it is applied should be tailored to the context and use, and provide information of the type and form needed by the stakeholders. In general terms, the number and type of technique selected should be scaled to the significance of the decision, and take into account constraints on time and other resources, and opportunity costs.

There is often a choice of techniques relevant for a given circumstance. Several techniques might need to be considered, and applying more than one technique can sometimes provide useful additional understanding.

As the degree of uncertainty, complexity and ambiguity of the context increases then the need to consult a wider group of stakeholders will increase, with implications for the combination of techniques selected.

[11] AS4292.1:2006 Part 1 General Requirements, Section 1.6, p.9.
[12] ASNZ IEC 31010:2020 Risk Assessment Techniques

5.3 Change Analysis

Change Analysis is used to compare the actual accident situation to a similar accident free situation. By analysing the impact of the differences between the accident situation and the accident-free situation, one can determine the residual risk and vulnerabilities.

5.3.1 Equipment Changes

Table 6: Equipment Change Analysis.

V-Set current.	NIF (D-Set).	Difference.
a. No door obstruction detection	Sensitive Door Edges	Difficult for passenger or object to be trapped in door.
b. Step and Gap	Step and Gap	Same gap as OSCAR sets.
c. No external door lighting	Door foot lighting and gap lighting	Less likely to slip, trip and fall in gap.
d. Legacy crashworthiness	Current standard crashworthiness	Improved crash survivability.
e. Train trip SPAD control	Train trip and ATP control	Enforcement of limits.
f. Door forced closed when obstructed	Door remains open after three attempts to close	Difficult for passenger or object to be trapped in door.
g. Guard looks to see doors are closed	Traction Interlock light extinguishes on Crew Desk	Unlikely that a door would not be closed and train departs.
h. Guard Bells 'All Right' when doors close	Drivers - Traction Interlock light extinguishes when doors prove closed	Unlikely that a door would not be closed and train departs.
i. Guard unable to practically discern all saloon doors or obstructions in doors.	Train Crew unable to discern saloon doors or obstructions in doors with CCTV.	No change. Except relying on door controls as above.
j. Guard to discern a person has fallen in gap.	Driver has obstructed and reduced view of a person fallen in gap.	Driver has reduced discernability and cannot watch PTI as train departs and drive safely.
k. Driver or Guard use their own techniques as reminder devices for safety critical tasks	Driver can use DRA when using the CCTV monitor as reminder for safety critical tasks	No change.

The equipment change assessment demonstrates that the NIF D-set is safer than the V-set, with the exception of the use of CCTV, and many of the issues with respect to passenger PTI interface hazards are addressed by two technologies that being ASDO and the PSBD sensitive edges.

5.3.2 *Role of Staff*

Summarising the outline of Train Crew duties:

- Driver duties are specified in NGE232 as the safe and efficient transit of the train in the network.
- Train Guard is to watch a train in and out of every platform (as detailed in TWP156:Operating Doors) at which it stops and ensure that the train is run according to the timetable (as detailed in TWP100:Responsibilities of Train Crew).

The following change assessment is based upon various NSWT procedures and railway practices for the various events that occur.

Table 7: Process Change Analysis.

V-Set current.	NIF D-Set.	Difference.
a. Guard and Driver monitor PTI on approach.	Driver monitors PTI on approach through windscreen.	Passenger behaviour on platform not monitored after cab passes them. CSG unable to warn passenger on platform.
b. Train arrived at platform. Guard & Repeater monitor PTI.	Driver & Guard monitor PTI at platform using CCTV.	Repeater removed. CSG not required to attend to platform. Platform monitored from CCTV. Verbal queues from passengers & RoW staff not available. Platform gap and PSBD obscured.
c. Train at platform. Guard warns Driver of passenger or object fallen into platform gap - does not give RoW.	Train medium body outline. Train Crew are to watch for a passenger fallen into platform gap on CCTV.	Platform gap smaller. Open door obscures platform gap on CCTV. Verbal queues from passengers & RoW staff not available.
d. PSBD closing. Guard warns Driver if trapped passenger in door – does not give RoW.	PBSD sensitive door edges. Driver monitors PTI & closes PSBD. Driver to watch for trapped passenger in PSBD on CCTV.	Unlikely to trap passengers in doors with sensitive edges.
e. PSBD closed. Guard warns passenger on PTI - does not give RoW.	Driver monitors PTI. Does not proceed.	Passenger not warned to not approach train.
f. PSBD closed. Guard warns Driver of passenger or object fallen into platform gap - does not give RoW.	Driver monitors PTI on departure using CCTV.	Ability to monitor PTI dependent upon; 1. driving task load and prioritisation and 2. CCTV dynamic range. Verbal queues not available.
g. Train departing platform. Guard & Repeater monitor PTI.	Driver monitors PTI at departure using CCTV.	Driver required to Keep a Look Out on the track ahead. Conflicting priorities for driver. Task load and priorities make task impossible.

The assessment again shows that the OIM removes existing controls and the use of the CCTV provides new latent failure pathways which are not assessed or addressed in the documents provided.

5.3.3 *Operating Models*

Table 8: Summary of current and proposed 'Operating Models'

Existing - TWP 156 Operating Doors & OSP 7, 'Right Way procedure'	NSW Trains - draft document OIM 3.7 'Train Dispatch'	RTBU Proposal
Guard - Announcements prior to the arrival of a train at a station if DVA not available.	DVA automatically announces next station.	DVA automatically announces next station.
Driver - Train is stopped – at 'car markers'.	No change	No change
Guard - Visual checks to make sure cars are correctly positioned beside the platform.	Not addressed.	Not addressed.
Guard - Operation of saloon doors, including selective door operation.	**Driver** – Releases saloon doors. ADSO – selects door operations according to location information.	**Driver –** Releases saloon doors. ADSO – selects door operations according to location information.
Guard - If available, check the platform information. If the information is incorrect: • Use the PA system to tell customers the correct information. • Tell Station Staff if present, the correct information.	Not addressed.	Not addressed.
		CSG – observes PTI from crew door.
Not addressed.	**CSG** - If required, carry out boarding / customer service activities assistance while the train is stopped at the platform. **When platform tasks are complete, close the door of the active guard's cab and sit at the crew workstation.**	**CSG** - If required, carry out boarding / customer service activities assistance while the train is stopped at the platform. **CSG advises driver by bell code if required to exit cab. Driver acknowledges bell code given. Vice versa on return of CSG to cab.**
Not applicable.	Not addressed.	**CSG** – clears boarding assistance icon from the TMS or advises accordingly for new requirement.
Guard - If DVA is provided, operate the recorded door warning announcement by pressing the DOOR CLOSE button or Door Warning Device (DWD) button. If there is no DVA, announce to customers "Doors Closing, Please Stand Clear".	DVA, announce to customers "Doors Closing, Please Stand Clear".	DVA, announce to customers "Doors Closing, Please Stand Clear".

Existing - TWP 156 Operating Doors & OSP 7, 'Right Way procedure'	NSW Trains - draft document OIM 3.7 'Train Dispatch'	RTBU Proposal
Guard - Make sure that customers have left or boarded the train safely.	**Driver** - Prior to departure, use the CCTV images to monitor the platform, ensuring that customers have finished boarding or alighting, and all boarding assistance tasks have been completed.	**Driver -** Prior to departure, use the CCTV images to monitor the platform, ensuring that customers have finished boarding or alighting, and all boarding assistance tasks have been completed.
Guard - Close the saloon doors. Stand at the cab door to observe the platform train interface and door closing process.	**Driver** - When all customers are clear of the doors, press the DOORS CLOSE pushbutton.	**Driver -** When all customers are clear of the doors, press the DOORS CLOSE pushbutton. **Guard - Stand at the cab door to observe the platform train interface and door closing process.**
Driver - If there is an On-Train Repeater or Station Staff provided for Right of way purposes, wait for them to show a RIGHT OF WAY hand signal.	No change.	No change.
Guard - Make sure that nothing is protruding outside the train and that it is safe for the train to depart.	Not addressed.	Not addressed.
Guard - Check that the Door Open Indicator Light (DOIL) if fitted, is extinguished.	**Driver** - Listen for the audible tone indicating all doors have closed and check that the traction interlock (TI) light has extinguished.	**Driver -** Listen for the audible tone indicating all doors have closed and check that the traction interlock (TI) light has extinguished.
	Driver - Complete the PTI safety check, using the crew workstation CCTV display screen, and check that: • nothing is protruding from the train. • customers are standing behind the yellow line.	**CSG** – Complete the PTI safety check, using the crew workstation CCTV display screen, and check that: • nothing is protruding from the train. • customers are standing behind the yellow line. **Guard – Close the crew compartment door.**
Guard - When it is safe to proceed, give the	Not applicable.	CSG - When platform tasks are complete,

Existing - TWP 156 Operating Doors & OSP 7, 'Right Way procedure'	NSW Trains - draft document OIM 3.7 'Train Dispatch'	RTBU Proposal
ALL RIGHT, 1 long bell signal. Stand at the cab door to observe the platform train interface as the train departs.		close the door of the active guard's cab and observe the PTI via the CCTV monitor. **CSG - When it is safe to proceed, give the ALL RIGHT, 1 long bell signal**
Driver - Shortly before the departure time, give one long whistle blast, to warn customers on the platform that the train is about to leave.	Not addressed.	Not addressed.
Driver – Power the train from the platform once the Right of Way provided.	**Driver** - When it is safe to do so, move the train.	**Driver** – Power the train from the platform once the Right of Way provided.
Guard - closure of the crew cab door – it must be closed 4 carriage lengths along the platform or when the workstation reaches the departure end of the platform – whichever occurs first.	Not applicable.	Not Applicable.
	Driver - When the train speed reaches approximately 3 kph, the CCTV screen will switch off. If concerned about the safety of customers on the platform when the train moves, the train driver is required to switch on the crew workstation CCTV display screen, **by tapping it, to keep it active following departure.**	Not Addressed.
	Driver - Apply the emergency brake if: • the customer service guard gives the STOP IMMEDIATELY (2) bell signal. • Station Staff give a STOP hand signal. • a dangerous situation is observed at the PTI. • a passenger intercom (PI) call is received within 10 seconds of departure.	**Driver** - Apply the emergency brake if: • the customer service guard gives the STOP IMMEDIATELY (2) bell signal. • Station Staff give a STOP hand signal. • a dangerous situation is observed at the PTI. • a passenger intercom (PI) call is received within 10 seconds of departure.

Existing - TWP 156 Operating Doors & OSP 7, 'Right Way procedure'	NSW Trains - draft document OIM 3.7 'Train Dispatch'	RTBU Proposal
Guard - Be prepared to respond to: • an emergency situation, or • hand signals from Station Staff, or • two whistle blasts. If there is an emergency: • send the Driver the STOP (2 bells) bell signal. • if necessary, operate the emergency brake tap.	**CSG -** Watch the PTI on the CCTV display screen as the train departs until the trailing car of the train has reached the departure end of the platform, being prepared to stop the train if: • station staff give a STOP hand signal, or • a dangerous situation is observed at the PTI.	**CSG -** Watch the PTI on the CCTV display screen as the train departs until the trailing car of the train has reached the departure end of the platform, being prepared to stop the train if: • station staff give a STOP hand signal, or • a dangerous situation is observed at the PTI.

The assessment of the three operating models when considered with the hazard assessments in this report demonstrates that the existing procedures are much better developed to address the hazards at the PTI especially when combined with the ASDO and sensitive door edge improvements. The substantial latent hazards introduced by the OIM procedures and the use of the CCTV are not addressed in either proposal. If the current train design is introduced to the network then the current procedures should be retained as far as possible together with controls and monitoring arrangements in place to address the residual risks until it has been demonstrated that those latent hazards are addressed by design (stations and trains) or new operating procedures developed.

6 INDUSTRY GOOD PRACTICE

An alternative to the hazard approach taken so far is to consider 'Good Practice' solutions. Good practice simply looks at all the good ideas other people in the rail industry use and see if there is any reason why such ideas ought not be applied.

Good Practice is not intended to be limited to consideration of any one practice, method or act, to the exclusion of all others, but rather, is intended to require the consideration of a spectrum of possible practices, methods or acts.

6.1 Passenger Train Interface

UK Rail Industry Standard RIS-3703-TOM titled 'Passenger Train Dispatch and Platform Safety Measures' Part 3, sets out the specific principles and considerations for the different methods of a driver receiving the Right of Way to depart a platform. Mr Metcalfe also refers to this standard in his original report.

The standard specifies that staff involved in the Right of Way process shall be 'provided with a view' that enables them to observe the platform and platform side of the train (which can be described as the Platform Train Interface or PTI) to:

a) Monitor passenger behaviour on the platform;
b) Determine nothing and/or no-one has fallen onto the track or is trapped by the train doors;
c) Where practicable, monitor all train doors during the door closing process; and
d) Determine that all doors are securely closed and the train can safely depart from the platform.

This standard makes a number of unstated assumptions relevant to the considerations being made here:

- 'monitor passenger behaviour' assumes from the time the train approaches the platform to the time it has cleared the platform.
- 'shall be provided a view' has an implicit assumption there is good lighting that provides discernability to undertake a safety critical role.
- 'determine … no one has fallen onto the track' assumes a view with discernability of the platform gap to undertake a safety critical role.
- 'monitor all train doors' assumes a view of the train doors not an oblique angle along the length of train.
- 'doors are securely closed' assumes there is no person or object trapped in them.

The following table summarises the assessment of the three operating models to this standard. Each of the operating models fails to fully implement the Good Practice given the hazards and context of the procedures and equipment.

Table 9: Assessment of operating models to RIS-3703-TOM titled 'Passenger Train Dispatch and Platform Safety Measures' Part 3.

RIS-3703-TOM requirement	Existing Op. Model	NIF OIM Proposed Op. Model	RTBU Proposed Op. Model
a. Monitor passenger behaviour on the platform;	Guard watches train into and out of platform and stands on platform with assistance from RoW Station staff. If the viewing angle is not sufficient the Guard moves to a better position. This includes not just visual but also sound queues from potentially several sources of alarm or warning. **Procedure limited by time to complete task and diligence of Guard and RoW staff. Rosters for RoW staff not fully manned.**	Driver & CSG view from crew cab with CCTV. Driver responsible for PTI. **CCTV viewing angle limited, door obstructing the view. Environmental visibility and platform lighting standards concern.**	Driver from cab & RoW from platform when arriving. CSG & RoW staff monitor from platform & cab door when arrived. CSG monitors CCTV on departure and RoW staff on platform. **CCTV viewing angle limited, door obstructing the view. Environmental visibility and platform lighting standards concern.**
b. Determine nothing and/or no-one has fallen onto the track or is trapped by the train doors;	Guard and RoW Station staff keep a Look-Out by listening, watching, investigating discerning. **Limited by operational practicality & station platform design.**	Driver & CSG not specified to consider "nothing and/or no-one has fallen onto the track". **Practically difficult with CCTV unable to provide resilient discernible image in platform gap.** Trapped in doors detected by sensitive door edges. **CCTV image of doors obscured and crew isolated from otherwise discerning situation.**	CSG & RoW staff are to provide a proper look-out from the platform and CCTV that "nothing and/or no-one has fallen onto the track". Trapped in doors detected by sensitive door edges. **CCTV image of doors obscured and crew isolated from otherwise discerning situation.**
c. Where practicable, monitor all train doors during the door closing process; and	Guard and RoW Station staff keep a Look-Out by listening, watching, investigating discerning. Not fully practical because of station platform design. Guard & RoW staff required to work together.	Driver & CSG cannot monitor all doors during closing because CCTV provides a view of the platform, not the doors, and if PSBD are open the doorway is obscured and the platform partially obscured.	Guard and RoW Station staff monitor doors from platform when Driver shuts the PSBD. During closing Driver & CSG cannot monitor all doors because CCTV provides a view of the platform, not the doors, and if PSBD are open the doorway is obscured and the

RIS-3703-TOM requirement	Existing Op. Model	NIF OIM Proposed Op. Model	RTBU Proposed Op. Model
	No indication of doors proved closed on V-Set.	**Platform view obscured by open doors, platform gap may be obscured by limits of CCTV dynamic range in poor contrast, lighting levels and weather conditions**.	platform partially obscured. **Platform view obscured by open doors, platform gap may be obscured by limits of CCTV dynamic range in poor contrast, lighting levels and weather conditions**.
d. Determine that all doors are securely closed and the train can safely depart from the platform.	Guard and RoW Station staff keep a Look-Out by listening, watching, investigating discerning. **Not usually fully practical because of station platform design and PSBD design.**	Driver & CSG. Doors proven closed indicated by Traction Interlock light going out. **Person in platform gap may be obscured because of limits of CCTV dynamic range.**	Driver & CSG. Doors proven closed indicated by Traction Interlock light going out. **Person in platform gap may be obscured because of limits of CCTV dynamic range.**

The assessment again demonstrates that the current procedure produces a safer outcome when combined with ASDO and Sensitive door edges. Both proposed operating models fail to address driver distraction and the limits of CCTV technology to discern the PTI.

6.2 Engineering & Process

I add to the consideration the guidance provided by ASA T MU HF00001 ST and AEO Guide T MU HF 00001 GU which states that: "*design shall not introduce workload and distraction that impairs the primary safety task and workload is appropriate*". From my previous studies and reviews of workload for RailCorp which was supported by Human Performance expert Dr Mark Wiggins I know that workload is largely determined by attention management in completing the primary safety task. The drivers primary safety task is the management of train and that primarily includes keeping a lookout of the track ahead.

It is inconceivable that the driver could then also undertake a safety task, looking at the CCTV, and meet the requirements of this ASA standard while in control of a train.

I have been involved in the transition to DOO in the Melbourne metropolitan services as well as plans for levels of train automation known as GOA for the Melbourne Tunnel Project. Having experienced how not to introduce DOO in the Melbourne system and travelled extensively with the Institute of Engineers in Asia and USA, as well as on my own visiting other high-performance railways. I make these further observations on Good Industry Practice:

a) Pre-recorded Digital Voice Announcements, which warn that doors are about to close. The digital announcement is clearer and more predictably related to the start of the doors closing.
b) Platform gap reduced, by tight tolerances to the dynamic envelope of the train at the door sill.
c) Static and dynamic envelopes maximised, to minimise gap and step with the PTI.
d) Sensitive door edges, detect an obstruction in the door and reopen the doors to prevent passengers being caught. Ideally the doors never force closed and alert staff to attend to a door that does not close after three attempts.
e) Traction Interlocking with PSBD, reduces the risk of dragging passengers by disabling traction power for the period from when doors start to open, until the doors are closed. If the doors don't fully close, traction power is disabled for a period of time thus allowing the driver and guard to take corrective action.
f) PSBD warning indications, are also placed with the crew to indicate if a door has not closed or remains open after crew have attempted to close these doors.
g) Door proved close indication, a positive indication to the train crew that the saloon doors have proved closed.
h) Saloon door light, usually mounted on the train this involves higher

standards of lighting to show passengers the step and gap PTI.

i) Step lighting, this involves higher standards of lighting to show passengers the step and gap PTI. This is achieved by step lighting (a row of LED's) or some other lighting of the gap.

j) Platform lighting standard, increased contrast and lux levels with higher platform lighting standards improves CCTV discernment performance. This has been the approach on the Melbourne suburban network with some success.

k) Driver mirrors, the driver uses mirrors mounted externally to look back and observe the platform in combination with other CCTV arrangements and a Guard or right of way station staff.

l) High standard of platform lighting, if visibility and discernability are required at the PTI then good quality lighting must be provided. No shadows, bright but no glare providing contrast and good visibility.

m) Platform CCTV, in the Japanese high speed rail network, some parts of NSWT network and the Melbourne suburban network platform mounted CCTV cameras are used to provide an aid to the train crew when monitoring saloon doors. The photo below shows a Guard monitoring train doors with the monitors on the platform above him.

Photo 8: Japanese railway Guard using platform mounted CCTV cameras to monitor train doors.

n) PSBD CCTV of saloon doors, these are usually cameras in board of the vestibule facing outwards usually taking in a view of the platform gap.

o) Train mounted CCTV, this is the current approach on the Waratah and the NIF train. On the Warratah the door operation does not obscure the platform view but still has the limits of effectively looking into the platform gap compared to a Guard observing the train departing.

p) Platform Screen Doors, provide a barrier between the track/train and the platforms so that no one can fall onto the track/gap after the train doors are closed. This is found on the Sydney Metro system.

q) Platform gap extensions, either mounted on the train or as part of the platform a small platform extends mechanically to fill the gap to remove the platform gap.

r) Obstacle Detection, automatic door operations on fully automated railways such as Sydney Metro provide high levels of resilience in the door operations in a highly engineered environment especially when combined with platform screen doors. As found on the Sydney Metro system.

s) Saloon door handrails, for passengers to hold onto when boarding and alighting the train.

t) Brightly coloured saloon doors, to show passengers more distinctly where the saloon entrance is.

u) Customer Service Guard (CSG)/Passenger Service Supervisor (PSS)/Train Captain, on intercity services in other Australian railways, Japan and Germany the Guard (with some other title) provides a safety critical role in managing the PTI. I note in particular the VLine approach and the XPT services which provides for the driver to determine their own RoW but the CSG manages the PTI and confirms for the driver that 'platform operations completed'.

There is the potential for latent failures in the defences when relying upon the Crew or CCTV technology alone. Only when these are combined effectively is the safe outcome for passengers achieved because of the limits in both approaches when not in highly engineered environments.

7 METCALFE REPORT

Transport for NSW commissioned an Independent Review of the NIF proposed operating model. The Metcalfe report does not record at what stage of development that train was, at the time of the review. However, he does not record seeing the train. The Metcalfe review made some significant recommendations which I advance further here.

1. I support the recommendation, to modify the instructions on the application of the NIF model:

a. to require the CSG to look out for any passenger behaviour/events that should stop the train from departing and then signal to the driver to stop the train from departing.

b. Asking the driver to carry out the safety checks, except when the train is stationary, is contrary to the Network Rule requiring drivers to keep a Look Out of the track ahead.

c. When the passenger intercom is operated the CSG has the responsibility for deciding if there is a need to stop the train and, in an emergency, apply the emergency brake.

2. I support the recommendation that during the dispatch the images from the passenger areas should not be displayed on the other monitor when the CSG is monitoring the platform side images to avoid distraction from the safety critical task.

3. I support the recommendation that when the 'Passenger Intercom' is operated, the CSG should have their attention drawn to the operation of the 'Passenger Intercom' and the outside view of the vehicle where the intercom is operated should be enlarged on the CCTV monitor. Clearly this addresses the hazard more effectively.

4. I support the recommendation that a review of the functionality of the Driver Reminder Appliance (DRA) and using it should be made mandatory. This has benefits beyond the PTI hazards.

5. I support the recommendation that "produces a document that describes the method for the train dispatch risk assessment and apply this to the stations where the NIF will operate". This should include lighting levels of the platform and platform gap.

6. I support the recommendation that "Review the NSW TrainLink competence management system to ensure it has an appropriate assessment and monitoring regime for the NIF train and the proposed new operating model".

7. Having considered the UK standard I see no reason why it cannot be adopted to Australian railways to address the recommendation to "Produce a single standard that describes all mandatory requirements on managing risk at the 'Platform Train Interface (PTI)".

8 FINDINGS

My opinion and conclusions listed below are wholly or substantially based upon my field of specialised knowledge and also wholly or substantially based upon the facts that I have applied both assumed and observed.

It should be noted that verification testing and assurance process have not been completed on both the train and the procedures. In addition, I have requested existing key documents which have not been provided at the time this report was prepared.

I was asked my opinion and conclusion relating to 5 items in the letter of instructions:

a) Is the NIF Operating Model safe?

The documentation provided is incomplete to identify all material hazards and fails to assess them to the degree necessary, hence my assessment is that the NIF operating model is not safe So Far As Is Reasonably Practical (SFAIRP).

In particular I am concerned with short comings in the requirements and subsequent hazard identification and assessments that I consider safety critical to the development of OIM procedures and crew roles.

I also have concerns with the OIM and training with respect to:

a) The technical CCTV limitations compared to direct observation as a hazard not identified.
b) The conflict between the drivers instructions to manage the train (keep a look out of the track ahead) and observe the PTI on departure of the platform are not addressed.
c) Driver distraction in using the CCTV and driving the train is not addressed.

A safe outcome for the NIF Operating Model now largely relies on the effective Safety Leadership by NSWT to address procedurally and by training, if possible, the shortcomings of the trains performance. I expect this shall centre on the functional performance of the CCTV system and the resilience of the NIF Operating Model which has not been demonstrated. In this regard I note the extensive list of unaddressed hazards documented by the HSR's Hazard Log from both RailConnect (not provided me but as advised by HSR's) and NSWT HSR's. I do not accept NSWT advice that a document headed 'Hazard Log' utilised to record concerns raised by HSR's in consultation is an issues list.

b) Is the NIF Operating Model as safe or safer than the current train fleet operating conditions for guards, when monitoring the platform train interface?

Current procedures for Guards produce a safer SFAIRP outcome when combined with ASDO and Sensitive door edges than the NIF Operating Model.

It should be noted the procedures and rules (OIMs) and training are still being developed and assurance process have not been completed.

Specifically, I am concerned the documentation does not address the competing hazards between the current controls and the proposed controls. To be clear this has been requested from RailConnect and NSWT, and has not been provided to me.

The limitations of the CCTV technology have not been documented, assessed and tested to demonstrate that those limitations will provide a fit-for-purpose replacement to the eyes and ears of the Guard and RoW staff. Especially as the technology introduces hazards consequences at least as severe as the current arrangements.

The NIF Operating model would appear at this stage not to address the latent hazards of the current operating model. Namely, the Guards inability to view the individual doors of each saloon and the platform gap where a person may have fallen.

c) How does the NIF Operating Model compare with the methods used by the international train operating community?

The NIF operating model does not address Good Practice in the industry for similar InterCity operations with comparable hazards and risk tolerability. In this matter I considered what Good Practice means and took it to be:

Any of the practices, procedures and equipment which in the exercise of reasonable judgment by an accredited Railway Transport Organisation with all it's resources; in light of the facts known, or which should have been known, would have been expected to accomplish the desired result consistent with reliability and safety.

It is insufficient to say that some part of the rail industry does this or that without assessing their further controls and the residual hazards that remain there. Good Practice is not intended to be limited to consideration of any one practice, procedure or equipment, to the exclusion of all others, but rather, is intended to require the consideration of a spectrum of possible practices, procedures or equipment.
It is reasonable practical to address the risk or at least somewhat mitigate the apparent hazards of the CCTV approach in the NIF operations using an existing resource that is already trained and proven to be effective in the role of the Guard.

d) How does the NIF Operating Model compare with the RTBU's proposed operating model for the NIF?

My concerns with the NIF operating model previously detailed are concerns that I share with the RTBU's alternative model as both models fail to address the

shortcomings of the CCTV technology and the hazards to passengers, trespassers and staff on track.

As expressed in the Network Rules it is imperative that the Driver is not distracted from keeping a proper Look Out of the track ahead and any such distractions should not be introduced to the driving environment.

At this stage of verification of the train and the verification of the procedures in the absence of a validation step the CCTV system is best utilised as an aide to the Guard/CSG to manage the PTI in cooperation with the Driver. I do not believe either proposal achieves this in that they neither addresses the essential weaknesses of the CCTV system:

a) CCTV technology is severely limited in achieving discernability compared to the human eye.

b) CCTV technology cannot replace the auditory queues currently available to the Guard/CSG.

c) The removal of the Guard/CSG from the train door at departure as well as the removal of station repeaters reinforces the vulnerabilities of the proposed Operating methods.

d) The driver is distracted by the CCTV in both models and I do not believe this is safe.

e) Any other matter you consider relevant.

a) Testing of the limits of discernability using the CCTV is not part of testing or specified in requirements.

b) Safety Assurance process demonstrates shortcomings in the Validation and Verification methods. In particular I noted a lack of documented assumptions and validation of those assumptions.

c) A driver at night who may have two bright lights from signals, against a largely black background, facing them, as they depart the train from a platform would take some brief time for their eyes to adjust from the CCTV screen to the lights to darkness as they pass the signal. In this scenario it appears impractical and potentially negligent for a driver to observe the PTI as the train departs as a safety control.

d) CCTV is only suitable for discerning safety critical information in the most favourable of lighting conditions which is not representative of a platform in all conditions encountered on the NSW Trains network.

e) CCTV image of the PTI is obscured by the open saloon doors. Similarly a crew cab door open completely obscures the image of that camera.

f) CCTV coverage of the cab environment is detrimental to safety. Placement of the camera to the side rather than over the desk detracts from the value of the coverage and encourages stress and distrust without achieving the safety benefits.

g) The trainers position in the cab is inadequate to monitor the performance of the trainee at the crew workstation.

h) Consultation hap hazard, fragmented and incomplete. Consultation should be based upon a hazard approach to demonstrate a SFAIRP outcome using the expertise of the SME staff as far as practical.

i) Hazards based approach has not been demonstrated. In reviewing the NIF hazard log and the NSWT HSR hazard log (RailConnect HSR hazard log was not provided me) there are significant hazards that have not been addressed and more importantly not assessed using good practice risk assessment techniques.

j) The requirements for the safety outcomes sought from the Operating Procedures should be validated and finally verified in the development of the OIM and the training materials and delivery. In particular all assumptions and requirements for the procedures to be safe should be documented as part of the validation and verification process.

k) [redacted] has not been demonstrated.

l) I was advised that the introduction of the train into service would not be preceded with an operating trial of the NIF operating procedures. I am concerned that this should not proceed as the operating procedures need further development and assessment to identify and mitigate the latent hazards I have identified.

m) Location specific risk assessments are not considering the levels of lighting on the platforms. This should be completed once the CCTV testing confirms the performance that can be achieved and then the results used to inform lighting improvements and further controls as necessary SFAIRP.

n) There are no specific instructions to drivers on how to drive the train and use the monitor. At the same time the policy and procedures are that drivers are to stop the train if they require to use their phone. The drivers CCTV monitor should be turned off immediately the brakes are released to avoid driver distraction.

Dated: 6 November 2020

Klaus JE Clemens

ATTACHMENT A: EXPERT WITNESS CODE OF CONDUCT

Annexure A

Harmonised Expert Witness Code of Conduct

Application of Code

1. Th s Code of Conduct app es to any expert w tness engaged or appo nted:

(a) to prov de an expert's report for use as ev dence n proceed ngs or proposed proceed ngs; or

(b) to g ve op n on ev dence n proceed ngs or proposed proceed ngs.

General Duties to the Court

2. An expert w tness s not an advocate for a party and has a paramount duty, overr d ng any duty to the party to the proceed ngs or other person reta n ng the expert w tness, to ass st the Court mpart a y on matters re evant to the area of expert se of the w tness.

Content of Report

3. Every report prepared by an expert w tness for use n Court sha c ear y state the op n on or op n ons of the expert and sha state, spec fy or prov de:

(a) the name and address of the expert;

(b) an acknow edgment that the expert has read th s code and agrees to be bound by t;

(c) the qua f cat ons of the expert to prepare the report;

(d) the assumpt ons and mater a facts on wh ch each op n on expressed n the report s based [a etter of nstruct ons may be annexed];

(e) the reasons for and any terature or other mater a s ut sed n support of such op n on;

(f) (f app cab e) that a part cu ar quest on, ssue or matter fa s outs de the expert's f e d of expert se;

(g) any exam nat ons, tests or other nvest gat ons on wh ch the expert has re ed, dent fy ng the person who carr ed them out and that person's qua f cat ons;

(h) the extent to wh ch any op n on wh ch the expert has expressed nvo ves the acceptance of another person's op n on, the dent f cat on of that other person and the op n on expressed by that other person;

( ) a dec arat on that the expert has made a the nqu r es wh ch the expert be eves are des rab e and appropr ate (save for any matters dent f ed exp c t y n the report), and that no matters of s gn f cance wh ch the expert regards as re evant have, to the know edge of the expert, been w thhe d from the Court;

(j) any qua f cat ons on an op n on expressed n the report w thout wh ch the report s or may be ncomp ete or naccurate;

(k) whether any op n on expressed n the report s not a conc uded op n on because of nsuff c ent research or nsuff c ent data or for any other reason; and

( ) where the report s engthy or comp ex, a br ef summary of the report at the beg nn ng of the report.

Supplementary Report Following Change of Opinion

4. Where an expert w tness has prov ded to a party (or that party's ega representat ve) a report for use n Court, and the expert thereafter changes h s or her op n on on a mater a matter, the expert sha forthw th prov de to the party (or that party's ega representat ve) a supp ementary report wh ch sha state, spec fy or prov de the nformat on referred to n paragraphs (a), (d), (e), (g), (h), ( ), (j), (k) and (I) of c ause 3 of th s code and, f app cab e, paragraph (f) of that c ause.

5. In any subsequent report (whether prepared n accordance w th c ause 4 or not) the expert may refer to mater a conta ned n the ear er report w thout repeat ng t.

Duty to Comply with the Court's Directions

6. If d rected to do so by the Court, an expert w tness sha :

(a) confer w th any other expert w tness;

(b) prov de the Court w th a jo nt report spec fy ng (as the case requ res) matters agreed and matters not agreed and the reasons for the experts not agree ng; and

(c) ab de n a t me y way by any d rect on of the Court.

Conference of Experts

7. Each expert w tness sha :

(a) exerc se h s or her ndependent judgment n re at on to every conference n wh ch the expert part c pates pursuant to a d rect on of the Court and n re at on to each report thereafter prov ded, and sha not act on any nstruct on or request to w thho d or avo d agreement; and

(b) endeavour to reach agreement w th the other expert w tness (or w tnesses) on any ssue n d spute between them, or fa ng agreement, endeavour to dent fy and c ar fy the bas s of d sagreement on the ssues wh ch are n d spute.

ATTACHMENT B. DOCUMENTS REVIEWED.

Besides reference books & journals used by me, listed in the report, the following documents were reviewed by me:

- "Independent Review of the New Intercity Fleet (NIF) Operating Model" dated 9 December 2019;
- RTBU's alternative Customer Service Guard operating model.
- UK Rail Industry Standard RIS-3703-TOM titled 'Passenger Train Dispatch and Platform Safety Measures'
- Railsafe NTR410 Defective Equipment
- Uncontrolled doc. list of NSWT HSR meetings.
- NSWT PP NIF procedures and OIM transition plan.
- NSWT Small Group Consultation. DDR completed June 2019, Concept of Operations baseline completed Sept 2019.
- NSWT SAR App4, uncontrolled document.

NSWT Incident statistics & Industry reviews.

Current operating rules and procedures:

- NTTWP 156, Operating Doors, November 2017, V1.0
- NTOSP 7, 'Right of way procedure for Guards and Passenger Service Supervisors', NTOSP7. November 2017. V1.8
- Right of way procedure for Station Staff and On-Train Repeaters. OSP 6. September 2018. V6.1
- OSP 6, 'Right of way procedure for Station Staff and On-Train Repeaters', September 2018, V6.1
- Right of way procedure for Station Staff and On-Train Repeaters. NTOSP 6. November 2017, V1.0.

Draft operating rules and procedures for the new model:

- Operator Instruction Manual, Volume 3.

Transport Asset Standards Authority Standards:

- Human Factors Integration – Rolling Stock. T HR HF 00001 ST. Version 2.0. Issued date: 25 June 2018
- System Safety Standard for New or Altered Assets. T MU MD 20001 ST. Version 1. Issued date: 20 December 2016
- RSU Appendix D - Train (Driver) Safety Systems. T HR RS 00840 ST. Version 2.0. Issued date: 04 November 2016
- Train Safety Systems. T HR RS 13001 ST. Version 2.0. Issued date: 04 December 2017

Network Standard

- Requirements for Passenger Train Dispatch. NS-0918. July 2018. V4.1

NSW Safety Management System Documents

- Safety and Environment Change Management. Document number: SMS-07-SP-5067,Version: 3
- Risk Management. Document number: SMS-07-SP-5213 Approver: Director,

SEQR, Version: 2

- Risk Assessment Guide. Doc No: SMS-07-GD-5084, Version: 2.0Issue Date: 15/08/2016

• A saloon door being opened inadvertently when it is not alongside a station platform.	HRC HAZOP 30/4/20 REDA202088 -ID as PDR
• NSW TrainLink a passenger falling down the gap between the train and the platform.	NSWT DNSW2017/32992 25/10/17
• A passenger falling down the gap between two saloon cars.	HRC PDR
• A passenger trapped in a saloon door.	HRC PDR
• A passenger trapped in a saloon door and the train departs.	HRC PDR
• NSW TrainLink location specific risk assessment for every station where the NIF train will stop.	NSWT (Fassifern 1&2 in E6) WIP not completed PP 22/7/20 19 platforms remain.
• Signal Passed at Danger (SPAD) risk assessment at departure from a platform.	HRC PDR
• ISA reviews of the CCTV system dependent procedures hazard assessment.	ALTRAN/AXESS document
• ISA reviews of the CCTV system dependent procedures Human Factors design.	ALTRAN/AXESS document
• CCTV system RAMS assessment.	MITSUBISHI 8001133 RAM report TCC1A
• CCTV system Verification reports from testing etc. 9/10/20 Advised SVR report available.	HRC SVR 25/8/20 TS TCC1A WIP
• CCTV technology, can I be provided with: – The functional description of an acceptable image quality. (Target detection report) – Test results, reviews and issues register for the CCTV system (see doc C8).	MITSUBISHI 8001133, System Functional Description.
• Documents demonstrating a SFAIRP outcome for the passengers alighting and boarding the NIF train. 9/10/20 PTI Risk Assessment	HRC PDR 24/4/18. REDA202030
• Documents demonstrating consultation with train crew and NSW Trains. Provided was a set of presentation prepared by NSWT to present at the Working Group rather than any minutes of consultation. 9/10/20 Minutes of meetings to be provided.	NSWT documents: PP at Meetings, Action minutes, HSR Feedback to Regional HSR Comm & Hazard Log.

• Description and location of proposed changes to station design and train protection requirements for the NIF train. 9/10/20 TfNSW to provide.	Marked up NIF network map. No document control. 24 of 212 Platform Ext, 19 Signal relocations, & 20 Car marker relocations.
• TrainLink: NIF Driver and Guard Train Dispatch Communications Protocols – Human Error Analysis. Issue 01	NSWT
• Safety Validation Report – Detailed Design Report (DDR).3 June 2019 by Carolyn Walsh	NSWT
• Providence not recorded: Risk Associated with PTI and Train Dispatch for NSW Trains. DNSW2019/2742	NSWT
• NSW TrainLink Study of Slips, Trips and Falls (STF) Incidents at the Platform Train Interface (PTI). DNSW2017/32992. Issue 1. 25/10/17	NSWT
• TrainLink: Safety Change and Human Factors Integration Plan – Impact Assessment. TRIM Reference: DNSW2017/32988. Issue 1.2. 30/7/2018	NSWT
• TrainLink Risk Assessment - Proposed Change to Network Standard to enable Train Dispatch using CCTV. Draft, V0.4, 89/09/2019 EW: Working draft title that was subsequently revised to "Scope of work: Risk Assessment – New Intercity Fleet Train Dispatch".	NSWT (provided RA – NIF PTI, 20/7/20 DNSW2020/5817)
• RailConnect, New Intercity Fleet Human Factors Integration Plan, TeamBinder Ref NIF-150010-RCN-EM-000071, Issue 5, 8/2/2019	RailConnect
• HRC: Human Factors Assurance Report – DDR Unit Level. REDU21802. Rev .01. 06/06/2019	HRC
• HRC: Safety Assurance Report (Units). REDA201896. Rev 1. 25/06/2018	HRC
• HRC: System Hazard & Risk Analysis (Units). REDA201874. 21/05/2019	HRC
• RailConnect: New Intercity Fleet System Safety Plan, TeamBinder Ref NIF-150010-RCN-RS-00001, Revision 5, 14/12/2018	RailConnect
• RailConnect: Safety Assurance Report (ACC – Access and Egress). REDA202019. 29/03/2019	RailConnect
• NSW TrainLink Driver Reminder Appliance (DRA). NIF design options and considerations paper. DNSW2018/3500. V1.0. 09/07/18.	NSWT

ATTACHMENT C. RESUME OF KLAUS CLEMENS

Qualifications

- Masters of Business Administration (Technology) from Monash University Clayton, 1995.
- Certificate in Financial Management at the Australian Institute of Management, 1991.
- Bachelor of Manufacturing (Chemical) Engineering with Honours from Swinburne University of Technology, 1988.
- Diploma of Applied Science (Chemistry) from Victoria University, 1985.
- Member Institute of Engineers Australia and Railway Technical Society Australia (RTSA)

Career History

RMAus, December 2000 - current
A new rail management consultancy established to build on my management experience particularly in the railways. Key clients have been:

- **Transport for NSW.**
  Review of Train Planning & new Timetable Implementation
  NWRL Project Interfaces
- **Metro Trains Melbourne**
  Rail and Asset Management advice
  Negotiations with Drivers union on new rolling stock standards
- **State Rail Authority of NSW.**
  Parramatta Rail Link tender evaluation
  Parramatta Rail Link Safety Review of Tunnel walkway
  Waterfall accident investigation
- **Connex Trains Melbourne.**
  Rail and Asset Management advice
- **Rail Infrastructure Corporation of NSW.**
  Review of Signalling Projects & Strategy
  Review of Signaller workload study
- **The Department of Transport NSW.**
  Review of Safety arrangements in NSW & VIC
- **The Department of Transport VIC.**
  Regional Fast Rail Project Train Operations & Safety
  Regional Rail Link requirements definition document
  Review of Fleet Configuration to increase passenger capacity
  Advice on infrastructure requirements to increase passenger capacity to the City of Melbourne
  Peer review of Network Requirements planning for the Melbourne suburban network
- **Waterfall Special Commission of Inquiry.**
  Rail Safety Management Advice.
- **RailCorp NSW**
  Workplace change management to support ATRICS role out
  Workload assessment of Signallers, Tran Controllers, Fleet Controllers
- **Yarra Trams.**
  Safety Transition Plan for M>Tram merger

STATE RAIL AUTHORITY NSW, 25 April, 1998 – Dec, 2000

The State Rail Authority operates all the passenger train services in NSW. On average there are 900,000 passenger journeys per day carried on 1680 railcars generally running as eight car sets. The average scheduled train journey is 160 kilometres. In addition there are the interstate services that run from Melbourne to Brisbane and regional services as far as Broken Hill.

Position: General Manager Organisational Development reporting to the Chief Executive Officer.

Responsibilities: Management of Safety Improvement and Business Improvement across the whole organization.

Accomplishments:

- Reviewed Safe working training and established an Adult Learning Model for all Safe working training.

- Established the Safety Management System and personnel to develop and deliver a culture change. Lost Time Injury Frequency Rate reduced from 72 to 42 in two years.

- Undertook BPR review and implementation in the timetabling area. Following the BPR study the CEO assigned the train planning section of 300 employees under my direct management.

- Introducing the latest timetabling technology and a team based organisational structure that has lead to a more positive and professional work attitude in the section.

- Established the timetable development teams and processes that delivered the timetables for New Years Eve 2000, Easter Show 2000 and the Olympic Games.

- Implemented for the first time in NSW (and probably Australia) a timetable evaluation tool that is now used to validate timetables and infrastructure changes.

INDEC consulting, 15/1/95 – April, 1998

INDEC Consulting is a general management consulting business focusing on business performance improvement.

Position: Principal Consultant reporting to the Managing Director.

Responsibilities: Full sales and financial accountability for the Victorian Operations. Lead a team of 9 consultants providing a range of engineering and management professional services.

Accomplishments:

- Advised the Victorian State Government (Transport Reform Unit) on the replacement options for the portal wheel lathe at Newport Railway

Workshops.

- Advised the Victorian State Government (Department of Infrastructure) on the refurbishment options for historic railway gates that required preservation while being part of the operational railway.

- A design fault in the brake system of Light Rail Vehicles operated by the PTC Victoria (MET Trams) was causing major service disruptions and high maintenance. I then undertook a detailed analysis of the problem and after intense negotiation with the supplier had them agree to replace the brake system. I then assisted a team of operators and the supplier to design a new brake system, prototype and test the mechanism and finally commission the new design. The project has been a complete success at no cost to the operator.

- Identified the causes of ongoing major electronic equipment failures on Metropolitan Trains costing hundreds of thousands of dollars a year and customer dissatisfaction in a service environment, for the client after the equipment supplier had given up. The equipment is now operating successfully.

- Assisted in complex negotiations for the PTC to have the supplier of new equipment allowing single person operated trains to acknowledge their responsibility in supplying equipment that did not meet contracted performance levels. Suppliers have now installed new equipment at their own cost (some $3M) after an intense design review lead by me.

ATTACHMENT D. MEETINGS WITH NSWT HSR'S

The following notes are from meetings documented with each of the NSWT HSR's who were approached by management to meet with me.

1. HSR's are divided into two groups; seconded NSWT crew to RailConnet under their own accreditation this started at the beginning of 2000. NSWT claimed to be managing the consultation for RailConnect on the NIF project. As well as, the NSWT staff HSR's which includes HSR's on the NIF Working Group.
2. Driver screen glare resolved, CCTV monitor turns off at 13kph, no instructions as to how to use CCTV monitor when leaving the platform and continue driving.
3. CCTV camera visibility unknown in fog, rain, and the effect of dirt.
4. Seconded HSRs involved in several tests and attended meetings but not provided outcomes of any assessments. Many hazards identified no feedback and the hazards have not been mitigated since they commenced in January 2000.
5. NSWT HSR Driver:
    a. Information is dictated to them by NSWT or TfNSW no opportunity to understand or explore solutions to issues. This is not how the other rollingstock projects were managed.
    b. Drivers seat unsafe ergonomically. Trainers seat unsafe cannot see controls and actions of trainee.
    c. Concerned about the mental stress on crew with the cab CCTV.
    d. OIMs are dangerous. These have been presented by NSWT.
    e. COO has only been at one meeting.
    f. Safeworking pilot was on a static train which is unrepresentative of the hazards.
    g. Lots of secrecy on the project.
    h. OIM hazard log has open issues.
    i. Training pilot was based upon the use of a non-existent application on the phone, simulator location at Everleigh has unsuitable access, OIM not ready for training or operations.
    j. Simulator does not show one of the main hazards that is a person fallen in the platform gap.
    k. Expect to leave children behind because cannot see enough of platform.
    l. Mirror better than CCTV because wider field of view.
    m. Risk Assessments too narrow and incomplete.
    n. Driver injured by seat and increased fatigue.
    o. CCTV too small.
    p. Station risk assessment incomplete does not include, slope of platform, Platform construction, car markers, transition risks. Form over simplified.
6. NSWT HSR Guard:
    a. Information is dictated to them and there is never anyone in the room to answer questions.
    b. COO once at meeting 12-14 months ago.
    c. Concerned for safety when no Guard watching train in or out of platform.
    d. PTI hazard of persons running for train.
    e. Guard now calls out to warn passengers.

f. Hazard with door buttons is kids will run for the door to press button ahead of parent. Train may be departing.
g. Too many cameras to watch. Guards will be assaulted if they walk through the train. Passengers will not know where Guard is if they walk through train. Luggage downstairs is a hazard. Guards will fall when walking on train because it sways so much and they are carrying equipment with them.
h. There is only a help button so no priority for emergency calls on the train.
i. Bikes on train are an obstruction to evacuation and movement.
j. Seats at the end of each saloon area are so small unusable. Been told to use them for luggage.
k. How can CCTV replace three sets of eyes and ears.
l. CCTV screen delay of 1/3 second is a hazard.
m. CCTV is not fit for purpose.
n. Guard isolated from driver is a safety concern.
o. Lighting not covered in platform risk assessment. Raised as an issue and remains an unresolved issue.
p. Crew cab steps too shallow to safely use.
q. Guards save several persons a year at the PTI – undocumented and unacknowledged.
r. Stations reform, removal of staff and RoW, on hold pending introduction of NIF.

7. NSWT Stations HSR:
    a. South Coast platforms being extended. No station repeaters.
    b. Guard in middle of train.
    c. CCTV wont see fallen kids in platform gap.

ATTACHMENT E. NIF RTBU DRAFT OPERATING MODEL

1/7/2019

Rail, Tram & Bus Union
(NSW Branch)

New InterCity Fleet

RTBU Draft
Operating Model

Australian Rail, Tram & Bus Industry Union *(NSW Branch)* ABN 66 090 785 801
Level 4, 321 Pitt Street, Sydney NSW 2000 **T** (02) 92642511 **F** (02) 9261 1342 **E** nswho@rtbu-nsw.asn.au **W** www.rtbu-nsw.asn.au

ORGANISING WORKERS IN THE TRANSPORT INDUSTRY
PROTECTING AND BUILDING RIGHTS AT WORK

Summary of NIF Related Concerns/Issues

In Cab CCTV Monitors

The RTBU remains in opposition to the placement of the CCTV Monitors within the drivers cab in their current location. The RTBU is of the view that the placement of these monitors may pose operational risks regarding driver's line of sight requirements for signalling, infrastructure, car markers, track work and track workers, etc.

Whilst the RTBU understands that these monitors and their location will be subject to operational validation and testing, in which the RTBU will participate, our participation should neither be taken nor seen as accepting or agreement to the placement of the Monitors.

Drivers CCTV Utilisation

The RTBU remains in opposition to the utilisation of CCTV monitors by the driver for the performance of operational tasks contained within the proposed new NIF operating model. The RTBU is of the view that the utilisation of these monitors by the driver poses an unacceptable risk of potential distraction to the drivers primary duty, that of the safe operation of the train. These potential distractions arise from the ability to, or requirement to access these monitors whilst driving the train.

Additional potential distractions also arise from the positioning of the monitors and their potential to reflect light/glare onto other safety critical work screens i.e. Speedo & ATP equipment. Further potential glare related risks arise from utilising CCTV for critical image requirements during train departure that may be affected by glare within the cab.

Whilst the RTBU understands that the above concerns/issues will be subject to operational validation and testing for which the RTBU will participate, our participation should not be taken or seen as accepting or agreement as to Drivers utilisation of the CCTV Monitors.

Crew Cab Door Traction Interlocking

The RTBU regards the application of the above as a deliberate action to engineer the guard's current role in the PTI to one of CCTV monitor only. NSW Trains position regarding the apparent safety concerns for guards standing at crew doors with the risk of injury or assault is regarded as negligible when compared to the risk of passenger injury/fatality arising from the use of CCTV only as a risk detection methodology,

CCTV utilisation on existing rolling stock is currently mandated as an aid only in the Right Away process and has been deemed inadequate to replace the human visual and audible capability and the RTBU considers the same should apply to the NIF unless proven categorically otherwise.

The RTBU also does not accept the response provided by the NIF project engineers regarding the alleged inability to remove/bypass Traction Interlocking on crew cab doors nor does it accept the supposed alignment with National Standards. The engineering explanation received is considered evidentially weak and flies in the face of current engineering applied to the very latest Sydney Trains rolling stock purchase, that being the "B" Set or Waratah mark 2 which was designed, built and accepted with crew doors non Traction Interlocked.

It is considered with NSW Trains and the NIF project engineers capabilities to have the Traction Interlocking bypassed in the Guards cab by way of key activation and NSW Trains also have the capacity to compile appropriate train working procedures that mandate the guards must close their crew cab door once the train has commenced departing the platform at low speed.

In Cab Camera

The RTBU does not agree with NSW Trains view that the in cab camera provides a safety enhancement for its operations. The proposed use of the in cab camera is seen as a gross invasion of the privacy of the RTBUs members without providing any justifiable benefit.

As the train's crew cab is our member's daily workplace, to have the continuous thought that someone is watching their every move, all the time is unacceptable in the extreme and is considered an unacceptable risk of distraction to their primary role, that of the safe operation of the train and passengers therein.

Should NSW Trains wish to conduct further and separate discussion on the installation and or use of in Cab Cameras the RTBU would be prepared to participate in such discussions on a without prejudice basis.

Driver Only Operations (DOO), Empty cars

The RTBU considers DOO operations on empty or non revenue service's the same DOO on any train on a main line and therefore holds the position that the minimum wage increase for that working is already established at 18% and would be applicable to the NSW Trains proposal for empty car working.

The RTBU remains unconvinced the technologies applied to the NIF train and the subsequent proposed train working rules and procedures are sufficient to provide adequate safety measures for our members performing this task.

Consideration of empty car working over the length and breadth of the NSW Trains electric operational area is considered impractical to be undertaken solely by one person, operating through busy platforms without the assistance of the guard who has a safety critical task to perform at every platform, regardless of whether carrying passengers or not as there are still station requirements to be met even when empty.

It is also considered unsafe to have the train's driver working in isolation for extended periods over and distances regardless of NSW Trains assurances that new technologies will be provided for their assistance which remain unproven to date.

Customer Service Guards PTI Role

The RTBU regards the NSW Trains proposed Customer Service Guards role in the PTI process as insufficient in providing the safety assurance necessary during the safety critical train departure process. CCTV imagery is a useful aid to the process however; it fails to provide the full visual and audible capability requirements of the traditional Guards role of today. The RTBU is of the view that the Customer Service Guard should be required to assess the PTI during boarding and door closing processes from an open crew cab door to maintain the existing safety levels.

The RTBU is of the view that the tabled process supplied to NSW Trains on 20.6.2019 is a safer and more viable option that optimises the use of both CCTV capabilities and on site visual and audible capacities and is more consistent with current processes.

It appears somewhat disingenuous to create a Customer Service role that does not have a requirement to perform that customer service role at every station by providing a visual presence and assistance for customers yet requires the same inside the train.

Customer Service Guards PI Utilisation

The RTBU is of the firm view that the Customer Service Guard could, and should, supply a valuable role in dealing with passenger calls to the PI as a first on train responder to any issue or inquiry raised by passengers. The Customer Service Guard is perfectly positioned on the train with the passengers, knows and understands NSW Trains operations and can provide information to passengers as and when required.

Whereas it is conceded that broader operational information may be required by passengers at limited times, the Customer Service Guard is ideally placed with appropriate technology to source any information required and supply the same to passengers.

The train Guard currently has the training and skill set to deliver this important function and does on a daily basis for passengers and it seems illogical to not utilise the skills of existing employees under the new title of Customer Service Guard, the emphasis being on customer service.

Once again, it appears somewhat disingenuous to create a Customer Service role that does not have a requirement to perform that customer service function when they are capable and confident to do so. It would also appear illogical to create and fund a position in the NSCC to undertake a task for which an employee can, and does, already perform that task and is more than willing to continue to do on the NIF train.

The Customer Service Guard is also qualified in First Aid and CPR. The Customer service Guard is best placed as the first responder, to assess and provide assistance to any on board medical emergency.

Provision of Boarding Assistance

The RTBU is of the view that the Customer Service Guard is ideally placed with appropriate technologies to manage all boarding assistance requirements designated via the TMS and NSCC. They should also be allocated a PTI role on train arrival that provides the best opportunity for boarding assistance for those who choose not to utilise NSW Trains proposed technologies.

It is also believed appropriate for the Customer Service Guard to have a role in allocating TMS icons relating to boarding assistance requests as well as acknowledging the activity on the TMS and liaising with the NSCC regarding the same.

The NSW Trains proposed operating model broadly refers to boarding assistance yet fails to acknowledge the diversity of passengers who are physically challenged and not readily detectable as needing assistance until the trains arrival. The RTBU is of the view that the Customer Service Guard plays a crucial role in identifying these passengers and should be strategically placed on the train with appropriate PTI duties to reflect this service requirement.

NSW Trains Proposed Operating Model, New Driver Tasks/Duties

1. Full accountability/responsibility for all elements of on-train operation including safe working requirements
2. Designation of, and accountability for, operational tasks to Customer Service Guard
3. Responsible and accountable for Platform train interface and train door operations utilising external CCTV and ASDO
4. Train fault detection, management and reporting
5. Utilisation of MSDO
6. Sole responsibility for IEDR Override
7. Responsible and accountable for boarding assistance management utilising the TMS
8. Provision of boarding assistance when Station Staff or Customer Service Guard are unavailable
9. Transpositions, accountability for management/application of electronic transpositions via TMS
10. Provision of manual announcements when Customer Service Guard, NSCC or Station Staff cannot.
11. Preparation - all duties undertaken solely by the driver
12. Stabling- fault detection and reporting solely by the driver
13. Conduct over carry checks in yard and responsible for safe removal of over carried passengers
14. Amalgamation - all duties undertaken solely by the driver
15. Division - all duties undertaken solely by the driver
16. Yard Departure/Arrival- all duties undertaken solely by the driver
17. Empty Car Running- all duties undertaken solely by the driver

NSW Trains Proposed Operating Model, Customer Service Guard Tasks/Duties

1. Assist the driver during train departure utilising CCTV
2. Proactive planning to provide boarding assistance when required
3. Traversing the customer areas of the train and providing assistance and information as required
4. Pre-boarding customer service support on the platform if required
5. Assistance to manage anti-social behaviour where safe to do so
6. Provide presence and customer reassurance
7. Perform fault rectification under the direction of the driver
8. Reporting delay related information
9. Assist the driver when the train is operating in degraded mode
10. Possess safe working qualifications appropriate to the role
11. Utilise technologies to provide information and customer assistance

Draft RTBU NIF Operating Model

Driver

The driver has the primary accountability for the safe movement and operation of the NIF train across the electrified Suburban and InterCity network with the responsibilities of:

- Operating the NIF train across the network in adherence to all Network rules and Procedures.
- Train door operations during arrival and train dispatch using Automatic Door Selection (ASDO)
- Managing the platform train interface and door closing utilising external CCTV in conjunction with the Customer Service Guard
- Train fault detection and management with the assistance of the Customer Service Guard
- Train preparation and stabling
- Delegation of duties to the Customer Service Guard during the journey as required
- Provide manual announcements in exceptional circumstances where this cannot be provided by the Customer Service Guard, NSCC or station staff.

Train Arrival

The driver will stop the train at the appropriate car marker and open/release the train doors. The Customer Service Guard will position themselves in an appropriate crew cab prior to arrival to expedite boarding assistance if required and to monitor the passenger access/egress from the open crew cab door.

Train Departure

At the appropriate departure time, the driver will assess the PTI via CCTV and close the passenger doors. The Customer Service Guard will monitor the door closing process from the open crew cab door and, if all clear will position themselves at the driver's workstation and indicate such via an "alright bell", close the crew cab door and monitor train departure via CCTV.

Upon extinguishment of the Traction Interlocking light on the drivers dash and receipt the "alright bell" from the Customer Service Guard to indicate they are in position to monitor the PTI, the driver will take power and commence departure when safe to do so. The Customer Service Guard will monitor external CCTV during departure and stop the driver via bell signal only if required.

- The driver will be responsible for train preparation outside of Kangy Angy. The Customer Service Guard will attend the train within any yard prior to departure, set up their cab and travel passenger to the station.

- A Customer Service Guard will be required on all empty train movements.
- The driver will assume primary responsibility for decisions around safe working requirements of the train and can delegate instructions to the Customer Service Guard.
- In exceptional circumstances the driver may provide boarding assistance if station staff and/or the Customer Service Guard are unavailable.
- In exceptional circumstances the driver may provide customer information where this cannot be provided by the Customer Service Guard, NSCC or station staff (e.g Degraded mode)
- Transpositions will be electronically delivered directly to the driver who will advise the Customer Service Guard accordingly.
- The driver communicates directly with the NSW TrainLink Fleet Controller in the NSCC for identifying and managing faults and may delegate fault rectification to the Customer Service Guard.

Greater use of technology including:

- CCTV to observe the PTI prior to dispatch in conjunction with the Customer Service Guard.
  Train Management System (TMS) used during train preparation, amalgamation & division & boarding assistance.
  Automatic Train Protection (ATP) to monitor and manage train speeds across the network.
  Digital Train Radio System (DTRS) for reliable communication with Network Control Officers and the NSCC. The DTRS will send a critical text to the NCO & NSCC via the Driver Safety System escalation process. Once alerted, the NCO will contact the driver.
  ASDO automatically selects doors aligned with the platform upon arrival and releases them for operation.
  Swipe card for cab entry and securing the cab.
  Portable Crew Interface (PCI) used to access the TMS information and support communications during out of cab activities.
  The driver can choose (when safe to do so) to listen in on calls being managed by the Customer Service Guard or NSCC.
- The driver will be responsible for stabling duties and fault detection during this process and report the same for overnight rectification. The Customer Service Guard will perform a walkthrough of the train with the assistance of station staff on termination and secure individual carriages once checked and accompany the train into the yard.

Draft RTBU NIF Operating Model

Customer Service Guard

Driver and Customer Service Guard operations across the electrified suburban and intercity network with the role of the Customer Service Guard designated to provide quality customer service for customers travelling on the NSW Trains NIF services with the following responsibilities:

- The Customer Service Guard will have safeworking competencies appropriate to the role
- Utilising the PCI to receive live data from the train and communicate with customers, the Driver, NSCC and Network Control, etc.
- Increased focus on customer service and information requirements
- Utilising the PCI to support customers
- Utilising CCTV for platform train interface monitoring during arrival and departure
- Proactive planning and assistance to support customers with boarding and alighting positions for their destination utilising the TMS request alerts
- Pre-boarding customer service support on the platform if required
- Manage customer anti social behaviour where safe in line with current procedures and policies
- Designated Authorised Officer to provide presence and customer reassurance and enhance train/customer security
- Boarding assistance for customers when station staff are unavailable
- Conduct fault rectification under the direction of the driver
- Reporting train faults and delay related information
- Provide manual customer announcements as and when required
- Manage customer calls from the help points and utilise the NSCC if required
- Assist the driver, incident commander and customers when operating in degraded mode/emergency/evacuation

Train Arrival

The driver will stop the train at the appropriate car marker and open/release the train doors. The Customer Service Guard will position themselves in an appropriate crew cab prior to arrival to expedite boarding assistance if required and to monitor the passenger access/egress from the open crew cab door.

Train Departure

At the appropriate departure time, the driver will assess the PTI via CCTV and close the passenger body side doors. The Customer Service Guard will monitor the door closing process from the open crew cab door and, if all clear, will position themselves at the crew

workstation and indicate such via an "alright bell", close the crew cab door and monitor train departure via CCTV. The Customer Service Guard will stop the train via bell signal if required.

The Customer Service Guard will attend the train within any yard prior to departure, set up their cab and travel passenger to the station.

A Customer Service Guard will be required on all empty train movements.

Draft Platform Train Interface Process

RTBU NIF Operating Model

Train arrival

- The Customer Service Guard will position themselves in an appropriate crew compartment prior to arrival at the next station in order to view the platform via CCTV on arrival and expedite Boarding assistance if required.
- The driver will stop the train at the departure end of the platform on the appropriate car marker.
- The driver will open/release the train passenger doors (CCTV not required).
- Once the train comes to a stand, the Customer Service Guard will observe the PTI from the open crew cab door.
- The Customer Service Guard will provide customer boarding assistance as required via sight or as pre planned via the TMS.
- The Customer Service Guard will advise the driver via bell code if required to exit the crew compartment. The driver will acknowledge bell code given.
- Once boarding assistance is complete, the Customer Service Guard will return to the crew compartment and advise the driver via bell code.
- The Customer Service Guard will clear the appropriate boarding assistance icon from the TMS or advise of new location/requirement via the same.

Train Dispatch

- 20 seconds prior to the timetabled departure time, the driver will observe the external CCTV and, if safe to do so, will close the train passenger doors.
- The Customer Service Guard will remain at the open crew compartment door to observe the PTI and door closing process.
- Once the train passenger doors are closed, the driver will re-focus on the route ahead and any/all signalling indications.
- The Customer Service Guard will conduct a final scan of the PTI once the train doors are closed and close their crew compartment door.
- The driver will observe the Traction interlocking light extinguish on the workstation.
- The Customer Service Guard will position themselves to observe/monitor the CCTV of the PTI and provide the drive with an "all right" bell signal to indicate they are in position to observe departure and/or stop the train if required.
- The driver will release the train brakes, apply power and depart the platform.
- The Customer Service Guard will monitor the PTI via CCTV during the departure process and stop the train if required by use of appropriate bell code.
- If the train is required to stop during departure, the driver and guard will liaise regarding the cause and any requirement to re-open the train doors.

RTBU NIF Operating Model

Draft

Process 1 - Start of Day

- Sign On at Depot – Train Crew
- Pre-operational train checks
- Yard Departure
- Hand back Train to NSW Trains at Kangy Angy.

Drivers

Drivers will prepare the train or pick up the train at the Kangy Angy handover/hand back point.

Customer Service Guard

Customer Service Guard will not undertake preparation duties other then cab set up and will be required on all non revenue services.

For Both

Attesting requirements will still be required from authorised staff however; train crew will be required to report to the Shift Manager at sign on.

Key Changes to Current Operations

- Customer service Guard will have a mobile device to view operational documents
- Drivers will Handover/Handback NIF at Kangy Angy from the Maintainer who undertakes train preparation at that location.
- At Kangy Angy the driver will have access to the Certificate of Serviceability displayed on the TMS.
- Drivers will perform train preparation at all other locations which will be subject to time trial as per the provisions of the 2018 NSW Trains EA
- Customer Service Guard will not be required to undertake train preparation duties other then cab set up prior to yard departure.
- Customer Service Guard may be required to perform customer assistance on the platform during train dwell time, prior to train departure.

Description

Train crew will sign on at their current depot locations. Except at Kangy Angy, drivers will undertake all train preparation duties and does not require any tasks to be undertaken by the Customer Service Guard other than cab set up prior to yard/platform departure. The activities to be undertaken by the driver to prepare the train for service and to leave the yard include:

- Detailed checks and raising of defects and or maintenance related issues are moved from start of day to the end of the day stabling process. The intent of this process is to increase opportunities for RailConnect to perform maintenance activities before the next train service.
- Train preparation duties are intended to be reduced owing to less visual inspection requirements due to automation of testing visible on the TMS.
- Train preparation requirements at Kangy Angy will be performed by RailConnect as a part of the maintenance contract. Train preparation at all other locations will be subject to time trials in accordance with the 2018 NSW Trains EA.

Yard departure will be as it is today with the driver responsible for all communications. The driver will make contact with the Yard controller (signaller/shunter) for authority to depart in accordance with OSPs, TWPs and General Instructions.

At Kangy Angy train crew facilities will be available at the Handover/handback point. Train crew will receive confirmation of train preparation at handback.

The driver will access the Certificate of Serviceability on their mobile device or the TMS to confirm the train is ready for service. The driver will contact the Fleet controller if there are any issues with the certificate.

Process 2 - Normal Operations

This process includes:

- Operate between stations
- Transpositions
- Customer Assistance
- Customer information
- Terminate and Stable trains
- Amalgamation and division
- Changing ends
- Crew changeover
- Empty car running
- Stable/handback at Kangy Angy
- Crew sign off

Summary of new operating model

The driver will:

- Work the train with the Customer Service Guard to the yard and conduct fault finding and stabling procedures. The Customer Service Guard will conduct final over carry checks in the yard.
- Perform amalgamation and division activities form the relevant amalgamation cab.
- Perform division activities from the relevant division cab however the train will not need to be moved to achieve division.
- Conduct amalgamation and division activities under the authority of the yard controller.
- Handover to RailConnect at Kangy Angy.

Customer Service Guard will:

- Respond to help point inquiries (PI) as the first point of contact.
- Receive additional information from the NSCC for regarding customer inquiries and digital messaging.
- Engage with customers face to face at platforms and train saloons while underway as some tasks are now automated or enabled by mobile device.
- Support on-train announcements in circumstances where additional customer information is required.
- Work with station staff to carry out termination activities and over carry checks at the terminating locations. Where a lookout is available, carriage doors can be locked as the checks are completed.
- Accompany the driver to yard and conduct final over carry checks.

Train Crew will:

- Receive updates to the stopping pattern via the TMS when logged and the guard will also be able to see the updates on the PCI.
- Changing ends will operate in a similar fashion as today.

Key Changes to Current Operations

- A Customer Service Guard will accompany all trains as today
- The Customer Service Guard will provide face to face customer service between stations.
- The Customer Service Guard will need to have situational awareness of where they are in the train in order to assist customers.
- The Customer Service Guard will position themselves in a non leading cab prior to arrival at a platform in order to better facilitate boarding assistance if and when required and to enhance train operations.
- The Customer Service Guard will position themselves at the crew workstation prior to departure from the platform, to view the CCTV monitors and to provide the Driver with an 'alright' indication.

Description

The normal operation of the train will be similar to that of the OSCAR process for the driver, the Customer Service Guard engages with customers face to face at platforms and train saloons while underway. These opportunities are possible due to automation of tasks, the NSCC or mobile device applications.

The train systems will also provide enhanced visual and audible messaging to customers during the journey. The Customer Service Guard may have fewer safe working responsibilities between stations e.g they may not be required to be part of the passing signals at stop or other safe working procedures unless directed by the driver. Any changes to existing safe working duties of the Customer Service Guard will be dependent on and reviewed following the successful implementation of new technologies (e.g ATP etc.) throughout the rail network.

The Customer Service Guard will have a Portable Crew Interface (PCI) with functionality to view CCTV, and also communicate with the driver or the NSCC while out of the crew cab. The PCI will also notify the Customer Service Guard when passenger intercom calls require attention.

Transpositions will be sent to the train as soon as the Train Controller creates an update in the Electronic Graph after which it will be automatically transmitted to the train. The driver will receive a transposition alert via the DTRS to advise there is a transposition for their service which they will acknowledge on the TMS.

Drivers will acknowledge transpositions at a station while stationary by acknowledging the message on the TMS. The Customer Service Guard will also receive the updated information via the TMS and PCI. The driver and Customer Service Guard will consult each other regarding the changes. The TMS will indicate a unique transposition number for the crew's records. Once the transposition has been acknowledged by the driver the customer announcements will be updated and automatically played to advise customers of the changes to the stopping pattern of the service. The train crew will not be required to perform manual updates or adjustments in the TMS.

The onboard train systems will play automated pre-programmed audio and/or visual announcements to customers e.g. station information. The NSCC can also trigger the train to play pre-programmed audio and/or visual announcements from a library or make adhoc announcements on the train. The Customer Service Guard will be first responder for Passenger Intercom inquiries however; these may be allowed to go through to the NSCC for their dealing.

The Customer Service Guard will provide face to face customer information or where required make announcements using the on-train communication system. To ensure NSW Trains complies with DSAPT requirements, manual announcements will only be made in degraded situations or where no programmed DVA announcements are available.

Customers will be able to use the Help Point (PI) to contact the Customer Service Guard in the first instance, or the NSCC in an emergency, with the driver having the ability to listen in or mute as they prefer. If there is information applicable to the operation of the train, the train crew can join the call in conference. The NSCC will ensure the train crew are advised of any issues relevant to the operation of the train or customer needs.

Amalgamation and division of trains will be carried out at platforms and in stabling yards. Train communications systems will automatically indicate the proposed operation to customers (on approach and arrival) and the TMS will support the train crew to efficiently communicate the details during the process.

A second person will not be required to amalgamate or divide a train at a platform as the train is designed to support single person operation however: supporting roles (Customer Service Guards and Station staff) to further communicate directly to customers and manage the PTI. Within a yard the train will also be able to be divided or amalgamated by a single person under authority of the yard controller.

Changing ends will essentially remain the same. Passenger body side doors will automatically re-close after they are opened by customers to ensure climate in the carriage is maintained provided the driver releases the doors on arrival.

The Customer Service Guard and station staff will carry out terminating check at the final platform of revenue service in accordance with OSP 26. The Customer Service Guard will

accompany the driver into the yard where they will conduct a final over carry check. The driver will carry out fault finding and stabling procedures. Time trials for this process will be subject to time trials in accordance with the 2018 NSW Trains EA.

Process 3 – Station Operations

These processes will cover the following scenarios:

- Arrive at station
- Manage platform overshoots
- Perform station activities
- Provide boarding assistance
- Dispatch train

Summary of new operating model

For the driver:

- Release/open the doors as appropriate on arrival at platforms
- Driver may, by observation, advise the Customer Service Guard if boarding assistance is or maybe required.

For the Customer Service Guard:

- The Customer Service Guard will ensure they are in a crew cab prior to arrival and during departure.
- The external body side cameras will activate 300m from the platform. On approach, the Customer Service Guard will monitor these camera images with the cameras in the forward facing position.
- The Customer Service Guard opens the crew cab door on arrival and scans the platform.
- The Customer Service Guard will remain at the crew cab door to observe the PTI and door closing process.
- The Customer Service Guard will then indicate to the driver they are in position to view the CCTV screen and be responsible for monitoring the PTI once the driver has closed the train doors and during departure.
- The Customer Service Guard may stop the train via bell signal or emergency brake application if required.

For both:

- Stopping position will change to ensure the drivers cab is on the platform.
- Boarding assistance hierarchy will be Station staff, Customer Service Guard (where station staff are unable to assist). The driver may provide assistance in exceptional circumstances. The Customer Service Guard will enter or acknowledge boarding assistance details to the TMS when a passenger is boarded or alighted.
- The NSCC will administer boarding assistance requests with alerts to the train crew using icons (and PCI for the Customer Service Guard) as a reminder to the crew.

- The Customer Service Guard opens the crew cab door on arrival and scans the platform.
- The platform train interface will be managed by:
    - The driver using the CCTV prior to closing the doors
    - The driver closing the customer doors and conducting a final CCTV check
    - The driver focussing on the authority to depart (signals)
    - The Customer Service Guard will be responsible for monitoring the PTI once the driver has closed the doors.
    - Station staff may support the dispatch procedure using flags from a position to be seen by the Customer Service Guard.
    - The Customer Service Guard will support the driver by viewing the platform from the open crew cab door prior to departure and CCTV from within the cab once the train doors are closed. The Customer Service Guard may stop the train via bell signal if required.

Key Changes to Current Operations

- The driver will release/open the doors as appropriate on arrival at the platform
- Boarding assistance hierarchy will be Station staff, Customer Service Guard (where station staff may be unable to assist). The driver may provide assistance in exceptional circumstances during which Suspended mode will be utilised.
- The NSCC will administer boarding assistance requests with alerts to the train crew using icons (and PCI for the Customer Service Guard) as a reminder to the crew.
- The external body side cameras will activate 300m from the platform. On approach, the Customer Service Guard may monitor these camera images with the cameras in the forward facing position.
- The Customer Service Guard will scan the platform before and during the door closing process.
- The Customer Service Guard will communicate to the driver via bell signals if they leave the train during station operations.
- The Customer Service Guard will ensure they are in the crew cab prior to arrival and during departure.
- The platform train interface will be managed by:
    - The driver using the CCTV prior to closing the doors
    - The driver will close the customer doors and conduct a final CCTV check
    - The driver will focus on the authority to depart (signals)
    - The Customer Service Guard will be responsible for monitoring the PTI once the driver has closed the doors.
    - Station staff may support the dispatch procedure using flags from a position to be seen by the Customer Service Guard.

- The Customer Service Guard will support the driver by viewing the platform from the open crew cab door prior to departure and CCTV from within the cab once the train doors are closed. The Customer Service Guard may stop the train via bell signal if required.

Description

Customer Service Guards will be required to travel in the middle of the train, in the front of the non leading consist other then on north services which stop at platforms shorter than six cars when they will travel in the leading consist. This will assist the Customer Service Guard in maintaining customer focus.

The drivers cab will always stop on the platform to reduce variations of stopping location and to standardise customer messaging.

Drivers will manage train arrival to the platform as they currently do. If the train overshoots the platform or the platform is shorter than the train, ASDO will prevent the opening of doors that are not on the platform. When an overshoot occurs, the Customer Service Guard will make manual announcements. The train will not set back unless there are exceptional circumstances and is a network restriction (in many cases the train will exceed the platform length). It is deemed more practical for the NSCC to arrange alternate transport rather than delay the network.

The driver will release customer doors on arrival at the platform reducing customer discomfort at low loading locations.

Customers requiring boarding assistance will be attended to by station staff or by the Customer Service Guard if station staff are unavailable. The driver may provide assistance in exceptional circumstances during which Suspended mode will be utilised. The NIF will also have on-train boarding ramps in the cab to expedite crew response times. The NSCC will handle boarding assistance request updates from the train crew.

The Customer Service Guard will assess from the boarding app or the TMS if there are customers requiring assistance prior to the arrival of the train. The Customer Service Guard will advise the driver via bell code if they leave the train to assist customers and on their return.

It is intended that station staff will have access to the boarding assistance application to enable them to establish and close boarding assistance requests which will include station staff at suburban stations.

The despatch procedure will be carried out by the driver with the support of the Customer Service Guard. This will involve checks of the CCTV prior to and during the door closing process. The driver will then focus on the signals and route ahead. The Customer Service Guard will monitor the CCTV once the doors are closed, alert the driver to any hazard

and/or stop the driver if necessary. The drivers CCTV monitor will go blank once power is taken. Station staff may support the dispatch procedure by using flags in a location that can be seen by the Customer Service Guard.

Repeaters duties are no longer required as CCTV will enable the crew to view the entire length of the train.

Process 4 –Degraded Operations

Degraded scenarios and processes include:

- Controlled detrainment
- Incapacitated driver
- Internal Emergency Door Release (IEDR)
- Network failure
- Signal Passed at Danger (SPAD)
- Train faults
- Implement train protection

Summary of new operating model

For Drivers

- The driver will be responsible for the rectification of faults but may delegate to the Customer Service Guard
- The driver will follow "fault guides" and escalate to the OIM procedures if necessary. The driver will then escalate to the Fleet controller if other attempts are ineffective.
- The logging of faults can be done verbally via the DTRS to the Fleet controller unless the driver has the time to enter it into the mobile app.
- The Fleet controller will support the driver with real time assistance on faults and procedures and will have direct access to the RailConnect help desk.
- Detrainment will take place only when support arrives on site except in an emergency detrainment situation.
- The IEDR will become the responsibility of the driver however the Customer Service Guard may be directed to reset the affected cover by the driver. The Customer Service Guard may also be required to override the IEDR when necessary, or at the direction of the driver or NSCC.
- The driver will be checked for fitness to continue following an incident by the NSCC shift manager who will use a check list to assess the driver.

For the Customer Service Guard

- The Customer Service Guard will assist to remedy faults under the direction of the driver including door faults.
- If the driver doesn't have time they may instruct the Customer Service Guard to log faults via the mobile app.
- The Customer Service Guard will act as a first responder and will maintain First Aid qualifications.
- The Customer Service Guard will assist the driver and IRC during controlled detrainment.

- The Customer Service Guard will assist the driver to monitor the IEDR.
- Following a SPAD the Customer Service Guard may assess and accompany the driver if necessary.
- The Customer Service Guard will note the location of all mobility impaired passengers and report to NSCC or emergency services if required.
- The Customer Service Guard will be trained in, and have the ability to use DTRS as required.

For both

- Checklists and OIM procedures will enhance support for the train crew in degraded scenarios via their mobile device
- Train crew will have access to the PCI so they can interact with the train whilst away from the cab.

Key Changes to Current Operations

- In a range of functions, while the driver will be responsible for train operations the Customer Service Guard will be available to assist the driver through delegation.
- A driver may override IEDR or the use of suspended mode will override it for a period of 30 minutes which is in line with the current timeline if both crew leave the train.
- Driver incapacitated – in the event of a DSS escalation, the NSCC will be notified that the train is may be in distress and will check on the welfare of the driver. The Customer Service Guard will be available to assist the driver if required.

Description

The detrainment process requires support to arrive before an evacuation begins except in the case of an emergency requiring immediate evacuation. This support may be Sydney Trains Incident first responder, emergency services, station staff or other NSW trains resources where appropriate.

The driver's safety systems on the NIF are designed to stop the train in the event of driver incapacitation much the same as current rolling stock. On the NIF these systems work in a more autonomous way to ensure that the failure of one system does not require the bypass of multiple systems or requiring a second person to operate a bypass switch.

In the event of an incident the NSCC shift manager will conduct a welfare check on the driver to ensure fitness to continue. The NSCC shift manager will receive training and use a checklist to assess the driver.

In the event of an incapacitated driver the train will automatically stop with the activation of the DSS and escalate a warning message to the signaller and the NSCC shift manager.

The signaller will protect the train if necessary and notify the Train Service Delivery Manager. The following process will see the incident recorded in the Rail Incident Management system. The NSCC will then follow a process to check on the driver's welfare which may include the use of the in-cab camera.

In the event that the Customer Service Guard is incapacitated the current process will remain.

IEDR management is the driver's responsibility however; The Customer Service Guard may override the IEDR from a drivers cab if the driver does not or at the direction of the driver. If the IEDR is activated a critical text message will be sent to the Signaller and NSCC.

In the event of a SPAD, the driver will contact the signaller in accordance with the current process however; the NSCC may undertake a welfare check and the Customer Service Guard may attend the drivers cab.

Train faults will be managed similarly to today with the key difference being the driver is accountable for the rectification and reporting of all train faults but they may delegate tasks to the Customer Service Guard who would then execute the required checklist and report to the driver or report faults to the Fleet controller at the driver's direction.

If the train crew cannot rectify a fault using the TMS fault hints or the OIM checklists; they will have access to the NSCC Fleet controller via the DTRS. The Fleet Controller is a new role which will balance train sets, manage operational issues with regards to availability of sets and manage fault reporting from drivers. The role will have access to a RailConnect employee called the Fleet Operations Support Officer (FOSO). The Fleet Controller will source technical information from the FOSO to support train crew in rectifying faults referencing the relevant procedure where required.

Train protection will follow the relevant network rules however; the primary form of train protection is communication with the signaller via the DTRS.

When degraded scenarios occur the NSCC will use the automated systems to push delay messages to the train for customer announcements consistent with DSAPT compliant messaging. In addition the Customer Service Guard will make announcements on train for specific issues requiring customer communications.

Process 5 – Emergencies

The emergency scenarios cover:

- Collision & Evacuation
- Fatality & Near Miss
- Fire
- Uncontrolled detrainment

Summary of impact new operating model:

For drivers:

- The NIF will have technology that will assist the driver with situational awareness and will automatically advise the signaller and the NSCC of events on the train such as fire, driver incapacitation and IEDR activation. Where 4G is available on the train the NSCC will also have access to CCTV cameras in the passenger areas to assist and coordinate a response.

For the Customer Service Guard:

- The Customer Service Guard will assist customers and will act under the direction of the driver.
- The Customer Service Guard may assist the driver to monitor the IEDR.
- Where the driver is incapacitated and the IRC is unavailable, the Customer Service Guard may evacuate passengers in accordance with OSP 11.
- The Customer Service Guard will retain First Aid qualifications.
- The Customer Service Guard will retain Fire Fighting qualifications.

For both:

- When away from the train the crew will have a PCI enabling them to interact with the NSCC and access the TMS.

Key Changes to Current Operations

- The driver will be responsible for the train operations and the Customer Service Guard will be available on all trains to assist the driver as directed.
- In the event of driver incapacitation the DSS will notify the signaller and the NSCC that the driver may be in distress. The signaller and the NSCC may contact the driver to check on their welfare.
- The Customer Service Guard will support the driver in managing all on board emergency incidents. Skill sets and competencies will be maintained to ensure safety remains the first priority.

Description

The NIF will have proposed technological features to ensure more reliable, real time information and the establishment of the NSCC is proposed to ensure better inter-agency collaboration and communication in order to respond quickly and effectively in emergencies. New incident management processes have been developed to assist and secure customers, train crew and the train.

The proposed incident management process is a comprehensive process that can deal with multiple types and combinations of incidents. A controlled detrainment/evacuation may occur at the incident site, a specific location or at a station.

The processes consider various methods of alerting including customer calls to 000, help point calls to the Customer Service Guard or NSCC and emergency calls via the DTRS and train generated Critical Text Messages (CTM). The CTM will be generated following a DSS activation that has no response to cancel from the driver, level 2 fire alarms or the passenger doors are opened via the IEDR system.

The NSCC can use the automated system to push messaging to the train and the train is designed to enable people to self egress from hazards to safe locations such as other carriages or away from the train if this becomes necessary. The train is designed to enable passengers to operate end of train detrainment systems to move between sets or to the track via the ramp. The train crew will support this through manual announcements to instruct passengers to move away from danger or how to evacuate safely as can the NSCC.

In the event of a person struck by train/fatality the Customer Service Guard will be available on all trains to assist the driver if required. As of today, the train crew will only seek to assist the person if they are capable of doing so. NSW trains will dispatch resources to manage the site and assist the train crew.

Smoke and fire on the NIF will indicate the level of response required by the train crew. Low level alerts will give a visual indication to the driver. A higher level of smoke will trigger an alarm with visual and audible annunciation in the cab. This higher level alarm will also trigger a DTRS message to be generated to the signaller and NSCC.

Where controlled evacuation is required the driver may open the train doors using ASDO bypass or customers may use the IEDR. In the event that IEDR is activated a CTM will be generated by the train and sent to the signaller who will arrange protection for the train. Train crew may arrange additional protection via applying a track short circuiting clip.

These scenarios are subject to a "manage incident process" which are a general set of procedures that address many scenarios and give decision making roles the flexibility to make suitable decisions and dispatch the most suitable staff to assist. The Sydney Trains Rail Infrastructure Management (RIM) will coordinate all rail traffic movements. When an incident is recorded in the Rail emergency Management (REM) system a rail incident type is recorded and a Network Incident Manager takes over the management of the incident. NSW Trains will determine the necessary responses for each event/incident.

Process 6 - Customer Security

The customer security scenarios and processes cover:

- Anti-social behaviour/Medical emergency
- Manage customer PI calls

Summary of impact of new operating model:

For drivers:

- NSCC will provide information to help drivers make operational decisions.
- Passengers in the vestibule area may press a Help Point (PI) button which will initiate and intercom call to the Customer Service Guard or the NSCC.
- The driver may listen to the call in the cab or mute if required.

For the Customer Service Guard:

- Passengers in the vestibule area may press a Help Point (PI) button which will initiate and intercom call to the Customer Service Guard or default to the NSCC.
- The Customer Service Guard may also overhear the call if they are in the cab.
- When the Customer Service Guard is away from the crew cab they will also be able to receive a notification on the mobile device and be able to respond to the PI using the PCI application.
- The Customer Service Guard will identify anti-social behaviour and render assistance when it is safe to do so or arrange for assistance to meet the train at a suitable location.
- The Customer Service Guard will be designated as an "Authorised Officer" to enhance customer security by their presence on all trains.

For both:

- The train crew will have access to the PCI so they can interact with the train while away from the cab.
- The train crew will need to advise the signaller of the need for emergency services and the ROC will arrange for their attendance. The NSCC will provide oversight and assistance from the ROC and will utilise on train communications to push messaging to the train. The Customer Service Guard will make additional announcements on train for issues requiring passenger communications.

Key changes to previous operating model

- The Customer Service Guard will be designated as an "Authorised Officer" to enhance customer security by their presence on all trains.

Description

The Incident Management process will be used to manage medical emergencies and anti-social behaviour. As currently occurs, the Customer Service Guard will render assistance when it safe to do so or arrange for assistance to meet the train at a suitable location. The train crew will need to advise the signaller for emergency services which the ROC will arrange for their attendance.

The NSCC will provide oversight and assistance via the ROC and may use the communications system to push messaging to the train. The Customer Service Guard will make additional announcements on train for issues requiring passenger communications.

Passengers in the vestibule area may press a Help Point (PI) button which will initiate and intercom call to the Customer Service Guard or the NSCC. PI calls that are allowed to go to the NSCC can be overheard by the train crew. This mechanism provides a means for passengers to obtain information or request assistance if required.

Summary of RTBU Operating Model

Whereas the RTBU remains opposed to certain elements of the NSW Trains proposed operating model, namely on safety grounds however; it is obvious that the RTBU's approach in its proposed operating model expresses a willingness to change current working methods. These safety grounds centre on proposed technologies that are so far un-validated as fit for purpose however; the RTBU has embraced these concepts within its proposed operating model subject to full operational testing and validation for which it would be a willing participant.

It is the view of the RTBU that the role of Customer Service Guard should be exactly that, providing customer service both on and off the train utilising all technologies available. The RTBU remains convinced that the best person to deal with customer related enquiries or issues should be the person "at the front line" i.e. on the train, to provide face to face or firsthand information with a sound operational understanding and knowledge.

It is considered that the RTBU's proposed operating model offers a higher customer focused role and security presence (utilising proposed technologies such as CCTV, PCI etc) to ensure customers safety and reassurance by undertaking the requested train roving operations and adoption of lawful Authorised Officer Status.

Whereas the RTBU is of the view that the implementation of traction interlocking to crew compartment doors creates a less safe system of platform operations then the current longstanding procedures, it has worked with the train design & NSW Trains to enhance these procedures in the interests of members and passengers safety.

The RTBU is also of the view that based on the above, its proposed operating model offers enhanced safety procedures for train arrival and the safety critical dispatch process, once again utilising proposed technology assets on the train.

In recognition of the previous commitment to investigate the "Single Manning" operations of Regional train services, the RTBU's proposed operating model seeks to align the tasks and responsibilities of the train crew with a reasonable and practical workload for each yet recognising the driver is in overall charge of train operations and associated crew duties.

This model is considered to have applied a more equitable and practical distribution of the work by delegation of duties to the Customer Service Guard where the driver may otherwise have safety critical tasks to perform, namely the safe operation of the train. Whereas this proposal does not remove the drivers overall responsibilities it is considered to offer improvements in the driver's workload (and therefore longevity) as contained in the NSW Trains proposed operating model.

All key changes to the procedures for this role will be subject to further consultation with the RTBU.

RTBU June 2019

ATTACHMENT F. STATIC VIEW 26 SEPT 2020.

Static view of D-set cab at Everleigh Maintenance Centre 26 September2020.

1. The train was not yet tested and commissioned.
2. The train was being used by trainers to review the training procedures.
3. Platform camera monitor displayed highly variable colours saturation, brightness and contrast. In bright sunlight the view was very contrasty with detail lost to pure white and pure black.
4. The view on the monitor is of the leading edge camera facing backwards. But more limited than an external mirror or a view from a person standing in the cab door or on the platform.
5. By tapping on an image of the platform the image enlarged.
6. There was a good view of the platform gap when the doors were closed.
7. There was no view of the saloon doors. The doors are indiscernible when the doors are closed.
8. With the doors open the side of the train was obscured. There is a limited view of the platform.
9. The camera is mounted at head height from the platform at either end of the saloon car with both cameras facing each other.
10. Some platform gap lighting is provided at the saloon doors by the external step lights. This is patchy localised around the steps and does not cover the whole width of the door evenly.
11. The drivers and guards workstations are combined and the guard now rides the train facing backwards.
12. Ergonomics for both roles appears unfavourable with reaching required to achieve the required tasks.
13. Saloon doors have sensitive edges that work on the width of a single finger. The force is very gentle and the reaction time to an obstruction rapid. I was advised that the doors cannot be forced and that after a number of attempts at closing the doors will return to the open position and remain there until attend by train crew.
14. Substantial pillars at the front of the train it was reported provided higher crash worthiness than a V-Set.
15. Visibility from the cab seems restrictive but adequate. I was advised that the view was better than the OSCAR train.
16. There is a forward facing camera and a camera on the train crew in the cab.
17. There is a chime in the crew cab when the saloon doors are about to open.
18. It was reported that the same warning and annunciation as on the OSCAR train is provided when doors are opening and closing. This was not available for demonstration on the train viewed.

ATTACHMENT G. SIMULATOR VIEW 14 OCT 2020.

D-set cab training simulator at Everleigh Maintenance Centre 14 October 2020.

1. The simulator is trailer mounted portable with self contained power.
2. The training pilot was completed last week and the feedback from this is not yet available.
3. The trainer was unaware of any safety reviews of the training material or what approvals have been achieved at this stage.
4. The cab desk appeared the same but the cab was truncated version to fit on the trailer. The circuit brakers were in the next room rather than on the bulkhead.
5. The trainer provided an over view of the trainers work stations with options for simulation.
6. Training is centred upon conversion training from the OSCar train sets.
7. Train performance was reported to be very similar.
8. Desk was reported to be very similar. Seat is harder and with less adjustments and the foot deadman was reported to be at a steeper angle and reported to be of some comment from trainees. Foot deadman did not appear to go down as low as V-Set.
9. There had been an injury to a test driver and so I was instructed on the correct procedure for adjusting the drivers seat for my safety.
10. There is no jockey seat for a test driver just as on the delivered train.
11. Trainer driver advised it would be difficult to supervise a trainee without a view of the TOM and ATP screen from the provided seating.
12. The extreme positions of the seating were demonstrated.
13. The standing driving position was demonstrated.
14. A night driving simulation was demonstrated. Trainer agreed glare and brightness were more favourable than he had experienced test driving D-Set.
15. CCTV and Door functions were demonstrated on the CCTV monitor and the TOM.
16. I was advised the trainer did not have the MOS (Min. Operating Standards) yet and as such there was limited degraded mode training provided until this clarified.
17. The training delivery plan is 11 days driver training and 5 days CSG training.
18. The training does not include workload/attention management.
19. The train radio does not have a SIM card back up and does not work in dark territory. Drivers are instructed to use their mobile phones but only if the train is stationary.

ATTACHMENT H. MEETINGS ATTENDED.

a)	Opening meeting with RTBU Locomotive Division.	11 September
b)	Opening meeting with NSWT management.	17 September
c)	NIF D-Set Static View EMC sidings.	26 September
d)	Tram Driver meeting.	29 September
e)	NIF Test Crew HSR meeting.	7 October
f)	Ray Metcalfe meeting.	7 October
g)	Access to documents provided.	8 October
h)	Access to documents provided.	9 October
i)	TfNSW & NSWT Safety Assurance managers & GP.	9 October
j)	WHS coordinator of consultation.	13 October
k)	Access to documents provided.	13 October
l)	NIF Simulator View	14 October
m)	Access to documents provided.	15 October
n)	NIF NSWT HSR Station rep.	15 October
o)	NIF NSWT HSR Driver & Guards rep's	16 October
p)	Closing meeting with NSWT management.	16 October
q)	NIF D-Set Dynamic view of NIF train	27 October

ATTACHMENT I. D-SET DYNAMIC VIEW

D-Set Dynamic View commenced at Central Station at 21:20 hours on 27 October travelling to Gosford Station arriving at 23:20 hours.

1. NIF-test 000893. Eveleigh to Newcastle return. 19:55 to 05:00.
2. Special Train Notice, STN 2569-2020 & TOC Waiver – TW:203-972.
3. Escorted by NSWT Operational Readiness to Plat 7.
4. 4 Car Set.
5. Inducted by Train Captain.
6. Advised ASDO isolated.
7. Taken to rear cabin of train through saloons to meet CSG.
8. Shown toilet, internal saloon cameras, and inter-car doors.
9. Departed Central Country Platform 7, at 21:30.
10. Advised CCTV images representative of images on trains tested.
11. Observed CSG workstation in dark with cab light out with and without CCTV screens on. No observable reflection on cab windscreen.
12. Observed headlights and high beam on and off. Ditch lights not available with drivers cab cut in.
13. Observed Guards location light flashing on the exterior.
14. Operated door window.
15. Contrast and brightness adjustments demonstrated to me.
16. Operated CCTV screen. Zoom.
17. CSG observed seat was uncomfortable compared to V-Set.
18. Observed no emergency button only a help button in vestibule.
19. Arrived Strathfield 21:42: Observed platform viewing angle from 4 cameras facing the rear. Observed step lights on CCTV image. Observed platform lighting and visibility. Observed poor visibility in CCTV images compared to looking directly out of cabin door at platform gap.
20. Delayed Pennant Hills between 22:00 and 22:10.
21. Mt Colah 22:31.
22. Arrived Hawkesbury River 22:54: 5 off operations of PSBD and CSG Cab door completed.
23. Observed when CSG cab door open PSBD camera obscured.
24. Observed CCTV high contrast compared to direct visual check particularly in areas of poor lighting.
25. Observed large platform step and gap with track appearing to be canted away from platform and train not level at this location.
26. Tascott 23:16.
27. Arrived Gosford 23:21: detrained.