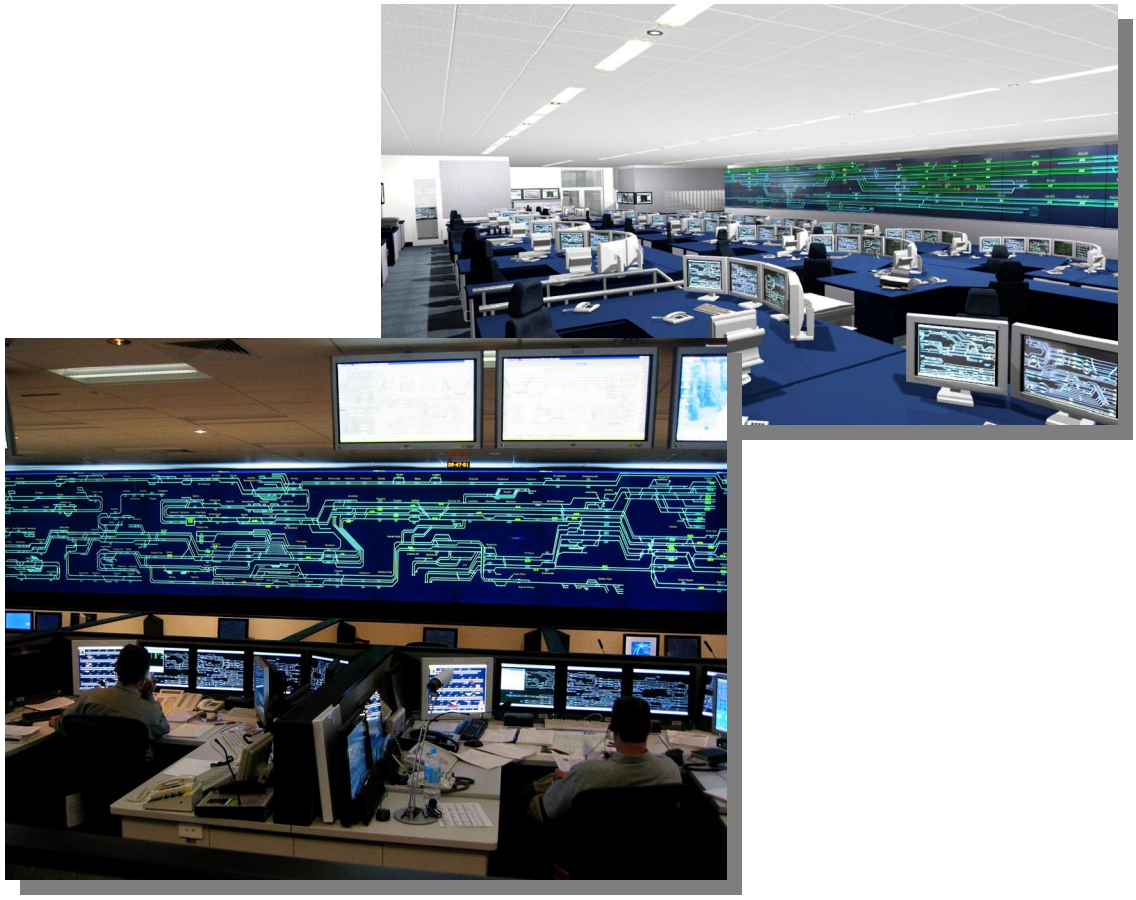
Caravel
LEADING THE WAY IN PROJECTS

NSW State Rail Authority

(now known as RailCorp)

Rail Management Centre



A CASE STUDY

BACKGROUND

Rail Corporation NSW (RailCorp, previously NSW State Rail Authority) is responsible for the end-to-end delivery of safe and reliable rail services to the people of NSW.

RailCorp is the largest provider of public transport services to the people of NSW, operating, maintaining and developing a vital part of our State infrastructure. Their fleet comprises 1,650 carriages, servicing 307 stations across 1,595 km of mainline track, 888 bridges and 46 km of tunnels.

The Rail Management Centre (RMC) was a grand vision on the part of RailCorp to see their existing train control functions brought together under a single centre, offering coordinated, effective, responsive and dynamic management of the end-to-end passenger journey. This was an ambitious initiative for the organisation, especially when prior to this project, the network, fleet and passenger services were co-ordinated across a number of disparately located train control groups. Despite peopleôs best efforts, the result was that incidents were often mismanaged with major knock-on effects to the fleet, network, station and passengers alike.

The Caravel Group was engaged as the delivery partner for the RMC project; the primary aim of which was to bring the various train control groups together under one roof and to establish a state-of-the-art facility. That facility would provide a communications, command and control management structure under which the various groups would operate. To minimise overall project risk, IT&T systems were simply transitioned to the RMC from their existing locations, only being refreshed or updated where necessary.

PROJECT OVERVIEW

The purpose of the project was to co-locate a number of separate train control functional groups into one control centre ï the Rail Management Centre (RMC). These groups were:

- Train Control
- Mechanical Control (Defects)
- Security Control
- Passenger Information
- Stations Operations
- Train Crewing; and
- Train Infrastructure (RIC)

The scope did not include signal control groups.

The expectation was that by co-locating these key groups in one open-plan facility, the existing issues associated with a lack of communication and visibility would be largely addressed. From a change management perspective, the co-location initiative was aimed at breaking down barriers, opening communication channels and establishing a centralised command, control and communication structure. This was to be further aided through the provision of an overview screen depicting the complete network and enabling functional groups to have a clearer ópictureôof what was happening in real time.

The scope of the RMC project did not encompass any significant process flow integration and improvements between the separate groups ï this was considered to be a ófuture improvementô Rather, the focus was on optimising and enhancing the existing capability and fine tuning existing processes to ensure that where interfaces and connections should occur, they did.

From a complexity perspective, this project posed a significant risk to RailCorp as it was to be the control centre for the entire network, had complex systems & technology, operated in a difficult industrial relations environment, and encompassed many commercial matters which needed to be addressed. This was further compounded by the tight project schedule and the high profile nature of the project.

The completion of the RMC project would ensure that the relevant recommendations of the Glenbrook Enquiry (McInerney) report, specifically 39i and 39ii, were fully implemented.

Stakeholders

This project had a number of stakeholders, each with differing requirements and expectations:

- Private and corporate users of the network
- State Govt and the taxpayer
- Customers (passengers) of the train network
- NSW Department of Transport
- RailCorp and associated corporate entities
- RailCorp staff and their representing unions

Project benefits

The RMC project would provide a number of key benefits to the organisation, including:

- Improved oversight of the network and better access to information for train controllers, thereby reducing the risk of ñerrorò
- Improved communication, particularly the timely release of pertinent information during incidents.
- Improved visibility with respect to the role each functional group played and the ability for faster operational recovery.
- An embedded culture of teamwork.
- Better management of customer needs and better support of stations.
- Enhancement of service to all stakeholders, with responsiveness and dynamic management of the train journey becoming a central focus.
- Pro-active rather than reactive management of communication and service rectification during peak periods or incident response.
- A centralised command, control and communication structure including alignment of internal reporting structures for operational groups within the RMC and refinement of processes and procedures to support and optimise the structure.
- A platform for enhancement and optimisation for other roles within the RMC.

PROJECT SCOPE

Clarifying, containing and locking down the project scope were critical initial steps for the Caravel Group. As the delivery partners, Caravel knew that ósscope creepôwould be the undoing of this project. As such, the Project Director invested heavily in ensuring that the organisation was clear on the scope of the project and what could be achieved within the agreed timeframe, given the complex environment within which the project was to deliver.

In short, the projectôs scope was to deliver a new state-of-the-art facility with like-for-like functionality and no significant material change to systems, with the exception of the large-format overview screen system.

While focus was on the main control room and the overview screen (discussed later), the Rail Management Centre comprised a number of areas that supported the operation of the main control room, as well as meeting areas and staff amenities.

Also in scope for this complex change initiative were the extensive negotiations and user consultations that went hand-in-hand with achieving the co-location of the functional groups. A major effort for the program was ensuring that the relevant unions and their representatives were engaged, consulted with and that where practicable, agreement in principle was reached on the major factors affecting personnel.

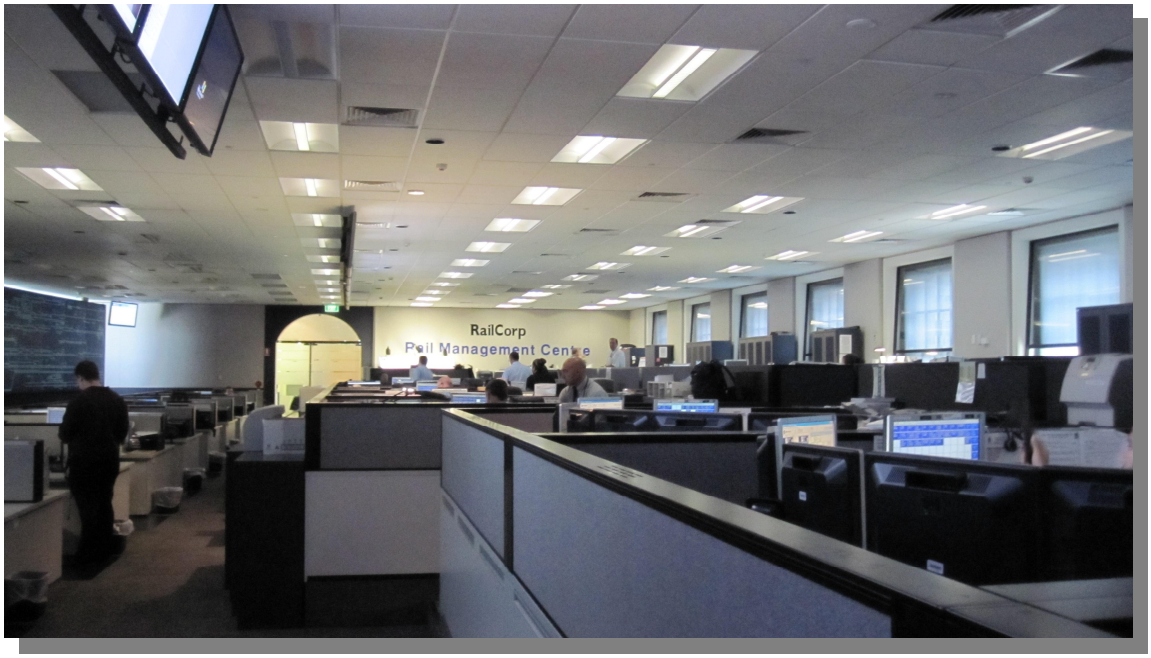
To ensure that all areas of the project were captured and managed, Caravel broke the project into 30 separate workstreams. Each of these projects were managed in their own right and of course were considered as components in the overall program of work.

The scope detailed on the following pages will give a clearer picture of the complexity of the project and the challenges that faced Caravel in delivering this project.

The facility

The RMC facility was custom designed to meet the unique requirements of the train control groups. This included specific consideration to factors such as:

- Acoustics and Lighting ï specifically acoustic and lighting treatment of the accommodation to meet appropriate standards for control room environments.
- Layout ï it was critical that the design took into consideration factors such as workplace dynamics, requirements for communication and information flows, supervision and political factors. The centre layout was agreed in consultation with the various stakeholders and through extensive engagement with the unions and their workplace representatives.



- Ergonomic Design ï including detailed design of customised workstations. These were to meet the unique requirements of Train Control and ensured that the environment was conducive to delivering optimal working conditions for the functional groups. Workstations were designed in consultation with Ergonomists and the workforce representatives.
- Amenities ï including lunchroom, locker facilities, bathrooms etc.

- Incident Management and Recovery capacity ï which was a specific RailCorp-designed ówar roomôaimed at catering for senior management requiring access to information and the centre during incident management and recovery.

The change management team worked in close consultation with the business stakeholders to ensure that the facility met their expectations and that clear build specifications existed. This process included extensive business, union and workplace consultation. The Change Managers ensured that at all stages engagement had occurred, that there was buy-in and ownership and that the affected users were communicated with and aware of the progress. Although this level of engagement and consultation was time-consuming and labour intensive, it proved to be essential in ensuring the successful transition of the work groups into the centre and ownership of the RMC by the employees once commissioned.

The success of the change program was undeniable to observers, who consistently commented on the level of pride and ownership that the employees had once the centre was commissioned and they had taken up residence. The success of the layout was further evidenced through the improved communication and relationship dynamics of the functional groups within the centre.

Information Technology & Telecommunications

The information technology and telecommunications scope for the project was essentially like-for-like transition with no material changes to the systems, except for the development of the large format overview display screen system.

The major complexity from an IT&T perspective on this project was the disjointed and archaic nature of some of the systems used by the operational groups. Over the years, a number of bespoke solutions had been developed for the Train Control group and these did not have backup or recovery plans in place. As such, the project had to work closely with RailCorp's technology group, various third parties, suppliers and other system integrators to ensure that during transition, the systems would be maintained and operational.

In order to achieve this the project undertook a number of desktop trials. These were used to rehearse the transition and ensure that the real-time operational conditions were maintainable and would not be compromised or jeopardised in any way. The trial process demonstrated the robustness of the systems and enabled the project to plan and cater for any potential risks or ógrey areasô

New Job Roles

The fundamental purpose of the project was to achieve co-location of the different operational functional groups within the Rail Management Centre. However, at a strategic level, there were also benefits to be obtained from integrating these functions to some extent, optimising work processes and embedding a single command, control and communication protocol. As such, the scope of the project did include the creation of several new positions (or refinement of existing positions). New position descriptions were created and appropriately skilled staff were recruited directly into these positions. The positions that were either refined and/or created were:

- Train Monitoring Officer
- Stations Interface
- Train Crew Interface
- Rail Infrastructure Interface.

The RMC project was responsible for the change management associated with developing and integrating these positions into the centre. As such the change team developed the new position descriptions, established clear reporting lines and documented the communication frameworks and desired position outcomes. The change team worked with the business groups to identify the relevant functions and ensure that the positions were created to enable optimal outcomes for the business.

Once the positions were established and approved by Human Resources, the RMC change team developed induction programs to induct these new positions into the Rail Management Centre and provide onï the-job training to ensure that the position holders understood their function, job role purpose and required outcomes. In particular, the project ensured that the communication and command elements of the centre were clearly defined and detailed with the position holders.

Workplace Consultation

Workplace consultation formed a prime component of the change program for the RMC project. RailCorp, through the RMC project team undertook an unprecedented level of workplace consultation with the major unions and their membership. The RMC change team worked closely with RailCorpôs industrial relations, human resources and operational group leadership. This ensured alignment of strategies and ensured that the project was successful in engaging with workplace representatives and able to achieve agreement in principle on all the individual factors affecting the end users, including layout, acoustics, ergonomic design of workstations, lighting, facilities and functionality.

The workplace consultation program undertaken by the RMC project team was comprehensive and proved to be extremely successful in achieving the desired result of successfully co-locating the functional groups responsible for the safe end-to-end passenger journey. Further, this level of consultation achieved the optimal result of delivering the design outcomes for the centre and the operational frameworks to position the centre for future success.

The Large Format Display System

The large format display system, also called the Overview Screen, was the single highest expenditure item of the RMC project.

At 26m long and 2m high, it could be confused as merely an oversized computer screen ï itô s not. The screen was, and is, pivotal to generating the benefits of the RMC envisaged right at the start of the project.

The screen – some specifications

The screen comprises 36 sub-panels.

Each sub-panel is 1.4m long x 1.1m high. The screen is configured as 18 panels long and 2 panels high.

The display

Each panel is built using high definition full video speed LCD technology. It is supported by the necessary computer and video technology to drive the system as a whole.

System uses

The large format display system has a number of uses with a direct impact on the effectiveness of the RMC operations, including:

- continuously displaying the location of all trains on the currently visible network via the Train Logistics System (?)
- facilitating the rapid and parallel dissemination of critical information to all parties in the RMC, thereby enabling proactive management. This also allows controllers to visualise and anticipate incident situations before they happen and put pre-emptive actions in place to avoid, or lessen the severity of an incident
- providing controllers with information in different formats ï ie: video clips of incident sites, security videos, train locations and the status of signals.

The system was built to support future enhancements of computer-based visibility systems.

The benefits

Put simply, increased visibility ï such as that enabled by the large format display system ï allowed Train Controllers to recognise and visualise problems before they happened and take pro-active/pre-emptive action to prevent incidents from occurring in the first place.

The system also allowed Train Control and the supporting functional groups to readily visualise solutions to incidents once they have happened, thereby preventing further knock-on effects and facilitating the rapid restoration of service.

Industry best practice

There are a number of industries ï such as utilities (electricity, water and telecommunications), banking and finance that make extensive use of control centres. RailCorpôs Rail Management Centre was considered industry, if not worldôs, best practice.

DELIVERING THE PROJECT

Working with the client – a collective effort

A key to the success of this project was bringing together expertise from both RailCorp and Caravel and ensuring all team members worked together in close partnership towards a common goal.

Caravel provided a team of highly skilled project professionals who worked alongside the RailCorp team to support the project delivery. In particular, Caravelôs project and change experts were critical in enabling the project to achieve its tight deadlines.

Transition

Caravelôs comprehensive transition management plan for the RMC project covered all foreseeable events and provided contingencies (such as termination of the process) for any unforeseeable events, if they arose. Barring any unforeseeable event or major equipment failure, Caravel allowed 38 days (5.5 weeks) for the transition phase of the project.

The commencement of the transition plan marked the conclusion of all testing associated with the delivery of the physical facilities and the beginning of the final readiness preparations for the testing of business operations within the RMC.

Given the complexity of the ótreal timeô environment, a full risk assessment was undertaken for the transition phase of the project. The plan covered both the lead up to the transition phase, as well as the transition phase itself and included scenarios such as the practical completion of physical facilities; testing; and preparation for systems and business operations.

As the transition plan included a contingency to terminate the process in the event of a major train event, approval for such an action was to be obtained through consultation and agreement with two senior project team leaders.

Resources

A number of resources were on-site throughout the transition process to minimise and/or treat any (perceived) risks and address issues as they arose. Key resources included:

- Users
- Project staff ï particularly the Change Manager
- On-site or rapid response infrastructure support and maintenance personnel
- Help desk staff

Help desk and support services

Initially, the RMC had its own priority help desk number. Help desk staff were domiciled on-site at the RMC to help them familiarise themselves with the environment, develop relationships with users in the centre and ensure a smooth operation.

Rapid response help desk support on a 24/7 basis was maintained for 2 months following the project, moving to 16/7 support from there-in.

Third party suppliers were on 24-hour notice, with critical systems support on-site during the transition phase.

Preparation for business operations

Preparation for business operations to be transitioned to the RMC was undertaken in conjunction with management, unions and users. Preparations included:

- delivery of personnel required for the RMC
- development and delivery of orientation briefings, detailed inductions, walk-throughs of various scenarios and other on-the-job training as needed for each function.
- confirmation from users that the RMC environment matched their existing environment (from a like-for-like systems perspective, including all visual aids and other tools required for them to perform their function).
- ensuring users participated in one or more business operations trial.

Preparation for systems operations

Preparations for the systems operations to be transitioned to the RMC included:

- documentation aligning the RMC systems operations processes and practices with help desk systems
- continued involvement of help desk staff
- established support and maintenance contracts with suppliers
- systems tested at three levels:
    - basic systems testing (end to end)
    - integrated systems testing (included stress testing)
    - user profile testing
- documentation handover to operations, including:
    - systems testing
    - as-built
    - systems operations management manuals

ACHIEVEMENTS

The RMC project provided some unique challenges to the project team. The project required expert planning and management at all stages to ensure success.

While much was gained during the project and key lessons learnt, there were a few standout achievements:

☑ **Centre up and running**
The RMC project was ambitious. Taking disparately located personnel and relocating them under one roof with a new management paradigm was never going to be an easy task.

The project required expert workplace consultation, timing and planning ï all of which Caravel as delivery partner achieved. We worked in partnership with RailCorp throughout the course of the project to benefit from the combined expertise of both groups and ensure that the project met its objectives and satisfied the needs of both the users and the stakeholders.

☑ **Project delivered under budget**
The RMC project was delivered *under budget* ï a key achievement for all clients.

☑ **Project delivered ahead of time**
Caravel has over 20 years experience managing and delivering complex projects. Over this time, Caravel team members have developed and refined new methodologies, to ensure that project resources ï human or otherwise ï are utilised effectively and efficiently.

Applying these methodologies and utilising tools such as e-P3MO enabled the delivery of the RMC project *ahead of time***.**

☑ **No downtime**
In most projects, relocation of hardware and switching systems over to a new location is achieved by taking the systems ógoffline ôfor a period of time to enable transfer, testing and trailing in the new location ï even for only a short period. However, with the RMC project, this was not an option due to the real-time operational environment that we were delivering.

To add to the level of complexity, all testing and trials were undertaken whilst still ógonline ô as the day-to-day running of the network could not be affected.

☑ **Transitioned in 'real time'**
Given the 24/7 nature of the rail environment, the various systems and personnel had to be trailed, tested and transitioned to the new centre in ógreal time ô

This was achieved through the development of a comprehensive transition management plan that provided timings for the transition of all systems and the physical relocation of equipment and staff. The plan included fallback positions/contingencies should they be required ï ultimately there were not.

CARAVEL'S METHODS & TOOLS

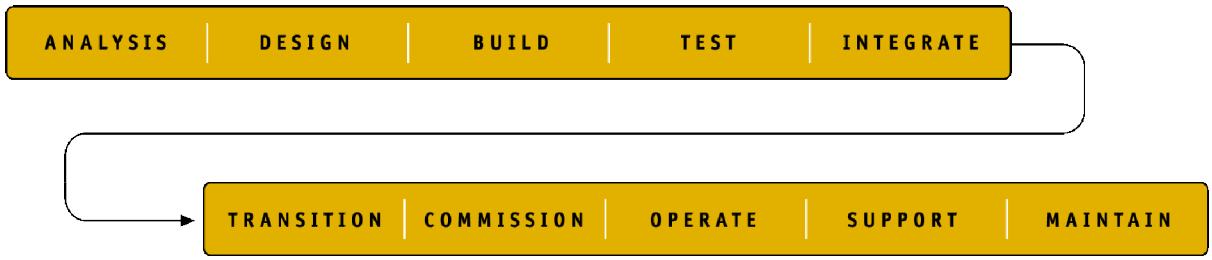
In order to contain and ensure visibility of the project risks, the Caravel Project Director relied upon various Caravel project control tools to enable successful delivery including:

Critical Chain Methodology

Due to the significant uncertainty in the program outcomes, Caravel applied the *Critical Chain Methodology*.

The Critical Chain method comes to the fore when dealing with the uncertainty that is inherent in task duration commonly associated with the human aspects of change.

Critical Chain addresses this problem by dividing work into natural workstreams, or "chains" whereby each step must be completed before progressing to the next step.



This approach also addresses the human behaviours that typically cost project time – such as building in time safety "buffers" when estimating how long a task may take; leaving tasks until the latest possible time to complete; putting off mundane tasks in favour of more interesting/easier ones – leaving the Project Manager in firm control and reducing the chance of time slippage.

e-P3MO toolkit

Caravel's core capability is the management of complex projects in complex environments. It is this expertise and understanding that highlighted the shortcomings of conventional PMOs and led us to develop an innovative solution called P3MO.

P3MO reflects the sophistication of modern management systems and delivers an effective organisational structure for the management of projects, whereas conventional PMOs only have access to simple tools for project activities such as status reporting, project planning and manual audits.

Caravel has since developed a toolkit that reflects the P3MO model – enterprise-P3MO (e-P3MO). Built "on top" of Caravel's knowledge management system, TKMS, e-P3MO integrates business and project outcomes and performance monitoring in a single package within an enterprise and provides the necessary management and visibility of the project, program and portfolio elements.

The e-P3MO architecture is based on ISO9001 compliant quality system processes. It can be adapted to any other quality system and will work with any mainstream project methodology.

Change implementation

It would be easy to look at the RMC project only from the perspective of logistics, IT and construction. However, a key factor to the success of the RMC project was ensuring that the various operational areas and the respective functional groups were ready for the new centre, business processes and operational framework.

The RMC project changed the way the operational functional groups ódid businessô These groups were transitioning from an environment where each area worked independently and largely in isolation with limited communication, to an open plan óall inôenvironment where all areas had access to information, and communication flows would necessitate interaction with other groups.

Given the fundamental cultural change that this project was going to have on the organisation, the ópeople-sideôwas likely to have a much higher impact than other aspects of the project such as ergonomics, design, layout or transitioning to the new centre.

During the project, significant consultation occurred to ensure all relevant parties ï staff, management and unions, were engaged and supportive of the changes and the new structure.

Safety management

Safety is paramount at RailCorp. Given the risks associated with the transition of staff, equipment and systems in real-time whilst maintaining services, it was imperative that Caravel complied with accepted standards and methodologies. The project achieved this by ensuring that there were no material changes to the safe working systems, protocols and practices and obtaining safety sign-off from RailCorpôs Safety Division. In addition, where changes were introduced with regard to the command, control and communication protocols, these were integrated into the existing environment with all affected documentation updated, processes mapped and employees inducted or trained on the changes as necessary. Safety sign off was also obtained on these changes, as well as sign off from other business stakeholders such as Human Resources, Industrial Relations and the respective business group managers.

From a risk management perspective, the project adhered to the AS/NZ ISO31000 and AS 4292 standards.