



Caravel

Your Complex Infrastructure Delivery Partner



The New Royal Adelaide Hospital

A CASE STUDY

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Background and Objective

In 2006, the South Australian Government embarked on a project to construct a new (800 bed) Royal Adelaide Hospital (new RAH) hospital as its flagship healthcare facility nominally costing \$2.3 Billion. \$1.85 Billion of which was for design & construct and the remainder for State procurement and installation of high tech equipment, the State ICT system upgrades and the State project team.

The new RAH forms the centrepiece of the state's \$3.6 billion Adelaide BioMed City, set to become one of the largest health and life sciences clusters in the southern hemisphere comprising of:

- **The South Australian** Health and Medical Research Institute (SAHMRI)
- **The University of Adelaide** Medical and Nursing School and
- **The University of South Australia's** Centre for Cancer Biology.

The new RAH provides a comprehensive range of the most complex clinical care to an estimated 85,000 inpatients and 400,000 outpatients each year. These services include:-

- **complex cancer and bone** marrow transplants, Craniomaxillofacial surgery, neurosurgery and cardiothoracic services with a focus on complex thoracic surgical cases

- **specialist acute spinal and brain injury** rehabilitation, renal transplantation, hyperbaric medicine and complex vascular medicine and surgery.

The hospital spans the equivalent of three city blocks and is located on a pristine site containing almost four hectares of landscaped parks and internal green space, including over 70 courtyards, terraces and sky gardens.

Its innovative design combines cutting-edge technology with new standards in conservation and environmental management. However, it isn't just the building's dimensions and high-tech equipment that sets the new RAH apart.

The new RAH is one of Australia's most technologically advanced healthcare facilities, integrating the latest innovations across health, education and research to deliver high-quality care. This state-of-the-art facility appeals to healthcare professionals, helping to attract some of the best expertise from around the world.



Some of the new technologies employed were:-

- **one of the biggest** Automated Pharmacy Distribution Systems in the nation, comprising more than 80 automated dispensing cabinets in patient wings to support the accurate and timely distribution of medicines
- **advanced tele-health facilities** enabling staff to consult with colleagues and patients across the state, including remote rural areas
- **a fleet of automated guided vehicles** to help move supplies and equipment around the hospital safely and efficiently
- **a digital instrument tracking system** to manage the RAH's vast collection of medical equipment and enable items to be located quickly and easily
- **interactive wayfinding touch screen kiosks** located in main entrance areas, which will provide printed directions and on-screen maps
- **digital imaging technology** allowing clinical images to be streamed live from operating theatres and procedural rooms for diagnostic and training purposes
- **a wireless patient nurse call system**, enabling nurses to respond to patients wherever they are, before attending to them in their rooms.
- **Patient touch-screen controls**

The new RAH was designed to provide:-

- **700 overnight and 100 inpatient day beds**
- **70 Emergency Department** treatment spaces
- **60 Intensive Care Unit beds**
- **40 technical suites** (Operating, interventional and procedural)
- **40 Overnight Mental Health beds**
- **Every overnight patient** with a single room with an ensuite and a built-in day bed for carer overnight stay
- **42 Cancer Day Centre** treatment spaces
- **30 Renal Day Centre** treatment spaces
- **Over 70 internal courtyards** and green spaces within 2 minute walk for each patient
- **The ability to be operational in "Island Mode"** for 48 hours cut-off from outside services such as water and power
- **State of the art Quarantine**, decontamination and mass casualty facilities including five negative pressure rooms to handle patients with highly infectious diseases

Project Outline

Overall Time Line

2006

Commenced design and specification activities following Government approval to proceed.

2008

Signed the Project Agreement (PA) for the construction of the new RAH following the tender, evaluation and partner selection phases

2016

The contract date for Technical Completion (TC) was 4 April 2016.

Caravel was the Project Director from **Dec 2016** to **15 Sep 2017**

2017

MARCH

Technical Completion (TC) achieved

JUNE

Commercial Acceptance (CA) achieved

SEPTEMBER

Moved in

Size and Scale

The new RAH covers **165,000 sq metre** in area and required more than half a million tonnes of bulk excavation removed from the site to allow construction of the hospital along with the 2,300 car and 150 motorcycle undercover parking spaces. The construction involved 100,000 cubic metres of concrete, 25,000 tonnes of structural steel and 40 Kilometres of partitioning. Each floor is the equivalent size of two football ovals.

The construction of the new RAH required over 15 million man-hours from 24,000 people with over 2,200 present on-site at the peak of its construction. Over 190 vendors alone were involved in the assembly, testing and installation of complex medical equipment.



State Works

The new RAH was constructed with over 30,000 I.T. network ports to provide connectivity for 10,480 State ICT devices including:-

- **3800 Computer devices**
- **3,160 clinical computer applications** constituting over 90,617 computer application installations.
- **974 Bedside devices**
- **1065 printers/MFD**
- **112 faxes**

Major items of State equipment was specified, procured, installed and commissioned included a 16 bed hyperbaric chamber, two nuclear hot-labs, a linear accelerator and numerous CT, MRI and SECT/PET scanners.

Over 7,917 items of portable bio-medical equipment were specified, procured and held in store on over 2,200 pallets ready to be transported into the hospital, unpacked and commissioned ready for use.

Over 450 major business applications were to be retired, upgraded or transferred and a further 5 major state wide applications were being rolled out at the same time. In addition, over 24,000 consumable items had to be stocked hospital-wide in readiness for day 1 of operations.

In total there were over 2,206,670 relationships between all the equipment, its placement and people involved that needed to be defined and managed.

Stakeholders

The organisational structure commenced at the highest level with the State Government through to SA Health, to CALHN (Central Adelaide Local Health Network) which includes the Royal Adelaide Hospital (RAH).

Other interested major stakeholders included the Department of Treasury and Finance; the Crown Solicitors Office, the Department of Transport, Planning and Infrastructure, staff, patients and the public.

Public Private Partnership (PPP) Contract

The State contracted with a Special Purpose Vehicle (generally known as Project Co) within the PPP consortium called Celsus (previously SA Health Partnership). It comprised the following:

- **5 partners** providing shareholder equity locally and from around the world
- **28 Banks** providing debt financing locally and from around the world
- **A 2-party, Joint Venture HYLC** (Hansen Yunken and Leighton Contractors) to build the facility

- **A facility management operator** (Spotless) to provide non-clinical services
- **An ICT network provider DXC** (Previously HP Enterprises)

Big business was truly represented on this project from the beginning. The State had a dedicated team of people to manage this major contract to ensure that the facility would be safe and to protect the State's interests at all stages of delivery.

Change Management

It is easy to forget that while the construction of the facility was important, the project was all about patients, staff and the new model of care being implemented. This added many additional layers of complexity to the project not the least of which was communication, training and change for over 6,000 staff.

But the story does not stop there. From an organisational point of view the quantum of change undertaken included:

- **Physical Location**
- **Physical Size**
- **Physical Configuration**
- **Business Processes**
- **Staff Numbers**
- **Staff Roles & Levels**
- **Clinical Equipment**
- **ICT - Core Admin Systems**
- **ICT - Core Clinical Systems and**
- **Facilities management**

If these factors were compared to 9 of the most recently completed hospital projects, only one other project reached 75% of the quantum level of change involved in the new RAH. However, change factors such as these are often not independent factors. A multiplicative score system (product) would be more appropriate and would yield a much larger difference.

This clearly demonstrates that the overall scope of work delivered by the project team was of immense complexity rarely seen in projects within Australia.

Moving-in to the New RAH

While the focus of the move related to the ramp-down, move and ramp-up of services, it was a physical and clinical move in 5 distinct parts. These being:

- **Patients (300)**
- **Workstation boxes (2,000)**
- **ICT Equipment** recovered from the old RAH (about 20%)
- **Clinical equipment** transferred from the old RAH (about 20%) and
- **Staff transfer management**

A critical part of delivering the hospital lies with the work performed by CALHN and Staff as part of the project team to support the specification, procurement, installation, communications and commissioning of the clinical instrumentation and then manage the movement of patients from the Old RAH. The move-in to the New RAH was adjudged by those involved who have participated and observed the moves of many other hospitals as being the smoothest move they have ever experienced.





Caravel's Involvement

Caravel's Initial Involvement

Unfortunately, the consortium failed to reach

Technical Completion on the contracted date. In April 2016 Caravel was engaged to assist the State with the ongoing delivery of the project.

In the first instance, the focus of Caravel's services was to fill the role of Project Director under the Project Agreement (PA) and manage the PPP contract using the existing staff in the States PPP Contract Administration (PPPCA) team.

Caravel's Project Director joined the Steering Committee and the newly formed commercial and legal advisory group.

During this time, Caravel strengthened the management of the contract, reviewed the project and made a series of recommendations to relevant parties which included:

- **Enhancing the Governance structures**
- **Amending the Project Delivery** structures and
- **Implemented measures** to hold all parties accountable for their responsibilities to ensure the successful delivery of the project
- **Significantly increasing the focus** on Safety and Fitness-for-Purpose matters

The full delivery vision presented by Caravel was accepted in December 2016. This set in motion the means for the successful delivery of the project.

APR

DEC

Caravel's Expanded Role

From December 2016, Caravel was appointed as the Project Director for the project making Caravel accountable for the activities of over 350 personnel involved in the project.

The remainder of the governance and delivery recommendations were implemented along with streamlined and simplified reporting.

To support the flat structure proposed, a Project Control Centre (PCC) was built and commissioned on 31st March 2017. This supported contemporaneous transference of information to the Project Director and the direct reports, as well as the ability to make fast and reliable decisions and simultaneously manage project incidents, issues and risks as, and when, they arose.

The Project Control Centre Innovation

As part of the updated delivery governance arrangements, a Project Control Centre (PCC) was established within the new RAH Program Office.

The new RAH schedule was well over 10,000 line items of activities comprising a total of over 100,000 tasks. It was simply not possible to interrogate and confirm the veracity of the schedule without the use of smart technologies to aid planners in performing this task. The schedule was converted to 24x7 operation with numerous enhancements in the project schedule being implemented along the way.

The PCC was a purpose built technology space that would enable key decision-makers to access accurate information in near real-time to effectively coordinate all activities occurring at the new RAH in the lead up to and during the Facility Transition Period (FTP) move, and post move period.

The PCC fulfilled several roles, including governance, effecting change, project management, risk and issue management, and safety. Transition from the completion and commissioning of the building through to the move from the old RAH to the new RAH was built into the PCC processes.

The PCC was an enabler for the delivery of the new hospital, principally as an interface between work streams and directorates along with dynamic, live management of issues and scheduling of activities. Critical activities for each day were identified in the schedule and key people involved in those activities attend the PCC on each day to ensure rapid decision making as, and when required. The PCC was the approved decision-making forum for the operational aspects of the project.

The new RAH PCC brought together a number of pre-existing project processes including project management: scheduling, reporting, go/no go gates, communications and integration management in accordance with ISO 21500:2012 to effectively manage multiple change processes.

The PCC also served as a risk management capability by discovering and managing risk and functionally reducing those risks to be as low as reasonably possible. In the eventuality of an incident, its rapid response planning and deployment capability minimised resultant consequences.

In short, the PCC was established to respond to new RAH Project operational delivery matters in (near) real time throughout the period of activation. The PCC ensured that the right people had access to the right information at the right time - so that the many onsite activities that needed to happen concurrently at the new RAH would be managed effectively and any issues could be quickly identified and resolved.

Activities from the project schedule were presented in (near) real time via interactive maps on multiple large state-of-the-art screens in the PCC – giving key decision makers a high level view of areas within the new RAH, as well as the ability to drill down to individual rooms for more specific information. The PCC provided visual tools to manage the sheer scale of information during this period.

The role and function of the PCC was constantly reviewed to meet the requirements of the different project phases. It was expected that the membership may change as well as the required data requirements to support decision making relative to the phase.

The PCC implemented by Caravel:

- **Was a whole new** project delivery paradigm
- **Created a mechanism** to form a single project delivery team from all the parties involved to work collaboratively and in partnership with each other.
- **Re-defined** the world's best practice (Major international consulting company)
- **Co-ordinated and communicated** project delivery information between stakeholders, contractors, planners and regulating bodies
- **Provided** "4D" visibility of delivery and commissioning activities highlighting congestion.
- **Gave greater visibility** of Risk and provided improved Incident Management and resolution through greater co-ordination between actioning entities.
- **Enabled** fast, reliable decision-making in a dynamic environment as well as continuous compliance
- **Managed** over 2.2 million inter-relationships between people, ICT, equipment and the target location within the new RAH
- **Provided :-**
 - Effective management
 - The ability to model changes
 - A facility to test contingencies
 - Near real-time activity data
 - Visualisation of solutions and
 - Facilitated timely decisions ensuring the right solutions were implemented efficiently and safely.

Safety and Fitness-for-Purpose

Most people well understand the need for construction sites and workplaces to be safe. No one goes to work to be injured, or worse, die on the job.

Workplace Health and Safety (WHS) is enshrined in law with severe criminal offenses under the Act for those found guilty of operating their work place in an unsafe manner.

As a result, 30% of a regular report was devoted to safety, but this time with a focus on Operational Safety that encompasses worker health & safety. Operational safety demonstrates the complete flow down off all aspects of safety and its effect on patients, staff and the public in general. It started with the building itself, the plant and equipment installed into the building and how this flows through to the clinical systems and clinical equipment installed and operated within the hospital.

Operational Safety is philosophically a very high order matter. To be able to demonstrate that any facility is “safe” and therefore fit-for-purpose, requires a very high standard to be achieved. A lot has to be done correctly on all aspects of the project for this to be achieved. The philosophy of safety stretches from design, right through build, commissioning and into day to day operations for the long haul.

Examination of systems to avoid single-point failures and system failures to achieve a fail-safe mode all help drive the business continuity plans and disaster recovery planning effort. Of course, safety does not just include the technical reliability of systems but also the Human Factors in operation. This is the study of Cognitive Ergonomics and the propensity for error in tasks performed by human beings.

Consequently, Caravel instituted a safety programme which included safety within:

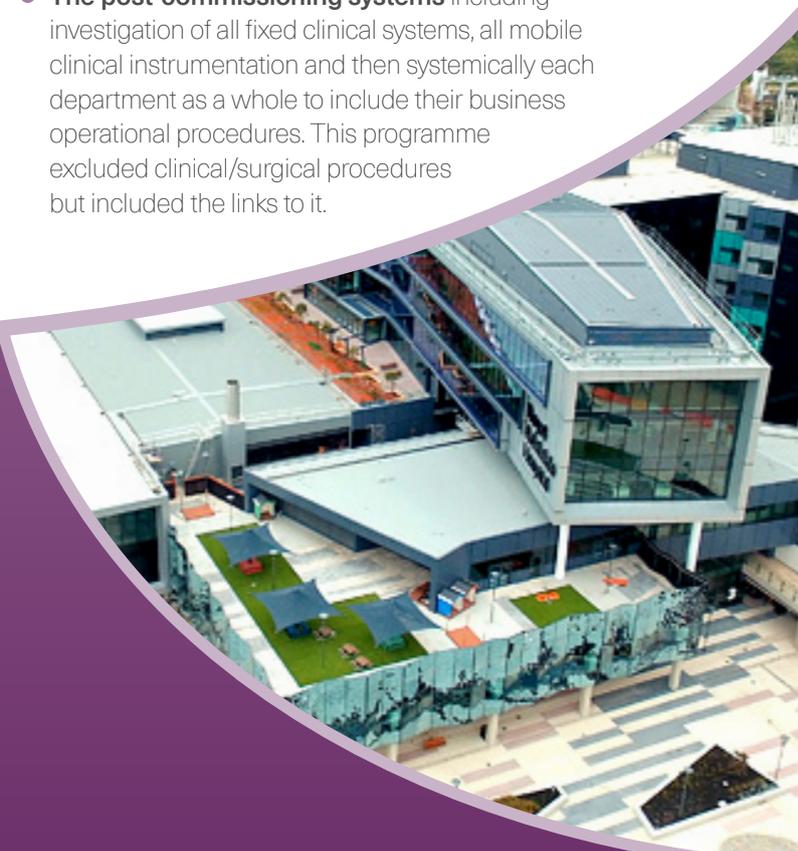
- **The entire constructed facility,** its systems and subsystems including the condenser water systems, chilled water systems, the electrical plant and other major subsystems. This was performed by the construction consortium pursuant to the Project Agreement.
- **The post-commissioning systems** including investigation of all fixed clinical systems, all mobile clinical instrumentation and then systemically each department as a whole to include their business operational procedures. This programme excluded clinical/surgical procedures but included the links to it.

What we achieved

Caravel acted as the centre point and focus in its role as the Project Director for the delivery of the new RAH project – and it worked!

In a nutshell, Caravel:

- **Stepped in to lead the project** in a near seamless fashion
- **Gained and held** Stakeholder support
- **Met the revised dates** for Technical Completion, Commercial Acceptance and then the Clinical Move.
- **Applied a very strong** safety programme to the project.
- **Applied strong** commercial management of the Project Agreement
- **Delivered innovation and operation** within an environment of high uncertainty
- **Enhanced team morale**
- **Effected major cultural change** within the team to find solutions
- **Managed Change** via the Change Management Support System (CMSS) to augment the Configuration Engine to ensure delivery of the Clinical move.





Caravel's Capability is no Accident

Caravel's value extends from many years of experience and knowledge in delivering complex projects. But it also arises from years of dedicated effort through:

- **Research in conjunction** with Melbourne Business School and
- **Research performed by Caravel** into establishing the 8 root causes of delivery failure

Deployment of the results of this experience and research determined by Caravel demonstrated that they constitute a powerful capability to drive project success in an environment of high scale and complexity.

Caravel's tool kit and project delivery innovation is no accident.

To find out more, email Paul Myers at Paul.Myers@caravelgroup.com.au

Congratulations SA Health

Caravel extends its congratulations to its client South Australian Health in the delivery of this truly magnificent world class facility and also recognises the major contributions to the success of the project by the Department of Transport, Planning and Infrastructure, The Crown Solicitor's Office and the Department of Treasury and Finance. Caravel is proud to have played its role in its successful delivery for patients, staff, the government and the people of South Australia.