Centre Block, Royal Brisbane Hospital, Herston: A Case Study

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Introduction
The construction of Centre Block at the Royal Brisbane Hospital, was a major component in Stage One of the Redevelopment of the Herston Hospitals Complex. The redevelopment of the hospital, is the largest hospital project in Australia with a capital works programme totalling over $500 million.

Masterplanning for the redevelopment started in 1994. Centre Block, now known as the Ned Hanlon Building, was a highly complex project, not only because it is a major teaching hospital, but also because it is located in a fully operational hospital campus. The development of the new hospital on the site at Herston called for extensive ‘enabling works’ which included relocation of the Central Energy Plant, construction of a new car park, and construction of the Herston Medical Research Centre.

The client for Centre Block was also a complex entity, made up of two branches of Queensland Health, District Health Services and Capital Works Branch, each with distinct priorities for the project outcomes. While the Capital Works Branch was fully supportive of the medical requirements, its main objectives were to have the project delivered on budget and on time. The District Health Services’ priorities were design and quality to optimise operational and functional objectives.

The procurement system adopted for this project was Managing Contractor, Documentation and Construction Management. Bovis Lend Lease was the Managing Contractor.

The building was completed in mid-2000 and the project is generally surrounded by an aura of success. The project exceeded expectations in quality, there were no time or cost overruns and there are no unresolved disputes.

This case study looks at the general background to the project, discusses the procurement system adopted and identifies factors which contributed to the sense of project success. These success factors are then compared to the findings of previous re-engineering research carried out by Ireland (1994) and Mohamed and Yates (1995).

Project background
Size and scale
Centre Block is the single largest building contract ever entered into in Queensland.

- The construction value of this building was $180 million.
- It is a twelve-storey concrete structure, 135 metres long and seventy metres wide.
- The top four floors are ward areas. The design of these floors allows each bed access to an external window, as the wards are arranged around open-air daylight courts.
- East Block, due to commence construction soon after this case study research was carried out, is to be fully structurally integrated with Centre Block.

<table>
<thead>
<tr>
<th>Project name</th>
<th>Centre Block, Royal Brisbane Hospital, Herston</th>
</tr>
</thead>
<tbody>
<tr>
<td>Project type</td>
<td>Major tertiary hospital</td>
</tr>
<tr>
<td>Size and Scale</td>
<td>12 storeys, 135m x 70m</td>
</tr>
<tr>
<td>Contract Type</td>
<td>Managing Contractor – Guaranteed Maximum Price</td>
</tr>
<tr>
<td>Construction Value</td>
<td>$180,000,000</td>
</tr>
</tbody>
</table>

Table 1. Summary of project details

Technical items
Some of the complexities involved in planning for and delivering this complex project were:

- Excavation of the basements required the use of rock fracturing techniques to remove very hard foundation rock (Brisbane Tuff).
- Programming involved many critical interfaces such as co-ordination of the relocation of small specialist departments.
- Medical technology required to be housed was a combination of established and evolving technology.
- The building incorporates a helipad on the roof for emergencies.
- Centre Block incorporates many clinical areas, operating theatres, and the hospital’s central sterilizing unit.
- The main kitchen for whole Herston campus is also located in the building.

**Multiple stakeholders**

This project involved many stakeholders. Queensland Health could be described both as the principal and the operator in the context of this project. Mr David Jay, Capital Works Branch Director, was the nominated Principal under the contract. The District Health Service, Herston Hospitals, as the operator/end-user had a good understanding of their needs and worked with the design consultants to develop a comprehensive brief.

![Diagram of Project Management Structure](image)

**Fig. 1 Project Management Structure for the procurement of Centre Block.**

**Herston Hospitals complex redevelopment.** Provided by Capworks Management Qld Pty Ltd.

Together with the Procurement Manager and the Project Director, the District Health Service and the Capital Works Branch made up the Project Steering...
Committee which provided strategic direction and oversaw the project on behalf of Queensland Health and the Hospital.

Other stakeholders and their roles are outlined below. Figure 1 depicts the contractual relationships between parties and the lines of communication between them.

- **End-users.** User groups comprising staff from all functional areas worked with the health planners and designers to research, justify and document the functional content of their work areas as the basis of the design. About one hundred user groups dealt directly with the design consultants. The Commissioning Team Leader co-ordinated the user groups and reported to the Project Director. The resulting Functional Brief described in detail the services to be provided, the activities to be performed and clearly identified the Government and Hospital policies within which these were to be provided.

- The Queensland Department of Public Works and Housing was the Procurement Manager assisting the client in an advisory role regarding risk management and probity requirements.

- The Project Director was Bill Geerlings of the Capworks Management (Qld) Pty Ltd, corporate infrastructure management consultants. This role performed the executive management of the overall project from inception to handover, and reported to the Director of Capital Works Branch, Queensland Health. In this capacity, the Project Director had a degree of independence and his brief was to act in the best interests of the project.

- Principal’s Representative was Incoll Total Project Control who acted on behalf of the client (Principal) for all approvals under the contract and undertook the role of Superintendent (Principal’s Representative). Incoll reported directly to the Director of the Capital Works Branch.

- The Managing Contractor was Bovis Lend Lease. The BLL project manager, was the single point of accountability between the Contractor and the Client, Post GCS. The project manager co-ordinated design consultants and sub-contractors.

**Consultants**

- The Architects and Health Planners were Daryl Jackson di Carlo Potts who were originally commissioned to design the masterplan for the entire campus. They worked with user groups to define the comprehensive functional brief and were engaged by the client up until sign-off of the Design Development stage, at which point they were novated to the Managing Contractor.

- Services Engineering was undertaken by the RBH Joint Venture (Norman Disney Young, Connell Wagner, and Meinhardt, project managed by Mr Barry May) The building engineering services were undertaken by joint venture amongst three consulting engineers because the procurement managers perceived that a services budget of $64,000,000 was too large a project for one firm to carry.

- Structural Engineer: McWilliams

- Quantity Surveyor, Davis Langdon, was retained by QH Capital Works through the Project Director.

- Sub-contractors were co-ordinated by the Managing Contractor.
**Procurement Method - Managing Contractor**

**Generic Description**

The Queensland Department of Public Works developed initial forms of this procurement method in the early 1980s. Historically, this form of contract has proven to satisfy the essential demands of both clients and contractors. For clients this means a better chance of project delivery on time and on budget; for contractors it means achieving reasonable reward for performance, and an ability to control their risk. The contract form supports a no claims/no disputes regime. Table 2 below outlines the key characteristics of Managing Contractor form of contract.

<table>
<thead>
<tr>
<th>KEY AREAS OF CONTRACT</th>
<th>CHARACTERISTICS</th>
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<tbody>
<tr>
<td><strong>Relationships</strong></td>
<td></td>
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<tr>
<td></td>
<td>Non-adversarial</td>
</tr>
<tr>
<td></td>
<td>Parties must act in “good faith”</td>
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<tr>
<td></td>
<td>Relationship team building workshops</td>
</tr>
<tr>
<td></td>
<td>Opportunity for incentive drivers</td>
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<tr>
<td><strong>Risk Profile</strong></td>
<td>Contractor warrants:</td>
</tr>
<tr>
<td></td>
<td>Design development meets brief</td>
</tr>
<tr>
<td></td>
<td>Construction documentation reflects design</td>
</tr>
<tr>
<td></td>
<td>Cost of offered solution</td>
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<tr>
<td></td>
<td>Completion time of offered solution</td>
</tr>
<tr>
<td></td>
<td>It will act in “good faith”.</td>
</tr>
<tr>
<td>Principal warrants:</td>
<td>It will act in “good faith”.</td>
</tr>
<tr>
<td>Principal’s option:</td>
<td>May seek other tenders if GCS is not less than or equal to target GCS.</td>
</tr>
<tr>
<td><strong>Budget Cost</strong></td>
<td>Tender Costs</td>
</tr>
<tr>
<td></td>
<td>Comparatively low</td>
</tr>
<tr>
<td>Tender Sum</td>
<td>Stage 1 Lump sum Fees + Stage 2 Guaranteed Construction Sum</td>
</tr>
<tr>
<td></td>
<td>Marginally higher than traditional lump sum contract approach</td>
</tr>
<tr>
<td>Final Cost</td>
<td>Very low likelihood of significant increase</td>
</tr>
<tr>
<td><strong>Contract Administration costs</strong></td>
<td>Comparatively low</td>
</tr>
<tr>
<td><strong>Additional Works</strong></td>
<td>Potential for significant additional works to be added at competitive tender rates</td>
</tr>
<tr>
<td><strong>Design/Quality</strong></td>
<td>High level of control over design and quality</td>
</tr>
<tr>
<td></td>
<td>User Group input through Project Advisory Group I Stages 1 &amp; 2</td>
</tr>
<tr>
<td></td>
<td>High buildability input</td>
</tr>
<tr>
<td></td>
<td>Potential to add further significant works but not to change</td>
</tr>
<tr>
<td></td>
<td>Long term maintenance can be added.</td>
</tr>
<tr>
<td><strong>Time</strong></td>
<td>Design Phase is shorter than under traditional Lump Sum process.</td>
</tr>
<tr>
<td></td>
<td>Construction Phase:</td>
</tr>
<tr>
<td></td>
<td>Potential for early start due to overlap of design/documentation/construction</td>
</tr>
<tr>
<td></td>
<td>Potential for early works packages</td>
</tr>
<tr>
<td></td>
<td>Low likelihood of significant time extensions</td>
</tr>
<tr>
<td><strong>Incentive Drivers</strong></td>
<td>Potential areas for bonuses to be awarded</td>
</tr>
<tr>
<td></td>
<td>Design</td>
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<td></td>
<td>Early completion</td>
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The following table outlines the process of the generic form of Managing Contractor delivery system which the Queensland Government developed to deliver the Queensland Health Capital Works program.

### Table 2: Characteristics of generic Managing Contractor procurement process

<table>
<thead>
<tr>
<th><strong>Stage 1</strong></th>
<th><strong>Tendering to GCS</strong></th>
</tr>
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</table>
| Selection process - tendering | - Competitive tenders are called for lump sum fees for Design Development, Documentation and Preliminaries.  
- The Principal provides a **Target Guaranteed Construction Sum**.  
- Tenders are evaluated on non-price criteria which are weighted 65% - 75%, and price. |
| Appointment of MC | The Principal accepts a tender at Stage 1 and appoints a Managing Contractor. |
| Novation | Principal’s design consultants are novated or nominated to the MC. |
| Audit control | Principal retains cost consultants, programmer and audit engineer. |

### Design Stage

The Project Brief and Schematic Design are generated by the Principal’s consultants.

<table>
<thead>
<tr>
<th><strong>Stage 2</strong></th>
<th><strong>Documentation and Construction</strong></th>
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</table>
| GCS | - At sign off of the Design Development phase, the Managing Contractor offers a Guaranteed Construction Sum.  
- If the GCS is not within the Target GCS, the Principal has the option to seek other tenders. |
| Audit control | Actual cost of construction - audited cost of all labour and materials |
| Bonus Sharing | Bonus sharing between Principal and MC if actual costs of construction are under the GCS. Ratios vary. |
| Defects Maintenance | Twelve months from Practical Completion |

### Table 3: Generic Managing Contractor procurement process.

**Reasons for adopting Managing Contractor form of contract for Centre Block**

The Managing Contractor form of contract was adopted for procurement of the Centre Block project for various reasons. Most importantly, Queensland Health wanted to start on site as early as possible for the sake of political reasons. This form of contract allows design and construction activities to overlap, thus compressing potential project delivery time. Secondly, the client wanted a firm contract price at the tender stage. It was politically imperative to avoid a cost blowout. This form of contract transferred financial risk to the Managing Contractor and allowed the client to be a party to any savings achieved. As cost savings were achieved these were translated into further investment by the Queensland Health into the overall Herston redevelopment.
The Managing Contractor model was also attractive to the Principal because of the flexibility it offered to be able to accommodate policy changes in Queensland’s health care delivery. For example, during the Centre Block procurement phase, a major policy shift saw the requirement to incorporate an electronic x-ray system known as PACS (Picture Archiving and Communication System) which would deliver savings to Queensland Health. Additions to scope of work that occurred within the Centre Block project were handled by the Managing Contractor as part of their management fee.

**Contract characteristics**
- Under this form of contract, both client and contractor seek to establish a guaranteed maximum price for construction. The terminology employed under the Centre Block contract was the Guaranteed Construction Sum (GCS).
- Incentives for the contractor were negotiated at the time of presenting the GCS. These conditions were a share in savings at a ratio of 75:25 in favour of Queensland Health, up to savings of $5 million. Any savings achieved above that level were to be shared 50:50 between Managing Contractor and Queensland Health.
- The Managing Contractor was required to absorb full costs if the construction costs exceeded the GCS.
- Liquidated Damages were set at $35,000 per day.
- The contract did not include a mechanism for the consultant team to share incentives.
- Downstream suppliers did not share incentives.

**Selection of Managing Contractor**
The Managing Contractor was selected on both price and non-price criteria. Price criteria included costs of preliminaries, design management fee and managing contractor fee.

Non-price criteria included:
- Detailed information regarding the contractor’s resource structure, particularly the skill and calibre of nominated personnel, and
- Confirmation of programme including time and cost planning.
- Methodology for effective management of construction operations in a working hospital environment.

Bovis Lend Lease, formerly Civil and Civic, were selected as the Managing Contractor despite not having constructed major hospital construction projects previously.

**Project Delivery Process**

**Selection of consultants**
Following a competitive tender process, Daryl Jackson Di Carlo Potts Architects were engaged by Queensland Health in 1995 to undertake the masterplan of the Herston Hospitals Complex Redevelopment. They are highly regarded for their quality work and have a successful track record of working on hospital projects and other large scale projects.

Subsequently, they submitted a competitive proposal and were commissioned to design and document both East and Centre Blocks as a single project. In the bid document for this consultancy the designers were asked to submit two separate fee
proposals which addressed provision of services under a traditional lump sum contract, and alternatively, for services under a novated contract. Under the novated contract there would be provision for termination of engagement by the client and re-engagement of the consultants by the contractor, under the same terms and conditions. It had not been finalised at that stage what form of novated contract would be employed.

**Design Stage – Project Brief and Schematic Design**

DJDCP were selected as consultants for the combined East and Centre Block project and were involved in scoping the project and in preparation of the Project Definition Plan in consultation with user groups.

The East Block structure is designed to be tied structurally and operationally into Centre Block. However, following completion of the schematic design, the East Block and Centre Block projects proceeded as separate projects because of sequencing issues. East Block could not be built until the existing Royal Women’s Hospital building was demolished. Once Centre Block was completed, the RWH could be relocated to the new building and the old building could make way for East Block.

Queensland Health continued to engage the consultant team for the Design Development stage. During this time the Managing Contractor was also engaged for constructability advice. At the finalisation of that stage, Bovis Lend Lease took on management of consultants and assumed control and responsibility for completion of documentation. In a departure from the typical novation process, the consultants renegotiated their scope of service with the Managing Contractor and were re-engaged under new terms and conditions.

BLL was paid a design management fee and co-ordination of documentation was their responsibility. Some sub-consultants felt that this was the responsibility of the architectural consultants and that the architects failed to deliver. As the DIST & NatBACC 1998 report on procurement and Delivery Strategy notes, the management of design, the design office and sub-consultants is in itself a complex process and requires skill and understanding by the instructing party. Possibly, some consultants on the project team did not fully understand the roles and duties of various project participants under the Managing Contractor delivery system. Also, the contractor’s design management expertise is more critical in MC projects than in traditional procurement systems.

The parties to the contract reached agreement on the Guaranteed Construction Sum in March 1998 at a stage when contract documentation was about 20% complete.

**Process Details**

Bovis Lend Lease (known as Civil and Civic at the time) submitted their bid for Managing Contractor in February 1997. The Guaranteed Construction Sum was presented to the client in September 1997. Agreement on the GCS was reached in March 1998.

- Consultants were engaged by Queensland Health up until the GCS was agreed.
- During the “pre-novation” period, Bovis Lend Lease reviewed documentation and prepared cost plans on documentation as it was prepared by the consultants. They also refined programmes and worked with consultants to a point where the documentation could be used to prepare the Guaranteed Construction Sum.
Prior to taking on responsibility for the consultants, Bovis Lend Lease was retained to provide constructability advice.

Bovis Lend Lease was contracted to carry out early works including minor demolition and the earthworks.

Consultants were required to document 65 packages of work. The sheer volume of drawings, about 1000 were issued by the architectural consultants, required a greater degree of document control than that required by a traditional delivery process.

As work was completed, the client’s QS determined actual construction sum compared to the GCS. As savings were realised for the client, funds were redirected to further investment in the hospital redevelopment.

Bovis Lend Lease managed additional work and variations introduced into the work within the scope (intent) of the Centre Block project as part of the agreed management fee.

All proposed changes to design were reviewed by the Client’s Quantity Surveyor before being adopted.

Construction Management methods

Site Management

- Construction work took place on a ‘live’ site. The Herston complex has 5000 staff and is operational 24 hours a day. This required a high level of understanding and co-operation between the constructors and the end-users.
- Bovis Lend Lease had full responsibility for the construction site and as such was required to manage security for the site. They had a strategic management plan in place to manage the effect of construction activities on the rest of the campus, diverting patients and staff around the construction site.
- BLL were also responsible for managing impacts on the local community. They were instructed to cause least possible disruption the residents of nearby Butterfield Street by ensuring all deliveries to site came via Bowen Bridge Road.

Sub-contract management

- Bovis Lend Lease was on site to carry out earthworks for a period of 6-7 months. During this time they were able to identify more efficient ways to construct and maintain functionality. As the design was refined, better ways to package sub-contracts for tender purposes were determined.
- When BLL went out to the sub-contractor market, they sought to gain efficiencies where the nature of the works would allow. On the advice of the procurement manager, they worked on the basis of trying to break down the elements as much as possible to reduce the sub-contractor margins they would be required to cover. Smaller packages were let to a larger number of subcontractors. The sixty-five work packages documented by the consultants were broken down further, and eventually one hundred and twenty individual sub-contracts were let.
- The rationale was to maximize resources which were already on site. For example, the façade was built by pre-casting panels off site. Existing crane crews were on site already, specialist riggers were engaged to position and fix pre-cast panels and grout.
Tendering for sub-contracts was based on State Government purchasing policy. Expressions of Interest were called publicly for various sub-contracts. Out of 20-30 expressions received, a short-list of five sub-contractors was selected from pre-qualification criteria. These were then asked to tender against weighted criteria. Weightings for price varied from 40% - 60%, depending on the package. The Services Engineer remarked that Bovis Lend Lease’s process secured the best contracts at the lowest price for services installation.

Bovis Lend Lease’s project manager also reported that significant savings were achieved because the RBH project was seen as a positive project environment in the industry and received positive participation from sub-contractors.

At the time of going out to the market for subcontractors, it was thought that supply of materials and labour would be under pressure due other large projects under construction at the same time. These included other hospitals around the State and pre-Olympics construction in Sydney. However these factors did not impact unduly on the Centre Block project because contrary to a price index forecast which predicted an overheating of the market, the economic downturn which occurred in South East Asia in 1997 meant that as builders recalled their resources to Australia there was good availability of sub-contractors.

Early completion

The second part of the two-stage contractual process commenced on site in March 1998. Contract completion was scheduled for September 2000 but completion was actually achieved two months early.

Achieving the date for delivery became imperative once the Managing Contractor informed the Principal of the completion date. They indicated in January 2000 that completion would be achieved by July that year. From that time onward, planning for the move into the new hospital commenced. This included relocating the Royal Women’s Hospital into Centre Block. Since large numbers of hospital staff would be involved in the decanting process, hospital administration were concerned with commitments to changes to rosters, holidays and so on.

Industrial Relations

A large workforce of 1700 people was employed on the site at the peak time during construction process. There were generally about 1170 workers on site plus the project team.

With a very high public profile, and large workforce, the project was potentially sensitive to industrial relations issues. It was the largest building project under construction in Queensland at the time which the Union movement could have targeted. There were a number of minor stoppages but Bovis Lend Lease management had very good relations with the union movement, and had an effective structure in place to manage industrial relations issues.

Changes implemented by Managing Contractor during construction process

Some material changes occurred during the construction process. These were driven by the Principal’s need to make savings in order to accommodate changes in Health policy. In order to assist Queensland Health achieve savings, the Managing Contractor carried out recurrent costing analysis on all building elements as part of
their commission. Some subsequent recommendations were made by BLL and accepted by the Principal. In retrospect, some savings were achieved by narrow “solutions” which merely shifted the problem or created new ones, by false economy.

- The building design originally incorporated external sunshading devices. These were deleted for cost reasons when Bovis Lend Lease advised that the internal heat load could be adequately controlled by the air-conditioning system. This required internal shading to avoid glare and the increased heat load.
- The paint finish to external in-situ concrete stairwells and so on was deleted. It was determined that 200mm thick concrete was in itself waterproof. Additional steel reinforcing was installed to avoid cracking, and construction joints were given a waterproofing treatment.
- A design strategy which called for an inclined wall to the ward floors was ruled out by Bovis Lend Lease for constructability reasons early in Design Development stage. This decision proved to be cost neutral, with no savings made.
- The design of the roof was changed by BLL for ease of construction, but not necessarily to the long-term benefit to the project. Roof drainage continues to be an issue which has not been satisfactorily resolved.
- Cost savings were associated with a significant reduction in the quantity of fibre-cement internal wall sheeting and wall protection. Wherever possible, walls received a low cost plasterboard finish with rub strips for robustness, as an alternative. Experience has shown that this treatment is inadequate for protection against heavy trolley traffic, and has implications for maintenance costs.
- The 300mm high skirting which was specified to be installed in clinical areas was reduced to 150mm high. This is also inadequate to protect the walls from the impact of trolleys hitting the wall.

**Project team relationships**

**Project Organisation Structure**

Bill Geerlings, Capworks Project Director, notes that very large and complex projects such as the Herston hospital redevelopment need much more than conventional project management techniques to achieve optimum outcomes. The challenge in managing projects of this magnitude is to achieve effective teams rather than hierarchies, and collaboration rather than competition.

In this case the project organisation structure reflected the collaborative team philosophy. To achieve the objectives of co-ordination, control, formal and informal co-ordination, all groups were represented and logically linked in the Organisation Structure. The following table (fig 2) depicts the Working Group structure devised by Capworks Management for the Centre Block project.

- The user groups comprised staff from all functional areas of the hospital who worked closely with the design consultants on preparation of the Functional Brief, Schematic Design and Design Development. Any insoluble problems were referred to the Project control Group.
- Consultants met at regular intervals to coordinate design, costing, programming etc. The design processes were monitored and design problems resolved. Issues outside the terms of reference of this group were referred to the Project Control Group.
The Contractor and Superintendent’s Representative met with sub-contractors to monitor the construction and commissioning activities and resolve any issues as they arose or where appropriate, referred them to the Project Control Group.

The Project Control Group represented the major project stakeholders and managed the project in terms of planning, design, cost and time, within the delegated authority of the Project Steering Committee.

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**Fig. 2 Working Group Structure, Herston Hospitals Complex Redevelopment, Centre Block.** Provided by Capworks Management Qld Pty Ltd.

**Information exchange**

The Working Group structure outlined in Figure 2 proved to be an effective monitoring and approval system to govern design changes. This structure offered many opportunities for communication and integration from group to group. Consultants co-ordination meetings were chaired by the Architects. The Project Control Group included the lead consultants. There were eighty-eight user groups. Policy and Planning meetings were chaired by the District Manager who made recommendations to the Steering Committee.

Informal communications were also encouraged. Bill Geerlings said that “without diminishing the need for formal communication channels, informal communications are essential for a focus on outcomes rather process.”

Centre Block RBH
RCDP Case Study 4
Formal and informal communications were reported as being “average to good” within the project team.

The communications process was mostly effective because the whole team was located on one floor of the same building in close proximity to the site. This physical fact provided a greater opportunity for good working communications. The project team was accessible to each other.

Leadership

Joint leadership was provided by the Project Steering Committee (see Figure 1) which consisted of the Principal, who was the District Manager Health Services, the Procurement Manager and the Project Director. The strength of the steering committee was the key to keeping the project on track and to remediating any problems that developed.

However, from the client’s perspective the leadership role played by the Project Director was invaluable. He was able to use experience and expert knowledge to maintain an independent stance to act in the best interests of the project rather than in favour of one or another stakeholder.

Both the Principal and the Bovis Lend Lease team agreed that the Project Director played a large part in pulling the team together.

The main point of contact between the Principal and sub-contractors was the project manager for Bovis Lend Lease, Dale Connor. He was very accessible, was located on site for the three year duration of the project, and had an excellent feel for the overall project. He was aware of all aspects of the project at all times.

Team building

In the project-based system which characterises the construction industry, consultants are thrown together with other consultants. The newly formed project team needs to build up connections and confidence and settle into working relationships in a relatively short period of time. In the words of one interviewee, “you just get going, then the project finishes and you go off and do it all again.” This differs from the manufacturing sector where players are able to develop long term supplier relationships.

At the time of framing their proposal for design and documentation of the Centre Block project, consultants did not know who they would be working with. All consultants were commissioned independently by Project Services; the skill mix of the team covered all requirements of the project. In this system, the lead consultants do not “get a say” on who they will be working with. Lead consultants base their fee proposal on providing design documentation and co-ordination of all the other consultants’ work.

No formal team building exercises were instigated for the immediate project team, but team-building was considered a day-to-day activity. People working together developed positive relationships internal and external to the project.

Several project participants remarked that team relationships were more important than the form of contract in terms of the impact these factors can have on a project.

Project-oriented Queensland Health personnel ensured the client’s capacity to be part of an integrated project team.

Post GCS, the team of novated consultants had a degree of cohesion which enabled it to continue to focus on the project outcome and respond to Client requirements and queries.
Team Culture

In general, the quality of the relationships between client, client representative, the design team and the construction management team assisted in achieving and exceeding the required objectives at project level.

- Willingness of the members of the team to co-operate with each other was considered to be very high considering the size of the team.
- Instances which tested team chemistry were when changes to signed-off design were approved. An analogy used was that the project was like a huge ship and difficult to turn around – if changes were needed, it was very unwieldy for a large number of consultants to carry these out.
- ‘Turf protection’ did exist in relationships between some project participants however, this was viewed positively as providing a functional level of tension between team members which delivered a better outcome for the project. Diverse attitudes and expectations of the various members of the project team ensured that solutions were pushed beyond the mediocre.
- The lead consultant reported encountering some difficulties with sub-consultants, with some individuals being very difficult to get on with. A certain lack of willingness to cooperate may have been a reaction to the changes and challenges of working within a non-traditional procurement system.
- To some of the consultants – it was “just another project”. They did not necessarily connect with the holistic project objectives in terms of cultural or social significance of a major public hospital. This attitude was likely to be a result of dissatisfaction at not being selected as consultants for a subsequent hospital redevelopment project during the life of the Centre Block project. In a fee-driven project system, repeat business is not a given, even with successful project outcomes.

Conflict management

A prime requirement for the successful resolution of conflict between project participants is an understanding of and empathy with the other stakeholders’ points of view. Bill Geerlings summarised the diverse objectives of the various stakeholders: the Health Department seeks to minimise expenditure; the Hospital require optimisation of the quantum and quality of its new facility; consultants must retain profitability by not spending more time on the project than their fees allow; and the contractor strives to optimise profitability by constructing the project at the minimal cost.

The Principal reported that the Project Director was pro-active in conflict resolution and maintained an appropriate level of detachment which enabled him to generate options directed towards win/win solutions. In general the Project Director did not get involved in disputes between consultants.

Continuity

- Previous experience was important to the success of this project. Design and management personnel brought an understanding of hospital systems to the project. There was less experience in the BLL on-site team.
- Most of the high level people involved on the project remained on the job until completion. Continuity of personnel was very important to overall project knowledge.
Changes of personnel in the Bovis Lend Lease team caused some concern at project leadership level. It was perceived by the client that BLL personnel gained on-the-job training on the Centre Block site.

**Customer focus**

This was discussed on two levels. Firstly, in terms of consultants’ focus on user needs in the planning phase and the schematic design phase and secondly, in terms of the Managing Contractor’s overall focus on the Client’s project needs, post GCS.

**Consultants’ focus on user needs**

- The Health Planners operated at a high level of customer focus. However, to some extent user groups were indulged rather than challenged during the planning stage. Responsiveness was not necessarily an advantage to the overall project as health planners/architects were sometimes ‘too co-operative’ with the end users in terms of attempting to fulfil their ‘wish list’ rather than introducing alternatives which would increase design efficiency while satisfying user needs. The management of user groups is critical in this sense.

**Managing Contractor’s focus on client needs**

- The Project Steering Committee was concerned about a lack of customer focus on the part of the Managing Contractor at the outset of the project. Progress on site was experiencing substantial delay which could be attributed to the capacity of project personnel then engaged by BLL. In the jargon common to the industry, the Managing Contractor had won selection for the project with their “A” team and within three months had substituted them with their “B” team. The Steering Committee acted swiftly to remedy the problem and worked at the highest levels of the client and contractor organizations to ensure the project was set back on track.

- On the other hand, BLL attention to client needs during handover planning and commissioning was at a high level. A valuable aspect of BLL’s management was that the hospital was able to move patients into the new facility immediately after practical completion was attained. The Managing Contractor worked pro-actively with the Commissioning Team and allowed the hospital to install equipment during the construction phase, with appropriate insurance arrangements. Fire testing had been organised at least 4 months prior to practical completion. Building approvals were gained progressively with a Building Surveyor located on site throughout the construction phase.

**Project Outputs and factors which contributed to project success**

**Indicators of Success**

The project achieved a high degree of success. It was completed ahead of time and achieved a level of savings which exceeded client objectives. The District Health Service now has a high quality functional facility. No significant disputes arose during the procurement phase.

At project completion the feedback was:

- Highly satisfied client. Client share of procurement savings of approximately $12 million allowed Queensland Health to achieve more in terms of capital investment, for example a hyperbaric chamber was able to be installed.
Amongst the service providers, the architects and health planners considered it was ‘a terrific job’. It was a ‘wonderful project to be associated with – positives outweigh the negatives.’

Bovis Lend Lease registered an extremely high level of satisfaction with the project.

**Key issues which contributed to project success**

- **Clear Objectives**
  
  The strict management of user requirements was a critical component of the success of this project. According to the DIST & NatBACC Report on Procurement and Delivery Strategy (1998), many projects fail due to clients not fully developing their ideas, refusing to brief for confidentiality reasons, or not understanding that project outcomes need to be measured against project requirements.

  The Functional Brief and Project Definition Plan developed at the commencement of the Centre Block project with extensive user input contributed to the success of the project. Health projects have traditionally been plagued by changes. A major objective in the delivery of the Centre Block project was that there would be no significant changes during the procurement phase. In general, the process worked. Once user groups had signed off on schematic designs, they were not entitled to change anything but avenues to request changes did exist through the Project Director.

- **Client/Client Representative understood project procurement responsibilities**
  
  The client was fully aware of its role and responsibilities under the contract. It sought to establish a capability to manage the project through the appointment of experts such as Capworks Management and Incoll TPC to the team. It understood its responsibility to limit requirement changes and an effective monitoring and approval mechanism for design changes was installed. However, due to the nature of the project itself the Principal required a degree of flexibility to be able to make changes if evolving health services policy changes dictated it. The selected project delivery system met this requirement.

- **Design and documentation**
  
  Many industry participants are of the opinion that project success has less to do with the form of contract than the actions that take place before a contract form is selected, particularly whole of life design and costing. Suitable attention to alternate options in concept design and design development is required to ensure a project’s overall cost effectiveness.

  Fee levels for the lead consultant on this project were realistic enough to allow the necessary level of testing and design fine-tuning. For example, eighteen different options for the design of the building facade were prepared by the Architects to determine costings over fifteen years. Subsequently, the design achieved and reflected the Client Brief and the cost plan.

- **Adequate cost planning**
  
  The cost planning and cost budgeting process was undertaken rigorously by the Client’s Quantity Surveyor in order to maintain a strong relationship between design and cost-effectiveness.

- **Project personnel**
  
  The client, project director, design and construction teams all involved key people with an appropriate level of experience. Some inadequacies in the Managing Contractor’s team were addressed in the early stages of the construction phase. In general, the skill and calibre of project participants’ personnel played a major role in project success.
Reasonable Risk Allocation

Both parties to the main contract felt that financial risk was allocated to the party most able to manage this risk. The savings-sharing clauses provided the incentive to Bovis Lend Lease to deliver the project within budget, within program and to the required quality. Whilst the contractor’s risks were high, their expectations of gain corresponded with this.

Teamwork

The breadth and depth of inter-organisational teamwork was not investigated in detail during this study but it was stated by the stakeholders that the high level of professionalism which each of the project participants brought to the project was a major factor in the successful outcome regardless of whether teamwork was a particular focus. As Chan et al (2001) point out, non-traditional procurement brings changes and challenges to project participants, especially to those who have operated within the traditional procurement system for a long time. Therefore it is important for all project participants to understand and accept their new roles and duties, otherwise, claims and disputes easily arise, which in turn could hamper project performance.

Other factors which influenced the success of this project which have been discussed already are:

- High levels of client leadership and involvement.
- Effective communications due to close proximity of all members of the consultant team, housed on one floor of a building opposite the site.
- Conflicts were managed in a collaborative, non-adversarial way.

Comparison with previous re-engineering studies

Re-engineering is about introducing radical changes to business processes to achieve dramatic improvements in contemporary measures of performance such as cost, quality, service and speed (Hammer and Champy 1993). Re-engineering is also about creating and adding value in each and every activity within these processes and delivering the project to the level of customer expectation. Two previous studies on re-engineering the construction delivery process identified key areas for change.

In the T40 Project, Ireland (1994) found that adoption of re-engineering concepts could address issues such as the integration of owner, designer, supplier, builder, procurement and production into one entity. Ireland also noted that opportunities exist for reducing non-productive time between the phases and for developing congruence of interest and motivation.

Mohamed and Yates’ (1995) findings mainly accorded with the T40 project and noted that a fundamental issue to be addressed is to meet the client’s expectations through resolving customer needs and business objectives. The findings of both studies reflect the importance of the human/communication factor to the success of re-engineering.

Table 4 summarises the issues which were identified by the Ireland and Mohamed and Yates as requisites to make the quantum change to a re-engineered process and comments on the applicability of these to this case study.
<table>
<thead>
<tr>
<th><strong>T40 (Ireland 1994)</strong></th>
<th><strong>Comment on applicability to Centre Block, RBH process</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td>Agreed common goals</td>
<td>Client and contractor understood and supported each other’s objectives. Functional Brief also provided reference point.</td>
</tr>
<tr>
<td>Simplified process</td>
<td>MC offered single point of accountability between consultant team and client, post GCS.</td>
</tr>
<tr>
<td>Re-engineered activities (fewer sub-contractors, larger work components)</td>
<td>Smaller rather than larger work modules adopted to lead to savings.</td>
</tr>
<tr>
<td>Workforce commitment</td>
<td>All parties including consultants and subcontractors very highly committed to project.</td>
</tr>
<tr>
<td>Partnering with local government</td>
<td>Approval process through State Govt own statutory authority. Timely – no delays.</td>
</tr>
<tr>
<td>Tendering on benchmarking</td>
<td>Tenders selected on the basis of pre-qualification and fees.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th><strong>Re-engineering (Mohamed and Yates 1995)</strong></th>
<th><strong>Comment on applicability to Centre Block RBH, process</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td>Strong commitment by the team to improving design and construction workflow</td>
<td>All project team members highly committed to project development, resolution and completion.</td>
</tr>
<tr>
<td>Effective communications between major project participants</td>
<td>Effective structure in place for communication cycle.</td>
</tr>
<tr>
<td>Positive involvement of customer at early stages</td>
<td>Client heavily involved with design team. Excellent user input. Requirements identified and implemented at planning stage.</td>
</tr>
<tr>
<td>Quality assurance techniques</td>
<td>Integral to suppliers’ businesses – applied through all phases. Value-adding attitude.</td>
</tr>
<tr>
<td>Encouragement of innovation</td>
<td>Savings identified were not led by innovation. Managing Contractor form of contract may give the wrong incentive to find savings – led to false economy.</td>
</tr>
<tr>
<td>Improved construction output</td>
<td>Project completed ahead of time.</td>
</tr>
</tbody>
</table>

**Table 4. Re-engineering success factors**

This case study has illustrated some of these factors. It is obvious that the client and the team went to great lengths to ensure that there were agreed common goals, effective communications and positive involvement by the customer. The process was as simplified as possible for a very large and very complex project.

Contrary to the principles of the T40 Report which sought to reduce time, and thus achieve cost savings by this strategy, more packages rather than fewer were engaged on this project. The decision to tender smaller packages on the Centre Block project was driven purely by economic reasons and appears to have paid off. Larger work packages would have meant that the sub-contractors themselves would sub-contract work thus adding pressure to the budget through increased margins.

The need to find savings in the capital cost of the project was driven by the principal need to finance emerging technologies. The deletion of external sunshading, or the replacement of heavy duty internal wall sheeting with less durable but cheaper wall sheeting may have resulted in budget savings during procurement, but is likely to result in additional operating costs. The Managing Contractor did not initiate significant innovations. These amendments, advised by the Managing Contractor and agreed by the Client may turn out to have a somewhat negative effect...
on the project in the long term. Because the contract allowed the means to carry out these changes, perhaps it could be said that the Managing Contractor form of delivery provides the wrong incentive to find savings and does not necessarily encourage innovation.

**Conclusion**

Overall project performance on the Centre Block project was extremely high. The client body felt that the Managing Contractor approach to procurement allowed an appropriate degree of client interface. A benefit perceived by the client was that additional capital investment in the project was enhanced by the savings achieved in the construction process.

However, the success of a health project is measured by the quality, efficiency and effectiveness of delivery of health services. A Post-Occupancy Evaluation of the Ned Hanlon Building will commence at least two years after commissioning. Project performance will be benchmarked against other major hospitals. A round table assessment process will compare certain data, for example, cleaning, maintenance, and support services. A holistic approach means that efficiencies would be sought by changing the method of operation. The last resort would be to change the fabric of the building.

A way of overcoming the potential problems of spiralling long term operating and maintenance costs on a project such as this may be to tie on-going asset management or operating costs to rewards. The contractor would be responsible for the maintenance of the facility over a set period of operation.

As Chan, Ho and Tam (2001) point out teamwork could have a substantial contribution to project performance. The effect of enhancing teamwork amongst the project participants, including client organisation, contractor firm, and architectural and engineering consulting firms on the performance of Managing Contractor projects may warrant further research effort and attention.

Further, the concept of outcome-based reward is applied only to the Managing Contractor and is based on the main deliverables of cost, time and quality. If the form of contract allowed a mechanism for the consultant team to share incentives (or penalties) based on those same deliverables, an outcome which further improves benefits to the client and end users may result. The entire project team would be involved in a high risk/high gain enterprise.
References


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1 The material for this table was prepared by Mr Bob Giles, Legal and Contractual Services, Dept of Public Works.