Managing Time, Cost and Quality: A Tale of Two Buildings

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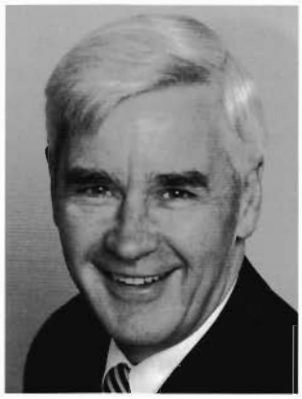

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Introduction

Successful project management of the delivery of a building involves managing the three elements of time, cost and quality to the satisfaction of the building owner. Conversely, a perceived shortcoming in one or more of those elements in the procurement of a building project will be seen by the owner as a "failure" — "an unacceptable difference between expected and observed performance".[1] That is, a building owner may perceive the outcome of a building project to be a failure if the project cost more than anticipated, took longer to complete than anticipated or the final quality fell below expectations.

As every building practitioner is aware, the "failure" of a building project is frequently the trigger for a dispute, and avoiding "failure" is therefore the best way of avoiding building disputes. It is suggested that the lessons of the past are not always heeded, and this is a powerful reason that "failures" should be carefully analysed to avoid repetition of similar problems in the future.

Engineering or building failures in the more generally accepted sense of structural failure capture the public's attention, particularly when they result in significant loss of life. However, "failures" in the broader sense as defined above are also newsworthy, particularly if they involve publicly funded buildings or infrastructure. Cost overruns and late delivery of public infrastructure are virtually certain to be subject to public scrutiny. Such public attention can in turn capture the attention of politicians who can be subjected to considerable political pressure to "do something". That "something" not infrequently takes the form of a public enquiry or investigation, sometimes a Royal Commission.

The public is often understandably cynical about the time, cost and outcome of such enquiries into a project "failure". However, the resulting reports can have considerable value as a contemporaneous record of what went wrong and why, and which aspects of the project were successful. It is suggested that a public enquiry conducted under appropriate terms of reference can have considerable value, if the lessons from the "failure" are learned and heeded in future projects. In contrast to the case law that arises from a building dispute decided in court, a public enquiry is not confined to the issues that the parties consider to be relevant to their dispute, or the identities of the parties in dispute. A "private" dispute is about legal liability — usually to decide who pays how much money to whom. The scope of a public enquiry is considerably wider, as it is intended to fulfil the function of informing the public of all the reasons for the "failure", usually with the avowed aim of avoiding such errors in the delivery of future projects.

The theme of this paper is the lessons that can be learned from the delivery of two seminal building projects — the Australian Parliament House in Canberra ("APH"), and the Scottish Parliament House in Edinburgh ("SPH"). Whilst these projects were completed at different times (1988 and 2004 respectively), and in different countries, it will be seen that there are many common factors, including the method of project delivery. APH received significant adverse comments on the cost and time management of the construction by the Auditor-General, who published a critical "Efficiency Audit".[2] After completion of the building, the Parliament House Construction Authority ("PHCA") prepared its own publication documenting the history of the project and the lessons learned, and rebutting the Auditor-General's criticisms.[3] There was, however, no independent public enquiry as such into the procurement of APH. The procurement of SPH was also the subject of examination by the Scottish Auditor-General on two occasions: in 2000 when construction was at an early stage,[4] and in 2004 near the end of the project.[5] Further, as a consequence of the publicity given to the substantial time and cost overruns of SPH, there was a public enquiry into all aspects of the procurement of SPH conducted by Lord Fraser, building on the Auditor-General's findings.[6] The sources of the following comments on these two high-profile public buildings was derived from these public documents.

It should be emphasised that neither of these two buildings could be considered a "failure" in the traditional sense, nor is it suggested that there was any shortfall in the expected quality of either building. These buildings are both architectural award-winning, very high-quality, nationally symbolic buildings, providing an environment for the complex workings of democratic parliaments, accessible by the people. It is, however, arguable that the substantial cost overrun for SPH constituted a "failure" in that there was an unacceptable difference between the budget cost and the final as constructed cost, as well as an unacceptable difference between the scheduled date for completion and the actual date of

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completion. Whether or not the final cost and time of delivery of APH constituted a "failure" depends on whether the view of the Auditor-General or the PHCA is accepted.

Similarities in delivery of APH and SPH

Clearly, no two buildings on different sites, let alone in different countries, with different functional requirements and constructed at different times, can be directly comparable. However, the following factors relevant to the project delivery method and its implementation were similar for these two buildings:

- construction of a long-lasting Parliament building as a national symbol;
- procurement and project management by civil servants responsible to the Government and Parliament;
- architect selected after an international design competition;
- emphasis on very high building quality, both as a functioning, long-lasting durable building, and as a showcase for local craftspeople, artisans and artists;
- procurement and construction by a construction manager who managed the construction by letting and administering a large number of trade subcontracts;
- a very tight construction program that could only be achieved through fast track construction in which construction was commenced before the design was complete;
- changed user requirements, including significant increase in space after the design had been commenced;
- considerable public scrutiny of achievement of time, cost and quality targets; and
- architects' pursuit of excellence, notwithstanding the (largely unsuccessful) project manager's attempts to impose budgetary constraints.

Australian Parliament House

An international design competition was held in 1979 to select the design for Australia's new Parliament House. Key aspects of the competition brief were:

- budget cost $151m in May 1978 prices;
- building to be opened on Australia day 1988;
- usable area of 60,300 m^2 for 188 parliamentarians, 124 representatives and 64 senators;
- high-quality materials and finishes;
- national symbol; and
- building to last 200 years.

No doubt mindful of the possible time and cost consequences of innovative structural design (e.g. Sydney Opera House, 1976 Montréal Olympic Stadium), an early decision was taken that the structure was to be conventional, using existing technology. Nevertheless, there were substantial challenges "which derived from the building's massive size, extensive range of facilities, number of advanced electronic systems, tight program, shortage of resources, extensive approval process and quality standards".[7] The site for the building covers 32 ha, and the building itself an area 300 m long by 300 m wide.

The Australian Government formed the Parliament House Construction Authority ("PHCA") as the government body with overall responsibility to project manage the delivery of the project. The PHCA provided overall direction to the project, and was responsible to the Parliament and the Cabinet through the Minister for the Capital Territory. A Cabinet Committee and a Joint Standing Committee of Parliament provided the PHCA with user requirements.

The PHCA made an early decision that the project would have to be "fast tracked" by commencing construction before design was completed, in order to meet the opening date set by Parliament. As a consequence of fast tracking, the construction was procured by Construction Management, in which a joint venture of John Holland and Concrete Constructions managed a large number of trade subcontracts. The architect was the principal consultant engaged by PHCA, and the engineering consultants (structural, mechanical, electrical, etc.) were secondary consultants, technically responsible to the architect. The cost consultant (quantity surveyor) was directly responsible to PHCA, as was the construction manager.

The original building budget of $151 m was prepared by the National Capital Development Commission (NCDC) based on a conceptual notional design with a usable floor area of 58,000 m^2 and a gross area of 80,000 m^2. The winning architectural design had a usable area of 69,057 m^2, which the PHCA estimated added an additional $33 million to the budget. The PHCA also estimated that the winner's design involved an additional $36 million for underground car parking, circulation, plant rooms, site works, landscaping, energy-saving devices and increased standards and finishes that were not provided for in the competition brief budget. Significantly, not only did the winner's design include a larger usable area than provided for in the competition brief, but the efficiency factor (usable area divided by gross area) was 53.5 per cent, considerably less than the 72.5 per cent assumed by the NCDC in its conceptual design. After the winning design had been selected in 1980, the approved budget was revised from $151 million to $220 million in May 1978 prices, the basis on which the PHCA was required to report to the Parliament. The budget approved by Parliament contained neither contingencies, nor any provision for cost escalation arising from inflation.[8] As the PHCA noted: "The building budget for the new Parliament House was destined to be controversial because of misunderstandings of its base cost and the effects of additions, variations and other factors which were not part of the original calculation."[9]

In the event, PHA was opened in May 1988 (not 26 January as originally planned), and the actual final cost was $1,076 million. The Auditor-General conducted an "Efficiency Audit" of the design and construction of PHA in 1987 during the last stages of construction. His report was critical of virtually every aspect of PHCA's management of time, cost and quality, and he considered that the requirements of Parliament in respect to time and cost had not been met. He noted that: "Many of the difficulties arose from the fast track system which the Authority adopted to try to meet the target date for completion." The Auditor-General considered that PHCA's deficiencies in managing the architect and the construction manager and the multitude of contractors on the project added to the costs of the project. He identified that some of these problems arose from the particular terms of the standard form contracts with the architect and the construction manager which had not been appropriately prepared to protect the Commonwealth from cost and time overruns.[10] In respect of the architect's time and cost performance he noted: "The architect continually has been late

with design documentation work for a large part of the project and has made costly changes to work after the tender date",[11] and in respect of quality: "the architect's pursuit of excellence appears to have had detrimental cost and time effects on the project".[12]

PHCA objected to the Auditor-General's Report in an appendix,[13] and rebutted the criticisms in a published response to the Auditor-General's Report,[14] and in a subsequent comprehensive report prepared after the building had been completed.[15] PHCA claimed that PHA was completed within the budget approved by Parliament and on time, noting that a strike closed the site for 14 weeks in 1984 and budget cuts caused delays and imposed cost penalties. In a detailed analysis of the cost revisions to the budget of $220 million that occurred over the life of the project, PHCA identified the major contributors to the increase to be:

- escalation in building costs from inflation of May 1978 prices, accounting for $487 m, 45.3 per cent of the final cost;
- non-building items — $82 m (7.6 per cent);
- extensions to the House of Representatives and Senate wings to provide for an increase in the size of Parliament to 226, comprising an additional 23 representatives and 12 senators — $41 m (3.8 per cent);
- changed user requirements, including dining facilities, relocated and additional security areas, enlarged underground eastern car park, landscaping, additional minister's suites and cost of not using rainforest timber — $77 m (7.2 per cent);
- items that would normally come from a contingency allowance — $87 m (8.1 per cent); and
- insolvencies, exchange rate variations, government fees, etc. — $82 m (7.6 per cent).

The PHCA reviewed the operation of the fast track design and construction method and considered that, "despite its drawbacks, fast track will provide the building some 2–3 years earlier and at a significantly lower completed cost than the conventional construction method".[16] In respect of the criticism of the architect's "pursuit of excellence", PHCA noted: "A proper balance has been achieved between the many conflicting criteria including cost, time, quality and symbolism. There will be instances where the pursuit of one of the criterium will to some extent have a detrimental effect on other criteria. The Authority is proud of the role it has played in balancing the competing criteria."[17]

The report prepared by PHCA is a comprehensive analysis of the impact of the myriad of issues that contributed to the project delivery. Clearly this report, written from the perspective of a Government Authority that had been heavily criticised by the Auditor-General, cannot be viewed as an independent assessment of its own performance. Whilst it may not have the persuasiveness of the report of an independent public enquiry, it nevertheless provides a useful summary of the entire project, prepared by the one body that was involved in all aspects of the project delivery. As such, it is an invaluable resource on the procurement of one of Australia's two most important buildings of the twentieth century. In a final chapter, the PHCA provides conclusions and recommendations under a number of headings, including a discussion of the following topics which have a wider application than to PHA or government projects alone:

- project implementation: the cost of time lost;
- design competition;
- the budget;
- the fast track method;
- project management by the principal;
- organisational arrangements;
- project planning — design, construction, design consultants agreements;
- construction management agreement and experience;
- method of contracting;
- general conditions of contract;
- the superintendent;
- selection of consultants;
- project insurances;
- workers compensation insurance;
- quality assurance; and
- legal advice and arbitration.

Contributing factors to project performance

The following specific conclusions and recommendations identified by PHCA are of particular interest in a broader context, and as will be seen from what follows, are of particular relevance to the procurement of SPH:

- "An earlier decision to commence, given the target end date, would have enabled considerable cost savings. ... The Authority believes that clients should be made aware of the value of potential savings through the earliest possible decision to begin their projects. Implementation is greatly assisted through the maximisation of time for preplanning, efficiently establishing the operational organisation and utilising the most economical form of project delivery."[18]
- "The design competition for the Parliament House was well managed and produced an outstanding piece of public architecture. But it was deficient in failing to finalise the terms of agreement for the architect in time to include them in the conditions. The Authority believes that projects should endeavour to achieve this if they rely on a competition for their design."[19]
- "Political considerations have an inevitable bearing on the conduct of some public projects ... The Authority believes that, although its role is not to question such matters, the consequences have to be accepted and there are lessons to be learned".[20]
- "The Authority would not have adopted the fast track method of delivery if there had been more time available to complete the project ... Nevertheless, fast tracking also yielded a number of specific benefits".[21]
- "Coordination problems experienced would have been more severe if the designers had been operating from different cities and if the architect had not been given responsibility for the engineering consultants."[22]
- "... the Authority believes that a specialist Project Planner (PP) should be employed as a consultant on major and complex projects to ensure that independent and professional expertise is readily available."[23]
- "The Authority believes that agreements — particularly with consultants — are only successful if they are fair to both sides."[24]
- "Large numbers of variations are inevitable on projects such as the Parliament House. The reasons include design alterations ranging from user changes, improvements in previously designed sections, coordination problems, consultant errors, principal-generated scope changes and nonavailability of materials."[25]

- "The PHCA strongly recommends the formulation of an industry approved standard form of agreement for the engagement of a CM [Construction Manager] as an agent."[26] [Author's note: Standards Association Australia has since produced AS 4916–2002 Construction management – General conditions and AS 4917–2003 Construction management trade contract – General conditions as part of a suite of contracts based on AS4000–1997.]
- "The decision of the Authority to construct the building on a trade basis was justified by the experiences, especially in the early part of the program. This enabled the achievement, using the fast track system, of greater speed and flexibility than with other methods."[27]
- "Traditional forms of contract are not specifically designed for, nor — at least in an unamended form — suited to fast tracking or to projects where a CM is employed rather than a main contractor."[28]
- "In the case of the Parliament House project the PHCA chose to nominate the Construction Director [as Superintendent] with largely satisfactory results ... Perhaps the most satisfactory solution, at least on major projects where there is sufficient demand for the full-time services of a superintendent, would be to devise a method for appointing a qualified nominee acceptable to all parties or at least perceived as the most independent choice."[29]
- "The PHCA always recognized that the project had to achieve high standards of quality and durability. This presented no problems as far as the design consultants were concerned but difficulties were anticipated in obtaining the specified standards in the field ... In anticipation of the need to introduce a refined quality assurance program, the PHCA, following a detailed study, adopted a system similar to that used in Canada. Many of the philosophies adopted can now be found in the new Australian Standard for Quality in Buildings (AS2900) ... The Authority strongly recommends quality assurance programs for all major projects, particularly when the achievement of standards above the norm is a requirement."[30]
- "Major projects require expert legal advice and inevitably need to resolve disputes through the arbitration process. The new Parliament House was no exception. The Authority believes it successfully managed this aspect, despite the lack of a standard form contract for a fast track CM-type project. While strongly recommending a study of its experiences, detailed in Chapter 21, the Authority would like to emphasise the following points:
  - — In the absence of a suitable form of contract, it is not satisfactory to try to amend an unsuitable form. It is preferable to word a new contract carefully, specifically tailored to the structure and requirements of the particular fast track project.
  - — At an early stage, select and engage the best available firm of solicitors specialising in the building and construction industry.
  - — Establish a comprehensive information management capability to provide an effective project database. Access to such information is essential when a contract enters the arbitration process."[31]

New Scottish Parliament House

When the Blair Labour Government came to power in 1997, one of its early commitments was to legislate for the devolution of power over Scottish affairs to a Scottish Parliament. That Parliament needed a Parliament house, and planning for it started in 1997, even before the *Scotland Act 1998* was passed. The man who was to become Scotland's Chief Minister took a proactive role in driving the project from its inception, and he recognised the architectural importance of the building as a national symbol, as well as the need to secure a workable, durable building that would last for a long time. Indeed, he is quoted as having said that "he had a mandate to act as the most important patron of the architecture of government for 300 years".[32]

The White Paper to the passing of the *Scotland Act 1998* identified the following essential features of the building, which were later incorporated into the user brief on which the design competition was based:

10.2 The building the Scottish Parliament occupies must be of such a quality, durability and civic importance as to reflect the Parliament's status and operational needs; it must be secure but also accessible to all including people with special needs; it must promote modern and efficient ways of working and good environmental practice.

10.3 It will be an important symbol for Scotland. It should pay tribute to the country's past achievements and signal its future aspirations. It must be flexible enough to accommodate changes over time in operational requirements. Quality and value for money are also key considerations.

10.4 The accommodation must allow Scottish Parliamentarians and their staff to work efficiently, harnessing the best of modern technology. People must be able to see and meet their elected representatives and to watch the Scottish Parliament in operation. Provision needs to be made to permit easy reporting and broadcasting of Parliamentary proceedings so that people throughout Scotland can be aware of its work and decisions.[33]

Following the selection of the four acre site at Holyrood, adjacent to the Royal Palace of Holyrood House, in January 1998, an international competition was held to select a designer. The brief for this design competition included:

- budget cost £50 million at March 1998 prices;
- building to be opened in July 2001;
- gross area of 21,000 m^2;
- high-quality materials and finishes;
- national symbol; and
- building fabric to last at least 100 years.[34]

The winning entry was the concept design put forward by a "signature" Spanish architect, Enric Miralles.[35] The Chief Minister was keen to have a Scottish architect, and the architectural brief was subsequently awarded to a specifically incorporated joint venture comprising Miralles' firm and a Scottish firm of architects. The Miralles' design was a striking and very complex collection of buildings with high-quality materials and some unusual design and construction features, including:

- exposed laminated oak roof beams in the debating chamber, connected by

110 uniquely specified stainless-steel nodes;
- themed irregular window and construction forms; and
- distinctive curved ceilings of the committee rooms and vaulted concrete ceilings of the public area below the debating chamber.

Project management was carried out by a team including civil servants and private sector appointees on secondment to the team. The organisation and senior personnel underwent a number of changes, including a change of client from the Secretary of State for Scotland to the Scottish Parliamentary Corporate Body, comprising the presiding officer and four members of Parliament. From the acceptance of schematic design in June 2000, the project management team was headed by a project director/ Sponsor, accountable to the Scottish Parliament through the clerk who was the principal accountable officer.[36] The design team, headed by the architect, was responsible to the project team, as was the cost consultant.

Because of the perceived importance of having the new Parliament House functioning as soon as possible, an early decision was made to "fast track" the project to enable construction to commence before design had been completed. The project team decided to procure the construction by engaging a construction manager (Bovis Lend Lease) to manage construction to be carried out by a number of individual trade subcontractors, with the design, tendering and construction overlapping. Each of the works package contracts was let by the project team. This method of project procurement appears to have been selected by the responsible civil servants without a clear understanding of the time and cost risks entailed, and without preparation of a comprehensive procurement strategy document. Furthermore, it was selected without properly informing the politicians responsible for the project that construction management meant the final cost could not be fixed before the project was complete, and of the substantially higher risk adopted by the client in that mode of project delivery. It appears that the requirement to deliver a landmark, high-quality project at the earliest possible time was the ultimate driver of the decision to adopt construction management, notwithstanding the cost risk, or perhaps because it was not fully understood.[37]

Edinburgh Scottish Parliament.

The first published cost estimates of building SPH were £10–40 million,[38] although these figures were not rationally based on a notional building or a specific site, and a minimum of £24.5 m had been identified previously.[39] The £40 million figure could never have been a realistic estimate for anything other than the most basic of new Parliament buildings, and there was no clear understanding whether that was the total cost including professional fees or only a construction cost.[40]

The assessment of the space requirements for the new Parliament by civil servants was originally 20,740 m² of gross area. This was costed for budget purposes at £50 m for the basic building cost (excluding fees, VAT and acquisition costs of £5 m) of a notional design of a single building on the Holyrood site. Additional non-building costs for site acquisition (£5 m), construction contingency (£5 m), fees (£10m), furniture and fit out (£8 m) and VAT (£13 m) brought the total estimated project cost to £90 m. This was based on an anticipated 129 Members of Parliament.

The winning Miralles concept design had a gross area of 27,610 m², which was estimated to cost £62.6 m. Following design development to produce a scheme design that was accepted in June 2000, the architect reported that the gross area had increased to 30,600 m². The additional area resulted from:
- additional provision of 3,000 m² net usable space requested by the client and project management;
- additional 6,300 m² balance area because the original brief assumed an efficiency factor of 87 per cent, whereas only 68 per cent of the gross area of the scheme design was net usable space;
- 2,500 m² additional net space because of architectural changes accepted by the client; and
- reduction in area of car parking of 1,900 m² for 65 instead of 130 spaces.

Subsequently the cost consultant and construction manager independently measured the gross area of the scheme

design which revealed an additional 2200 m^2 and 2400 m^2 over the 30,600 m^2 which the architect had reported and the client had approved.[41] The reason for this area increase was never satisfactorily explained by the architect, but meant that the gross area was actually approximately 33,000 m^2 .

By June 2000, the estimated construction cost had increased to £108 million (based on March 1998 prices), with the increase in gross area accounting for about half of the increase, with the other half arising from an increase in unit costs due to the nature and high-quality of the design for the building, delays to the design and progress of the works and other risk factors which had crystallised.[42] Some of the additional non-building costs had also increased: construction contingency (to £11 m), fees (to £26 m), furniture and fit out (to £17 m) and VAT (to £28 m) bringing the total estimated project cost to £209 m including landscaping of £14 m.[43]

In October 2000 a risk workshop identified risks with a total estimated risk cost of £51 m, substantially higher than the £11 m contingency provision at that stage. Seventy per cent of that identified risk was for items that were categorised as "highly likely" with at least a 95 per cent probability of occurring. Furthermore, it did not account for the monetary value attached to risks to the time schedule. The £11 m contingency provision was required to meet construction inflation (estimated to be £11–£13 m), as well as all the other significant construction risks. By the middle of 2001 it was apparent that the building could not be delivered for the then £195 m total budget approved, and Parliament passed a motion which effectively removed the previous overall budget constraint and did not set an upper limit.[44]

In June 2004 the Auditor-General reported a total forecast cost of £431 m for the project,[45] comprised of:

- construction: £241 m;
- construction risk contingency: £28 m;
- program contingency: £10 m;
- fees and site organisation: £68 m;
- VAT on construction: £42 m;
- fit out: £20 m;
- landscaping: £18m; and
- site, demolition and archaeology: £6 m.

The increase in construction cost from the approved budget of £108 m in 2000 to £273 m (including risk) in 2004 was estimated to arise from the following:[46]

- inflation from published indices: £19 m;
- client approved changes: £1 m;
- prolongation, disruption and delay: £73 m; and
- design development: £68 m.

The Auditor-General identified a number of shortcomings in the project delivery in his September 2000 report, many of which persisted to the end of the project. In the event, the ultimate project cost was of the order of £430 m, and the building was not opened until October 2004. Such massive cost and time overruns on a public building of such high-profile inevitably lead to public criticism which culminated in a public inquiry conducted by Lord Fraser QC. The final report of the inquiry,[47] and the complementary Auditor-General's reports[48] provide a textbook case study of the reasons why the costs of this high-profile public project costs escalated so much from the original estimates. The Australian reader of these reports has a sense of *déjà vu*, as many of the significant reasons for the time and cost overruns of the Scottish Parliament house were a reprise of issues that had surfaced in Australia decades earlier in the Sydney Opera House, and more recently (at least in respect of cost) in the Australian Parliament House.

Contributing factors to project performance

The Auditor-General and Lord Fraser identified a number of factors that contributed to the cost and time overruns, the most important of which were:

- **Architect's performance** The Joint Venture between architects of very different style and who had not previously worked together, appeared to be quite dysfunctional for a significant proportion of the time. Miralles worked in Barcelona, independently of the Scottish architects, and insisted on being personally involved in all design issues which inevitably involved delay and disruption. Communication issues were evident throughout the life of the joint-venture company.[49] Throughout the entire design the architect was apparently unable to meet the timetable for the provision of documentation, or to prepare designs that were within the budget that the client was aiming to achieve. Lord Fraser concluded that the architect's performance was below what could reasonably have expected.[50]
- **Construction management** Lord Fraser identified the decision to adopt construction management as "the single factor to which most of the misfortunes that have befallen the project can be attributed ... I regard the decision to adopt construction management without advising Ministers of the attendant risks and the inflexible insistence on a rigid program was among the most flawed decisions in the history at the project. It beggars belief that Ministers were not asked to approve the proposal to adopt construction management."[51] The Auditor-General also stated: "The difficulties of delivering the Holyrood building using the 'construction management' method of procurement lie at the heart of the problems that arose."[52]
- **Budget** The so-called budget of £50 m (at 1998 price levels and exclusive

of VAT and professional fees) in the design competition brief never had any basis in reality, and at the time of selection of the winning design was not set against even a tentative cost estimate. Notwithstanding that the winning architects' joint venture gave assurances that the design could be delivered within the budget, "it is difficult to see how that assertion could have been given conscientiously or taken seriously, given the embryonic state of the designs."[53]

- **Cost estimates and cost plan** The project team engaged a quantity surveyor to assist in the preparation of cost estimates, however it did not operate a genuine cost control process. The civil servants apparently believed the majority of cost risks identified could be "managed out", and accordingly did not inform the politicians of the actual cost estimates that had been prepared.[54] Lord Fraser concluded that the senior officials did not fully understand the cost advice they were receiving,[55] perhaps a function of the fact that these officials did not have any previous experience of construction.[56] It is doubtful that either the design team or the construction manager were ever properly committed to the cost plan as a basis for containing costs.[57]
- **Building brief** Although extensive design development occurred over the period 1998–2000, the building user brief was not changed. This meant that at an important stage in the project, the design was not being developed in response to a clearly formulated set of user requirements. Lord Fraser found that whilst the brief conveyed strong messages about the symbolism of the building and the expected high-quality, the messages in relation to program and more significantly in relation to budget were more muted.[58]
- **Timetable** The flow of design information required for construction failed to keep pace with the program demanded by the client and proposed by the construction manager. The architect was largely responsible for this, which arose because of poor coordination and communication between the offices in Edinburgh and Barcelona. Lord Fraser was of the view that "it ought to have been more completely understood by the client that high-quality design work takes time, and that the program itself was unrealistic given the complexities of the design, especially after Mr Brigg's report in February 2002. Bovis [the construction manager] too should have understood that. By the same token, the architect should not have signed up to programs which it could not honour and ought, in my view, to have been more vociferous in relation to the time needed to achieve designs which could be programmed accurately. The program was propelled by the client obsession with early completion. Irreconcilable objectives were being set. [The Scottish First Minister], the SPCB [Scottish Parliamentary Corporate Body] and later the HPG [Holyrood Progress Group] all wanted to maintain the character and integrity of the concept for the Parliament. What appears not to have been completely grasped, if at all, throughout the project was that if the quality and unique complexity of the building was of overriding importance, the program and timing of completion would be affected significantly and extra cost would inevitably occur."[59]
- **Communications** Many aspects of the lines of communication from the project team and the architectural joint venture were criticised by the Auditor-General and Lord Fraser as unclear and inconsistent with good practice.[60] There were a number of project managers, and from mid-2000 to the end of the project there were four different project directors. The project director from July 2001 to June 2004 was an administrative civil servant with no construction background who was required to "manage the political dimension of the Project as well as earn the confidence of the professional consultants".[61]
- **Client preferences** The client placed greater store on the issue of aesthetics/quality than on either cost or program. For example, Kemnay granite was chosen in preference to an alternative resulting in additional costs of £520,000 when the bids for the cladding package were already £3 m over budget.[62]

As can be seen from the cost figures quoted above, the client did not significantly alter its requirements after 2000, and the size and layout of the building were not materially altered. The Auditor-General identified that the main reasons for construction cost increases after 2000 were design development and delay in the construction process. "For this project, design development became a process of costing the developing design rather than developing the design within a cost limit."[63] The extent of design development can be gauged from the 10,000 changes that project management approved over the course of the project. There were many novel and complex features of the design, in particular the foyer roof and glazing. In some cases complex architectural requirements involved previously untested building solutions in which the difficulties were made worse by tight tolerances and multiple complex interfaces between packages.[64] Further, the delays in producing architectural details after contracts had been let resulted in substantial increases in contract costs from the multitude of change orders and delay and disruption. As an example, the cost plan allowed a lump sum of £0.7 m for the foyer roof and glazing package for which a tender of £2 m was accepted. Ultimately the estimated costs increased to £7.4 m as a result of the extent of design development post tender, and extensions of time for delays due to other packages not completed on time and difficulties of crane access.[65]

The Auditor-General was unequivocal in assigning responsibility for the program slippage: "The main cause of the 20 months delay to the project since September 2000 was the production of detailed design variations and the late supply of information during the construction process. There were difficulties associated with the construction of a very complex, densely developed, unusual building against very tight deadlines. In some cases trade contractors were responsible for some elements of design. Both the architects and some trade contractors did not deliver on time some critical elements of the design work."[66] Lord Fraser apparently considered that the time required for the "design flow" was an inevitable consequence of the complexity of the design: "In consideration of this problem, the tension among time, cost and quality is very well illustrated, in that it is plain that if the time criterion is set too tightly, it is likely to

follow that the design flow will fail to meet expectations. In addition if as a result of time parameters having been set too tightly, construction cannot proceed in accordance with the program, then there will clearly be a cost penalty, as has been the case."[67]

In hindsight, it should not be surprising that the cost and time of this project overran its budget to the extent that it did. In the real world it is practically impossible to give equal emphasis to all three elements of time, cost and quality, and it is naive to suggest that all three can be satisfied in equal measure. It is clear that in the case of SPH, having selected a signature architect to deliver a landmark building, quality was paramount. In his principal conclusions, Lord Fraser aptly summed this up: "Whenever there was a conflict between quality and cost, quality was preferred. Whenever there was a conflict between early completion and cost, completion was preferred without in fact any significant acceleration being achieved."[68]

Conclusion

Both APH and SPH highlighted the risks and cost consequences of adopting a fast track construction management method of procuring a large complex high quality public building with tight construction deadlines. Both of these buildings clearly delivered the architectural and building quality expected of them, each having subsequently been awarded a number of architectural prizes. With respect to time and cost outcomes, the evidence shows that procurement of Australian Parliament House was better managed than the Scottish Parliament House. Perhaps one of the key differences between these two buildings was the Australian decision to adopt conventional structures, using existing technology. Although there were clearly issues arising from the tight timeframe for delivery of design information for construction for APH, the extent of design development for SPH was substantial and very time consuming as a consequence of the novelty and complexity of the design.

It is suggested that many of the time and cost issues that plagued the Scottish Parliament House could have been avoided or at least reduced by careful study and heeding the lessons learned from the Australian experience. The report prepared by the Parliament House Construction Authority to document its experiences provides a thorough analysis of the project and an assessment of the factors that contributed to time, cost and quality issues. In particular, the time and cost risks that arose from the use of fast track construction procurement by construction management were well identified, as were the difficulties of managing architects to procure design documents to an extremely tight program, in circumstances where quality was paramount, and was clearly seen as such by the end client.

No doubt managing a large and complex public building project in a political environment will never be easy, and perhaps it is impossible reconcile the conflicting demands of time, cost and quality. Nevertheless, documentation of the Australian Parliament House experience suggests that not all the same lessons had to be relearned during delivery of the Scottish Parliament House.

Notes

1. G.A. Leonards "Investigation of Structural Failures" (1982) No GT2 (February) *Journal of the Geotechnical Engineering Division* (ASCE) 108.
2. Commonwealth, *Parliament House Construction Authority: Construction Project Management*, Parl Paper No 147 (1987).
3. Parliament House Construction Authority, Commonwealth, *Project Parliament: The Management Experience* (1990).
4. Auditor-General, Scotland, *The new Scottish Parliament Building: An Examination of the Management of the Holyrood Project* (2000).
5. Audit Scotland, *Management of the Holyrood Building Project* (2004).
6. Scotland, A Report by the Rt Hon Lord Fraser of Carmyllie QC, *The Holyrood Inquiry*, SP Paper No 205 (2004).
7. Parliament House Construction Authority, Commonwealth, *Response to the Order to the General's Efficiency Audit Report on the New Parliament House Project/Parliament House Construction Authority* (1987) 88.
8. Parliament House Construction Authority, Commonwealth, *Project Parliament: The Management Experience* (1990) 21–23.
9. Ibid, 21.
10. Commonwealth, *Parliament House Construction Authority: Construction Project Management*, Parl Paper No 147 (1987) 65.
11. Ibid, 26.
12. Ibid, 68.
13. Commonwealth, *Parliament House Construction Authority: Construction Project Management*, Parl Paper No 147 (1987) Appendix B.
14. Parliament House Construction Authority, Commonwealth, *Response to the Order to the General's Efficiency Audit Report on the New Parliament House Project/Parliament House Construction Authority* (1987).
15. Parliament House Construction Authority, Commonwealth, *Project Parliament: The Management Experience*, (1990)
16. Parliament House Construction Authority, Commonwealth, *Response to the Order to the General's Efficiency Audit Report on the New Parliament House Project/Parliament House Construction Authority* (1987) 84.
17. Ibid, 91.
18. Parliament House Construction Authority, Commonwealth, *Project Parliament: The Management Experience*, (1990) 165.
19. Ibid, 166.
20. Ibid, 167.
21. Ibid, 168.
22. Ibid, 169.
23. Ibid, 170.
24. Ibid, 171.
25. Ibid.
26. Ibid, 172.
27. Ibid, 173.
28. Ibid.
29. Ibid, 174.
30. Ibid, 177.
31. Ibid.
32. Scotland, A Report by the Rt Hon Lord Fraser of Carmyllie QC, *The Holyrood Inquiry*, SP Paper No 205 (2004) 55.
33. United Kingdom, *Scotland's Parliament*, White Paper presented by Secretary of State to Scotland (1997) 10.7 (http://www.scotland.gov.uk/government/devolution/scpa-13.asp).
34. Audit Scotland, *Management of the Holyrood Building Project* (2004) 14.
35. "A signature architect is [a] high profile individual who is very clearly identified personally with a building and its design. The top (house-

hold) names in architecture can be regarded as signature architects." (Audit Scotland, *Management of the Holyrood Building Project* (2004) 77).

36. Auditor-General, Scotland, *The New Scottish Parliament Building: An Examination of the Management of the Holyrood Project* (2000) 4.
37. Scotland, A Report by the Rt Hon Lord Fraser of Carmyllie QC, *The Holyrood Inquiry*, SP Paper No 205 (2004) 86.
38. United Kingdom, *Scotland's Parliament*, White Paper presented by Secretary of State to Scotland (1997) 10.7 (http://www.scotland.gov.uk/government/devolution/scpa-13.asp).
39. Scotland, A Report by the Rt Hon Lord Fraser of Carmyllie QC, *The Holyrood Inquiry*, SP Paper No 205 (2004) 21.
40. Ibid, 27; Auditor-General, Scotland, *The New Scottish Parliament Building: An examination of the management of the Holyrood Project* (2000) 21.41. Audit Scotland, *Management of the Holyrood building project*, (2004) 21.
42. Auditor-General, Scotland, *The New Scottish Parliament Building: An Examination of the Management of the Holyrood Project* (2000) 23–24.
43. Ibid, 25.
44. Audit Scotland, *Management of the Holyrood Building Project* (2004) 21–24.
45. Ibid, 18.
46. Ibid, 57.
47. Scotland, A Report by the Rt Hon Lord Fraser of Carmyllie QC, *The Holyrood Inquiry*, SP Paper No 205 (2004).
48. Auditor-General, Scotland, *The New Scottish Parliament Building: An Examination of the Management of the Holyrood Project* (2000); Audit Scotland, Management of the *Holyrood Building Project* (2004).
49. Scotland, A Report by the Rt Hon Lord Fraser of Carmyllie QC, *The Holyrood Inquiry*, SP Paper No 205 (2004) 105.
50. Ibid, 136.
51. Ibid, 86.
52. Audit Scotland, *Management of the Holyrood Building Project* (2004) 1.
53. Scotland, A Report by the Rt Hon Lord Fraser of Carmyllie QC, *The Holyrood Inquiry*, SP Paper No 205 (2004) 66.
54. Ibid, 101–102.
55. Ibid, 111.
56. Ibid, 98.
57. Ibid, 172–174.
58. Ibid, 76.
59. Ibid, 230.
60. E.g. Scotland, A Report by the Rt Hon Lord Fraser of Carmyllie QC, *The Holyrood Inquiry*, SP Paper No 205 (2004) 107, 164, 177, 189–192, 194, 198.
61. A Report by the Rt Hon Lord Fraser of Carmyllie QC, *The Holyrood Inquiry*, SP Paper No 205 (2004) 193.
62. Ibid, 199.
63. Audit Scotland, *Management of the Holyrood Building Project* (2004) 6.
64. Ibid, 26.
65. Ibid, 55.
66. Ibid, 1.
67. A Report by the Rt Hon Lord Fraser of Carmyllie QC, *The Holyrood Inquiry*, SP Paper No 205 (2004) 228.
68. Ibid, 240.

BDPS Regional News

The inaugural meeting of the Ballarat Chapter was held at the Ballarat Yacht Club on 8 August 2007.

Approximately 30 solicitors, builders, building consultants, engineers and architects attended, including President Andrew Whitelaw, Immediate Past President John Anderson and Ed Samo from the Building Commission. Cathy Aird, Deputy President of the Domestic Building List and Marg Lothian, Principal Mediator, gave an informative run-down of the List procedures, experts giving evidence at VCAT and mediation.

A Steering Committee of seven, to be led by Rex Petersen as Co-coordinator, was formed. The Committee met in November to plan a membership drive within the Ballarat and surrounding areas and the Chapter's first Discussion Evening.