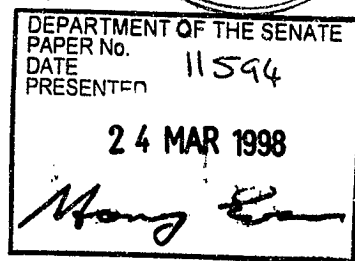
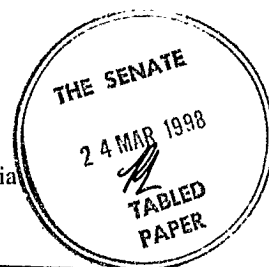


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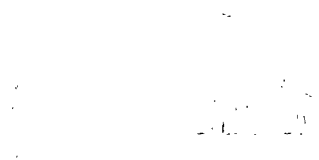
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## REPORT 357

The Jindalee Operational Radar  
Network Project

March 1998

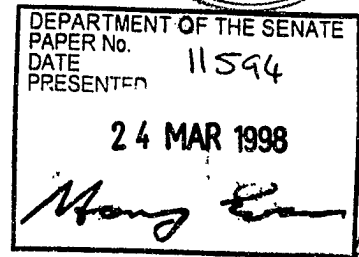


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Joint Committee of Public Accounts  
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## REPORT 357

The Jindalee Operational Radar  
Network Project

March 1998

## MEMBERSHIP OF THE COMMITTEE

Mr A M Somlyay, MP (Chairman)<sup>1</sup>  
Mr R E Charles, MP (Chairman)<sup>2</sup>

Mr A P Griffin, MP (Vice-Chairman)

Senator H Coonan	Mr L Anthony MP
Senator the Hon R Crowley	Hon D Beddall MP
Senator the Hon B Gibson AM	Mr R Broadbent MP
Senator J Hogg	Hon J Crosio MP
Senator A Murray	Mr J Fitzgibbon MP
Senator J Watson	Mr P Georgiou MP
	Hon J Sharp MP
	Mrs S Stone MP

Secretary:	Mr Grant Harrison (until 14.11.97)
	Dr Margot Kerley (from 17.11.97)

---

1 Discharged 22 October 1997  
2 Appointed 22 October 1997

## MEMBERSHIP OF THE JORN SECTIONAL COMMITTEE

Mr Alex Somlyay, MP (Chairman)<sup>3</sup>  
Mr Bob Charles, MP (Chairman)<sup>4</sup>

Mr Alan Griffin, MP (Vice-Chairman)

Senator the Hon Rosemary Crowley	Hon David Beddall MP
Senator the Hon Brian Gibson AM	Mr Russell Broadbent MP
	Mr Petro Georgiou MP
	Mrs Sharman Stone MP
Inquiry Staff	Ms Gillian Gould
	Ms Maureen Chan
	Ms Donna Christophers
	Ms Laura Gillies
	Mrs Yolanda Rao

3 Discharged 22 October 1997  
4 Appointed 22 October 1997

## DUTIES OF THE COMMITTEE

The Joint Committee of Public Accounts and Audit is a statutory committee of the Australian Parliament, established by the *Public Accounts and Audit Committee Act 1951*.

Section 8(1) of the Act describes the Committee's duties as being to:

- (a) examine the accounts of the receipts and expenditure of the Commonwealth, including the financial statements given to the Auditor-General under subsections 49(1) and 55(2) of the *Financial Management and Accountability Act 1997*;
- (b) examine the financial affairs of authorities of the Commonwealth to which this Act applies and of intergovernmental bodies to which this Act applies;
- (c) examine all reports of the Auditor-General (including reports of the results of performance audits) that are tabled in each House of the Parliament;
- (d) report to both Houses of the Parliament, with any comment it thinks fit, on any items or matters in those accounts, statements and reports, or any circumstances connected with them, that the Committee thinks should be drawn to the attention of the Parliament;
- (e) report to both Houses of the Parliament any alteration that the Committee thinks desirable in:
  - (i) the form of the public accounts or in the method of keeping them; or
  - (ii) the mode of receipt, control, issue or payment of public moneys;
- (f) inquire into any question connected with the public accounts which is referred to the Committee by either House of the Parliament, and to report to that House on that question;
- (g) consider:
  - (i) the operations of the Audit Office;
  - (ii) the resources of the Audit Office, including funding, staff and information technology;
  - (iii) reports of the Independent Auditor on operations of the Audit Office;

- (h) report to both Houses of the Parliament on any matter arising out of the Committee's consideration of the matters listed in paragraph (g), or on any other matter relating to the Auditor-General's functions and powers, that the Committee considers should be drawn to the attention of the Parliament;
- (i) report to both Houses of the Parliament on the performance of the Audit Office at any time;
- (j) consider draft estimates for the Audit Office submitted under section 53 of the *Auditor-General Act 1997*;
- (k) consider the level of fees determined by the Auditor-General under subsection 14(1) of the *Auditor-General Act 1997*;
- (l) make recommendations to both Houses of Parliament, and to the Minister who administers the *Auditor-General Act 1997*, on draft estimates referred to in paragraph (j);
- (m) determine the audit priorities of the Parliament and to advise the Auditor-General of those priorities;
- (n) determine the audit priorities of the Parliament for audits of the Audit Office and to advise the Independent Auditor of those priorities; and
- (o) undertake any other duties given to the Committee by this Act, by any other law or by Joint Standing Orders approved by both Houses of the Parliament.

## TERMS OF REFERENCE

As part of its statutory responsibility to examine reports from the Auditor-General, the Committee shall inquire into and report on *Audit Report No. 28, 1995-96, Jindalee Operational Radar Network Project, Department of Defence (June 1996)* and any circumstances connected with matters raised in the audit report.

The Committee's inquiry will focus on:

- (a) the management of the project by the Department of Defence, and
- (b) the performance of Telstra Corporation Ltd in its capacity as the prime contractor for the JORN project.

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## GLOSSARY

IRSU	1 Radar Surveillance Unit
ADF	Australian Defence Force
AEW&C	Airborne Early Warning and Control
AI	Australian Industry Involvement
ANAO	Australian National Audit Office
AOCI	Australian Ownership and Control of Information
AWA	Amalgamated Wireless (Australasia) Ltd
BHP	Broken Hill Proprietary
CDR	Critical Design Review
CI	Configuration Item
CSA	Computer Sciences of Australia
CSCI	Computer Software Configuration Item
Defence	Department of Defence
DOA87	<i>Defence of Australia 1987</i>
DoD	Department of Defence
DOD-STD	US Department of Defense Standard
DSTO	Defence Science and Technology Organisation
ETC	Estimate To Complete
FMS	Frequency Management System
FYDP	Five Year Defence Program
GBE	Government Business Enterprise
GE	General Electric
GEC-Marconi	GEC-Marconi Systems Pty Ltd
HF	High Frequency
HFRD	High Frequency Radar Division (DSTO)
HQADF	Headquarters Australian Defence Force
ICD	Interface Control Document
IP	Intellectual Property

## GLOSSARY

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JCPA	Joint Committee of Public Accounts
JCPAA	Joint Committee of Public Accounts and Audit
JFAS	Jindalee Facility Alice Springs
JORN	Jindalee Operational Radar Network
JORN IP	JORN Intellectual Property
JPO	Jindalee Project Office
LADS	Laser Airborne Depth Sounder
LEA	Lindsay L Ekert and Associates Pty Ltd
LMC	Lockheed Martin Corporation
MCS	Major Capability Submission
MIL-STD	Military Standard (US)
OTC	Overseas Telecommunications Corporation
OTHR	Over-the-Horizon Radar
PDS	Preliminary Design Study
RAAF	Royal Australian Air Force
RAN	Royal Australian Navy
RAP	Risk Abatement Plan
RFT/RFI	Request for Tender/Request for Information
RLM	RLM Management Company
TAT	Telstra Applied Technologies
Telstar	Telstar Systems Pty Ltd
Telstra	Telstra Corporation Limited
TDS	Transfield Defence Systems
UK	United Kingdom
USA	United States of America
USAF	United States Air Force

## CHAIRMAN'S FOREWORD

This report presents the findings of the inquiry of the Joint Committee of Public Accounts and Audit into the Jindalee Operational Radar Network (JORN) Project.

The Committee decided to conduct this inquiry following its review of the report of the Auditor-General *Audit Report No.28, 1995-96, Jindalee Operational Radar Network (JORN) Project, Department of Defence*, which raised a number of serious concerns about Defence's management of the project. The Committee resolved to investigate further Defence's management of the JORN Project and to expand its terms of reference to encompass the performance of the Telstra Corporation Ltd in its capacity as prime contractor.

In June 1991 Defence entered into a contract with Telstra (then Telecom) to acquire a wide area surveillance capability based on an over-the-horizon radar technology which had been developed in Australia. The JORN Project was scheduled to be completed by mid 1997. By then, however, the project had fallen four years behind schedule and had incurred cost overruns of over \$600 million.

The Committee is particularly concerned that, given that Telstra was a Commonwealth entity, any additional costs incurred by Telstra over and above the contract price to be paid by Defence are costs to the Commonwealth in terms of reduced dividend payments to the Government and its shareholders.

The Committee found deficiencies in almost every aspect of the JORN Project: in the process of selecting the prime contractor; in the supervision of the prime contractor by Defence; in the management of the project by Telstra; and in the performance of a key sub-contractor, GEC-Marconi.

In particular, significant problems were found to exist in project management. The Committee believes that it is critical that Defence obtain the *best* project managers, if necessary from overseas, for major acquisition projects. Defence should choose appropriately experienced consortiums or companies to acquire major defence capabilities, with a particular focus on choosing the best project managers.

The Committee believes that Defence should also establish a proper career structure in procurement and project management within its own organisation.

Defence spends in the order of \$3 billion a year on major projects. It is essential that Defence address project management shortcomings and establish sound procedures which will ensure that high cost projects are completed within allocated budgets and time-frames.

The Committee has had a longstanding interest in Defence's management of major projects and will continue to monitor Defence's performance in this area.

The inquiry into the JORN Project was conducted by the JCPA which, through a legislative change, became the Joint Committee of Public Accounts and Audit (JCPAA) on 1 January 1998. Reference to the Committee in the report is therefore to the JCPA. The JCPAA subsequently adopted the JORN Project inquiry and the evidence taken by the JCPA.

In conclusion, I would like to express the Committee's appreciation to those people who contributed to the review by preparing submissions and giving evidence at both public and *in camera* hearings. I would also like to thank John Alcock from the Department of Defence and, in particular, Ray McNally from the Australian National Audit Office who not only acted as observer but as a valuable source of assistance during the course of the Committee's inquiry.

Finally, I wish to acknowledge the contribution of the former Chairman of the JCPA, the Hon Alex Somlyay, and, on behalf of the Committee, thank the members of the sectional committee for their time and dedication in conducting what has been a complex and lengthy inquiry.



Bob Charles MP  
Chairman  
24 March 1998

# JCPA OVERVIEW OF THE JINDALEE OPERATIONAL RADAR NETWORK PROJECT

## Introduction

The Jindalee Operational Radar Network (JORN) Project is a major defence acquisition project which, the Committee was told, was to cost a total of \$1108 million in December 1995 prices (later revised to \$1117 million, December 1996 prices to cover escalation and exchange variations).

The project is to construct a number of integrated 'over-the-horizon' radar facilities which will provide a wide area surveillance capability for the Australian Defence Force. It is a capability which does not presently exist in this format and is based on a technology which was developed in Australia.

In addition to the Department of Defence, the original key players in the JORN Project were Telstra Corporation (the prime contractor), GEC-Marconi Pty Ltd (a sub-contractor responsible for the design and supply of major components of the radar) and Telstar Systems Pty Ltd (a sub-contractor responsible for the development of a significant proportion of the radar's software).

The contract for the JORN Project was signed in June 1991 and specified that the prime contractor was to provide a working radar network to the Commonwealth by June 1997 for a target price of \$814 million and a ceiling price of no more than \$895 million (December 1995 prices - revised to \$902 million, December 1996 prices).

From the beginning the project has been bedevilled with technical and management problems. The effect of these problems is plain to see; as at June 1997 (the contracted completion date):

- Australia did not have a working radar;
- the parties had not agreed on a firm revised completion date, although Defence is hoping for completion by December 2001 (a delay of more than four years);

- the prime contractor had been paid \$679,446,023 (November 1996), which represented 76 per cent of the then ceiling price;
- the prime contractor had made a loss on the project (that is, has incurred costs in excess of the contracted ceiling price) to the extent of \$605 million; and
- the prime contractor was endeavouring to divest itself of responsibility for completing the project and had appointed a management company (a joint venture between Lockheed Martin Corporation and Transfield Defence Systems) to manage the project.

The JCPA has sought to understand how this situation developed and what the future holds for the JORN Project. In the process the Committee drew some conclusions about what might be done to avoid similar problems occurring in other defence acquisition projects.

## The JCPA inquiry

The JCPA reviewed *Audit Report No.28, 1995-96, Jindalee Operational Radar Network (JORN) Project*, which examined Defence's management of the JORN Project, at a public hearing in July 1996.

The hearing raised several issues which contributed to the JCPA's decision to conduct its own comprehensive inquiry into the management of the JORN Project, in particular:

- the sheer magnitude and significance of the project;
- the admission by the prime contractor, Telstra, of a likely financial loss on the project;
- the extent of the Commonwealth's liability;
- the impact of Telstra's performance on Defence's management of the project; and, conversely, the impact of Defence's management on Telstra's performance;
- the failure of the hearing to dispel the Committee's scepticism, based on its previous experience, about Defence's ability to manage major projects; and

- the character of the evidence given. The Committee perceived a mismatch between the manifest problems revealed in the Auditor-General's report and the evidence given at the 'round table' hearing. The Committee believed that too many questions were not answered in an open and forthright way.

The Committee was dissatisfied with the caution with which witnesses addressed the issues raised with them by the Committee. Given the significance of the contract and the problems raised by the audit report, the Committee was unhappy to let the matter rest.

The Committee found that some witnesses from Telstra and Defence were reluctant to provide candid answers to its questions.

For example, Mr Lindsay Yelland, representing Telstra, admitted on 23 July 1996 that he 'believe[d] we will make a loss on the project' and that 'it is possible that we might incur a loss on JORN'. It was subsequently revealed that Mr Yelland had known for at least 12 months that Telstra would indeed make a loss: Telstra's auditors, Price Waterhouse, had drawn Telstra's attention to the potential loss and provision had been made for it in the June 1995 accounts.

The Committee also found that, notwithstanding that the project had fallen well behind schedule and that Telstra faced a significant financial loss, witnesses painted a picture of a warm and supportive relationship between Defence and Telstra which failed to reflect the degree of acrimony that had developed between them and the impact that this was to have on the progress of the project.

At every stage the Committee experienced immense difficulty in extracting details. The witnesses had to be pressed constantly for information. The Committee believes that, at times, both Telstra and Defence claimed commercial and strategic sensitivities as a means of limiting open examination of their performance.

The Committee appreciates the need for confidentiality at some phases of commercial dealings. 'Commercial-in-confidence' status does not, however, justify witnesses withholding information requested by the JCPA.

The JCPA has a statutory obligation to examine Auditor-General's reports and all public servants and officials responsible for the expenditure of public funds have a duty to provide the Committee with accurate and detailed answers to questions put to them. Witnesses to an inquiry may request that their evidence be taken *in camera* if they have concerns about answering questions publicly. The Committee should not have to draw upon its full powers to extract the information that it needs to perform its role.

## The problems with JORN

### Overview

The JORN Project was intended to achieve a wide area surveillance network and to develop an indigenous defence industry capability. With respect to JORN neither of these objectives has been achieved.

The JCPA found deficiencies in almost every aspect of the JORN Project: in the process of selecting the prime contractor; in the supervision of the prime contractor by Defence; in the management of the project by the prime contractor; and in the performance of a key sub-contractor.

### Selecting the prime contractor

The processes for selecting the prime contractor for JORN were conducted in accordance with government purchasing policies (involving preliminary investigations, industry briefings, requests for tender, and preliminary design studies) and were protracted (beginning in June 1988, three years before the contracts were finalised). Observance of the process did not result in the selection of a prime contractor capable of delivering the product on time and on budget.

A significant factor in the selection process was that too much importance was placed on 'growing an Australian prime' contractor and not enough on ensuring that the preferred contractor could do the job. In the process the important goal of enhancing Australia's surveillance capability was compromised.

One of the most telling findings on this aspect of the project was that those involved in selecting the contractor ignored the report of an internal Defence Department review team which concluded, early in the process, that the best approach would be to select a contractor *experienced* in over-the-horizon radar technologies and with a *proven* track record in managing major defence projects. The review team had favoured a US-based prime contractor with an Australian company in partnership.

The joint venture company currently managing the project on behalf of Telstra, and considering acquiring the project, involves a US-based company in partnership with a local defence industry contractor. It is ironic that the US company is Lockheed Martin, which had formerly operated as General Electric and, as a member of the AWA consortium, had tendered for the JORN Project in 1990.

While it may be that the management of the prime contract by a joint venture company offers the best way ahead for the JORN Project, the situation highlights the deficiencies of the original selection process and the failure to appreciate potential hazards of placing responsibility for a project of the magnitude of JORN with a company inexperienced in acting as prime contractor for a major defence system development project.

#### *Defence's supervision of the prime contractor*

The JCPA agrees with the Auditor-General's conclusions that the Commonwealth's interests would have been better protected had Defence dealt more firmly and promptly with Telstra by handling in a more thorough, timely and systematic manner the problems which have emerged in the project.

For example, Defence did not intervene early enough or with sufficient vigour to:

- require Telstra to put in place formalised and systematic risk assessment procedures (as required by the contract);
- insist on an independent technical audit in 1993, when concerns about Telstra's performance first emerged;

- insist on greater Telstra consultation with the High Frequency Radar Division in the Defence Science and Technology Organisation (DSTO) (world renowned experts in the field of over-the-horizon radar technology);
- insist on complete, correct and documented system design reviews, system requirement reviews and work breakdown structures before progressing to large-scale detailed design work; and
- insist on identified progress being met before making payments to Telstra.

The nature of the contract between the Commonwealth and Telstra gave rise to two other problems: an inappropriate basis for making progress payments; and a counter-productive aversion to sharing in the risk associated with design decisions.

The contract provided for payments to be made to Telstra on the basis of preset milestones (or targets). However, the milestones were amended to match Telstra's expenses (so that the contract's neutral cash flow provisions were honoured). They were later found to be only a coarse measure of progress and, as the project went on, there was an increasing mismatch between the payments made to Telstra and the earned value of the work completed. The payment regime has now been altered to reflect earned value in order to provide a more reliable and objective measure of how much work has been accomplished on the project.

Defence's unwillingness to give progressive approval to Telstra's system designs, while understandable given the terms of the contract (which was clear in making Telstra responsible for designing the radar network), contributed to Telstra's difficulties in finalising and progressing a design capable of meeting JORN's very demanding performance specifications.

*Telstra's management of the project*

Telstra's lack of experience in Defence contracting and its unfamiliarity with contracts written in terms of required functions and performance became evident in the early stages and were to have damaging consequences for the project. Nonetheless, Telstra's inexperience was a known factor from the outset yet little was done to achieve the objective of developing Telstra as 'an Australian prime' through the transfer of technology, project management skills or systems engineering expertise.

The transfer of skills to Telstra may have been accelerated by engaging appropriately skilled and experienced US project managers and team leaders to act as mentors to Telstra's personnel. They may also have been engaged as line managers and given authority, responsibility and rewards for desired project outcomes. Defence could have insisted on this, given that technology and project management capability transfer was the second highest JORN Project goal.

The Committee believes that many of the problems experienced by Telstra were:

- demonstrated lack of commitment by senior management to the JORN Project;
- failure to access relevant expertise in Defence project management or systems engineering;
- failure to develop an effective relationship with DSTO, notwithstanding that DSTO had developed the JORN technology; and
- compromised systems engineering processes in the face of schedule pressures, in particular, a failure to apply adequate rigour to systems engineering planning and to finalise the design. This had significant ramifications for sub-contractors, particularly Telstar.

Telstra also encountered significant difficulties in its management of a major sub-contractor, GEC-Marconi.

Many of these difficulties stemmed from the construct of the original sub-contract which gave rise to a cumbersome division of responsibilities between Telstra and GEC-Marconi. Remaining unresolved for over three years, the problem of

poorly specified interfaces and lack of a coherent plan to manage and control hardware and software interface configurations significantly influenced Telstra's management of the sub-contract.

It is clear that the organisational culture of Telstra militated strongly against the establishment of productive relationships with both GEC-Marconi and Defence and against properly resourcing its own JORN Project Office to accomplish the task.

*The performance of the sub-contractors*

While the terms of reference did not extend to assessing the performance of sub-contractors, evidence to the inquiry suggested that the work of sub-contractors was generally satisfactory, with the exception of GEC-Marconi.

The Committee was told that GEC-Marconi's inability to deliver transmitters and receivers and associated drivers to quality, performance and time requirements had a critical impact on the project's cost and schedule. The Committee notes that there appear to have been significant problems in GEC-Marconi's involvement in United Kingdom major defence projects which had been revealed during the 1980s by the UK Public Accounts Committee and were publicly known before the JORN contract was signed.

The Committee noted that Telstar was unable to meet its initial contractual commitments as a result of Telstra's failure to establish a software requirements baseline on time. This denied the software developers a contractually binding baseline of software performance requirements for each individual software configuration item. However, the pressure of meeting schedule deadlines resulted in Telstar commencing an iterative software development process using threads of software requirements as particular software requirements became known. This may result in the delivery of a fully integrated stable software system in advance of the integration of hardware and software configuration items, and thereby reduce the level of risk in the final JORN integration. This remains to be proven.

*Intellectual Property*

The Committee concluded that it may be timely for Defence to review its current Intellectual Property (IP) policy to assess whether it is achieving its objectives, particularly those of value for money and encouraging increased industry investment and capability.

The Committee is also concerned that there may be a general lack of understanding by Defence procurement and acquisition staff of IP and its importance.

**Possible solutions***Recommendations*

With regard to its own management of major projects Defence should adopt the following recommendations:

- *obtain the best possible managers, if necessary from overseas, for major acquisition projects;*
- *employ the most appropriately qualified and experienced personnel in its senior project positions and not limit identification of these personnel to Defence or Government staff, bringing in non-Defence Department experts on contract, where necessary;*
- *choose appropriately qualified consortiums or companies to acquire major defence capabilities, with a particular focus on choosing the best project managers;*
- *establish a career structure in procurement and project management;*
- *ensure that in any future Commonwealth contracts and related sub-contracts Commonwealth access to Intellectual Property is explicitly defined;*
- *review its current policy and guidelines on Intellectual Property to determine whether its*

*objectives are still appropriate and, if so, to what extent they are being achieved; and*

- *assist its procurement and project staff to become sufficiently aware of the relevance and importance of Intellectual Property rights to ensure the effective management of IP issues pre-contract, at contract negotiation and during contract management.*

**The way ahead for JORN**

The future of the JORN Project is far from clear.

Defence asserts that the radar network's performance requirements are technically achievable; that the project will not cost the Department more than the contracted ceiling price; and that they accept the prime contractor's revised completion date of December 2001. They also assert that they have learnt from their early experiences with the project and that their project management practices and procedures are much improved and adequate for the tasks that remain.

The partners in the joint venture company now managing the project for Telstra (Lockheed Martin Corporation and Transfield Defence Systems) have expressed confidence that the radar network can and will be completed.

However, there are good reasons for a more cautious assessment to be made.

Although much has been done to mitigate the technical risks that are still to be confronted in the project, the fact remains that it is in the last years of the project that the high-cost, high-risk systems integration phase will take place and the integration risks are heightened by many of JORN's performance specifications being at or beyond current state-of-the-art. As Defence's new submarine project has shown, systems integration and testing can be particularly troublesome and time consuming.

There is considerable uncertainty in relation to the final cost to the Australian community of this project. It is true that the commitment to the prime contractor from the Defence budget is capped at \$902 million (as at July 1997). However, Telstra (as a government business enterprise) has incurred costs

significantly more than the ceiling price. Telstra's financial accounts for 1995-96 and 1996-97 reveal that a provision of \$605 million has already been made for the loss.

In addition, Lockheed and Transfield's review of JORN's cost and schedule and the possible change in the prime contractor arrangement introduce a whole range of possibilities and consequent uncertainties into the project. Until the results of that process are released publicly the community will have no way of knowing:

- precisely what remains to be done to produce an over-the-horizon radar network to the required standards;
- when it will be completed and how much it will cost; and
- what continuing obligations Telstra will have in relation to the project.

While the new arrangements may well result in the JORN Project being completed in accordance with the revised schedule, there remains a need for Defence to learn from the mistakes which have been made since 1991 and exercise strong financial and project management of the project.

The JCPA has examined a number of Defence projects and programs which have revealed Defence's consistent inability to gain value for money. It is essential that Defence addresses project management shortcomings and establishes sound procedures which will ensure that high cost projects are completed within allocated budgets and time-frames.

# 1

## INTRODUCTION

### Background to the inquiry

1.1 In June 1996 the Auditor-General tabled *Audit Report No.28, 1995-96, Jindalee Operational Radar Network (JORN) Project, Department of Defence* which assessed the performance of the Department of Defence's management of the JORN Project in the light of accepted project management techniques, including risk management.<sup>1</sup> The audit report was reviewed by the Joint Committee of Public Accounts (JCPA).<sup>2</sup>

1.2 The finding of the Auditor-General of significant problems in Defence's management of the JORN Project was of particular concern to the JCPA, given its longstanding interest in the Department of Defence's management of major projects.

1.3 The Committee first became aware of inadequacies in Defence's project management during its inquiry in 1983 into the amphibious heavy lift ship (HMAS *Tobruk*) Project.<sup>3</sup> At that time the Committee concluded that there was an urgent need for a separate review which focused specifically on Defence project management.<sup>4</sup> A detailed and comprehensive inquiry into the Defence Department's overall project management and administration was therefore undertaken in 1984-85 by the JCPA.

1 ANAO, *Audit Report No.28, 1995-96*, p.7.

2 Pursuant to Section 8(1) of the *Public Accounts Committee Act 1951*, the JCPA is required to examine all reports of the Auditor-General.

3 JCPA, *Report 223, HMAS Tobruk*, 1983.

4 JCPA, *Report 223, HMAS Tobruk*, 1983, pp.vi-viii.



1.4 In the course of that inquiry the Committee reviewed sixteen major projects (including the Jindalee Over-the-Horizon Radar Project<sup>5</sup>). The Committee found that eleven of the sixteen projects had failed - or were likely to fail - to be completed on time, to budget or to technical requirements as a result of ineffective project management within the Department of Defence.<sup>6</sup>

1.5 In relation to the Jindalee Project, the Committee reported that:

*Overall the timing of the project has slipped. Certain of the delays such as processing contracts and staffing procedural problems directly added to the cost of the project. Design and other technical problems were also encountered, and the resolution of these have delayed final evaluation of the experimental system.*<sup>7</sup>

1.6 The Committee again turned its attention to Defence project management following the presentation to Parliament of the report of the Auditor-General, *Audit Report No.22, 1992-93, New Submarine Project*, which identified serious weaknesses in the management of the submarine acquisition project. The Committee's subsequent inquiry focused on the management of major commercial risks facing the project, including cost and schedule risks and the risk that Australian Industry Involvement (AII) objectives would not be achieved.<sup>8</sup>

5 Project Jindalee was established in 1974 with a view to determining the feasibility of using an over-the-horizon radar system for surveillance of Australia's northern approaches. See Chapter Two.

6 See JCPA, *Report 243, Review of Defence Project Management, Volume 1 - Report, Volume 2 - Project Analyses*, 1986.

7 JCPA *Report 243: Review of Defence Project Management, Volume 2 - Project Analyses*, p.183.

8 JCPA, *Report 337, A Focus on Accountability: Review of Auditor-General's Reports, 1992-93*, June 1995, Part IV. AII has been a requirement for defence capital acquisition projects since the 1970s.

1.7 The Committee noted that several of the problems which had been identified in relation to the submarine project were also highlighted in the report by the Auditor-General on the JORN Project. The Committee therefore decided to review *Audit Report No.28, 1995-96, Jindalee Operational Radar Network (JORN) Project, Department of Defence* in greater detail within its 1996-97 program.<sup>9</sup>

1.8 On 23 July 1996, therefore, in accordance with new JCPA procedures for reviewing audit reports which were introduced at the beginning of the 38th Parliament, the Auditor-General and officials from the Department of Defence and the prime contractor, Telstra Corporation Limited (Telstra), were invited to comment on the audit findings and the responses from Defence at a public 'round table' hearing.<sup>10</sup>

1.9 The hearing revealed that, although the seventeen recommendations made by the Auditor-General had been accepted by Defence and some remedial action taken, there remained shortcomings in the management of the JORN Project which required further investigation.

1.10 The hearing raised several issues which contributed to the JCPA's decision to conduct its own comprehensive inquiry into the management of the JORN Project, in particular:

- the sheer magnitude and significance of the Project;
- the admission by the prime contractor, Telstra, of a likely loss;
- the extent of the Commonwealth's liability;

9 JCPA, *Report 347, Annual Report 1995-96*, p.8.

10 Under the new review procedures introduced in 1996 the JCPA selects reports of the Auditor-General which raise significant accountability issues for review at 'round table' public hearings. The purpose of the hearings is to allow the JCPA to give immediate attention to recommendations of the Auditor-General, to enable differing views to be raised in public, and then to make timely reports to Parliament on what further action, if any, needs to be taken by departments and agencies to protect the interests of the Commonwealth. *Transcript*, 23 July 1996, p.2.

- the impact of Telstra's performance on Defence's management of the project, and conversely, the impact of Defence's project management on Telstra's performance;
- the failure of the hearing to dispel the Committee's scepticism, based on its previous experience, about Defence's ability to manage major projects; and
- the character of the evidence given.

#### *Magnitude and significance of the project*

1.11 The Jindalee operational radar network is intended to provide a significant capability in the surveillance of the northern and western approaches, which is a key part of Australia's defence strategy.<sup>11</sup> It is one of a number of 'layers' of surveillance, each of which has a different mix of characteristics such as coverage, reliability of detection, precision, identification capability, vulnerability, capital cost and operating cost.<sup>12</sup>

1.12 The Committee was told that in Australia's environment JORN offers very wide coverage, reasonable reliability of detection, precision adequate for its intended early warning purpose and better identification capability than conventional radar. The system is considered to be relatively safe from attack due to the distance of the radar installations from the area of likely operations and, according to Defence, it is affordable in terms of the Defence budget.<sup>13</sup>

1.13 The approved cost to Defence for the JORN Project (December 1995 prices) was \$1108 million.<sup>14</sup>

11 Mr Tony Ayers, Secretary of the Department of Defence, *Transcript*, 23 July 1996, p.4.

12 Defence, *Submission*, p.S134.

13 Defence, *Submission*, p.S134.

14 Revised to \$1117 million (December 1996 prices). Figures provided at the beginning of the inquiry were December 1995 prices. See paras.2.27, 2.30, 2.31-2.32, 4.5-4.6 for details of costs.

1.14 The JORN Project has particular significance because it utilises technology which was developed in Australia. The scientific concepts were proven by the Jindalee radar at Alice Springs. Mr Garry Jones, Deputy Secretary (Acquisition), Department of Defence, told the Committee that:

*This was one area where I think there was felt to be a significant Australian unique input available, and people were very concerned that Australia as a country did not lose that.*<sup>15</sup>

1.15 The Committee was told that the overall scale of the systems engineering task and the degree of design and development needed to meet the radar's performance specifications, however, make the task more difficult than any technology-based construction project previously attempted in Australia.<sup>16</sup>

#### *Admission by Telstra of a likely loss*

1.16 The review of the Auditor-General's report revealed that neither Defence nor the prime contractor,<sup>17</sup> Telstra, was able to determine the total cost of the project or the date on which the surveillance system would become operational. It was evident at the hearing, however, that Telstra would incur a loss on the JORN Project. Mr Lindsay Yelland, Group Managing Director, Retail Products and Marketing, Telstra Corporation Limited, admitted that he believed 'we will make a loss on the project'.<sup>18</sup> Mr Yelland then qualified his answer at the hearing by saying that 'it is possible that we might incur a loss on JORN'.<sup>19</sup>

15 Mr Garry Jones, Deputy Secretary, Acquisition, Department of Defence, *Transcript*, 6 December 1996, p.87.

16 Mr Tony Ayers, *Transcript*, 23 July 1996, p.4.

17 The prime contractor is the contractor which deals directly with the Government (Department of Defence); the prime contractor engages sub-contractors on the project.

18 Mr Lindsay Yelland, Group Managing Director, Retail Products and Marketing, Telstra Corporation Limited, *Transcript*, 23 July 1996, p.14.

19 Mr Lindsay Yelland, *Transcript*, 23 July 1996, p.16.

1.17 In fact the Committee later found that Telstra was well aware at that time that it would incur a loss and had known about, and made provision for, a loss in its June 1995 accounts. The Committee obtained a Telstra audit committee report prepared by Price Waterhouse and the ANAO which revealed that:

*In mid-1995, a technical and financial due diligence was performed which considered the status of the project and costs estimated to complete the project (some \$1.1 billion) were in excess of management's original estimates. As a result, a provision of \$154 million was raised for project losses in the June 1995 accounts.<sup>20</sup>*

#### *Extent of the Commonwealth's liability*

1.18 The Committee was concerned about the extent of the Commonwealth's losses on the JORN Project and the potential for the Commonwealth to incur further losses in excess of those already estimated and for which provision had been made.

1.19 Defence may face losses through additional administrative costs and overheads associated with the deferred schedule for completing the project, the cost of money over the period of the delay and opportunity costs arising from the delay in having the over-the-horizon radar (OTHR) capability. Mr Jones told the Committee that there are:

*real costs to the Commonwealth in the capability forgone. It is a little hard to quantify what that cost to the Commonwealth would be because it is not a capability that exists today. It is unlike replacing a warship or an aeroplane.<sup>21</sup>*

1.20 The Committee later noted that, in evidence to the inquiry into level of funding for Defence, Mr Hugh White, Deputy Secretary, Strategy and Intelligence, Department of Defence acknowledged his concern that:

20 Telstra Corporation Limited Audit Committee Report, 'Significant Audit and Accounting Issues', ANAO and Price Waterhouse, dated September 1996, p.8.

21 Mr Garry Jones, *Transcript*, 23 July 1996, p.19.

*It is that all of our acquisition processes take too long because there is a real strategic cost in delay in introducing capabilities and because that increases the risk that, on the day you want it, you are not going to have it ... It is delays of introduction in capability which can be very damaging strategically.<sup>22</sup>*

1.21 Given Telstra's status as a Commonwealth entity, any additional costs incurred by Telstra over and above the contract price to be paid by Defence will be costs to the Commonwealth in terms of reduced dividend payments to the Government and shareholders.

1.22 While Defence claimed that it had insulated itself against cost overruns by negotiating a ceiling price in its contract with Telstra,<sup>23</sup> the Committee considered that there had been scant regard by Defence towards the fact that cost overruns would be incurred by another Commonwealth entity. Defence, however, justified its position on the grounds that from the outset it was directed to deal with Telstra as if it were a private organisation and not part of the Commonwealth:

*we were directed - and we went to great pains in this contract - to treat Telstra at arms-length, as if it were a private company and not part of the Commonwealth ... In any large contract of this size, we would normally seek to do business with a large substantial company - typically, with US companies which have tens of billions of dollars of turnover. We expect those companies, when they sign a contract with Defence, to meet their obligations. Indeed, we treated Telstra no differently.<sup>24</sup>*

1.23 Nonetheless, the Committee was concerned that Defence's attitude towards the fact that it was not itself liable but that it was Telstra which would assume liability for cost overruns may have contributed to its failure to hold the contractor to the provisions of the contract, both in terms of cost and of meeting the schedule for completion of the project.

22 Mr Hugh White, *Joint Standing Committee on Foreign Affairs, Defence and Trade (Defence Sub-Committee) Transcript*, 31 October 1997, p.267.

23 Mr Garry Jones, *Transcript*, 23 July 1996, p.15; Mr Tony Ayers, *Transcript*, 23 July 1996, p.5.

24 Mr Garry Jones, *Transcript*, 23 July 1996, p.28.

1.24 Moreover, the Committee was not convinced by Defence's assurances that it would not incur costs above the approved project cost - the Committee had already experienced considerable disquiet over Defence's inability to manage the submarine project. The Committee was concerned that establishing a ceiling price on the contract may have created a 'comfort zone' and a refuge for those who were not capable of managing the contract properly.

1.25 The hearing also confirmed press reports that Telstra was seeking to divest itself of any further responsibility for the JORN Project. This possibility had serious implications for the whole-of-Commonwealth's liability and for the likelihood of completing the project. The Committee considered that any new management arrangements involving Commonwealth expenditure should be examined.

#### *Impact of Telstra's performance on Defence's management*

1.26 In deciding to proceed with a full inquiry, the Committee also took into account the fact that the Auditor-General's study had been limited to an examination of Defence's management of the JORN Project. The ANAO had, however, provided a copy of its proposed report of the audit to Telstra for comment. Telstra's response discussed a range of factors which, from its perspective, had contributed to the cost overruns and delays to the project. The Committee decided that these factors warranted further investigation.

1.27 The Committee also believed that a detailed analysis of Telstra's performance would shed light on Defence's management of the project. Conversely, the Committee was concerned to examine the impact of Defence's management of the project on Telstra's performance.

#### *Scepticism about Defence project management*

1.28 The evidence taken at the 23 July 1996 hearing did not convince the Committee that Defence had overcome problems identified by earlier reviews of its management of major projects.

#### *Character of the evidence*

1.29 The Committee perceived a mismatch between the manifest problems revealed in the Auditor-General's report and the evidence given at the 'round table' hearing. The Committee believed that too many questions were not answered in an open and forthright way.

1.30 The Committee was concerned that some witnesses failed to provide the necessary detail in answers to the Committee's questions or avoided answering questions directly. An example of this is to be found in the transcript of 23 July 1996 when the Committee attempted to find out whether the ceiling price was likely to increase as a result of 'scope creep'. Defence appeared to be unwilling to give direct answers to straightforward questions.<sup>25</sup> The Committee encountered similar situations in the course of taking evidence at *in camera* hearings.

1.31 The Committee believes that failure to respond fully to a committee's questioning is unacceptable. Indeed, this inquiry was characterised by the difficulty the JCPA encountered in obtaining the detailed information that it required.

#### *The JCPA inquiry*

1.32 On the basis of the combination of factors outlined above the Committee resolved to inquire into the JORN Project in the following terms:

*As part of its statutory responsibility to examine reports from the Auditor-General, the Committee shall inquire into and report on Audit Report No 28, 1995-96, Jindalee Operational Radar Network Project, Department of Defence (June 1996) and any circumstances connected with matters raised in the audit report.*

*The Committee's inquiry will focus on:*

- *the management of the project by the Department of Defence; and*

<sup>25</sup> See Transcript, 23 July 1996, pp.14-15.

- the performance of Telstra Corporation Ltd in its capacity as the prime contractor for the JORN project.

### Conduct of the inquiry

#### *Inspections: Alice Springs and Longreach*

1.33 Prior to publicly launching the inquiry the Committee undertook inspections of the long range sky-wave OTHR facility at Alice Springs and the JORN sites at Longreach on 24 and 25 October 1996. The inspections afforded an opportunity for the Committee to view radar operations at No.1 Radar Surveillance Unit (IRSU) and to gain an appreciation of the Transmit and Receive Sites at Longreach.

#### *The inquiry*

1.34 The inquiry was advertised nationally on 1 and 2 November 1996. Sixteen submissions were received and authorised for publication; they are listed at Appendix I. Three submissions remain confidential to the Committee.

1.35 Public hearings were held in Canberra in late November and early December 1996 and in March 1997. In addition to the Department of Defence, the Telstra Corporation and its then subsidiary Telstar,<sup>26</sup> witnesses from GEC-Marconi Systems Pty Ltd (UK), Lockheed Martin Corporation (USA) and Transfield Defence Systems appeared before the Committee. Former employees of the Department of Defence, Dr Michael Gilligan and Mr Max Brennan, also provided verbal evidence to the inquiry. The programs for the public hearings are located at Appendix III.

<sup>26</sup> Joint venture owned by Telstra and Lockheed Martin on a 60:40 share basis.

1.36 A feature of this inquiry was the extent to which evidence was taken *in camera*. Confidential evidence was taken in conjunction with each of the public hearings indicated above and again in August 1997.

1.37 The Committee recognised the sensitivities which attached to both national security and commercial elements of aspects of this inquiry. Accordingly, the Committee took particular care not to hinder or complicate the progress of Telstra's negotiations with Lockheed Martin Corporation and Transfield Defence Systems to conclude new management arrangements or possibly *novation* of the JORN contract with Defence.<sup>27</sup>

1.38 Nonetheless the Committee believes that, at times, both Telstra and Defence claimed commercial and strategic sensitivities as a means of limiting open examination of their performance.<sup>28</sup>

1.39 Most submissions provided to the Committee by Telstra and Defence were submitted as 'commercial-in-confidence' documents.<sup>29</sup>

1.40 At the public hearing on 3 March 1997 Mr Yelland was asked about the new management arrangements for the completion of JORN. Mr Yelland responded:

*I have provided a confidential letter to the committee ... Telstra has entered into a contract ... for the management of JORN ... That contract has been assented to by the Department of Defence ... I will go through those contracts in more detail if we are able to go to an in camera session.<sup>30</sup>*

<sup>27</sup> *Novation* is an act whereby, with the consent of all parties, a new contract is substituted for an existing contract and the latter discharged. Usually a novation takes the form of an introduction of a new party to the new contract and the discharge of a person who was party to the old contract (John B Saunders: *Words and Phrases Legally Defined*, London 1989).

<sup>28</sup> See, for example, Mr Lindsay Yelland, *Transcript*, 23 July 1996, pp.15, 16, *Transcript*, 3 March 1997, pp.97, 99-102, 104, 105; Mr Tony Ayers, *Transcript*, 23 July 1996, pp.16, 30; Defence Submission dated 11 July 1997.

<sup>29</sup> Defence, however, later agreed to its submissions being published. See Defence, *Submissions*, pp.S129-151; pp.177-185.

<sup>30</sup> Mr Lindsay Yelland, *Transcript*, 3 March 1997, p.97.

1.41 While the Committee appreciates the need for confidentiality at some stages of commercial dealings, it is firmly of the view that the public has a right to know how the Commonwealth is expending public funds. This is a fundamental tenet of accountability.

1.42 Another accountability issue raised by the Audit Report which was considered at the hearing concerned the comment in the *Defence Annual Report 1994-95* that JORN:

*design activity was nearing completion and confidence that the specifications would be met was high ... Radar hardware was in production for installation on completion of the building work.*<sup>31</sup>

1.43 Mr Nick Hammond, First Assistant Secretary, Defence Materiel explained that:

*At the time - May of last year [1995] ... the statements that were made were made in good faith and, as far as we knew, were correct. The design was nearing completion. It was not until the completion of the technical audit ... led by Lockheed Martin and conducted by Telstra and GEC-Marconi that a number of shortcomings in the design process were disclosed [in November 1995].*<sup>32</sup>

1.44 The Committee supports the ANAO's remark that Defence needs to pay more attention to the basis of its comments about JORN in its published annual report. The Committee notes however that the Defence Report acknowledged that delays were experienced in finalising a design capable of meeting the very demanding specifications.<sup>33</sup>

1.45 Nonetheless the Committee is concerned that Defence's JORN Project Office was out of touch with the status of the project and, moreover, had not proceeded with its own audit of the project proposed in 1993.

31 *Defence Annual Report, 1994-95*, p.148.

32 Mr Nick Hammond, *Transcript*, 23 July 1996, p.8.

33 *Defence Annual Report, 1994-95*, p.148.

1.46 The Committee also noted that, at the 23 July 1996 hearing, witnesses from Telstra and Defence painted a picture of a warm and supportive relationship between them. As the inquiry progressed it became evident that this impression failed to reflect the reality of the situation. Indeed, Telstra's submission to the inquiry and Defence's comments on Telstra's submission clearly demonstrated the high degree of acrimony that existed between Defence and its prime contractor which could only be detrimental to the project.<sup>34</sup>

### Structure of the report

1.47 Following this introductory section, Chapter Two traces the origins of the JORN Project, from the initial OTHR concept developed by the Defence Science and Technology Organisation (DSTO) in the 1960s to the decision by the Government to proceed with the operational radar network.

1.48 The selection of the prime contractor was to have significant effects on the history of the JORN Project. The circumstances surrounding the choice of the prime contractor are examined in Chapter Three.

1.49 Chapter Four provides an overview of the task for Telstra and its sub-contractors and examines aspects of the prime contract and sub-contracts. From the outset of this inquiry some witnesses attributed the failure to complete the project on schedule to the project being at 'the cutting edge of technology', as 'pushing the boundaries of technology' or in terms of 'technology unknowns'. This is explored and the evidence on the extent to which technological complexities impeded progress on the project is examined.

1.50 Chapter Five examines Telstra's management of the prime contract and its management of sub-contractors.

1.51 Chapter Six focuses on issues raised in the Auditor-General's report concerning Defence's management of the project.

34 *Defence, Submission*, pp.S155-176.

## THE JINDALEE OPERATIONAL RADAR NETWORK PROJECT

1.52 This inquiry raised the issue of intellectual property which has broad application across a range of Commonwealth departments. The Committee believes this is a vitally important issue and has therefore included a chapter which specifically addresses the treatment of intellectual property in the JORN Project.

1.53 Chapter Eight sets out the conclusions of the Committee.

## 2

### ORIGINS OF THE JINDALEE OPERATIONAL RADAR NETWORK PROJECT

#### From Geebung to JORN - 1969 to 1986

2.1 The Jindalee OTHR concept was developed by DSTO which had been engaged in research into the potential of bouncing radio waves off the ionosphere for detecting targets beyond the range of conventional radars since the 1960s.<sup>1</sup>

2.2 Over-the-horizon radar uses the ionospheric layers of the earth's upper atmosphere to refract a transmitted high frequency (HF) radio signal downwards to the earth's surface enabling the radio signal to be steered to areas some thousands of kilometres over the horizon from the transmitter. Contact with a ship or aircraft will cause some part of that transmitted signal to be scattered back to HF radio receivers, again via the ionosphere. The fusion of a number of technologies has enabled the capture of that relatively weak return signal, and for it to be distinguished from background clutter, in order to locate, and to some extent characterise, aircraft or ship contacts.<sup>2</sup>

#### *Early developments*

2.3 A preliminary project, Project Geebung, was instigated in 1969 to measure ionospheric effects and examine the potential of over-the-horizon radar.

<sup>1</sup> Research into OTHR was undertaken initially by the Weapons Research Establishment. DSTO was established in 1974, following a reorganisation of the defence group of departments.

<sup>2</sup> Report of Options for Over-the-Horizon Radar, Department of Defence, 1986, p.1.

2.4 In 1974 the Government approved Project Jindalee with a view to establishing the feasibility of using an OTHR system for surveillance of the northern approaches to Australia. An experimental radar system was constructed at Alice Springs. This Australian enterprise was aided by the loan of special electronic equipment and technical consulting assistance from the US Department of Defense.<sup>3</sup>

2.5 During the first phase of the project a low-power narrow fixed beam radar was established to scan a track used regularly by international air traffic en route to and from Singapore. The location at Alice Springs provided the radar with a ready source of aircraft of different characteristics for test purposes.

2.6 The subsequent development of a scanning radar covering the north and north-western approaches from Alice Springs in 1977 demonstrated that an operational coverage of the northern approaches was practical at comparatively modest cost.<sup>4</sup>

2.7 Although DSTO had developed the OTHR in consultation with American scientists,<sup>5</sup> a Defence Department review found that the characteristics and potential capabilities of the Australian system were better suited to Australia's strategic requirements than were systems based on American designs.<sup>6</sup>

3 Hon Lance Barnard, Minister for Defence, *Press Release*, 11 April 1974.

4 Peter Hastings, writing for the Sydney Morning Herald, observed at the time that 300 Orion surveillance aircraft would be needed to equal the potential capability of Jindalee. By his reckoning such an aircraft capability would cost \$3,600 million. *SMH*, 24 February 1978.

5 The development of Jindalee OTHR had been assisted by a bilateral cooperative arrangement with the US/Australia Memorandum of Understanding on Cooperative Research and Development (1968). House of Representatives, *Debates*, 20 May 1986, p.3581.

6 Hon Kim Beazley, Minister for Defence, *News Release*, 14 October 1986.

### *From experimental to operational radar*

2.8 In 1981 consideration was given to the possibility of converting the experimental radar for military use under Air Force control. Two years later tenders from industry were called for studies to be undertaken over a twelve month period on the conversion of the Jindalee experimental radar to an operational system. Contracts for this purpose were subsequently awarded to Amalgamated Wireless (Australasia) Ltd and Computer Sciences of Australia Ltd.<sup>7</sup>

2.9 Trials of the system undertaken between 1984 and 1986 demonstrated the viability of OTHR technologies and capabilities and indicated their operational potential.<sup>8</sup> Air Force proposed that the experimental radar be converted into an operational radar at a cost of \$46 million.

2.10 However, it was becoming apparent that the Jindalee radar, as it was proposed to be converted, would be lacking a number of key technology advances which were becoming available. Consequently, the question of whether a *network* of radars would better suit Australia's needs was raised.<sup>9</sup>

2.11 Indeed, the success of the Alice Springs Jindalee radar demonstrated the feasibility of the operational OTHR concept, notwithstanding that the specifications for JORN are more extensive and significantly more demanding, particularly in the areas of electrical noise immunity, target location accuracy, the integration of the two radars into a single network and in electronic protection.<sup>10</sup>

2.12 In the meantime, Defence was becoming aware of the potential value of OTHR as an important joint-Service strategic capability, with relevance for Navy and Army as well as Air Force.<sup>11</sup>

7 *Defence News Release*, No.22/84, 13 February 1984.

8 Department of Defence, JORN Project Management and Acquisition Plan, 30 April 1993.

9 Report of Options for Over-the-Horizon Radar, Department of Defence, 1986, p.31.

10 Defence, *Submission*, p.S139.

11 Report of Options for Over-the-Horizon Radar, Department of Defence, 1986, Attachment A.



*Towards an operational radar network*

2.13 While the trials were in progress, the Chief of the Defence Force and the Departmental Secretary jointly decided, in October 1985, to conduct a review into possible options for developing an OTHR capability. The study was to have a joint-Service focus. The then Acting First Assistant Secretary (Development and Analysis), Dr Michael Gilligan, was appointed to lead the study team comprising DSTO scientists and engineers and RAAF and RAN personnel. The team was due to report its findings the following year.<sup>12</sup>

2.14 Dr Gilligan told the Committee that:

*The issue in 1986 was essentially whether or not we ought to go ahead with an air force proposal to upgrade the Alice Springs DSTO prototype radar or whether ... we would invest in [the new OTHR technology] ... and how far and how fast.*<sup>13</sup>

2.15 In March 1986 Defence analyst Paul Dibb presented his review of Australia's defence capabilities to the Government.<sup>14</sup> Dibb recognised that while details of performance characteristics and operational procedures were yet to be established, OTHR technology made wide area surveillance more feasible and practicable, though with some technical limitations.<sup>15</sup> Nonetheless, OTHR technology offered the prospect of real time knowledge of sea and air movements within Australia's area of direct military interest which would offer new solutions to the formidable problem of broad area surveillance.

12 This report is discussed further in the next chapter.

13 Dr Michael Gilligan, *Transcript*, 5 December 1996, p.25.

14 *Review of Australia's defence capabilities*, March 1986.

15 OTHR provides wide-area coverage with low target definition. Small-area high-definition systems such as airborne early warning and control (AEW&C) aircraft, could compensate for the technical limitations of OTHR. As a prime surveillance system, however, AEW&Cs were considered prohibitively expensive.

2.16 The Dibb report stated that the existing surveillance of Australia's maritime approaches - covering some 2000 nautical miles from west to east - by conventional means such as ground-based radar, long range maritime patrol aircraft and naval vessels, was both costly and unreliable. Ground or ship-based radars lacked coverage beyond 250 nautical miles for high-flying aircraft. For detection of low-flying aircraft or surface ships the range was even more limited. Aircraft could provide comparatively extensive coverage but were limited by range and endurance factors which effectively precluded continuous and comprehensive coverage except at great cost.<sup>16</sup>

2.17 Dibb concluded that, in Australia's strategic circumstances, long-range detection and tracking requirements were likely to be met by OTHR, particularly if two or more systems were deployed.<sup>17</sup> He therefore strongly recommended that further development proceed as soon as possible.<sup>18</sup>

*Airborne early warning and control aircraft*

2.18 Critics of Dibb's recommendations in Air Force were concerned that he credited Jindalee with a potential capability that no other nation had yet achieved and that pursuit of Jindalee would block the early acquisition of a proven working system such as airborne early warning and control (AEW&C) aircraft.<sup>19</sup>

2.19 Air Force was concerned that the Jindalee operational system would not provide adequate early warning of attack and argued that AEW&C aircraft should be acquired to complement the OTHR operational system.

16 *Review of Australia's defence capabilities*, p.62.

17 *Review of Australia's defence capabilities*, pp.61-63.

18 Hon Kim Beazley, Minister for Defence, *News Release*, 14 October 1986.

19 *Sydney Morning Herald*, 16 July 1986.

2.20 In a paper issued at the time, Air Force noted that OTHR had a very useful wide area surveillance capacity but its dependence on favourable ionospheric conditions coupled with relatively poor resolution and lack of height-finding capability militated against its use in precision tasks associated with effective airspace control, maritime air surveillance and air defence.<sup>20</sup>

2.21 Defence submitted that although the AEW&C aircraft offers significantly better precision and the ability to control air engagements locally, it is more vulnerable to battle or accidental damage, has a substantially greater capital and operating cost than JORN and coverage of at least two orders of magnitude less.<sup>21</sup>

2.22 In 1986 trials were conducted to ascertain whether the Jindalee system could detect fighter aircraft and make intercepts without the complementary use of AEW&Cs. Defence concluded from the trials that the Jindalee OTHR offered a greater surveillance capability than AEW&Cs in terms of cost effectiveness.<sup>22</sup>

2.23 This conclusion was reinforced by the Chief Defence Scientist's assessment that the technical risk in establishing an OTHR network was acceptable. Extensive research and development, both in Australia and in the United States, had demonstrated that OTHR was a practical and affordable wide area surveillance sensor. At the time the US was proceeding with an OTHR facility in Maine and a relocatable OTHR for the US Navy.

20 Cited in Report of Options for Over-the-Horizon Radar, Department of Defence, 1986, p.14.

21 Defence, *Submission*, p.S134.

22 The Committee noted that in December 1985 the Minister for Defence, Kim Beazley, had called requests for proposals for airborne surveillance and control systems but had indicated that the decision to seek proposals from manufacturers did not commit the Government to proceed with their acquisition. No further action was taken to acquire AEW&Cs until 1997 when requests for proposals were invited.

### *The Jindalee Operational Radar Network*

2.24 On 14 October 1986 the Minister announced the Government's intention to proceed with a major project to develop a comprehensive OTHR system. The existing Jindalee radar at Alice Springs was to be upgraded to provide a test bed for scientific, engineering and operational development at an estimated cost of \$57.5 million spread over five and a half years. The upgrade would enable Service operators to gain operational experience on an over-the-horizon radar in preparation for the proposed new network.<sup>23</sup>

2.25 The Committee noted that AWA Ltd was awarded the prime contract to manage the upgrade program through the provision of systems engineering, configuration management, cost and schedule control and project coordination services. AWA was also responsible for the operations and the maintenance of the Alice Springs sites. Computer Sciences of Australia was the nominated sub-contractor for software tasks.<sup>24</sup>

2.26 The Jindalee Project Office (JPO) was established in late 1986 to oversight the introduction of JORN into the Australian Defence Force (ADF). A key function was to ensure that the network met the specified performance requirements and was delivered on time and within the project cost provisions.

2.27 The total cost of the OTHR network was estimated at that time to be in the order of \$500 million.<sup>25</sup> This figure is the equivalent of \$730 million in December 1997 prices.

2.28 In 1988 industry briefings were conducted and in 1989 preliminary design studies undertaken.

23 Hon Kim Beazley, Minister for Defence, *News Release*, 14 October 1986; House of Representatives, *Debates*, 14 October 1986.

24 Other sub-contracts were awarded to Radio Frequency Systems of Victoria, Digital Equipment Corporation and Australian Construction Services.

25 Hon Kim Beazley, House of Representatives, *Debates*, 14 October 1986.

2.29 On 15 November 1990 the Public Works Committee concluded that there was:

*a need to establish the Jindalee Operational Radar Network to provide the capacity to carry out effective surveillance of ship and aircraft movements up to 2000 kilometres from Australia's northern coastline.*<sup>26</sup>

2.30 The Committee recommended the construction of the Queensland, West Australian and South Australian sections of the Jindalee over-the-horizon radar at an agreed ceiling price of \$95 million for the public works aspects of the proposal.<sup>27</sup>

2.31 On 20 December 1990, the Minister for Defence announced that Cabinet had approved construction of the operational radar network at a total project cost of \$970 million.

#### Approved cost to Defence in December 1995 prices

2.32 The Committee was told in November 1996 that the total approved cost to Defence for the project (in December 1995 prices) was \$1108 million, which included a ceiling price to the prime contractor of \$895 million. The prime contractor was also awarded a maintenance and support contract for \$120 million over a four year period. The costs were attributed as follows:

26 Parliamentary Standing Committee on Public Works, Report relating to the Jindalee Over-the-Horizon Radar, (Twelfth Report of 1990), p.6.

27 Parliamentary Standing Committee on Public Works, Report relating to the Jindalee Over-the-Horizon Radar, (Twelfth Report of 1990), p.32.

JORN Approved Costs	\$m
Prime contract	895
Maintenance and Support	120
GFS Communications	35
Project Administration and Minor Work	10
Contingency	48
Total	1108

Source: Defence, *Submission*, p.S138.

2.33 In July 1997 the JCPA was advised that the then current estimate of the project cost to Defence was \$1117 million (December 1996 prices), with a ceiling price to the prime contractor of \$902 million. The increase was explained by Defence to have resulted from escalation and exchange variations.<sup>28</sup>

#### Committee comment

2.34 The Committee emphasises that it has no basis for making a judgment about the strategic value of OTHR and is not technically qualified to accept or reject the judgment of the military analysts and strategists who clearly favoured it at that time.

2.35 The Committee was told that:

*the probability of JORN being made obsolete by a new form of broad area surveillance technology in the foreseeable future is considered low ... The only technology which might feasibly compete with JORN is the use of satellite surveillance. This is more vulnerable and, at a level of coverage approaching that of JORN, is currently unaffordable.*<sup>29</sup>

28 Defence, *Submission*, p.S178.

29 Defence, *Submission*, p.S134.

## SELECTING THE PRIME CONTRACTOR

### Circumstances surrounding the selection

3.1 The selection of the prime contractor was to have significant effects on the history of the JORN Project. An examination of the circumstances surrounding the choice of the prime contractor was therefore considered important in revealing some of the underlying causes for the current status of the JORN Project.

3.2 Evidence to the Committee suggested that the circumstances which were to have particular influence on the decision included:

- failure to appreciate the assumptions of the Defence review team which examined options for OTHR in 1985-86 and recommended that the project proceed;
- a focus on a defence policy for industry which aimed to develop in Australia industry capabilities to meet long-term Defence requirements; and
- strategic considerations.

### The 1986 review

3.3 As mentioned in the previous chapter, a review team headed by Dr Michael Gilligan was established in 1985 to canvass various options for acquiring a wide area surveillance network based on OTHR technology and to make recommendations to the Chief of the Defence Force and Secretary of the Department of Defence in 1986. The report of

the review team assessed options beyond the Air Force proposal to spend \$46 million on the experimental radar at Alice Springs in the Five Year Defence Program (FYDP) 1986-91.<sup>1</sup>

3.4 The review team found that Australian industry expertise was limited to certain areas of OTHR technology and **did not include signal processing technology**. According to the report, the expertise which did exist resided mostly in the two companies involved in the Jindalee maintenance and pre-conversion work, namely, Amalgamated Wireless (Australasia) Ltd on the hardware and Computer Sciences of Australia in software. The report noted that AWA had some five years experience on site operations, maintenance and selected aspects of the Jindalee radar.<sup>2</sup>

3.5 In the course of its investigation the review team visited the United Kingdom and the United States. **The review team identified the US as the only other nation sharing Australia's familiarity with the potential of over-the-horizon radar. It found no comparable OTHR expertise to exist in the United Kingdom.** The leader of the team, Dr Gilligan, commented to the Committee that:

*We spoke to GEC-Marconi in the UK, more by way of trying to round out our experience of what was available in a worldwide sense, and it was quite clear that there was no expertise whatsoever in skywave radar there. There was some expertise in surface wave radar ...*<sup>3</sup>

*the contractors who were then constructing the USAF OTHR network (ie GE/TRW) were easily the most impressive. They were open about the difficulties they had experienced, but were overcoming ...*<sup>4</sup>

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- 1 Report of Options for Over-the-Horizon Radar, Department of Defence, 1986, p.3.
  - 2 Report of Options for Over-the-Horizon Radar, Department of Defence, 1986, p.46.
  - 3 Dr Michael Gilligan, *Transcript*, 5 December 1996, p.25.
  - 4 Dr Michael Gilligan, *Submission*, p.S67.

3.6 The recommendations of the review team - including a forecast construction time of six years - were therefore predicated upon a technology flow and assistance coming from the US. Testifying before the Committee that the US company, General Electric, was the 'most credible' contractor, Dr Gilligan said:

*we attempted to put some words into the report which steered [the choice] towards what we thought was the most credible contractor ... Essentially, you will see some rather guarded words in there. In earlier drafts, we tried to steer it in this direction, but we were told we were stepping over the mark, that procurement people knew all about this and there were bigger issues there. So our job was to paint a picture ... for the procurement people, of this task. We did that, expecting them to see the obvious. As it turned out .... the obvious was not picked up. The immensity of the task was not picked up and it was assumed that you could just go and take a representative sample of Australian companies - including a telephone company - and get them to run this project.<sup>5</sup>*

3.7 The review recognised that management of the project would be demanding, requiring coordination not only of Service requirements but also of DSTO and industry resources necessary for indigenous design. It would also require technology transfer on a scale not attempted before in Australia.<sup>6</sup> There was a clear need for proven project management and technical breadth in the organisation chosen to lead the project.

3.8 The review team assumed that the prime contractor would be an experienced US firm.<sup>7</sup> Dr Gilligan told the Committee that:

*Our recommendations made it quite clear that the recommendations were predicated on a US source ... We didn't name contractors, but everywhere we talked about the transfer of technology from the US.<sup>8</sup>*

<sup>5</sup> Dr Michael Gilligan, *Transcript*, 5 December 1996, pp.25-27.

<sup>6</sup> Report of Options for Over-the-Horizon Radar, Department of Defence, 1986, p.7.

<sup>7</sup> Dr Michael Gilligan, *Submission*, p.S67.

<sup>8</sup> Dr Michael Gilligan, *Transcript*, 5 December 1996, p.32.

3.9 This was not to rule out substantial Australian involvement in order to facilitate later through-life support. The review team envisaged that the prime contractor would work in conjunction with an Australian company as a secondary partner so that the latter would benefit from the proven expertise of the prime contractor.

3.10 Notwithstanding the expectation of the review team, an Australian company was selected as the prime contractor.<sup>9</sup> The review team had based its recommendations on assumptions that the prime contractor would be an experienced US company and those assumptions were ignored.

#### *Defence policy for industry*

3.11 The review team's assessment of the potential of an OTHR network as a basic element of wide area surveillance coincided with the implementation of a defence policy for industry which, in June 1984, the Government had agreed should be an integral part of the policy of defence self-reliance.

3.12 The policy of Government to encourage the widest possible involvement of Australian industry in defence work was enunciated in the Defence White Paper in 1987.<sup>10</sup> The White Paper set out priorities for Australia's self-reliance, Australia's defence strategy and the detailed program for the development of the ADF. This included the basis for identifying key technologies and priorities for support capabilities in Australian industry.

3.13 To meet this broad policy goal the Government specified particular requirements under its Australian Industry Involvement (AII) policy to assist Australian industry to acquire the necessary technology, equipment and expertise.

3.14 Under the AII policy, components of an item being procured by Defence were required to be manufactured, assembled, tested or set-to-work in Australia. Technology transfer and work to the value of 30 per cent of the imported

<sup>9</sup> Dr Michael Gilligan, *Transcript*, 5 December 1996, p.32.

<sup>10</sup> *Defence of Australia 1987 (DOA87)*, p.77.

content of any project valued at \$2.5 million or more had to be placed with Australian industry as part of the Defence offsets requirement.

3.15 In line with the AII policy, Defence determined that new projects, such as submarines, light patrol frigates and OTHR, were to have high levels of local content.<sup>11</sup> The resulting substantial increase in the proportion of expenditure going to Australian industry coincided with:

*the use of a more commercial, competitive framework in defence procurement ... encouraging teaming arrangements between Australian and overseas companies for technology transfer, ... requiring Australian prime contractors for some of the larger projects.*<sup>12</sup>

3.16 Against this background there was support for choosing an Australian company as the prime contractor for the JORN Project. Mr Tony Ayers, Secretary of the Department of Defence, told the Committee that:

*we were very keen on seeing an Australian prime in this. We wanted to be able to maintain the systems and we wanted to upgrade the systems. It is true that we have not always had access to all the material from the United States when we wanted to upgrade systems. We have made it quite clear now in negotiations ... that we will no longer buy equipment if we do not have that guarantee of access. That was not the case in those days; we did not have such guarantees of access.*<sup>13</sup>

3.17 Dr Gilligan provided an example of this problem that Defence:

*had had a lot of trouble with the Americans on the F18 with software. We could not get access to the code ...*<sup>14</sup>

11 DOA87, pp.80-81.

12 Cited in Peter Hall and Stefan Markowski, 'Defence Industry and Local Content Requirements' in *Fostering an Indigenous Defence Industry? Defence Industry Policy after the 'Price Review'*, edited by Graeme Cheeseman, 1994, p.53.

13 Mr Tony Ayers, *Transcript*, 6 December 1996, p.83.

14 Dr Michael Gilligan, *Transcript*, 5 December 1996, p.29.

3.18 Mr Max Brennan, a former director of the Jindalee Project Office who had been involved in the selection process, told the Committee that, at the time, it was considered critical that an Australian company have the carriage of JORN to maximise the technology transfer to Australia to ensure an indigenous base for its support and continuing enhancement.<sup>15</sup>

3.19 Approval was given by Defence's Deputy Secretary, Acquisition and Logistics on 15 May 1989 for the Request for Tender (for phases 3 and 4) to be restricted to three Australian companies that were short-listed from the *Invitation to Register Interest* and had carried out the preliminary design studies, namely Amalgamated Wireless Australasia Ltd (AWA), Broken Hill Propriety Ltd (BHP) and Telecom Australia (Telecom).<sup>16</sup>

3.20 Mr Brennan said that although the prime contract bidders for the JORN Project contract were restricted to Australian companies, it was expected that they would need to import technology through overseas subcontractors.<sup>17</sup> According to Mr Brennan:

*it was recognised that the experience level [in Australia] in dealing with a large, complex development project would be low and, indeed, one of the objectives of the JORN Project was to grow in an Australian company the ongoing capability to undertake such projects.*<sup>18</sup>

3.21 The expectation that, no matter which Australian company was awarded the prime contract, it would rely on technology input from overseas meant that each of the Australian companies which tendered for the contract did so in concert with overseas firms. Indeed, the intention was that expertise would transfer to Australia by this process.

15 Mr Max Brennan, *Transcript*, 6 December 1996, p.42; *Submission*, p.S75.

16 Phases 3 and 4 included the establishment of the Longreach and Laverton radars and the JORN Coordination Centre at RAAF Base Edinburgh. See JORN Project Management and Acquisition Plan, 30 April 1993.

17 Mr Max Brennan, *Submission*, p.S75.

18 Mr Max Brennan, *Submission*, p.S75.

3.22 Dr Gilligan observed that:

*Having made the decision, for whatever reason, that the project would proceed within the framework of competing Australian prime contractors, there was nothing proactive about the way in which those prime contractors were then to match up. The cards were left to fall as they fell and it seems to me that the first person who got on the phone to GE in New York was probably AWA. AWA had been in the business and they knew who had the most to offer.<sup>19</sup>*

#### Strategic considerations

3.23 According to Mr Brennan the choice of an Australian company as the prime contractor was also influenced by strategic considerations. Mr Brennan said:

*There was a belief that the JORN capability was going to be such an important strategic asset in that the information that would come from the JORN would provide such an important strategic input into Australia's defence that reliance on an overseas company for its continuing support and enhancement was a wrong step to make. Therefore, a decision was made that the prime contractor for JORN would be an Australian company.<sup>20</sup>*

#### The contenders

3.24 The first steps towards selecting the prime contractor were taken in June 1988 when Defence organised industry briefings for representatives of some 50 companies interested in taking part in the development of the JORN Project.

19 Dr Michael Gilligan, *Transcript*, 5 December 1996, pp.25-26.

20 Mr Max Brennan, *Transcript*, 6 December 1996, p.42. With respect to the protection of sensitive Australian classified information, the Committee noted that provision existed in the Australian Ownership and Control of Information (AOCI) Program. Although this program was discontinued in 1995, new arrangements which are tailored to the specific circumstances of each case provide essentially the same protection. See Defence, *Submission*, p.S137. Such arrangements concerned the purchase of AWA Defence Industries by British Aerospace in 1996.

3.25 In May 1989 a Request for Tender for the construction of the Jindalee OTHR network was issued to AWA, BHP and Telecom (now known as Telstra). Each of these potential prime contractors had gathered a team of sub-contractors, as follows:

AWA	<ul style="list-style-type: none"> <li>• General Electric (GE) of the USA;</li> <li>• Computer Sciences of Australia (CSA); and</li> <li>• Transfield.</li> </ul>
BHP	<ul style="list-style-type: none"> <li>• BHP Aerospace &amp; Electronics division;</li> <li>• BHP Engineering division;</li> <li>• Raytheon of the USA;</li> <li>• Andrew Antennas;</li> <li>• Computer Power; and</li> <li>• Logica Pty Ltd.</li> </ul>
Telecom Australia	<ul style="list-style-type: none"> <li>• GEC-Marconi of the UK;</li> <li>• Lockheed Missile and Space Company;</li> <li>• DEC; and</li> <li>• Technology Australia.</li> </ul>

#### The AWA team

3.26 AWA had been associated with the Jindalee radar program at Alice Springs since 1980 when it was awarded a contract worth \$2 million for work on the second phase of the Jindalee project.<sup>21</sup> AWA provided operational assistance throughout the Jindalee experimental program between 1983 and 1985 and undertook project definition studies for the proposed conversion of the radar to an operational system.<sup>22</sup>

3.27 In February 1984 AWA was awarded a contract for system design, transmitters, antennae, timing system design, software and data processing. AWA sub-contracted Computer Sciences of Australia to provide the radar system software and computer hardware.<sup>23</sup>

21 Defence, *Press Release*, 11 June 1980.

22 JCPA, *Report 243, Review of Defence Project Management, Volume 2 - Project Analyses*, p.187.

23 AWA had other experience in Defence contracting, for example, as prime contractor for the Barra project which involved the development of a submarine detection device.

3.28 In January 1986 two contracts worth a total of \$22 million were awarded to AWA for the upgrading, continued operation and maintenance of the Jindalee experimental radar. AWA's responsibilities included managing the upgrade program through the provision of systems engineering, configuration management, cost and schedule control and project coordination services and managing the sub-contract with Computer Sciences of Australia for software tasks.<sup>24</sup>

3.29 Under the proposal submitted in its bid for the JORN Project in 1989 AWA, as prime contractor, was to be design authority responsible for overall system engineering, design integration and testing. In addition, AWA proposed to manufacture in Australia a wide range of electronic equipment, including the radar's receivers and display consoles.<sup>25</sup>

3.30 CSA's proposed task was to develop software for the receivers and management cells which would analyse and interpret the radar information. CSA would also provide long-term software support and would configure, integrate and test the computer systems. It would also establish a software training facility. CSA was to be supported by C3 - a software house in Canberra which was a subsidiary of AWA.

3.31 The proposed role for Transfield was to design and construct facilities for the transmit and receive sites and the training centre, in addition to providing project management services.<sup>26</sup>

3.32 AWA would draw upon the experience of GE, the US company which had designed, manufactured and implemented the US Air Force OTHR system located in Maine. GE was to assist the AWA team design and implement a custom-built system.

<sup>24</sup> Defence, *News Release*, 22 January 1986.

<sup>25</sup> *Defence Industry*, 8 June 1989.

<sup>26</sup> The Transfield Group at the time controlled the AMECON consortium which was contracted to construct ANZAC Meko 200 frigates for the Royal Australian Navy.

### *The BHP team*

3.33 In 1989 BHP was Australia's largest public company with sales in the order of \$11 billion based on its core business of steel, minerals and petroleum.

3.34 BHP had demonstrated its interest in major Defence contracting through its involvement in programs such as the laser airborne depth sounder (LADS) in 1989.<sup>27</sup>

3.35 Under its proposal for the JORN Project BHP's Aerospace and Electronic Division would perform the role of prime contractor and implement a technology transfer plan. BHP Engineering would supply and install the facilities, including the remote radar sites.

3.36 BHP's major OTHR technology partner was the US company, Raytheon, which had developed a relocatable OTHR radar system for the US Navy which could be deployed in tactical positions. Raytheon produced the radar in association with TRW Defense Systems Group as sub-contractor.

3.37 BHP was also teamed with Logica which would be responsible for the software and Andrew Antennas for sub-systems for frequency management.<sup>28</sup>

### *The Telecom (Telstra) team*

3.38 Telstra based its bid on its experience as the manager of Australia's largest communications projects, especially in digital technology, systems integration and communications research. Telstra would therefore contribute network and area wide communications expertise to the project.

3.39 Mr Max Brennan, who, as Director General of the Jindalee Project Office, had been involved in the latter stages of the selection process for the prime contractor, observed to the Committee that Telstra's bid made much of its strengths in managing large projects in the communications field - albeit

<sup>27</sup> *Defence Industry*, 30 March 1990.

<sup>28</sup> *Defence Industry*, 14 September 1989.



not of the complexity of JORN - and of the ability of its JORN organisation to call upon the resources of the whole Telstra organisation to support it.<sup>29</sup>

3.40 Telstra's previous experience in Defence contracting included support for Defence's *Exercise Kangaroo 89* by providing the ADF with secure video-conferencing between Operational Command and Headquarters Australian Defence Force (HQADF). It had also funded research at the Australian Defence Force Academy on fundamental problems associated with secure, large scale public communications systems and cryptographic and computer security techniques as they apply to the military services.<sup>30</sup>

3.41 In 1989 GEC-Marconi Ltd agreed to team with Telstra to bid for the JORN Project on the basis that GEC-Marconi had radar systems expertise as well as software and hardware design and manufacturing capabilities.

3.42 While Dr Gilligan claimed in 1986 that GEC-Marconi had no experience in OTHR, only in surface-wave radar, Mr Brennan explained that during the three years between Dr Gilligan's report and when the initial bids for JORN were submitted GEC-Marconi had, through private venture capital, developed a high frequency digital receiver for communications applications. It was an adaptation of this receiver which was relevant to the bid for JORN.<sup>31</sup>

3.43 A former AWA employee seconded to the AWA JORN Project Office, Mr John Collins, also believed that at the time no evidence was available of GEC-Marconi's ability to specify, design and manufacture the critical transmitters and receivers for JORN.<sup>32</sup>

3.44 Indeed, in material provided to the Committee by Channel Nine Network's *Sunday Program*, the Committee noted that in 1985 the House of Commons Committee of Public Accounts had examined a number of UK Ministry of Defence projects in which Marconi had acted as a principal or prime contractor. A number of shortcomings were identified.

29 Mr Max Brennan, *Submission*, p.S75.

30 *Defence Industry*, 14 September 1989.

31 Mr Max Brennan, *Submission*, p.S116.

32 Mr John Collins, *Submission*, p.S7.

3.45 The *Sunday Program* material suggested that many of Marconi's inadequacies were publicly known in the UK in the period leading up to the JORN procurement decision. This raises the question of whether Defence or Telstra had verified the accuracy of the information or had taken into account the findings of the UK Public Accounts Committee.

3.46 The Committee noted that a contract worth \$15 million had been awarded to GEC Australia Limited for the supply and installation of eighteen high-powered, high-frequency transmitters in May 1989. For this project GEC had teamed with Marconi Communications Systems Limited (UK).<sup>33</sup>

### The choice

3.47 At the tender stage it was recognised that JORN was a high-risk program. As an initial step in managing the risk, each of the selected companies was funded by the Government to undertake a systems engineering and risk analysis.<sup>34</sup>

3.48 Accordingly, preliminary design study contracts were awarded to the three potential prime contractors, to be completed between September 1988 and March 1989 at a total cost of \$3 million.<sup>35</sup> The purpose of the PDS was to enable the selected tenderers to appreciate the potential technical problems involved in the proposed network and to assist the Department of Defence in identifying the potential capabilities of each tenderer.

3.49 The preliminary design studies included risk reduction studies that required several project risk areas to be addressed. These were used by the Jindalee Project Office to evaluate each tenderer's appreciation of the risks.

33 Hon Kim Beazley, Minister for Defence, *News Release*, 16 May 1989.

34 Mr Garry Jones, *Estimates Committee Hansard*, 25 September 1996, pp.444-445.

35 JORN Project Management and Acquisition Plan, 30 April 1993.

3.50 The preliminary design studies resulted in confirmation of the viability of the project and the potential Australian prime contractors and provided valuable input to the Request For Tender.<sup>36</sup>

3.51 As a result of the first round of tendering, the BHP team was eliminated from the tender process in September 1989. According to Mr Collins, who was involved in the JORN PDS contract, BHP was recognised within the AWA/GE team:

*as one of the two teams with previous experience in this field (through Raytheon with their operational OTHRs) and [with] proven project management and organisational capability.*<sup>37</sup>

3.52 In May 1990 a supplementary request for tender was released to the remaining two bidders. The outcome was the elimination of AWA.

3.53 AWA's tender price was more competitive than Telstra's. The price differential between the AWA and Telstra bids which was considered by the Defence Source Definition Committee was \$61.51 million, when the prime contract target price was \$685 million (April 1991 prices).<sup>38</sup> When provision was made for the four year maintenance and support period, however, the differential was \$51.57 million.<sup>39</sup>

3.54 AWA's bid contained a risk sharing provision which capped its liability at \$50 million above the ceiling price. By contrast, Telstra's liability was open-ended and was not limited to a specified upper limit. Telstra undertook to pay any cost overruns. This obviously increased the Commonwealth's exposure.

3.55 Evidence to the Committee suggested that AWA appeared to have the experience but was ruled out. While AWA had previously had a substantial association with the Jindalee project, the Committee was told that at the time the prime contractor was to be selected the company was experiencing considerable financial difficulties which posed an

36 JORN Project Management and Acquisition Plan, 30 April 1993.

37 Mr John Collins, *Submission*, p.S7.

38 ANAO, *Audit Report No.28, 1995-96*, p.5.

39 Defence, *Correspondence*, 25 February 1997.

unacceptable degree of risk.<sup>40</sup> The Committee understands that AWA was also considered to have made some errors of commercial judgment in relation to Defence activities which contributed to its financial difficulties. By way of contrast Telecom, as a Government entity, did have solid financial backing.

3.56 Mr Gilligan observed that:

*as things progressed, people became a little uncertain about the capacity of AWA and, for that reason, the most competent contractor fell away.*<sup>41</sup>

3.57 Following the announcement by the Minister for Defence on 20 December 1990 that Cabinet had approved construction of JORN, Telstra was awarded the prime contract after five months negotiation, on 13 June 1991.

3.58 The Committee noted Mr Collins' comments that two (or three) stage projects are considered good risk management practice for advanced technology projects. Mr Collins advised the Committee that in the US it is normal for the large majority of defence major projects to be awarded in three discrete contracts: design, development and production. At the conclusion of each contract, a Technical Data Package is delivered and this acts as the basis for open or selected tendering into the next contract phase.<sup>42</sup>

3.59 Mr Brennan told the Committee that Telstra was awarded the contract because, at the time, the Defence Source Selection Committee considered that Telstra had put forward a credible bid and that its technical solution (based on digital technology) more satisfied the requirement than that of its competitor.<sup>43</sup>

3.60 The Committee was surprised to be told that Telstra's JORN design was considered to be more up-to-date. Telstra's solution was thought to be necessary to meet the goal of building a 'next generation' system. The Defence Selection Committee was looking for the potential to provide a

40 Mr John Collins, *Submission*, p.S8.

41 Dr Michael Gilligan, *Transcript*, 5 December 1996, p.26.

42 Mr John Collins, *Submission*, p.S7.

43 Mr Max Brennan, *Transcript*, 6 December 1996, p.38.

capability that could mature over a period. Therefore, having up-to-date hardware which was going to last through that life type and be capable of being updated was a significant factor.<sup>14</sup>

3.61 The Selection Committee concluded that Telstra's offer was more likely to result in a final contractual financial outlay for the Commonwealth around the tendered price - there was even some belief that the outcome might be less than that - and more likely to meet the tendered schedule. Subsequent contract negotiations did nothing to diminish those expectations.<sup>15</sup>

3.62 The Committee was told, however, that at the time there was no evidence of Telstra management experience with complex real-time software development, especially to Military Standards which differ substantially from normal commercial requirements: they are more demanding. Neither had Telstra had any experience of managing defence Major Capital Equipment Projects other than those related to their normal communications responsibility.<sup>16</sup>

#### *Committee comment*

3.63 The Committee concluded that the primary objective of the JORN Project of acquiring a wide area surveillance OTHR network was compromised by the secondary objective of developing an indigenous defence industry capability. While clearly there was merit in the notion of 'growing an Australian prime', it was perhaps too ambitious to implement the policy with a project of the magnitude of JORN. Telstra was chosen as the project manager but was unable to manage the project.<sup>17</sup>

44 Mr Max Brennan, *Transcript*, 6 December, 1996, p.39.

45 Mr Max Brennan, *Submission*, p.S72.

46 Mr John Collins, *Submission*, p.S7.

47 See Chapter Five.

3.64 Indeed, the Committee believes that too much emphasis was placed on having an Australian company as a prime without any detailed judgment being made about the penalties of such an approach. This clearly has had serious implications for the project. Telstra did not have technical radar expertise or Defence project management experience.

3.65 The Committee is critical of Defence's actions in establishing a review team for the particular purpose of making recommendations on acquiring an OTHR network, only to ignore the fundamental assumptions on which its recommendations were based.

3.66 The choice of a Government-owned company as the prime contractor perhaps contributed to the open-ended nature of the contract. The Committee noted above that AWA's tender constrained its liability while no such provision was included in the Telstra contract. The Committee concluded that an experienced private company would be unlikely to expose its share-holders to the same degree of risk as that accepted by Telstra.

3.67 The Committee noted the criticism of Peter Robinson who, writing for the *Financial Review* at the time, observed that:

*The awarding of the contract to Telecom can be seen simply as one government organisation servicing another -- if there are cost overruns, it will be government money chasing government money.*<sup>48</sup>

3.68 Telstra was perhaps the least experienced in Defence contracting of the three companies contending for the JORN Project. Given the rationale for choosing an Australian company, however, Telstra's inexperience should have been recognised and more effort taken to ensure that appropriate mechanisms were in place for the transfer of technology and project management skills at the outset.

48 Peter Robinson, "Early Warning of a Jindalee Tax Burden", *Financial Review*, 28 June 1991, p.19.

3.69 Notwithstanding the original strategic arguments for maintaining the project under the control of an Australian company, the Committee notes that the completion of the project now rests upon management by the US company, Lockheed Martin Corporation with an Australian company in partnership.<sup>49</sup>

3.70 It is ironic that the company now responsible for completing the JORN Project is Lockheed Martin. Lockheed Martin had formerly operated as General Electric and, as a member of the AWA consortium, had tendered for the JORN Project in 1990.

3.71 With the benefit of hindsight it is clear that the JORN Project was placed at higher risk because of the emphasis on choosing a prime contractor which did not have the technical or the project management expertise and the failure to heed the advice of an advisory review team.

3.72 The Committee believes that it is vital that contractors engaged by Defence on major projects have :

- technical experience;
- experience in managing major defence projects; and
- a comprehensive understanding of the complexities of contracts.

### Defence's project managers

3.73 It is essential that Defence encourage a culture which favours obtaining the best possible project managers, if necessary from overseas. The Committee recognises that expert project managers will be expensive to acquire, but will be worth the investment if major capital projects can be completed within budget and on time. Besides choosing an appropriately qualified consortium, it is essential that Defence focus particularly on choosing the best project managers.

3.74 Project management is a specialised skill and should not be left to individuals without appropriate experience or expertise. The Committee notes the observation

49 See paras.4.33-4.54.

in Hinge and Markowski's publication *Defence Project Management: Pitfalls and Pointers* that:

*most project managers, within and without Defence, are from a technical background. Historically, they were selected as project managers due to their abilities as technological problem solvers, their logical thought processes and their involvement in the end product of the project. Unfortunately, in many instances insufficient weight was given to their business acumen, their ability to lead a multi-disciplinary team, their skills at integrating the many factors that are inherent in all projects and their lack of understanding of the environment within which the project process is conducted.*<sup>50</sup>

3.75 Hinge and Markowski describe the elements which characterise Defence project management as follows:

*A project is a task requiring planned and managed effort to bring about change. In Defence, the 'changes' ... are those related to capabilities - where fully supported defence capabilities are brought on line or existing capabilities are improved. Such projects are organisationally complex, technologically sophisticated and prolonged. Usually, many alternative courses of action present themselves at various phases of a project's life cycle, and the project manager's primary job is to make the best choices at each stage of the project. Equally important is the need to anticipate problems, minimise mistakes and oversights and manage avoidable risk which can lead to cost, schedule and performance variation.*<sup>51</sup>

3.76 The problems which have been encountered by Defence in managing the JORN Project demonstrate that it is critical that there should be a great deal of emphasis placed on recognising and obtaining appropriate project management skills.

50 *Defence Project Management: Pitfalls and Pointers*, Volume 1, edited by Alan Hinge and Stefan Markowski, Australian Defence Studies Centre, 1995, p.3.

51 *Defence Project Management: Pitfalls and Pointers*, Volume 1, edited by Alan Hinge and Stefan Markowski, Australian Defence Studies Centre, 1995, p.i.

3.77 Recommendation 1

*That Defence obtain the best possible managers, if necessary from overseas, for major acquisition projects.*

3.78 Recommendation 2

*That Defence choose appropriately qualified consortiums or companies to acquire major defence capabilities, with a particular focus on choosing the best project managers.*

## 4

## THE TASK FOR TELSTRA

## Telstra's role

4.1 The task for Telstra was to deliver a complete working operational radar network against a specification written primarily in terms of required functions and performance and to maintain and support that system for a period of four years after the scheduled delivery date of June 1997.<sup>1</sup> Telstra was required to:

*engineer, design, develop, integrate, construct, install, set to work, test, document and offer for acceptance the Jindalee Operational Network conforming in every respect with the Specifications [Clause 400].<sup>2</sup>*

4.2 About three-quarters of this was to be achieved through engagement of sub-contractors. Telstra was to coordinate the activities of sub-contractors across a wide range of locations - in remote areas, capital city headquarters and factories overseas.

4.3 Defence was to procure, under separate contracts, wideband data communications links between the JORN radars and the Coordination Centre and with other elements of the ADF such as Air Defence Operations Centres and the Maritime Intelligence Centre. These communications links were to be supplied to the prime contractor as Government Furnished Services.<sup>3</sup>

4.4 This chapter examines aspects of the prime contract awarded to Telstra and the sub-contracts between Telstra and Telstar Systems Pty Limited, Lindsay Ekert and GEC-Marconi.

1 Defence, *Submission*, p.S138.

2 Cited in ANAO, *Audit Report No.28, 1995-96*, p.6.

3 Defence, *Submission*, p.S139.

## The prime contract

### Costs to Telstra

4.5 The approved cost to Defence for the JORN Project of \$1108 million (December 1995 prices)<sup>4</sup> included a target price for Telstra of \$814 million, which was set under a ceiling price incentive contract in recognition of the risk associated with designing the radar.

4.6 Under this form of contract, a target cost and corresponding target price (cost plus profit margin) were established. Variations between actual and target costs were to be shared between the contractor and Defence, with the latter's liability being limited by a ceiling price. In the case of JORN, the target price was \$814 million and the share ratio was 60:40 with Defence accepting 60 per cent of any cost saving or overrun and Telstra 40 per cent up to a ceiling price of \$895 million. All costs above the limit set by the ceiling price were to be the responsibility of Telstra.<sup>5</sup>

4.7 While Telstra bears the liability of cost overruns, the Commonwealth bears all the risk of delay (in terms of being deprived of the JORN capability).

4.8 The contract included a separately priced requirement for maintenance and support for four years after delivery. The ceiling price for maintenance and support was set at \$120 million with incentive pricing arrangements also for this component.

4.9 The contract contained no provision for penalties for late delivery by Telstra. Defence justified this on the grounds that the technical risks inherent in the JORN Project were recognised and that insisting on a liquidated damages provision would have resulted in an increase in the tendered prices to cover the perceived risk. Liquidated damages would be attracted, however, if the level of Australian Industry Involvement specified in the contract, of approximately 70 per cent of the contract price, was not achieved.<sup>6</sup>

<sup>4</sup> See para. 2.32 for details of approved project costs.

<sup>5</sup> Defence, *Submission*, p.S139.

<sup>6</sup> Defence, *Submission*, p.S139.

4.10 The prime contract contained provision for mutually agreed changes, typically to cover variations in the specifications or scope of work proposed by the client. Changes in price or other contract conditions are normally determined by negotiation between the parties.

### Scope creep

4.11 At the hearing of 23 July 1996 Mr Yelland implied that the ceiling price could change, pending amendments to the contract to account for 'scope creep'. Telstra later argued in its submission to the Committee that 'massive scope creep' and expansion of the work and resources required to carry out the prime contract, as compared to what was covered by the original contract price, had occurred. For example, Telstra considered that 'scope creep' had occurred with respect to the buildings and facilities that were required to house and support the project which had more than doubled in size and cost.<sup>7</sup>

4.12 Defence argued that the costs of the facilities at the remote sites exceeded Telstra's estimates, largely due to the unexpectedly high cost of meeting the requirement for screening the buildings against electromagnetic interference. Defence claimed that the requirement for such screening had always been included in the specification and was quite unambiguous. Defence therefore assessed that Telstra had no basis for a claim.<sup>8</sup>

4.13 Defence also advised that a change to the design of the command and control arrangements to provide an integrated operations centre covering both radars was proposed by Telstra and agreed by the JPO in August 1994. Defence asserted that, as the previous design approach was flawed, Telstra's prospects for a successful claim were negligible.<sup>9</sup>

4.14 According to Mr Nick Hammond, First Assistant Secretary, Defence Materiel, under the JORN contract, 16 changes affecting price had been approved at a cost of about

<sup>7</sup> Telstra, *Submission*, p.S108.

<sup>8</sup> Defence, *Submission*, p.S131.

<sup>9</sup> Defence, *Submission*, p.S131.

\$11.4 million at base rate (1.7% of the base date contract price). As at November 1996 a further 12 change proposals were under development or negotiation. In Mr Hammond's view, the only one likely to result in a substantial price increase was the incorporation of high-bandwidth communications at an estimated cost of about \$12 million at base rate. This change was not able to be included in the original contract as the requirements were not fully defined; it was, however, foreshadowed in the contract and provision was included in the project costs.<sup>10</sup>

4.15 Mr Nick Hammond told the Committee that, apart from a number of minor contract changes, no significant change to the ceiling price was expected by Defence.<sup>11</sup>

#### *Payments to the prime contractor by Defence*

4.16 At the beginning of the inquiry in November 1996 Defence advised the JCPA that \$679,446,023 (representing 76 per cent of the ceiling price) had been paid to Telstra.

4.17 This was a key issue for the ANAO audit of the JORN Project which found during its review that:

*the JPO has paid Telstra 80 per cent of the contract target price of \$814 million, or 73 per cent of the ceiling price ... if current payment trends continue Defence's JORN full-scale development budget will be spent by mid-1997 (the original project completion date), but there will still be at least two more years of system development work to be done, including the high-risk, high-cost, systems integration phase of the project.*<sup>12</sup>

4.18 Defence advised in July 1997 that no further JORN contract payments had been made against contractual milestones.<sup>13</sup>

10 Defence, *Submission*, p.S131.

11 Mr Nick Hammond, *Transcript*, 23 July 1996, p.15.

12 ANAO, *Audit Report No.28, 1995-96*, p.xii, xiv. Also see para.6.6.

13 Defence, *Submission*, p.S178.

#### *Admission of loss by the prime contractor*

4.19 At the JCPA's initial hearing in July 1996 Mr Yelland admitted that he believed that Telstra 'will make a loss on the project'.<sup>14</sup> Mr Yelland then qualified his answer at the hearing by saying that 'it is possible that we might incur a loss on JORN'.<sup>15</sup>

4.20 The Committee discovered in the course of the inquiry that Telstra had made provision for the project to exceed the ceiling price by over \$150 million. As mentioned in the introduction to this report, following a technical and financial audit in mid-1995, a provision of \$154 million was raised for project losses in the June 1995 accounts.<sup>16</sup>

4.21 Telstra later revealed to the Committee that the cost overruns were in the order of \$211-\$213 million. Provision for an anticipated loss of \$211 million was therefore contained in Telstra's accounts for the year ended 30 June 1996.

4.22 In October 1997 Telstra publicly announced that it had made provision in its current accounts for a liability of \$394 million. This, added to the provision of \$211 million in the previous financial year, totalled a cost overrun incurred by Telstra - and hence the Commonwealth - of almost \$606 million.

#### **Schedule**

4.23 Under the provisions of the prime contract signed in June 1991, the scheduled completion date for the JORN Project was mid 1997.

4.24 In 1994 Telstra rescheduled JORN's completion date from 1997 to 1999. By July 1996 the schedule had been extended to 2000. However, in November 1996 the Committee was advised that no revised schedule had been agreed

14 Mr Lindsay Yelland, *Transcript*, 23 July 1996, p.14.

15 Mr Lindsay Yelland, *Transcript*, 23 July 1996, p.16.

16 See paras. 1.16-1.17.

between Defence and Telstra, principally because the latter had been unable to obtain a satisfactory detailed schedule from GEC-Marconi.<sup>17</sup>

4.25 In July 1997 Defence told the Committee that there was 'some indication' that the Longreach radar would be fully operational on 31 December 2001. Integration of the Laverton radar into the network would then be scheduled to take place progressively over the ensuing eight months with the overall JORN Project being completed by September 2002.<sup>18</sup>

4.26 In explaining Defence's position on the delays, Mr Garry Jones, Deputy Secretary, Acquisition, placed more emphasis on constraining the risk and cost of the project than on constraining the schedule.<sup>19</sup> Mr Jones expressed the view that:

*if I had to compromise on the capability we are to get or the time it takes, I would first compromise on the time. I think the capability is much more important.*<sup>20</sup>

#### *Costs attributed to the delays*

4.27 Mr Jones told the Committee that real costs are accrued by the prime contractor in terms of extra overheads as a result of the delays to the schedule.<sup>21</sup> There are real costs to the Commonwealth in both the extra overheads and in the capability foregone. The Committee was told that these costs cannot be quantified because the capability does not currently exist.<sup>22</sup>

17 Defence, *Submission*, p.S132.

18 Defence, *Submission*, p.S179.

19 Mr Garry Jones, *Transcript*, 23 July 1996, p.28.

20 Mr Garry Jones, *Transcript*, 23 July 1996, p.19.

21 Mr Garry Jones, *Transcript*, 23 July 1996, p.19.

22 Mr Garry Jones, *Transcript*, 23 July 1996, p.19.

4.28 The Committee noted the comment by Mr Jones on the extent of additional costs due to the delays:

*It is true that the department will have increased costs in terms of managing the project over a longer period. In a sense we will have reduced cost because we will not be operating the capabilities as early and there will be other undefinable cost that you cannot quantify by not having a capability when we would have liked it.*<sup>23</sup>

4.29 The Auditor-General reported that the overall cost of JORN does not include \$3.5 million per year in salaries for the 45 staff members of the Jindalee Project Office. (It does include \$1.4 million per year for JPO's administration costs.) Even on the crudest reckoning this is likely to total some \$40 million dollars if JORN is completed by December 2001.

#### *Future of the prime contract*

4.30 At the first hearing on 23 July 1996 Telstra indicated that it was considering its future options for the JORN contract which included divesting itself of any further responsibility for the JORN Project.<sup>24</sup> It was subsequently revealed that a joint venture management company owned jointly by the US defence and aerospace corporation, Lockheed Martin Corporation, and the Australian defence company, Transfield Defence Systems Pty Ltd, could take over the project.

4.31 Both Lockheed Martin and Transfield claim extensive experience in Defence contracting. Lockheed Martin (formerly General Electric Aerospace) had designed, manufactured and integrated the USAF's Over-the-Horizon Radar (AN/FPS-118). Transfield Defence Systems was responsible for the design, integration and delivery (with post-delivery support) of ten ANZAC Frigates equipped with state-of-the-art weaponry, sensors, communications and control systems.

23 Mr Garry Jones, *Estimates Committee Hansard*, 25 September 1996, p.445.

24 Mr Lindsay Yelland, *Transcript*, 23 July 1996, pp.15-16.



4.32 The Committee was led to believe in September 1996 that novation of the prime contract to the joint venture management company was 'imminent'.<sup>25</sup> After protracted negotiations, however, the proposal to novate was put on hold and interim management arrangements were implemented in February 1997.

#### *Interim management arrangements*

4.33 On 17 February 1997 Telstra relinquished its management role to the Lockheed Martin/Transfield joint venture management company (known as the RLM Management Company) which was granted full rights to manage the prime contract on behalf of Telstra. Telstra agreed to pay RLM a fee of \$65 million to manage the project through to completion.

4.34 The role Telstra was to retain was in funding the new management arrangements. The management agreement provided for regular financial accounting and reporting to Telstra on the progress of the project. Telstra, however, was to retain liability for the cost of completing the project.<sup>26</sup>

4.35 The interim arrangements included a move from a variable price basis to a firm price basis, with significant incentives for early delivery and corresponding penalties for late delivery. If the network was not delivered within twelve months of the agreed date, Defence had the right to terminate the contract and to sue under the terms of the agreement.<sup>27</sup>

4.36 It was not expected that there would be any change to the scope of the project under the management agreement.

4.37 Through a facilitation agreement, the Commonwealth supported the arrangements negotiated for the ongoing management of the prime contract.<sup>28</sup> Mr Nick Hammond believed that any setbacks to the project which

<sup>25</sup> See *Transcript*, 13 February 1997, p.4, pp.10-12.

<sup>26</sup> Mr Ron Bonighton, *Transcript*, 13 February 1997, p.2.

<sup>27</sup> Air Commodore Dick Hedges, *Transcript*, 13 February 1997, p.7.

<sup>28</sup> Air Commodore Dick Hedges, *Transcript*, 13 February 1997, p.7.

may have occurred as a result of the changeover would be more than offset by the advantages to be gained from the new arrangement.

4.38 Mr Hammond told the Committee that RLM had access to project management skills which could be applied to the project. In addition, through Lockheed Martin's experience with the USAF OTHR network, RLM would be able to draw upon specific expertise in OTHR.

4.39 A further advantage, according to Mr Hammond, was that, as a result of LMC/TDS' experience in managing large complex projects, RLM would be likely to have the ability to manage the sub-contractor GEC-Marconi effectively and to:

*overcome the somewhat corrosive relationship that exists there. Also, because of the technical resources available in one of the two companies there is an alternative to going to GEC-Marconi to solve problems. It can be done in another way which puts considerable contractual leverage on them and would perhaps incline them to come to an agreement much more readily than they have been able to do so to date.*<sup>29</sup>

4.40 Defence told the Committee that under the joint venture management arrangements, additional experienced personnel (both local and overseas) have injected fresh views into the planning process, which was expected to lead to improved performance:

*The result has been new scheduling and work management proposals (for example, integrated product teams) which have been positively addressed by Defence over recent months. Defence and joint venture personnel have established a more effective working relationship.*<sup>30</sup>

4.41 Under the interim arrangements the Commonwealth was to retain the intellectual property (IP) rights which existed in the previous prime contract. The Commonwealth would thereby own all IP developed under the contract and paid for as a contract cost, would have the right to use JORN IP for Commonwealth purposes and the right to

<sup>29</sup> Mr Nick Hammond, *Transcript*, 6 December 1996, p.80.

<sup>30</sup> Defence, *Submission*, pp.S180-181.

prevent the use or disclosure of JORN IP by the prime contractor or its sub-licensees in certain defined circumstances.

4.42 As part of the new arrangements, Telstra entered into a share sale arrangement by which it disposed of its 60 per cent interest in Telstar Systems Pty Ltd to Lockheed Martin and Transfield Defence Systems on a 50:50 ownership basis.<sup>31</sup> Telstar was to continue as the major software developer for the project.

#### *Responsibilities of RLM*

4.43 Defence told the Committee that the services to be provided by RLM Management to Telstra stipulated in Clause 5 of the Management Agreement are quite detailed but in essence RLM Management must:

- manage the project using its best efforts to achieve project completion within the schedule and at the lowest practicable price; and
- manage the performance of the prime contract and each sub-contract.

4.44 In managing the prime and sub-contracts, the joint venture must be responsible for project management and technical direction, together with the provision of skilled and competent personnel to manage the performance of the project.<sup>32</sup>

4.45 Similarly, Clause 19 of the Management Agreement defines the consideration to be paid. RLM is to receive a management fee based on monthly contract performance to a maximum assured amount of \$65 million.<sup>33</sup>

4.46 The proposal to novate the contract was not ruled out. Defence told the Committee that:

31 Telstar was originally owned by Telstra and Lockheed Martin on a 60:40 basis.

32 Defence, *Submission*, p.S180.

33 Defence, *Submission*, p.S180.

*The joint venture's sub-contract with Telstra remains in place until assumption rights are executed and the contract novates. The alternative outcome will be that assumption rights are not executed and the joint venture remains a sub-contractor to Telstra for the life of the contract.*<sup>34</sup>

4.47 The decision to novate was contingent, in part, upon the outcome of a re-baselining process to be conducted by Lockheed Martin and Transfield by June 1997. The aim of re-baselining was to determine how much work remained to be carried out to complete the project and the estimated cost of that work. The delivery schedule for the network would be contingent upon the findings of the re-baselining report. Accordingly, the re-baselining was to determine an estimate to complete (ETC), to be prepared in terms of both financial and schedule considerations.

4.48 The re-baselining report was tendered to Telstra in July 1997 and RLM and Telstra entered into another series of protracted negotiations concerning novation of the contract. Defence advised that it was:

*aware that the estimate to complete that RLM presented to Telstra on 2 Jul 97 was significantly higher than Telstra anticipated. Accordingly, RLM and Telstra have sought Defence's assistance in reducing their costs. This action is under way.*<sup>35</sup>

4.49 In July 1997 Defence told the Committee that it held high expectations that novation would occur. Under the terms of the then current agreements, Telstra and RLM were required to decide on novation, or otherwise, by September 1997. Defence believed that the timing of the imminent Telstra float would result in the parties agreeing to novation at an earlier date.<sup>36</sup>

4.50 By October, however, novation had not occurred and a new management agreement was concluded with RLM.

34 Defence, *Submission*, p.S181.

35 Defence, *Submission*, p.S182.

36 Defence, *Submission*, p.S181.

4.51 The Committee was told that:

*Under this arrangement, Telstra has a continuing, but capped, obligation to make payments to RLM for the purposes of paying JORN project costs. This arrangement will continue until the cost of completing JORN is equal to the balance of the contract price payable under the JORN Prime Contract, namely \$230.77 million.*

*It is at this point that novation is expected to occur and the Commonwealth will assume liability for payment of the balance of the contract price to RLM as Prime Contractor. This liability is capped at \$230.77 million and the responsibility for any costs over this amount for the completion of JORN lies with RLM.<sup>37</sup>*

#### *Costs associated with the new management arrangements*

4.52 Defence told the Committee in July 1997 that there have been no additional costs to Defence as a direct result of the transfer of management to the joint venture. Some adjustments, however, were made:

- an increase of \$20 million in recognition of the abandonment of previous claims and adjustments for changing to a firm price;
- a decrease of \$4.5 million in consideration of the removal of the provisions for prime contract warranty coverage; and
- at that time, it was anticipated that if Telstra could demonstrate substantial life cycle savings in the support of JORN computers, the firm price contract would be increased by \$5 million.<sup>38</sup>

4.53 Defence told the Committee that the issue of exposure through warranty was a major issue for Telstra during its assessment of costs to complete. Defence held the view that most of the risk lay in the sub-contract development work where current warranty provisions remained unchanged. The sub-contract warranty cover (including the two major sub-

<sup>37</sup> Minister for Defence, *Correspondence*, dated 21 January 1998.

<sup>38</sup> Defence, *Submission*, p.S181.

contracts to GEC-Marconi and Telstar) would be unaffected by the new management arrangements. In the event that the warranty provisions were exercised, the benefit would be passed on to the Commonwealth. Defence considered that the provisions of the fixed price maintenance and support contract would provide protection during the post-delivery maintenance and support period.<sup>39</sup>

4.54 Defence advised that post-acceptance maintenance and support arrangements are established in the prime contract. If novation were to occur, responsibility for maintenance and support would pass to the joint venture, RLM.

#### **The sub-contracts**

4.55 The major sub-contractors together with the approximate value of their sub-contracts (current in December 1996) are as follows:

Sub-contractor	Principal Location	Scope of Work	Approximate value
GEC Marconi Ltd	UK	Radar sub-systems	\$395 million
Telstar Pty Ltd	Melbourne	Network and controls software	\$70 million
John Holland Construction Group	Australia	Facilities and site work	\$65 million
Lindsay Ekert and Associates	Australia	Facilities design and supervision	\$20 million
Digital Australia Pty Ltd	Sydney	Computing equipment	\$20 million
Radio Frequency Systems Pty Ltd	Melbourne	Antenna systems	\$30 million

Source: Defence, *Submission*, p.S140.

4.56 Of the sub-contractors, the Committee received submissions to the inquiry from GEC-Marconi, Telstar Systems and Lindsay L Ekert and Associates Pty Ltd. The following information is drawn from those submissions and from evidence taken from GEC-Marconi and Telstar at public hearings, as well as from evidence provided by Defence.

<sup>39</sup> Defence, *Submission*, p.S184.

### GEC-Marconi Systems Pty Ltd

4.57 Under the terms of its sub-contract, GEC-Marconi was the system design authority for the surveillance segments, that is, radar and Frequency Management System (FMS), transmit and receive sub-systems and command and control functions. It was also responsible for the detailed design and supply of hardware and software configuration items (CI) which formed part of the surveillance segments. The CIs were to be delivered to Telstra after verification that the items met the requirements set for those items.

4.58 GEC-Marconi was not responsible, however, for the installation, integration and testing of these items as sub-systems or systems. That was Telstra's role. Notwithstanding this, GEC-Marconi was to be responsible for the *performance* of the surveillance segments.<sup>10</sup>

4.59 Mr Raymond Mathews, Major Project Director (JORN), GEC-Marconi told the Committee that the project was regarded by GEC-Marconi as a medium to high-risk endeavour because of the demanding technical specification of the product and because it involved a high degree of research and development.<sup>11</sup>

4.60 Dr William Bardo, Technical Director, GEC-Marconi suggested that the ideal structure for as risky a project as JORN was to have some kind of cost sharing arrangement for a period of time until all parties were satisfied that the nature and degree of the risk is understood. At that stage a firmer contract could have been negotiated.<sup>12</sup>

4.61 GEC-Marconi was required to maximise work in Australia in order to meet the Australian Industry Involvement policy requirements. The terms of the contract obliged GEC-Marconi to perform engineering and production work in Australia to a value of not less than 34.5 per cent of the GEC-Marconi price plus associated Defence offsets to a value of 36.72 per cent of the imported content.

40 GEC-Marconi, *Submission*, p.S59; *Transcript*, 29 November 1996, p.7.

41 Mr Raymond Mathews, *Transcript*, 29 November 1996, p.8.

42 Dr William Bardo, *Transcript*, 29 November 1996, p.11.

4.62 For example, as part of Marconi's undertaking to achieve the prescribed level of AII, initial system engineering was conducted principally in Australia. While development work took place in the UK, the manufacture of some 200 front-end receivers was to occur in Australia. Installation and integration tests were to be undertaken in Australia.<sup>43</sup>

4.63 According to GEC-Marconi, the requirement to achieve the AII levels specified in the contract led to a process in which there were multiple handover points between GEC-Marconi and Telstra, each having an interface to be agreed between the parties:

*It has been this issue of multiple handover points that has been the subject of continual debate between GEC-Marconi and Telstra.*<sup>44</sup>

4.64 GEC-Marconi told the Committee there had been several attempts to reduce the number of handover points through sub-contract changes:

*including in April to September 1995 the more fundamental concept of creating a Joint Venture between GEC-Marconi and Telstra. Although this later concept did not materialise it did lead to a pragmatic 'cradle to grave' approach being agreed in principle between the parties in January 1996 such that GEC-Marconi are now responsible for the two major sub-systems (Receive and Transmit).*<sup>45</sup>

4.65 The Committee was told that part of the agreement to make GEC-Marconi responsible for sub-systems involved the transfer back to Telstra of the role of Design Authority for the Surveillance Segment, Radar system and FMS systems.<sup>46</sup>

4.66 Following the rescoping of the project, Mr Mathews acknowledged that:

43 Mr Ian Sharp, *Transcript*, 29 November 1996, pp.3-4; Dr William Bardo, *Transcript*, 29 November 1996, p.7.

44 GEC-Marconi, *Submission*, p.S60.

45 GEC-Marconi, *Submission*, p.S60.

46 GEC-Marconi, *Submission*, p.S60.

*the concept of us now developing two major sub-systems, and being responsible for all aspects of those subsystems and everything within it, and their performance totally within Marconi is a much more normal construct within this industry.*<sup>47</sup>

4.67 On 11 July 1997 Defence advised that the development and the production of transmitters was complete and installation at the Longreach site was under way. According to Defence:

*some production problems are being encountered with receivers but these are expected to be overcome. GEC-Marconi development work carried out so far indicates that the JORN performance specifications may not be met in all respects, but any shortfalls should be at the margin. Final impact will not be able to be assessed until equipment installation activities have been advanced further.*<sup>48</sup>

4.68 Defence also told the Committee that, as at July 1997, the software development was behind schedule and also behind the hardware development. According to Defence, GEC-Marconi had estimated that its development work for both the receiver and transmitter configurations could extend to July 1998.<sup>49</sup>

4.69 Aspects of Telstra's management of the GEC-Marconi sub-contract are discussed in Chapter Five.

### Telstar Systems Pty Ltd

4.70 In June 1991 Telstra entered into a contract with Telstar Systems Pty Ltd (Telstar) to develop a substantial proportion of the JORN software. Telstar was incorporated as a software engineering company in February 1991 as the result of a joint venture agreement between Telstra and Lockheed Martin Corporation for the purpose of creating an Australian, defence qualified, software engineering capability to design and implement most of the JORN software and subsequently to support JORN operations, maintenance and

47 Mr Raymond Mathews, *Transcript*, 29 November 1996, p.10.

48 Defence, *Submission*, p.S184.

49 Defence, *Submission*, p.S184.

evolutionary development. It was envisaged that Telstar would capitalise on the JORN experience and evolve the company into an Australian software engineering 'centre of excellence' with world-class defence contractor credentials capable of sustainable business growth in domestic and overseas defence and commercial markets:

*To achieve these objectives Telstar systems exploits software engineering expertise, experience, tools and technology through transfer to Australian engineers from its Lockheed Martin parent as well as other leaders in software engineering technology.*<sup>50</sup>

4.71 The Committee was told that approximately one third of the JORN software component was within the GEC-Marconi scope of work and was related to radar hardware, radar control and the first-stage processing of the received signal. The remainder, to be developed by Telstar, was to cover the major system and command and control functions. The Committee was also told that software development is an inherently high-risk endeavour, particularly where there is no existing model to serve as a basis for development, as was the case for the JORN command and control software.<sup>51</sup>

4.72 Telstar's software engineering cost was based on an estimate software size of 500,000 source lines of code. (Defence told the Committee that the JORN Project includes a software component representing about 1.2 million lines of code.<sup>52</sup>)

4.73 The sub-contract with Telstra was a firm fixed price contract with a cost incentive provision in the ratio of Telstra 60 per cent to Telstar 40 per cent.<sup>53</sup> The contract target cost was \$51.2 million (1989 prices).

4.74 Provision for software size growth was contained in a contingency portion of Telstar's margin which was Telstar's 40 per cent share of the cost incentive. For example, if no unforeseen circumstances required the use of contingency funds, the software size could increase from 500,000 to 1,000,000 source lines of code before the ceiling price would be reached.

50 Telstar Systems, *Submission*, p.S87.

51 Defence, *Submission*, p.S134.

52 Defence, *Submission*, p.S134.

53 Telstar Systems, *Submission*, p.S87.

4.75 Telstar told the Committee in December 1996 that, in fact, by October 1996 Telstar's software size estimate had grown by 40 per cent (from 500,000 to 700,000 source lines of code).<sup>54</sup>

4.76 The sub-contract schedule required the completion of all sub-contract work by June 1995. This schedule was dependent upon receipt from the prime contractor of the requirements 'allocated' to software - an output of the *System Design Review*<sup>55</sup> - by June 1992 in accordance with the project Master Schedule.

4.77 Telstar stated that its sub-contract with Telstra required adherence to all the Military Standards that normally govern system acquisitions. In particular, the sub-contract specified that the software development should be conducted in accordance with US DOD-STD-2167A *Defense System Software Development*.<sup>56</sup>

4.78 The MIL-STD-2167A (referred to as the 'Waterfall' process) is the specification governing the software development process. The process is controlled by establishing 'baselines' and placing them under formal configuration control at the conclusion of each phase and not allowing work to start on the next phase until the preceding baselines have been established.

4.79 The *Systems Engineering Management Guide* explains that configuration management (or control) is an integral part of the systems engineering management process for system definition and control. Its role is to:

- identify the functional and physical characteristics of selected system components, designated as configuration items during the system's acquisition life cycle;
- control changes to those characteristics; and

<sup>54</sup> Telstar Systems, *Submission*, p.S90.

<sup>55</sup> The *System Design Review* provides a review vehicle for data that are used to establish the system functional baseline.

<sup>56</sup> Telstar Systems, *Submission*, pp.S87-88.

- record/report change processing and implementation status.<sup>57</sup>

4.80 Configuration control is thus the means through which the integrity and continuity of the design, engineering, and cost trade-off decisions made between technical performance, producibility, operability, testability and supportability are recorded, communicated and controlled by program and functional managers.

4.81 At any given time configuration control can supply current descriptions of developing hardware items, computer software configuration items (CSCI) and the system itself. Configuration control provides traceability to previous baseline configurations of the system and for each of the configuration items. Configuration control also contains complete information on the rationale for configuration changes, thus permitting analysis and correction of deficiencies when they arise.

4.82 Configuration control can be initiated by inputs from the system engineering process as early as the definition phase and continues throughout the acquisition life cycle as the system develops and is modified. Configuration changes occur throughout the life of the systems as:

- more knowledge of the system design, operation and maintenance concepts is gained;
- mission requirements change; or
- non-technical factors such as cost and schedule influence the design.

4.83 The *Systems Engineering Management Guide* advises that these changes must be controlled to ensure first that they are properly documented so that all users are aware of the current configuration status.

4.84 Configuration control is initiated after the system level specification, which defines the technical portion of the program requirements, has been established.

<sup>57</sup> The *Systems Engineering Management Guide*, Technical Management, US Department of Defense, December 1989, Chapter 11.

4.85 An allocated requirements baseline is established for each configuration item. It is derived from the prime contractor's system functional baseline which defines the technical portion of the program requirements. Allocated requirements enable the start of the software development.

4.86 The success of this conventional 'waterfall' model depends upon a complete and unambiguous specification of the requirements *before* other development activities can begin, and depends upon those requirements remaining constant over the project development lifecycle.

4.87 Thus Telstar in a strict contractual sense could not commence the software engineering and development process for which it was responsible until it had received and contractually agreed to an allocated requirements baseline from the prime contractor, Telstra. In accordance with the project master schedule, the baseline was to be derived from the system design by Telstra by June 1992.<sup>58</sup> Telstar was to have completed its software development tasks (specified in the allocated requirements baseline) by June 1995. Telstar provided the following account of its experience to the Committee.

#### *Sub-contract history*

4.88 During the first 12 months of the project Telstar Systems concentrated on preparation of the required planning documents, implementing the infrastructure required by the sub-contract, building the software development environment, and recruiting software engineers.

4.89 In June 1992 the allocated software requirements were not available. The *System Design Review* was rescheduled to December 1992. Telstar's planned completion of the software engineering tasks by June 1995 was unachievable because the software development could not begin as planned. In December 1992 the allocated requirements were still not available. To minimise costs during this time Telstar Systems reduced its recruiting activities.<sup>59</sup>

<sup>58</sup> Telstar Systems, *Submission*, p.S90.

<sup>59</sup> Telstar Systems, *Submission*, p.S91.

4.90 By September 1993 the allocated requirements had not been made available to Telstar by Telstra which again reinforced the view that Telstra's June 1995 deadline could not be met.<sup>60</sup>

4.91 During 1993, however, Telstar noted that significant advances were being made in the US in applying a new theoretical 'spiral' or 'iterative' software development process to real defence projects. Telstar observed that, like JORN, many major defence projects were experiencing difficulties establishing firm software requirements and the conventional MIL-STD-2167A (specified in the sub-contract) was fast becoming obsolete.

4.92 Telstar decided that it was feasible to start the JORN software development by applying the process of 'iterative' software development. An iterative development plan was produced and agreement to implement such a plan was sought from the prime contractor and from Defence. Authorisation to proceed was given by the prime contractor in March 1994.<sup>61</sup>

4.93 Telstar told the Committee that the iterative development process has a potential advantage to the project in that the software configuration items can be integrated into a single stable software system prior to the integration of the hardware configuration items. Theoretically, problems in the final integration of the software and hardware can thereby be reduced.<sup>62</sup>

#### *Status of the software sub-contract*

4.94 By December 1996, the cost/schedule systems reported an 'earned value' of 76 per cent of the target cost. 'Earned value' is an objective measure of how much work has been accomplished on the contract. According to Telstar, the earned value accurately reflected the completed scope of work under the sub-contract:

<sup>60</sup> Mr Charles Swanson, *Transcript*, 6 December 1996, p.52.

<sup>61</sup> Telstar Systems, *Submission*, p.S92.

<sup>62</sup> Telstar Systems, *Submission*, p.S99.

*All of the project related plans have been completed and delivered, the Software Development Environment is complete and operational, all staff have been recruited, security cleared and trained, the Cost/Schedule Control System and Quality Management System have received the required accreditations, test harnesses and tools have been developed, software architecture and preliminary design is complete, and approximately 275,000 of the 500,000 (Contract Baseline estimate) Source Lines of Code have been designed, coded, unit tested, integrated into Computer Software Configuration Items, and the CSCI's have been integrated and tested as a software system.*<sup>63</sup>

4.95 Defence advised the Committee in July 1997 that:

*Telstar's success is dependent on the ICD [Interface Control Document ie interface between sub-systems] definition (between Telstar/Marconi) and to a lesser extent the GEC-Marconi design. However, Telstar is implementing a Telstra design for controlling the JORN that was originally developed by Marconi and is considered overly complex. Telstar's success will be judged by its ability to meet performance requirements. To date only functional demonstrations have been undertaken.*<sup>64</sup>

4.96 Defence advised in July 1997 that all high level Interface Control Documents (ICDs) were available but a large number of low level ICDs were still to be finalised.<sup>65</sup>

#### **Lindsay L Ekert and Associates Pty Ltd**

4.97 Lindsay L Ekert and Associates Pty Ltd (LEA) were commissioned by Telstra in June-July 1989 to prepare an estimate of cost for the design and project management of the construction of the facilities for JORN. The resulting estimate of costs prepared formed part of the request for tender submitted to Defence in 1989. Subsequently further work was

63 Telstar Systems, *Submission*, pp.S93-94.

64 Defence, *Submission*, p.S185.

65 Defence, *Submission*, p.S184.

done on behalf of Telstra culminating in the submission of the refined bid in August 1990. Lindsay L Ekert and Associates were awarded a sub-contract for the design, project management and construction of the facilities for JORN.

4.98 The works and facilities constructed include:

- construction of access roads;
- construction of water supply;
- procurement and delivery of the temporary site accommodation to house the construction workforce; and
- supply of site offices.

4.99 LEA is responsible for the project management of the construction of the major part of the facilities namely, the transmitter building at both remote sites (Longreach and Laverton), the receiver site building at Stonchenge in Queensland and Laverton in Western Australia, two permanent accommodation and administration facilities, permanent water supply, sewerage reticulation and treatment and supply and fitting out of the four power stations at the remote sites.

4.100 In addition LEA was to design and project manage the JORN Coordination Centre constructed at Edinburgh, South Australia.

4.101 LEA told the Committee that it had no criticism of the facilities team management provided by Telstra from the early stages of the construction of the facilities through to their completion.

4.102 LEA made the point to the Committee that the failure of the ANAO report to mention the excellent progress made in the construction of the facilities (which makes up 15 per cent of the project) has brought adverse comment against their practice by parties reading the broad conclusions of the Audit Report when those comments related only to systems engineering and software development.<sup>66</sup>

66 LEA, *Submission*, pp.S84-85.



### The technological challenge

4.103 The Committee appreciates that the JORN Project is a highly complex and technically demanding undertaking and that there are challenges inherent in aiming to develop a 'next generation' system. The Committee also recognises the magnitude of the project. As Max Brennan pointed out to the Committee, the JORN Project involves:

*technology ranging from building roads to state of the art real time signal processing. It involves the management of a substantial component of radar transmitter and receiver sub-systems being developed and manufactured overseas and it involves the installation and integration of elements of the JORN at harsh and isolated sites in inland Australia and around Australia's northern coasts.*<sup>67</sup>

4.104 Dr Bardo told the Committee that the technical aspects of the program were extremely demanding:

*The Commonwealth is most anxious that the ability of the radar receiver to detect the tiniest signals should not be limited by generation of internal noise. They wanted it to be limited only by the background noise from atmospheric sources et cetera. This has proved most demanding, but we have solved the problem.*<sup>68</sup>

4.105 The Committee noted that the JORN Project is commonly described as being at the 'cutting edge of technology', as 'pushing the boundaries of technology' or in terms of 'technology unknowns' and 'performance limitations' or 'approaching the fundamental laws of physics'.<sup>69</sup>

4.106 Mr John Collins, who was formerly employed in the AWA JORN Project office to assist with the JORN preliminary design study, suggested to the Committee that excessive use of such jargon has tended to conceal the fact that the scientific basis for JORN and the technology are well understood both in Australia and overseas (the US, China and, on a slightly

67 Mr Max Brennan, *Submission*, p.S72.

68 Dr William Bardo, *Transcript*, 29 November 1996, p.4.

69 For example, Mr Tony Ayers, *Transcript*, 23 July 1996, p.4; Mr Lindsay Yelland, *Transcript*, 23 July 1996, p.6, 3 March 1997, p.103.

different basis, in the UK and Russia) and that the apparent technical risks have been used as a shield against the real causes of delay to the project.<sup>70</sup>

4.107 In Mr Collins' view, the JORN Project has exhibited many characteristics of a badly planned project.<sup>71</sup> This has been compounded by problems in project management and systems engineering.

4.108 Mr Brennan also claimed that technological issues were not the major impediments to the progress of the contracted activities but that management issues were the real cause for concern:

*I note that Defence's expressed concerns over Telstra's management of contracted activities were confirmed by a technical audit commissioned by Telstra and conducted under Lockheed Martin Management. It is not my intention to understate the technical challenges that are involved in delivering a system like JORN, but I submit that management difficulties overshadow any technical ones.*<sup>72</sup>

4.109 One particular aspect of the project was raised as a fundamental technological issue on which many of the problems of the project rested, namely, the decision to utilise digital technology in preference to an analog solution.

4.110 In the course of this inquiry the Committee was told that it was originally intended that the radar network would utilise analog (or conventional) receivers.<sup>73</sup> Conventional receivers were employed in the Alice Springs experimental facility.

4.111 The Committee was also told that Telstra was awarded the contract to manage the JORN Project because it had put forward a technical solution based on digital technology, which at the time was thought to best satisfy the requirements to build a 'next generation' system.<sup>74</sup> In evidence Mr Brennan said:

70 Mr John Collins, *Submission*, p.S4, S25.

71 Mr John Collins, *Submission*, p.S25.

72 Mr Max Brennan, *Transcript*, 6 December 1996, p.38.

73 Mr Lindsay Yelland, *Transcript*, 6 December 1996, p.69.

74 See *Transcript*, 6 December 1996, pp.38-39.

*We were looking for a step up in capacity from what was already provided. We had an expectation that this capability was going to mature over a period. Therefore, having up-to-date hardware which was going to last through that life type and be capable of being upgraded was a significant issue.*<sup>75</sup>

4.112 The Committee found that considerable disagreement existed within the OTHR community over whether a conventional receiver would have been adequate. One industry representative said that an analog solution would have been adequate because significant developments are occurring in analog technology in parallel with advances in digital technology. The Committee was told that the analog concept is employed in other radars around the world and in the current Alice Springs operation.

4.113 The Committee was also told that the GEC-Marconi digital design is more complex than a conventional receiver because, while all potential JORN receivers accept analog signals and digitise them for processing, the GEC-Marconi design digitises the data earlier in the receiver, carries more information in the digital frame and therefore requires more powerful computers to handle the sampling rate.

4.114 One industry representative claimed that the decision to utilise digital technology significantly increased the level of risk because it contributed to the greater complexity of the system which led to delays and escalations in cost.

4.115 The Committee was also told that a decision was made, on advice from senior scientific people both in Australia and overseas, that the transmitter drive train in its analog construct would not meet the performance criteria as defined by the Department of Defence. Mr Yelland stated:

*the advice I have is that we could not have met the specifications with an analog interface. We were advised that we would have to go digital, so we went digital - at considerable cost ... I do not think that the decision was taken lightly.*<sup>76</sup>

<sup>75</sup> Mr Max Brennan, *Transcript*, 6 December 1996, p.39.

<sup>76</sup> Mr Lindsay Yelland, *Transcript*, 6 December 1996, p.70.

4.116 The Committee was told that Defence would not agree to a different specification and, therefore, the decision had to be made to digitise the entire drive train.

4.117 Dr Bardo stated that:

*We switched, at an early stage in our design, from ... an analog design to a digital design. The significance of this is that the transmitter is controlled very flexibly by software, giving great freedom of choice in the use of the radar.*<sup>77</sup>

4.118 The Committee is unable to comment on the wisdom or otherwise of using digital technology. The Committee noted, however, that the decision to change to digital technology in the early stages of the project was not universally supported by OTHR experts.

#### *Current technological risk*

4.119 In November 1996 Defence advised that with respect to technical risk all important elements of the specified performance were achievable:

*The Jindalee radar at Alice Springs has proved the basic concept and enough testing of the major items of hardware has been completed to demonstrate feasibility. While the integration of the system remains a substantial challenge, the major risks lie in the areas of cost, schedule and management rather than technical feasibility.*<sup>78</sup>

4.120 The Committee canvassed a range of views on this assertion and was told by an experienced industry representative that the project is fully capable of completion in terms of technical aspects:

*we do not believe there are any technical show-stoppers. It is obviously a very demanding project but by all means a very possible project.*

<sup>77</sup> Dr William Bardo, *Transcript*, 29 November 1996, p.4.

<sup>78</sup> Defence, *Submission*, p.S133.

4.121 One view put to the Committee was that Defence had set a specification, but the specification had become effectively 'a moving target' which has prevented Telstra and Defence from reaching an agreement on what is to be delivered in terms of the radar:

*That, fundamentally, is a significant reason for the blow-out in costs.*

4.122 The Committee was also told that while there are shortcomings in the project with respect to systems engineering work, there are no technical obstacles which would prevent delivering the system to meet original expectations.

*Committee comment*

4.123 It is clear to the Committee that Telstra is unable to complete the JORN Project. Other than agreeing to a satisfactory arrangement for assignment of the contract, Defence's options for further action are limited.

4.124 Defence acknowledged that termination of the contract for failing to make adequate progress could result in litigation by Telstra or its sub-contractors. Contractual intervention short of termination, such as directing particular actions, could be attempted but would be unlikely to result in improved progress and would have the effect of transferring significant risk from Telstra to Defence.<sup>79</sup>

4.125 The Committee noted that Defence's submission stated that the *Commonwealth's* liability was limited by the ceiling price. In fact, it was *Defence's* liability which was limited by the ceiling price. The Committee is concerned that any liability incurred by Telstra is a *Commonwealth* liability.

4.126 The Committee's real concern is that any additional cost overruns incurred by Telstra are ultimately costs to be borne by the Commonwealth.

4.127 The Committee is not confident that the JORN Project will be completed within the newly agreed cost or within the anticipated timeframe.

<sup>79</sup> Defence, *Submission*, p.S147.

4.128 The contract has still not been novated. While RLM has entered into an incentive agreement to complete the project within the terms of the agreement, there are no guarantees that further costs will not be incurred or that JORN will be delivered in accordance with the revised schedule. Telstra *currently* remains liable for any further costs above the agreed estimate to complete by RLM.

4.129 Moreover, the Committee is concerned that any changes to specifications to compensate for Marconi's inability to meet its contractual requirements may increase the scope of the project. This would impact on Defence's ceiling price.

4.130 Any losses are a straight reduction in dividend to the Commonwealth to the extent that they cannot be recovered.<sup>80</sup>

<sup>80</sup> Mr Lindsay Yelland, *Transcript*, 3 March 1997, p.107.

## TELSTRA'S MANAGEMENT OF THE JORN PROJECT

5.1 The Auditor-General's audit of the JORN Project was confined to Defence's project management of the high-risk OTHR systems engineering aspects of the project. It was not an audit of the prime contractor's or sub-contractors' operations. The ANAO, however, provided a copy of the proposed report on the audit to Telstra for comment.

5.2 Telstra's response to the ANAO report and the evidence taken by the Committee identify a range of factors which contributed to Telstra's difficulties in the management of the JORN Project. These factors, addressed briefly below, are:

- the construct of the prime contract;
- Telstra's inexperience in Defence contracting;
- failure to access relevant expertise;
- lack of senior management commitment;
- inadequate systems engineering skills;
- lack of technical baseline; and
- management of sub-contractors.

### The construct of the prime contract

5.3 The ANAO report analysed the construct of the prime contract in terms of the protection it afforded the Commonwealth. ANAO's comments related to the contract's risk sharing arrangements, performance incentives and

milestone payments.<sup>1</sup> This JCPA report focuses on the impact of the construct of the prime contract on the progress of the project.

5.4 In evidence to the Committee, Telstra attributed most of the cost and schedule overruns to the original construct of the prime contract. Telstra claimed that the contractual specifications were not structured to an acceptable standard for commencing a major systems engineering program. As a consequence Telstra was required to undertake large scale analysis work to determine the feasibility of the requirements and to develop technical solutions to satisfy the requirements.<sup>2</sup>

5.5 Defence contended that, under the terms of a 'turnkey' contract, large scale analysis work was what Telstra was paid to do:

*it should not have come as a surprise.<sup>3</sup>*

5.6 A 'turnkey' approach to project delivery provides for a product to be delivered ready for operation. Detailed design elements are therefore the responsibility of the contractor. Under the 'turnkey' contract for the JORN Project, Telstra was responsible for delivery of a complete working system against a specification written primarily in terms of required functions and performance.

5.7 While clearly Telstra has successfully undertaken major projects concerning its core business of communications, the Committee was told that Telstra had little or no experience in sub-contracting on the basis of performance-based functional specifications.<sup>4</sup> Mr Collins observed that, traditionally, Telstra had been used to managing aspects of design and technical (as opposed to functional) specification in its normal communications activities:

<sup>1</sup> ANAO, *Audit Report No.28, 1995-96*, p.38.

<sup>2</sup> Telstra, *Submission*, pp.S106-107.

<sup>3</sup> Defence, *Submission*, p.S160.

<sup>4</sup> Mr John Collins, *Submission*, p.S11.

*To change from [Telstra's] traditional way of working to the JORN basis of a functional design and specification, and formulate appropriate sub-contracts, is not something that would be attempted by a normal commercial organisation for such a significant project.<sup>5</sup>*

5.8 Nevertheless, the apparent misunderstanding of what was required under the 'turnkey' form of contract contributed to a serious breakdown in the relationship between Telstra and Defence which stood in the way of a cooperative approach to problem solving.

5.9 Telstra claimed that its efforts to clarify the specifications contained in the contract were impeded by the risk averse posture of the JPO.<sup>6</sup>

5.10 Defence, however, claimed that the specifications were accepted by Telstra<sup>7</sup> and according to Mr Brennan, any attempt to influence Telstra was invariably met with a response that Defence should make it a direction and accept the risk for that direction.<sup>8</sup>

5.11 Mr Yelland believed that a key lesson for the future emerged from this situation:

*The concept of having a principal - namely, the customer - who does not want to affirm any part of the design going forward or does not want to be involved because of future potential liability effectively puts the prime contractor in a catch-22 situation ... We have an environment now where it is very hard for us to now get approval to proceed, and any proceeding we do is proceeding at risk of getting it wrong and therefore having to fix it at our cost should it not work in its end envisaged manner ... when you are building something as complex as a radar - which is not being built ... to a set of specifications but is being built to a design yet to be done - there is risk associated with what you are trying to achieve..<sup>9</sup>*

5 Mr John Collins, *Submission*, p.S20.

6 Telstra, *Submission*, p.S107.

7 Defence, *Submission*, p.S160.

8 Mr Max Brennan, *Submission*, p.80.

9 Mr Lindsay Yelland, *Transcript*, 6 December 1996, p.66.

5.12 With hindsight Telstra stated that there was little possibility that the project could have been completed to the original schedule within the target (or ceiling) price. Telstra's argument was that, although the construct of the contract was, ostensibly, an incentive and risk sharing contract, it was effectively a fixed price contract from the beginning.<sup>10</sup> This view was not shared by Defence.

5.13 For its part Defence maintained that at the time of negotiation, Telstra had taken trouble to ensure that the contract was satisfactory to it and had signed it accordingly.<sup>11</sup>

5.14 Telstra also believed that the prime contract enabled Defence to expand the contractual requirement beyond that which was contemplated when the contract was let.

5.15 Clearly, the difficulties arising from the construct of the prime contract were not anticipated by either Telstra or Defence when it was signed in June 1991.

5.16 Mr Brennan recalled the lengthy negotiations of five months in concluding the original contract:

*Part of the reason for that length of time was Defence's insistence that Telstra understood precisely what its obligations were so as to avoid any potential misunderstanding as the contract progressed. I recall the Defence head negotiator clearly making this point in his opening remarks at the start of negotiations. The matter of the prime contractor carrying the risk was covered in Defence tender documentation issued to potential prime contractors during the first and second rounds of bidding and was specifically covered during contract negotiations. There can be no question over whether Telstra clearly understood and accepted this position at the time it signed the contract.<sup>12</sup>*

5.17 On the basis of evidence provided to the Committee, including that given *in camera*, it is not clear why Telstra agreed to sign the contract in June 1991.

10 Telstra, *Submission*, p.S159.

11 Defence, *Submission*, p.S158.

12 Mr Max Brennan, *Submission*, p.S117.

5.18 Telstra's agreement to the contract was a manifestation of its inexperience in Defence contracting. This, coupled with the Government's desire to 'grow an Australian prime', were to have damaging consequences for the project.

#### Telstra's inexperience in Defence contracting

5.19 Telstra's lack of experience in Defence contracting became evident early in the project. Telstra underestimated the time and cost of the project and made insufficient allowance for the complications, uncertainties and other contingencies inherent in the project at the time of contracting.<sup>13</sup>

5.20 The Committee is mindful that one of the objectives of the JORN project was to develop in an Australian company the skills to equip it with an ongoing capability to undertake large, complex Defence projects. The Committee understands that Telstra's inexperience was recognised at the outset.

5.21 Telstra was placed, however, in a situation in which the technological knowledge resided in the client, Defence (in particular DSTO), and in the sub-contractor, GEC-Marconi. In theory, there was to be a flow of technology, systems engineering expertise and project management skills to Telstra.<sup>14</sup>

5.22 Mr Peter McNair, former Contract Manager (JORN), Telstra observed that:

*some members of the JPO appeared to resent Telstra being involved in the project and were less than helpful in assisting Telstra on many issues ... It was a common known fact that Telstra was an inexperienced Prime contractor and needed all the assistance it could get. In my opinion this was not forthcoming from staff in the JPO.*<sup>15</sup>

13 Telstra, *Submission*, p.S107.

14 According to ANAO, DSTO's technology is transferred through research teams, working groups and the JORN Technical Review Committee. ANAO, *Audit Report No.28, 1995-96*, p.7.

15 Mr Peter McNair, *Submission*, p.S153.

5.23 Nonetheless the Committee believes that Telstra's own actions in failing to identify its own deficiencies and to access sources of relevant expertise militated against it achieving the objective set for it under the aims of the policy of 'growing an Australian prime'.

#### Failure to access relevant expertise

##### *Transfer of technology from GEC-Marconi*

5.24 Telstra selected GEC-Marconi as sub-contractor on the basis that GEC-Marconi possessed technical expertise which would complement its own skills. It was intended that Telstra would enhance its own expertise as a result of working closely with GEC-Marconi as the project progressed.

5.25 Militating against this was the fact that GEC-Marconi itself encountered significant difficulties in meeting the specifications for the radar hardware. In addition, it had proven unable to establish the systems engineering technical baseline.

5.26 Telstra belatedly addressed this problem when it sought the assistance of overseas expertise (other than from GEC-Marconi) to address specifically systems engineering issues. On this occasion the expertise was recruited from Lockheed.<sup>16</sup>

##### *Failure to develop an effective relationship with DSTO*

5.27 Because of the 'turnkey' nature of the prime contract, DSTO was not accorded a contractual role in the project. The initial project approach was to avoid Commonwealth participation in technical decisions to avoid the danger of transfer of risk. Defence observed that:

16 Mr Lindsay Yelland, *Transcript*, 6 December 1996, p.66.

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*while this is often a sensible strategy it is questionable in cases such as JORN where the Commonwealth's knowledge in the technical and scientific domain is greater than the Contractor's.*<sup>17</sup>

5.28 Nonetheless, it was understood that DSTO would be available to provide advice and assistance to Telstra when required. The Committee was told however that Telstra was unwilling to seek assistance from DSTO.<sup>18</sup>

5.29 Action was subsequently taken to attempt to develop a more productive role for DSTO participation in the project than that of the client's technical agent. Several measures were introduced including the establishment in 1995 of a joint JORN Technical Advisory Board with the Chief of the HCF Radar Division as the Commonwealth representative.

5.30 Telstra advised that there had been parallel development by both DSTO and Telstra of some aspects of the project.<sup>19</sup> The Committee was told that failure to draw upon DSTO expertise contributed to higher costs and greater risk. DSTO technology could have been utilised at lower cost than the solution provided by Telstra's engineers.<sup>20</sup>

5.31 Mr Ron Dicker, Telstra's JORN Project Director from January 1994 until March 1995, observed that DSTO, having been excluded from the Telstra developments initially, progressed too far along alternative routes to allow for easy integration of their developments in the design at later stage.<sup>21</sup>

5.32 The Committee believes that, from the beginning of the project, better use should have been made of the expertise, capabilities and the developments within DSTO to support the design and development of JORN.

17 Defence, *Submission*, p.S146.

18 Mr Max Brennan, *Submission*, p.S80.

19 Telstra, *Submission*, p.S192.

20 Mr Nick Hammond, *Transcript*, 6 December 1996, p.91.

21 Mr Ron Dicker, *Submission*, p.S55.

# TELSTRA'S MANAGEMENT OF THE JORN PROJECT

5.33 The Committee notes that, under proposed changed arrangements for the JORN Project, DSTO would still not be accorded a contractual role but on the instigation of the new contractor, would have a much greater involvement through participation in 'Integrated Product Teams'.<sup>22</sup>

## Project management skills

5.34 The Committee heard a range of perceptions about Telstra's project management skills in evidence to the inquiry.

5.35 According to Defence, lack of appropriate skills and experience in the management team allocated to the task by Telstra was evident from the early days of the program.<sup>23</sup>

5.36 Mr Brennan attributed Telstra's management problems to the fact that the initial project management team included a high proportion of members of the contract bidding team. The skills required for winning the contract were different from those required for developing the project. Consequently, while individual team managers were technically competent, the team composition was skewed, with a shortage of experience in project management.<sup>24</sup>

5.37 Following his appointment in 1995 as Telstra's JORN Contract Manager, Mr Peter McNair found the level of management and leadership for a project of the complexity and size of JORN to be poor:

*Maybe because I had come from a well led organisation ... (Transfield), the contrast struck me with the way Telstra ran the JORN Project ... I was rather dismayed upon joining the JORN Project to find it in such a state of mis-management.*<sup>25</sup>

22 Defence, *Submission*, p.S183.

23 Defence, *Submission*, p.S144.

24 Mr Max Brennan, *Submission*, p.S75.

25 Mr Peter McNair, *Submission*, pp.S152-153.

# THE JINDALEE OPERATIONAL RADAR NETWORK PROJECT

5.38 Defence told the Committee that although some changes were made in management personnel within Telstra, a shortage of skilled and experienced personnel and constraints imposed by Telstra's overall internal management culture resulted in only moderate improvement from these changes.<sup>26</sup>

5.39 Mr Dicker considered that the project had suffered from a lack of leadership. As a result staff appeared to be demoralised, blaming others and to have lost focus and energy.<sup>27</sup>

5.40 This view was supported by Mr McNair who found staff reluctant to accept responsibility, finding it:

*easier to blame others, including Sub-Contractors eg. Marconi, than admit they made an error or make a decision and act as Prime Contractor ... During my time in the Project there was very little trust among the Telstra staff, let alone with the Customer (DoD) and sub-contractors ... This lack of trust caused problems to remain in the functional sections ...*<sup>28</sup>

5.41 Mr Brennan believed that there was a sustained reluctance by Telstra to hire the relevant experience:

*even when it must have been apparent that project management was a problem.*<sup>29</sup>

5.42 The Committee noted that it was not until the second half of 1994 that Telstra decided to engage a team of senior Lockheed executives to assist and educate its own managers, for a period of a year, in the management of the project.<sup>30</sup>

<sup>26</sup> Defence, *Submission*, p.S145.

<sup>27</sup> Mr Ron Dicker, *Submission*, p.S50.

<sup>28</sup> Mr Peter McNair, *Submission*, p.S153.

<sup>29</sup> Mr Max Brennan, *Submission*, p.S75.

<sup>30</sup> Mr Ron Dicker, *Submission*, p.S53.

# TELSTRA'S MANAGEMENT OF THE JORN PROJECT

5.43 Telstra's initiative to seek Lockheed's help in training its JORN managers seems to have been too late. Because of the project's poor progress at that stage, perhaps the Lockheed experts should have been given line management responsibility and authority, as well as the task of acting as mentors to Telstra employees.

5.44 Mr Nick Hammond, then First Assistant Secretary Defence Materiel, sought to balance the criticisms made of Telstra's project management skills by saying that:

*I would not like to leave the impression that Telstra and GEC-Marconi have not had some good people on the job. We need to balance our view of management ability against the difficulty of the task. Given the substantial difficulties that were encountered, particularly in the Marconi subcontract, it is not a question of there being a whole bunch of incompetent people. It was a question of people lacking the necessary skills to take on this quite daunting task.*<sup>31</sup>

## Lack of senior management commitment

5.45 The Committee was concerned by evidence to the inquiry which suggested that the JORN Project lacked commitment by senior Telstra management personnel to its success.

5.46 It appeared that interest within Telstra in broadening its commercial base by entering into Defence contracting had waned in light of competition from Optus which focused Telstra's attention on its core business concerns. This change of strategic direction within Telstra was to the disadvantage of the JORN Project. Telstra acknowledged that:

*[its] strategic interests ... probably do not lie in defence contracting.*<sup>32</sup>

5.47 According to Mr Brennan, the JORN Project was also affected by changes in management arising from the

<sup>31</sup> Mr Nick Hammond, *Transcript*, 6 December 1996, p.85.

<sup>32</sup> Mr Lindsay Yelland, *Transcript*, 3 March 1997, p.104.



amalgamation with the Overseas Telecommunications Corporation (OTC).

5.48 Mr Brennan argued that Telstra suffered from minimal attention from higher Telstra management (that is, management above the Telstra JORN Project Director level) which prevented a wider corporate view being taken of its management and appropriate direction being given to better utilise available expertise within the company.<sup>33</sup>

5.49 Mr McNair expressed to the Committee that he believed that:

*the lack of commitment, focus and interest in management from the TAT [Telstra Applied Technologies] level to Board level has played a major role in the Project "going off the rails".<sup>34</sup>*

5.50 According to Mr McNair:

*the management and processes imposed by those above the Project Director for getting resources was totally inadequate and was/is a major factor in Telstra's poor performance as a Prime Contractor.<sup>35</sup>*

### Inadequate systems engineering skills

5.51 Defence described systems engineering as a process which starts with the operational performance specifications and proceeds through requirements analysis to development of the detailed design of the systems and the specifications for each of the components. This is usually a 'top down' (or waterfall) process which, in complex projects, needs to be conducted in a number of iterations.<sup>36</sup>

5.52 Defence reported that the systems engineering work had suffered significant delays and had not been well managed:

<sup>33</sup> Mr Max Brennan, *Submission*, p.S75.

<sup>34</sup> Mr Peter McNair, *Submission*, p.S154.

<sup>35</sup> Mr Peter McNair, *Submission*, p.S153.

<sup>36</sup> Defence, *Submission*, p.S142.

*The main shortcoming is Telstra's failure to consolidate the systems engineering process which has resulted in a lack of documentary evidence that all specified requirements of the contract have been adequately addressed in the JORN system design.<sup>37</sup>*

5.53 Some of the particular systems engineering deficiencies drawn to the Committee's attention were:

- the flow down of systems engineering requirements, both in top level analysis and the process and methodology by which the requirements were to be flowed down, were not adequate for a program of the complexity of JORN;
- the level of planning and detail required to link higher and lower level specifications was non-existent. This meant, for example, that there was no safeguard to ensure that changes at the lower level did not impact adversely on the operational requirement;
- the project was placed at considerable risk because it lacked a plan to perform a system simulation and timing analysis to ascertain how all the elements of the system were likely to interact; and
- insufficient attention was paid to configuration management for both hardware and software.

5.54 According to Mr McNair, Telstra failed to appoint an Integration and Test Manager for the JORN Project.<sup>38</sup>

5.55 Mr Brennan told the Committee that:

*there was no one responsible for, or capable of, adequately taking on the system architect, or as it came to be known, the "Mr JORN" role. Thus any design and development work that was done was fragmented ...<sup>39</sup>*

<sup>37</sup> Defence, *Submission*, p.S142.

<sup>38</sup> Mr Peter McNair, *Submission*, p.S152.

<sup>39</sup> Mr Max Brennan, *Submission*, p.S76.

5.56 Without a system architect, the project lacked a comprehensive integration, test and acceptance plan. Indeed, one of the most significant risks to the project is the ability to integrate the major elements of the project and have them work together successfully.

5.57 Substantial inadequacies thus existed with respect to the rigour which was applied to the systems engineering planning.

5.58 According to Mr Brennan, Telstra demonstrated a willingness to compromise accepted system engineering processes in the face of schedule pressures.<sup>40</sup> Mr Brennan explained that while it was always recognised that there would be elements of 'bottom-up' design being conducted in parallel with the 'top-down' system design process, the degree to which this occurred was much greater than expected and the risks increased proportionally.<sup>41</sup>

5.59 Defence's assessment of this situation was that the problems were acknowledged by Telstra. According to Defence:

*Telstra ... considered that the risk involved in proceeding was preferable to delays involved in repeating the [systems engineering] process.*<sup>42</sup>

### Lack of clear technical baseline

5.60 A fundamental problem of the JORN Project was the failure to establish the technical baseline or system design upon which other elements of the project were based.

5.61 Defence told the Committee that it had been aware of the deficiencies of the systems engineering process since 1993. However, pressure on Telstra to 're-visit and consolidate' the requirements analysis and system design had been unsuccessful.<sup>43</sup>

<sup>40</sup> Mr Max Brennan, *Submission*, p.S76, p.S81.

<sup>41</sup> 'Bottom-up' development is valid when products are already developed and may, with some iteration, be cost effectively integrated into the 'top-down' design.

<sup>42</sup> Defence, *Submission*, p.S142.

<sup>43</sup> Defence, *Submission*, p.S145.

5.62 By March 1997, some six years after the commencement of the project, the technical baseline had still not been established. This fundamental problem had ramifications for sub-contractors, particularly Telstar.

### Management of sub-contractors

5.63 The Committee found on evidence provided to the inquiry that Telstra's management of its sub-contractors had been generally satisfactory, with the exception of the sub-contract with GEC-Marconi.

#### GEC-Marconi

5.64 The original sub-contract between Telstra and GEC-Marconi prescribed the complex arrangement in which Telstra was responsible for the overall design, GEC-Marconi for radar system design and hardware, and Telstra for its installation and integration.<sup>44</sup> This cumbersome division of responsibilities contributed to a breakdown in the commercial relationship between Telstra and GEC-Marconi.

5.65 Remaining unresolved for over three years the problem of poorly specified interfaces and lack of a coherent plan to manage and control hardware and software interface configurations significantly influenced Telstra's management of the sub-contract and impeded progress on the project.

5.66 Mr Brennan believes that the relationship was further complicated because GEC-Marconi had difficulty adapting to the sub-contractor role. He claimed that GEC-Marconi had offered to take over the prime contractor role. Mr Brennan told the Committee:

*In the face of this challenge, Telstra's initial management of Marconi was quite weak ... Telstra management has gone through the range of attitudes from acquiescence to bloody-mindedness in an attempt to find something that worked but none resulted in any sustained success. The difficult*

<sup>44</sup> Defence, *Submission*, p.S144.

*relationship has not only caused delay and diminished productivity and effectiveness in the progression of project activities, but it has distracted management attention from directing progress.*<sup>45</sup>

5.67 Mr Brennan also proffered the view that Telstra underestimated the 'commercial imperative' which dominates GEC-Marconi's behaviour. Defence was also concerned about GEC-Marconi's poor performance. Defence told the Committee that:

*Unsatisfactory performance by GEC-Marconi has also been a factor [contributing to the problems experienced with the project] . While this was in part due to unpredictable technical difficulties ... poor management, lack of coordination between divisions of the company and an approach to the work which emphasised commercial advantage over performance have played a prominent part.*<sup>46</sup>

5.68 The Committee was told that GEC-Marconi's inability to deliver transmitters and receivers and associated drivers to quality, performance and time requirements had a critical impact on the project's cost and schedule.<sup>47</sup>

5.69 The Committee is critical that GEC-Marconi, given its experience in the UK, the US and Europe, did not anticipate the difficulties which were inherent in the construct of the original sub-contract with Telstra.

5.70 The Committee was told that there was technology transfer from DSTO to GEC-Marconi which would appear to be the reverse of what was intended. Mr Hammond commented on the issue of technology transfer to GEC-Marconi that:

*it is certainly true that they know more now about over the horizon radar than they did at the beginning. It has cost them a fair bit to get to that point.*<sup>48</sup>

5.71 On this basis the Committee questions the wisdom of selecting GEC-Marconi in the first place.

45 Mr Max Brennan, *Submission*, p.S79.

46 Defence, *Submission*, p.S144.

47 Mr Ron Dicker, *Submission*, p.S55.

48 Mr Nick Hammond, *Transcript*, 6 December 1996, p.88.

### *Telstar Systems Pty Ltd*

5.72 Telstar, owned partly by Telstra, expressed no concerns about its relationship with Telstra. However, Telstar's sub-contract performance was significantly influenced by Telstra's management of the JORN Project and in particular by Telstra's lack of systems engineering expertise.

5.73 As mentioned in the previous chapter, Telstra's failure to establish a software requirements baseline on time delayed Telstar's schedule by almost four years.<sup>49</sup> Telstar, formed specifically to develop the JORN software, was therefore unable to meet its contract commitments.

5.74 Telstar decided against taking legal action under the 'inexcusable delay' provision of the contract because there was no commercial imperative to do so. Telstar had no other commercial contracts given that its *raison d'être* was to develop the JORN software from a low experience base and, in so doing, develop skills which would have application to future Defence contracting.

5.75 Telstar was initially contracted to build 23 computer software configuration items and to test each individual CSCI against its specification before delivery to Telstra for integration with the hardware. According to Mr Swanson, Managing Director, Telstar Systems Pty Ltd, Telstar's implementation of the iterative methodology resulted however in Telstar exceeding its initial contractual requirement because the iterative methodology necessarily involves integration of the software.<sup>50</sup>

5.76 Mr Swanson stated in evidence that the positive outcome of this approach is that Telstar will deliver a fully integrated stable software system in advance of the integration of the hardware and software configuration items. This should reduce risks to the final JORN integration.<sup>51</sup>

49 See paras.4.88-4.90.

50 Mr Charles Swanson, *Transcript*, 6 December 1996, pp.54-55.

51 Mr Charles Swanson, *Transcript*, 6 December 1996, pp.53-55.

5.77 The Committee found that Telstar has managed the transfer of expertise from overseas more successfully than its parent company, Telstra. The software toolsets employed by Telstar were acquired through its joint venture partner, Lockheed. Telstar also accessed software tool sets from the US company, Rational Corporation, for use in the iterative methodology adopted in 1993.<sup>52</sup>

5.78 Mr Swanson acknowledged the assistance provided by DSTO:

*there was a lot of software that was developed at the Alice Springs facility over the years, and we have never been denied any access to examining that software and understanding how it works. We have also been provided with some real radar data to use as drivers to test some of our software.*<sup>53</sup>

#### Committee comment

5.79 Telstra's inability to manage the JORN Defence contract stemmed in part from its inexperience in Defence contracting and its inexperience in managing a major project of the magnitude of JORN. These factors however were known at the time the contract was let. Indeed, the rationale of 'growing an indigenous prime' acknowledged that the company chosen as the prime contractor would lack experience in areas such as systems engineering and project management.

5.80 Nonetheless, many of the problems experienced by Telstra were of its own making. Witnesses provided evidence to suggest that the organisational culture of Telstra militated strongly against the establishment of a productive environment within its JORN Project office.<sup>54</sup>

<sup>52</sup> Mr Lindsay Yelland, *Transcript*, 6 December 1996, p.51.

<sup>53</sup> Mr Charles Swanson, *Transcript*, 6 December 1996, p.62.

<sup>54</sup> See paras.5.37-5.41.

5.81 Mr Brennan also observed that the difficulties arising from the nature and magnitude of the JORN Project task were exacerbated by Telstra's apparent unwillingness to overcome what he described as its 'cultural arrogance'.<sup>55</sup> Consequently, dysfunctional relationships between the customer and prime contractor and the prime contractor and sub-contractor were major impediments to resolving problems and completing the project.

5.82 The Committee noted the remarks of the Chief Executive Officer of Telstra, Mr Frank Blount, at a Melbourne press conference on Telstra's Annual Results on 29 August 1997:

*Let me talk a little bit about JORN because I think it does need some explanation. I don't have the exact date but I believe it was '89 or '90, the former Telecom Australia entered into a contract and I think perhaps maybe even nudged a little bit by the current [the then Labor] Government to do it because of local content kinds of things.*

*In retrospect, and I've been living with it now ever since my first day of arriving here five and a half years ago, it was a mistake to even think about entering into this arrangement because, first of all, it wasn't our core business. We had no skills in high frequency radar and certainly had no experience in large defence projects with a myriad of sub contractors to have to deal with, some of which are overseas in the UK. The construct of the financial arrangements, in my view, were flawed from the beginning from Telstra's point of view in that it was a brand new technology, totally unproven, yet we signed up for a fixed price contract after some risk sharing between defence and us but then all the remaining risk was with Telstra and on a new technology yet to be proven so I think that's a big issue and then, finally, ever since I've been here we've had a lack of stable specifications for the project. It was a moving feast trying to get the specifications nailed down.*

*Having said that, I don't know where you put the blame. Is it the blame of the company for getting into it to start with, do we share some blame with others, I can't ask that.*

<sup>55</sup> Mr Max Brennan, *Submission*, p.S75.

*I would have to say that we haven't managed it as effectively as we might given that it was not our core business but I will tell you we've had about 4 different Group Managing Directors who have tried to manage it in my tenure here and nobody's done any better than the ones before. It is a tough, tough project to manage and, frankly, we just didn't have enough leverage over some of the sub contractors to get them to perform and it was not our core business so I think it was a mistake.<sup>56</sup>*

5.83 For major defence projects such as JORN, Mr Blount advised:

*Get a professional that knows how to manage defence contracts to run it.<sup>57</sup>*

56 Mr Frank Blount, CEO Telstra, *Annual Results Media Briefing: Questions and Answers Session*, Melbourne, 29 August 1997.

57 Mr Frank Blount, CEO Telstra, *Annual Results Media Briefing: Questions and Answers Session*, Melbourne, 29 August 1997.

## 6

## DEFENCE'S MANAGEMENT OF THE JORN PROJECT

6.1 The responsibility of the Jindalee Project Office was to oversight the production of a JORN Network which met the specified performance requirements, and was delivered on time and within the project cost provisions. The selection of Telstra as the prime contractor, given that it had no previous experience in Defence major capital equipment projects, no experience with OTHR and its lack of systems engineering expertise, was to make an already difficult task even more difficult.

6.2 The complexity and high risk nature of the project and the limitations of the prime contractor should have ensured that a very high level of project management skill was applied from the start.

6.3 The issues of how well Defence performed its project management role and the extent to which the JPO contributed to the problems that have occurred with the JORN Project were pursued with a view to identifying lessons to be learned from any problems arising from Defence's management of the project.

## Management of the JORN Project

6.4 The conclusions of the ANAO and the Committee's examination of the evidence available to it identify a range of factors that have contributed to Defence's difficulties in the management of the JORN Project. The three major factors are:

- the construct of the prime contract being inappropriate for a development project;
- inadequate risk management; and
- weak contract enforcement and oversight.

### The prime contract

6.5 Three aspects of the prime contract appear to have contributed significantly to project management problems.

6.6 First, the prime contract provided for payments to be made on the basis of pre-set milestones which are milestones which are pre-determined and form part of the agreed contracted deliverables. However, given the developmental nature of the project and the uncertainty involved in the engineering development, it proved to be impossible to predict progress precisely. Also, the milestones were found to be only a coarse measure of progress.<sup>1</sup> This resulted in payments to the prime contractor for work that was not properly completed and so were in excess of the earned value of work completed. (Earned value is an objective measure of how much work has been accomplished on the contract.) Defence has agreed with the ANAO that the milestone payments, although they satisfied the terms of the contract, were inappropriate.<sup>2</sup>

6.7 Second, the prime contract was structured in a way that minimised the risk to Defence by making Telstra fully responsible for delivery of a JORN system which met Defence's operational requirements. In order to maintain this risk strategy, Defence would not provide progressive formal approval of the prime contractor's activities.

6.8 Mr Max Brennan told the Committee that the design of a system like JORN is very complex and it is not possible to isolate any particular aspect of the design and quantify its impact on overall system performance. This inability to quantify the consequences of giving the prime contractor explicit direction on any particular design aspect caused problems.<sup>3</sup>

6.9 Mr Hammond made the point that in his view:

*We certainly should not be directing the contractor, but we should be sharing the information that we have, and we certainly should be giving the contractor a good indication that this design that it has produced is, in our opinion, going*

1 Mr Nick Hammond, *Transcript*, 23 July 1996, p.26  
2 Mr Nick Hammond, *Transcript*, 23 July 1996, p.25.  
3 Mr Max Brennan, *Submission*, p.S80.

*to be fit for purpose or not going to be fit for purpose. That does not absolve you from the need to test it and approve it, but I think it is a valid point that we could have gone further, particularly in the early days, to take responsibility for some of the design decisions that were being made, but in a cautious and controlled fashion.<sup>4</sup>*

6.10 Mr Brennan explained that when Defence did attempt to influence strongly the prime contractor this was invariably met with a response asking the Commonwealth to take the risk for the direction.<sup>5</sup>

6.11 This led to the adoption of a risk averse posture on the part of the JPO<sup>6</sup> and, according to Telstra, contributed to the cost and schedule overrun.<sup>7</sup>

6.12 The third factor relates to the incentive payment clause of the prime contract. The intent of Defence was to provide, on the one hand, an incentive for the prime contractor to share in any savings arising from the cost of the project being less than the target price and, on the other hand, to minimise the risk to Defence if the target price was exceeded. To this end Telstra and Defence had agreed, in 1991, on a price-ceiling cost-incentive contract that contained:

- a target price of \$685.5 million (April 1991 prices);
- a maximum (ceiling) price payable by Defence equal to the target price plus 60 per cent of any cost overruns up to a maximum of 10 per cent above the target price. This would have yielded a ceiling price of \$754.1 million (April 1991 prices);<sup>8</sup>
- a financial risk share where Telstra was responsible for 40 per cent of any cost overruns up to the ceiling price, and 100 per cent of all costs that exceeded the ceiling price; and

4 Mr Nick Hammond, *Transcript*, 6 December 1996, pp.88-89.  
5 Mr Max Brennan, *Submission*, p.S80.  
6 Mr Max Brennan, *Submission*, p.S80.  
7 Telstra, *Submission*, p.S106.  
8 ANAO, *Audit Report No.28, 1995-96*, p.41.

- a savings share that entitled Telstra to 40 per cent of the savings if JORN was completed for less than the target price.<sup>9</sup>

6.13 *Audit Report No.28, 1995-96* reported that Defence had advised that, due to price escalation and foreign currency variations, the target price rose to \$814 million in December 1995 prices and the ceiling price to \$895 million and the share ratio was 60:40 with Defence accepting 60 per cent of any cost saving or overrun up to the ceiling price of \$895 million and Telstra 40 per cent.<sup>10</sup>

6.14 Telstra has claimed that the contract could have operated as an incentive and risk sharing contract only if at the time the contract was signed the system design had been fully specified so that what had to be built and delivered was defined and ascertainable. This would have made it possible to properly estimate the cost of what had to be built and derive an achievable completion schedule.<sup>11</sup>

6.15 The Committee has been advised that incentives are normally applied to production contracts so that production efficiencies are rewarded. Design and development is an ongoing 'one-off' process where this factor does not apply.<sup>12</sup>

6.16 Mr Collins suggests that perhaps the Defence Department should have tried this mechanism on a smaller, less complex project before applying it to the JORN Project. It would then have been better able to judge the actual achievements and formalise its objectives for such an arrangement.<sup>13</sup>

9 ANAO, *Audit Report No.28, 1995-96*, p.41.

10 ANAO, *Audit Report No.28, 1995-96*, p.41.

11 Telstra, *Submission*, p.S106.

12 Mr John Collins, *Submission*, p.S9.

13 Mr John Collins, *Submission*, p.S9.

#### Committee comment

6.17 The Committee appreciates that the JORN prime contract was negotiated and signed some six years ago. At the time, Defence considered that it contained some worthwhile innovations such as its incentive clauses and that it was one of the early 'turnkey' contracts.. Mr Garry Jones stated that:

*The JORN contract ... in its day and at its time ... was on balance quite a good contract.*<sup>14</sup>

6.18 What seems not to have been appreciated by Defence, at the time, was the complexity and high risk nature of this developmental project and that the risks were even higher given the low experience level of Telstra for this type of project. Defence told the Committee under questioning that it was moving to earned value payments - and also that Defence unilaterally changed to the earned value approach. Defence recognises that milestone payments for this project were not appropriate and that an earned value criterion would have been better.

6.19 The Committee notes the rationale of the JPO in not wanting to accept the risk that Telstra was attempting to transfer in exchange for accepting Defence's approval of Telstra's progressive design proposals. However, taking such a rigid stand contributed to the difficulties that Telstra was having in progressing the design of JORN. The Committee also notes that Defence recognises that the JPO had adopted a strong risk averse position.<sup>15</sup> Mr Hammond acknowledged in evidence that Defence:

*could have taken more responsibility for some of the design decisions.*<sup>16</sup>

6.20 The Committee believes that inept management has cost the Commonwealth *cash benefits* which would have been obtained through good management.

14 Mr Garry Jones, *Estimates Committee Hansard*, 25 September 1996, p.446.

15 Mr Nick Hammond, *Transcript*, 6 December 1996, p.79.

16 Mr Nick Hammond, *Transcript*, 6 December 1996, p.79.

## Risk management

6.21 The Auditor-General found:

*the absence of a formalised and systematic risk management approach by the JPO [to be] a key issue.*<sup>17</sup>

6.22 Though the JORN prime contract required formal and systematic risk management processes by Telstra, the JPO did not seek to enforce the requirement.<sup>18</sup>

6.23 The ANAO considered that the JPO gave the JORN contract's risk management a low priority and failure to enforce the requirements of the contract denied the JPO more timely insights (and hence a stronger basis for initiating remedies) into the project's problems which were later identified in the 1995 JORN Technical Audit Report.<sup>19</sup>

6.24 This lack of enforcement by the JPO supports the view that risk management is treated as a minor component in the roles of Defence's project offices and that very few Defence projects have had their risk management plans modified in the light of project outcomes.<sup>20</sup>

6.25 Yet projects are essentially about risk and uncertainty. That is the nature of projects.<sup>21</sup>

6.26 In evidence to the Committee Mr Collins assessed that many of the problems identified in the ANAO report reflect broader planning inconsistencies in the Materiel Division of the Department of Defence. He maintains that the Force Development cell does not have the resources or skills to prepare an adequate risk management plan prior to the finalisation of its Major Capability Submission (MCS). Adequate funding to prepare risk management plans is not made available by the Department until the project is endorsed by the Force Structure Policy and Programming Committee. In many cases, this funding is too late and there is

17 ANAO Audit Report No.28, 1995-96, p.14.

18 ANAO, Audit Report No.28, 1995-96, p.12.

19 ANAO, Audit Report No.28, 1995-96, p.14.

20 Mr John Collins, Submission, p.S11.

21 Defence Project Management: Pitfalls and Pointers, Volume 1, edited by Alan Hinge and Stefan Markowski, Australian Defence Studies Centre, 1995, p.5.

a reluctance to return and modify the MCS to reflect the 'lessons learnt' during further planning. Thus the Department fails to recognise that the ability to influence project outcomes diminishes as the project progresses.<sup>22</sup>

## Committee comment

6.27 The Committee is concerned that, for such a high risk developmental project as JORN, Defence gave risk management processes such little attention. This raises the question of the adequacy of Defence's present approach to risk management for its major projects.

## Weak contract enforcement and oversight of contractor performance

6.28 Weak enforcement of prime contract provisions in relation to risk management has been identified as a factor which contributed to Defence's difficulties in the management of the JORN Project. The JPO itself has recognised that enforcing contractor performance is an area of weakness in its management of the JORN Project.<sup>23</sup> Mr Brennan stated that:

*Defence was quite lenient in its treatment of Telstra.*<sup>24</sup>

6.29 In addition, information provided by Defence indicates that there was a range of other issues on which the JPO, although it made some attempts, did not successfully influence the prime contractor.

6.30 As one example, the JPO began pushing for an independent technical audit in 1993 with the intention of convincing Telstra management of the deficiencies in the management of the project.<sup>25</sup> However, the audit was continually delayed by Telstra, until finally, it was

22 Mr John Collins, Submission, p.S10.

23 Defence, Submission, p.S124.

24 Mr Max Brennan, Submission, p.S80.

25 Mr Max Brennan, Transcript, 6 December 1996, p.45.



commenced in May 1995 as a part of the due diligence process, which was a necessary prerequisite for a proposed joint venture between Telstra and Marconi.<sup>26</sup>

6.31 As another example, Defence indicated that it would have preferred to have greater DSTO involvement in assisting the prime contractor. Stronger project management could have overcome the attitude of 'not invented here' in the lower levels of the engineering organisation in Telstra,<sup>27</sup> an attitude that resulted in DSTO not being sufficiently consulted.

6.32 Mr Dicker proffered the view that Defence should have taken a firmer management approach to Telstra and GEC-Marconi in the early stages of the project and insisted on a complete and correct System Design Review, System Requirements Review and a better structured Work Breakdown Structure before progressing to detailed design.<sup>28</sup> As a result of the bottom up approach used, system requirements gaps were allowed to evolve.<sup>29</sup>

6.33 This was to have unfortunate consequences:

*The uncertain and divergent responsibilities between contract parties led to an environment in which conflict was allowed to develop to the detriment of progress. DoD could have taken a more directive approach towards Telstra than it did.<sup>30</sup>*

6.34 The former Director of the JPO acknowledged that a more demanding regime might have provided a more effective learning environment.<sup>31</sup>

26 Mr Max Brennan, *Submission*, p.S77.

27 Mr Nick Hammond, *Transcript*, 6 December 1996, p.91.

28 Mr Ron Dicker, *Submission*, p.S54.

29 This is usually a 'top down' process which, in complex projects, needs to be conducted in a number of iterations. Defence, *Submission*, p.S142.

30 Mr Ron Dicker, *Submission*, pp.S54-55.

31 Mr Max Brennan, *Submission*, p.S80.

#### *Committee comment*

6.35 In considering why the JPO did not adequately enforce the contract provisions or more forcefully oversight contract performance, the Committee agrees that the following factors contributed:

- a tolerance of Telstra because it was a GBE and because it was an inexperienced Defence contractor which needed to be given the opportunity to learn;<sup>32</sup>
- the lack of commercial experience by the JPO<sup>33</sup> which resulted in the JPO being less hard-nosed and disciplined in its oversight of the prime contractor than was necessary; and
- the fact that there was a ceiling price.

#### **JPO human resource project management skills**

6.36 The Committee was concerned to know the extent of experience and training of the senior JPO staff and what impact this may have had on performance.

6.37 The Committee was advised that JPO civilians had been selected using normal Australian Public Service selection processes based on approved selection criteria and that Service personnel have been selected by their Service on the basis of matching their skills and experience to selection parameters.<sup>34</sup>

6.38 Defence considered the experience and qualifications of the senior JPO staff to be high and that these staff had been provided relevant training since joining the JPO.

6.39 Turnover of JPO senior staff has also been relatively low.

32 Mr Max Brennan, *Submission*, p. S80.

33 Mr John Collins, *Submission*, p.S20; Mr Nick Hammond, *Transcript*, 6 December 1996, p.86.

34 Defence, *Submission*, p.S123.

### Project management in Defence

6.40 Over the past decade, project management in the Defence Organisation has attracted criticism from the ANAO and from Parliamentary committees.<sup>35</sup> There have been some persistent themes in these reviews including:

- poor project definition;
- inadequate specifications;
- badly drafted contracts;
- poorly enforced contracts;
- poor record keeping and acquittals;
- absence of adequate warranty and penalty provisions; and
- poor assessment and management risk.

6.41 Regarding Defence's management of the JORN Project, a number of these themes have again emerged from this inquiry.

6.42 That project management problems previously identified have been repeated in the JORN Project raises questions about the effectiveness of actions that Defence has been taking to improve its project management performance. One might ask how widespread across Defence's more than 150 capital equipment projects are the problems such as those occurring in JORN Project management? What level of improvement in Defence project management overall, has occurred since the major review by the JCPA in 1986?<sup>36</sup>

6.43 Defence has progressively sought to improve its program management capability over the past ten years, particularly since the publication of the JCPA *Review of Defence Project Management*, with a range of initiatives.

35 For example: JCPA, *Report 243, Review of Defence Project Management*, 1986; and ANAO, *Audit Report No. 22, Department of Defence: New Submarine Project*, 1992.

36 JCPA, *Report 243, Review of Defence Project Management*, 1986.

6.44 Reference to the 1995-96 *Defence Annual Report* reveals that Defence is continuing to develop its project reporting and financial management information systems, improving its procurement management processes and developing its human resource project management skills.<sup>37</sup>

6.45 The Committee notes, however, that some Defence practices militate against developing project management expertise. The Committee was told that about 35 per cent of the JORN Project team consists of military personnel. The posting cycle of most military personnel of two to three years prevents longer term development of skill requirements in what is essentially a non-core area.

#### Committee comment

6.46 As there is no career stream of project managers in the military there is no opportunity for personnel to accumulate the level of expertise required to manage large projects in today's commercially oriented environment.

6.47 The Committee noted that the Defence Efficiency Review recognised that military staff spend most of their careers outside acquisition and are therefore less expert in the pure acquisition aspects than equivalent civilian staff. However, 'military staff with recent operational and support experience in the relevant systems are essential to equipment project teams.'<sup>38</sup>

6.48 The Defence Efficiency Review team suggested that the military component of a project team should be ten per cent.

37 *Defence Annual Report*, 1995-96, p.134.

38 *Defence Efficiency Review Report*, p.26.

6.49 The Review team also put forward the view that:

*there should be a firm rule that, for Colonel (equivalent) and higher levels, a posting to the Acquisition Executive will only be considered if the individual has been in the organisation at least once before at a lower rank. This should help to provide the management of the Executive with a benchmark on which to judge their likely expertise.<sup>39</sup>*

6.50 The Committee considers that it is quite unrealistic for Defence to expect that military personnel, who have not had the necessary professional training and experience in major capital project management, although very capable in other respects, successfully manage large projects such as JORN.

6.51 The Committee believes that there is a need to establish a stronger career structure in procurement and project management.

#### 6.52 **Recommendation 3**

*That Defence establish a career structure in procurement and project management.*

6.53 The Committee also considers that until and unless Defence can, for all its major capital equipment projects, develop and publish appropriate performance assessments that are based on relevant performance measures, then it will be difficult to make any informed judgements about the impact of management improvement initiatives or the current status of project management performance. It is also likely that views and judgements about Defence's overall project management capability and performance will continue to be formed on the basis of *ad hoc* external reviews which, by nature, will focus attention on problem areas rather than successes.

39 Defence Efficiency Review Report, p.26.

#### 6.54 **Recommendation 4**

*That Defence employ the most appropriately qualified and experienced personnel in its senior project positions and not limit identification of these personnel to Defence or Government staff, bringing in non-Defence Department experts on contract, where necessary.*

## INTELLECTUAL PROPERTY

### Introduction

7.1 Intellectual Property (IP) is the generic term used to describe the property rights for creations of the mind or intellect and includes copyright, patents, trade marks, registered designs, trade secrets and confidential information.

7.2 Largely as a result of the information technology boom, intellectual property and its associated rights of ownership have grown in importance over recent years and this is particularly so in the Australian defence environment.

7.3 Given Australia's policy of greater defence self-reliance and the consequential strategy to foster a viable and active Australian defence industry,<sup>1</sup> the need to be able to readily access IP in the acquisition, operation and through-life support of the high technology equipment upon which the Australian Defence Force relies, is critical for operational effectiveness.

7.4 As there is considerable potential for financial gains or losses from IP, the sound management of Australian-developed IP, such as that arising from the research of the DSTO and developmental projects like JORN, is particularly important.

7.5 Because of the importance for Defence of ready access to IP and the need to protect any potential financial benefits of Australian-developed IP, the Committee wished to determine whether the IP associated with the JORN project was being properly managed.

1 Defence White Paper 1994, *Defending Australia*, Chapter 11.

### What is JORN Intellectual Property?

7.6 As described in the Licence Agreement between the Commonwealth and Telstra, *Intellectual Property Rights*:

*means all copyright, rights in the nature of copyright, patents, registered and unregistered trade marks (including service marks), registered and unregistered designs, rights in relation to semi-conductor 'chips and integrated circuits or other intellectual property rights as defined by Article 2 of the World Intellectual Property Organisation Convention of July 1967 and includes all rights to register or procure the registration of any intellectual property or to protect any intellectual property.*<sup>2</sup>

7.7 JORN intellectual property (JORN IP) means:

*all Intellectual Property Rights pertaining to the JORN which result from the performance of the Prime Contract, or a sub-contract ... in relation to which Telstra has received payment as an Allowable Cost [under the JORN contract].*<sup>3</sup>

7.8 IP specifically created as a result of contract activity is generally identified as *foreground* IP in order to distinguish it from IP that is brought into the contract which is identified as *background* IP. Identification of background IP is important for the purposes of determining rights in relation to future commercialisation activity.

7.9 For the JORN prime contract the Commonwealth, where feasible, has formally identified its background IP, mainly developed by DSTO. Such formal identification provides a legal basis for protecting the Commonwealth's rights in relation to its background IP.

2 Attachment JJ to CAPO C438574 (the JORN Prime Contract).

3 Attachment JJ to CAPO C438574.

## JORN IP ownership

7.10 The JORN prime contract states that all JORN IP 'shall immediately upon creation vest in and become the property of the Commonwealth'.<sup>4</sup> JORN IP may be used by the Commonwealth for Commonwealth purposes which, by agreement with the prime contractor (Telstra), excludes commercialisation.

7.11 Commonwealth ownership of JORN IP is therefore clearly articulated and the Commonwealth's access needs to JORN IP appropriately protected in the prime contract.

7.12 The Commonwealth's position with respect to IP arising from JORN Improvements is, however, not so well protected. This is discussed in the following section on commercialisation rights.

## JORN and JORN Improvement commercialisation rights

7.13 'JORN Improvements' are defined as the IP Rights, relating to JORN, created by a contractor and funded by other than the Commonwealth.

7.14 Although the Commonwealth owns JORN IP, under the terms of the prime contract, Telstra was granted 'an irrevocable, world-wide, royalty-free and unrestricted licence'<sup>5</sup> to use, commercially exploit, or sub-licence JORN IP, for 20 years from contract signature, unless such action is contrary to the national interests of the Commonwealth.

7.15 This licence to Telstra to commercialise JORN IP was given in exchange for:

- a \$2.4 million reduction in the JORN contract price;
- free and unfettered use of JORN IP by the Commonwealth for Commonwealth purposes;
- commercially significant Australian industry involvement in JORN IP; and

<sup>4</sup> CAPO C438574, clause 4200.

<sup>5</sup> CAPO C438574, clause 4300.

- access by the Commonwealth to JORN Improvements.<sup>6</sup>

7.16 The licence granted to Telstra also provided for Telstra to sub-licence all or any of its rights under the licence, provided that Telstra obtained the approval of the Commonwealth before it entered into a sub-licence agreement.<sup>7</sup>

7.17 In June 1991, concurrent with the signing of the prime contract, Telstra signed a sub-contract with its major sub-contractor, GEC-Marconi, which included a sub-licence for GEC-Marconi to commercialise JORN IP. However, not all the conditions that applied to Telstra's licence flowed down to this sub-licence. In particular, it did not include:

- any requirements to involve Australian industry; nor
- did it allow for the Commonwealth to have royalty free access to JORN Improvements developed by GEC-Marconi and based on JORN IP.

7.18 These two conditions were included in the Telstra Licence Agreement because the Commonwealth wished to provide Australian industry opportunities for the commercial exploitation of JORN IP. Also, the Commonwealth wanted to ensure that it did not have to pay for JORN Improvements based on the Commonwealth's own IP.

7.19 The JPO considered that this sub-licence was granted by Telstra to GEC-Marconi without the Commonwealth's explicit approval and in contravention to the requirements of the Telstra Licence Agreement (clause 15.1). The JPO said that the sub-licence would not have received approval had it been sought as it did not flow down the conditions of the Telstra Sub-Licence identified above.<sup>8</sup>

7.20 Telstra, however, believed that the Commonwealth was given a copy of the agreement before it was signed and that the Commonwealth had agreed to it.<sup>9</sup>

<sup>6</sup> ANAO, *Audit Report No.28, 1995-96*, p.44.

<sup>7</sup> Attachment JJ to CAPO C438574, p.JJ-24.

<sup>8</sup> ANAO, *Audit Report No.28, 1995-96*, p.45.

<sup>9</sup> Telstra, *Submission*, p.S104.

7.21 Since September 1992 the JPO has made efforts, initially through Telstra, then directly with GEC-Marconi, to resolve administratively, the omissions in the sub-licence.

7.22 In mid-1995, the JPO reached in-principle agreement with GEC-Marconi concerning the potential difficulties created by the omissions in the Telstra Sub-Licence with GEC-Marconi. The essence of this agreement, which was ratified in February 1997, grants the following rights to the Commonwealth in respect of GEC-Marconi JORN Improvements:

- GEC-Marconi will disclose all Marconi JORN Improvements to the Commonwealth;
- GEC-Marconi undertakes to use all reasonable efforts to secure the involvement of Australian industry to the extent commercially and technically practicable in the commercialisation of Marconi IP; and
- if the Commonwealth wishes to use Marconi JORN Improvements, Marconi will provide quotes in accordance with those rates offered to Marconi's most favoured customers.

*Committee comment*

7.23 The Committee noted the differing positions of JPO and Telstra regarding consideration for the approval of the GEC-Marconi Sub-Licence. The Committee also noted that the GEC-Marconi Sub-Licence and Commercialisation Agreement were listed on the Timetable for Closing Ceremony for the signing of the contracts and therefore the JPO would have had prior access to the Agreement. That the JPO did not identify the omissions suggests a lapse in its vetting process.

7.24 The Committee noted that the Licence Agreement granted to Telstra did not require Telstra to ensure that any sub-licences it granted included the Australian industry participation requirements that were contained in its own

Licence. There was also no obligation in Telstra's licence to provide the Commonwealth with access to improvements developed by other parties.<sup>10</sup>

7.25 The Committee concluded that as a result of:

- omissions in the construct of the Licence Agreement between the Commonwealth and Telstra;
- the failure of Telstra to ensure that it had formal approval for its Sub-Licence Agreement with GEC-Marconi; and
- the failure of the JPO to scrutinise the proposed Sub-Licence Agreement with GEC-Marconi before signature;

the Commonwealth and Australian industry have been potentially disadvantaged regarding participation in JORN-related commercialisation activity and access to JORN Improvements.

7.26 The Committee acknowledges that administrative action taken by the JPO, which resulted in the signing of an agreement between GEC-Marconi and the Commonwealth, should reduce the potential for disadvantage to Australian industry in regard to commercialisation opportunities for JORN Improvements.

7.27 However, the Committee considers that the proposal by GEC-Marconi to offer the Commonwealth 'most favoured customer' terms in relation to access to JORN Improvements will go only part way to recovering what would have been royalty-free access if the relevant terms of the Telstra Licence had been flowed down.

7.28 **Recommendation 5**

*That Defence ensure that in any future Commonwealth contracts and related sub-contracts Commonwealth access to Intellectual Property is explicitly defined.*

<sup>10</sup> Telstra, *Submission*, pp.S103-104.

### GEC-Marconi's position regarding commercialisation of JORN IP and JORN Improvements

7.29 Prior to its involvement with the JORN Project, GEC-Marconi was considered to have no experience with sky wave (OTH) radar.<sup>11</sup> As the main sub-contractor for the JORN Project, GEC-Marconi now has considerable knowledge about OTHR and the re-scoping of its work that has been agreed with Telstra will provide additional knowledge.<sup>12</sup>

7.30 Defence acknowledges that there has been a transfer of technology from Australia to GEC-Marconi, an overseas company, albeit with that company sharing the development risks. An important question arising from this is whether there will be appropriate benefits accruing to Australia as a result of this technology transfer.

7.31 The previous section has described how the Sub-Licence between Telstra and Marconi did not ensure that Australian industry would benefit from GEC-Marconi JORN Improvements or that Defence would have free access to these Improvements. These benefits seem to have been partially recovered through administrative action by the JPO. But what about JORN IP? Will GEC-Marconi be able to commercialise JORN IP, particularly given its increased work scope?

7.32 First, Defence made it clear that GEC-Marconi, although it has a significant part of JORN IP, could not commercialise JORN without the involvement of both Telstra and Telstar.<sup>13</sup>

7.33 Second, the Sub-Licence between Telstra and GEC-Marconi requires that either company not undertake any OTHR commercialisation without the participation of the other, unless the other elects not to participate.<sup>14</sup> There may be a national interest component to whether or not a party goes ahead on its own to commercialise JORN IP without the cooperation of the other party.

11 Dr Michael Gilligan, *Transcript*, 5 December 1996, p.25.

12 See paras. 4.63-4.66.

13 Mr Nick Hammond, *Transcript*, 23 July 1996, p.17.

14 Mr Nick Hammond, *Transcript*, 6 December 1996, p.88.

### Committee comment

7.34 The Committee notes that GEC-Marconi does not have sufficient JORN IP to enable it to commercialise JORN and that under present contractual arrangements it must seek participation of the prime contractor in any commercialisation of JORN IP.

### Management and administration of JORN Intellectual Property

7.35 As the prime contractor, Telstra has responsibility for the administration and management control of JORN IP. The role of the JPO is to monitor and review the overall management of JORN IP. This role is effected through its representation on an IP Liaison Committee established under the terms of the Telstra Licence Agreement and which is required to meet at least every six months.<sup>15</sup>

7.36 Rather than develop its own IP plan, the JPO formally agreed to use Telstra's IP plan to guide its own management of IP on the basis that, because of its licence to commercialise JORN IP, Telstra had an incentive for managing this properly.<sup>16</sup>

7.37 In response to criticism from the ANAO, the JPO has now decided to finalise the development of its own IP management plan which the JPO said had been under development since late 1995.

7.38 In its examination of the JORN project, the ANAO concluded that:

*JPO officers had difficulty in understanding the IP provisions and their importance [and] as a consequence the JPO has not taken appropriate action to enforce compliance with the contract or have non-compliance rectified.*<sup>17</sup>

15 Attachment JJ to CAPO C438574, p. JJ-10.

16 ANAO, *Audit Report No 28, 1995-96*, p.45.

17 ANAO, *Audit Report No 28, 1995-96*, p.45.

7.39 Although audits of IP administration of some of Telstra's sub-contractors have been undertaken, it was not until mid-1996 that the JPO decided it was timely to undertake an audit of Telstra's IP management. The JPO advised that this audit, at Telstra's request, was postponed several times but eventually commenced in January 1997. An initial report on the audit was provided by the JPO to Telstra on 7 February 1997.

7.40 The main findings of the audit were that the Telstra IP management procedures were generally satisfactory. However, knowledge and adherence to procedures by engineering personnel were inconsistent, the general knowledge of staff about IP and its capture was below standard and staff training on IP was inadequate.<sup>18</sup>

#### *Committee comment*

7.41 The Committee concludes that the JPO has, until recently, not given sufficient emphasis to its oversighting responsibility for the administration and management of JORN IP.

#### **JORN IP commercialisation activity**

7.42 As the Prime Contractor and owner of an exclusive licence to commercialise JORN IP, Telstra has the rights and responsibility for pursuing commercial opportunities for JORN IP.

7.43 Telstra has advised the Committee that a significant number of patents, sponsored by Telstra or GEC-Marconi, have been taken out to protect JORN IP. Commercialisation efforts by Telstra have involved delegations to, and presentations and trade exhibits in, several countries over the past three years. However, no commercialisation of JORN IP has yet been achieved.

<sup>18</sup> Department of Defence letter DMD 95/09105 dated 18 February 1997.

7.44 The Committee is unaware of any activities on the part of GEC-Marconi to commercialise JORN IP.

7.45 Telstar said that in respect of the software modules that it is developing for JORN, it would be seeking approval from the Commonwealth to capitalise on them.<sup>19</sup>

#### **Protection of the Commonwealth's IP interest in any novation of the JORN prime contract**

7.46 An important issue in any proposed divestiture of the JORN project by Telstra is the protection of the Commonwealth's interests in JORN IP. Defence, as the Commonwealth's representative and owner of JORN IP, has the responsibility for ensuring that the interests of the Commonwealth are fully protected.

7.47 The Committee notes that Defence is cognisant of this responsibility and has assured the Committee that special arrangements for the protection of sensitive Australian IP will be negotiated as part of any sale.<sup>20</sup>

7.48 Telstra advised the Committee that, in the new management arrangements following the establishment of the joint venture, pre-existing IP rights have been maintained.<sup>21</sup> Telstra also advised that it is trying to enshrine in the new arrangements, a continuing Australian-based capability for OTHR.<sup>22</sup>

<sup>19</sup> Mr Charles Swanson, *Transcript*, 6 December 1996, p.62.

<sup>20</sup> Mr Nick Hammond, *Transcript*, 6 December 1996, p.81.

<sup>21</sup> Mr Lindsay Yelland, *Transcript*, 3 March 1997, p.101.

<sup>22</sup> Mr Lindsay Yelland, *Transcript*, 3 March 1997, p.109.



### Current Defence policy and practices regarding IP rights

7.49 At the time that the JORN contract was signed (June 1991), although Defence did not have a formally articulated policy, it was normal practice for Defence to retain ownership of IP generated by a contract paid for by Defence. Following a 1993 internal Defence review, the Minister for Defence, in May 1994, approved a newly articulated policy on intellectual property which was reflected in the Defence publication, *Intellectual Property Guide* (July 1995).

7.50 The main objectives of current Defence policy on IP are to:

- facilitate the cost-effective acquisition, operation and through-life support of Defence equipment; and
- promote development of defence industry, with the consequent benefits of stronger industry support by facilitating industry exploitation of IP.<sup>23</sup>

7.51 The general principles of Defence's policy are:

- Defence will only acquire the IP rights that it actually needs, focusing on value for money rather than complete IP rights or ownership;
- industry should own IP generated by industry under Defence contracts unless specific constraints or significant benefits from Defence ownership can be demonstrated;
- Defence will obtain appropriate, royalty-free rights to use and sub-license both existing IP and new IP generated under the contract to use and support the equipment supplied by the contractor; and
- Defence will provide greater commitment to supporting industry to exploit IP, including more sole rights to exploit Defence owned IP and assistance to licensees.<sup>24</sup>

23 Department of Defence, *Intellectual Property Guide*, 1995, p.8.

24 Department of Defence, *Intellectual Property Guide*, 1995, p.5.

7.52 The current emphasis on industry ownership of foreground IP is directly related to Defence's policies for industry support<sup>25</sup> and designed to provide a greater incentive for industry participation than Defence ownership of IP might provide.

7.53 Despite this current emphasis of Defence IP practices,<sup>26</sup> Defence advises that industry associations are still unhappy about the IP conditions included in tenders, considering them to be too onerous.

### Committee comment

7.54 In comparing Defence's policy on IP ownership and that of the Australian Public Service, the Committee notes that the current general Commonwealth policy is that where the Commonwealth has paid full commercial price for work, the Commonwealth owns any IP produced. The Department of Administrative Services also includes IP policy guidance in its draft Commonwealth Procurement Guidelines. These guidelines state that in general, the Commonwealth would expect to own IP in materials paid for by it and developed to meet its specific requirements. However, the draft also says that in some cases it may be appropriate that the contractor retain ownership of the new material developed under the contract on the basis that the Commonwealth obtains a licence to use the delivered material.

7.55 The Committee notes the difference in emphasis between Defence's IP policy and current Commonwealth IP policy and that this difference is related to Defence's industry support strategies.

7.56 The Committee considers that it may be timely for Defence to review whether its current IP policy is achieving its objectives, particularly those of value for money and encouraging increased industry investment and capability.

25 Defence White Paper 1994, *Defending Australia*, Chapter 11.

26 Department of Defence, *Intellectual Property Guide*, 1995, p.5.

### Education and training in Defence about Intellectual Property

7.57 The ANAO report on the JORN project and the Committee's enquiries brought to light a number of problems relating to Defence's management of IP in the JORN project. These included:

- that Telstra was able to assign a sub-licence for the commercialisation of JORN IP to GEC-Marconi without the required formal approval from Defence;
- concern by the ANAO that JPO officers administering the contract had difficulty in understanding the IP provisions and their importance;
- the failure by the JPO to finalise a JORN IP management plan and its reliance on Telstra's plan; and
- differing definitions of IP in the Prime Contract and the Telstra Licence Agreement.

#### *Committee comment*

7.58 While these problems are largely related to the performance of the JPO, the Committee questions whether they might also reflect a more general lack of understanding of IP and its importance by Defence procurement and acquisition staff.

7.59 In pursuing this issue the Committee was informed that the Defence Acquisition Program has taken steps in recent years to improve the level of awareness of procurement staff about IP issues and to improve the level of policy guidance of IP. This has been done through:

- the publication of a Defence IP policy and guidelines;
- the establishment of an IP Section which includes responsibility for providing advice on IP matters to the Portfolio, IP protection activities and assistance with the implementation of IP policy;
- the establishment of IP expertise in DSTO;

- the development of standard clauses on IP for the guidance of Defence procurement staff;
- planned inclusion of a module on IP in relevant training courses; and
- use of specialist external advisers on IP for all Major Capital Equipment project contracts.

7.60 While the Committee considers that these actions should go some way towards improving IP management in Defence, the devolved nature of Defence procurement activity is such that it may be difficult to determine the impact of these measures without some formal assessment and review process.

#### 7.61 Recommendation 6

*That Defence review its current policy and guidelines on Intellectual Property to determine whether its objectives are still appropriate and, if so, to what extent they are being achieved.*

#### 7.62 Recommendation 7

*That Defence assist its procurement and project staff to become sufficiently aware of the relevance and importance of Intellectual Property rights to ensure the effective management of IP issues pre-contract, at contract negotiation and during contract management.*

## CONCLUSION

8.1 The Jindalee Over-the-Horizon Radar project began in an atmosphere of optimism:

*Jindalee, the experimental over-the-horizon radar under development in Central Australia, is likely to become one of the major success stories of Australian defence and science.<sup>1</sup>*

*But already there is no doubt in anyone's mind that it will be successful.<sup>2</sup>*

8.2 This optimism diminished very early in the expanded project to acquire the Jindalee Operational Radar Network capability and, at the same time, develop an indigenous capability in the prime contractor, Telstra. The Committee found that there were clear indications that, as one witness told the Committee:

*To take on a billion dollar job as your first exercise in military contracting is really an unrealistic expectation.*

8.3 The warning signs however were ignored.

8.4 As this report demonstrates, the Committee received a substantial amount of information on the shortcomings of Telstra and GEC-Marconi in performing their roles as prime contractor and sub-contractor.

8.5 Moreover, Defence's shortcomings in managing the project were evident at every stage of the project. Although the work was to be undertaken by a prime contractor, Defence had prime responsibility for overall management of the project.

### *Acquiring the prime contractor*

8.6 The selection process failed to deliver a prime contractor capable of fulfilling its contractual obligations.

8.7 The Committee concluded that it was too ambitious to begin to develop Australian industry capability to support Defence through a project of the complexity of the JORN Project.

8.8 Given the increasing trend in Defence to engage prime contractors for the acquisition of major capital equipment, the ability to set sound criteria for selection and to assess tenders rigorously is critical.

### *Contract terms and conditions*

8.9 Evidence to the inquiry suggests that Telstra and Defence showed a level of naivety concerning the terms and conditions of the prime contract which contributed to poor performance on the part of both organisations. Neither party appeared to have a clear understanding of its contractual obligations.

8.10 Defence did not intervene early enough or with sufficient vigour to require Telstra to put in place formalised and systematic risk assessment procedures, as required by the contract. Nor did Defence insist on complete, correct and documented system design reviews, system requirement reviews and work breakdown structures before progressing to large-scale detailed design work.

8.11 The nature of the JORN Project contract gave rise to two other problems: an inappropriate basis for making progress payments and a counter-productive aversion to sharing the risk associated with design decisions.

8.12 Defence will continue to engage contractors and will therefore need to ensure that contracts are unambiguous and properly understood by contractors. Contracts should be managed professionally and proactively to ensure that the performance of contractors is assessed early in a project and appropriate action taken where performance is unsatisfactory.

1 Defence Industry Newsletter, 17 August 1983.

2 Defence Industry Newsletter, 17 August 1983.

8.13 Particular attention should be given to risk management clauses of contracts. Defence should insist on risk abatement plans being both provided and adhered to by contractors.

#### *Development of an indigenous capability*

8.14 The JORN Project was intended to achieve a wide area surveillance network and to develop an indigenous capability.

8.15 To date the original objective of technology and skills transfer to Telstra has failed and it is uncertain that ultimately an indigenous capability will be developed. At this stage the most optimistic outlook for the project is that it will be completed through significant management by an overseas (US) company in association with an Australian company. While the theory of transferring expertise to an Australian joint venture partner remains current, the Committee has yet to be convinced that appropriate mechanisms are in place to facilitate the transfer of expertise.

#### *Project management*

8.16 Complex projects undertaken by Defence continue to be dogged by weaknesses in project management. Yet project management is not new. It has been employed since the Second World War in the US on the Manhattan Atomic Weapon Project and submarine projects in the US and the UK. The discipline was introduced into Australia with the Snowy Mountains Scheme and adopted by Defence in the early 1970s.<sup>3</sup>

8.17 Clearly, project management is a specialist concern yet few organisations, including Defence, develop career paths dedicated to project management. Most project managers in Defence are from a technical background.<sup>4</sup>

<sup>3</sup> *Defence Project Management: Pitfalls and Pointers*, Volume 1, Edited by Alan Hinge and Stefan Markowski, 1995, p.2.

<sup>4</sup> *Defence Project Management: Pitfalls and Pointers*, Volume 1, Edited by Alan Hinge and Stefan Markowski, 1995, p.3.

8.18 Given that Defence currently commits some \$3 billion a year to major projects, the Committee is concerned lest major projects - and the public purse - continue to suffer from lack of dedicated project management expertise.

8.19 The Committee recognises that 'buying in' project management expertise is expensive but given the magnitude of the projects in which Defence is involved, the Committee concluded that Defence cannot afford not to obtain the most experienced project managers available.

8.20 The Committee recognises that Defence has implemented a number of initiatives aimed at improving its project management techniques. Nonetheless, it is clear to the Committee that Defence exercised weak project management with respect to the JORN Project.

8.21 The Committee is of the view that Defence should have taken a firmer management approach to Telstra and GEC-Marconi in the early stages of the project. Earlier action may have significantly reduced cost overruns and schedule delays, given that the management of the project has ultimately been transferred to Lockheed Martin/Transfield for completion.

8.22 The Committee concluded that Defence had lost control of the project during the early phases. This situation could have been avoided to some extent had Defence taken a stronger stance and, for instance, acted on its own proposal in 1993 to conduct a technical audit of the project rather than rely on that initiated by Telstra several months later.

8.23 The Committee concluded that many project management problems which have been identified in previous inquiries by the JCPA are not yet resolved. The Committee therefore believes that the problems inherent in the JORN Project are evidence of a wider, more fundamental problem in the Department of Defence which warrants further investigation.

#### *The prime contractor*

8.24 From the outset the choice of Telstra as prime contractor was to have devastating effects on the JORN Project.

8.25 Telstra did little to overcome its lack of experience in Defence contracting, systems engineering or project management.

8.26 Much has been made of Telstra's lack of *project management* skills. On the basis of evidence to this inquiry, however, the Committee concluded that inadequacies in Telstra's *general* management skills contributed to many of the difficulties that it encountered as prime contractor.

#### DSTO

8.27 Given DSTO's role in developing the OTHR technology of the JORN Project, the Committee is critical that better use was not made from the start of the project of the expertise, capabilities and the developments within DSTO to support the design and development of the network.

8.28 DSTO has continued to develop its expertise in radar technology and has had access to, and been directly involved in, research projects conducted jointly between Australia and the US.

8.29 The Committee notes that in March 1992 Australia and the US entered into an Agreement Concerning Cooperation in Radar Activities. That agreement provides for bilateral cooperation on a range of radar-related activities including research and development, testing and evaluation, operational analysis, radar network operations and operational use of radar.

8.30 The Committee further notes that, pursuant to the Agreement, two Project Arrangements were approved when the Agreement was signed in 1992 which enhanced DSTO's expertise on spread clutter and radar synoptic performance modelling. Two further Project Arrangements approved in October 1997 enable DSTO, in conjunction with the USAF to develop, test and evaluate methods and techniques for the detection and tracking of targets by OTHR in circumstances

where there is considerable interference to the radar, due to natural or man-made causes including deliberate interference, and the associated enhancement of their ability to track targets within their radar coverage in such clutter.<sup>5</sup>

8.31 These Project Arrangements have the potential to reduce technical difficulties in using networked OTHRs which detract from the ability to track small targets with low velocity.<sup>6</sup>

8.32 The Committee believes that the JORN Project would have benefited from a more direct input from DSTO.

#### Cost and schedule

8.33 The Committee was particularly concerned that, having identified a need for a surveillance capability to be operational by 1997, Defence appeared complacent about the fact that it would not have the benefit of the JORN capability until at least four years after the scheduled completion date.

8.34 The Committee believes that the significant overall cost escalation to the Commonwealth is unacceptable.

#### Technical risk

8.35 While it was implied that delays to progress on the JORN Project were to be expected in an endeavour that was at 'the cutting edge of technology', the Committee concluded, on the basis of the evidence to the inquiry, that the major risks lay in the areas of cost, schedule and management rather than technical feasibility.

<sup>5</sup> Project Arrangement between the Government of Australia and the Government of the United States of America on Detection and Tracking of Targets in Clutter. See *Defence News Release*, 51/92, 3 March 1992.

<sup>6</sup> These Project Arrangements were the subject of a report of the Joint Standing Committee on Treaties, tabled in the Parliament on 20 October 1997.

*Intellectual Property*

8.36 The Committee concluded that it may be timely for Defence to review its current IP policy to assess whether it is achieving its objectives, particularly those of value for money and encouraging increased industry investment and capability.

8.37 The Committee is concerned that there may be a general lack of understanding by Defence procurement and acquisition staff of IP and its importance.

*Managing Defence projects*

8.38 The JORN Project has not been delivered on time and has resulted in a significant financial loss to the Commonwealth. The future of the operational radar network remains uncertain and there is no guarantee that further costs will not be incurred by the Commonwealth.

8.39 The main conclusion of this inquiry is that, in embarking upon major projects in future, it is essential that Defence obtain an experienced and appropriate overall project manager to drive the contract. Defence should set the required specifications and ensure that the necessary expertise is brought into the project. Defence should avoid entering into open-ended and poorly defined contracts. Appropriate cost effective mechanisms must be set in place to guard against cost escalations and late delivery.

Bob Charles MP  
Chairman

**APPENDIX I - SUBMISSIONS**

1. John F Collins
2. Ron F Dicker
3. GEC-Marconi Systems Pty Limited
4. Dr M F Gilligan
5. M J Brennan
6. Lindsay L Ekert and Associates Pty Ltd
7. Telstar Systems Pty Ltd
8. Telstra Corporation Limited
9. Telstra Corporation Limited
10. M J Brennan
11. Telstra Corporation Limited
12. Department of Defence
13. Department of Defence
14. P McNair
15. Department of Defence
16. Department of Defence

The Committee also received confidential submissions.

## II

### APPENDIX II - EXHIBITS

1. Department of Defence Over-the-Horizon Radar Brief for JCPA, dated 14 October 1996.
2. Telstra Corporation Limited, Summary Report JORN Second Pass Engineering, dated 22 October 1996.
3. Department of Defence, Defence News Releases (historical).
4. Department of Defence - JORN Project Presentation to JCPA, dated 23 October 1996.
5. JORN Sites Visits - August 1996 (video and booklet) provided by Telstra.
6. Department of Defence letter to ANAO, dated 17 October 1996.
7. Confidential.
8. Telstra Corporation Limited, Compilation of Recommendations Resulting from the Technical and Management Audit of JORN.
9. Department of Defence documents relating to JORN.
10. Spreadsheet of Prime Contract Milestone Payments, Department of Defence, dated 8 November 1996.
11. Spreadsheet of Prime Contract Milestone Payments, Department of Defence, dated 13 November 1996.
12. Extracts from Report on Options for Over-the-Horizon Radar, Department of Defence, 1986.
13. Telstra Corporation Limited, summary of JORN Project billings and payments to date, dated 25 November 1996.

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14. Department of Defence document on Project Management Training in Defence, dated 25 November 1996.
15. Telstra Corporation Limited, financial information relating to JORN, dated 27 November 1996.
16. Telstra Applied Technologies JORN Project document on Organisation Structure and Effectiveness.
17. Letter from Nick Hammond relating to JORN, dated 27 November 1996.
18. Telstra Corporation Limited, JORN Organisation slides, dated 2 December 1996.
19. Telstar Systems, Promotional Information Folder.
20. GEC-Marconi Company Organisation Executive Summary, dated 22 November 1996.
21. JORN Office document, JPO Senior Management Training and Experience Summary, dated 2 December 1996.
22. Department of Defence, Minute, Intellectual Property Issues, dated 19 November 1996.
23. Department of Defence, letter on Project Management Training in Defence, dated 25 November 1996.
24. Department of Defence, letter on Review of Auditor-General's Report No.28, dated 2 December 1996.
25. Department of Defence, letter on JORN Tender Price Differential, dated 25 February 1997.
26. Department of Defence, letter on Intellectual Property Audit of Telstra, Quick Report, dated 18 February 1997.
27. Extract, Telstra Corporation Limited Audit Committee Report, dated September 1996.



## APPENDIX III - WITNESSES AT PUBLIC HEARINGS

Canberra, 23 July 1996<sup>1</sup>

*Australian National Audit Office*

Mr Pat Barrett AM  
Auditor-General

Mr Tony Minchin  
Executive Director

Mr Ray McNally  
Performance Audit Business Unit

*Department of Defence*

Mr Tony Ayers AC  
Secretary

Mr Garry Jones  
Deputy Secretary, Acquisition Organisation

Mr Nick Hammond  
First Assistant Secretary, Defence Materiel

Air Commodore Dick Hedges  
Director-General, Jindalee Project

Mr Peter Sharp  
Inspector-General

---

<sup>1</sup> Review of Auditor-General's Reports

*Telstra Corporation Limited*

Mr Lindsay Yelland  
Group Manager Director, Retail Products & Marketing

Mr David Krasnostein  
Group Director, Strategic Planning & Development

Mr Les Morrison  
National General Manager, Telstra Applied Technologies

Ms Jillian Arnott  
Solicitor

Canberra, Friday 29 November 1996

*GEC Marconi Systems Pty Ltd*

Mr Ian Sharp  
General Manager

Dr William Bardo  
Technical Director

Mr Raymond Mathews  
Major Project Director (JORN)  
GEC-Marconi Radar and Defence Systems

Canberra, Thursday 5 December 1996<sup>2</sup>

*Citizen*

Dr Michael Gilligan  
Former Acting First Assistant Secretary  
Development and Analysis, Department of Defence

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<sup>2</sup> The transcript of evidence taken on this day was authorised for publication on 13 February 1997



Canberra, Friday 6 December 1996

*Citizen*

Mr Max Brennan  
Former Director General, Jindalee Project  
Department of Defence

*Telstar Pty Ltd*

Mr Charles Swanson  
Managing Director

Mr Ross Gould  
General Manager, Operations

Mr Anthony Hall  
Chief Financial Officer and Company Secretary

*Telstra Corporation Limited*

Mr Lindsay Yelland  
Group Managing Director

Ms Jillian Arnott  
Solicitor

Mr Barry Hibble  
Project Director, JORN

*Department of Defence*

Mr Tony Ayers AC  
Secretary

Mr Ron Bonighton  
First Assistant Secretary, Materiel Division

Dr Malcolm Golley  
Chief, High Frequency Radar Division  
DSTO Salisbury

Mr Nick Hammond  
First Assistant Secretary, Materiel Division

Air Commodore Dick Hedges  
Director General, Jindalee Project

Mr Garry Jones  
Deputy Secretary, Acquisition Organisation

Canberra, Thursday 13 February 1997<sup>3</sup>

*Department of Defence*

Air Commodore Dick Hedges  
Director-General Jindalee Project

Mr John Gordon  
Jindalee Business Manager

Mr Ron Bonighton  
First Assistant Secretary, Materiel Division

Canberra, Monday 3 March 1997

*Telstra Corporation Limited*

Mr Lindsay Yelland  
Group Managing Director

Ms Jillian Arnott  
Solicitor

Mr Les Morrison  
National General Manager

Mr James Prell  
Partner, Mallesons Stephen Jacques

Mr Noel Robertson  
General Manager, Strategic Planning and Development

<sup>3</sup> The transcript of evidence taken on this day was authorised for publication on 21 August 1997

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