

COMBAT SYSTEM DEVELOPMENT

8.1 The combat system is a major and critical part of the new submarine project.

8.2 The Collins class submarine combat system design utilises multi-function operator consoles to overcome the disadvantages of dedicated process-unique operator consoles found in earlier submarine combat systems. A more capable operator console, designated as the command plot, provides a central point for monitoring the submarine's tactical situation and exercising key combat and operations decisions.¹

8.3 The Project Office reported in 1998 that most of the combat system hardware had been delivered and been subjected to stand-alone testing, and that the equipment on the submarine was meeting expected performance.²

8.4 The software used to integrate, display and control the various combat system functions (known as the Tactical Data Handling System TDHS) had struck serious technical difficulties and was still under development. The Audit Report stated:

The combat system software [Release 1 and Release 2] was scheduled for delivery and integration into Collins by September 1993. However, software-related system integration problems prevent its completion until at least 1999.³

8.5 The Project Office acknowledged that a very low percentage of the combat system's final integrated performance had been delivered. However, the ANAO stated that until final software was delivered, the combat system's fully integrated performance could not be trialed.⁴

1 *Audit Report No. 34, 1997-98, p. 97.*

2 *Audit Report No. 34, 1997-98, p. 97.*

3 *Audit Report No. 34, 1997-98, p. 96.*

4 *Audit Report No. 34, 1997-98, pp. 97-8.*

8.6 The Audit Report noted that the Project Office senior management seemed not to recognise or acknowledge the degree of the difficulties until 95 per cent of the combat system software development and test payments had been made to ASC. The Audit Report stated that by December 1996, 97 per cent of the combat system's contract funds had been spent.⁵

8.7 The Audit Report stated:

*The contractors have not fully resolved all TDHS integration problems despite five years of concerted effort. Project Office records indicate that the contractors have not claimed payment for their post-January 1994 TDHS integration development and test efforts because they had already claimed the work was largely complete.*⁶

8.8 At the April 1998 hearing, the JCPAA asked Defence about the status of the integrated combat software.⁷

8.9 Defence responded:

*We were trying to build something which would be at the forefront of technology. When we brought all the bits together, some worked and some did not. Some have caused us a lot of pain and they have cost the contractor a lot of money. I think we now have a very good understanding of where we are. To some extent we would like to go back and rewrite history and apply some of the new techniques we have learnt, but we have a good understanding of the scope of the problem. Our current estimates are that we will bring this together by the year 2000.*⁸

8.10 The Committee revisited the matter of the development of the combat system in March 1999.

5 *Audit Report No. 34, 1997-98*, pp. 96, xxi, 98.

6 *Audit Report No. 34, 1997-98*, p. 100.

7 *Transcript, 29 April 1998*, p. PA 60.

8 Capt. Tim Barker, Submarine Project Manager, DAO, *Transcript, 29 April 1998*, p. PA 63.

8.11 Defence acknowledged that:

*... probably the biggest issue we have yet to fully resolve relates to the combat system and the software.*⁹

8.12 Defence stated that while weapons could be fired from the submarine, the system could not use all the information which was available through the submarine sensors and do the analysis of the targets that the sensors provide, and could not develop the fire control solutions and pass all that information to the weapons:

*The combat system, at the moment, has problems in doing that to the extent that we would want if we were going to commit that submarine to operations.*¹⁰

8.13 In response to Committee questioning, Defence confirmed that the provisionally accepted Collins class submarines could not fire weapons with the same degree of capability as the Oberon class submarine. However, Defence stated that this was a temporary situation and that it was confident of being able to achieve that level of capability by the end of 1999.¹¹

8.14 Defence confirmed that practice torpedo firings had been conducted and a live torpedo firing was planned against the ex HMAS *Torrens* off the Western Australian coast later in 1999. Defence added that it was expecting to deploy *Collins* to participate in Exercise RIMPAC 2000 which would provide an opportunity to conduct the firing of the Harpoon missile.¹²

9 Mr Garry Jones, Deputy Secretary, Acquisition, Defence, *Transcript, 5 March 1999*, p. PA 87.

10 Rear Adm. Christopher Oxenbould, Deputy Chief of Navy, Royal Australian Navy, Department of Defence, *Transcript, 5 March 1999*, p. PA 99.

11 Rear Adm. Christopher Oxenbould Deputy Chief of Navy, Royal Australian Navy, Department of Defence, *Transcript, 5 March 1999*, p. PA 100.

12 Rear Adm. Christopher Oxenbould Deputy Chief of Navy, Royal Australian Navy, Department of Defence, *Transcript, 5 March 1999*, pp. PA 120-1.

8.15 The Committee asked Defence whether, in hindsight, the specifications for the submarines had been too ambitious.¹³

8.16 Defence responded that it had been very ambitious in some areas of the specification for the Collins class. It acknowledged that if the combat system specification was written today it would be done differently:

*There are several reasons for that. One is that technology has moved on, and what we can do with technology today is different in some ways.... the spec was written anticipating where technology would go, and it did not get it quite right. But I point out that the whole area of information technology software is the most difficult area in all these projects. It is not surprising that there have been difficulties.*¹⁴

8.17 The Committee asked Defence when the variations to the contract, together with an assessment of ASC's capability to deliver and remaining funding issues, would be reported to Parliament.¹⁵

8.18 Defence replied that it currently had before ministers a proposal for at least some next steps in terms of the submarine, and that there would almost certainly be some modification of the specification of the combat system:

*It is also fair to say that there is going to be a good quid pro quo. In other words, if we agree to modify the specification in this area to make it more achievable, [ASC is] going to have to do some work in that other area where we now decide it seems much more feasible [to have outcomes].*¹⁶

8.19 The Committee was very interested to know whether there would still be an integrated weapons system at the end of that redesign process.¹⁷

13 *Transcript, 5 March 1999, p. PA 100.*

14 Mr Garry Jones, Deputy Secretary, Acquisition, Defence, *Transcript, 5 March 1999, p. PA 101.*

15 *Transcript, 5 March 1999, p. PA 101.*

16 Mr Garry Jones, Deputy Secretary, Acquisition, Defence, *Transcript, 5 March 1999, pp. PA 101-2.*

17 *Transcript, 5 March 1999, p. PA 102.*

8.20 Defence answered that there would be an integrated system¹⁸ and made the following statement:

... what we are talking about here is the evolution to a future state of the combat system as it stands at present. We are not looking at a wholesale rip-out, redesign or billion buck replacement.... We are picking those bits that have high operational return on investment and those areas that are highly regarded in an operational sense. We are looking at how we might best evolve from where we are now to provide the Chief of Navy and the submarine commanders with the capability that they need. This capability will, in many cases, exceed that which is currently contracted. So what we are looking at is, by the end of [1999], a combat system that is more capable in some areas and less capable in those lower priority operational areas.¹⁹

8.21 Defence stressed that the major portion of the existing combat system would still be used, but it was Defence's expectation that over the next five years the architecture of the combat system would be gradually changed.²⁰

8.22 Defence was quick to point out that although the Collins class submarine had not met its original specifications in terms of the number of targets it could track, it still had a target tracking performance which was far superior to the Oberons.²¹

8.23 The Committee asked ASC for more detail on where the weapons system development stood.²²

8.24 In reply, ASC stated:

We have completed the interim delivery, which we call release 1.5.5.6, which is the delivery point to which we are

18 Mr Garry Jones, Deputy Secretary, Acquisition, Defence, *Transcript*, 5 March 1999, p. PA 102.

19 Cdre Eoin Asker, Director-General, Undersea Warfare Systems, DAO, Department of Defence, *Transcript*, 5 March 1999, p. PA 102.

20 Cdre Eoin Asker, Director-General, Undersea Warfare Systems, DAO, Department of Defence, *Transcript*, 5 March 1999, p. PA 103.

21 Mr Garry Jones, Deputy Secretary, Acquisition, Defence, *Transcript*, 5 March 1999, p. PA 103.

22 *Transcript*, 22 March 1999, p. PA 150.

currently contracted for submarines 1, 2, 3, 4 and 5. We believe we will be in a position to have the final contracted combat system, release 2, installed on [either] submarine ... 5 or 6.

The system will be [highly] integrated and, in fact, is integrated to a significant degree today. Whether all that will be integrated in the end, or whether there will be stand-alone capabilities, is a matter for my client to decide.... [the system] will not require additional staffing to operate. It will be as good a system as industry is capable of delivering to date.... We have as subcontractors the Boeing organisation of Seattle—and with Boeing we have Raytheon as a subcontractor to Boeing—and the CSC [Computer Sciences Corporation] organisation of the United States. These are three of the most significant software houses in the world. It is this capability I rely on in order to deliver to you the best possible combat system that I am currently capable of building.²³

8.25 Pressed further on the fate of the original combat system specifications, Defence stated that despite considerable reassurance from the US companies involved that the program was achievable, by mid 1998 or slightly earlier it had been Defence's assessment that the risk in terms of the schedule in pursuing a totally integrated combat system was unacceptably high.²⁴

To this end, we have instituted a change in the scope from the totally integrated system to a lesser integrated system, reducing the risk but providing a similar level of capability to ... the Navy, at less risk.²⁵

8.26 ASC stated that the manner in which the combat system was currently integrated was further advanced than

23 Mr Hans Ohff, Managing Director, ASC, *Transcript, 22 March 1999*, pp. PA 150, 151.

24 Cdre Eoin Asker, Director-General, Undersea Warfare Systems, DAO, Department of Defence, *Transcript, 22 March 1999*, pp. PA 151, 157.

25 Cdre Eoin Asker, Director-General, Undersea Warfare Systems, DAO, Department of Defence, *Transcript, 22 March 1999*, pp. PA 151-2.

any other integrated systems available thus far in the submarine world.²⁶

8.27 The Committee sought assurance from Defence on whether there would be a requirement for additional submarine personnel due to combat system changes.²⁷

8.28 Defence replied that in respect of the current contract it would deliver a baseline combat system and no requirement for additional personnel on board the submarine to manage the combat system was anticipated. Defence went on:

That baseline combat system cannot stay stagnant; it must continually develop; otherwise the technological edge—the capability edge that we have developed—will atrophy; it will degrade....

*I cannot ... guarantee that we will not require additional people for future combat system upgrades.*²⁸

8.29 The Committee sought information on whether the new combat system to be provided by ASC would cost more than the approximately \$800 million provided for in the original contract.²⁹

8.30 ASC replied that it would not, stating:

*Under the terms of the current contract, [ASC] will provide Navy with a combat system that meets the contemporary baseline requirement—that is, today's baseline requirement.*³⁰

8.31 In response to the Committee's question on the combat system effectiveness of the baseline combat system as compared to the envisaged effectiveness of the original combat system, Defence stated:

26 Mr Hans Ohff, Managing Director, ASC, *Transcript, 22 March 1999*, p. PA 156.

27 *Transcript, 22 March 1999*, p. PA 156.

28 Cdre Eoin Asker, Director-General, Undersea Warfare Systems, DAO, Department of Defence, *Transcript, 22 March 1999*, p. PA 156.

29 *Transcript, 22 March 1999*, p. PA 155.

30 Mr Hans Ohff, Managing Director, ASC, *Transcript, 22 March 1999*, p. PA 155.

I would put forward to you that the capability improvements that are in the new baseline are improvements over and above what was originally contracted, just as in some areas there is lesser performance than was originally contracted....

... the requirements, as defined back in 1987, do not reflect the current or contemporary requirements of ... the Navy.³¹

8.32 The Committee asked whether a contract for the redefined combat system had been completed.³²

8.33 Defence replied that a contract amendment had not been passed for that as yet.

We are redefining the performance in terms of the combat system supplier. That will be done through the Submarine Corporation. As far as the technical specifications are concerned, we are almost there.³³

8.34 The Committee expressed some concern that Defence appeared to be accepting the lowest possible minimum standard as the baseline requirement for the combat system, and at the same time was seeking more money from the Government to improve the capability of the combat system.³⁴

8.35 Defence stated that it was not the only example of a long contract where enhancements had been sought to keep the capability up to speed:

... you just cannot afford to stand still...³⁵

31 Cdre Eoin Asker, Director-General, Undersea Warfare Systems, DAO, Department of Defence, *Transcript, 22 March 1999*, pp. PA 156-7.

32 *Transcript, 22 March 1999*, p. PA 164.

33 Cdre Eoin Asker, Director-General, Undersea Warfare Systems, DAO, Department of Defence, *Transcript, 22 March 1999*, p. PA 164.

34 *Transcript, 22 March 1999*, p. PA 157.

35 Rear Adm. Richard Lamacraft, Head Systems Acquisition, (Maritime and Ground), DAO, *Transcript, 22 March 1999*, p. PA 158.

Committee comments

8.36 The Committee observes that although the progress payments for the combat system's TDHS development and test work package reached 100 per cent by 1994, unresolved technical problems experienced in 1995 placed at high risk the combat system's development past 60 per cent of its specified requirement.³⁶

8.37 Despite categorical assurances from ASC in 1997 that the Collins submarine would have a fully operational combat system in 1998, the Committee notes that the whole project has now been delayed by at least 20 months and there is still uncertainty about the resolution of the integration of the various systems that make the submarine a formidable weapon platform.³⁷

8.38 The Committee notes Defence's 1998 statements that the issue of capability enhancements for the submarines' combat systems was under consideration, that Boeing still intended to deliver the full functionality to the specification within the original contract price, that there had been no additional cost to the Commonwealth and that the impact on capability had been minimised.³⁸

8.39 The Committee considers that substantial additional costs have and are being borne by the Commonwealth through payments to contractors ahead of progress achieved as well as through continuing delays.

8.40 The Committee notes that Defence already has plans before the Government for enhancements to the combat system, which, because of its unresolved problems, has not to this point been able to function as intended.³⁹

36 *Audit Report No. 34, 1997-98*, pp. 99-100.

37 *Audit Report No. 34, 1997-98*, p. 106.

38 *Audit Report No. 34, 1997-98*, pp. 106, 107.

39 Cdre Eoin Asker, Director-General, Undersea Warfare Systems, DAO, *Transcript, 22 March 1999*, pp. PA 156, 157.

8.41 Defence has stated that combat system capability as specified in the contract will be delivered.⁴⁰ The Committee considers that delivering full combat system capability as specified in a contract in which the specifications are being changed is only of value if the amended specification does indeed reflect Navy's current capability requirements.

40 DAO, Submission No. 1, p. 2.