

## ON TIME, ON BUDGET & ON MICRO PLANNER

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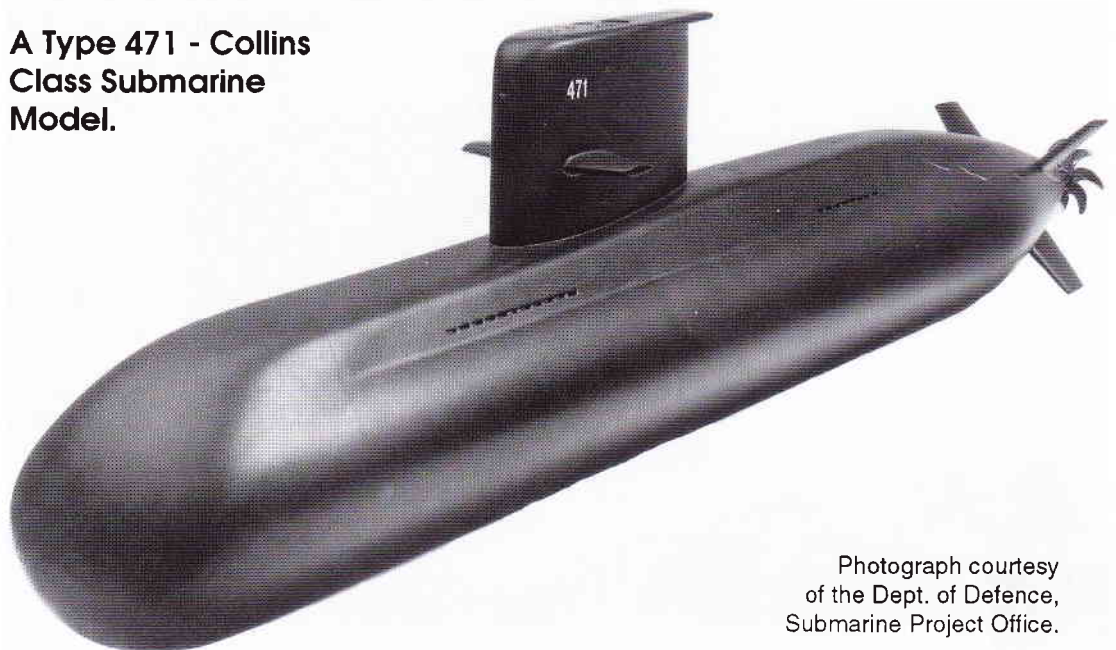
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**Quote :- Dr. Don G. Williams A.O. Managing Director,  
Australian Submarine Corporation.**

The launch on the 28th August 1993 of SM01 (Collins), the first of the new Australian Collins Class of submarines from the ASC facility at Osborne will be another milestone successfully achieved by the Australian Submarine Corporation team within a sustained project management exercise. Obviously, the launch of the first of a new class of submarine is an important milestone but it is only one of many in the overall submarine project. The Collins still has 5 months of fit out and 12 months sea trials prior to commissioning into the Royal Australian Navy. In the meantime, work is continuing on the other five submarines with the keel of SM04 already laid in the hull shop and

SM02 and SM03 building in line with the ASC's overall programme. Controlling this matrix of operations is the role of the ASC's schedule control systems, ensuring adequate resources are allocated to all facets of the project in a coordinated way. The 75 planners, working throughout the ASC, using Micro Planner X-Pert perform a number of key roles within the overall control system. Major departments using X-Pert at Osborne include Production, ILS (see page 4), Weapons and ITT. Off site, ASC Engineering at Gepps Cross, SA; ASC Shipbuilding Newcastle and the New Submarine Training School in WA also use X-Pert along with the ASC's 'client' - The Submarine

**A Type 471 - Collins  
Class Submarine  
Model.**



Photograph courtesy  
of the Dept. of Defence,  
Submarine Project Office.

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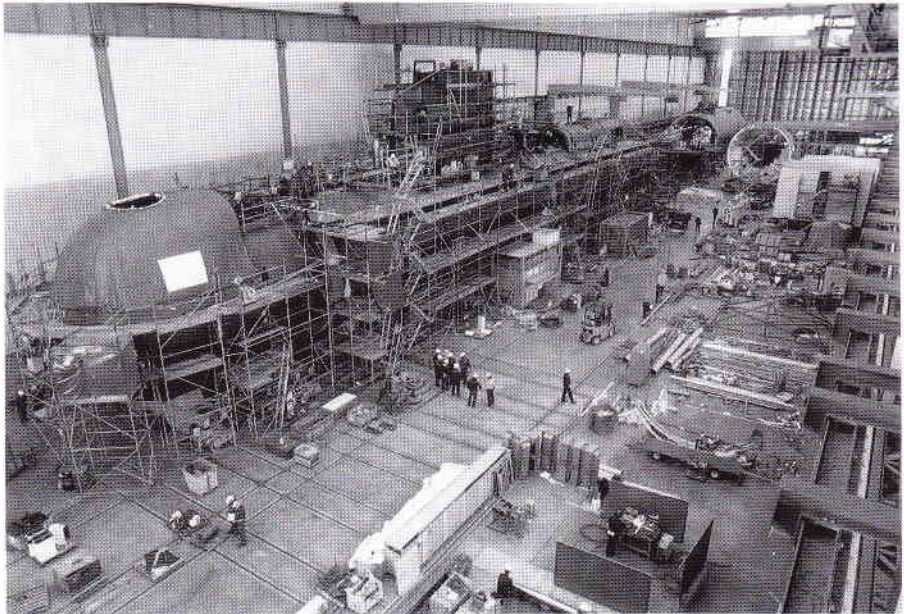
# The Australian Submarine Project

Project Office within Defence and several subcontractors.

Micro Planner's initial use at the ASC started with the ILS Department in 1987. The ASC purchased a copy of Micro Planner "Version 6.1a" for the ILS Manager's Mac Plus whilst the project was still located within Wormalds at Brookvale in NSW. This set expanded to two or three when the project moved to Woodville in S.A. However it was not until the release of X-Pert in 1989 that ILS had access to a major project management system on the Macintosh capable of dealing with their complex scheduling requirements.

The ASC's ILS Department was the only official Beta test site for X-Pert in Australia and their requirements for C/SCSC reporting significantly influenced the development of the final shape of X-Pert v1. The sophistication of the ILS project also influenced the development of X-Pert v2 (launched last year) and continues to provide one of the key driving forces in Micro Planners ongoing development.

Early in 1991 the Production Department commenced detailed planning for the outfitting of all six submarines and the



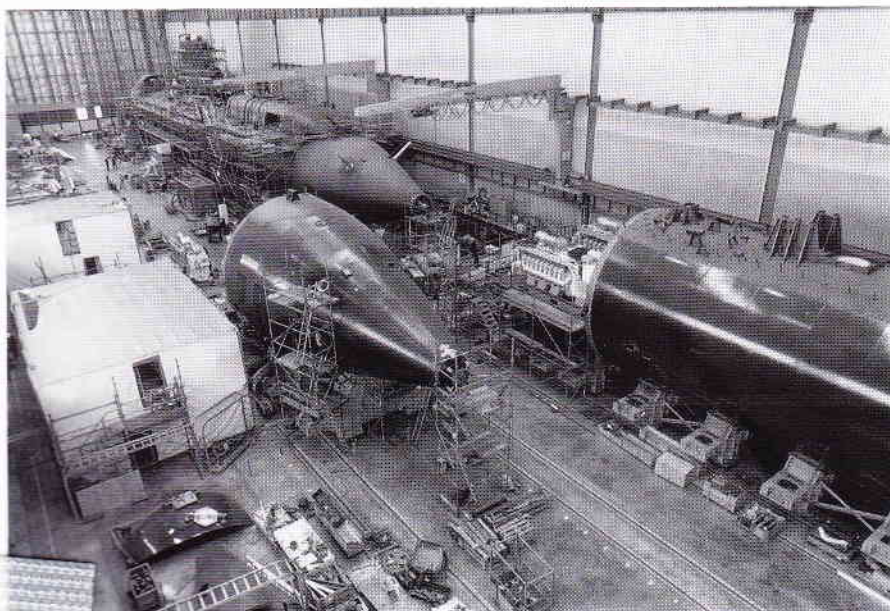
Construction photographs courtesy of ASC

fabrication of the remaining five hulls (hull 1 was planned in ASC's central systems). Micro Planner X-Pert was used to carry out this work as well as planning the production of work orders within the production planning department. The August launch date of the Collins was confirmed by this early planning work and the role of the X-Pert planners since

that time has been to ensure the project remains on schedule despite the numerous problems that are expected on any new undertaking as complex as a submarine. X-Pert's speed of analysis and flexibility has been a key factor in keeping the schedules relevant and the project on programme.

## SYSTEMS INTEGRATION

The quality of materials used in a submarine are vital! The ASC's certified AS3901 quality control function has been linked to a C/SCSC work order system within their customised 'Cincom MRP II' system. Analysis results from X-Pert are passed to the Cincom system to produce the necessary lead times for the procurement and delivery of materials. As final 'build' documentation and materials are received and QA checks complete, the Work Orders are released to the shop floor where day to day working is scheduled using detailed, resource levelled X-Pert programmes. Actual progress information is captured within the MRP system and the Production Directors Programme (PDP) updated from this consolidated data. Progress information





forwarded from the PDP to the ASC's central CMACS system for billing and its C/SCSC system for performance measurement. This integration of CMACS, C/SCSC, MRP II and schedule control is one of the hall marks of the ASC's success in meeting milestones and quality requirements "on schedule, on budget and on Micro Planner".

The Production Department networks were initially set up on X-Pert at the CWBS level 4 within the overall C/SCS hierarchy. As time has passed, many specific networks have been developed to support the "level 4" schedule and to assist management in particular areas, for example the Battery Installation. The installation of the batteries commenced on schedule on 10th May 1993, this milestone was predicted in a special X-Pert schedule developed for the Production Director in February 1991 (there are several hundred tonnes of batteries requiring careful installation and maintenance in each submarine - hence the special programme).

The peak production period for the ASC's Collins Class submarine project is just starting and X-Pert will continue to perform a key role in the various departments, scheduling skilled resources across

a matrix of jobs on several submarines at the same time. MPI's Technical Director, Raf M. Dua has been very closely associated with the ASC project to date due to his detailed knowledge of submarine construction and maintenance (including working on the original Polaris project in the USA, construction of nuclear powered submarines in the UK and refitting RAN 'Oberon' class submarines for many years at Cockatoo Dockyard using ICL PERT and Micro Planner). However, as the ASC's internal skills continue to develop, aided by the ease of use of X-Pert and additional facilities built-in to meet the ASC's specific requirements, we can expect to see more of Raf back in the Eastern States. Raf is anticipating maintaining his personal involvement with SM01 - Collins, through to the start of sea trials but is confidently expecting the ASC's planners to carry the balance of the contract through to a successful conclusion. The target is to launch and commission all six submarines on schedule, on budget and on Micro Planner, not just the first one.

In addition to the New Australian Submarine contract, the ASC is also actively looking to apply its management capabilities to a range of other defence projects.



The Collins at the official "Roll-Out" ceremony, four weeks prior to the launch

The ASC has already been short listed on the Coastal Minehunter Project and is tendering the new Oceanographic Ship. The ASC's management and MIS capabilities, supported by Micro Planner and X-Pert will play a vital role in these tenders and the growth of the ASC into a major regional defence contractor.

### THE NEW SUBMARINE CONTRACT

The Australian Submarine Corporation Pty Ltd is contracted to supply the Royal Australian Navy with six new Collins Class submarines. The basic details of the contract are :-

**Contract Awarded :-** 3rd June 1987

**Project Value :-** \$4,500,000,000.00

**Key Dates :-**

Submarine 01 - Collins  
 Launch 28/8/93  
 Commissioned 7/1/95

Submarine 06 - Rankin  
 Commissioned 29/9/99

**Submarine Details :-**

Length	77 meters
Hull Diameter	8 meters
Displacement	3050 - 3300 tonnes
Crew	42
Weapons	Harpoon Missiles & Type 48 Torpedoes
Propulsion	Diesel Electric
Parts Tracked	500,000 approx. per submarine.

**Submarine Names :-**

Collins, Farncombe, Waller, Dechaineux, Sheean & Rankin

**Australian Industry Involvement :-**

Main Systems	70%
Weapons Systems	45%

### ITHACA TAFE AWARDS FOR EXCELLENCE

MPI was pleased to be able to sponsor an award for Highest Achievement in Year 5 of the Associate Diploma Course in Building at Ithaca TAFE College, Qld.

# INTEGRATED LOGISTIC SUPPORT

As well as designing and building the submarines, Australian Submarine Corporation must also supply the support packages necessary for the COLLINS Class to meet the Royal Australian Navy's stringent safety and availability targets for this complex and sophisticated warship. To support this requirement, ASC has established one of the largest and most comprehensive ILS groups in Australia.

At the heart of ILS is the Logistics Engineer whose analytical skills are used to firstly establish the likely failure modes and probabilities for critical systems and

equipments and then to address the consequences of failure. From this work may flow recommendations for design improvements, maintenance or operating practices.

This information is then used by the Supply Support and Maintenance Analysts who work together to ensure that all maintenance tasks are clearly defined and the spare parts necessary to do the job are documented. Documentation Developers, who form part of the team, assemble these facts into the technical and operating manuals which are produced either electronically or in hard copy by the ILS Group's own publishing department.

All these activities are controlled electronically using a sophisticated data management system which ensures the efficient management of change - the key to effective through-life support.

In addition to these in house skills, Australian Submarine Corporation's ILS Group manages the complex training task of training the Royal Australian Navy's submarine crews in the new technologies of the COLLINS Class. This involves not only the management of the training professionals involved in the development

and conduct of training (much of which is computer-based), but also the procurement of complex training aids such as ship and propulsion simulators.

This blend of in house expertise and project management skills ensures that ASC's ILS group is well placed to offer a complete range of products in a military or civil environment to maximise the through-life availability and cost effectiveness of systems and equipments - the aim of all forward-looking organisations.

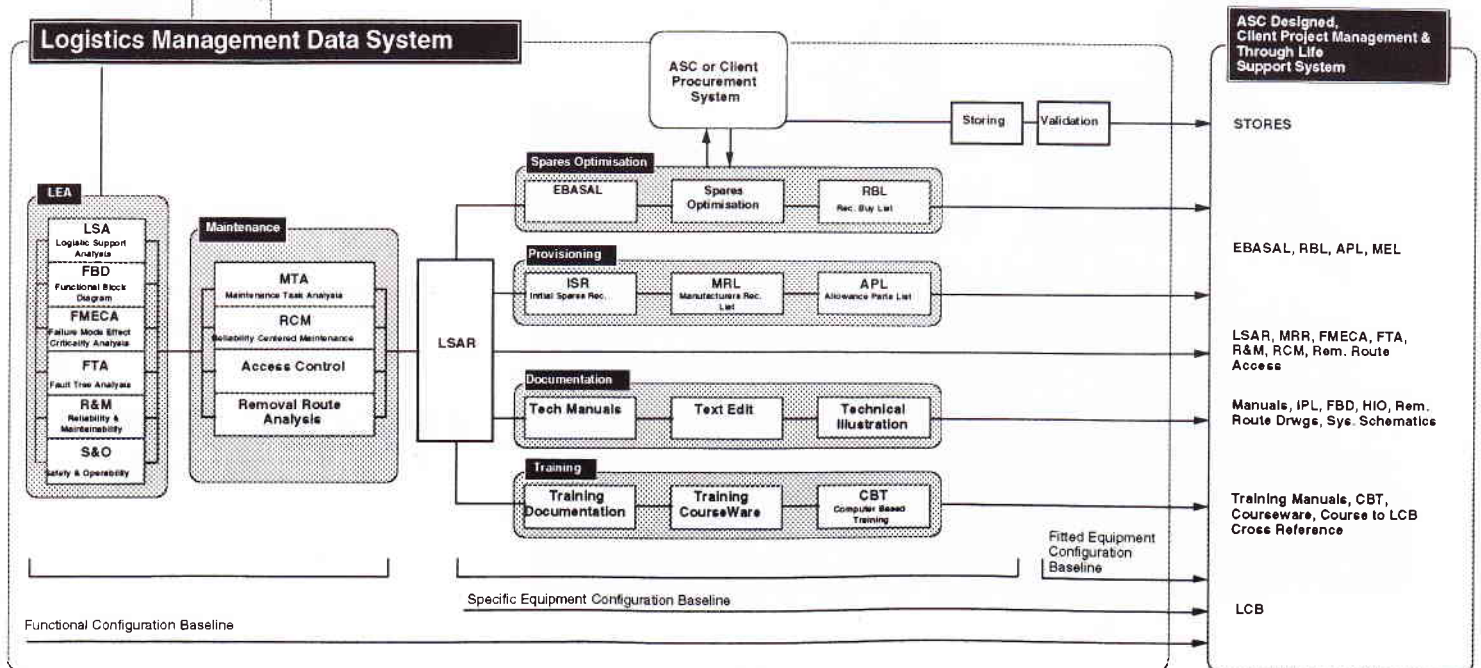
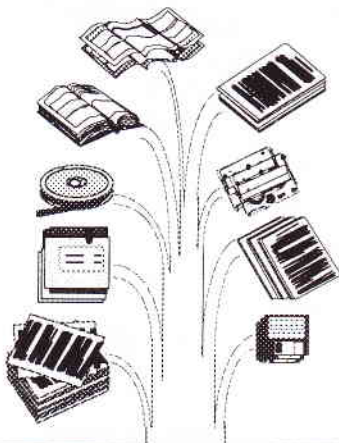
## ILS DISCIPLINES

The disciplines incorporated in the ASC logistic management structure, but no longer forming the structure itself are:-

**Logistic Engineering**, which evaluates system criticality with respect to safety, reliability, maintainability and different design configurations, and establishes the most effective through-life support through the overall usage/upkeep plan.

**Technical Documentation**, which produces system and equipment technical repair and operating manuals, maintenance documentation, techni-

### Source Data





## ILS GUARANTEEING RELIABILITY USING X-PERT

cal repair standards, drawings, parts lists and usage/upkeep plans for systems and equipments.

**Supply Support**, which determines the range and depth of spare parts and support / test equipment needed to provide support at the shipboard, base and depot levels; produces comprehensive parts lists and outfits each vessel.

**Training and Manpower**, which determines the training requirements for operators and maintainers at both the organisational and intermediate levels and develops computer based training for the crews.

**Computer Resources**, which design and develop Logistic Management Data Systems and general computer systems to support the ILS effort.

**Facilities**, which provide recommendations for technical and staff training support services for operational vessels, and docking and refit facilities for vessels undergoing major repair.

### ASC LOGISTIC DATA MANAGEMENT SYSTEMS

One of the most visionary aspects of the entire project was the decision to adopt an almost totally electronic environment for the handling of logistics data within both ASC and the RAN. As with most visionary objectives it has proven to be a most demanding undertaking. The major logistic systems which have been developed are the Logistic Management Data System (LMDS), the Ship Information Management System (SIMS) and its on-board subset the Ship Information System (SIS).

#### LOGISTIC MANAGEMENT DATA SYSTEM:

The Logistic Management Data System (LMDS) provides developmental and management capability for ILS products and logistic data [related to in-service

support and operation] during the design and construction phases of the vessel

The Figure opposite is an overview of the developmental and management capabilities and represents the dataflow from source to final product which is totally managed by the LMDS. The system was developed incrementally, the initial requirement was to support the needs of Supply Support Management Systems which had a need for weekly transfer of initial provisioning data. The final phase of development was completed in December 1992 and will provide a download to the customer's Ship Information Management System (SIMS) of data required for the through-life support of each vessel. SIMS has also been developed by ASC to meet the customer's specific requirements.

The system has been designed to interact with other corporate ASC computer systems including the Technical Information System (TIS) and Configuration Management Information System (CMIS). Interaction with these systems ensures a totally integrated approach to the development of logistic support products for the as-built configurations.

LMDS major functions are the management of the Logistic Configuration Baseline (LCB), Logistic Engineering Analyses, Supply Support, Documentation and Training Development.

#### SHIP INFORMATION MANAGEMENT SYSTEM and SHIP INFORMATION SYSTEM

The introduction of a state-of-the-art vessel into RAN service requires the implementation of sophisticated support mechanisms. Prominent components of this support for the new vessel are the land-based SIMS and vessel based SIS which will allow the RAN to manage ILS deliverables and logistic data. These computer-based information systems have been specifically developed to record and deliver the information necessary for the in-service management of support of the new vessel. SIMS and SIS will provide an

essentially 'paperless' or at least a 'minimum paper' environment for all aspects of the vessels' use and support, with direct electronic access to all logistics information, including technical documentation. The systems are currently in Detailed Design Phase.

The extensive cross-referencing between all related logistics data, which is a fundamental part of the development process, combined with a sophisticated GUI implemented on high-resolution large-screen Unix workstation hardware, enables SIMS and SIS users to access data rapidly and effectively. Cross-referenced data, documentation, tables and illustrations are presented in multiple windows and accessed via hyperlinks. For example, a user can identify a particular item of fitted equipment for a vessel via a graphical display of the configuration hierarchy, and is then able to directly access all relevant information such as maintenance procedures, documentation, logistics engineering information via cross-reference hyperlinks. Use of the latest GUI, 4GL relational database and SGML documentation technology results in an extremely intuitive and user-friendly logistics data system.

SIMS supports ILS functions ashore, while SIS will support these functions on-board the vessel. SIS units are also installed in certain land-based facilities, predominantly for training purposes. An ancillary unit of SIMS, Remote SIMS (RSIMS), is being developed to facilitate maintenance operations away from established SIMS locations.

#### SCHEDULE CONTROL

As with the other major departments within the ASC, Micro Planner X-Pert play a key role within ILS. X-Pert's resource levelling capabilities are heavily used scheduling the available ILS staff against the vast array of tasks required to be completed as well as providing the basic schedule and cost data for the ILS components of the ASC's CS<sup>2</sup> system.

#### ACKNOWLEDGEMENTS

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