

# **QINETIQ APPLIED AND CORPORATE RESEARCH PROGRAMMES**

## **EXPLOITATION OPPORTUNITIES FOR DOPSE, MARINE EQUIPMENT IPTS**

BY

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### **Introduction**

This article has been produced from an annual review of QinetiQ research programmes conducted for WSA DOpsE, to identify key projects of interest to the Marine Equipment IPTs. The report from this review, is distributed to all Marine Platform and Equipment IPTs via the WSA DOpsE Requirements Manager. This article presents a summary of that report.

The report is intended to identify and encourage exploitation of QinetiQ Applied and Corporate Research by Marine Equipment IPTs. Research proposals, quarterly and final reports are reviewed to compile a catalogue of current material that has relevance to marine systems and equipment.

Research projects have been summarized in the report and grouped into themes suited to the Marine Propulsion, Electrical, Auxiliaries and Environment, Survivability and Habitability IPTs. As around 100 projects were listed in the report, it has been abbreviated to an index for this article.

With the recent changes to the management of research and the inception of the Research Acquisition Office, the old and new structures will be briefly described.

### **Applied and Corporate Research Programmes**

The MoD has traditionally commissioned research through two main avenues, the Applied and Corporate programmes. The Applied Research Programme (ARP) supports the specific needs of individual customers, exploiting current or emergent technology. The purpose of the Corporate Research Programme (CRP) is to advance scientific and technical knowledge of key interest to defence. It also maintains and develops the defence science and technology base.

In 2001, the MoD Chief Scientific Advisor conducted a Technology Review to improve the acquisition and management of research. This led to the establishment of the Research Acquisition Organization (RAO) and development of research output streams intended to succeed ARP and CRP. The bulk of research considered in this article has been procured under existing ARP and CRP arrangements, which are discussed below in greater detail.

The ARP Customer is the Deputy Chief of Defence Staff (Equipment Capability), (DCDS(EC)), who delegates management to four Capability

Managers (CM), each of whom is responsible for a number of Capability Areas (CA).

The ARP is currently structured into 14 Packages aligned to the CAs. Packages are sub-divided into 'entities' which consist of discrete programmes or groups of smaller related programmes of work.

Changes to the structure of DCDS(EC), with the return to the MoD Main Building, have resulted in a reduction to 3 Capability Managers and 11 Capability Areas.

Each ARP package is assigned a QinetiQ Channel Manager and a MoD DSTL Technical Officer. The Technical Officer manages the direction and conduct of research and accepts the product on behalf of the MoD. The Channel Manager is the focal point for QinetiQ and liaises with Project Managers who run research programmes within each ARP package.

The Corporate Research Programme (CRP) is controlled by the Director General Research and Technology. The programme is currently structured into Technology Domains (TD), each comprising a set of Research Objectives (RO), which are sub-divided into Technical Areas (TA), containing a number of individual projects.

Each TD is managed on a day-to-day basis by a Research Director of Technology (RD(T)) acting on behalf of the Central MOD Customer. The main programme is currently contracted at TD level through the QinetiQ MoD Channel.

The CRP is split into the Directed and Inventive Programmes. The Directed Programme forms the bulk of the FY03/04 CRP (around 50-60%) and supports key themes identified by MoD as needing immediate attention. The Inventive Programme covers the remaining 30-40% of CRP, accommodating the 'blue sky' research into new technologies which have traditionally been undertaken in the CRP.

### **Research Acquisition**

Following the Technology Review conducted by the Chief Scientific Advisor in 2001, the Defence Science and Technology Board (DSTB) was set up to develop improved strategies for the delivery of defence science and technology research outputs. The broad aim of the DSTB is to improve the exploitation from research and include it to greater advantage in forming policy. Further aims were to improve the agility of research outputs to achieve greater balance of investment, while maintaining clear high level coherence and policy direction.

A framework of seven research outputs was developed to structure research delivery and replace the ARP and CRP streams. Each output has a senior Corporate Owner, who is a member of the DSTB. Corporate Owners work with stakeholders to define the output and relative priority of the research.

The output streams, with their Corporate Owners are shown in Table.1.

TABLE.1 – *Research Output Framework*

RESEARCH OUTPUT	FUNCTION	CORPORATE OWNER
Output 1	Advice to Ministers on science and technology issues.	Chief Scientific Advisor
Output 2	Advice to policy and planning.	DSTB Policy Director
Output 3	Advice to capability management.	DCDS(EC)
Output 4	Maintaining MoD advice supplier base.	Science and Technology Director
Output 5	Technology awareness.	Science and Technology Director
Output 6	Technology/capability in the supplier base.	Defence Procurement Agency
Output 7	Innovative solutions to Defence problems.	DCDS(EC)

Existing elements of ARP and CRP are now mapped to the output structure, with traditional ARP content principally falling into Outputs 3 and 6.

The RAO comprises a team of technical, contractual and finance staff who support the Corporate Owners in translating the research output into individual research programmes. Currently forming at the Royal Military College of Science at Shrivenham, the RAO is intended to collocate dispersed elements of the MoD research organization to provide management coherence across all outputs. A single budget was created in April 2004 from existing separated areas to fund the majority of MoD science and technology research.

The RAO includes Output Managers who support the Corporate Owners by providing specialist advice in the planning and delivery of research, with the following key roles:

- Maintaining an understanding of extant and previous work.
- Advising on options for content of individual programmes.
- Maintaining knowledge of the research supplier base.
- Providing advice on methods to maximise research output, through collaboration or shared programmes across different Corporate Owners.
- Providing advice for translating Corporate plans into research programmes and contracts.
- Providing contracting and management services.
- Presenting and interpreting research output to customers.

Science based Clusters will be established to monitor every aspect of a specific technology area (e.g. materials or structures) across all the Outputs. Their role is to be similar in concept to the Technology Domains from the CRP and is intended to maximize value and avoid duplication.

The roles of the RAO and the Corporate Owners who sponsor each output stream continue to develop rapidly. The description included in this article represents a summary of the position when written, but it is considered likely that the detail will change as the structure of the RAO and Output based research develops.

### Extent of research reviewed

The review for DOpsE is focussed to provide a condensed compilation of research projects for the Marine Equipment IPTs. The content is drawn from QinetiQ research projects within ARPs 1 to 13, and the CRP. Project Support and Marine Engineering Development Programme contracts are not included.

Each relevant QinetiQ research project is summarized and then compiled into a list for each of the four Marine Equipment IPTs. The project summaries include start and delivery dates, points of contact, a brief synopsis and suggested exploitation value. Due to the length of the combined summaries been replaced by an index in this article.

### Conclusions

Research constitutes a significant proportion of Defence spending. It is vital for the MoD and research providers, that the product is relevant and exploited to achieve maximum value. This article and the report from which it is derived, is intended to contribute by providing a relevant compilation of research to a specific target audience.

### Index of Research Exploitation Opportunities for Marine Equipment IPTs

ITEM NO.	RESEARCH THEME	IPT APPLICABILITY	RESEARCH AREA
1	Survivability	MESH	ARP 01 AWB
	<b>PROJECT TITLE</b>	<b>PROJECT START DATE</b>	<b>PROJECT FINISH DATE</b>
	Advanced FF and DC techniques and systems.	April 2002	December 2003
	<b>RESEARCH THEME</b>	<b>IPT APPLICABILITY</b>	<b>RESEARCH AREA</b>
2	Propulsion	MPS	ARP 01 AWB
	<b>PROJECT TITLE</b>	<b>PROJECT START DATE</b>	<b>PROJECT FINISH DATE</b>
	Composite Propeller.	April 2002	December 2003
	<b>RESEARCH THEME</b>	<b>IPT APPLICABILITY</b>	<b>RESEARCH AREA</b>
3	Automation and Management	MLS	ARP 01 AWB
	<b>PROJECT TITLE</b>	<b>PROJECT START DATE</b>	<b>PROJECT FINISH DATE</b>
	Concepts and processes for warship management systems.	April 2002	December 2003
	<b>RESEARCH THEME</b>	<b>IPT APPLICABILITY</b>	<b>RESEARCH AREA</b>
4	Auxiliaries	MESH	ARP 01 AWB
	<b>PROJECT TITLE</b>	<b>PROJECT START DATE</b>	<b>PROJECT FINISH DATE</b>
	Reduced dependency on liquid cooling.	April 2002	December 2003
	<b>RESEARCH THEME</b>	<b>IPT APPLICABILITY</b>	<b>RESEARCH AREA</b>
5	Propulsion	MLS/MPS	ARP 01 AWB
	<b>PROJECT TITLE</b>	<b>PROJECT START DATE</b>	<b>PROJECT FINISH DATE</b>
	Advanced podded drives for warship applications.	April 2002	December 2003

ITEM NO.	RESEARCH THEME	IPT APPLICABILITY	RESEARCH AREA
6	Whole life cost reduction	General	ARP 01 AWB
	<b>PROJECT TITLE</b>	<b>PROJECT START DATE</b>	<b>PROJECT FINISH DATE</b>
	Strategic studies for predicting and reducing Whole Life Cost of maritime platforms.	April 2002	December 2003
	<b>RESEARCH THEME</b>	<b>IPT APPLICABILITY</b>	<b>RESEARCH AREA</b>
7	Health and environment.	MLS	ARP 01 AWB
	<b>PROJECT TITLE</b>	<b>PROJECT START DATE</b>	<b>PROJECT FINISH DATE</b>
	Impact of EM fields on human health and IFEP signature implications.	April 2002	December 2003
	<b>RESEARCH THEME</b>	<b>IPT APPLICABILITY</b>	<b>RESEARCH AREA</b>
8	Platform technology	MLS/MPS	ARP 01 AWB
	<b>PROJECT TITLE</b>	<b>PROJECT START DATE</b>	<b>PROJECT FINISH DATE</b>
	Novel energy sources and storage techniques.	April 2002	December 2003
	<b>RESEARCH THEME</b>	<b>IPT APPLICABILITY</b>	<b>RESEARCH AREA</b>
9	Auxiliaries	MESH	ARP 01 AWB
	<b>PROJECT TITLE</b>	<b>PROJECT START DATE</b>	<b>PROJECT FINISH DATE</b>
	Platform sustainability.	April 2002	December 2003
	<b>RESEARCH THEME</b>	<b>IPT APPLICABILITY</b>	<b>RESEARCH AREA</b>
10	Platform Technology	MLS	ARP 01 AWB
	<b>PROJECT TITLE</b>	<b>PROJECT START DATE</b>	<b>PROJECT FINISH DATE</b>
	CEPA 16 Fuel Cell report.	April 2002	December 2003
	<b>RESEARCH THEME</b>	<b>IPT APPLICABILITY</b>	<b>RESEARCH AREA</b>
11	Health and environment	General	ARP 01 AWB
	<b>PROJECT TITLE</b>	<b>PROJECT START DATE</b>	<b>PROJECT FINISH DATE</b>
	Green Warrior.	April 2002	December 2003
	<b>RESEARCH THEME</b>	<b>IPT APPLICABILITY</b>	<b>RESEARCH AREA</b>
12	Platform technology	MESH	ARP 01 AWB
	<b>PROJECT TITLE</b>	<b>PROJECT START DATE</b>	<b>PROJECT FINISH DATE</b>
	Dirt in warships.	April 2002	December 2003
	<b>RESEARCH THEME</b>	<b>IPT APPLICABILITY</b>	<b>RESEARCH AREA</b>
13	Platform technology	MLS/MPS	ARP 01 AWB
	<b>PROJECT TITLE</b>	<b>PROJECT START DATE</b>	<b>PROJECT FINISH DATE</b>
	Fuel reduction technology and fuel system strategy.	April 2004	April 2006

ITEM NO.	RESEARCH THEME	IPT APPLICABILITY	RESEARCH AREA
14	Survivability	MESH	ARP 01 AWB
	<b>PROJECT TITLE</b>	<b>PROJECT START DATE</b>	<b>PROJECT FINISH DATE</b>
	Future fire fighting streaming agent study.	February 2006	March 2007
	<b>RESEARCH THEME</b>	<b>IPT APPLICABILITY</b>	<b>RESEARCH AREA</b>
15	Automation and management.	MESH/MLS	ARP 01 AWB
	<b>PROJECT TITLE</b>	<b>PROJECT START DATE</b>	<b>PROJECT FINISH DATE</b>
	Cost effective concepts and technologies for damage control and machinery control system.	April 2005	March 2007
	<b>RESEARCH THEME</b>	<b>IPT APPLICABILITY</b>	<b>RESEARCH AREA</b>
16	Whole life cost reduction.	MPS/MXS	ARP 01 AWB
	<b>PROJECT TITLE</b>	<b>PROJECT START DATE</b>	<b>PROJECT FINISH DATE</b>
	Underwater engineering.	April 2004	April 2005
	<b>RESEARCH THEME</b>	<b>IPT APPLICABILITY</b>	<b>RESEARCH AREA</b>
17	Platform technology.	MESH/MLS/MPS	ARP 01 AWB
	<b>PROJECT TITLE</b>	<b>PROJECT START DATE</b>	<b>PROJECT FINISH DATE</b>
	Energy management	April 2004	April 2006
	<b>RESEARCH THEME</b>	<b>IPT APPLICABILITY</b>	<b>RESEARCH AREA</b>
18	Propulsion	MPS	ARP 01 AWB
	<b>PROJECT TITLE</b>	<b>PROJECT START DATE</b>	<b>PROJECT FINISH DATE</b>
	Pod technology risk reduction.	April 2004	April 2007
	<b>RESEARCH THEME</b>	<b>IPT APPLICABILITY</b>	<b>RESEARCH AREA</b>
19	Power systems	MLS	ARP 01 AWB
	<b>PROJECT TITLE</b>	<b>PROJECT START DATE</b>	<b>PROJECT FINISH DATE</b>
	Impact of large electrical power systems in the RN.	December 2003	April 2004
	<b>RESEARCH THEME</b>	<b>IPT APPLICABILITY</b>	<b>RESEARCH AREA</b>
20	Power systems	MLS	ARP 01 AWB
	<b>PROJECT TITLE</b>	<b>PROJECT START DATE</b>	<b>PROJECT FINISH DATE</b>
	Electro magnetic fields.	April 2004	December 2007
	<b>RESEARCH THEME</b>	<b>IPT APPLICABILITY</b>	<b>RESEARCH AREA</b>
21	Power systems	MLS	ARP 01 AWB
	<b>PROJECT TITLE</b>	<b>PROJECT START DATE</b>	<b>PROJECT FINISH DATE</b>
	Detailed power system earthing and shielding study (including podded drives and ICCP systems).	April 2004	April 2005

ITEM NO.	RESEARCH THEME	IPT APPLICABILITY	RESEARCH AREA
22	Power systems	MESH/MLS	ARP 01 AWB
	<b>PROJECT TITLE</b>	<b>PROJECT START DATE</b>	<b>PROJECT FINISH DATE</b>
	Damage control for HV systems.	April 2004	April 2005
23	<b>RESEARCH THEME</b>	<b>IPT APPLICABILITY</b>	<b>RESEARCH AREA</b>
	Automation and Management	MLS	ARP 01 AWB
	<b>PROJECT TITLE</b>	<b>PROJECT START DATE</b>	<b>PROJECT FINISH DATE</b>
	Cost effective combat systems.	April 2004	April 2007
24	<b>RESEARCH THEME</b>	<b>IPT APPLICABILITY</b>	<b>RESEARCH AREA</b>
	Health and Environment	MLS	ARP 01 AWB
	<b>PROJECT TITLE</b>	<b>PROJECT START DATE</b>	<b>PROJECT FINISH DATE</b>
	Human health effects of IFEP power systems.	April 2004	April 2007
25	<b>RESEARCH THEME</b>	<b>IPT APPLICABILITY</b>	<b>RESEARCH AREA</b>
	Platform technology.	General	ARP 01 AWB
	<b>PROJECT TITLE</b>	<b>PROJECT START DATE</b>	<b>PROJECT FINISH DATE</b>
	CESIL.	April 2004	April 2007
26	<b>RESEARCH THEME</b>	<b>IPT APPLICABILITY</b>	<b>RESEARCH AREA</b>
	Platform technology	General	ARP 01 AWB
	<b>PROJECT TITLE</b>	<b>PROJECT START DATE</b>	<b>PROJECT FINISH DATE</b>
	Shades of grey.	December 2003	March 2005
27	<b>RESEARCH THEME</b>	<b>IPT APPLICABILITY</b>	<b>RESEARCH AREA</b>
	Miscellaneous	General	ARP 01 AWB
	<b>PROJECT TITLE</b>	<b>PROJECT START DATE</b>	<b>PROJECT FINISH DATE</b>
	Adaptability for FSC novel stern.	March 2006	April 2007
28	<b>RESEARCH THEME</b>	<b>IPT APPLICABILITY</b>	<b>RESEARCH AREA</b>
	Platform technology	General	ARP 01 AWB
	<b>PROJECT TITLE</b>	<b>PROJECT START DATE</b>	<b>PROJECT FINISH DATE</b>
	Maritime platform characteristics.	December 2003	April 2004
29	<b>RESEARCH THEME</b>	<b>IPT APPLICABILITY</b>	<b>RESEARCH AREA</b>
	Platform technology	MESH	ARP 01 AWB
	<b>PROJECT TITLE</b>	<b>PROJECT START DATE</b>	<b>PROJECT FINISH DATE</b>
	Drudgery countermeasures.	April 2005	April 2007
30	<b>RESEARCH THEME</b>	<b>IPT APPLICABILITY</b>	<b>RESEARCH AREA</b>
	Platform technology	General	ARP 01 AWB
	<b>PROJECT TITLE</b>	<b>PROJECT START DATE</b>	<b>PROJECT FINISH DATE</b>
	Aluminium as an alternative to steel for ship construction.	April 2005	April 2006

ITEM NO.	RESEARCH THEME	IPT APPLICABILITY	RESEARCH AREA
31	Whole life cost reduction	MLS	ARP 01 AWB
	<b>PROJECT TITLE</b>	<b>PROJECT START DATE</b>	<b>PROJECT FINISH DATE</b>
	Technology based alternative manning concepts.	April 2004	April 2007
	<b>RESEARCH THEME</b>	<b>IPT APPLICABILITY</b>	<b>RESEARCH AREA</b>
32	Whole life cost reduction	MESH/MLS	ARP 01 AWB
	<b>PROJECT TITLE</b>	<b>PROJECT START DATE</b>	<b>PROJECT FINISH DATE</b>
	Complement reduction, technology to support minimal size FF and DC organization.	April 2004	April 2006
	<b>RESEARCH THEME</b>	<b>IPT APPLICABILITY</b>	<b>RESEARCH AREA</b>
33	Whole life cost reduction	General	ARP 01 AWB
	<b>PROJECT TITLE</b>	<b>PROJECT START DATE</b>	<b>PROJECT FINISH DATE</b>
	Cost reduction, the platform perspective.	April 2004	April 2007
	<b>RESEARCH THEME</b>	<b>IPT APPLICABILITY</b>	<b>RESEARCH AREA</b>
34	Health and Environment	General	ARP 01 AWB
	<b>PROJECT TITLE</b>	<b>PROJECT START DATE</b>	<b>PROJECT FINISH DATE</b>
	Legislation, and its impact on the RN's ability to operate globally.	April 2004	April 2007
	<b>RESEARCH THEME</b>	<b>IPT APPLICABILITY</b>	<b>RESEARCH AREA</b>
35	Platform technology	General	ARP 01 AWB
	<b>PROJECT TITLE</b>	<b>PROJECT START DATE</b>	<b>PROJECT FINISH DATE</b>
	Exploitation of commercial ship repair and platform technology.	April 2005	April 2006
	<b>RESEARCH THEME</b>	<b>IPT APPLICABILITY</b>	<b>RESEARCH AREA</b>
36	Miscellaneous	General	ARP 01 AWB
	<b>PROJECT TITLE</b>	<b>PROJECT START DATE</b>	<b>PROJECT FINISH DATE</b>
	FSC propulsion and auxiliary.	December 2003	April 2005
	<b>RESEARCH THEME</b>	<b>IPT APPLICABILITY</b>	<b>RESEARCH AREA</b>
37	Propulsion	MLS/MPS	ARP 01 AWB
	<b>PROJECT TITLE</b>	<b>PROJECT START DATE</b>	<b>PROJECT FINISH DATE</b>
	Pumpjet and waterjet application in warships.	March 2005	April 2006
	<b>RESEARCH THEME</b>	<b>IPT APPLICABILITY</b>	<b>RESEARCH AREA</b>
38	Ship/air integration	MLS/MXS	ARP 01 AWB
	<b>PROJECT TITLE</b>	<b>PROJECT START DATE</b>	<b>PROJECT FINISH DATE</b>
	Marine landing systems.	April 2002	December 2003



ITEM NO.	RESEARCH THEME	IPT APPLICABILITY	RESEARCH AREA
39	Ship/air integration	MLS / MXS	ARP 01 AWB
	<b>PROJECT TITLE</b>	<b>PROJECT START DATE</b>	<b>PROJECT FINISH DATE</b>
	Maritime UAV.	April 2002	December 2003
	<b>RESEARCH THEME</b>	<b>IPT APPLICABILITY</b>	<b>RESEARCH AREA</b>
40	Ship/air integration	MLS / MXS	ARP 01 AWB
	<b>PROJECT TITLE</b>	<b>PROJECT START DATE</b>	<b>PROJECT FINISH DATE</b>
	Personal communications.	April 2002	December 2003
	<b>RESEARCH THEME</b>	<b>IPT APPLICABILITY</b>	<b>RESEARCH AREA</b>
41	Ship/air integration	MLS/MXS	ARP 01 AWB
	<b>PROJECT TITLE</b>	<b>PROJECT START DATE</b>	<b>PROJECT FINISH DATE</b>
	Entry level recovery systems.	April 2004	August 2005
	<b>RESEARCH THEME</b>	<b>IPT APPLICABILITY</b>	<b>RESEARCH AREA</b>
42	Platform technology	MLS	ARP 01 AWB
	<b>PROJECT TITLE</b>	<b>PROJECT START DATE</b>	<b>PROJECT FINISH DATE</b>
	Evaluation of technologies and techniques for Combat Management System Human Machine Interface.	April 2002	December 2003
	<b>RESEARCH THEME</b>	<b>IPT APPLICABILITY</b>	<b>RESEARCH AREA</b>
43	Platform technology	General	ARP 01 AWB
	<b>PROJECT TITLE</b>	<b>PROJECT START DATE</b>	<b>PROJECT FINISH DATE</b>
	Optimized complements based on NOMISETS.	April 2002	March 2005
	<b>RESEARCH THEME</b>	<b>IPT APPLICABILITY</b>	<b>RESEARCH AREA</b>
44	Platform technology	General	ARP 01 AWB
	<b>PROJECT TITLE</b>	<b>PROJECT START DATE</b>	<b>PROJECT FINISH DATE</b>
	Federated confederated and ship alongside training.	April 2002	January 2003
	<b>RESEARCH THEME</b>	<b>IPT APPLICABILITY</b>	<b>RESEARCH AREA</b>
45	Trimaran	General	ARP 01 AWB
	<b>PROJECT TITLE</b>	<b>PROJECT START DATE</b>	<b>PROJECT FINISH DATE</b>
	Trimaran.	April 2002	March 2004
	<b>RESEARCH THEME</b>	<b>IPT APPLICABILITY</b>	<b>RESEARCH AREA</b>
46	Survivability	MESH	ARP 01 AWB
	<b>PROJECT TITLE</b>	<b>PROJECT START DATE</b>	<b>PROJECT FINISH DATE</b>
	Blast suppression using water.	February 2002	April 2003
	<b>RESEARCH THEME</b>	<b>IPT APPLICABILITY</b>	<b>RESEARCH AREA</b>
47	Survivability	MESH	ARP 01 AWB
	<b>PROJECT TITLE</b>	<b>PROJECT START DATE</b>	<b>PROJECT FINISH DATE</b>
	CVF vulnerability issues.	February 2002	March 2003

ITEM NO	RESEARCH THEME	IPT APPLICABILITY	RESEARCH AREA
48	Survivability	General	ARP 01 AWB
	<b>PROJECT TITLE</b>	<b>PROJECT START DATE</b>	<b>PROJECT FINISH DATE</b>
	Destroyer grade scheme report.	February 2002	November 2002
	<b>RESEARCH THEME</b>	<b>IPT APPLICABILITY</b>	<b>RESEARCH AREA</b>
49	Survivability	General	ARP 01 AWB
	<b>PROJECT TITLE</b>	<b>PROJECT START DATE</b>	<b>PROJECT FINISH DATE</b>
	Post hit ship and systems survivability.	February 2002	May 2003
	<b>RESEARCH THEME</b>	<b>IPT APPLICABILITY</b>	<b>RESEARCH AREA</b>
50	Survivability	MESH	ARP 01 AWB
	<b>PROJECT TITLE</b>	<b>PROJECT START DATE</b>	<b>PROJECT FINISH DATE</b>
	Post hit ship recovery fire damage and spread assessment.	February 2002	October 2002
	<b>RESEARCH THEME</b>	<b>IPT APPLICABILITY</b>	<b>RESEARCH AREA</b>
51	Survivability	General	ARP 01 AWB
	<b>PROJECT TITLE</b>	<b>PROJECT START DATE</b>	<b>PROJECT FINISH DATE</b>
	FSC Initial gate vulnerability input.	February 2002	May 2002
	<b>RESEARCH THEME</b>	<b>IPT APPLICABILITY</b>	<b>RESEARCH AREA</b>
52	Survivability	General	ARP 01 AWB
	<b>PROJECT TITLE</b>	<b>PROJECT START DATE</b>	<b>PROJECT FINISH DATE</b>
	Generic warship and crew issues (presentation).	February 2002	December 2002
	<b>RESEARCH THEME</b>	<b>IPT APPLICABILITY</b>	<b>RESEARCH AREA</b>
53	Survivability	General	ARP 01 AWB
	<b>PROJECT TITLE</b>	<b>PROJECT START DATE</b>	<b>PROJECT FINISH DATE</b>
	RFA survivability in littoral operations.	February 2002	March 2003
	<b>RESEARCH THEME</b>	<b>IPT APPLICABILITY</b>	<b>RESEARCH AREA</b>
54	Survivability	General	ARP 01 AWB
	<b>PROJECT TITLE</b>	<b>PROJECT START DATE</b>	<b>PROJECT FINISH DATE</b>
	Whipping code demonstration.	February 2002	September 2002
	<b>RESEARCH THEME</b>	<b>IPT APPLICABILITY</b>	<b>RESEARCH AREA</b>
55	Whole life cost reduction	General	ARP 01 AWB
	<b>PROJECT TITLE</b>	<b>PROJECT START DATE</b>	<b>PROJECT FINISH DATE</b>
	AWB cost reduction.	January 2004	April 2004
	<b>RESEARCH THEME</b>	<b>IPT APPLICABILITY</b>	<b>RESEARCH AREA</b>
56	Automation and management	MLS	ARP 02 UWB
	<b>PROJECT TITLE</b>	<b>PROJECT START DATE</b>	<b>PROJECT FINISH DATE</b>
	Hybrid photonic processing techniques.	April 2002	June 2005

ITEM NO	RESEARCH THEME	IPT APPLICABILITY	RESEARCH AREA
57	Whole life cost reduction	General	ARP 02 UWB
	<b>PROJECT TITLE</b>	<b>PROJECT START DATE</b>	<b>PROJECT FINISH DATE</b>
	UW platforms cost reduction.	April 2002	October 2002
	<b>RESEARCH THEME</b>	<b>IPT APPLICABILITY</b>	<b>RESEARCH AREA</b>
58	Health and Environment	MESH	ARP 02 UWB
	<b>PROJECT TITLE</b>	<b>PROJECT START DATE</b>	<b>PROJECT FINISH DATE</b>
	Life support.	April 2002	February 2004
	<b>RESEARCH THEME</b>	<b>IPT APPLICABILITY</b>	<b>RESEARCH AREA</b>
59	Auxiliaries	MXS	ARP 02 UWB
	<b>PROJECT TITLE</b>	<b>PROJECT START DATE</b>	<b>PROJECT FINISH DATE</b>
	Underwater mobility.	April 2002	January 2004
	<b>RESEARCH THEME</b>	<b>IPT APPLICABILITY</b>	<b>RESEARCH AREA</b>
60	Auxiliaries	MESH/MXS	ARP 03 DSR
	<b>PROJECT TITLE</b>	<b>PROJECT START DATE</b>	<b>PROJECT FINISH DATE</b>
	Alternative amphibious platform offload procedures.	April 2003	December 2003
	<b>RESEARCH THEME</b>	<b>IPT APPLICABILITY</b>	<b>RESEARCH AREA</b>
61	Auxiliaries	MESH/MXS	ARP 03 DSR
	<b>PROJECT TITLE</b>	<b>PROJECT START DATE</b>	<b>PROJECT FINISH DATE</b>
	Contribution to littoral manoeuvre, sea based logistics and OOTW of commercially available containerisation and transport techniques.	April 2003	December 2003
	<b>RESEARCH THEME</b>	<b>IPT APPLICABILITY</b>	<b>RESEARCH AREA</b>
62	Platform technologies	General	ARP 03 DSR
	<b>PROJECT TITLE</b>	<b>PROJECT START DATE</b>	<b>PROJECT FINISH DATE</b>
	Corrosion reduction techniques.	April 2002	April 2005
	<b>RESEARCH THEME</b>	<b>IPT APPLICABILITY</b>	<b>RESEARCH AREA</b>
63	Whole life cost reduction	General	ARP 03 DSR
	<b>PROJECT TITLE</b>	<b>PROJECT START DATE</b>	<b>PROJECT FINISH DATE</b>
	Design options for LPD(R).	April 2004	December 2004
	<b>RESEARCH THEME</b>	<b>IPT APPLICABILITY</b>	<b>RESEARCH AREA</b>
64	Whole life cost reduction	General	ARP 03 DSR
	<b>PROJECT TITLE</b>	<b>PROJECT START DATE</b>	<b>PROJECT FINISH DATE</b>
	Identification of cost drivers and cost reduction concepts for DEC (DSR).	April 2002	April 2005

ITEM NO	RESEARCH THEME	IPT APPLICABILITY	RESEARCH AREA
65	Trimaran	General	ARP 03 DSR
	<b>PROJECT TITLE</b>	<b>PROJECT START DATE</b>	<b>PROJECT FINISH DATE</b>
	Trimaran concepts for DSR.	April 2003	December 2003
66	<b>RESEARCH THEME</b>	<b>IPT APPLICABILITY</b>	<b>RESEARCH AREA</b>
	Health and environment	General	ARP 03 DSR
	<b>PROJECT TITLE</b>	<b>PROJECT START DATE</b>	<b>PROJECT FINISH DATE</b>
	The impact of emergent and future maritime legislation on DSR and ALM.	November 2003	April 2004
67	<b>RESEARCH THEME</b>	<b>IPT APPLICABILITY</b>	<b>RESEARCH AREA</b>
	Auxiliaries	MESH / MXS	ARP 03 DSR
	<b>PROJECT TITLE</b>	<b>PROJECT START DATE</b>	<b>PROJECT FINISH DATE</b>
	New techniques for RAS.	April 2002	December 2002
68	<b>RESEARCH THEME</b>	<b>IPT APPLICABILITY</b>	<b>RESEARCH AREA</b>
	Misc	General	ARP 03 DSR
	<b>PROJECT TITLE</b>	<b>PROJECT START DATE</b>	<b>PROJECT FINISH DATE</b>
	Hovercraft technology.	November 2003	March 2004
69	<b>RESEARCH THEME</b>	<b>IPT APPLICABILITY</b>	<b>RESEARCH AREA</b>
	Whole life cost reduction.	General	ARP 03 DSR
	<b>PROJECT TITLE</b>	<b>PROJECT START DATE</b>	<b>PROJECT FINISH DATE</b>
	Design options for LPH.	April 2003	December 2003
70	<b>RESEARCH THEME</b>	<b>IPT APPLICABILITY</b>	<b>RESEARCH AREA</b>
	Auxiliaries	MESH/MXS	ARP 03 DSR
	<b>PROJECT TITLE</b>	<b>PROJECT START DATE</b>	<b>PROJECT FINISH DATE</b>
	New techniques for amphibious offload.	April 2004	December 2004
71	<b>RESEARCH THEME</b>	<b>IPT APPLICABILITY</b>	<b>RESEARCH AREA</b>
	Miscellaneous	General	ARP 03 DSR
	<b>PROJECT TITLE</b>	<b>PROJECT START DATE</b>	<b>PROJECT FINISH DATE</b>
	PACSCAT design.	April 2002	December 2002
72	<b>RESEARCH THEME</b>	<b>IPT APPLICABILITY</b>	<b>RESEARCH AREA</b>
	Platform technology	General	ARP 03 DSR
	<b>PROJECT TITLE</b>	<b>PROJECT START DATE</b>	<b>PROJECT FINISH DATE</b>
	Shock reduction for DSR.	August 2002	January 2003
73	<b>RESEARCH THEME</b>	<b>IPT APPLICABILITY</b>	<b>RESEARCH AREA</b>
	Platform technology	General	ARP 03 DSR
	<b>PROJECT TITLE</b>	<b>PROJECT START DATE</b>	<b>PROJECT FINISH DATE</b>
	Signature reduction techniques for DSR maritime platforms.	September 2002	January 2003

ITEM NO	RESEARCH THEME	IPT APPLICABILITY	RESEARCH AREA
74	Auxiliaries	MESH	ARP 03 DSR
	<b>PROJECT TITLE</b>	<b>PROJECT START DATE</b>	<b>PROJECT FINISH DATE</b>
	Production of water from air.	August 2002	January 2003
	<b>RESEARCH THEME</b>	<b>IPT APPLICABILITY</b>	<b>RESEARCH AREA</b>
75	Auxiliaries	MESH	ARP 03 DSR
	<b>PROJECT TITLE</b>	<b>PROJECT START DATE</b>	<b>PROJECT FINISH DATE</b>
	Development of a technology that will allow the production of potable water from vehicle exhaust.	August 2002	January 2003
	<b>RESEARCH THEME</b>	<b>IPT APPLICABILITY</b>	<b>RESEARCH AREA</b>
76	Auxiliaries	MESH / MXS	ARP 03 DSR
	<b>PROJECT TITLE</b>	<b>PROJECT START DATE</b>	<b>PROJECT FINISH DATE</b>
	Development of in dock wave reduction techniques.	April 2003	December 2003
	<b>RESEARCH THEME</b>	<b>IPT APPLICABILITY</b>	<b>RESEARCH AREA</b>
77	Automation and management	MLS	ARP 03 DSR
	<b>PROJECT TITLE</b>	<b>PROJECT START DATE</b>	<b>PROJECT FINISH DATE</b>
	Platform availability	January 2004	April 2004
	<b>RESEARCH THEME</b>	<b>IPT APPLICABILITY</b>	<b>RESEARCH AREA</b>
78	Platform technology	General	ARP 03 DSR
	<b>PROJECT TITLE</b>	<b>PROJECT START DATE</b>	<b>PROJECT FINISH DATE</b>
	LPH SLEP.	January 2004	April 2004
	<b>RESEARCH THEME</b>	<b>IPT APPLICABILITY</b>	<b>RESEARCH AREA</b>
79	Ship/air integration	MESH / MLS	ARP 03 DSR
	<b>PROJECT TITLE</b>	<b>PROJECT START DATE</b>	<b>PROJECT FINISH DATE</b>
	MARS DSR Ship air interface	January 2004	April 2004
	<b>RESEARCH THEME</b>	<b>IPT APPLICABILITY</b>	<b>RESEARCH AREA</b>
80	Ship/air integration	MESH / MLS	ARP 03 DSR
	<b>PROJECT TITLE</b>	<b>PROJECT START DATE</b>	<b>PROJECT FINISH DATE</b>
	Deployable hangars.	January 2004	April 2004
	<b>RESEARCH THEME</b>	<b>IPT APPLICABILITY</b>	<b>RESEARCH AREA</b>
81	Whole life cost reduction	MESH / MXS	ARP 03 DSR
	<b>PROJECT TITLE</b>	<b>PROJECT START DATE</b>	<b>PROJECT FINISH DATE</b>
	DSR cost reduction studies.	January 2004	April 2004
	<b>RESEARCH THEME</b>	<b>IPT APPLICABILITY</b>	<b>RESEARCH AREA</b>
82	Propulsion	MPS	ARP 04 DS
	<b>PROJECT TITLE</b>	<b>PROJECT START DATE</b>	<b>PROJECT FINISH DATE</b>
	Gas turbine technology.	April 2002	January 2003

ITEM NO	RESEARCH THEME	IPT APPLICABILITY	RESEARCH AREA
83	Propulsion	MPS	ARP 04 DS
	<b>PROJECT TITLE</b>	<b>PROJECT START DATE</b>	<b>PROJECT FINISH DATE</b>
	Assessment of the impact of control concepts in engine life usage.	April 2002	February 2003
	<b>RESEARCH THEME</b>	<b>IPT APPLICABILITY</b>	<b>RESEARCH AREA</b>
84	Power systems	MLS	ARP 05 CTA
	<b>PROJECT TITLE</b>	<b>PROJECT START DATE</b>	<b>PROJECT FINISH DATE</b>
	Status report of More Electric Aircraft Programmes.	April 2002	January 2003
	<b>RESEARCH THEME</b>	<b>IPT APPLICABILITY</b>	<b>RESEARCH AREA</b>
85	Platform technology	MPS	ARP 05 CTA
	<b>PROJECT TITLE</b>	<b>PROJECT START DATE</b>	<b>PROJECT FINISH DATE</b>
	Structural integrity and engine lifing.	March 2002	February 2005
	<b>RESEARCH THEME</b>	<b>IPT APPLICABILITY</b>	<b>RESEARCH AREA</b>
86	Power systems	MLS	ARP 06 CSS
	<b>PROJECT TITLE</b>	<b>PROJECT START DATE</b>	<b>PROJECT FINISH DATE</b>
	Powertrain and wheels.	April 2002	April 2003
	<b>RESEARCH THEME</b>	<b>IPT APPLICABILITY</b>	<b>RESEARCH AREA</b>
87	Automation and management	MLS	CRP
	<b>PROJECT TITLE</b>	<b>PROJECT START DATE</b>	<b>PROJECT FINISH DATE</b>
	Built for life electronics concept assessment and development.	April 2002	April 2005
	<b>RESEARCH THEME</b>	<b>IPT APPLICABILITY</b>	<b>RESEARCH AREA</b>
88	Power systems	MLS	CRP
	<b>PROJECT TITLE</b>	<b>PROJECT START DATE</b>	<b>PROJECT FINISH DATE</b>
	Silicon carbide electronics for high temperature power.	April 2002	June 2005
	<b>RESEARCH THEME</b>	<b>IPT APPLICABILITY</b>	<b>RESEARCH AREA</b>
89	Power systems	MLS	CRP
	<b>PROJECT TITLE</b>	<b>PROJECT START DATE</b>	<b>PROJECT FINISH DATE</b>
	Radiation effects in COTS microelectronics.	April 2002	April 2005
	<b>RESEARCH THEME</b>	<b>IPT APPLICABILITY</b>	<b>RESEARCH AREA</b>
90	Platform technology	General	CRP
	<b>PROJECT TITLE</b>	<b>PROJECT START DATE</b>	<b>PROJECT FINISH DATE</b>
	Novel sandwich structures.	July 2003	February 2006

ITEM NO	RESEARCH THEME	IPT APPLICABILITY	RESEARCH AREA
91	Platform technology	General	CRP
	<b>PROJECT TITLE</b>	<b>PROJECT START DATE</b>	<b>PROJECT FINISH DATE</b>
	Unconventional control of marine fouling.	May 2002	April 2005
	<b>RESEARCH THEME</b>	<b>IPT APPLICABILITY</b>	<b>RESEARCH AREA</b>
92	Automation and Management	MLS	CRP
	<b>PROJECT TITLE</b>	<b>PROJECT START DATE</b>	<b>PROJECT FINISH DATE</b>
	Building trust in military command and information systems.	April 2002	October 2004
	<b>RESEARCH THEME</b>	<b>IPT APPLICABILITY</b>	<b>RESEARCH AREA</b>
93	Propulsion	MPS	CRP
	<b>PROJECT TITLE</b>	<b>PROJECT START DATE</b>	<b>PROJECT FINISH DATE</b>
	Gas turbine core reconfiguration for constant volume combustion.	April 2002	November 2003
	<b>RESEARCH THEME</b>	<b>IPT APPLICABILITY</b>	<b>RESEARCH AREA</b>
94	Propulsion	MPS	CRP
	<b>PROJECT TITLE</b>	<b>PROJECT START DATE</b>	<b>PROJECT FINISH DATE</b>
	Very highly loaded gas turbine compressors.	April 2002	July 2005
	<b>RESEARCH THEME</b>	<b>IPT APPLICABILITY</b>	<b>RESEARCH AREA</b>
95	Health and Environment	General	CRP
	<b>PROJECT TITLE</b>	<b>PROJECT START DATE</b>	<b>PROJECT FINISH DATE</b>
	Disposal and recycling of polymer composites.	May 2002	April 2005
	<b>RESEARCH THEME</b>	<b>IPT APPLICABILITY</b>	<b>RESEARCH AREA</b>
96	Platform technology	General	CRP
	<b>PROJECT TITLE</b>	<b>PROJECT START DATE</b>	<b>PROJECT FINISH DATE</b>
	Structural design for reliability.	April 2002	April 2005
	<b>RESEARCH THEME</b>	<b>IPT APPLICABILITY</b>	<b>RESEARCH AREA</b>
97	Platform technology	General	CRP
	<b>PROJECT TITLE</b>	<b>PROJECT START DATE</b>	<b>PROJECT FINISH DATE</b>
	An expert system for moisture uptake prediction and degradation effects in composite materials and structures.	April 2002	December 2005
	<b>RESEARCH THEME</b>	<b>IPT APPLICABILITY</b>	<b>RESEARCH AREA</b>
98	Platform technology	General	CRP
	<b>PROJECT TITLE</b>	<b>PROJECT START DATE</b>	<b>PROJECT FINISH DATE</b>
	Graded compliant coatings for drag reduction.	April 2002	April 2005