

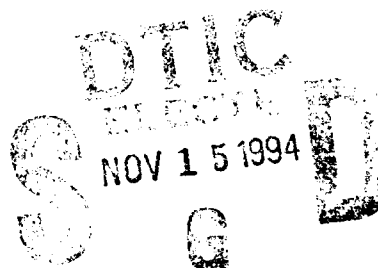


The New Age of Scientific Partnerships: Acoustic Capabilities and Facilities at NUWC Division, Newport -- Surface ASW Directorate Outlook

**Presented at the 127th Meeting of the
Acoustical Society of America, 6-10 June 1994,
Cambridge, Massachusetts**

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Joseph M. Monti
ASW Systems Department**

**David G. Browning
Environmental and Tactical Support Systems Department**



94-35050



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**Naval Undersea Warfare Center Division
Newport, Rhode Island**

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PREFACE

The work described in this document was performed in support of two efforts: the Shallow Water Active Classification Project and the Surface ASW Directorate Plans and Analysis Initiative. The Shallow Water Active Classification Project is part of the Submarine/Surface Ship USW Surveillance Block Program sponsored by the Technology Directorate of the Office of Naval Research (ONR); Program Element 602314N, ONR Block Program UN3B, Project No. RJ14B85, NUWC Division Newport Job Order No. B64600; Principal Investigator Joseph M. Monti (Code 33A), Program Director G. C. Connolly (Code 2192). The ONR Associate Director, Undersea Surveillance Division is T. G. Goldsberry (ONR-4510). The Plans and Analysis Initiative is part of the Surface ASW Directorate NUWC Division Newport Detachment New London under Job Order No. 630K12; Principal Investigator/Program Manager Peter D. Herstein (Code 304).

Reviewed and Approved: 29 September 1994



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NUWC DIVISION NEWPORT

THE NEW AGE OF SCIENTIFIC PARTNERSHIPS: ACOUSTIC CAPABILITIES AND FACILITIES AT NUWC SURFACE ASW DIRECTORATE OUTLOOK

PRESENTED TO THE 127TH MEETING OF
THE ACOUSTICAL SOCIETY OF AMERICA

7 JUNE 1994



PETER D. HERSTEIN (PRESENTER)

JOSEPH M. MONTI

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NAVAL UNDERSEA WARFARE CENTER, DIV NEWPORT, DET NEW LONDON

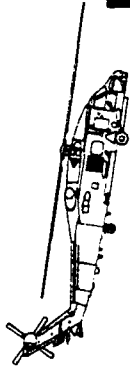
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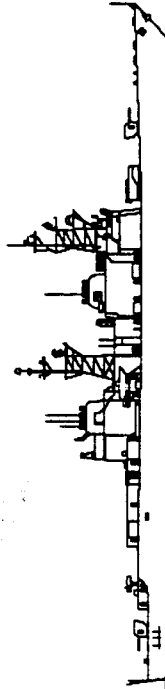
NEW WORLD ORDER

HOW CAN WE JOIN TOGETHER IN NEW ENDEAVORS?
HOW CAN WE JOIN TOGETHER IN NEW ENDEAVORS?
HOW CAN WE JOIN TOGETHER IN NEW ENDEAVORS?

HOW CAN WE JOIN TOGETHER IN NEW ENDEAVORS?



SURFACE ASW DIRECTORATE PROGRAMS



COMBAT/SONAR SYSTEMS	SUPPORTING PROGRAMS	SELF-DEFENSE
• AN/SQQ-89(V) ASW SYSTEM - AN/SQS-53 B,C - AN/SQR-19 - AN/SQQ-28 - AN/UUQ-25 - AN/SQQ-89 ON BOARD TRAINER • AN/SQS-53A EC-16 • AN/SQR-18A(V)3 TOWED ARRAY MULTI-STATIC RECEIVER • SHALLOW WATER ACTIVE TESTBED (SWAT) • LIGHTWEIGHT BROADBAND VARIABLE DEPTH SONAR (LBVDS) • AN/SQR-19 TOWED ACTIVE RECEIVER SYSTEM (TARS)	• SURFACE ASW ADVANCED DEVELOPMENT (SASWAD) • 6.2 SHALLOW WATER ACTIVE ACOUSTICS, ACTIVE CLASS, AND DATA FUSION • TACTICAL ASW INTEGRATED TRAINER (TASWIT) • COMBATANT DATA COLLECTION (CDC) • AN/UUQ-65 DISPLAY STATION • FULL SPECTRUM PROCESSING-MAC DSP • SPP-ADM (SENSOR PERFORMANCE PREDICTION - ADVANCED DEVELOPMENT MODEL)	• KINGFISHER • NATIONAL SURFACE SHIP TORPEDO DEFENSE (SSTD) • US/UK JOINT SSTD • TORPEDO COUNTERMEASURES (NIXIE, ATT, LEAD) • AN/SQQ-89 TORPEDO RECOGNITION PROCESSOR (TRP)

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NUWC SURFACE ASW DIRECTORATE: SUPPORTING U.S. NAVY SURFACE COMBATANT USW SYSTEMS WORLDWIDE



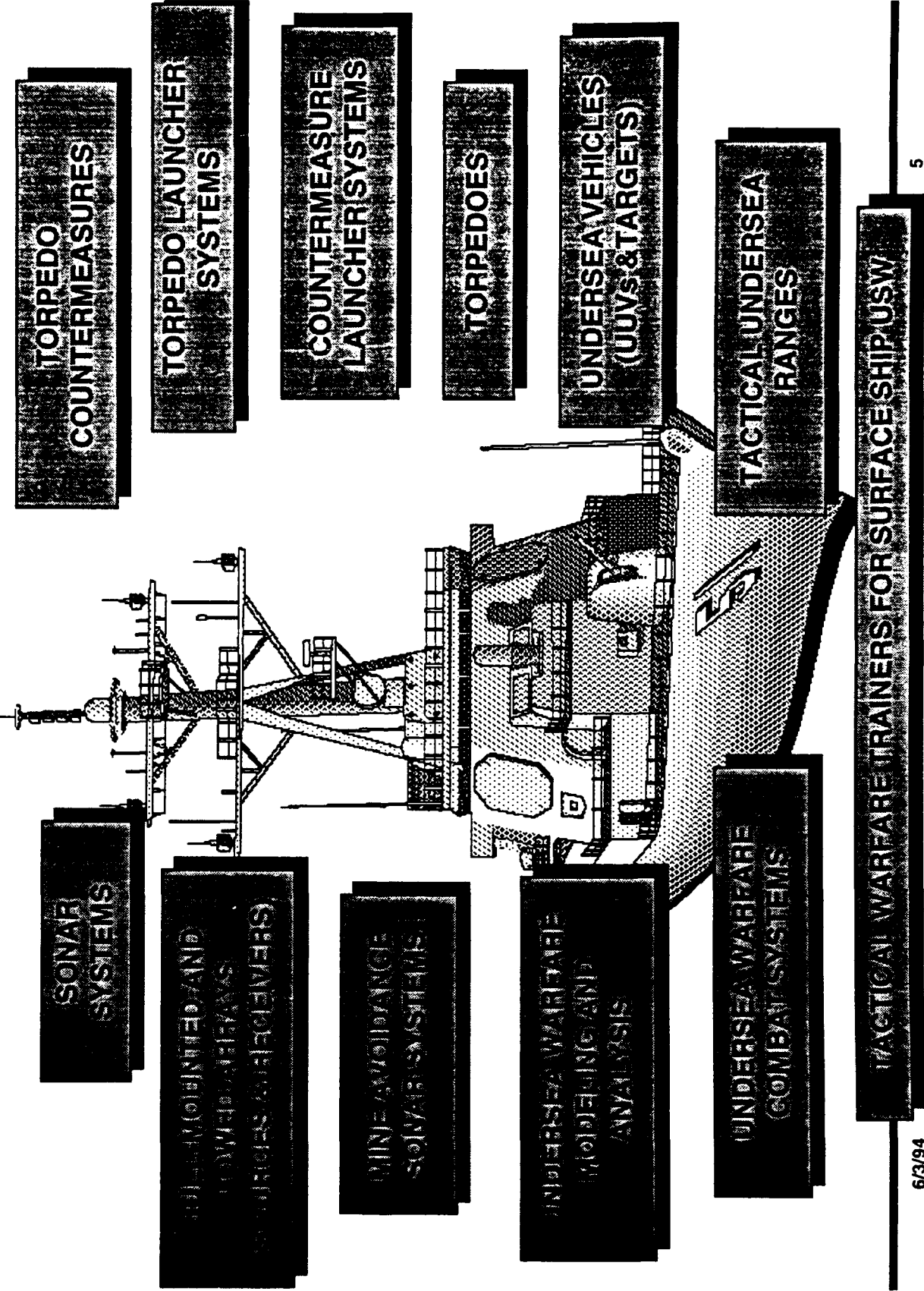
**SUPPORT NAVY MOBILE
OPERATIONS WORLDWIDE**

**PARTICIPATE IN TECHNICAL
EXCHANGES WITH ALLIES**

**DEVELOP NEW AND MODIFY
EXISTING SONAR CONCEPTS
TO MEET CHANGING WORLD
ENVIRONMENT**

NUWC DIVISION NEWPORT

NUWC SURFACE SHIP LEADERSHIP AREAS



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TECHNICAL COMPETENCIES OF THE SURFACE ASW DIRECTORATE

SPHERE OF INTEREST EXPERTISE IN:

ENVIRONMENTAL ACoustics

HYDROACOUSTICS

HYDROGRAPHIC SURVEILLANCE

HYDROGRAPHIC MEASUREMENTS

HYDROGRAPHIC TECHNOLOGY AND ENGINEERING

SINCE 1 JUNE 1990:

OVER 105 ARTICLES PUBLISHED
IN REFERRED JOURNALS

OVER 35 PUBLISHED AUTHORS

30 PhD's

103 MASTERS DEGREES

TECHNICAL COMPETENCIES APPLIED FOR SINCE 1990:

ENVIRONMENTAL ACoustics PROBE/PULSE

TECHNIQUE

COLLETTA

HYDROGRAPHIC SURVEILLANCE CABLE

SEAMAN ET AL.

HYDROGRAPHIC SURVEILLANCE SYSTEM

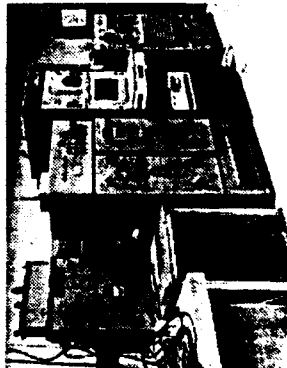
RUFFA

HYDROGRAPHIC MEANS FOR ISOLATING

EQUIPMENT FROM SHOCK LOADS

RYDBERG

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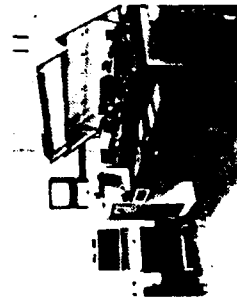
SURFACE SHIP TORPEDO DEFENSE

- US/UK AND NATIONAL PROGRAMS
- DETECTION/CLASSIFICATION/LOCALIZATION
- THREAT EVALUATION



SONAR DEVELOPMENT & EVALUATION COMPLEX

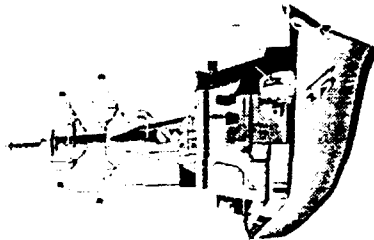
- SIGNAL AND DATA PROCESSING
- OPERABILITY
- ACOUSTIC DATA FUSION



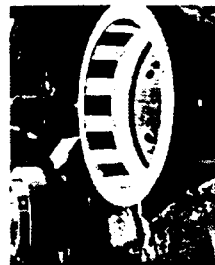
SONAR ARRAY MICROELECTRONICS

SURFACE SHIP SONAR FACILITIES RESEARCH & DEVELOPMENT PERFORMANCE CHARACTERIZATION IN-SERVICE SUPPORT

OUR CUSTOMER:
THE SURFACE COMBATANT NAVY



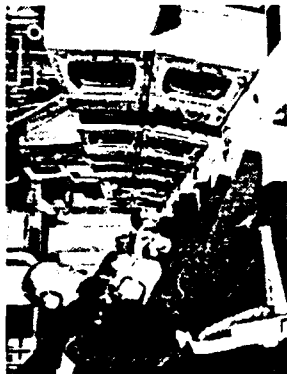
RELATED SUPPORT FACILITIES



ENVIRONMENTAL TEST

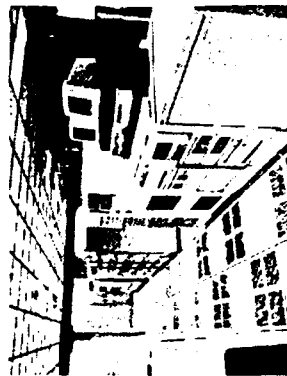


TOWED ARRAY COMPLEX



SQQ-89 LAND BASED INTEGRATED TEST SITE

- SOFTWARE LIFE CYCLE SUPPORT
- PRODUCT IMPROVEMENT
- FLEET PROBLEM RESOLUTION AND TRAINING



TACTICAL SONAR MEASUREMENTS & ANALYSIS

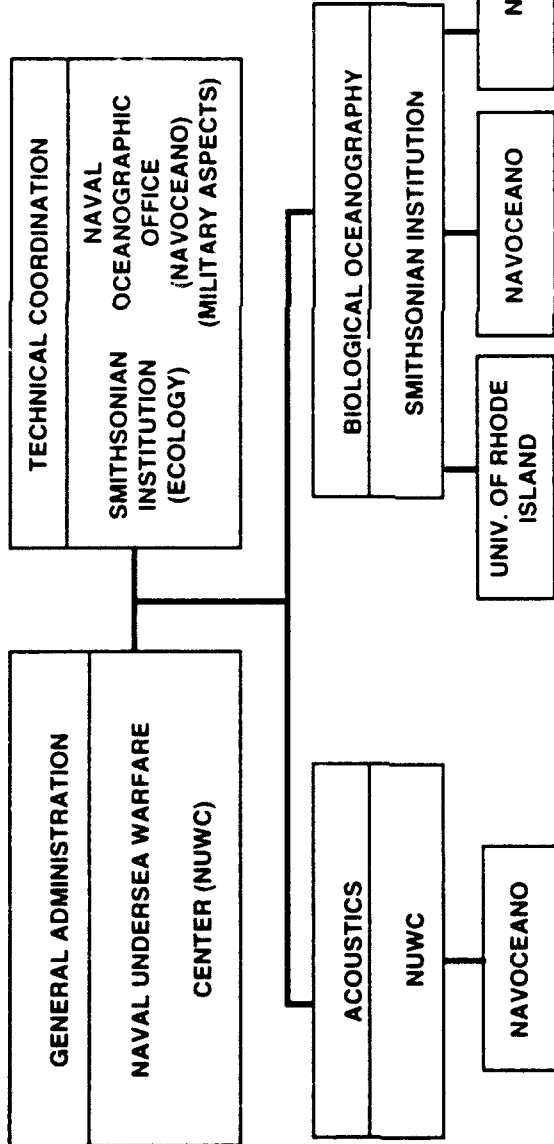
- UNDERWATER ACOUSTICS MODELING AND SIMULATION
- SONAR PERFORMANCE MODELING AND SIMULATION
- TACTICAL EXERCISE RECONSTRUCTION AND ANALYSIS



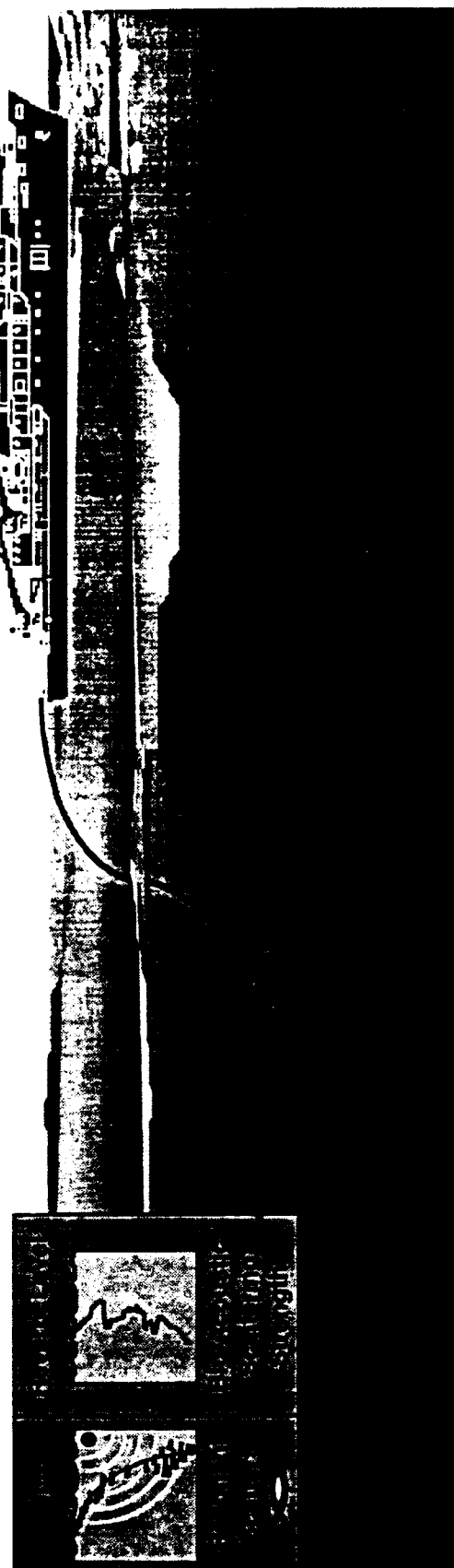
PIER 7

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NUWC HAS A LONG HISTORY OF COOPERATION WITH THE
NON-MILITARY RESEARCH COMMUNITY



**EXAMPLE:
OCEAN ACRE
1967-1978**

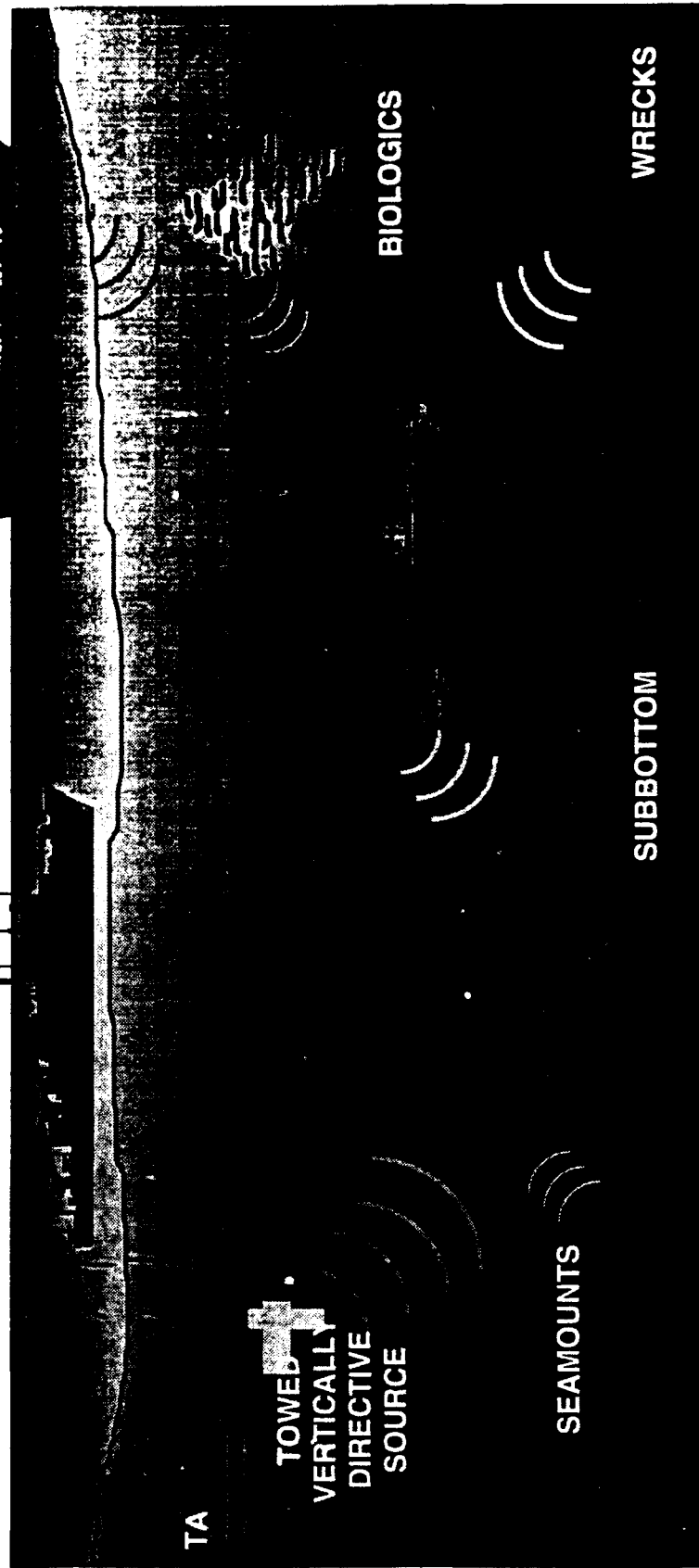


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SWACI
SEATRIAL

MERCHANT

RV ALLIANCE



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INDUSTRY IR&D TRANSITIONED TO NAVY PROGRAMS: ADAPTIVE CLUTTER FILTER (ACF) TECHNOLOGY EXAMPLE

1987-88
(IEIR&D)

- DEVELOPED ADAPTIVE CLUTTER SUPPRESSION FILTER TECHNOLOGY FOR AN INFRARED SENSOR APPLICATION

1989-90
(IEIR&D/NAEP)

- ENHANCED AND COMPREHENSIVELY EVALUATED ADAPTIVE CLUTTER FILTER TECHNOLOGY

1990-91
(IEIR&D)

- TRANSITIONED AND MODIFIED ACF TECHNOLOGY FOR ASW DETECTION AND CLASSIFICATION APPLICATION

1992
(NUWC 62)

- REFINED AND EVALUATED ACF TECHNOLOGY WITH USS STUMP SCS-53C SHALLOW WATER SONAR DATA

1994-95
(NUWC 62)

- INTRODUCED AN ENVIRONMENTAL TARGET ESTIMATION MODEL INTO THE ACF DESIGN AND DEMONSTRATED PERFORMANCE WITH HEAVY CLUTTER, IN SHALLOW WATER

1994-95
(NUWC 62)

- ENHANCE TARGET ESTIMATION MODEL AND COMPREHENSIVELY EVALUATE ACF PERFORMANCE DEVELOP AND DEMONSTRATE ACF EXTENSIONS

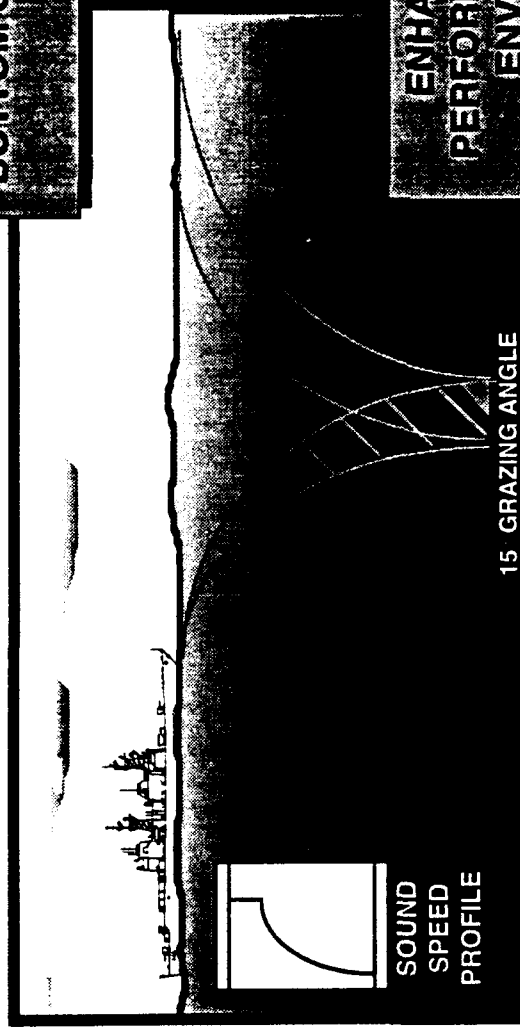
TECHNOLOGY RELEVANCY ACTIVE CLUTTER FILTER EXAMPLE

- ALL DATA IN RED
 - IDENTIFICATION OF
 - EXERCISES, VESSELS, AND
 - EXERCISE SUBELEMENTS

- COMMERCIAL/ACADEMIC APPLICATIONS
 - BIO MASS ESTIMATION
 - BATHYMETRIC FEATURE MAPPING
 - WARNING FOR HAZARDS TO NAVIGATION

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COMBATANT DATA COLLECTION
DEMONSTRATION (CDC)
BOTTOM SCATTER AND BOTTOM LOSS IN
SHALLOW WATER

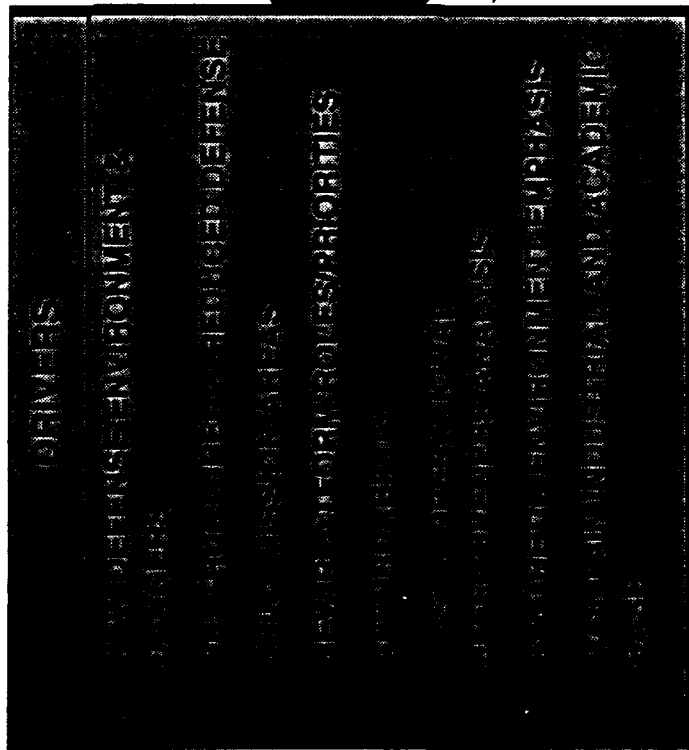


ENHANCED SENSOR/PLATFORM
PERFORMANCE BY REAL TIME IN SITU
ENVIRONMENTAL/ACOUSTICS
MEASUREMENTS AND MODELING

- SONAR PERFORMANCE VARIABILITY ASSOCIATED WITH SHALLOW WATER
REQUIRES UNDERWATER ACOUSTIC IN SITU DATA COLLECTIONS FOR REALISTIC
PERFORMANCE PREDICTIONS
- COMPONENTS
 - ENVIRONMENTAL MONITORS
 - HIGH FIDELITY AND HIGH SPEED ACOUSTIC MODELS
 - USE OF "PROBE PULSES"
 - DIGITAL RECORDERS
 - HIGH SPEED PROCESSORS
 - RAPID PARAMETRIC EXTRACTION AND PERFORMANCE ASSESSMENTS
 - DISPLAY ENHANCEMENTS

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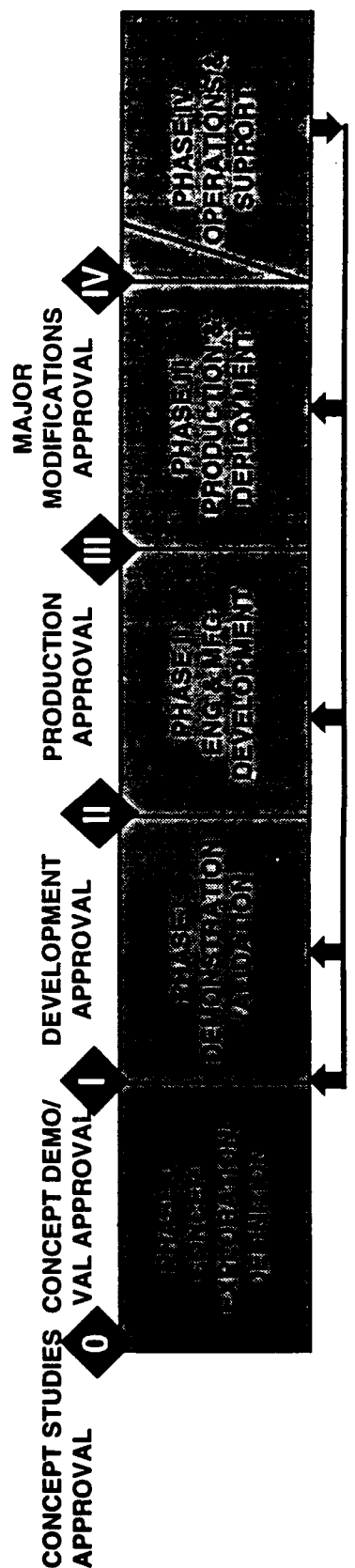
NUWC PROVIDES "CRADLE TO GRAVE" SMART BUYER FUNCTIONS



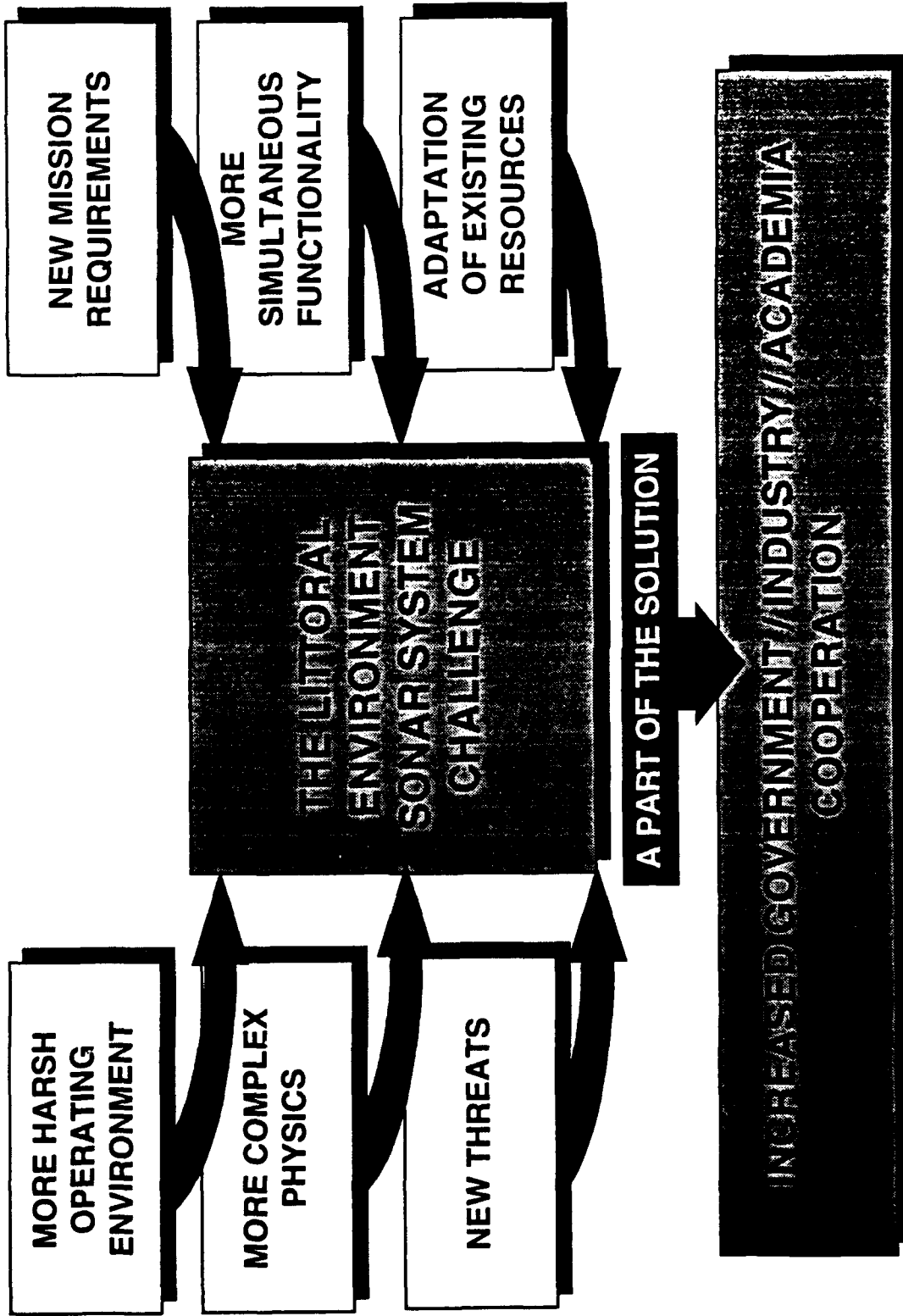
SCIENCE & TECHNOLOGY
WARFARE ANALYSIS
ADVANCED DEVELOPMENT
SYSTEMS ENGINEERING



ACQUISITION PHASES & MILESTONES



WHY WE MUST WORK TOGETHER



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**LIGHTWEIGHT BROADBAND
VARIABLE DEPTH SONAR (LBVDS)
A JOINT MARTIN MARIETTA/NUWC
ATD PROGRAM**

THESE TECHNICAL CHALLENGES
REQUIRE THE ADVANTAGE OF
THE LATEST TECHNOLOGY IN ACTIVE
SONAR. A NEW, MORE ADVANCED,
ENERGY DENSE SONAR IS BEING
DESIGNED AND DEVELOPED FOR
THE LBVDS. THE SONAR IS
DESIGNED TO BE A LOW PROFILE,
EASY TO INSTALL, AND EASY TO
OPERATE. THE SONAR IS
DESIGNED TO BE A LOW PROFILE,
EASY TO INSTALL, AND EASY TO
OPERATE.



- LBVDS CAPITALIZES ON RECENT SYNERGISTIC INDUSTRY-NAVY TECHNOLOGY BREAKTHROUGHS TO DEMONSTRATE A NEW SONAR SYSTEM BY COMBINING AND APPLYING NEW TECHNOLOGIES IN:
 - BROADBAND SIGNAL GENERATION AND PROCESSING
 - ENERGY DENSE TRANSDUCER MATERIALS
 - SPARSE RECEIVER LINE ARRAYS

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SUMMARY

- CHANGING NATIONAL AND WORLD PRIORITIES HAVE INCREASED THE NEED FOR CREATIVE AND EFFICIENT JOINT ENDEAVORS BETWEEN NAVAL RDT&E CENTERS, INDUSTRY, AND ACADEMIA
- THE SURFACE ASW DIRECTORATE SUPPORTS THE U.S. NAVY FROM "CRADLE TO GRAVE" IN ALL ASPECTS OF SURFACE SHIP SONARS AND THEIR INTEGRATION AS COMBAT SYSTEM ELEMENTS
- THE DIRECTORATE HAS A HISTORY OF ENCOURAGING MUTUAL EFFORTS AND WE ESPECIALLY WELCOME THEM NOW

FOR FURTHER INFORMATION CONTACT:

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