nmiotc
journal

MARITIME INTERDICTION OPERATIONS

NMIOTC/ΚΕΝΑΠ

ALLIED COMMAND TRANSFORMATION

PIRACY in the HoA & WIEDs

WMD in MIO Experimentation

UAVs in MIO - "Vellerofontis"

Regional Capacity Building

NMIOTC's Training Opportunities & Activities

CONTENTS

COMMANDANT'S OVERVIEW

C by Commodore Athanasios Makris H.N.

NMIOTC

NATO Maritime Interdiction Operational Training Center (NMIOTC), a NATO Education and Training Facility, which is located in Souda Bay, Marathi, is running successfully its second year of operation. Contributing to ACTs' (Allied Command Transformation) training and transformational efforts ,our Center is committed, on a daily basis, to provide to NATO/ PfP/MD/ICI and NATO approved third party countries iaw procedures in place, the best possible training product in MIO, in order to better prepare personnel in the field to conduct their operational missions with absolute success.

NMIOTC was accredited from ACT and acquired its full operational capability in 2 April 2008. The mission of NMIOTC is to conduct the combined training necessary for NATO forces to better execute surface, sub-surface, aerial surveillance, and special operations activities in support of Maritime Interdiction Operations and the vision of it is to become the Alliance's recognized expert in the field of MIO Training.

The NMIOTC fulfills specifically the following roles:

 • Improve Allied Units' MIO Expertise through specific training programs
 • Promote Skills, Interoperability & Co-operation among Naval Units through sea training & simulation
 • Based on lessons learned from its MIO training activities, the NMIOTC contribute support to ACT in MIO Tactical Doctrines, training directives and manuals, as well as research, modeling & simulation in support of MIO for the Alliace.

NMIOTC possesses the status of an International Military Organization and it is 100% funded from the Hellenic Government. All operational and maintenance costs are covered by host nation, however the training tasks and products required for NATO and Partner Forces are being assigned mainly by SACT which is the one to accredit also training deliverables.

NMIOTC Personnel

NMIOTC's instructors are specialized in the theoretical and practical MIO field. A number of high academic background and well trained officers and civilians (in master and Ph.D. level) have been assigned to NMIOTC in order to deliver the theoretical courses to the students. All NMIOTC instructors have also been participated in real MIO operations and due to this asset they are transferring their operational knowledge to classroom and to trainees accordingly.

On the other hand, a fairly big group of experianced Hellenic Navy Seals are conducting all the practical MIO courses. These highly specialized instructors are delivering all practical MIO courses under the notion of proficiency and excellency, taking into account that MIO is in the foreground of NATO operations (e.g. Operation Active Endeavor, Operation Ocean Shield etc). Additionally, NMIOTC is manned with international specialized personnel in other MIO subjectal areas such as WMD, Simulation and Exercise Planning and Transformation.

NMIOTC after two years of operation and by using its state of the art training resources, has made significant progress and acquired its reputation among NATO - IOs and other international institutions, as the specialized NATO MIO Training Centre which provides training that adds value to Education and Training in the context of current and potential future operational needs.

NMIOTC 2010 Training Activities

In the last two years NMIOTC has trained almost 1400 students coming from 41 different countries. The number of trainees has been increased this last year by a percentage of 1200 %, giving NMIOTC the credibility that its training resources and its deliverables are well welcomed from trainees. It is not an exaggeration to say that every week NMIOTC trains a different group of trainees, coming usually from completely different training environment. To the aforementioned pretty tough training schedule, one must not forget to add all the other activities and events that are taking place in NMIOTC throughout the year, such as Conferences, Seminars, Workshops, Experimentation and Simulation opportunities and many more.

NMIOTC is dedicated to provide first class training in the area of Maritime Interdiction Operations struggling to enhance trainee's knowledge and education to an absolute level, in order to meet the criteria that ACT and NATO generally has set for its personnel. More over, with the provision of the afore mentioned training we shall continue to contribute to the endeavor

NMIOTC Annual Conference, 28 June - 01 July 2010

to built the partnerships , enhance the interoperability, promote understanding and trust , necessary elements for regional security.

NMIOTC Vision

Our vision is to become the Alliance's recognized expert, in the field of Maritime Interdiction Operations training. Based on the progress that has been achieved and current dynamics, the future for NMIOTC seems bright. Cooperation with NATO and non NATO Educational and Operational Facilities as well as Centres of Excellences globally, is a critical factor in order to enhance our expertise and broaden our views to what trainees are expecting.

Updating our training with new courses and resources, the need of which comes directly from the operation areas, is a common goal for all NMIOTC personnel. This can be done either with close cooperation with Operational Commands or by contact with Standing NATO Maritime Groups-Forces.

Finally, it is worth mentioning that in our vision and priorities pie, NMIOTC MIO Journal possesses a good portion of it. The NMIOTC MIO Journal, the first Journal in MIO subject area, will continue to be edited on a semi-annual basis, bringing academia and operational factors all together to be met in a scientific publication. It is our inevitable goal to attract the interest of all personnel in order to contribute their ideas, conceptual models and innovative minds to express their opinions and make them well known through a periodical that now starts to outshine globally and more importantly among NATO communities.

Taking into account that NMIOTC is situated in a strategic geographic position,in the crossroads of a major maritime "high way", the hole crew and I are devoted to provide just in time operational training at the tactical unit as well as individual level, to standards that have been set from ACT and are internationally recognized and accepted. We find ourshelves in a period that a wind of change in NATO is blowing and we have to adapt continously and thus, all available capabilities and resources of NMIOTC must be fully exploited. All of us here in NMIOTC have continuously in our minds what Ploutarchos, the Greek Ancient Philosopher, said: "Training is a treasure which is being doubled when you share it with another one".

Commodore Athanasios Makris HN,graduated from the Hellenic Naval Academy with the rank of Ensign in 1981. During his career he has been appointed on board surface ships and submarines. He has commanded HS PONTOS(S119) and HS NAVARINON(F-461). Commodore A. Makris main appointments include Aide De Camp to the Chief Of Defense, Commander Submarines South- COMSUBSOUTH Naples Italy, as Operations Officer, COS Hellenic Submarine Command, Plans & Policy Director in HNGS andDeputy MILREP in NATO MILITARY COMMITTEE (NAMILCOM). Since April 2010 Commodore A.Makris HN is the NMIOTC Commadant.

Besides his naval education, Commodore A. Makris is Undergraduate of Piraeus University in Operational and Administrative department. Additionally, he has attended a number of educational programmes, including Naval War College, National Defense College, NATO Defense College, NATO School Oberammergau, HARVARD Executive Programme in Black Sea Security.

Commodore A. Makris awards include the Knight Gold Cross Of The Order Of Honor, the Gold Cross of the Phoenix, the Medal of Military Merit B' Class, the Navy Force Meritorious Command Medal, Staff Officer Service Commendation Medal, the NATO Medal for service with NATO on Operations in Relation to KOSOVO and the NATO Medal on Operations in relation to the Former Yugoslavia.

V.I.P VISITS IN NMIOTC

*Visit of the
Chief of Hellenic National Defence General Staff,
21 May 2010*

*Visit of the
Chief of the Hellenic Navy
28 July 2010*

*Visit of Commandant
US Navy Expeditionary Combat Command
17 September 2010*

*Visit of DCOM HQ MC NAPLES
07 July 2010*

*Visit of COMSIXTHFLEET
26 August 2010*

*Visit of
British Defence Attache
09 Sept. 2010*

*Visit of COM SNMG2
25 June 2010*

CONFERENCES - WORKSHOPS AND COURSES

NMIOTC Annual Conference
28 June - 01 july 2010

Training of SNMG1 Personnel
26 July 2010

MACA conference
15 - 17 June 2010

WMD in MIO course
21 - 25 June 2010

ATP - 71 Workshop
07 - 09 September 2010

Maritime Operational Terminology Course
20 September - 08 October 2010

MIO EXPERIMENT AT NMIOTC

NETWORKING AND COLLABORATION ON SMALL CRAFT MARITIME-SOURCED NUCLEAR RADIOLOGICAL THREAT DETECTION AND INTERDICTION ©

by   **Dr. Alex Bordetsky,** *Principal Investigator for MIO Experimentation, NPS, USA*

& Lt Georgios Mantzouris, *Ph.D. Candidate, Experimentation Lead, NMIOTC, Greece*

1. BACKGROUND AND OBJECTIVES

The MIO 10-2 experiment, is a part of unique field experimentation campaign, initiated by the Naval Postgraduate School (NPS) jointly with Lawrence Livermore National Laboratory (LLNL), and conducted semi-annually since 2005 (Bordetsky and Netzer, 2010). The project recently became a critical part of the Global Initiative for Combating Nuclear Terrorism , spearheaded by DHS Domestic Nuclear Detection Office (DNDO) and Defense Threat Reduction Agency. It is a collaborative effort supported by USSOCOM, USCG, first responders in SF Bay Area, Port Authority NY-NJ, LMCO Center for Innovation (East Coast), AATC in Ft. Eustis (East Coast), ARDEC, and overseas partners from Swedish Naval Warfare Center, Swedish Defense Research Agency (FOI) and Viking 11 program, University of Bundeswehr , Bundeswehr Center for Transformation/German NSW unit, and NATO Maritime Interdiction Training Center in Souda Bay, Greece (NMIOTC).

The overseas part of MIO 10-2 experiment conducted jointly with NMIOTC in June of 2010 represented next step in the collective field studies of integrating networks, advanced sensors, unmanned vehicles, and collaborative technology for supporting integrated detection and interagency collaboration to counter small craft sourced nuclear radiological threat. It is the next step in feasibility and constraints analysis experimentation for identifying:

− Ad hoc mobile networking architecture, which

Copyright (c) LyndseyMcCollam 1998
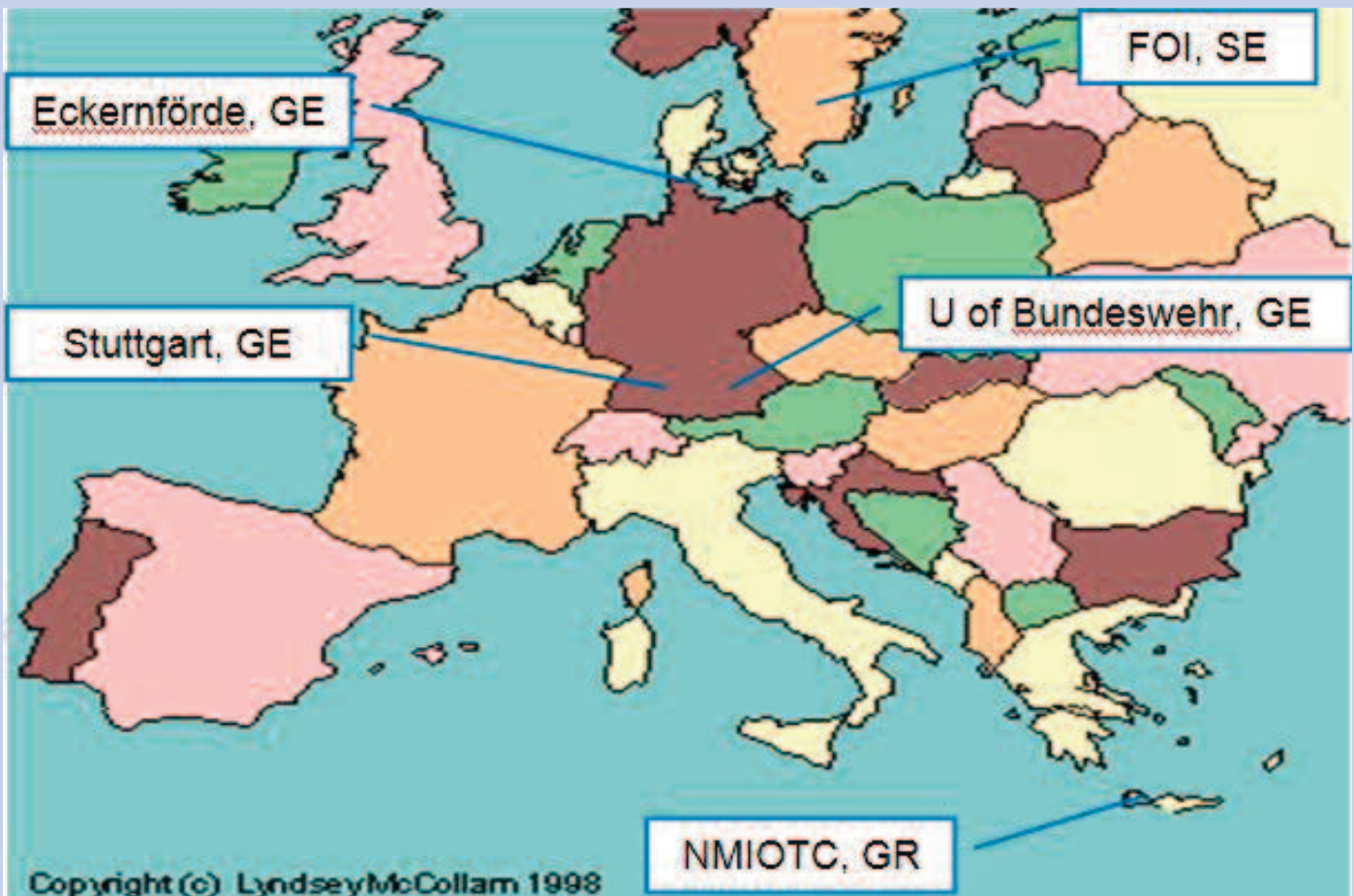
integrates **front line officers** using hand-held, portable, and unmanned system based detectors with geographically distributed experts and data fusion centers

– Information management architecture for sharing alerts on threats brought by small maritime craft or between land/ports of entry borders and translation of active and passive detection alerts into the shared situational awareness events

– The surveillance techniques enabling tagging the small craft carrying the illicit material, location and tracking of its global movement

– Operational constraints and search models for stand-off and drive detection at high-speed, in combination with remotely network-controlled unmanned surface, aerial, and ground systems

In the previous MIO 2007-2009 experiments our main focus was the network-enabled operational scenario, in which early detection/warning at different places overseas and subsequent tracking to the Port of Departure (POD), culminated in multiple small craft detection and interdiction at different Port of Entry (POE) sites within the CONUS. Based on it the goal for the MIO 10-2 experiment was to extend the operational horizon for small craft-sourced globally distributed threat countering, by the set of new models:

1.1. Integrated detection and interdiction of small craft-sourced nuclear radiological threats to some U.S. installations overseas. It included:

• Network-enabled swimmer detection of small craft-sourced threat at two overseas POE (Germany (GE), Greece (GR));

• Collaboration between U.S. experts and overseas POE operators on:
  - network-controlled choke point setup
  - drive-by primary and secondary screening
  - stand-off detection at high-speed pursuit (Eckernförde, GE)

• Modeling the application of Unmanned Surface Vehicles (USVs) to support small craft screening and pursuit (U.S. experts-POE operators) by remotely controlled maneuvering of the POE manned patrol boats (Eckernförde, GE);

• Ground tracking of illicit material transfer to U.S. military site, collaboration between U.S. unit in foreign country, foreign operations center (FOI-Sweden; University of Bundeswehr (UoB)), and U.S. remote experts, on losing, finding, and tagging the ground target, resolving the threat through source detection and adjudication (GE);

• Open water tracking of a source transfer to an overseas POE that is in proximity to a collocated NATO and U.S. installation site (Mediterranean, Souda Bay-GR);

• Collaboration between the patrol crews from different countries on the target small craft tracking, choke point screening, pursuit, and interdiction, combined with the situational awareness transfer and Unmanned Aerial Vehicle (UAV) integration (GR, Souda Bay).

The overseas part of MIO 10-2 experiment began with the overseas trials in Germany focused on studying major constraints associated with network-enabled detection and interdiction of a maritime-sourced nuclear/radiological threat to the U.S. and NATO installations in a foreign country. In terms of the DNDO Global Detection Architecture, the set of the trial steps in Germany explored several of the architecture's key elements (MIO 10-2 AAR, 2010):

• How networking with swimmers, sensor operators, patrol boat crews, and U.S. operators in the area, combined with an instantaneous reachback to the remote experts, could help to identify illicit material delivery to the foreign POE via the small craft,

• Enable tagging and tracking of its transfer on the ground in the direction of U.S. military base,

• Facilitate illicit material/device finding and interdiction on the approaches to target area.

Correspondingly, the set of trial steps at NMIOTC in Souda Bay (Fig. 2) extended the experiment with:

• Blue water tracking of illicit material delivery near a NATO / U.S. facility in the Mediterranean

• Collaboration among NATO MIO crews executing network-enabled choke point and target pursuit

• Integration of unmanned aerial vehicles to support choke point screening & target vessel pursuit

• Detecting illicit material and interdicting target small craft with coordination and shared situational awareness between the multinational crews assisting each other.

Phase II - Greece

Tag/Track small craft w/suspect material after transfer from ferry (GR)

Shared SA emong US, Intel partners, responders in field, reachback support - (global)

Shared manned/ unmanned sensor alerts

NATO teams aided by UAV, USV, eval & track small craft w/suspect materials at NATO base (GR)

Network & reachback-enabled boat crews conduct checkpoint, primary secondary standoff detection of small craft (GR)

Swimmers evaluate/tag small craft w/suspect materials IVO NATO base (GR)

Legend
SE = Sweden
GE = Germany
GR = Greece

Shared SA between checkpoints/ boarding parties

Peer-to-Peer, Info collaboration, via web portal

MIO SA, ISAS, IAC, DNDO, NATO MSS

Instantaneous Reachbeck to Expert Response Needs

Figure 2. *The elements of Layered Global Detection Architecture (DNDO) addressed with NMIOTC team in Greece (depicted by Steven Mullins)*

2. SMALL CRAFT DETECTION/ INTERDICTION WITH NATO CREWS AT NMIOTC

Based on the reporting materials, provided by the experiment participants: Steven Mullins (NPS), David Trombino (LLNL), Maj Michael Kutsor (NPS), Eugene Bourakov (NPS), Michael Clement (NPS), Bryan Hudgens (NPS), and Robert Forsgren (FOI, Sweden), the results of findings during the NMIOTC phase could be illustrated as follows.

2.1 Network-Enabled Swimmer model: Detecting the small craft with illicit material

In accordance with Steps 1-3 of the experiment plan (MIO 10-2 Experiment Plan, 2010), the joint team succeeded in integrating swimmers into the ad hoc mobile ship-to-ship/ship-to-shore mesh network, and cor-respondingly providing the swimmer video feeds on the suspicions object (potential source) to the remote. The NMIOTC patrol vessel served as the Mobile Operations Base (MOB) to find the small craft and identify threats to NATO base and nearby U.S. facility. The U.S./Hellenic swimmers, equipped with experimental

Figure 3. *Hellenic swimmers are putting US swimmer on the network.*

Figure 4. *The swimmer video feed on the suspicious device captured during the Romanian crew patrol shared and review with remote expert in US*
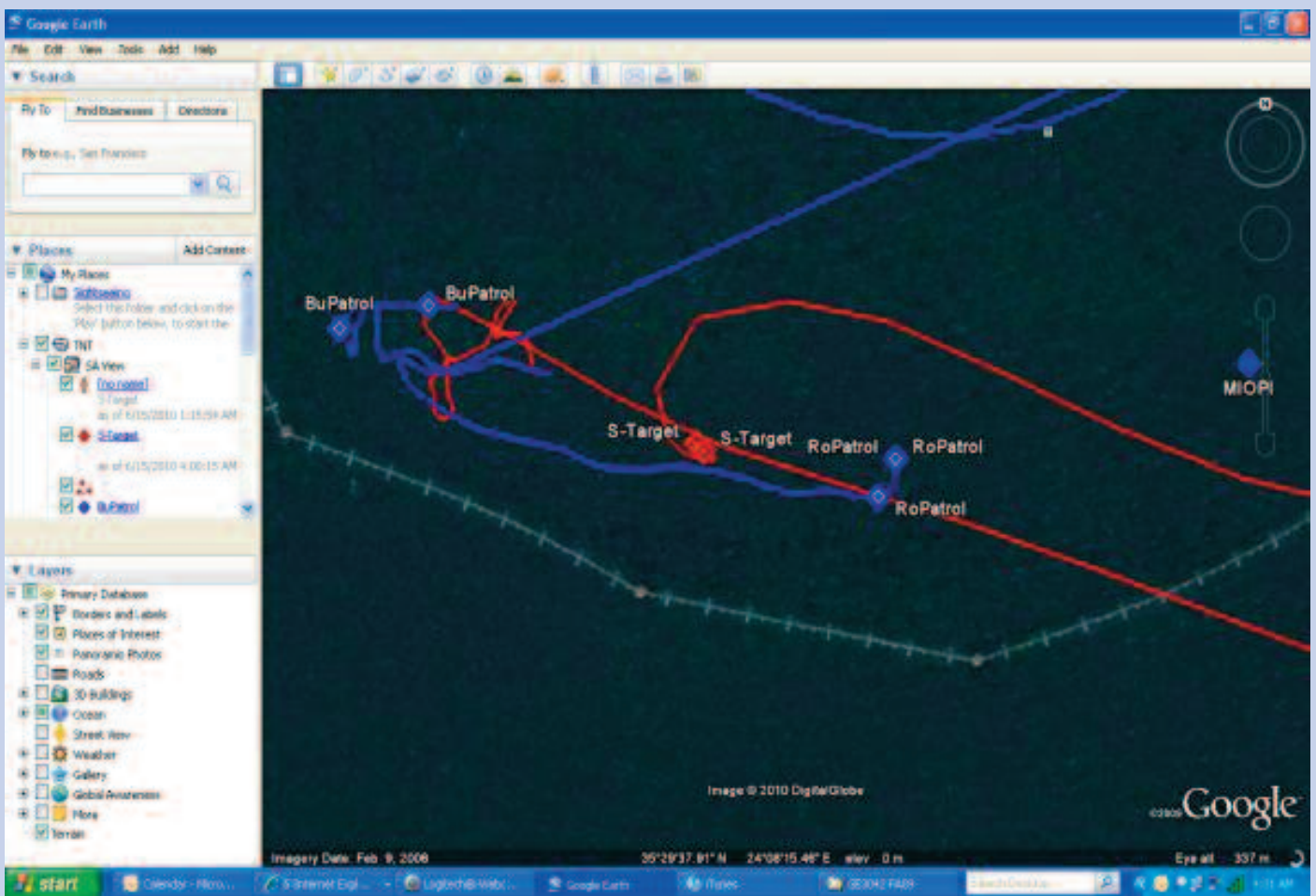
Figure 5. *The SA View on swimmer and NATO patrol crews dislocation (Ro-Romanian crew, Bu-Bulgarian crew)*

networking and video capability, were called to find and evaluate the lost target boat. Fig. 3 illustrates the final steps in putting the US swimmer on the network prior to searching the pier area. Swimmers provided video and verbal evaluation on the object. Info was transferred though the experiment collaborative environment to U.S. detection experts at the reachback location. Swimmer fed an underwater video stream, and his position was mapped to the SA view. The Czech officer at NMIOTC (simulated regional WMD reachback center) observed the video feed on suspicious object. Figure 4 illustrates successful sharing of swimmer video feed (unclear view in the low left frame in the picture) with the remote expert at NPS (role played by Bryan Hudgens in Monterey, CA-upper right frame in the picture) during the Romanian patrol (upper left frame in shared view). The dislocation of assets during the swimmer video feed sharing with expert is presented in the situational awareness view in Figure 5.

The joint experimentation team at NMIOTC has successfully simulated (step 4-8 of the experiment plan) the Regional Czech detection center calling to Global U.S. Expert Center (NPS-LLNL at NOC) assistance for evaluating the object (Figure 5). Upon completing evaluation, the Regional and U.S. experts decided that suspicious object resembled shielded illicit material and directed to maintain surveillance over the boat. The choke point (portal) drive-by screening was needed, so

a swimmer covertly tagged the boat and activated networking with the tag, received voice portal confirmation that small craft was persistently monitored, and returned to MOB.

2. 2 Small Craft Stand-off Detection On-the-Move by Self-Forming Mesh Networking Between the Patrol Boats .

In accordance with steps 11-16 of the experiment plan, the reachback experts recommended portal detection. Patrol boats from Romanian, Bulgarian, and Turkish sectors joined the operation. The U.S. sensor unit on site requested assistance from a Romanian boat team. Via the experiment collaborative environment, the Hellenic MOB crew and the Regional experts configured a choke point (portal) on-the-move. The MOB and patrol boats maintained separation at 100 ft, same direction (Fig. 6). The sensor alerted, but the Regional experts and the U.S. experts were jointly unable to make identification. Maintaining dialog with Regional experts, the Romanian patrol boat and MOB reduced the separation to 50' and then to 20' (Fig. 7), including changes in portal boat direction. The experts were still unable to identify the material. During these steps, the NPS – NMIOTC experiment control team in Souda Bay, the NPS NOC and FOI-SE all evaluated any discrepancies, gaps, delays, and uncertainties, associated with Regional Expert team's (Czech officer) ability to help the boat

Figure 6. Situational awareness view of recommended choke point initial setup (100 ft separation portal), conducted jointly by NMIOTC Hellenic, Bulgarian, and Romanian crews.
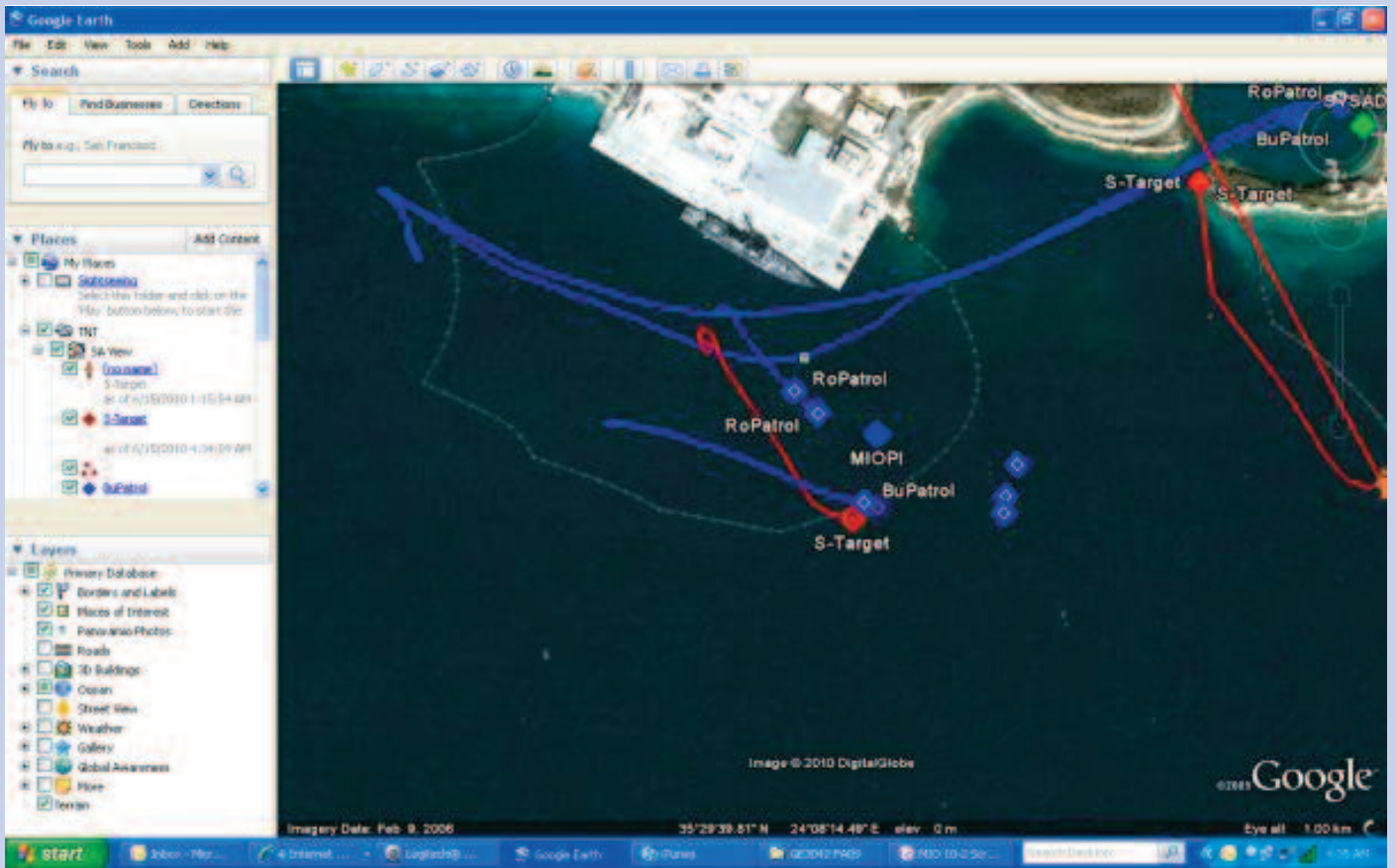
Figure 7. *Reducing separation to 50 ft, as recommended by experts*

Figure 8. *NMIOTC Romanian and Hellenic boats comprise mesh networking relays to assist Bulgarian sensor boat continuing non-LOS stand-off detection behind the island.*

crews remotely to configure and conduct the portal (choke point) detection. The crews provided video and voice recording of the process. The reachback center at NPS also applied the C2 Maturity Model to the analysis of collaboration between participants.

Based on detection results, lacking sufficient number of counts, the expert team recommended continuing following the target via stand-off detection (steps 17-19 of the experiment plan). The MOB needed help however, due to range limitations, so it requested assistance from Bulgarian crew to extend the network-

enabled reach to the (red) target boat. Hellenic and Romanian networked patrol boats comprised the peer-to-peer mesh between Bulgarian sensor vessel and TOC to maintain ubiquitous connectivity with experts. As Bulgarian patrol boat approached the target at about 100 ft, the MOB sensor operator issued a detection alert, but the Regional expert was still unable to identify the material. The expert team recommended continuing surveillance. Figure 8 illustrates that at this point the patrol boat with sensor is completely non-LOS behind the small island. Hellenic and Romanian boats provide the

Figure 9. *Putting detector and networking payload on board Unmanned Helicopter*
(left Lt.JG K.Karanagnostis H.N. right and LtCol D. Kotsifas HAF)

Figure 10. *An Unmanned Helicopter approaching rapidly the target for detection*
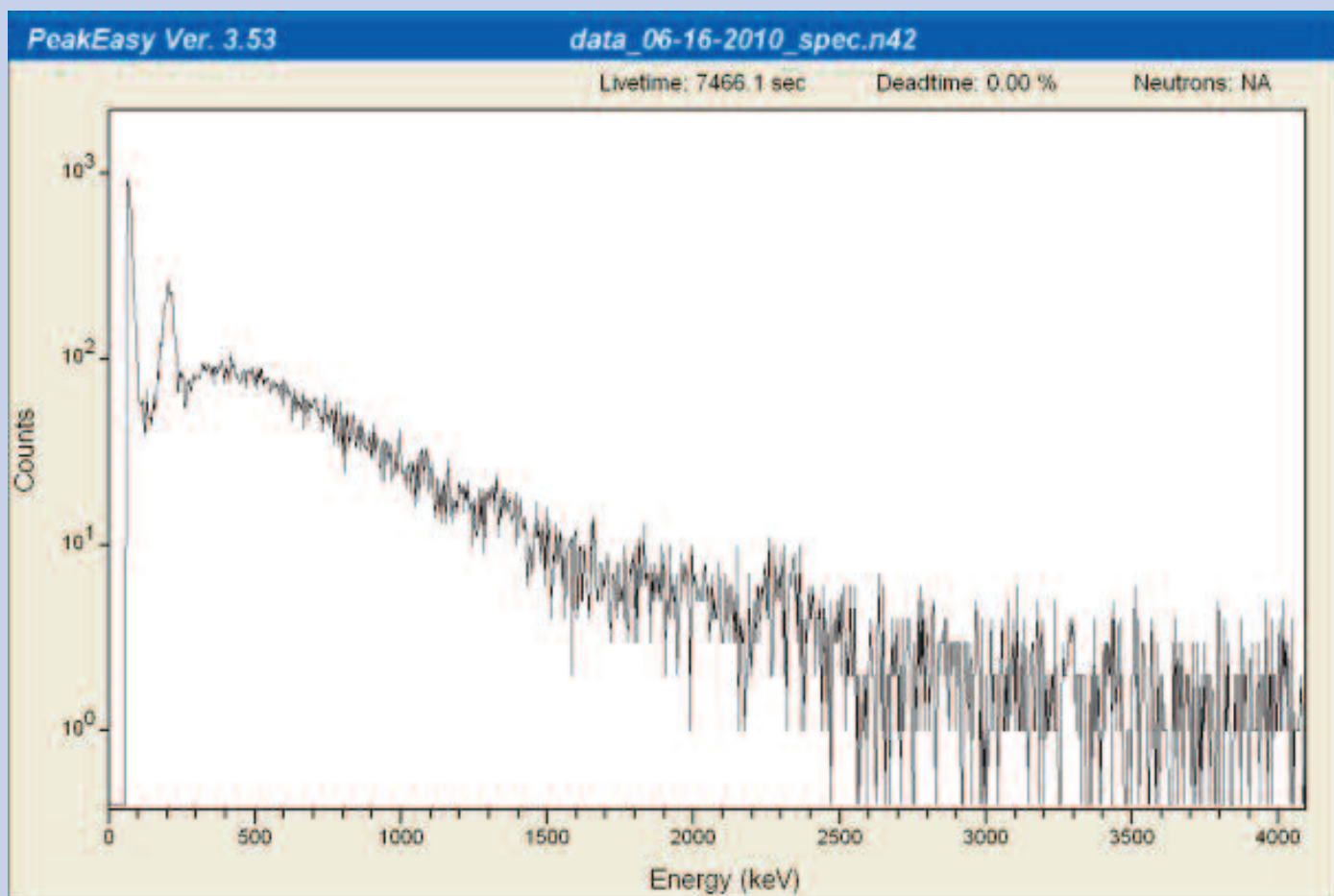
Figure 11. *Unmanned Helicopter detection: Total hits from before takeoff until after landing. Includes viewing target source (Am-241).*

Figure 12. *Hellenic and US Navy Officers together with NPS - LLNL - HNA researchers upon successful completion of aerial detection*

relays on-the-move (at the same time learning how to coordinate the maneuver), but are running out of peer-to-peer range.

2.3 Augmenting Stand-Off detection by Unmanned Mini Helicopter

As NATO crews collaborating on stand-off detection at high-speed started to run out of peer-to-peer networking range, an unmanned helicopter was called to assist in tracking on the target boat in order to facilitate video surveillance by transferring data via its wireless network to ground station at NMIOTC TOC (steps 20-21 of the experiment plan). Prior to UAV launch the NPS-LLNL-HNA (HNA stands for Hellenic Naval Academy) experts had identified that allocating sensor or radiological source on board UAV is doable. Figure 9 illustrates Hellenic Naval and Air Force officers focused on deciding of allocating sensor and networking load based on the LLNL and NPS experts guidance. If so, concurrently with the video feed the UAV will also do trial aerial detection. The U.S. unit and Hellenic operators on board MOB continue UAV-based video surveillance on target boat and its location tracking in SA views. The UAV video feed reveals suspicious maneuvering toward the U.S. installation.

Figure 13. *Capturing and reconstructing the MIO 10-2 experiment events in Souda Bay at the remote data analysis site at FOI Sweden*

In result of successful aerial detection twenty-eight positive identification events were noted; 23 clearly had the above spectrum, indicating Am-241.

By adjudicating the threat (steps 22-25 of the experiment plan), based on completed combined surface and aerial stand-off detection, the Global Reachback expert analyzed and determined that it was a shielded signal. The Regional expert requested secondary screening, so the MOB crew requested assistance from the Turkish sector boat and formed an on-the-move choke point with Turkish patrol vessel. Secondary choke point screening started, and steps 14-15 were repeated, but the result was still "not identifiable". At that point, the Regional and Global experts recommended target boat interdiction and search. The MOB Hellenic operators conducted the search. The boarding officer used the swimmer camera to provide a video feed to the Regional expert. The collaboration resulted in the shielded device being found, and the vessel was interdicted. Figure 13 illustrates observation of NMIOTC based activities at the MIO remote data capture and analysis side in Sweden. This is another proof-of-concept element of global collaboration on analyzing and countering the small craft sourced threat.

Conclusion

The MIO 10-2 experiment with NMIOTC team in Souda Bay on June 12-14, 2010 has demonstrated that collaboration among NATO MIO crews executing network-enabled choke point and target pursuit as well cooperative integration of unmanned aerial vehicles to support choke point screening & target vessel pursuit could be achieved within 2-3 days of joint learning. It demonstrated that ...
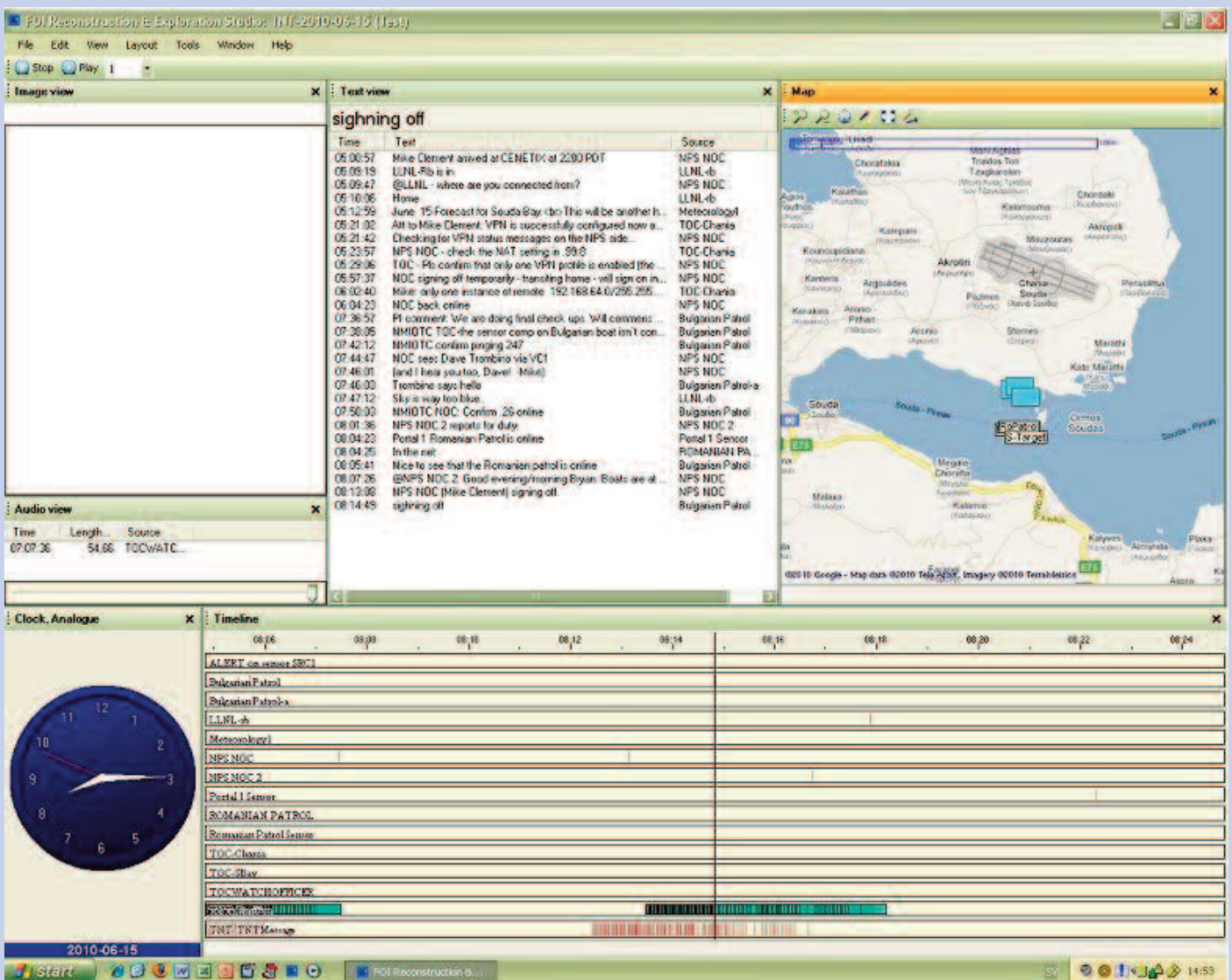
> ### detecting illicit material and interdicting small craft with coordination and shared situational awareness between the multinational crews assisting each other is feasible.

However, the discrepancy between perceiving the state of stand-off detection process by remote experts via network and situational awareness tools, and the physical state of the assets on-the-move is significant. Resolving this problem would require subsequent experimental studies of integrated (multichannel) detection, more scaled usage of unmanned systems, rapid expert feedback, and new techniques for networking with sensors.

REFERENCES

Bordetsky, A. & Netzer, D. (2010). "Testbed for Tactical Networking and Collaboration", International Command and Control Journal, Volume 3, Number 4.

TNT MIO 10-2 Experiment Plan (2010). Networking and Interagency Collaboration on Small Craft Maritime-Sourced Nuclear Radiological Threat Detection and Interdiction, Center for Network Innovation and Experimentation (CENETIX), Naval Postgraduate School

Dr. Alex Bordetsky is an Associate Professor of Information Systems at the Naval Postgraduate School, Monterey. He is also an Associate Chair for Research at the Department of Information Sciences. Professor Bordetsky is Director of the NPS Center for Network Innovation and Experimentation (CENETIX). He is Principal Investigator for one of the major research projects at NPS, Tactical Network Topology (TNT) Testbed and Experimentation, conducted jointly and sponsored by USSOCOM. Dr. Bordetsky is a recipient of prestigious Robert W. Hamming Interdisciplinary Research Award for his pioneering studies of collaborative technologies and adaptive network-centric environments. His work has been recently featured in the AFCEA SIGNAL Magazine, Via Sat, and the USSOCOM Tip of the Spear Journal. Professor Bordetsky publishes in major IT journals including Information Systems Research, Telecommunication Systems Modeling and Analysis, Command and Control Systems, and International Journal of Mobile Wireless Communications.

Lt G. Mantzouris H.N. graduated the Hellenic Naval Academy in 1998 and has served in various Greek Frigates as Communications, Intelligence, Operations and Chief Electronics Officer. He has attended the British Comms and Instructional Courses and is a Naval Postgraduate School graduate with two Masters in Systems Engineering and in Astronautical Engineering with distinctions. He is a Ph.D. Canditate in the Polytechnic University of Thrace in the Electronics Engineering Department studying design of microsatellites. He is now serving in NMIOTC as MIO instructor and as a staff officer in Naval Doctrine and Experimentation section under the Transformation Directorate.

"VELEROFONTIS"
UNMANNED HELICOPTERS FOR WMD IN MIO

by   *Proffesor I. Koukos and*
        LtJG K. Karanagnostis H.N.

1.General

Early in the past decade of 2000, Hellenic Naval Academy's Telecommunication Lab headed by Professor I. Koukos investigated the possibilities of UAV use in tactical naval operations. Encouraged by the former Chief of Fleet Adm. M. Horianopoulos, and with funding from the Hellenic National Defense General Staff constructed, in 2006, with the contribution of Chief Petty Officer John Koutsoulas, Hellenic Navy, a low cost Unmanned Air Vehicle (UAV) –Mini Helicopter, capable of being remotely controlled from the ground, equipped with an also remotely controlled video camera. Presently, the UAV pilot is the officer Lt.J.G. K. Karanagnostis H.N. who has suggested and performed a number of modifications-upgrades offering more capabilities and enhanced safety for the UAV itself and the payload it carries in light of the continued effort to improve it's overall performance.

2. The experiment's objective

To test the capability of the Lawrence Livermore National Laboratory (LLNL) gamma-ray (γ-ray) spectroscopy sensor when mounted on the UAV to detect the Simulated Low Energy Radioactive Material placed on board a small vessel and measure the detection distances.

Gamma-ray (γ-ray) spectroscopy is the quantitative study of the energy spectra of gamma-ray sources. A gamma spectroscopy sensor system, consists of a detector, electronics to collect and process the signals produced by the detector and a computer with processing software to generate, display, and store the spectrum.

3. Phases of the experiment

Day one and two were devoted for preparing the UAV and the Sensor, mounting the LLNL sensor on the UAV and extensive test flying to secure the smooth operation and security of the experiment. Special tuning and additional tests were conducted due to the extreme hot weather conditions (more than 42 degrees Celsius).

On day three the experiment was conducted as planned, in the docking area of the former Hellenic

Fig 1. *UAV mini helo with the LLNL Sensor onboard during test flights in NMIOTC's premises*

Navy training ship "HS Aris" , in Souda bay.

Multi runs were executed at various distances and altitudes (10-1m) from many directions and at various speeds.

CHARACTERISTICS	SPECIFICATION
Fuel	Unleaded GAS
Fuel Capacity	½ lt. (extendable if needed)
Fuel Consumption	½ lt. for every 20 ̇ 1 min
Main rotor diameter	1,85 m
Fuselage Lenght	1.623 m
Fuselage Width	0.38 m
Fuselage Hight	0.74 m
Net Weight	4.5 kg
Main Rotor diameter	1.8 m
Useful load	~4 Kgr
Speed	80-100 Km/h
Radius	~ 3 n.m.
UAV's Radio Control-Electronics	
Flight Receiver	Spectrum AR 7000
Video Tx-Rx	1,3 GHz Audio-Video 800mWatt
Camera	CCD 3.6mm lens
GPS module	10hz Operating frequency

Fig 2. *A high speed Low Altitude pass over the boat*

Fig 4 *High Speed chase of the vessel from the rear*

4. Gamma-Ray Sensor Recordings

Next we present two graphs with recordings made by the sensor flown on board the helicopter. In both graphs, the Y axis marks the number of events i.e. number of photons which hit the detector and the X axis marks quantities proportional to the energy of the events, translated via calibration to keV.

The energy per photon can be calculated from the Planck–Einstein equation

$$E = h * f$$

where E is the energy, expressed in the unit of electronvolt (eV), h =4.13566733(10)×10–15 eV•sec is Planck's constant, and f is the frequency in Hz.

Graph of Fig 5, presents a single sample spectrum, recorded by the LLNL sensor detecting γ-ray photons exceeding the background noise while the helicopter is hanging above the "suspicious" boat, which is carrying a jar with radio-active material.

Fig 3. *High Speed Low Altitude pass as captured from the onboard sensors*

Graph of Fig. 5 presents the cumulative recording for the entire flight of the Helicopter pursuing the "suspicious" boat, where clearly is shown that the LLNL sensor successfully detects γ-ray photons above the background noise.

4. Tactical Implications of the UAV in Maritime interdiction Operations

The Vellerofontis UAV is a promising low cost project, that can demonstrate operational usage for a wide variety of navy needs. It can take off and land to a ship deck with relative ease, and can be tasked with the surveillance of a designated area either over water or land without the need of an airfield nearby. Via a wireless link, it can download, in real time, streaming video to a console on board the mother ship for tactical use. The type of the video can be selected and adjusted according to the operational needs. Various types of cameras can be placed on board i.e. daylight optical low cost camera, HD camera, camera with high zoom capabilities are some choices, that can easily extend to night vision / IR cameras or mini Synthetic Aperture Radar (SAR) payloads, for naval surveillance under the cover of darkness or fog. A typical scenario would be a ship patrolling as unit of a fleet tasked to prevent piracy or prevent trafficking of illegal immigrants or furthermore prevent the transport of WMD materials overseas. In case it detects a suspect target the unit does not have to come close to it. The advantages are many. The suspect boat will not be aware of the ship's presence, so it will not take early evasive action. In case of aggressive mood of the crew of the interdicted vessel there is no fear of damages inflicted by enemy fire as their weaponry consists mostly of hand held equipment (with the deadliest being RPG's). The friendly unit stays clear 6 miles or more away and the UAV takes off. It approaches the suspect ship to a few hundred meters (so that it's own en-
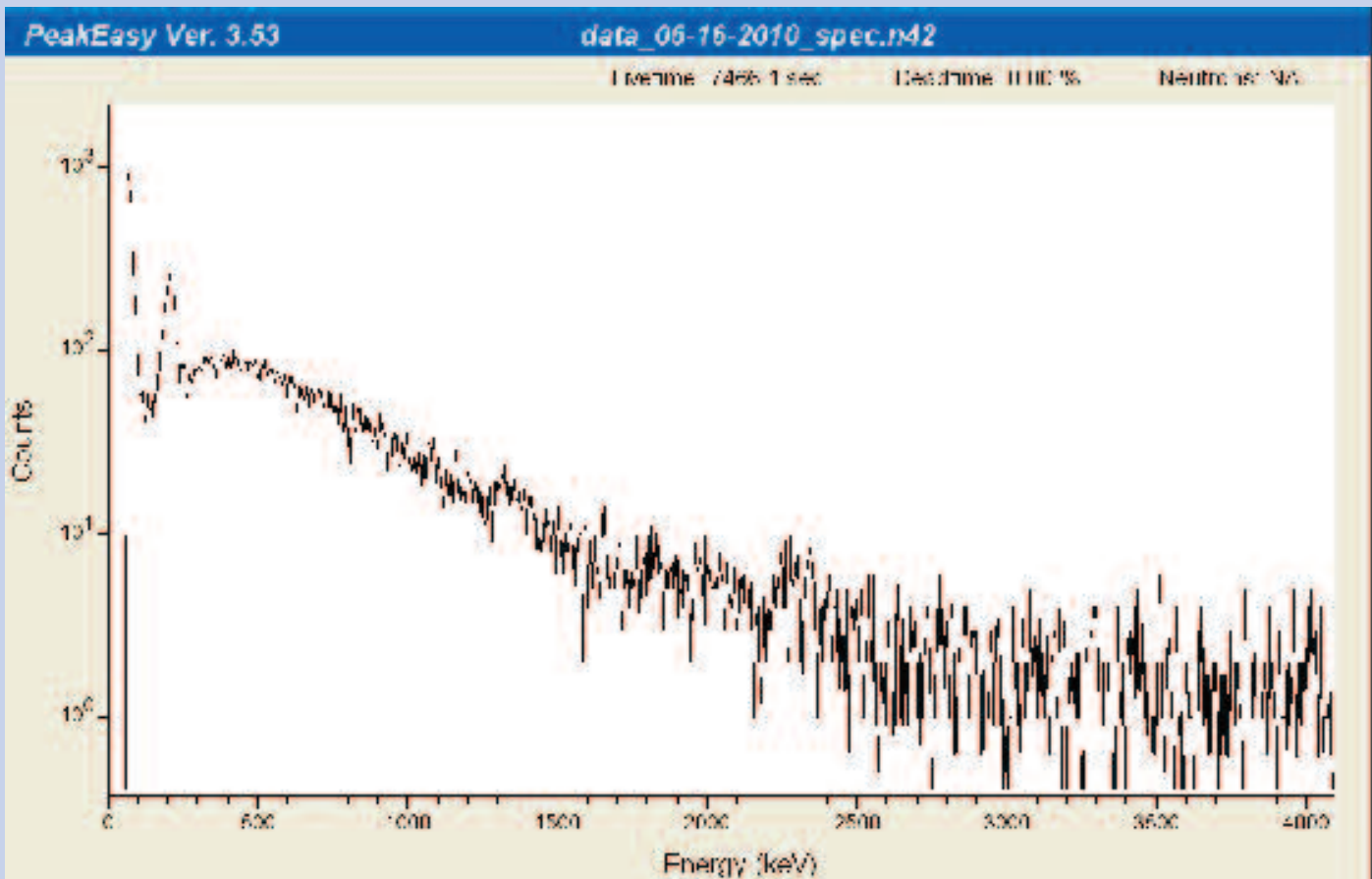
Fig 5. *Helo summed spectrum - total from before takeoff until after landing. Includes viewing target source (Am-241).*

gine noise will not give it away) and the far end user determines exactly the type of the vessel, it's cargo, crew etc. If it is estimated beforehand that trafficking of WMD materials is a possibility, then a low-weight sensor, like the one used in the above experiment, is placed onboard the UAV before takeoff and several passes are conducted at several altitudes and speeds. In case a decision to board the suspect vessel is taken, thorough examination of the topology of it can be made so that the boarding team will know exactly where and what to expect. Monitoring of the team's actions during boarding and operating on board presents the advantage of easier control and decision making.

5. Conclusions

The analysis of the data showed that the UAV during a 15 minute flight achieved 28 detections and 23 confirmations of the simulated low energy radioactive material. This success is due to capabilities inherent to a UAV such as:

(1). High speed transits, chases, passes.

(2). Low speed or hovering near the radio-activity area to give the sensor time to detect and analyze the data.

(3). High maneuverability and accuracy in approaching suspect targets.

By applying UAV's capabilities to Operational Training that NMIOTC is providing to NATO/PfP/MD/ICI countries and through close co-operation with NMIOTC's specialized personnel in MIO operations the above mentioned asset can inevitably be a major profit for simulated real time MIO training, something that NMIOTC is pursuing on a daily basis with proficiency and excellency.

Dr. Ioannis Koukos is a Professor at the Hellenic Naval Academy in the Electronics Engineering Department. He has extensive knowledge in Electronics applications and has worked for over 15 years in Southern California's Aerospace Industry, including 8 years at the prestigious JPL laboratory in Pasadena California for NASA's Deep Space Network. From 2006 he is doing research in avionics and architecture of UAV's for various Naval and Maritime Applications. Vellerofontis is the project that he ran under the auspices of the Hellenic General Staff.

LtJG K. Karanagnostis H.N. graduated from the Hellenic Naval Academy in 2006. He has served on various surface ships as Staff Officer and Executive Officer. He is currently attending the General School of Education of the Hellenic Navy in order to pursue his specialization diploma as a gunboat officer. The last four years he is working professionally with mini helo models where he has been certified as a mini helo pilot and has earned awards among the Greek Modelers Community. For the last year, he is working closely with Professor I. Koukos, flying and assessing the capabilities of the experimental mini helicopter "Vellerofontis".

MARITIME INTERDICTION OPERATIONS RADIATION DETECTION USING RADIO CONTROLLED HELICOPTER TRANSPORTING A SMALL SODIUM IODIDE-BASED SENSOR SYSTEM ©

by   Mr D. G. Trombino and Dr. A. D. Dougan,
US Lawrence Livermoore National Lab
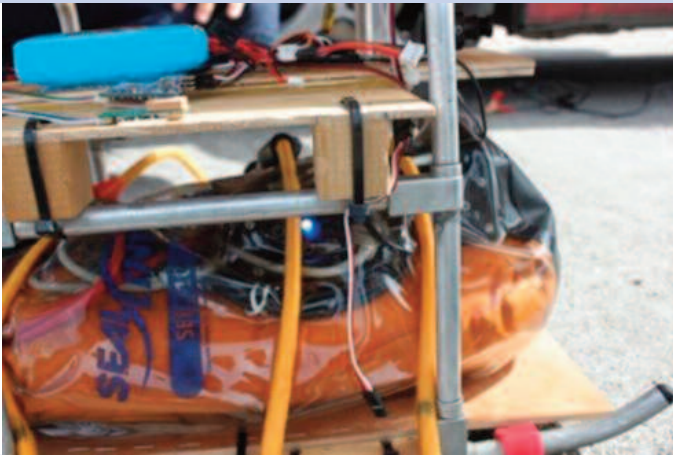
Figure 1. *Detector package prepared for flight.*

MIO Radiation Detection using Radio Controlled Helicopter Transporting a Small Sodium Iodide-Based Sensor System

During the joint Naval Postgraduate School (NPS) and Lawrence Livermore National Laboratory (LLNL) maritime interdiction operation experiment, MIO 10-2 (June, 2010) a radiation search using a small remotely operated unmanned aerial vehicle, a radio controlled (RC) helicopter was planned. The small RC helicopter had payload limit of three (3) kilograms, so fitting a radiation detector, power supply, multi-channel analyzer, computer, and GPS into a waterproof container was a challenge. The scintillation detector selected was a 4 x 4 cm NaI(Tl) linked by USB cable to an Ortec DigiBASE. The detector was connected to an Artigo picoITX computer powered with a Li-ion battery. Also attached to the computer by USB cable was a Garmin GPS antenna. This stand-alone system was placed in a clear plastic dry bag (Figure 1) to protect it since the flight was to be over water.

After a test flight behind the NMIOTC building to confirm the system was indeed within the payload weight limit, the detector system was started up and sealed in the dry bag for flight. Prototype software developed at LLNL was used to capture GPS time and location stamped radiation count rate and spectra. Though not used for this demonstration experiment, the system is also capable of data telemetry via USB wireless (WiFi 802.11) communication.

Photographs and video were taken of the flight and chase of the target vessel (Figure 2).

Video was also captured with an onboard camera from the RC helicopter. Video images were viewed in real time via the helicopter operator's laptop computer

Figure 2. Helicopter heads for target boat with high and low speed patterns

and were available as a head up display on specially developed goggles (Figure 3). With other telemetry information displayed on the head up display, there is a potential for incorporating a radiation count rate bar to enhance the video search capabilities.

The helicopter and the radiation detection system performed well during the demonstration experiment. At the conclusion of the flight in which multiple passes, chases, and attempts at overhead stationary hovering, the RC helicopter landed and the sensor package was removed for data download. As can be seen from the GPS track (Figure 4), the computer did not collect

Figure 3. Head up display goggles and their view. Googles were provided by the Hellenic Naval Academy's UAV MIO team. Boats were provided by NMIOTC and Naval Support Activity Souda Bay (US NSA)
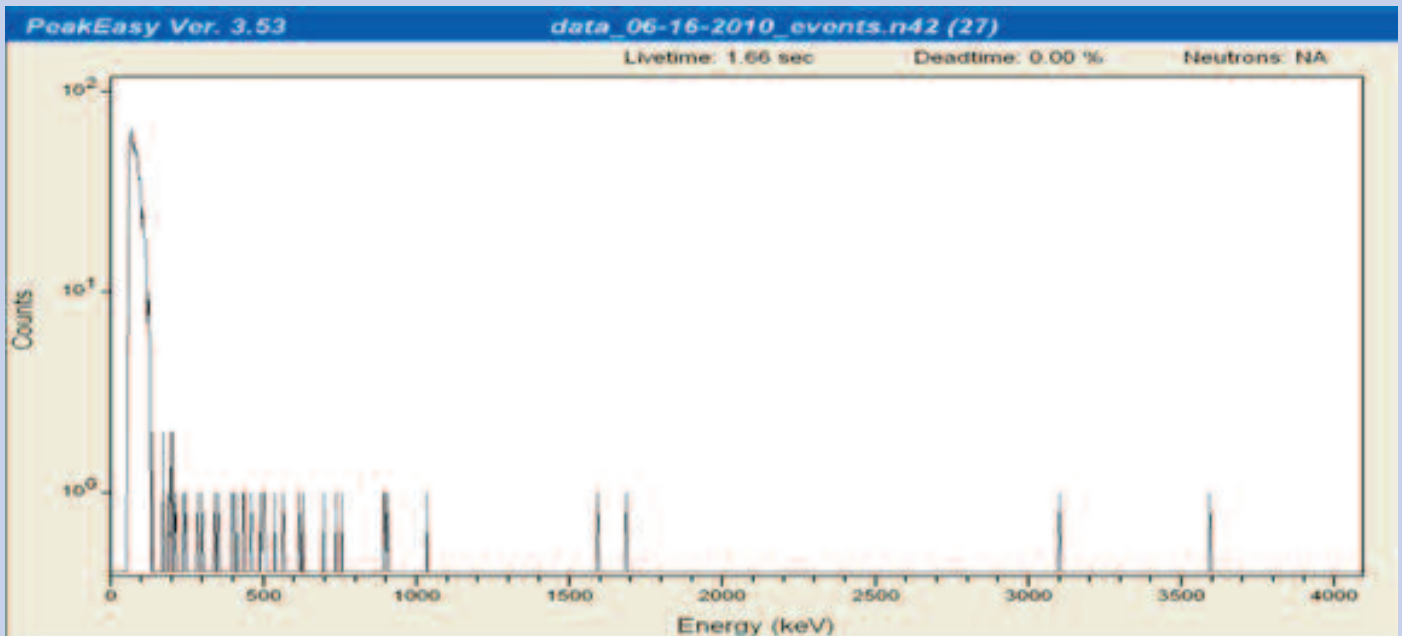
Figure 5. *Individual helicopter event spectrum.*
The large peak to the left, near 60 keV is from the target source, Am-241

Figure 4.*Target acquired!*
Yellow shows the detector onboard the helicopter GPS track. Red shows the detector radiation level detected.

complete data from the entire flight.

The system did capture a total of 28 'events', triggered by a count rate above a predetermined statistic. Of the events, spectra from 23 could clearly be used to identify the target source, 241Am (Figure 5).

The system did have a difficult time due to the external temperature during the experiment. After the helicopter landed and the dry bag assembly was removed, the system was too hot to touch and would not communicate via ethernet cable to the external com-puter (the unit that had been used for preflight startup). Data files saved during the flight were only able to be retrieved after the system had cooled down later that evening.

The experiment was a success in demonstrating that a small radiation sensor could be deployed on a small UAV. The total cost of the sensor package and the helicopter was less than $30k (20k €). There are several key areas for improvement and further development of this potentially valuable tool as an asset to maritime interdiction operations. The most important function to add would be real time communications and telemetry from the radiation sensor to the operator and to the command center. Environmental protection for the sensor computer and battery would also be necessary for continued experimentation. Incorporating radiation data into the head up display would enhance the operator's awareness and would improve the ability to search an area where the operator cannot see the helicopter.

Dr. Dougan and Mr D. Trombino *are members of the Lawrence Livermore Natioanal Laboratory in California, USA.*

HOW DO FEEDBACK LOOPS INFLUENCE THE NETWORK'S PERFORMANCE ON A MIO WITH SMALL BOATS ?

by **LtCdr S. Karamoutas** *H.N.,*

NPS's Master student in Information Sciences Department under the auspices of Dr. Bordetsky

This work is a brief summary of a research paper that was produced within the framework of the "Design of Experiments for Research" class by Dr. Alex Bordetsky (NPS)

Introduction

The war against asymmetric threats does not have any borders, constraints or battlefields requiring the synergy of multiple law enforcement and homeland security agencies in addition to military forces from a coalition of countries.

The current dynamic environment and the uncertainty of the future requires the continuation and moreover the enhancement of the efforts that all the international organizations and the individual nations do for deeper cooperation and mutual understanding, establishing trust, and interoperability, building the partnership that the war against terrorism dictates.

Significant roles with a noticeable number of successes, in that global effort, have the Maritime Interdiction Operations (MIO) as part of the strategic plan that the Network Centric Maritime Warfare has introduced.

It is axiomatic that, individual decision makers throughout an organization who have improved access and/or better information are more likely to make better decisions. The value of better information is clearly situation and scenario dependent that require synchronization of plans and actions and the development of synergy. (D.S. Albert, R.E Hayes,2006)

Hence, the key objective of a network used for Maritime Interdiction Operations, would be the ability to provide to the participating forces, the necessary means to exchange reliably, timely, securely, and effectively all the required information. Moreover the ad hoc nature of these networks, their mobility and the difference in means, technology and physical or technical environ-ment makes the structure and their performance even more demanding.

Thus, we will attempt to present the influence that the feedback loops have on the network performance under the prism of the combined problems that both the commander (at the tactical level) and the network manager (at the technological level), confront, during operations within the MIO environment. The objective will be to evaluate the use of networks, advanced sensors, and collaborative technology for conducting rapid MIOs. Specifically, the ability of a boarding party to rapidly set up ship-to-ship communications which permit them to search for radiation and explosive sources while maintaining contact with the mother ship, command and control organizations, and to collaborate with remotely located experts. Analysis of data captured from teams performing their tasks in a collaborative environment could provide valuable insight into what constitutes effective collaborative performance. This understanding could then be used to develop new technology (or improve the existed) to support this cognitive activity; develop tools to reduce cognitive workload, and techniques or processes to improve information exchange among collaborating members.

Environment

For the purpose of this paper we will select the geographic area of the Aegean Sea, as the environment that the MIO tactical network is deployed, due to its important characteristics. The sensitive nature of this area contains the Southeasters' edge of the EU and the cross point between the continents of Europe, Asia and Africa where the first is a stabilization factor and the later are significant areas of tension. Thus, the selected environment fulfills the criteria of a check point for the control of the proliferation of Weapons of Mass Destruction (WMD), smuggling, human and drug trafficking, illegal distribution of nuclear products and/or weapons, etc. Within that framework, the exploitation of an adaptive collaborative tactical network topology facilitates information and knowledge sharing that improves the decision making process of the MIO Commander. The real time connectivity between the nodes of the network eliminates the distance between subject expert groups and boarding teams that most of the times conduct and operate at geographically dispersed areas.

Our model's environment is consisted of two clusters of nodes where each node is a naval unit and each cluster is a group of 3-4 units that operate in a specific geographic area creating two independent LANs (Local Area Networks). Thus, each LAN has each own LAN manager responsible for the connectivity and quality of service (QoS) that is provided among the participants meaning ship to ship or ship to shore or ship to boarding teams' communications etc. Both of the

LANs are connected and exchange data with the land-based H.Q. located at NMIOTC's TMOC (Tactical Maritime Operational Center) in Crete, Greece.

The local authorities, the RadHaz experts etc constitute a LAN under the control of the LAN manager of the NMIOTC who also acts as Wide Area Network (WAN) manager monitoring and controlling the subordinate clusters of the naval units that operate under the NMIOTC's command. Then this land-based cluster will be directly connected via SATCOM links with another one cluster that contains all the required participants at the Naval Postgraduate School (NPS) within the framework of the already conducted Tactical Network Topology/MIO (TNT/MIO) series of experimentation (1) . The following figure provides the topology of the discovery experiment as it has been explicitly presented.

The situational awareness goals of the experiment is the exploitation of any feedback mechanism capable of increasing the broad interagency collaboration and data sharing using the existed capabilities of the naval and land-based units that participate in our network. In addition the involvement of the SATCOM technology will give us the flexibility of extending our local capabilities providing a universal profile by connecting the NMIOTC and the adjacent organizations and authorities with Subject Matter Experts (SME) and other related agencies located across the ocean. These feedback loops can be achieved with the establishment of two-way data sharing techniques like the CENETIXS SA Observer Notebook or the Office Groovy tool which can both build a common Maritime Recognized Picture (MRP) collecting and exchanging data that can be analyzed and produce information capable of creating knowledge that will ameliorate the shared situational awareness.
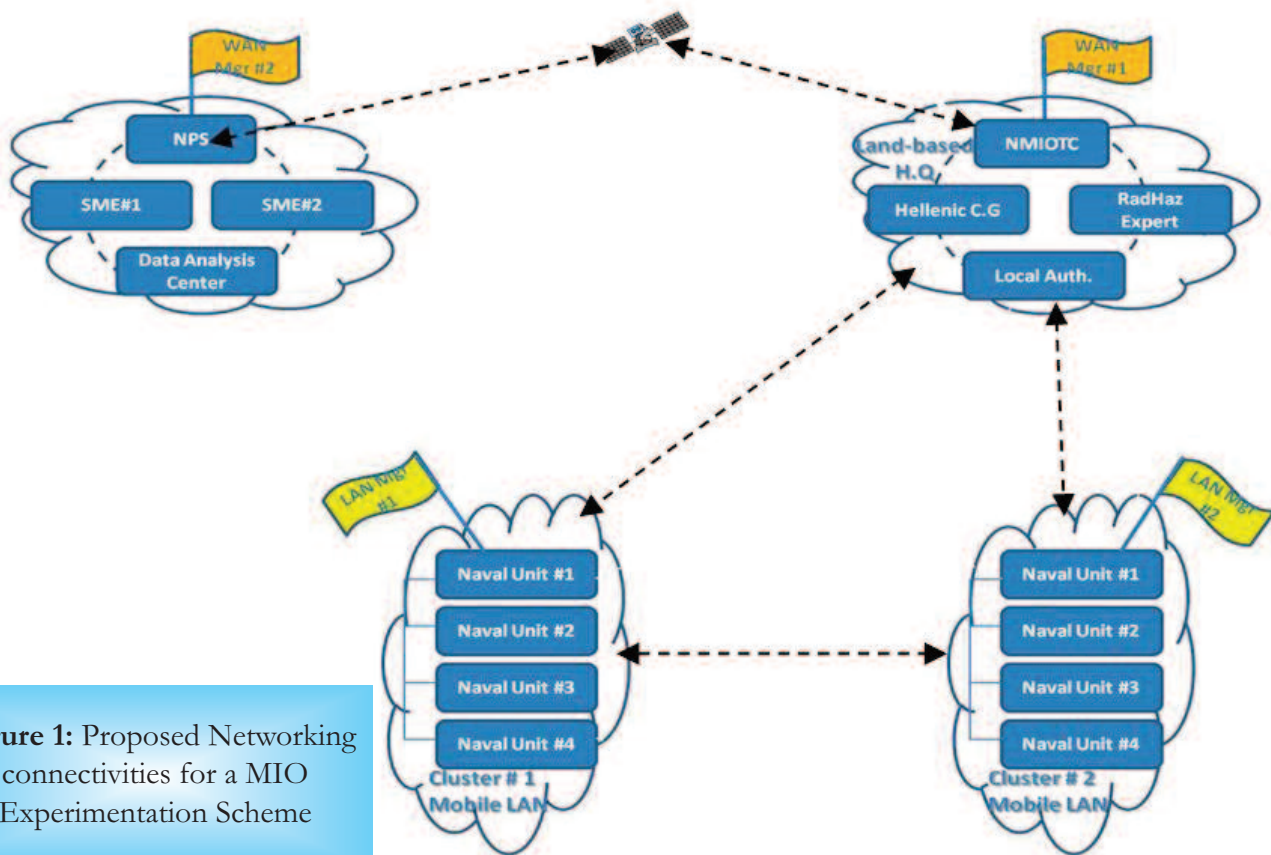
Figure 1: Proposed Networking connectivities for a MIO Experimentation Scheme

Figure 2. NMIOTC's aerial photo. NMIOTC is located in Souda Bay, Marathi area in Crete, Greece.

Additionally, the real time exchange of data and information can be achieved by the implementation of video streaming technology using any Video Teleconference facility that connects instantly and more interactively the participants of our network. Another one equally useful tool that was successfully implemented at the CENETIXS labs is the SA viewer where alarms and messages can be exchanged presented on the actual location that are produced through the collaboration with the Google Earth applications.

With all that in mind, we can maintain not only the shared situational awareness but also we can monitor and control the behavior of our network at each one of its stages, locally, regionally, globally.

Furthermore, network monitoring tools (Simple Network Management Protocol- SNMP type) in conjunction with the abovementioned collaborative systems can provide network fault/performance/configuration data at the packet level, which is hard to interpret by operational commanders. Hence the collaboration between Tactical and Network Operations Centers is required.

Conclusions-Proposals for future research

There is growth, development and evolution of the network technology that provides the gears for successful execution of the Maritime Interdiction Operation supporting the global Maritime security and fight against terrorism. The integration of the complex systems that act as networks and the dynamic of the networks that behave as systems, are the driving forces of the systems theory who determine the nature of the Maritime Interdiction Operations as part of the overall strategic planning of the Network Centric Warfare.

Already, non-military technology and applications seem to point towards future networks with: a) ad hoc pockets of connectivity, b) consumer-owned networks, and c) sensor-net technologies. For the purposes of our experiment a potential future use of UAVs overflying the target detecting for RAD-HAZ indications or suspicious movements on-board the ship could be accomplished by appropriately modified and equipped helicopter model (like the VELLEROFONTIS project introduced by the Hellenic Naval Academy) or even micro Air Vehicles. Both video stream data and detecting messages could be sent wirelessly and in real time back to the mother-ship without the safety issues of the boarding teams that strangle the MIO missions.

All of these applications will place increased scalability demands on self-organizing ad hoc networks that determine the future of MIO and open the floor for challenging research areas and demanding achievements.

Figure 3. Ex Hellenic Naval Cadet training ship "HS Aris" is now NMIOTC's mock up ship, where practical training for Boarding Teams is conducted throughout the year, almost on a daily basis.

LtCdr S. Karamoutas H.N. graduated the Hellenic Naval Academy in 1992 and has served onboard various platforms of the Hellenic Fleet as ASW, Ops. Officer and CO (La Combattante IIIb-class). He has attended the Principle Warfare Officers' Courses (HMS Dryad-UK) and was honored to be the Aid de Camp to the CINCHELFLEET and later CHOD Adm. P. Chinofotis HN. LtCdr S. Karamoutas is currently undergoing his Masters degree in Information Systems Technology at the Naval Postgraduate School (USA).

PIRACY TALKS
MERCHANT MARINE'S PERSPECTIVE

by Mr. G. Pateras

(presented at the NMIOTC Annual conference, 30 June - 01 July 2010)

Piracy is not something new, it has been around for centuries, probably from when the first craft set sail with something of value on board, there was someone who wanted to take her cargo illegally. At some point in history Kings, Queens and Rulers took advantage of the substantial profits in Piracy and legalized the act, provided, of course, that they received the lions share.

In the past 3 years piracy has re-entered the news, because the Somali pirates have changed the pirates "Modus Operandi" and don't steal the cargo but hold the ship to ransom.

It is interesting to note that in the first half of 2008, more pirate attacks occurred in the South China Sea and West Africa than in the Gulf of Aden. But the effects of the Somali Pirates are more dramatic, more expensive, and more risky to life and hence more news worthy.

The situation became so serious that the UN Security Council produced a series of resolutions:

Resolution 1816 Para 8

"Requests that cooperating States take appropriate steps to ensure that the activities they undertake pursuant to the authorization in paragraph 7 do not have the practical effect of denying or impairing the right of innocent passage to the ships of any third State."

"Free and innocent passage" the fundamental doctrine of world shipping.

Resolution 1846 Paragraph 11 states:

"Affirms that the authorizations provided in this resolution apply only with respect to the situation in Somalia and shall not affect the rights or obligations or responsibilities of Member States under international law, including any rights or obligations under the Convention, with respect to any other situation, and underscores in particular that this resolution shall not be considered as establishing customary international law; and affirms further that such authorizations have been provided only following the receipt of the 20 November letter conveying the consent of the TFG." (Transitional Federal Government)

And most importantly resolution 1846 on the 2nd of December 2008 paragraph 10 (b)

"Use, within the territorial waters of Somalia, in a manner consistent with such action permitted on the high seas with respect to piracy under relevant international law, all necessary means to repress acts of piracy and armed robbery at sea;"

On the other hand shipowners have been criticized for paying ransoms to Somali pirates, but we must all remember two very important truths.

1. The Shipowners are buying back their crews whereas the Somali pirate is selling a ship.

2. A Somali pirate is not ideologically motivated, he has no political agenda, he is a common thief.

We say this because some ill informed critics have suggested that piracy is an asymmetric threat. This description is appropriate only to terrorists.

At a recent un-classified meeting of the NATO Armaments Group workshop on Counter Piracy, Equipment and Technology, apart from the military briefing on NATO and EU operations, industry had a chance to present non-lethal weapons and the military had the chance to promote protective boarding and vessel protection detachments.

There have been several naval operations in the Gulf of Aden both from NATO & the EU. Statistics vary but the average shows that they are very effective. From 1 successful seizing in 3 attacks to 1 successful seizing in 7 attacks, that is a substantial improvement. We know that several crews that have passed through the Gulf of Aden in the past 12 months are truly thankful of the Naval presence. Actually, a Master of a merchant ship while passing the Gulf of Aden was very encouraged by the evident Naval presence throughout his time in the transit corridor and quite relieved that the weather was worsening. However this is for the Gulf of Aden and not for the Somali Basin.

The Convoy/patrolling pattern has been greatly improved or redesigned to cater for the 16,000 merchant ships passing through the Gulf of Aden annually. Naval resources are scarce and very expensive, NATO has 5 vessels in the area, this actually corresponds to an average of 2.2 vessels on any given day, the other 2.8 are refueling, victualling or being maintained.

Nevertheless, according to the latest information, SOMALI pirate attacks have reached an alarming 50% success rate in hijacking vessels since the end of the monsoon season.

The figures speak for themselves, up until the end of May 2010, 58 vessels had been fired upon, 28

ships captured and 1 attempted boarding, equal to a success rate of 48%.

By contrast in 2009, 127 vessels had been fired upon, 52 ships captured and 4 attempted boarding, equal to a success rate of 41%.

The sharp increase in the pirates success rate can be attributed to their move to attacking ships beyond 600 miles from the Somali coast and up to 1,000 miles out.

Unlike the Gulf of Aden, where coalition naval forces have a strong presence, there are few naval vessels in the seas 600 miles and beyond the coast of Somalia. The area is vast, and the distances that need to be covered are huge, the analogy that we have been recently given is: that it is similar to patrolling the whole of France with 4 police cars that don't go more than 20 miles an hour.

In addition pirates are attacking across such a huge area that any warships in the region could well be too far away to reach a merchant vessel under attack.

Mr Choong, of the International Maritime Bureau (**IMB**), said pirates were particularly targeting vessels trading into ports in Kenya, Tanzania and the Seychelles, as these ships have little choice but to turn in towards the coast to reach their destinations.

The IMB already warns ships transiting the area to stay 600 miles from east coast of Somalia, and now also advises masters to remain vigilant against pirates even when sailing further out from the coast.

NATO sees its position from a legal perspective as we were advised "Yes we have the right to pursue Pirates and keep the shipping lanes open by use of force, subject to National caveats. We are not here, though, to solve the Somali Pirate problem"

Attacking & arresting pirates is legal. However there are certain problems with detaining and prosecuting Pirates. This depends on Domestic law. Inevitably, pirates are released only to be re-captured days later. Industry, on the other hand, has been innovative; some of the equipment presented was interesting, and we will briefly describe 5 of these developments:

1. The radio wave beam guns is a deck mounted device carried in a standard 20' container. It is a non-lethal, totally legal, radio frequency beam "gun". This devise fires a non lethal beam about 200 m, concentrated onto an assailant, this beam penetrates about 1/16" below the skin, recovery time is almost instantaneous, with no lasting side effects. The assailant feels as though he is being burnt and by instinct moves out of the way of the beam, immediately recognizing the direction of the source. Due to its size, requirement for training, and positional blind spots its attractiveness is limited but its effectiveness is impressive.

Cost: Over $1,000,000

2. The long range acoustic device is a deck mounted movable acoustic device. It sends out a concentrated acoustic beam to a range over 300m, it is loud enough to be clearly heard over 300m and as you approach the source the sound becomes painful to the ears. At very close range it can damage the ears. Of course the element of surprise is lost after the first use as all that is required is simple ear protectors as used in any engine room.

Cost: very expensive

3. A small deck launched un-manned surveillance aircraft:

This is a small, deck launched, unmanned, radio controlled surveillance aircraft. It uses a deck mounted launching devise with a footprint of about 4m2, it has a flying range of about 20 hours and an altitude of about 1,000 ft. it is about 2m long and has a payload of about 20 kg. The standard surveillance equipment consists of GPS and video, of course the equipment can be customized. Other equipment includes night vision and thermal cameras. This aircraft has a deck mounted capture device for "dry recovery".

Cost: just under $1,000,000

Detection enhancement

4. Small Target Detection trough Advanced Radar Technology:

This device enhances the software & hardware of existing RADAR thus enabling the user to spot Pirates in their small, fast, plastic Skiffs at a bigger distance. The advantage of this advanced Technology is obvious both for the merchant Navy as well at the military.

Cost: not discussed

And finally there was the "Dazzler", a narrow green light beam that is very distracting to the eyes. This is a hand held device that looks rather like a torch, and is pointed directly at the pirates.

In spite of these technologies, the only practical equipment for the merchant navy, which is still under development, is long range information sharing by use of the free band width of say the AIS. With this technology vessels entering and leaning the Gulf of Aden or any other large area will be aware of events happening at a greater distance giving the vessel time to take appropriate action.

That deals with the industries proposals; others have made suggestions for enhancing self help by placing the military on merchant ships or better still putting armed or unarmed mercenaries or guards on merchant ships.

However, the idea of putting armed or unarmed guards or soldiers on a merchant ship has too many short comings.

The reason war ships are in the Gulf of Aden today, is to keep shipping lanes open and keep our crews out of harms way. Or to put it another way maintain and protect our right for "free and innocent passage" as laid down in article 110 of the United Nations conference on the Law of the Sea.

If we put such personnel on our ships:

• Are we sailing with the intent of free and innocent passage?

• Are we putting our crews in harm's way?

• Have we jeopardized our P+I & War Risks insurance cover?

•Should we not notify cargo interests, Charterers, H+M underwriters?

• Do we need flag state agreement and that of the Master & crew?

• What is their status under the Athens convention?

• Above 12 Passengers a merchant ship changes SOLAS status

• Does the class safety certificate allow for so many super-numeries?

These are just a few of the un-answered questions that come to mind when contemplating the idea of placing armed or unarmed mercenaries or soldiers on merchant ships.

There are also some legal issues:

• Who defines the imminence of attack, the level of response and liability?

• Will pirates, returning fire at a merchant ship have the opportunity to claim that they were acting in self-defence, as the ship fired first?

• What level of proof will the ship be required to provide to justify the use of lethal force?

• Who is in command of the situation? There is a conflict of interest between command of the master and that of the mercenary commander, while SOLAS (Article 34) clearly states that command always rests with the master.

• Will the mercenaries and the shipping company be risking an international legal entanglement costing far more than any pirate's ransom demands?

• Who will carry out accreditation and due diligence responsibilities, and basically police the private mercenary companies? There is a radical difference between contracting third parities on land and doing so at sea.

• What risk is involved with the cargo interests, cargo damage and the risk of negligence being judged-does the use of armed mercenaries "taint the insurance" These questions need to be addressed before a disastrous incident unfolds.

Furthermore BIMCO at their meeting in Athens on the 3rd June 2009 decided against placing either armed or un-armed guards or soldiers on to Merchant ships as the consequences of such action could be too dangerous.

Additionally, Intertanko declared that arms on merchant ships are no way to fight piracy. The use of arms "escalates the violence" from piracy and increases the risks to crew members.

On the other hand, the US Constitution's unique reference to the right to bear arms could be an influence on the US approach to the problem.

However the U.S. Defense Department has successfully deflected a Congressional effort to require that military detachments be assigned to U.S.-flagged merchant ships carrying U.S. aid or other governmental cargo that are operating in pirate-infested waters. The chairman of the House Subcommittee on Coast Guard and Maritime Transportation attached an amendment to this effect when the House debated the National Defense Authorization Act (H.R. 2647).

During the debate, the Ranking Republican of the House Armed Services Committee had argued against the amendment, noting that the U.S. Navy feared that "expanding the deployment of ESTs [embarked security teams] would negatively impact other operational commitments."

The Navy was more successful in its opposition stance when the Senate wrote its version of the defense bill. The Senate bill had no provision comparable to the amendment.

A House-Senate conference committee convened and when the compromise bill emerged from conference; Section 3506 of H.R. 2647 called only for a report to Congress. The Defense and State Departments are to report on their efforts to (1) eliminate or reduce legal restrictions on the carriage of arms and use of armed private-sector security teams on United States-flagged commercial vessels for purpose of self-defense in areas that are designated as being at a high risk of piracy, (2) negotiate bilateral agreements with other nations to allow United States-flagged commercial vessels carrying government cargos, such as food aid, that must transit areas designated as pirate-infested to enter foreign ports while carrying arms or embarked armed private-sector security teams for the purpose of self-defense, and (3) establish common standards for the training and professional qualifications of armed private-sector security teams. Thus, not only is there no mandate given to U.S. military forces, the report will not even talk about the possibility of such a role.

The US Coast Guard has released two port security advisories that clarify how existing US laws apply to armed self-defense and carriage of firearms on ships. Use of arms to defend US-flag ships from piracy re-

mains the prerogative of the shipmaster, and masters retain control over and responsibility for the actions of even embarked security teams. Consequently, the Department of defense opted for Armed Security guards or mercenaries for US flagged vessels rather than providing trained professional soldiers.

The recent US executive order does present some further problems; this basically says that any company or individual associated with the US are not allowed to pay money to certain individuals and organizations on the SDN list. (Specially Designated Nationals). It is further stated that the EO is not intended to target piracy, but to target the individuals who use ransoms for terrorist activity against the US. The question does arise "what do we do if a ship is seized by pirates ?" do we just abandon the crew?. Thankfully the Office of Foreign Assets Control (OFAC) will authorize ransom payments if allowed. In the short term I feel that this EO will just stem the flow of information between the Shipowners' negotiator and the naval forces, until there are certain needed clarifications.

Iran has followed the US example and has publicly announced that they will put armed guards on the NITC tankers.

At the moment the status quo amongst the Somali pirates is "non-lethal". However the more you arm the merchant ship the more fire power the pirate will buy. This delicate balance can shift very easily in the other direction.

Today Pirates are reinvesting their ill gotten gains into the family business and are buying more sophisticated equipment such as AIS, VHF, RADAR, GPS, SAT-COM, AK47, RPG's, 50 caliber machine guns and bigger & faster boats, etc. etc.

Are we putting our crews in harm's way by trying too hard to protect them?

Last year, the NATO PBOS had a working Group meeting in The NATO Shipping Centre in Northwood. This was an eye opening experience. Here is a large group of dedicated professionals spending their days & nights protecting the merchant ships sailing in the Gulf of Aden. I believe that it is essential that

every vessel passing through the Gulf of Aden signs up to the MSC HoA and the UK MTO Dubai, all the contact information is available on Admiralty Chart Q 6099 (which incidentally is free).

Recently the UN asked NATO to look into the legal and practical aspect of placing armed soldiers on the vessels taking aid to Somalia. We believe that this is a sensible solution provided the soldiers deployed are from AMISOM, and a practical means of embarkation and disembarkation is developed.

Of course this idea could be further developed and extended to other vessels; in this way it would be possible to make better use of the very costly naval assets assigned to protect the merchant navy in the Gulf of Aden and Somali Basin.

In closing, we would like to add that we believe history is a great teacher, Our fathers discovered that patrolling was not such a successful way of protecting the merchant ships in WWII across the North Atlantic and that convoys with limited air cover was a better method of protecting merchant shipping.

If we all work together and organize ourselves with the assistance of the very able Naval forces in the Gulf of Aden area, we can reduce the number of hijacking and we believe that this will be the solution for the crisis in the Gulf of Aden until there is the Political will for a land based solution. We need to help the Pirate find an alternative, legal source of income, otherwise he will not give up the very lucrative act of piracy.

Finally, a point that we raise in every meeting, conversation and presentation on Piracy is that, we in the Merchant Navy are really appreciative of the service provided by the navies of the EU operation Atlanta and NATO and the Joint Naval Forces, but we need one other service, and that is assistance to the ship after it is released from pirates. Often we are unable to provide bunkers and provisions to even get the ship moving, because a supplier is too scared to come to where the ship has been held hostage unless there is a military presence to provide security. I know this is a sore point with the powers that be, but for the crewman this humanitarian assistance makes all the difference.

Mr. GEORGE D. PATERAS *was born in London in 1958. He received his Bachelor in Marine Engineering from the University of Westminster, London and his MSc in Naval Architecture and Marine Engineering from Massachusetts Institute of Technology. He is a member and advisor in various International Committees and presently he is an advisor to the Hellenic Ministry of Defense and Chairman of the Hellenic Shipping War Risks Insurance S.A.*

PIRACY PSYCHOLOGICAL FACTORS

by *Professor Anastasios M. Tamis,*
Notre Dame University, Perth, Australia and
Lt JG C. Ntinias H.N., M.Sc student

There is no doubt that global technology, global politics and global economy had influenced ideologies and cultures and seriously affected the interpretation of meanings, values and social behavior. It is also a well established fact that the conflict of cultures and civilizations stemmed from unbalanced and biased socio-economic grievances triggered globalization terrorism and thus threw into peril and destruction the world's social stability. Consequently, a significant number of researches and relevant literature have been published, trying to explain the behavior of a terrorist (e.g. pirates) through different conceptualized frameworks. So, what is/are the factors that stipulate an individual to "pick up a gun" and express an aggressive behavior? The answer will arise through the perception of social psychology. From this point of view the aggressive behavior or generally the attributes of a terrorist are considered as a gradual progression in which the characteristics of an individual interact with environmental factors. Therefore, in the present article an attempt is being made to portray certain relevant social psychological processes namely social influence, social interaction, social identification, social conformity/compliance, ingroup/out-group theories etc that can contribute in increasing our knowledge of terrorist behavior. It is worth noting that this approach does not aspire to supplant the sociological and psychological perspectives whose contributors we considered to be equally necessary and enriching. Equally important in the debate and analysis about the origins of globalised terrorism is the contribution of political-science and religion studies.

According to the social psychology approach pertaining to terrorist (e.g. pirates) attributes, firstly, we shall define the term of Social Influence as being the process whereby a person's attitudes, opinions, beliefs or behaviors are altered or controlled by some form of social communication. It includes conformity, compliance, obedience, persuasion, minority social influence, group polarization and the influence of social norms.

In terms of terrorism, a significant number of studies have arguably suggested that the causation of inducing or even triggering terrorist behavior seems to rely heavily on the political subculture in which subsequent terrorists are socialized in the context of and within the framework of their family relations, group of friends, school, local community. Growing up in an unstable environment marked by nationalist values, dogmatic cultural meanings or by the strong influence of certain extremist religious currents could be assessed as decisive factors (San Martin, 2005). Some of these unstable environments usually predominate individual poverty, grievances, injustice and inequality making people living within susceptible, by motivating the role of a group's dynamics and peer pressure. Like Sageman (2004) demonstrated that networks of friends or relatives were instrumental in the radicalization process. In addition, a growing sense of alienation and a feeling of insecurity among youth make them "available" under the power and dynamics of social groups, facilitating the process of conformity. Conformity Groups provide expectations for individual beliefs and conducts that result in shifting individual attitudes, opinions, and behaviors in favor of group norms (Sheriff, 1935)- and compliance-Compliance Groups foster increased compliance with group requests and obedience to orders. It was found that high group cohesion, isolation from alternative groups, increased cost of defiance, and the degree to which the group satisfies individual needs increase the likelihood and severity of group conformity (Milligram, 1965)- as a need of response to the aforementioned social instability and its characteristics, perpetrating terrorist acts.

In terms of intergroup dynamics, the process of social categorization offers members of a group the sense of necessity. They categorize the world into "us" and "them" and their perception that anyone who is belonging to an out-group is considered as a target of violence. Thus, from the point of view of the members of terrorist (e.g. pirates) organizations, acts of violence against civilians are justified because civilians are part of the enemy. The psychological mechanism of categorization takes place by exaggerating the differences characterizing the in-group and the out-group perceptions and knowledge. This psychological distance is achieved apart from the sense which is given to a member of a group, also by the adoption of terrorist ideology, values which will be fulfilled by aggressive behaviors. If this psychological distance will be combined with the perception of rewards then this combination constitutes a motivation tool that could be useful for terrorist leaders. Group polarization creates strong divergences and severely manipulates individual attitudes to the extreme

(Moscovici and Zavalloni, 1969). Thus, social interaction that takes place during these processes combined with other factors help push individual members to a radicalized state of affairs.

Social identity is another process that can contribute an appropriate explanation and approach to our primary question: "what is/are the factors that stipulate an individual to "pick up a gun" and express an aggressive behavior". Why is the element of identity important? All people have basic human needs for a sense of belonging, an identity, recognition, and security. First of all Social Identity Theory asserts that group membership creates in-group/ self-categorization and enhancement in ways that favor the in-group at the expense of the out-group. The examples (minimal group studies) of Turner and Tajfel (1986) showed that the mere act of individuals categorizing themselves as group members was sufficient to lead them to display in-group favoritism. After being categorized of a group membership, individuals seek to achieve positive self-esteem by positively differentiating their in-group from a comparison out-group on some valued dimension. This quest for positive distinctiveness means that people's sense of who they are is defined in terms of 'we' rather than 'I'. More often than not, we define ourselves by first identifying what we are not and by distinguishing ourselves from others. Consequently, identity is shaped by the way we identify those members of the in-groups with whom we associate and the out-groups with whom we disassociate. Attachments to in-groups and preference of in-groups over out-groups are universal characteristics of human social life. These attachments and preferences result in a variety of in-group and out-group behaviors. The more negative behaviors include stereotyping, discrimination, prejudice, and violence (Brewer and Brown, 1998:558-559). Members perceiving themselves as members of the same group greatly help them to meet the demands of terrorist activity (Taylor, 2003). They put the interests and goals of the group before their own, and hence increase their commitment to the movement and their disposition to sacrifice themselves for it. The greater the identification with the terrorist group, the greater the identification with its goals and norms, and the lower the likelihood of disobedience to directives and orders from group leaders. More often than not, people who experience intense frustration and insecurity enough to hold a deep and violently aggressive sense of others are living in politically unstable and economically fragile societies. Unfortunately, the leaders of a terrorist group or organizations can play on group identities and frustrations to build enemy images in an effort to redirect internal dissent away from them and onto others. As a result, conflicts and terrorist attacks

with the out-group become functional serving purposes and values beyond the culture of a balance and ethic social life.

In this almost codified discussion paper we attempted to offer an introduction to the debate on terrorist/pirate behavior from a socio-psychological perspective. Terrorism and terrorist behavior specifically is a complex phenomenon that needs in depth research through combined conceptualized frameworks. In the context of pirate's behavior, taking into account the aforementioned as well as the fact that a …

pirate's behavior is motivated mostly by economical reasons which in turn are caused by political turbulences,

a research approach could be considered simpler. This could be implemented by utilizing an interpreted approach and basing our knowledge and meaningful reality on the epistemology that human practices are being constructed in and out of interaction between human beings and their direct and indirect cultural environment and transmitted within an essentially socio-psychological context.

Professor Anastasios Tamis was born in Thessalonice, Greece. He arrived in Australia in 1971. He has been appointed Head of the Department of Hellenic Studies (1992-1997), inaugural Director of the National Centre for Hellenic Studies and Research (NCHSR) (1997-2008), founder and inaugural Convenor of the Dardalis Archives of the Hellenic Diaspora (1992-2008) and inaugural President of the Australian Institute for Macedonian Studies (1986-2009), Professor and Academic Post-graduate Co-ordinator, University of Notre Dame, Australia (2009). Professor A. Tamis has been internationally acknowledged as a world authority in Greek Sociolinguistics and the history of Greek migration and settlement. He is also considered as the expert scholar on the Hellenic Diaspora and the State of the Greek Language in a Language Contact situation.

LtJG C. Ntinias graduated the Hellenic Naval Academy in 2000 and has served in various Hellenic ships (Destroyer, Fast Patrol Ship, Frigates), mainly on frigates as a staff officer. He has received a psychology bachelor degree from the Panteion University of Athens (2007) and he is an M.Sc of the University of Notre Dame in Australia. His current research deals with the working environment on a frigate and leadership issues (psychological factors affecting a MIO team). He is currently

SECURING A WORLD LIFELINE ©

by   U.S. Colonel (Ret.) Gus Moutos

Since the days of ancient mariners, the Red Sea, the Arabian (Persian) Gulf and the Indian Ocean have been the trade routes, and indeed the life blood, of many nations, particularly European nations. Nations of Old Europe perished when these trade routes were closed.

The same holds true in today's world. The most economic and useful trade routes from Europe to Asia are still through the Suez Canal and near the Persian Gulf. All types of commerce and travelers pass though these areas and must endure the threats of the Indian Ocean especially close to the coast of Africa and the Straits of Molucca in Indonesia.

Unfortunately these trade routes have choke points that can stop or severely limit the passage of commerce. Each of these choke points/danger points requires careful analysis for a diplomatic or military solution. Planning must be made now when time permits a less hurried effort to find solutions.

THE THREAT:

1. The Suez Canal. We can recall an earlier time when Abdul Gamal Nasser sunk a vessel and rendered the Canal useless for an extended period of time. The Middle East is a powder keg that could explode at any time and the canal could be closed by military action or terrorist activity. The canal is narrow and cannot be bypassed. NATO involvement is essential to ensure peace in the Middle East and cooperation with Egypt to secure the canal. Security forces, primarily Egyptian, must maintain constant vigilance. A NATO contingency to secure the canal's safety in time of hostilities must be explored.

2. The Horn of Africa. The threat there involves a multitude of possible actions. Yemeni militants could close the passage by terrorist action. Terrorist forces from Djibouti, as well as Somali pirates, could threaten the passage. All of NATO's political power must be focused to insure that Yemen remains a viable nation capable of handling insurgent threats. Yemen is a poor country requiring massive economic and technical assistance to survive. In the absence of a viable Yemen, NATO must plan for the security of the Horn of Africa and the Gulf of Yemen. A secure Yemen can provide NATO with a desirable operations base on Socotra Island where supporting NATO forces could be stationed.

3. The Somali Coast. This Gordian knot for regional security will require constant political maneuvering to secure a stable and friendly Somalia. In the absence of that and barring direct NATO military action on the Somali coast, a presence of NATO naval forces will be required for a long time. This will be expensive and tiring for participating NATO forces. A contingency for military land action will be required if the situation worsens.

4. The Straits of Hormuz. This presents perhaps the most difficult challenge. Iran can block this point with naval, air, or missile action. The present geopolitical arena involving Iran is a challenge for NATO. Iran possesses the military power to act quickly. To counter this, NATO must be prepared to deploy a large force to secure the straits. In addition, terrorists could cause paralysis in the straits and the Persian Gulf with or without Iranian help. The full capacity of the political power of NATO needs to be deployed as well as international pressure to insure that the Persian Gulf remains accessible. With the cooperation of the nation of Oman, contingency plans can be developed to address these dangers.

5. The Straits of Molucca. At present terrorist activity does not present a major problem, but NATO must keep an eye on the area.

*Photos from Operation EU ATALANTA
(Courtesy HS SALAMIS)*

Photos from Operation EU ATALANTA
(Courtesy HS SALAMIS)

Possible courses of action:

1. Enhance present operations with better surveillance and action forces.

2. Secure bases in Djibouti, Socotra Island, Oman, and the Seychelles for stable operations. From these points, forces, particularly heliborne or airborne forces on standby, can be sent into action rapidly. This can prove to be an economy of force move that will cost less than a large number of vessels operating at sea; that will provide a base to quickly launch forces in the area; and that will be a key basis for reconnaissance with a variety of craft and reduced cost (land based aircraft costs are less expensive than carrier based aircraft).

3. Mobilize political efforts to neutralize the threat. In today's difficult economy, diplomacy can have a major effect.

The security of these vital lanes is more critical now than ever before. NATO is the principal force to make it happen, and constant planning is a must for survival of the NATO economy.

In today's difficult economy, diplomacy can have a major effect.

Pirates acting like "sailing".
Photos from Operation EU ATALANTA
(Courtesy HS SALAMIS)

Colonel Gus Moutos (US Army, Retired)
spent more than ten years as a Foreign Area Operations Officer (FAO) in the Middle East. He served in several Arab nations and traveled extensively throughout the Middle East. His duties included advising governments in intelligence gathering and military organization, training, and operations.

THE CONTROVERSIAL ARGUMENT:
ARMING THE CREW OR ARMED SECURITY PROFESSIONALS ?
A CAPTAIN'S PERSPECTIVE

by   Capt. James K. Staples, Master Mariner

When Captain Richard Phillips was taken hostage a common question asked by the general public in the United States was "why do you not have guns on board. You should be allowed to protect yourself?" This question is a good one and the reason sound, however the reality of shipboard operations and crew nationalities and religious beliefs make it a complicated solution globally. If we look at the situation on board U.S. vessels we find that crew turnover and how a crew member finds employment present some of the difficulties which go along with arming a crew. Most U.S. Captains feel that arming the crew is the wrong thing to do, for which I concur. The employment of a U.S. crewmember starts at the hiring hall; he must wait until a job is put on a bulletin board. The seaman then puts a shipping card in as his or her bid on the job and depending on a few variables they may or may not get the assignment. He must first be qualified to take that position, to be qualified he must have his S.T.C.W. for the rating he intends to sail in, he must be drug free and competent according to U.S.C.G. regulations. To receive his documents the seaman must have had a background check which is completed by the U.S.C.G. when he applies for or renews his documents. The background check is done every renewal period at 5 year intervals. Background checks on American seaman are comprehensive and extensive, generally most seaman have a clean record and receive their documents with no problem at all. As we know nothing is perfect and this is true with the American Merchant Seaman who has been checked out by the U.S.C.G. and F.B.I. It has been found that some seaman have extensive criminal backgrounds and never should have been allowed on board American vessels never mind foreign vessels. Yet they seem to find their way on board and become part of the crew. This does not happen often, but it does happen.

On board American vessels we have seaman who served timely prison sentences for criminal activities. Some seaman slip between the cracks, are overlooked or have a political connection to get the endorsements and documents needed to sign aboard a merchant vessel. No system is perfect and not all seaman need to be squeaky clean.

We as Merchant Seaman understand that and respect that a man or women with a checkered past may now have found a new direction in life or heard the calling of the sea; they should be given an opportunity for a new life and career.

After the seaman has had a full background check his documents are issued and he is clear to take a job on board a merchant vessel. With his documents in order he can now proceed to a hiring hall and look for his next job assignment. When he finds employment the paperwork is sent to the home office and entered into the computer system prior to boarding the vessel. He shows up on board and meets with the Master or Chief Officer, depending on who does the sign on. His info is checked and verified and he now becomes a member of the crew.

The problem with this system is that the Master must rely on the background check that was done on this crewmember. The Master has no idea of past history or criminal involvement this crewmember may have had in his or her past, virtually the Master knows absolutely

nothing about this person who has just signed on board his vessel. Depending on the crew size the Master may only know his top four crewmembers and may have never sailed with or even knows the rest of his crew when he sails the vessel from port. This plays into the issue of arming the crew, under U.S. firearms regulations it is illegal and U.S. laws prohibit anyone from having a firearm if you have had a felony conviction. To pass out weapons to crewmembers who the Master knows nothing about would be unconscionable and a criminal offence in itself if they had prior felony convictions. We must enable the Master of his vessel to know who has signed on board his ship including past criminal history. The Master's responsibility on board any vessel is endless and the safety of his crew always paramount. This includes keeping his crew safe from one another during the sea voyage. To have a crewmember on watch at 0200A.M. and having been convicted of rape and served time, now on watch with a young twenty something female could pose a potential life threatening situation for that young lady, the seaworthiness of the vessel may be in jeopardy as well. The Master must know who is on board when it comes to the crew. How can he be expected to keep intact security when he has no idea who is working on board the vessel?

This brings us back to the question of arming the crew which should not even be comp-templated with out first giving the Master a full and complete background check on all crew members. Having that being said, what we can do is to train a few individuals who are permanent crewmembers assigned to the vessel with small arms training and arming them. This has been done before and is actually being done

on some American vessel now. Most American vessels allow for the Master to have a small caliber hand gun. This is for his personnel protection and maintaining discipline in a lifeboat if the situation ever arises. The senior personnel on board any vessel's primary mission are that of the safe navigation of the vessel and having to defend the vessel would take away from that mission.

You will usually find the top senior personnel on board American Merchant vessels have been sailing together and know each other well. Unions in the U.S. offer their members small arms training and those who choose to take this course must qualify every two years to be proficient in the weapons of choice and stay current. With this training in place and the senior crew being permanent members on board it offers the option of weapons on board for emergency situation's to keep the vessel and crew safe. Having already sailed with weapons on board and in the ready while transiting the Malacca straits we never encountered any problems, with pirates or having the weapons on board

Now if we look at vessels other than U.S. flagged ships we will find multiple problems with arming a crew. The diverse nationalities which make up the crew on board can create its

on problems never mind adding weapons to the equation. Certain cultures and religions prevent the taking of life, even when defending themselves. This alone should prevent the arming of the crew. The language barrier on board ships which should have been addressed by S.T.C.W. but was not in reality will prevent the safe training when it comes to firearms. Now we must look at the same problem as we see on board American vessels with the background checks done on seaman. To try and imagine that non-U.S. seaman go under the same tough background checks as an American seaman would be reaching and trying at best. So we must assume that with the diverse nationalities and cultures that the Master must deal with, security is no more keeping the vessel safe than it is about being compliant and a paper chase. The Master on a foreign vessel must rely on a hiring or crewing company to do proper background checks of the crew he has coming on. This presents a huge problem for the non-U.S. vessel when it comes to arming the crew, and a very good reason as to why the crew should not be armed. The mission of the merchant sailor is to move goods from one port to another, it is not meant to be a role which involves defending yourself from pirates or criminals. The vessel needs to have on board the proper equipment in helping with the detection and to have the capability to deter the un- wanted intruder-pirate or criminal-terrorist from getting on board. The crew can and should be trained in these procedures.   What we are left with is the defense of the vessel and how do we get this accomplished.

The vessel needs to be defended for many reasons, first and fore most is the safety of the crew, then the cargo and vessel. How can we do this and at what point should we do this.

Keeping the crew safe is our first concern, so we must take up the challenge of getting this done. We have done this when it comes to a sinking, or a fire, we have lifeboats, survival suits and firefighting equipment. The crew having been trained and certified in emergency procedures on a regular basis have no problems in keeping the vessel safe. Piracy is a different issue; vessels have limited capabilities when it comes to detecting a pirate, never mind deterring or defending a pirate. This is an area that needs to be addressed and improved upon. We need to give merchant seaman the proper equipment to help combat piracy and terrorism at sea. The last thing any seaman wants is to become a hostage on board his vessel.

As we saw with Captain Stapleton on board the 18,000 ton cargo ship Boularibank that was attacked by pirates, not only did he have his crew to think about, his wife and 11 passengers were also on board during the attack. The crew repelled boarders by tossing timber in to the approaching boats path as they tried to make their way alongside. Sometimes you need to have luck on your side and this time Capt. Stapelton had all of that. The question we should ask is why the crew should have to rely on throwing timber on to the pirates, or use safety flares to try and defend the vessel. Real security needs to be added to the vessel security plan. Capt. Stapleton used his imagination and his seaman's wit when it came to defending his vessel. He trained his crew, and carefully thought out his tactics which proved to be successful. What he did was defend his crew and vessel, as a Master should be allowed to do, bravo Capt. Stapleton

If we are not going to arm the crews which has been recommended then we need to think in terms of real security and defense which will keep the crew and vessel safe. A few shipping companies have opted to put armed security teams on board to keep all assets safe until Somalia is stabilized, which could take decades. This can also present many obstacles for a shipping company when it comes to transporting weapons from one country into another, given strict regulations already in place. Insurance becomes another problem for the hired security team and the crew as well. The bigger problem is who are these security personnel being placed on board the vessels. The many overnight companies which sprang up

should cause some concern on many levels. First it is and always will be the Master's responsibility and liability if an accident or wrongful death occurs for either the crew or the so called pirate, if it can be proved he was indeed a pirate. Documentation must show with out a doubt that the crew and vessels safety was indeed in peril. We must develop a process where these security companies are qualified to have trained security personnel on board. Training records need to be made known to the shipping company as well as background checks on each individual. Security companies should have a quality and safety program in place, carry all the required insurance and have a reputable reputation.

Well trained security teams on board merchant vessel weather we want to admit it or not is in all probability the only real solution to keep the vessel safe, when under attack by a pirate or terrorist in high risk waters. If a pirate wishes to engage in the act of piracy then he must realize and deal with the fact that he will be met with resistance and his newly found venture could end in his demise. Security teams will be trained in the escalation of force and only use deadly force when absolutely needed and under the command of the Master. This must all be set out in S.O.P. and R.O.E. The primary goal is to keep the seafarer safe and allow him to do his profession.

When a merchant mariner signs on board a vessel he should not have to worry about being taken hostage or be at the mercy of an owner who will negotiate best price. These negotiations can take up to seven months and maybe longer, as the crew is made to suffer with out basic human needs, where is the out cry for these poor sailors.

If armed security teams are to be placed on board then we need to ensure that all assets are protected. The crew, cargo, vessel, and security team the corporation and management companies also need to be protected from liabilities if an un-wanted death occurs for either the pirate or the crew-security team. A very few companies now operating as maritime security companies offer services to protect not only the mariner, but also the vessel and company they represent. One such company located in Colorado Springs, Lakonian International can offer a shipping company endless opportunity when it comes to risk mitigation, insurance, logistics and security for their vessels and facilities.

We are now faced with a very challenging problem with no easy solution or way out. The shipping companies did not create this problem, but they must continue to do business in this part of the world and need to find solutions to this growing problem world wide. At the moment a hard decision must be made, weather to put armed security on board or not. The answer lies in the question. Do we want to keep our innocent crews and vessels safe? I believe that answer is YES. The time has come to make those difficult decisions and keep are vessels safe. The greater majority of ship Masters and crew will favor putting armed security on board their vessel, it's the right thing to do. The ship owner needs to find the right security companies for the job.

The last question to tackle is that the pirates will escalate their weaponry which is a viable question and concern by all; it could also escalate if the pirates see their prey count diminish as Masters do not stop their vessel once engaged by the pirate. Either way the chance exists or most likely the pirate will go to an escalation of weaponry as a ploy to intimidate the ships Master into stopping his vessel.

Captain James K. Staples is a Master Mariner and the president of OceanRiver llc. Company which is specialized in supporting merchant vessels with private security measures especially in the Gulf of Aden fighting against piracy.

Fig. 1 : NMIOTC's Container stack

Fig. 2: NMIOTC's Fast Rope Tower

Fig. 3 *Boarding Team member are trained from NMIOTC's Hellenic special Forces in Crew Control Technique*
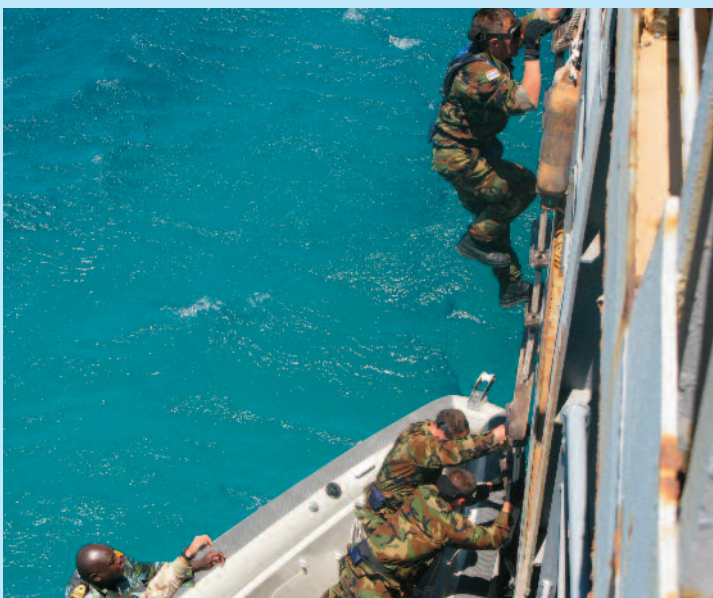

Fig. 4: *RHIB insertion onboard mock up ship ARIS*

Fig. 5: *NMIOTC's training mock up ship ARIS*

Fig. 6: *Boarding Team of a Naval Unit in tactical sweep techniques onboard NMIOTC mock up ship ARIS*

IMPACTS OF THE LEGAL FRAMEWORK ON OPERATIONS THROUGH THE EXAMPLE OF PIRACY

by   *LtCdr P. Sergis HN,* *HNGS Legal Advisor,*
Ph.D. Candidate

I would like to begin with one preliminary remark. Any views or opinions expressed in this presentation are solely those of the author and do not represent the views of the Hellenic Navy General Staff of the Greek Government.

It is maybe a truism to argue that one of the major factors to be taken into account during the planning and the execution of Maritime Interdiction Operations, especially in a Non Permissive Environment, is the legal framework, governing the conduct of the operation. Equally important is to take into account that the way operations are conducted has a profound impact on the legal regime itself. The conduct of the operations and the legal framework have a two-way relation, affecting one another. The aim of my presentation is to demonstrate this connection through the examination of the anti-piracy operations, conducted in the Horn of Africa.

The main reason for this relation is the inadequacy of the international legal regime concerning piracy. International law was always living up to its narcissistic view that piracy was one of its most regulated topics. The piracy provisions of LOSC are generally considered as reflecting existing customary law on the subject, repeating almost verbatim the relevant articles of 1958 Geneva Convention on the High Seas. Notwithstanding this, the resent growth in the piracy activity off the coast of Somalia, although it created a new unique field for international cooperation, has put into strains the existing legal framework of dealing with this disturbing phenomenon.

To start with the definition of piracy jure gentium, the most controversial aspect of it is the "private ends" requirement. Under Article 101 LOSC, piracy consists of any illegal acts of violence or detention, or any act of depredation, committed for private ends by the crew or passengers of a private ship, and directed on the high seas, against another ship or against a ship, aircraft, persons or property in a place outside the jurisdiction of any state. The distinction between acts committed for "private ends" as opposed to acts committed for "public ends", which is relevant to the discrimination between piracy and maritime terrorism, is not clear-cut.

The difficulty with the definition is that is based on one internal, psychological element. Instead of using one objective criterion, independent of the motives of the perpetrators, such as the undertaking of the act without due authority, which was the base of the distinction between pirates and privateers, the "private ends" formula was chosen. There seems to be general agreement that the concept of "private ends" should not be construed narrowly as to include only acts committed with the intent to plunder (animus furandi). Although plundering intentions strike at the heart of piracy definition, it is difficult to assess its parameters. Absence of "due authority" seems to suffice for some international law experts in order to characterize one act as piratical. Some others argue for one additional requirement especially during civil strife: if the attack is directed against "non-legitimate targets", these being the vessels belonging to the government that the insurgents wish to overthrow, it is qualified as piracy.

The discussion is not without relevance for the present situation in Somalia. Being the epitome of a failed state, Somalia has offered the perfect sanctuary for the pirates. Until now, their operations fall within the core of the piracy definition: the private gain seems to be their motive. But what about if, for example, the pirate groups join forces with the al-Shabaab, the Islamist insurgency group, or begin subsidizing its activities? In such situations we can admit that both private and political motives exist and a sort of balancing is required in order to determine whether an attack is a piracy jure gentium. Following the "due authority" criterion, if the victims of the attacks are foreign merchant vessels, it is obvious that such actions come under the definition of piracy. Although de lege ferenda, piracy and maritime terrorism cannot be assimilated, the gradual widening of the piracy definition can be expected, in order to include the new enemies of the whole mankind (hostis humany generis).

As far as the suppression of piracy is concerned, in accordance with Article 110 LOSC a warship or any other duly authorized ship or aircraft, which encounters on the high seas a foreign ship is justified to board her, if there are reasonable grounds of suspecting that she is engaged in piracy. But how the reasonable grounds are founded? Just mere "grounds" not suffice, they must be also "reasonable".

There is no other way to specify when this precondition exists, but to base the decision on the modus

operandi of the pirates, that is on the information already available on the way pirates operate. Taking into account that the ability to intervene to suppress piracy is an exception to the freedom of the high seas and as such must be construed narrowly, the most preferable way is to create a matrix giving different weight to the various relevant criteria. That is actually what was done by the tactical messages of the Force Headquarters (FHQ) of the Operation "ATALANTA". But this is not the case with all the forces operating in the region. The use of more loose criteria involves the danger of impairing the right of the freedom of navigation on the international waters. The utilization of the available information is one of the most vexed problems in the application of legal norms.

The boarding operations against the suspected vessels are generally classified into three distinct categories: unopposed (or consensual or cooperative) boardings – non-cooperative boardings – opposed boardings. The use of the term "consensual boarding" is somehow tricky, leading to confusion with "consent" as a circumstance precluding wrongfulness. Under article 20 of ILC Articles on State Responsibility "consent by a state to particular conduct by another state precludes the wrongfulness of that act in relation to the consenting state, provided the consent is valid and to the extent that the conduct remains within the limits of the consent given". Consent in this legal dimension is used in the boardings conducted during the Operation "Active Endeavour", where it serves to legitimize the conduct of the units participating.

On the other hand, the terminology used to qualify the anti-piracy boarding operations has no legal dimension, expressing only the expected difficulty of the boarding operation based on the level of cooperation of the suspect vessel and relating the authorization of the action to a specific level in the military command, in accordance with that difficulty. There is no need for consent either by the master of the vessel or the flag state or both in order to conduct the boarding if there are reasonable grounds for suspecting that a ship is engaged in piracy. This authorization stems from Article 110 LOSC. That is why it is preferable to use the terms unopposed or cooperative boarding only, in order not to sustain the existing uncertainty.

If the suspicions are proved, then follows the perplexing issue of the arrest of the suspected pirates and the disposal of their vessels and paraphernalia. Under Article 105 LOSC, which is the Achilles Heel of the LOSC anti-piracy provisions, the warships of every state are allowed to seize a pirate ship or aircraft, or a ship or aircraft taken by piracy and under the control of pirates, and arrest the persons and seize the property on board. The courts of the state which carried out the seizure may decide upon the penalties to be imposed, and may also determine the action to be taken with regards to the ships, aircraft or property, subject to the rights of third parties acting in good faith.

Thus, Article 105 LOSC establishes universal legislative and enforcement jurisdiction over the international crime of piracy or piracy jure gentium. Although every state may seize the pirate ship, the subsequent judicial proceedings, pertaining to the penal and civil aspects of the case, must be carried out by the courts of the state, which carried out the seizure. Of course, LOSC does not create any obligation upon the seizing state to try the suspected pirates. That state, simply, "may" decide upon the subsequent action. The point made here is that the wording of Article 105 precludes the transfer of the arrested pirates to any third state, other than the one, which arrested them. This interpretation is not based only on the text of the Article and the striking difference between the language of its first and second sentence. It is also supported by the drafting history of the Article. The drafters had the intention to limit the trials to the capturing state. Other scholars have a different approach on the matter. They assert that nothing in Article 105 affects the right of a state with custody of a suspected criminal to either prosecute that person or transfer him to another state for prosecution. In accordance with customary international law, every state has jurisdiction to prosecute a pirate subsequently present within its territory. This assessment does not cover the transfer of the arrested pirates to a third state. Furthermore, it runs counter to the view that the articles of the LOSC reflect the current status of the customary international law on the matter.

It is possible that during a piracy incident different states could claim jurisdiction over the arrested pirates, based on different jurisdictional principles (e.g. passive personality, universal, flag – state jurisdiction ect). It is true that general international law provides no rule of priority between these competing jurisdictional claims. But this is not the case, when the potentially competing jurisdictions are based on Article 105 LOSC, which establishes the universal jurisdiction over piracy. In such a case, the above-mentioned Article gives any state the right to seize pirate ships and arrest the suspected pirates, to have them adjudicated upon by its courts. This right cannot be exercised at a place under the jurisdiction of another state.

Despite the content of Article 105, in practice, the nations operating off the coast of Somalia are very reluctant to prosecute the suspected pirates, due to the anticipated practical and legal difficulties. When the suspects are detained, they are seldom sent to the states that

captured them. We are actually facing the "death" of the universal jurisdiction of the capturing states. Taking into account that all the efforts to establish other mechanisms for prosecution, such as an international tribunal, a regional court or a special domestic champers with international components, have until now failed (despite the resent call by the SC Resolution 1918(2010)) and their prospects are rather faint, most of the arrested pirates are transferred to regional countries, in order to face trial. For example, EU had agreements, in the form of exchange of letters, with Kenya and Seychelles in order to facilitate the transfer of the suspected pirates to these countries. Kenya had accepted also pirates captured by US ships, pursuant to a MOU signed between the two states. This practice is not confined only to western countries. For example, Russians have transferred arrested pirates to Yemen. Although, the penal systems of the regional states may have reached the saturation point, as it is shown by the resent announcement by the Kenyan Authorities that they will not try any more pirates detained in international piracy operations off the coast of Somalia, there does not seem to exist any viable alternative at the moment.

Although there are claims that such transfers from capturing states to third states is of dubious legality, there exists a relatively big amount of state practice to conclude that a contra legem custom has emerged, allowing such transfers to take place. Although the creation of a customary rule, which is contrary to the provisions of a treaty, is not free of difficulties, such a possibility exists. In our case, we have a general practice, which does not fit into the provisions of the treaty, with the concomitant opinio juris. It is noticeable, that no objection has been yet lodged, at least to my knowledge, regarding the transfers of the arrested pirates to regional countries, based on the violation of the provision of Article 105 LOSC, proving the acquiescence of the international community to that practice. The treaty provisions, which are replaced by the new customary rule, fall into desuetude. As long as the human rights of the arrested pirates are safeguarded, there is no legal difficulty to acknowledge that a customary rule has emerged, regarding the potential transfer to third states.

The last comment prompts us to question if the rights of the suspects are fully respected. To begin with, Article 105 LOSC provides that the judicial power is responsible to determine the action to be taken with regard to the ships, aircraft or property of the pirates. The provision of LOSC has a profound reason: only the courts must have the power to adjudicate a penal issue that seriously affects the property rights of the suspected pirates and maybe the rights of third parties acting in good faith. Its rationale is to protect individuals from arbitrariness. Despite this provision, the seized property is further destroyed without any involvement of any court, only by a decision taken by the commander of the naval unit. Some scholars argue that a contra legem custom is created; enabling members of the executive branch of the government, such as the naval officers to take the decision for the destruction of the property, when there is no other option available. That is the case especially when the suspected pirates are subsequently freed. It is doubtful whether such a custom can exist. It is beyond the ambit of this presentation to deal with the jus cogens character of the provisions that protect human rights. The issue is not free from controversy in the international literature. For our purposes, is sufficient to remind that:

"Everyone is entitled in full equality to a fair and public hearing by an independent and impartial tribunal, in the determination of his rights and obligations and of any criminal charge against him" (Article 10 Universal Declaration of Human Rights).

The destruction of the vessels and the equipment of pirates is not the only controversial aspect regarding the respect of the human rights of the arrested suspects. At sea, suspects most of the times have been captured with no ability to access legal advice and in the absence of an interpreter so they are unable to communicate in their Somali language or understand the evidence, despite the fact that that the UN Covenant on Civil and Political Rights stipulates that in the determination of any criminal charge against him, everyone shall be entitled to be informed promptly and in detail in a language which he understands of the nature and cause of the charge against him (Article 14). Moreover, the EU Standing Operating Procedure for the arrest of pirates provides a 48 hours timeframe for the Commanding Officer of the naval unit that took the pirates into custody, to reach a decision whether the suspects are going to be arrested or not, without determining anything about their legal status during this period. Operating under these "wholly exceptional circumstances" poses great problems regarding the respect of human rights.

Piracy jure gentium exists only in international waters. All piratical acts that occur in the territorial sea of any state do not qualify as piracy. That is why the distinction between "piracy" and "armed robbery" was introduced by IMO, in order to signify the difference resulting from place the illegal acts of depredation take place. As is evident from Article 105, universal jurisdiction exists only for the international crime of piracy. Subsequently, the states that have incorporated the crime of piracy in their internal penal systems refer only to piracy jure gentium. Despite the fact that the relevant

UN SC Resolutions authorized states cooperating with the TFG in the fight against piracy and armed robbery at sea off the coast of Somalia to enter the territorial waters of Somalia for the purpose of repressing acts of piracy and armed robbery at sea, in a manner consistent with such action permitted on the high seas with respect to piracy under relevant international law, there is not, at least the present writer's knowledge any country with prescriptive jurisdiction for the armed robbery in Somalia's territorial waters. The issue is of great importance, taking into account that the current operations of western forces in Somali Basin take place very near to the coast of the country, just outside the camps of the pirates.

Another issue regarding the relevance of Article 105 LOSC is the provision that every state may seize a ship or aircraft taken by piracy. Until now this possibility, although perfectly lawful, has not be explored by the naval forces operating off the coast of Somalia. Rescue efforts are not launched, once pirates have taken control of the merchant vessel, as it is often felt that intervening would endanger the hostages. Of course there are some rare incidents were military forces intervened after the boarding of the vessel by the pirates, but in all of these situations the pirates were not in control of the ship and the crew was locked in a safe place. Probably we are facing another erosion of Article 105 LOSC, moving towards release operations with the consent of the flag state of the merchant ship, as it is provided by the ROEs of operation ATALANTA.

Leaving the issues of Article 105, another interesting point is the confusion created by the current Maritime Interdiction Operations, regarding the "right of approach". Under customary international law the right of approach deals with the privilege of any warship to close the distance with merchant vessels in order to verify their nationality. Although, the customary right of approach was not subsequently codified by the treaties regarding the law of the sea, it is still applicable and it is implicit in the provisions of Article 110 LOSC. The current practice of the naval units taking part in the operation ATALANTA uses the term "approach" with a different meaning: An approach is defined as a de-escalatory low key interaction, which gives no jurisdictional powers and has as a prerequisite the invitation of the master of the vessel. Although approach does not include "boarding exploitation" of the vessel, it is routinely used by the naval forces. The same idea is materialized by the NATO forces under the term "consensual visit". Although as a principle a consensual visit is conducted at the invitation of the master of a vessel, which is not otherwise subject to the jurisdiction of the boarding officer, nevertheless it allows for a rapid verification of the legitimacy of a vessel's voyage by obtaining or confirming vessel documents, cargo, and navigation records without undue delay to the visited vessel. The blurring of the different definitions ("right of approach", "approach", "consensual visit", "consensual boarding") is an expression of the tendency to the relaxation of the current rules of international law regarding the interception of merchant vessels on international waters.

Because of the absence of a "leviathan" in the international system, the issue of the change in international law is a very complex one. A constant interplay between existing norms and emerging customary rules ensures the adaptation of international law to the current circumstances. In this period of international upheaval, a new balance between mare clausum and mare liberum is emerging. In such circumstances the two-way relation between conducts of the operations and legal framework is heightened.

Hellenic Navy Seals during a Boarding Operation

LtCdr Panagiotis Sergis HN was born in Athens in 1973. He graduated from the Hellenic Naval Academy in 1995 and has since served onboard various frigates of the Hellenic Fleet, as a deck officer.

He has obtained a law degree from the University of Athens (2002). He has received a Law and Legislation Master (LLM) from the University of London (2004) and from the London School of Economics (2005). He has also acquired a MSc in the field of International Relations, from the Panteion University, Athens (2008). He is a PhD candidate of the before mentioned University.

From December 2008 to April 2009 he has served as the Legal Advisor to the Force Commander of the first EU naval operation, "ATALANTA". He is currently serving at the International Law Department of the Hellenic Navy General Staff.

PIRACY AS AN INTERNATIONAL SECURITY BREACH

by **Lt. Spyridon Mazarakis** , *Ph.D. Canditate*

After the end of the Cold War, a new approach to security emerged. The concept of security has moved away from classic state-centric relations, and has broadened to include other aspects of security that exceed national borders. With the shadow of the Cold War lifted, critical security scholars recognised a wide range of security threats ranging from societal and economic to environmental and political threats. This concept was captured by the Copenhagen School of Security Studies founded by Barry Buzan, Ole Wæver and Jaap de Wilde. Moreover, the concept of human security started to become the focus of security and gained the attention of all international organisations and institutions. In its 2009 Annual Report, the UN Office on Drugs and Crime recognises maritime piracy as being one of the most significant emerging forms of transnational crime. Consequently, maritime piracy came out from the background which was after the end of its Golden age and re-emerged as a protagonist of the international scene. Piracy, as an emerging form of crime, is a challenge for international security as security is conceived today. Obviously maritime piracy constitutes a security issue which involves the loss of life (human and societal security) as well as loss of property (economic security) and may include collisions at sea and potential environmental disaster (environmental security). With oceans covering almost three-quarters of the earth's surface and the 90 percent of all international trade transported by sea , piracy and any kind of maritime crime is undoubtedly an issue of international security.

Fig. 1: *Image of Reported piracy and armed robbery incidents during 2010 (4)*

Piracy as a phenomenon has an interesting circular nature. Piracy finds the opportunity to flourish in areas which are characterised by an absence of law enforcement and a vacuum of authority, where simultaneously undermining the structures of civilisation and governance. Even though piracy was always conceived as a crime which all states had the obligation to counter piracy was never eliminated But why is piracy such a diachronic phenomenon? The answer is obvious; As Martin Murphy suggests "piracy is a low-risk, criminal activity that pays well." Undoubtedly, profits from piracy are disproportionate in contrast to the losses of those who are engaged in this kind of activity. Piracy has the same requirements as other forms of organised crime (trafficking, armed robbery, smuggling) : motive and opportunity. The motive is almost always the same, the gain of wealth. The challenge for governments and the international community is to eliminate opportunities. Piracy is an opportunistic crime which takes advantage of areas with limited law enforcement caused by the existence of weak state entities in the area. During recent years, piracy has increased in such areas around the world for instance the Gulf of Aden, the Malacca Straits and the Gulf of Guinea. Peter Lehr and Hendrick Lehmann argue that successful piracy depends on an 'enabling environment.' Such an enabling environment is characterised by the existence of narrow and congested waterways, in conjunction with the existence of important and dense sea lines of communication, near to coasts which feature mangrove swamps or waters littered with small islands and islets. An amplifying cause of an enabling environment is the existence of failed states in the area which are incapable or unwilling to uphold law and order. As it is shown n the following image the areas of the contemporary piratical activities is centred in places with such an enabling environment. The area of the Gulf of Aden and of the Horn of Africa is one of them.

The escalation of piracy around the world and mostly off the coasts Somalia and the Gulf of Aden, in 2008 concentrated the interest of the international community and caused a coordinated response in this area. There, piracy was conceived as a significant security issue which had to be countered. What caused the intervention of the international community can be found in the of the IMB 2008 Annual Report, "from every perspective, the phenomenon of Somali piracy is unprecedented and has spiralled out of control." The international community reacted because of the extraordinary nature

of the Somali piracy. This is partly because large scale piracy produces larger scale insecurities. It is arguable whether the international community was willing to intervene in the case of Somali piracy if the incidents in the area were limited to the classification of low level armed robbery. On that an important question arises; which is the threshold which piracy operations should pass in order to trigger international response of such a scale as in Somalia?

Assessing whether piracy should be interpreted as a security breach or as an ordinary crime is connected with the scale of the actual attack. Piracy targets vary from small fishing and sailing boats to cargo ships and large tankers. The difference of these patterns of attack is that the first are simply opportunistic or spontaneous attacks in contrast to the second which need an organised and planned attack. The figures of the IMB reports show some interesting results.

This table shows the tendency of pirates to execute more sophisticated attacks than before. A comparison of the figures of 2003 with these of 2009 illustrates this tendency.

The degree to which it could be a threat to security depends on its scale and organisation. The argument that low level armed robbery can create a significant economic security breach is debatable. In accordance with the Danish Institute for International Studies 2009 Report on piracy, attacks involving petty theft from ships in harbour or at sea can hardly have any significant impact on global shipping or world trade. On the other hand there are some direct and indirect effects which influence economic losses from piracy. The direct effects concern loss of cargo, money or even the whole ship; damage to a ship or cargo; ransom money; and even delays caused by detours to avoid high risk areas or investigations. The indirect effects concern increase the insurance costs, increase in costs to provide additional security measures on board or on shore, and costs incurred in the fight against piracy. It can be argued that the larger amount of economic losses from piracy is not caused by actual attacks but by the effect of piracy in the feeling of insecurity in high risk areas and by the efforts to provide security in such areas.

Concerning social and environmental security, the scale of the attack is crucial to determine the level of the threat. Undoubtedly, the higher the scale of the attacks, ,the higher the level of the threat. When low level robberies occur the feeling of social security may decrease but it will not be the same if major hijacks start to occur since they involve greater loss of life and show the existence of more organised groups of pirates which in fact may became a serious challenge for the regime of the states in the area. In the same sense, in cases where major hijacks occur, the danger of an environmental disaster is closer since the ship is controlled by criminals which may or may not have the capabilities to navigate the ship safely.
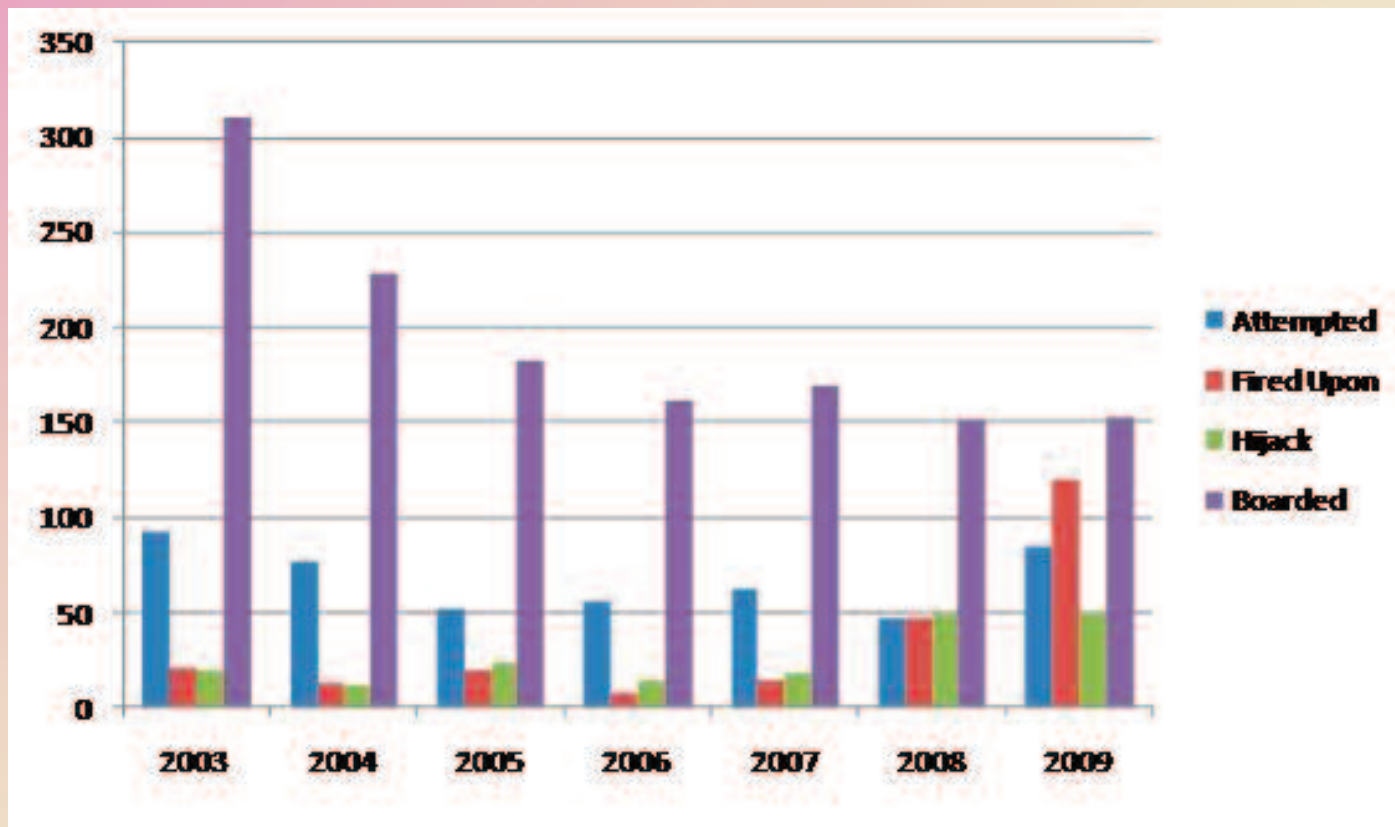

Fig. 2: *Types of Attacks (Figures corrected as at 31 March 2009)*

Unfortunately, the facts show that pirates are becoming more ruthless and that they use more sophisticated equipment in their operations. There are reports which show that Somali pirates have started to operate at great distances off the coast of Somalia by using "mother ships" to extend their range of operations. Simultaneously, the pirates have improved their equipment and they now use GPS systems and satellite telephones for coordination together, along with sophisticated weapons such as MANPADS (Man Portable Air Defence Systems) and RPGs (Rocket Propelled Grenades). Moreover, there are indications that Somali pirates are plugged into an international network which feeds information on the movements of vessels in the area. The highly sophisticated and coordinated attacks of Somali pirates show that the international community has "to deal with organised piracy, not with mere acts of ad-hoc piracy occasionally being committed by impoverished fisher folk."

Indeed, piracy of the scale of low level armed robbery can hardly be conceived as a serious security breach which needs extraordinary measures to reverse the situation. However, as was shown earlier pirates have started to organise themselves and undoubtedly the profits from piracy will equip them with even more sophisticated instruments. The scale of contemporary piracy supports its description as a transnational security problem but the analysis of cases of piracy shows a graver future for international security.

The threat is the potential linkage of piracy to maritime terrorism which has dominated the security agenda since 9/11. The scholars of maritime security believe there is a link between maritime crime and piracy and maritime terrorism. The attack on the USS Cole in October 2000, undoubtedly the work of Al-Qaeda, illustrates the harsh possibilities when terrorist organisations operate at sea. Piratical activities conducted by terrorists constitute a threat for international maritime security greater than ever. So far there has not been sufficient evidence to support actual cooperation between pirate groups and terrorist organisations. Martin Murphy argues that "Piracy and terrorism show no apparent links, but the presence of piracy is a possible indicator that the conditions exist for maritime insurgency and maritime terrorism to take root." Arguably, the 'soft underbelly' of the maritime environment and shipping industry is one of the potential targets of global terrorism. It is possible that when terrorists are unable to carry out acts on land, due to countries' security services, they will instead turn their efforts to the vulnerable maritime environment. The possible consequences of such a situation are beyond the foreseeable future. It is not in the West's interests to have a 'war on piracy,' as this would hamper the customary value of the freedom of navigation and will affect the international shipping industry. However, policy makers must act before such levels of piracy occur that would result in the making of a 'war on piracy'.

Even though the consequences of piracy today seem to be regional and rather limited, the potential escalation of this phenomenon may include further threats which will have a global influence. There is evidence which shows that piracy is starting to be more sophisticated; if has ceased to be just a robbery of small vessels and sailing crafts, and is starting to include attacks on larger ships such as tankers and cargo ships with the objective of hijacking and kidnapping for ransom. Moreover, there is a more frightening possibility. The potential linkages of piracy groups with terrorist organisations have created a threatening combination which may disturb the maritime domain in the recent years. The maritime environment, with its vast oceans, seems extremely vulnerable and opportunistic in front of the two threats of piracy and smuggling to maritime terrorism. An investigation must begin with the assertion that contemporary piracy is a global phenomenon but not a global problem. The threshold which the level of piracy must pass in order to be conceived as an issue of international security is debatable. The decision whether a situation is extraordinary or not is a matter of politics. The act of securitisation is at the centre of this process. Piracy in a region will be conceived as a threat to international when policy makers make it such through political speeches. The recent cases of piracy off the coast of Somalia and in the Gulf of Aden show that international cooperation, combined with domestic and regional efforts may bring about a suppression of this phenomenon. Cooperation between governments, agencies and organisations will not only suppress piracy but will also empower the maritime security environment to provide stability and development in the area. The question which must be answered is whether it is crucial to act before the emergence of a security breach in the maritime domain or wait until of has happened. This paper suggests that it is better to act in advance than rather react to a security breach. Maybe piracy is not a significant current international security issue but what if piracy evolves in something more threatening?

The only way to ensure the security of the seas is to develop a stable and secure maritime environment. The maritime domain must be protected by international law which would be robust enough to regulate international cooperation and action. As was discussed in the previous chapter, contemporary international law and subsequent special agreements have responded to piracy as a new type of organised crime. However, interna-

tional law has weaknesses which may constitute a significant problem in the face of future threats. Precautionary measures can be used as a safety belt for the development and further existence of a secure maritime environment. Piracy must be seen as a potential significant security problem and must be countered and anticipated today via international cooperation and action. Immediate action is important. Current piracy may not constitute a significant security threat but its potential and broader consequences are hardly foreseeable. Piracy must be countered as an issue of maritime security. Considering the extent and vulnerability of the maritime domain, it is highly risky to assume that maritime security is not a crucial issue. The international community must act before maritime crime reaches uncontrollable levels. Such an evolution would constitute a harsh situation which would need harsh measures to be countered. It is important to find "reasonable strategies and means" in order to suppress piracy and reduce the risk of an unsafe maritime environment "without sacrificing important values such as the principles of free navigation on the world's oceans and respect of the international law.

References

 Alan Collins, Ed., Contemporary Security Studies, (Oxford: Oxford University Press, 2007), p. 60.

 United Nations Office on Drugs and Crime, Annual Report 2009, United Nations, p. 4 http://www.unodc.org/documents/about-unodc/AR09_LORES.pdf (accessed May 28, 2009).

 United Nations Convention on the Law of the Seas, "Oceans: The Source of Life", 20th Anniversary, United Nations, p. 13. http://www.un.org/Depts//los/convention_agreements/convention_20years/oceanssource oflife.pdf (accessed May 20, 2009).

 Murphy, Small Boats, Weak States, Dirty Money, p. 24.
 Peter Lehr, Ed., Violence at Sea, p. 11.
 ICC, Live Piracy Map 1010

 http://www.icc-ccs.org/index.php?option=com_fabrik&view=visualization&controller=visualization.google map&Itemid=219 (accessed June 2010)

 ICC International Maritime Bureau, Annual Report 1 January–31 December 2008, p. 39.

 ICC International Maritime Bureau, Annual Report 1 January–31 December 2008, p. 5; ICC International Maritime Bureau, Report for the Period, 1 January–31 March 2009, p. 5.

 Bjorn Moller, "Piracy, Maritime Terrorism and Naval Strategy", International Relations and Security Network, Danish Institute for International Studies, DIIS Report 2009, p. 8, http://www.isn.ethz.ch/isn/Digital-Library/Publications/Detail/?id=96541&lng=en (accessed June 9, 2009).

 Roger Middleton, "Piracy in Somalia", p. 6.

 Peter Lehr, Ed. Violence at Sea, p. 17.

 Herbert-Burns, Bateman and Lehr, ed., Lloyd's MIU Handbook of Maritime Security.,p.9

 Catherine Zara Raymond, "Maritime Terrorism in Southeast Asia", p. 3.

 Peter Murphy, "Suppression of Piracy and Maritime Terrorism", p.40.

 www.nwc.navy.mil/press/Review/PressReviewPDF.aspx?q=65 (accessed 20 July 2009)

 Derek Johnson and Erika Pladdet, "An Overview of the Current Concerns in Piracy studies and New Directions for Research", Centre for Maritime Research, p. 34 http://www.marecentre.nl/people_and_the_sea_2/documents/piracy.pdf

 ICC International Maritime Bureau. Piracy and Armed Robbery against Ships, Annual Report 1 January – 31 December 2008.

 Murphy, Small Boats, Weak States, Dirty Money, p. 177.
 Moller, "Piracy, Maritime Terrorism and Naval Strategy", p. 31.

Lt. Spyridon Mazarakis H.N. graduated from the Hellenic Naval Academy and followed the normal carrier path of a Naval Officer. Today he is holding the position of Operations Officer of HS NAVARINON. He holds B.S., a M.Sc. in Global Security, from Cranfield University (UK). He has been nominated for Imbert Prize (awarded by the Association of Security Consultants) for his thesis on the contemporary anti- piracy law and its security implications. He has a special interest in Naval History and on various occasions lectured on Gunboat Diplomacy.

CAPACITY BUILDING AS AN ANSWER TO PIRACY

by   Dr. Thomas C. Bruneau &
       Lt JG Ioannis Nellas HN, *MSc student*

In every era mankind faces security challenges; however, one security challenge has remained throughout the ages, and its name is Piracy. Plenty of historical evidence proves that piracy has been an issue for international shipping since ancient times. In fact, there are historical reports on piracy that date from the 13th century BC. However, today many would expect that piracy is no longer serious security issue. Unfortunately, in the last several years piracy has turned into a major issue and the latest facts reveal that the piracy phenomenon is more complicated than many originally assumed.

The challenge of piracy is recognized globally. Indicative of the severity of the problem is the number of think tanks and regional experts that have focused on this issue, as well as the significant number of countries committing naval forces to address this challenge. This article attempts to present why capacity building on a regional level is the most promising way to address piracy by analyzing the origins of piracy in two localized situations, the Horn of Africa and Southeast Asia.

A wide consensus holds that piracy's roots are located ashore and usually it is a consequence of political and regional instability. In our age piracy is occurring in two areas of major strategic interest, the Gulf of Aden and the Malacca Strait in South East Asia. Clearly, piracy signals weak control over littoral waters in the region and weak local institutions that are unable to secure their maritime domain [1]. In closing, the 2009 International Maritime Bureau (IMB) report acknowledges 196 attacks in the wider area of the Gulf of Aden and about 30 piracy attacks in Southeast Asia [2].

Causal Factors of Piracy in the Horn of Africa (HoA)

The literature on this issue concludes that the causal mechanism of piracy in the HoA includes the following factors: intrastate conflicts, geography, cultural shifts, ship owner policy, and weak political and security enforcement institutions [1] - [3].

For the last two decades, Somalia has been suffering from a civil war between clans, ending up being a failed state. Likewise, due to domestic issues, Yemen is facing the danger of becoming a failed state. Both of these countries involuntary are hosts to pirate groups because internal conflicts provide pirates the necessary environment to direct and conduct operations [4].

Geography plays an important role, Somalia's coastline is estimated to be around 2000 miles long; since no coastguard or navy patrol these waters, and pirates are able to conduct their operations from a number of different bases without any trouble. Historically, the rise of piracy has been supported by the proximity of the Gulf of Aden to the Suez Canal. Yemen's geography also is very attractive to pirates due to its long coastline and proximity to high traffic maritime corridors ([4],[5]).

Piracy is supported from by a cultural shift on the part of the locals towards a more lenient policy against pirates. One of the main characteristics of the area is poverty, and piracy is providing a lot of money to the area. That is why many young Somalis view piracy as an optional professional choice [4].

Finally, two important contributors to the rise in piracy in the area is the lack of strong judicial/legal and security enforcement mechanisms. The failed-state status of Somalia limits it ability to put on trial any of the alleged pirates. Furthermore, the   European Union member states are unwilling to sign any agreement against piracy with Yemen due to the fact that Yemeni legislation opposes European Union laws regarding human rights on the issue of the death penalty. Consequently, the international community followed a different path and signed a memorandum with Kenya and Seychelles allowing these countries to put on trial alleged pirates ([3],[6],[7]).

Another aspect of this issue is the fact that piracy involves a number of jurisdictional restrictions that the international community has to overcome in order to intervene. In 2008, after a request from the Transnational Federal Government (TFG), the United Nations issued resolution UNSCR 1851 allowing the pursue of suspected pirate ships inside the Somali territorial waters by foreign non-Somali naval units ([5],[7]).

Causal Factors of Piracy in Southeast Asia

Southeast Asia is the other geographical area where, according to statistics, piracy still occurs and where it is worth attempting to distinguish the regional factors leading to piracy. The literature leans toward the same factors as those in the Horn of Africa, but on obviously different context [1] - [3].

The Malacca strait geography is as important as the Gulf of Aden since the Malacca strait is considered one of the most important, global strategic shipping routes. Indicative of the strait's importance is that half of world trade goes through this choke point ([1],[8]). The Malacca strait is about 600 miles long and is the frontier between the three states of Singapore, Malaysia and Indonesia. Specific features like the strait's width (in some areas it is only 1.5 miles wide), make it conducive to attacks.

Furthermore, the emergence of piracy has been helped by the fact that these countries do not have the necessary technological assets and means to keep an effective watch over the whole length of the strait. Pirates were left free to continue their attacks since there was no competent security authority to establish order in the Strait of Malacca ([1],[3]).

In Southeast Asia during difficult economic times, piracy provided a supplementary income to some villages. In order to avoid poverty, a number of people, reduced their moral standards and became pirates. The poverty in the region was so high that local fishermen were tempted by the sight of large ships transiting at very low speeds due to local draft limitations. In a sense, the pirates follow the same tactic as the pirates in the HoA; they ask for a low ransom, which after negotiation may end up at only a few thousand dollars- a relatively small amount in the global economy that represents an extremely high amount in the local community ([3],[9]).

Finally, piracy is helped by the unique geography and proximity of national borders in specific parts of the strait. The littoral states were motivated to view this problem as a domestic and not a regional problem, a view that inevitably led to a conflict of intra–regional interests. This conflict was further escalated due to the fact that these countries, (as former colonies), are extremely sensitive about sovereignty issues ([3],[10]).

Capacity Building

The preceding analysis of the factors of piracy in Southeast Asia and in the HoA clearly demonstrates the problematic nature of this issue by stressing its domestic and international dimensions, Consequently it becomes obvious that only a consistent capacity building policy against piracy will effectively address this issue.

Capacity building can be defined as: "Planned development of (or increase in) knowledge, output rate, management, skills, and other capabilities of an organization through acquisition, incentives, technology, and/or training [12]."

The majority of regional experts agree that piracy can only be effectively addressed if the coastal states assume responsibilities and exercise effective control over their inhabitants. Considering the complexities of the region, this is an optimistic scenario. In the case where political challenges on shore result in a stalemate, the international community should take the necessary steps they can towards capacity building to secure the area and protect the global economy independently of the anomalies happening ashore. Thus this issue can be effectively addressed only if the international community can find innovative ways to intervene in cooperation with local institutions and implement modern technologies. Consequently, it is important to develop a capacity-building strategy in accordance with the political developments ashore. In addition, there are allegations that pirates are affiliated with terrorist groups, so there is a great incentive for the international community to intervene.

The best way to address this threat is by considering the complexities in the area on all levels, from societal fragmentation in clans and sub-clans to specific geographic features of the region. Furthermore, in principle, there are some basic considerations that must govern this policy. These considerations can be summed up as the following: The policy to address all these challenges must be based on local, regional, and international collaboration; otherwise all efforts to deal with this issue will ultimately fail [7].

Conclusions

The international community can offer temporary solutions by deploying naval task forces (i.e. Operation Atalanta / Ocean Shield/ Allied Provider) or by providing to weak littorals states support and aid to exercise more effective maritime control over their area of responsibility. However, both of these methods of tackling this issue cause a significant economic burden to many countries, which they are unlikely to assume, with-

out addressing permanently this issue.

The issue of piracy can be addressed permanently only when the involved states obtain the power to establish strong local institutions, such as police and coastguard forces. The moment there are strong local institutions, the level of all criminality including piracy will be reduced significantly.

Capacity Building is the best path to accomplish a permanent solution. However this cannot occur over a very short period time, but rather only after a coordinated series of efforts from the international community in cooperation with the locals.

List of References

[1]   Murphy, Martin N. Contemporary Piracy and Maritime Terrorism: The Threat to International Security. Adelphi Papers; no.388. London: IISS, 2007.

[2]   ICC International Maritime Bureau. Piracy and Armed Robbery against Ships Annual Report (United Kingdom, January 1 – December 31, 2009).

[3]   Riggs, Stephen L. Piracy in the Horn of Africa: A Comparative Study with Southeast Asia. Thesis. Monterey, CA: Naval Postgraduate School, December 2009. http://edocs.nps.edu/npspubs/scholarly/theses/2009/Dec/09Dec_Riggs.pdf

[4]   Hansen, Stig Jarle. Piracy in the Greater Gulf of Aden: Myths, Misconception and Remedies. Oslo, Norway: Norwegian Institute for Urban and Regional Research, 2008.

[5]   Ploch, Lauren. Piracy off the Horn of Africa. R405528. Washington, DC: Congressional Research Service, 2009.

[6]   Meade, Richard. "EU Close to Legal Framework on Piracy Prosecutions," February 27, 2009, Lloyd's List, http://www.lloydslist.com/ll/news/viewArticle.htm?articleId=20017622826&src=rss,accessed May 2010.

[7]   Cline, Jeff. "Maritime Security." In. Securing Freedom in the Global Commons edited by Scott Jasper. Stanford, CA: Stanford Security Studies, 2010.

[8]   Bateman, Sam. "Regime Building in the Malacca Strait and Singapore Straits: Two Steps Forward, One Step Back," The Economics of Peace and Security Journal 2009 4(2): 45-61

[9]   Raymond, Catherine Zara. Piracy in Southeast Asia New Trends, Issues and Responses, (working paper) Singapore: Institute of Defense and Strategic Studies, 2005.

[10]   Mark, J.N. "Unilateralism and Regionalism: Working Together and Alone in the Malacca Straits, in Piracy" Maritime Terrorism and Securing the Malacca Straits, ed. Graham Gerard Ong-Webb Singapore: Institute of Southeast Asian Studies, 2006.

[11]   Young, Adam J. Contemporary Maritime Piracy in Southeast Asia: History, Causes, and Remedies. Singapore: International Institute for Asian Studies; Institute of Southeast Asian Studies, 2007.

[12]   Business Dictionary, http://www.businessdictionary.com/definition/capacity-building.html, accessed on August 10, 2010

Dr. Thomas Bruneau is a Distinguished Professor of National Security Affairs at the Naval Postgraduate School. He has researched and written extensively on Latin America, Portugal and a wide variety of issues in security and civil – military relations. Dr. Bruneau has published more than fifteen books as well as articles in journals including Comparative Politics, Third World Quarterly, Encyclopedia of Democracy, Journal of Democracy, International Journal of Intelligence and Counterintelligence, Democratization, and Military Affairs.

LtJG Ioannis Nellas H.N. is now pursuing a dual degree Master in Naval Postgraduate School (NPS) in Monterey California, studying Applied Physics and Civil Military relations His thesis is evaluating the idea of NATO Capacity Building in the Horn of Africa countries trying to eliminate piracy incidents.

MODELLING HUMAN PERFORMANCE IN MARITIME INTERDICTION OPERATIONS ©

by   Dr Trevor Dobbins,
                STResearch Ltd, UK (td@str.eu.com)
Dr Steve Myers,
                University of Chichester, UK
Dr Julie Stark,
                Combatant Craft Division, NSWC
Carderock, USA
Lt Georgios Mantzouris H.N.,
                NMIOTC, Greece

INTRODUCTION

Maritime Interdiction (MI) operations are an increasingly important element of the littoral environment, the control of Economic Exclusion Zones and the Global War on Terror. This is demonstrated by the International anti-piracy operations around the Horn of Africa and the establishment of the NATO Maritime Interdiction Operational Training Centre (NMIOTC). A generic MI operation may involve the insertion of a ship boarding team, utilising High Speed Craft (HSC), from where the team is required to board the ship using a flexible wire (caving type) ladder. Once aboard, the team undertakes a high-tempo offensive operation where accurate target recognition and prosecution are essential for operational success. The maritime environment is arguably one of the harshest work environment in which humans contend. In addition to hot, temperate or cold temperatures, the Repeated Shock (RS) and Whole Body Vibration (WBV) exposure of a HSC insertion transit has the potential to induce high levels of post-transit fatigue and injury.

Operational analysis demonstrates two single-points-of-failure that increases the risk of mission failure of the MI operation as described in this paper. These are:

• The HSC coxswain during the insertion phase

• The ladder climb/transfer onto the target vessel

A graphical representation of these risks is shown in Figure 1. It can be seen that the Risk to the Mission is high prior to the Transfer; this is where the actions of the coxswain during the approach to the target are critical to mission success. Similarly, the Risk to the Mission and Risk to the Force are greatest from just prior to the beginning of the Transfer through to its completion; this is where the actions of the coxswain during the Transfer, and the ability of the boarding team to successfully execute the transfer are critical to mission success.

PHASES OF A GENERIC MARITIME INTERDICTION OPERATION

PREPARATION PHASE

Planning & Rehearsal - The MI team, including the boarding and Command & Control (C2) elements, will have completed a through planning activity for a range of different MI scenarios, including wherever possible the use of intelligence specific to the target vessel. From these, the team will have undertaken training and rehearsals to maximise operational effectiveness.

Move to the Area of Operation (AOO) / Drop-off-point - The move to the start line can be short or long; and can include road, water and air moves. For example, the HSC may be deployed directly from a larger maritime platform operating in the area, whereas a longer deployment could include a road move to an air-head, where the MI team may be flown to the general area of operation. From this Drop-Off-Point the HSC may subsequently need to transit a significant distance to the target vessel, potentially requiring refuelling.

Physiological factors - In high-tempo operations where MI teams have to remain on-call, it can be difficult to plan and ensure that the team maintain the appropriate energy and hydration levels. Sleep deprivation is a commonly recognised factor influencing military operations. Where MI teams are kept on-call, rather than acting as part of larger planned operations, it can be typical for operations to start at times when the teams have been awake for significant periods of time undertaking normal duties. If an MI operation is initiated when the team has already been awake for 18 hours it is likely that the team members will have been awake for over 24 hours when the boarding phase is initiated.

INSERTION PHASE BY HIGH SPEED CRAFT

Repeated shock & WBV exposure from HSC transits has been shown to result in fatigue and an enhanced risk of musculoskeletal injury, whilst the use of shock mitigation solutions (e.g., suspension seating) may maintain performance post-transit and thus support operational effectiveness. Figure 2 provides an example of the effectiveness that shock mitigation can provide for maintaining performance post-transit.

The HSC Coxswain - an essential component in the MI operation, having the same level of importance as the helicopter pilot. The control of the HSC is achieved via steering, throttle and trim control, with effective throttle control being essential for reducing RS & WBV exposure, and ensuring the safety of the craft, embarked crew and passengers. Although this may appear to be a relatively passive 'driving' task, evidence suggests that the Coxswains role is high workload and requires a high level of training.
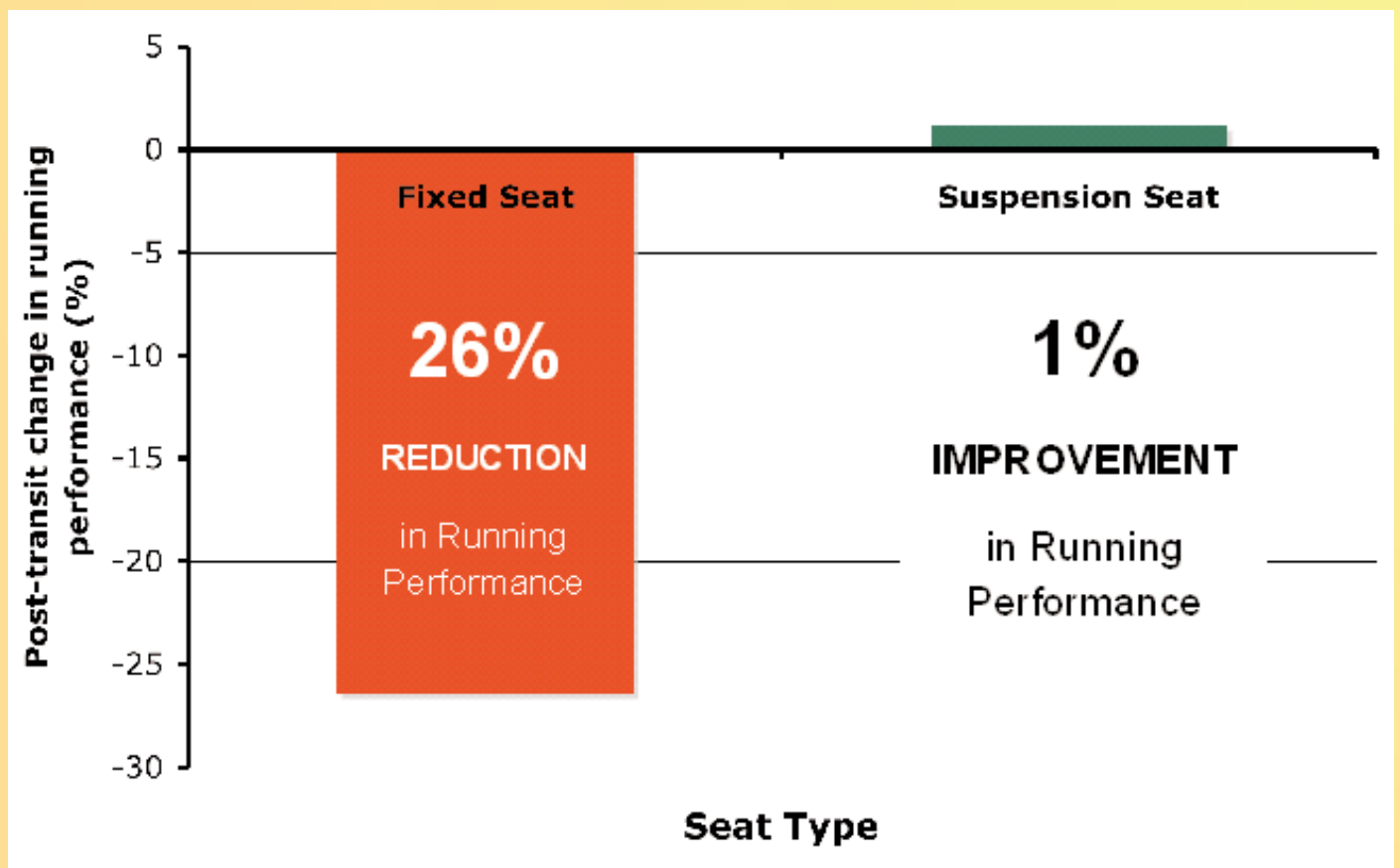

Figure 2: *Differences in Post-Transit Performance (Fatigue) following a 3-Hour Voyage (~Sea State 2) in 8.5m RIBs for Occupants using Fixed and Suspension Jockey-Style Seats.*

ACCESSING THE TARGET VESSEL

This may be considered the most important evolution of the operation and is a single point-of-failure.

Holding Station on the Target Vessel by the HSC: The Coxswains Role - The position held against the target vessel is a compromise between the wave pattern along the length of the vessel and the potential access points, lower level access being preferred to reduce the climbing height. The maintenance of the position is a combination of the HSC coxswains skill with steering and throttle control. The coxswain is required to accurately control the following positions; longitudinal position for the access location of the target vessel and the distance from vessel – this is important for not getting stuck on the target vessel and to be able to rapidly move away from the vessel if required. For HSC to be an effective part of the MI operation the appropriate Command & Control (C2) is required. This C2 has a number of aspects; communication with the operational command structure, communication for the operation of the HSC, and communication between the HSC crew and the boarding team. A model of HSC C2 (HSC3) has been developed that supports MI operations but specific operational procedures are required to achieve an effective boarding.

Boarding Equipment - Placing the ladder, poles, etc., often known as 'hooking-on', is a highly skilled task that must be practiced and perfected. A range of equipment is required by teams for the types of vessels they are likely to encounter. The boarding ladders used are of two designs; Fixed (limited height but dimensions and rigidity provide for good biomechanics) and flexible: (light weight and easy roll-up storage, but the flexibility and dimensions of the ladder result in control issues and an increase in the difficulty of climbing). There are a number of human factors issues that influence the individual's climbing performance. A number of these include; gravity/weight, mobility/range of motion/dexterity, visibility (darkness and water spray), ladder climbing technique and skill, (foot and hand placement, Centre of Gravity (CoG), strength/muscular endurance).

The Risk of Falling - There are multiple factors that increase the risk of falling from the ladder. In addition to potentially compromising the mission, the individuals are at risk of potentially fatal injuries. This issue contributes to making the climbing task a single point of mission failure. The following two issues are important; Stepping on the ladder and muscular fatigue.

ACTION ON TARGET PHASE

Once onboard the target vessel the team will execute its Standard Operational Procedures (SOPs) for the actions on target, e.g. search fire & manoeuvre. This article does not address the SOPs, but rather highlights the human related factors that can limit performance and operational effectiveness.

Repeated Sprint Activity - In order to understand human performance during the on-target phase an objective assessment of it is required. It is recognised that military operations are generally stochastic in nature, but similar to sporting events, there are generalisations that can be made. For example, the operators will spend certain amounts of time undertaking the following activities: stand/kneeling, walking, jogging, and sprinting. Therefore the following factors, which are recognised as being important for successful on-target tasks, may be examined; Load carriage, Exercise intensity, Mobility, Clothing PPE, Respiratory PPE, Noise, Cognitive ability.

Teamwork - The success of MI operations is dependant on effective teamwork. This requires an undertaking to understand how the following factors interact to facilitate an effective operational outcome; Individuals must understand and carry out their role within the operational framework, SOPs must be understood and executed at both the individual and team level, and communication is essential for effective teamwork, and methods of operation are required to cope with failures in communications systems.

Target Prosecution - There are two aspects to successful target prosecution that relate to human performance; firstly target recognition, and subsequently shooting accuracy.

EXFILTRATION PHASE

This phase is not covered within the scope of this article, but is generally considered to be a lower intensity activity. It should be noted that the duration of this Phase could be as long as Insertion Phase if conducted in poor weather conditions due to rotary air asset's reduced flying capability in these conditions.

HUMAN PERFORMANCE MODELLING

Using the model graphically described in Figure 3, the following questions may be asked; what is the performance degradation for each of the phases by the factors than potentially limit performance? Is it possible to quantify the 100% performance for each phase of the operation if undertaken separately? What happens when the phases are put together ? How does degraded performance in one phase influence performance during subsequent phases?

By understanding the factors that limit performance and the magnitude of their effects, potential solutions can be identified and the cost/benefits of different solutions examined and decisions made on their implementation. To model the human performance aspects of the MI operation, the factors influencing the insertion and on-target phases need to be quantified. The initial strategy of evaluation should include, a formal Task Analysis, to assess the potential degradation to performance and operational effectiveness.

The ability to model these inter-related human, environmental and equipment factors, provides the ability to develop effective solutions, to reduce performance degradation and enhance operational effectiveness.

GENERIC MARITIME INTERDICTION OPERATION

Preparation → Insertion → Action → Exfiltration

Prep. → High Speed Craft (e.g., RIB) → Ladder Climb → On-board Search + Fire & Manoeuvre → Exfil.

- Nutrition
- Hydration
- Sleep

- Shock & Vibration Exposure
- Exposure duration/over-take speed
- Cox'n Skill
- Command & Control (C2)
- Ergonomics & Posture
- Cold
- Nutrition &

- Holding Station:
  o HSC Design
  o Cox'n Skill
  o Target vessel speed
- The Ladder:
  o Hooking-on
  o Ladder type & length
- Human Factors:
  o Load Carriage
  o Centre of Gravity
  o Mobility
  o Dexterity
  o Climbing Technique
  o Strength & endurance
- Cognitive Factors
  o HSC Motion and 'stepping-on'
  o Fatigue

- Physical:
  o Load Carriage
  o Ex. Intensity
  o Respirator:
    ▪ Work of Breathing
    ▪ Field of view
  o Psychomotor & Cognitive Abilities
  o Mobility / Dexterity
  o Nutrition & Hydration
- Interaction:
  o Team Work
  o Comm's
- Target Prosecution:
  o Target Recognition
  o Shooting Accuracy

Factors
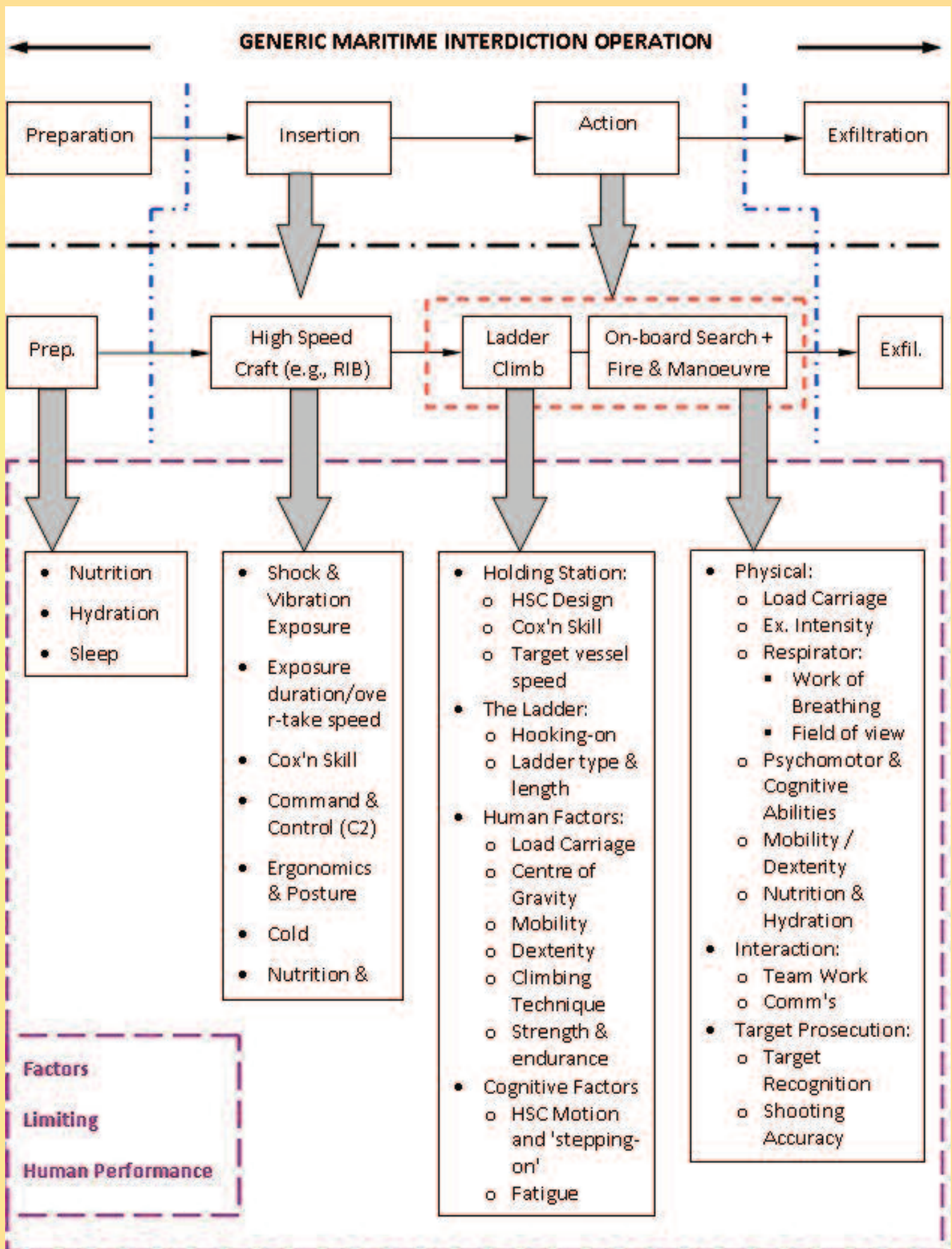
Limiting

Human Performance

Figure 5: A Factorial Model, Illustrating How Behavioral and Environmental Factors may Adversely Influence Maritime Interdiction Performance and Operational Effectiveness.

DEVELOPMENTAL REQUIREMENTS

The development of the MI human performance model supports the enhancement of operational effectiveness by providing a greater understanding of how the environmental stressors, engineering systems, the human operatives, and their interaction, influence performance and operational effectiveness. The following areas are highlighted for enhancing operational effectiveness and/or the maintenance of performance.

EQUIPMENT

HSC – a User-Centred approach to HSC design provides enhancements in system effectiveness and reliability, including shock mitigation and Command & Control (C2).

Ladder - the system requires improved hook control and placement, and ladder design for easier/safer climbing.

Individual PPE and equipment - these require improvements to the following features: reduced weight, improved mobility and enhanced thermoregulation.

TRAINING

Training is an inherent foundation of military operations. The following factors are highlighted as being essential elements within the MI operation that must be addressed by the appropriate training and assessment programme.

Standard Operating Procedures (SOPs) - The development of SOPs is recognised as essential for enhancing and maintaining operational effectiveness. Their development is beyond the scope of this article.

Skill and Technique

HSC Coxswain - professional coxswain training is required including the appropriate specific MI training with the full range of environmental conditions.

Ladder climbing - it is essential that good technique is taught to ensure that climbing effectiveness is developed and maintained with the PPE and operational equipment carried.

On-board Search + Fire & Manoeuvre - representative environments are required to ensure that boarding teams have the appropriate level of experience and competency to undertake operations with the required level of effectiveness.

Physical Fitness

MI personnel require both high levels of general and task specific fitness. Therefore training methods and pre-participation screening techniques are required to enhance performance and reduce the risk of injury in Special Operations Forces.

HSC transits - the harsh motion of the insertion craft requires the occupants to cope with the repeated eccentric contractions required for the vertical impacts. These eccentric contractions during HSC transits have been shown to result in elevated levels of muscle damage markers. Therefore specific eccentric training may assist in coping with the RS exposure. The required postural stability to cope with the lateral accelerations means that the individuals require an enhanced level of core stability and isometric strength/endurance.

Ladder climbing - anecdotal reports of climbing training support the need for upper body strength and endurance, but it should be noted that upper-body strength will, in the majority of circumstances, not cope with the weight of the equipment that the boarding team personnel carry onto the target vessel. Therefore the appropriate technique must be practiced in addition to developing the specific strength and endurance requirements.

CONCLUSION

It is anticipated that further development of the MI human performance model will help enhance operational effectiveness by providing a greater understanding of how environmental stressors and, engineering systems interact with human operatives to influence performance. In support of the performance modelling it is recommended that a formal Task Analysis (TA) and Training Needs Analysis (TNA) be undertaken. It is recognised that although there is no typical MI operation, it is essential that a generic operation be defined to support the development and assessment of solutions that have the potential to either enhance performance, or reduce performance degradation. It is therefore recommend that the proposed model of MI human performance is developed to promote a better understanding of operator performance in extreme maritime environments.

NMIOTC, using modern training facilities and techniques (including real platforms and high-fidelity simulations), is providing realistic MI training to International Naval Units/personnel, thus assisting in the development of their capability to confront a range of different scenarios within the MI operational environment. By facilitating this coordination and training, NMIOTC supports the increasing recognition of the MI Sector, and adds value to the continuing NATO efforts of assisting with the development of anti-piracy and related operations.

Dr Trevor Dobbins is a Director of STResearch who undertaken projects for Government, military, Search and Rescue and commercial organisations. He has published extensively on issues relating to the development of amphibious operations.

ATP-71 WORKSHOP IN NMIOTC

by **LtCdr I. HAZIR, TUR N,**
NMIOTC's Head of Exercise Planning Section.

and make contributions to the Maritime Interdiction

Fig. 1: *ATP -71 participants during discussions of proposed amnedments to ATP-71 publication*

In this century, Maritime Security is one of the most key issue related to economy, environment, homeland security, transportation and etc. for all countries even they don't have coasts. The rising piracy threat in the open seas showed the horrifying face of terrorism to the humanity once more. Therefore to live in a peaceful world, every one of us has to think what can do to contribute to Maritime Security.

As NMIOTC, we work on issues related to Maritime security and we are dealing with ATP 71 document which supports Maritime Interdiction Operations. In order to sustain today's operational requirements, the second ATP-71 Workshop was organized and held by NMIOTC from 7th to 9th September 2010, in NMIOTC's facilities.

The workshop works started with a warm welcome address from NMIOTC's Deputy Commander, Captain O. Celebi, TUR(N), who asked everybody for an active and fruitful participation. Following, NMIOTC Staff Officers initiated the procedure of presenting and discussing the NMIOTC's change proposals along with the participants from **Belgium, Denmark, Germany, Greece, Spain and USA**. During the workshop other nations change proposals were also discussed.

As NMIOTC, we hope that these change proposals will improve the currency of ATP-71 publication

Operations. The discussions made over proposals consisted of the issues that are related to todays technological and operational requirements that were experienced by the help of previous Maritime Operations. For further studies, the final ATP-71 workshop change proposals have already been posted to the MAROPS forum (NSA's official site).

The workshop also included an NMIOTC Command Brief and an NMIOTC Facilities Tour, for the participants to acquire a thorough knowledge of the training capabilities that NMIOTC is able to offer to Allies and Partners. For us updating ATP-71 document is of utmost importance due to the fact that the most precious contribution to Maritime Security is to feed Boarding Officers or generally officer in the field of the maritime arena, with information that depicts the real operational environment needs. This is our goal and we are dedicated to pursue this.

LtCdr Ilsev HAZIR TUR(N) is an officer from Turkey appointed in NMIOTC as Head Of Exercise Planning. He has graduated from Turkish Naval Academy in 1994 and served in various frigates and fast patrol boats. He has participated as CO of TCG YILDIZ in numerous NATO missions and exercises between 2006-2010.

MARITIME OPERATIONAL TERMINOLOGY COURSE

Fig. 1: *Maritime operational terminology course 2010 graduates and instructors*

by   **Cdr J. Singleton, USNR,**

MOTC OPR, NATO ACT HQ UNIT

NATO's premier facility for training navy and coast guard vessel boarding teams in maritime interdiction operations has successfully completed its third Maritime Operational Terminology Course (MOTC), from September 20th to October 1st, 2010. The NATO Maritime Interdiction and Operational Training Center (NMIOTC), located in Souda Bay, Crete, Greece, hosted the MOTC event with student sponsorship provided by NATO Allied Commander Transformation (ACT). NMIOTC reports to ACT's Education & Training branch as a NATO Training and Educational facility.

The Commanding Officer of NMIOTC, Commodore A. Makris, GRC(N), welcomed all of MOTC 2010's instructors and students during the first day of the course, " **I hope that you will find your time spent at NMIOTC both challenging and rewarding**."

MOTC is offered as part of NMIOTC's extensive combined training program. This program enables naval and coast guard forces to better execute surface, sub-surface, aerial surveillance and special operations activities in support of NATO Maritime Interdiction Operations (MIO). NMIOTC aims at improving allied and partner vessel crew's expertise in MIO, while promoting skills, interoperability and cooperation among them. Additionally, it supports ACT in developing MIO tactical doctrines, directives and manuals. Moreover, NMIOTC supports ACT in research, experimentation, modeling and simulation of MIO operations and contributing to ACT's lessons learned process.

The objective of MOTC is to familiarize NATO, Partners for Peace (PfP), Mediterranean Dialogue (MD), Istanbul Cooperative Initiative (ICI) and other allied

maritime officers with the use of maritime operational procedures and the associated terminology used by NATO naval forces. Students also receive instruction in NATO's Operational Planning Process (ATO OPP) and ship tactical simulator training. For those students staying a third week there was also practical MIO tactical training using NMIOTC's state-of-the-art facilities and expert instructors.

Upon completion of MOTC training the students will be better able to operate alongside NATO maritime forces in a variety of contingency operations or serve as part of a joint NATO maritime staff. Students from **Algeria, Azerbaijan, Jordan, Greece, Tunisia** and the **Ukraine** well represented NATO, PfP and Mediterranean Dialogue nations during the course.

This year's course focused on the many challenges facing NATO and coalition maritime forces in suppressing piracy off the Horn of Africa (HoA) and Gulf of Aden regions. The class schedule featured briefings covering related topics such as NATO Anti-Piracy Operations, HOA Geopolitical Analysis, Naval Guidance and Control of Shipping (NCAGS) and Merchant Marine Vessel Operations. These and the other core MOTC courses are designed to help a naval officer on anti-piracy patrol with NATO forces to better understand the type of environment he or she would be most likely to encounter.

The success of MOTC 2010 was made possible through the close cooperation between the Hellenic Navy, NATO ACT and the U.S. Navy (USN). The Hellenic Navy provided multi-service instructors, advanced training facilities and logistical support with sponsorship assistance from NATO ACT, while four senior officer instructors from USN Reserve unit NR NATO ACT HQ UNIT provided the English-language maritime terminology expertise.

NMIOTC offers both classroom and tactical training, to include small boat operations, ship and cargo search procedures and helicopter fast-roping. Training can be provided to individuals as well as navy and coast guard vessels visiting Souda Bay. NMIOTC teams can also be dispatched to forward units to provide exportable training.

The NMIOTC facility is ideally suited to carry out its MIO training task. Souda Bay, on the north-western coast of Crete, is a central location for all maritime units operating in the Eastern Mediterranean and transiting through the Suez Canal to operating areas off the Horn of Africa, Indian Ocean and Persian Gulf. As a result NMIOTC provides direct support to ongoing NATO naval operations Active Endeavor (Mediterranean maritime security patrols) and Ocean Shield (anti-piracy operations off Horn of Africa).

MOTC instructors actively encouraged students to engage in class discussion and interact as much as possible, improving their English skills and enhancing the learning experience for both students and instructors. Students were tasked with giving a 20 minute presentation about their home country in English during the second week. They also learned to work closely together in 3-man simulator teams, taking turns filling the key bridge officer roles onboard a frigate-size vessel on HoA anti-piracy patrol. The MOTC participants were evaluated by instructors basis their graded results from daily quizzes, a comprehensive final exam and daily class participation.

While the MOTC schedule was intensive, MOTC Course Director Lt Georgios Mantzouris, GRC (N), who was responsible for successfully coordinating the program, also arranged for a student tour of the ancient Minoan archeological site of Knossos, near Crete's modern capitol of Iraklion, as well as several social events. "In addition to ensuring that MOTC's learning objectives were achieved, we also wanted to ensure that the students and instructors had the opportunity to experience the rich hospitality and culture of Crete," said Lt G. Mantzouris.

Cdr J. Singleton is the Lead US MOTC Instructor for the last five years. Currently he is appointed as a member fo USN Reserve Unit in NATO ACT Headquarters.

NMIOTC 2D - MIO SIMULATOR CAPABILITIES

A LEAP IN NMIOTC'S TRAINING

by   Lt D. CIOBANITA ROU (N),
NMIOTC Staff Officer Exercise Planning Section

Nowadays the computer simulation is more often used to better train the military personnel. This is occurring to improve the theoretical training, when it is too expensive or too dangerous to use real equipment in the real world.

As NMIOTC and taking into account our mission - vision and training objectives, we worked hard in order to implement computer simulation in our theoretical courses (Command Team MIO Courses). So from the 29th to 30th September 2010, a 2D MIO simulated training took place for first time in NMIOTC's premises, giving trainees the opportunity to practice the terminology and procedures used during a Maritime Interdiction Operation focused on Counter Piracy. For this simulation, the NMIOTC's Tactical Maritime Operational Centre (TMOC) application was used.

The main objectives of simulation are to improve knowledge about maritime terminology, to practice MIO communication procedures and to familiarize with MIO procedures (interrogation, approach, stopping, boarding, diversion, seizing, legal aspects of MIO, ROEs, RMP building etc) and basic MIO messages. Additionaly, personel has the capability of undergoing training starting from a very basic level (e.g. Hailing Procedures) and reaching an advanced level of addressing the MIO Commander's tactical situation and responsibilities. Therefore, by the end of this training an officer will have the capability of undertake responsibility to almost any MIO operation from a typical Hailing Query Procedure up to MIO Commander of a Tactical Force.

The simulation scenarios address the Somalia Maritime Security Situation, as well as multiple different operations related to MIO. An assigned Multinational Task Force is conducting Maritime Interdiction Operations focused on Counter Piracy in Somalia's basin in order to support UNCLOS III art.110. The simulation incidents are built based on Operation Atalanta and Operation Ocean Shield reports. They resemble the real operational world and even the OPTASK MIO messages as well as any other related messages that students have in their files are exaclty similar with the real ones taking into account information security limitations. Also, students have the capability through voice comms to communicate with instructors who are at this point resembling either a merchant vessel's captain or pirates. Therefore, scenario is being executed in a very realistic way which is the most constructive method in the learning process.

Taking into account the internal evaluation, this simulation was conducted successfully during MOTC and it was further developed for usage during NMIOTC Course 1000 MIO Command Team issues and Course 4000 (Final Tactical Exercise). Closing this brief, but at the same time, very informative report it is fair and academic correct to mention that NMIOTC's technical team struggled through the summer of 2010 in order to create from scratch this 2D MIO simulator software bringing NMIOTC's simulation in a new era.

Lt Decebal CIOBANITA ROU (N) since July 2008 is Staff Officer in NMIOTC Exercise Planning Section. He has graduated from Romanian Naval Academy in 2000 and served onboard Romanian Minewarfare ships as well as staff officer. From 2002 to 2008, he has participated into numerous NATO courses and exercises.
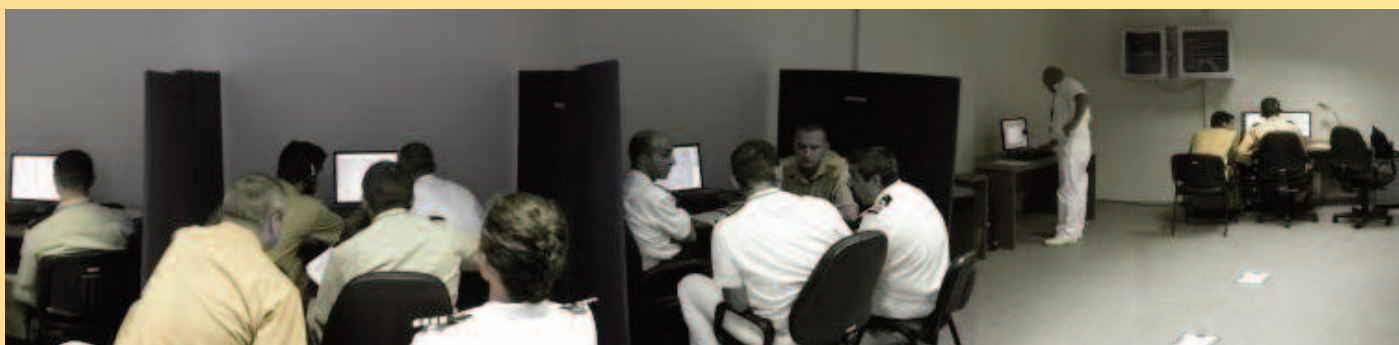
2D-MIO Simulator Cubicles. Students are attending the build up of the MIO Scenario while Instructors assist them sitting on their backs.
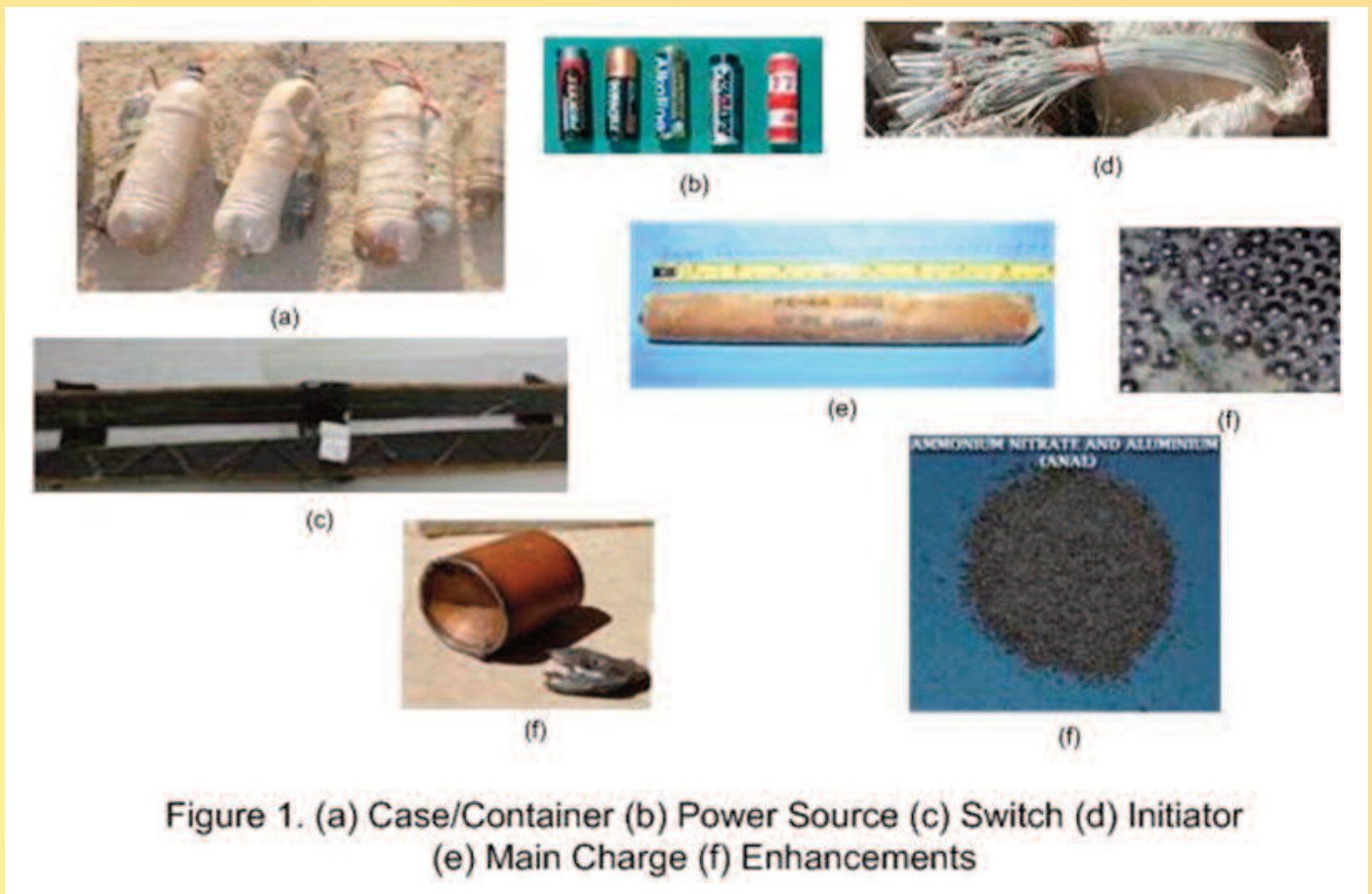
WATERBORNED IMPROVISED EXPLOSIVE DEVICES
W I E D s
IMPACT ON MARITIME OPERATIONS

by **Professor Ramesh Kolar** &
Lt. G. Mantzouris, *Ph.D. Canditate*

Figure 1. (a) Case/Container (b) Power Source (c) Switch (d) Initiator (e) Main Charge (f) Enhancements

1. Abstract

In this article an overview of the improvised explosive devices is provided. IED are weapons of choice used by extremist groups for gaining strategic and tactical influence. Different types of the IEDs and their functioning are explained together with their effects. The effective utilization of the IEDs in an asymmetric warfare and consequent influence on the public reaction is described. Some examples of water borne IEDs and their impact on maritime interdiction operations are also presented.

2. Introduction

Improvised Explosive Devices (IEDs) are used by the violent extremist groups as weapons of choice to inflict deadly effects causing both military and civil losses. The other effects include destabilizing the local governments and the economy, not to mention fear and disruption of normal life activities. IEDs are also becoming major concern in Africa, parts of Asia Pacific region and Latin America. Its usage is believed to continue because of low cost and high impact causing high damage with minimal risk and expense. The ideas and strategies are carried over maritime interdiction and are referred to as water or underwater improvised explosive devices (WIEDs or UWIEDs). The rest of the article is organized as follows- we introduce some of the common IED devices and their operation, followed by some applications. Some examples of maritime interdiction are followed by the concluding section.

3. What are IEDs?

IEDs are homemade homegrown low-tech bombs that can be made as simply from a group of artillery shells left over from other events or as sophisticated as a projectile shooting out molten metal [5]. Ordinarily, an IED includes five components- a case or container, a power source, a switch, an initiator, and a main charge [6, 8,
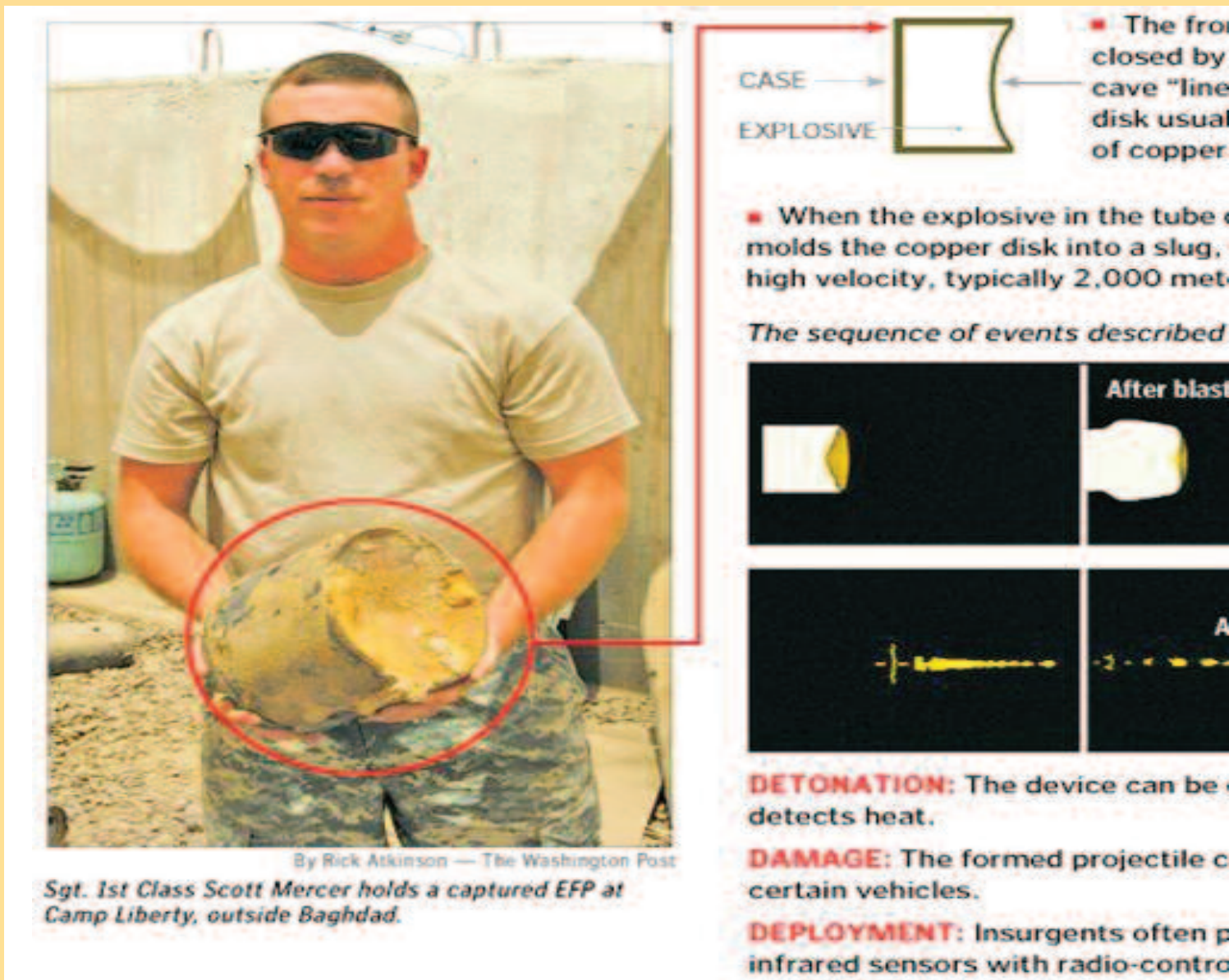
By Rick Atkinson — The Washington Post

Sgt. 1st Class Scott Mercer holds a captured EFP at Camp Liberty, outside Baghdad.

CASE
EXPLOSIVE

- The fro[nt]
closed by
cave "line[d]
disk usual[ly]
of copper

- When the explosive in the tube [is detonated] molds the copper disk into a slug, [traveling at] high velocity, typically 2,000 mete[rs...]

The sequence of events described [...]

After blast

DETONATION: The device can be [...] detects heat.

DAMAGE: The formed projectile c[...] certain vehicles.

DEPLOYMENT: Insurgents often p[...] infrared sensors with radio-contro[l...]

Fig. 1: Explosively [...]

and 14]. Figure 1 shows notional elements of a typical IED. As can be seen, the low tech IED elements can cause havoc to the high tech devices, weapons, and personnel. The enhancements include a copper disk together with other elements to form what is referred to as the Explosively Formed Penetrator or Explosively Formed Projectile (EFP) and Self Formed Fragmentation (SFF) charges. The EFP are deadly projectiles in the form of molten metal hurling at the target at speeds of the order of 2 Kilometers per second capable of penetrating several inches of steel [10]. Joint Improvised Explosive Device Defeat Organization (JIEDDO) [11] is a joint entity of the U.S. Department of Defense established with a mission to focus (leas, advocate, coordinate) all Department of Defense actions in support of the Combatant's Commanders and their efforts to defeat IEDs as weapons of strategic influence. The counter IED strategies of the JIEDDO are given as follows: defeat of the device, attack the network and train the force [11]. Figures 5 and 6 give the casualties of the coalition forces in the Iraq-Afghanistan(Including WIEDs), while the IED casualties are given in Figure 7 [13]. It is also to be noted that in addition to the casualties, an enormous burden exists on the coalition force countries, both in terms of the hardship as well as the devastating economic drain on the vital resources.
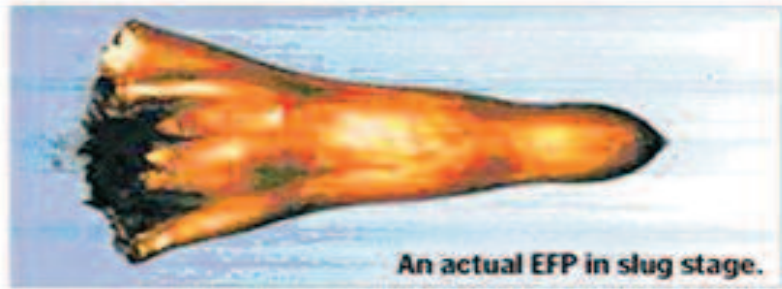
4. Emerging Applications

As the extremists expand their operations and seek out vulnerabilities, they have extended the IED threat to the maritime operations. The attack on USS Cole [6, 12] demonstrates the vulnerabilities of water borne threats. There have been reported instances of explosives discovered in small boats [12]. The conventional IEDs are an outcome of low tech off-the shelf components defeating high tech devices and systems to political and social advantages in an asymmetric warfare scenario. It is very conceivable that a similar extension can be made with reference to maritime watch or underwater IEDs (WIEDS / UWIEDs).

Carafano [12] refers to three types risks associated with
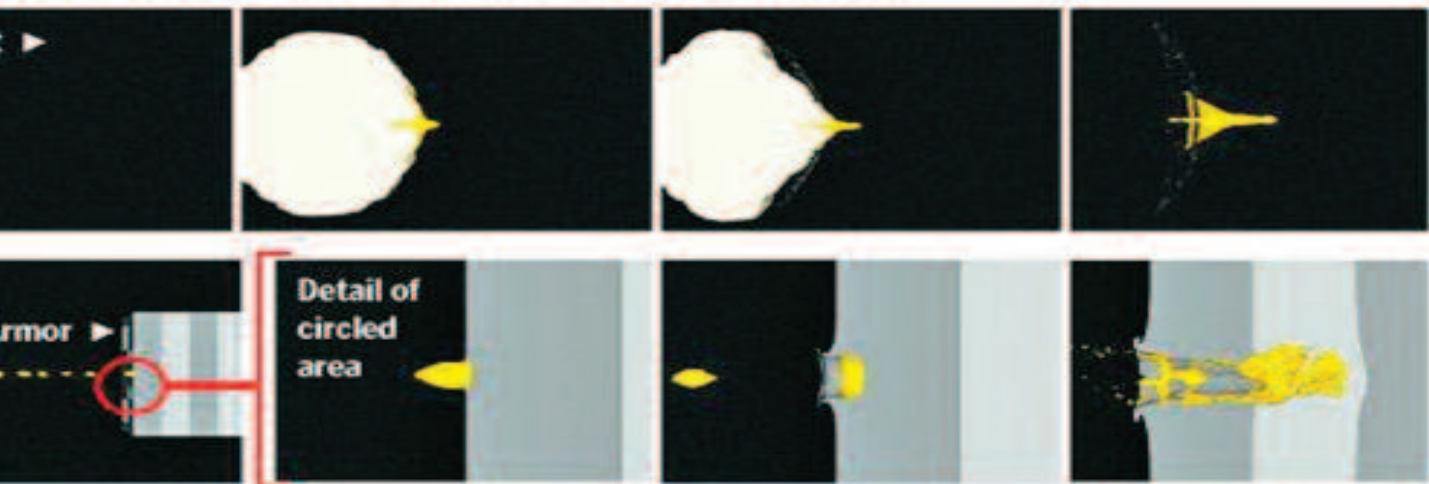
nt end is
a con-
r," a
ly made

The firing tube is usually cylindrical and often made of a plastic or metal pipe that contains the explosives.

An actual EFP in slug stage.

By David Lambert — Air Force Research Laboratory

detonates, the force of the blast

right, and propels it forward at

ers per second.

above, as shown in images from a JIEDDO animation:

Detail of circled area

detonated by a command wire, radio signal or a passive infrared trigger that

an penetrate several inches of armor with enough kinetic energy to destroy

place EFPs along roads or at choke points. Some EFP triggers now combine passive
lled activators, which allow insurgents to be more selective about their targets.

Formed Projectiles [10]

Fig. 2: USS Cole in Port of Aden attacked from a small inflatable boat in a terrorist/ pirate act [6,7]. WIEDs were used in order to provoke this criminal result
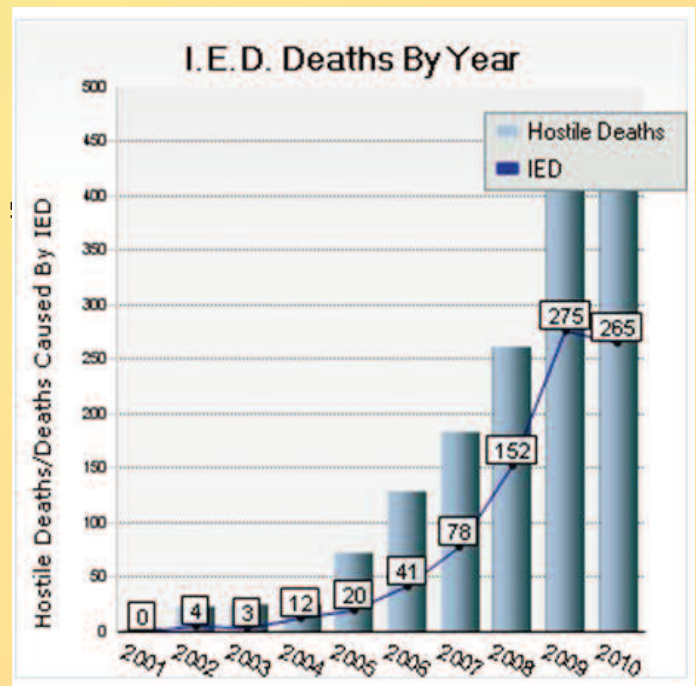

Fig. 3: IED fatalities in Iraq-Afghanistan [13] (Including WIEDs)

small boat threats: psychological, physical and disruption of services. Also, to address a complex WIED threat in maritime domain involving international stakeholders, a JIEDDO like effort with clearly defined mission, adequate resources, and concerted effort will be necessary also from NATO Institutions. Some of the challenges include fusion of intelligence gathered by different means and agencies in a timely manner as well dissemination to all the concerned players in the theatre. Other issues include constant and continuous training and education, efficient and adaptable red teaming.

5. Conclusions

NMIOTC is a NATO Education and Training Facility dealing with MIO training. WIED's is a subjectal area fairly new in the maritime arena. In order for boarding personnel to be ready to handle an unexpected IED situation and to counter WIED's, NMIOTC is preparing a Counter-WIED course that is going to be held in its premises in the near future. Cooperation with Internationally recognized organizations in this field (e.g. US JIEEDO or C-IED COE in Spain) is one of the ways that could lead to solutions to WIED problem and finally produce a training material that would be oriented directly to MIO operations. NMIOTC could achieve co-operations like these and at the same time it will be able to formulate knowledge and increase effectiveness in countering WIED's, in the harsh maritime environment of HoA and in the Gulf of Aden, where a few attempts have been made in order to solve this obscure phenomenon. Building a course like this, academia must become a vital part in order to maximize the result and use all of the available learning cognition that exists internationally.

6. References

1)   HASC O&I Hearing entitled, "Defeating the Improvised Explosive Device (IED) and Other Asymmetric Threats: Reviewing the Performance and Oversight of the Joint IED Defeat Organization (JIEDDO), 29 October 2009

2)   Metz, Thomas F., Countering the Global Challenge of IEDs Today and in the Future, House Armed Services, October 2009   Committee, http://armedservices.house.gov/pdfs/OI102909/Metz_Testimony102909.pdf

3)   Wilson, Clay., Improvised Explosive Devices (IEDs) in Iraq: Effects and Countermeasures, Congressional Research Service Report to Congress, http://www.history.navy.mil/library/online/ied.htm

4)   Package-Type Improvised Explosive Devises, http://www.globalsecurity.org/military/intro/ied-packaged.htm

5)   Military Grapples with Onslaught of Homemade Bombs in Iraq, http://www.pbs.org/newshour/bb/middle_east/jan-june07/ied_06-21.html

6) http://www.cargolaw.com/2000nightmare_cole.html

7) http://www.al-bab.com/yemen/cole1.htm

8)http://www.globalsecurity.org/military/systems/munitions/bullets2-shaped-charge.htm

9)http://publicintelligence.net/wp-content/uploads/2009/08/ied8.png

10)http://www.washingtonpost.com/wp-dyn/content/graphic/2007/10/01/GR2007100102020.html

11) http://en.wikipedia.org/wiki/JIEDDO

12)http://www.heritage.org/Research/Reports/2007/06/Small-Boats-Big-Worries-Thwarting-Terrorist-Attacks-from-the-Sea

13) http://icasualties.org/OEF/Nationality.aspx

14) http://en.wikipedia.org/wiki/Improvised_explosive_device

15) Dwyer, A., and King, C., Jane's Unconventional Weapons Response Handbook, Second Edition, Janes Information Group, Sentinel House, Surrey, UK (2006)

Professor Ramesh Kolar is on the faculty in the department of Mechanical and Aerospace Engineering, Naval Postgraduate School, Monterey, CA. His current research interests include Counter IED technology, Counter Directed Energy technology, risk assessment and mitigation as well as defense financial management.

MIO INTELLIGENCE & SURVEILLANCE – VALUABLE BUT FOR WHOM?

by   *LtCdr K. Tsakonas, H.N.,*

NMIOTC's Staff Offier - Networking Support

Piracy in the maritime domain is not a new issue. Its appearance is lost in time, along with the use of seaways for trading reasons. More than obvious remains the fact that piracy will remain an issue, since the world trade is mainly using sea as a transportation means, and the gain for pirates is more than tempting.

Also obvious remains the fact that through the years, the pirates evolute along with their persecutors. The pursuit begun by trying to raise the trading vessels self defense capability, and moved on by patrolling in the high seas or by making the intelligence process more efficient in order to achieve the productive surveillance of the maritime domain.

The past years the broader international marine community, focused on the need to know at all times everything that goes on in the maritime domain. Systems built, companies came to life and grew, operations established as well as co operations. The surveillance became quite efficient, still…

The statistics show that the slightest suppression of piracy has a long way to go in order to be achieved. The decrease of the incidents does not follow the efficiency enhancement of the intelligence and surveillance operations.

The changes that were observed in the pirates' way of act during the last couple of years, include among others, extend of their reach in areas more than a 1000 miles away from shore, in an area quite vast for the international community surveillance assets to handle. The size of the Indian Ocean does not allow for the provision of adequate protection.

Of course this change brought number of changes also to the pirates' tactics and equipment such as use of mother ships laid in some distance from one another in a form of a net, as well as the use of sophisticated electronic guidance systems.

The evolution of the pirates' tactics, as depicted earlier was more or less expected. The point of consideration here is our unwillingly contribution to their efficiency. Let's take a moment to consider the matter in simple steps.

First of all, the trading vessels broadcast all their information to the whole world in real time. AIS[1] broadcasts position, course, speed, destination and number of crew onboard, as well as flag. AIS has a VHF range, essentially depending on the height of the antenna as well as the transmission means condition. Low height land masses do not interfere with AIS data trans-

mission. A typical value to be expected at sea varies around 20-30 nautical miles and exceeding 100 nautical miles when airborne.   These transmissions are not encrypted and can be easily received by anyone who owns a piece of simple and low budget equipment (most time zero budget since pirates capture AIS devices from hijacked ships). Besides that, the fused Realized Maritime Picture can be accessed nowadays from various entities trough commercial companies, Systems built for National reasons or Multinational cooperations with trustful as well as with less trustful countries, providing almost real time picture to anyone that has access to this systems.

The key point for thought is the enormous number of stakeholders that have access to essential information today, through the global effort to enhance the surveillance. Through only a corrupt employee, pirates can track and locate big and valuable trading ships easily and plan their attack when and where the target is most vulnerable.

The newest tracking system that is also mandatory under IMO regulations since 1-1-2009 is a long-range satellite system, the Long Range Identification and Tracking (LRIT) [2] which uses Inmarsat C equipment to broadcast a signal to satellites. This system can provide global marine traffic picture on a satellite range coverage area. LRIT information is not generally available today with the exception of owning companies and SAR agencies, but it also takes only one employee to search the database regularly to provide a number of possible targets to the pirates.

In practice, real world scenarios have shown that we need to handle information carefully. So far this was not the case with AIS, and the number of actors has grown enormously. Can the situation rollback? Is AIS more useful for the "good guys" or for the "bad guys"? Will LRIT be handled more wisely?

It is certain that piracy won't vanish, not now not in the future, but it seems that there is a need for more close, wise and sophisticated consideration of the matter, in order to be able to handle the situation…

LtCdr K. Tsakonas graduated from the Hellenic Naval Academy in 1994 and has served in various Hellenic ships (destroyers and fast patrol boats) as Communications, Intelligence, Operations and Executive Officer. He has graduated from the Hellenic Navy Electronic Warfare Officers School, Hellenic Naval Staff and Command College and the Hellenic Army Software Engineers & Analysts College. He is an M.Sc. Candidate in the Polytechnic University of Crete in the Electronic & Computer Engineering Department. He is currently serving at NMIOTC as a Staff Officer for Networks in the Technical Sup-

SOUND CANNON LRAD
A SOLUTION TO COUNTER PIRACY PHENOMENON?

by *Mr. Agis Anargyrou*

Developed by the Institute for Fire Prevention and Safety Technology, Department of Research and Technology

In police operations and demonstrations, operational resources are sought and used, to lead aggressive demonstrators to cancel the demonstration. This is intended to minimize the damage inflicted on demonstrators. To this end, among others, water cannons and

Fig. 1: *Water cannon used by the police*

rubber bullets are set-in, which are not suitable to reduce the potential of aggression of the protesters.

In fact, a truly reliable method of moving demonstrators to cancel the demonstration peacefully has yet not been found. Only the LRAD1 offers the possibility to contact demonstrators at a certain distance. Every possible conceivable deterrence, begins to take place at a dangerous close proximity. This is due to the volume of these devices to be generated.

SOUND CANNON – LRAD
(Long Range Acoustic Device)

The American Technology Corporation provides sound cannons (LRAD), which were originally developed for military purposes. These cannons shall generate a very loud sound in the range of ca. 2kHz that can be addressed at a attacker and irritate him by the noise exposure so much, that a well-planned demonstration is not possible.

The sound generators, offered by the American Technology Corporation, have an input power of 400-600W, which are converted on electromagnetic sound-speaker-coils into sound energy that generate in the LRAD1000, in 1m distance a sound level of 151dB. In order to produce such capacity, the coils have to be cooled with liquid nitrogen. From the Company's published data can be calculated that the LRAD1000 has a maximum capacity of 35W and the stated 151dB can only be generated one area of a few cm².

For this reason, every single attacker has to be directly targeted by the sound, what makes this unit practically ineffective for this purpose, as experience has taught.

The Herbertzhorn
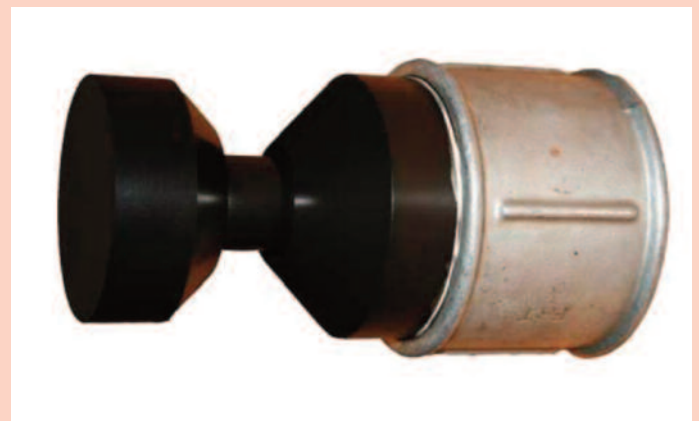Our Department of "Research and Technology" of the

Fig. 2: *Herbertzhorn without reflector*

"Institute for Fire Prevention and Safety Technology" of our company Hügin Group International, has managed to develop a highly efficient equipment, which under others shall be applied in the area of police- and military actions.

In collaboration with the leading scientist, Prof. Dr. J. Herbertz, certificated with diploma by the Standards Committee of acoustic, noise and vibration engineering (NALS) and price awarded with the Rudolf-Martin-Certificate in the field of ultrasound, the Institute for Fire Prevention and Safety Technology of the Hügin Group International, has developed and tested and patented a pneumatic transducer.

At a frequency of approximately 1.5 kHz (resonance frequency of the human ear), the Herbertzhorn shows an efficiency sound power of about 4.000 to 5.000 W. This is approximately 100 times more than the

sound power of the LRAD 1000, the so far strongest known sound cannon.

The sound generated by the Herbertzhorn is focused by a reflector and can be steered in any direction. As there is sufficient power available, the area where the Herbertzhorn is effective, is around 15° horizontally and 10 ° in the vertical.

In this way a whole demonstration march can be sonicated. The performance here is so high that it is reliably possible to keep demonstrators at a distance of

150 – 300 meters2.

DURATION OF ACTION

How long the protesters have to be sonicated, depends also on their motivation. Experiences are not yet available. It is certainly possible to use the Herbertzhorn in continuous operation. A coordinate action of the demonstrators will be disturbed in any case significantly, starting at a distance of 200m to 500m and made impossible, even with ear protection in any shorter distance.

CONFIGURATION

Herbertzhorn and reflector are installed on a remote monitor. This is equipped with a camera that transmits its images on a display, which is located in the control panel.

The displayed image corresponds exactly to the area, the sound of the Herbertzhorn is most emitted. The console is equipped with a joystick, with which you can control the direction of the Herbertzhorn vertically and horizontally.

...to control the Herbertzhorn, only one

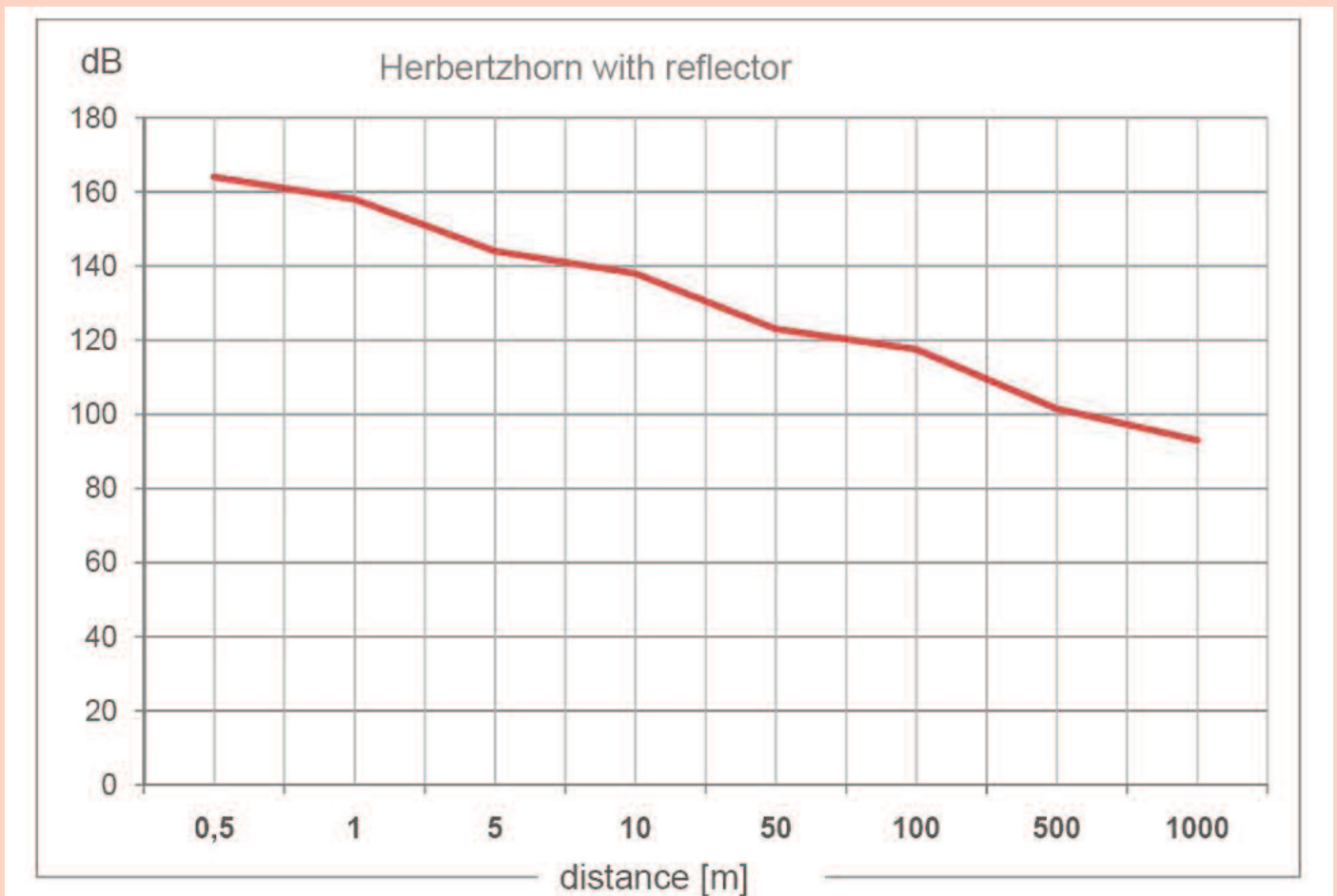**Fig. 3:** *Herbertzhorn with reflector device*

Fig. 4: *Measured dB values in function of distance*

Fig. 5: Herbertzhorn military version on a schematic diagram showing the sound propagation

person is needed.

PROTECTION OF STAFF

The protection of personnel is inasmuch available, as in the area outside the cone of sound, a sound level of 105 – 110dB were measured in a distance of approx. 3 m. This level will be muffled by the doors and windows of the car. A simple hearing protection insulates the sound level furthermore to values that are safe for the   human ear.

MILITARY VERSION
(SPECIAL RESOLUTION)

For the military sector, Herbertzhörner can be used as first stage as an alternative to weapons, when the situation, as for example currently in Afghanistan, is not clear and possibly civilians are involved. In this version, for example, a tank or armored vehicle is equipped in front and rear with one Herbertzhorn. The reflectors (focusing device) may be omitted as the vehicle front and rear with its rigid surfaces serve as reflectors.
To operate the Herbertzhörner, exhaustgases can also be used.

The usual stock used engines should allow this good since they have the necessary capacity of approximately 100 kW per Herbertzhorn.

Our defense system "Herbertzhorn" on overview

• Our system generates a sound capacity of about 4.000 - 5.000 watts at over 156 decibel.
• Works with air pressure
• Non leathal defense weapon

• Reduction of aggression
• Puts attacker into a state of shock
• Sonic is not faded out with hearing protection, because of to high volume
• Secure against firearms
• Goes easy on the defense because the sound achieves only extremely intensity in direction of the attackers
• Insensitive to long service life, rust, mechanical damage or corrosion

Conclusion

As the technology evolves we see that solutions of non lethal weapons become more apparent in our daily operational lives. Therefore, such sound devices / cannons and in accordance with conformities to the legal region regarding human being lives, can be used to deter pirates when attacking Merchant Vessels. The Japanese have already installed systems like these on their military crafts maximizing the possibilities of countering a pirate attack either on board their ships or in adjacent merchant vessels that they are escorting. By this way, they have put the maximum halt to the phenomenon of piracy saving merchant vessel crews from horrible situations such as seizing and waiting for ransoms to be paid endangering their lives to a huge extent.

Mr. Agis Anargyrou is the general manager of BIANA international s.a. (www.biana.gr, email : info@biana.gr), a company in Greece which is the official dealer for TASER applications. He is a chemical engineer and he has cooperation with NMIOTC regarding potential equipment applications for Boarding Teams and generally Maritime Interdiction

NATO Maritime Interdiction Operational Training Center

NMIOTC is offering an Efficient Training by applying:

- **Modular Course Structure:** Choose among multiple modules and subject areas
- **Flexible and Adaptive Training:** Choose among multiple training areas in order to meet your requirements
- **Just in Time Training:** Pick the time that fits most your operational requirements prior to deployment
- **Training Analysis for Audience:** NMIOTC Trainers will adjust the training IAW your training level
- **Tailored and Customized Training** IAW Customer's Training Needs
- **Mission Rehearsal Training:** Training will be executed with scenarios resembling the real maritime environment

MIO Courses - Training

NMIOTC is conducting training **every week** and in accordance with its Program of Work (NPOW - which is accessible online) to **Command Team** and **Boarding Team** Personel. Also **Naval Units** are executing MIO training during their port visit to Souda Bay and before their deployment to current operations. This training is including not only theoretical and practical issues but also **counter piracy training scenarios**. NMIOTC training is receiving requests via any possible means of communication and taking into account that there are vacancies in the specific requested training period.

Bi-Annual MIO Courses

COMMAND TEAM THEORETICAL TRAINING - 1000 Series Course (16-20 May 2011)

1010 MIO Operational Planning	**1050** MIO Phases
1020 MIO Messages	**1060** Units Organization
1030 Intel Support to MIO	**1070** Air Assets
1040 Legal Issues – ROE	**1080** Psychological Aspects

BOARDING TEAM PRACTICAL TRAINING - 2000 Series Course (16-18 May 2011)

2010 Actions Other than Tactical Sweep On board Suspect Vessel	**2040** Tactical MIO Planning
2020 Inspection / Detection Techniques	**2050** Boarding Team Psychology
2030 Intel Gathering on MIO Targets	**2060** Suspect Vessel Crew Psychology

BOARDING TEAM PRACTICAL TRAINING - 3000 Series Course (19-27 May 2011)

3010 Container Inspection	**3050** Small Boat Handling
3020 Small Arms Training	**3060** RHIB Insertion
3030 Tactical Sweep	**3070** Heliborne Insertion / Extraction
3040 Crew Control Suspect Crew Handling	**3080** Boarding Under Multiple Threats

Weapons of Mass Destruction in MIO (20-24 June 2011)

Proliferation of WMD is an issue that attracts a lot of interest in NATO. NMIOTC is conducting a course with the participation of high level guest speakers . The last day MIO practical training scenarios will be conducted.

NMIOTC Annual Conference (28 - 30 June 2011)

NMIOTC will conduct the Annual Conference in its premises from 28 - 30 June 2010

Practical Antipiracy Training Scenarios

NMIOTC provides practical antipiracy training to Naval Units before they proceed to participate in a real operation, using three different scenarios from Small Boat Investigation and Pirate Mother Ship Identification / Visiting / Boarding / Seizing up to a Protection of a Merchant Ship from Pirate Attack at Sea.
This course is available upon short request for a Unit's Boarding Team Members.

MIO Simulator Training

NMIOTC has taken the initiative of creating a software that gives the capability to the students of being trained in a two dimensional (2D) MIO Simulator, which is located in the Center's Tactical Maritime Operational Center (TMOC). Through suitable Simulator Exercises trainees understand thoroughly the real maritime environment through **Counter Piracy and MIO Simulated scenarios,** which have been constructed in such a way starting from a basic level of a MIO Operation (e.g. Hailing procedure) and reach the student to a level of being able of assuming responsibility as a MIO Comander of a Task Force. This training is available upon short request for a Unit's Command Team Members.

For more Information on the Application Process or for detailed description of the Courses please go to our website: **www.nmiotc.gr**
Course Catalogue: **http://www.hellenicnavy.gr/nmiotc/files/course_cat.pdf**
E-learning modules (ADL courses): **https://jadl.act.nato.int**
or for any further information please contact us to:
Phone:+30 28210 85710   email: studentadmin@nmiotc.grc.nato.int

"NEVER DECLINE THE DANGERS OF WAR"

MARITIME INTERDICTION OPERATIONS

ALLIED COMMAND TRANSFORMATION

NATO Maritime Interdiction Operational Training Centre
Marathi, Souda Bay, Crete, Zip 73200, Greece
Phone:+302821085710
Email: helpdesk@nmiotc.grc.nato.int
www.nmiotc.gr