nmiotc *journal*

MARITIME INTERDICTION OPERATIONS

PIRACY IN THE 21st CENTURY

MARITIME SECURITY ISSUES

NMIOTC SHIPS' TRAINING

NMIOTC 2009 TRAINING REPORT

WMD TRAINING IN NMIOTC

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NATO MARITIME INTERDICTION OPERATIONAL TRAINING CENTRE: COMMANDANT'S OVERVIEW

By Commodore Mazarakis - Ainian HN
Commandant NMIOTC

Introduction

Although not in the core tasks of NATO, Maritime Security is inevitably imposed as an important mission, thus requiring not only the conceptual framework but also the capability building of the Forces in order to be accomplished. The NATO Maritime Interdiction Operational Training Centre (NMIOTC) contributes to this goal by supporting the Strategic Allied Commander Transformation (SACT) in his transformational functions such as concept/ doctrine development and experimentation programs, while the main mission remains the provision of common and high quality education of personnel and the training of units and teams.

Inauguration ceremony of NMIOTC
14 October 2008

Maritime Interdiction activities may at any time be required to be undertaken by maritime forces in support of a number of very important areas like Maritime Counter Terrorism, Interdiction of Weapons of Mass Destruction (WMD) and associated materials, freedom of Navigation on the high seas and protection of Allies' Critical infrastructure upon request.

Taking advantage of the significant strategic position of Crete, in conjunction with the emerging safety and security issues in the maritime environment that need to be confronted, Greece offered to build, organize and fund, a new Maritime NATO Education and Training Facility, (NETF) for training of Allies and Partners.

The establishment of the NMIOTC was decided in 2003, and on 17 March 2008 it acquired Full Operational Capability. Official inauguration took place on October 14, that same year. In the period leading up to these events, and even later, the Centre consolidated and improved internal organization, and fine-tuned its education and training products while at the same time striving to make itself widely known. Possessing the status of International Military Organization, the NMIOTC is commanded by a Hellenic Navy Commodore and is multinationally manned, the Deputy Commander being a Turkish Navy Captain.

Very soon, the Centre acquired visibility, through aggressive promotion, including visits and presentations by NMIOTC staff officers and Commandant to Supreme Headquarters Allied Powers Europe (SHAPE), Supreme Allied Command Transformation (SACT), NATO Headquarters, and other venues. Most impor-

Training of HMS CORNWALL
in NMIOTC 2009

tantly, positive feedback to National Headquarters from NATO units and individuals that followed training at the NMIOTC boosted very quickly its reputation as a NETF that provides training that adds value.
Today, the NMIOTC is providing its expertise in Maritime Interdiction Operations (MIO), in the form of

Unit	Nation
HMS RICHMONT	UK
FS COMMADANT DUCUING	France
HS SALAMIS	Greece
HS LASKOS	Greece
HS SAMOS	Greece
USS KLAKRING	USA
USS ANZIO	USA
FNS MONTCALM	France
HMS CORNWALL	UK
HS ADRIAS	Greece
BLS LOUISE MARIE	Belgium
NRP ALVARES GABRAL	Portugal
BGS DRAZKI	Bulgaria
URS TERNOPIL	Ukraine
HMS LANCASTER	UK
Hellenic Navy Seals	Greece
HS LIMNOS	Greece
ROS REGINA MARIA	Romania
FNS SURCOUF	France
FNS PRIMAGUET	France
HS KANARIS	Greece
USS HIGGINGS	USA

Table1: Units whose Boarding and/or Command Teams followed MIO courses in 2009

NATO accredited courses. Each MIO course consists of a number of modules, each one dealing with a specific issue. This modular design allows the Centre to tailor the training package according to the specific requirements of each unit, based on it's training needs and schedule constraints.

NMIOTC 2009 Activities

Individuals and units from NATO and Partnership for Peace (PfP) nations started coming for training at the NMIOTC since the Summer of 2008. As the year progressed, the rate of training activities at the NMIOTC, grew. By March 2009, the rate of units and individuals attending courses at the Centre, had grown to a sizable level.

During the course of 2009, 22 NATO units and 1 Ukrainian frigate underwent training at the NMIOTC. Table 1 shows the units whose Boarding and/or Command Teams followed MIO courses.

NMIOTC activities include the training of groups of ships, in small or medium scale training events. In this respect, in 2009, the NMIOTC participated in the planning and the conduct of exercises as follows:

Visit of US AFRICA COMMANDER
General Ward lder

Exercise Phoenix Express 2009. This US AFRICOM multi-national exercise involved surface units and trainees from 10 NATO and non-NATO nations. The NMIOTC, during the first ten days of the exercise, trained 143 multinational personnel, and during the at-sea period, participated with assessment teams on board MIO target units.

Exercise Eurasian Partnership Capstone 2009. This US EUCOM multi-national exercise involved 63 trainees from 7 nations who trained at the NMIOTC premises.

EURASIA Partnership Cruise 2009

With US EUCOM assistance, two CBRN MIO exercises were planned and conducted, involving personnel from US, UK, Greece and NMIOTC trainers.

In conformance to the NMIOTC Programme of Work (POW), two sets of individual training courses (courses 1000, 2000, 3000) were conducted, one in spring and one in late fall, with participation from Albania, Ireland, Denmark, France, Croatia and USA. Tuition fees were limited to the replacement of expended ammunition and paintbullets. Also, the pilot Course for Maritime Operational Terminology was conducted in September, with participants from Egypt, Algeria, Jordan, Bulgaria, Kazakhstan and Greece.2009.

In September 2009, the NMIOTC participated with its means and personnel in an experiment, conducted by the United States Naval Post-Graduate School Monterey (NPS), regarding communications architecture for provision of real-time reach back support to the Boarding team, from ashore, during a suspect ship search.

In October, the NMIOTC, with strong support by NATO HQ/WMDC, conducted a high level seminar on Maritime Interdiction of WMD. The seminar invoked much interest and feedback received points to the need to repeat it in 2010.

The NMIOTC also provided limited education in the form of presentations to the Standing NATO Maritime Groups SNMG2 and SNMG1, in June and October respectively, immediately prior to their Operation Ocean Shield (OOS) deployment. In return, in November, Commander SNMG2 (COMSNMG2) briefed the NMIOTC on aspects of his involvement in OOS.

NMIOTC 2010 Prospects

Looking ahead, the prospects for 2010, seem bright. This year, the NMIOTC will continue to conduct training, at short notice, of NATO and Non-NATO surface units, especially those going or coming from Operation Active Endeavour (OAE), UNIFIL in the Mediterranean and operations Ocean Shield (OOS) and other deployments south of the Suez Canal.

In the same area of just-in-time training support to operational activities, the NMIOTC is eager to become involved in OOS local cabability development efforts, providing training at its premises and with Mobile Training Teams.

High Level Seminar on Maritime Interdiction of WMD in NMIOTC

Preparations for the conduct a WMD MIO course, 21 to 25 June, targeting operational, tactical and unit levels are advanced. Invitations for this course have already been sent out.

Also, planning for the 2010 NMIOTC Annual Conference in early summer (29th June to 1st July), is ongoing. The Conference will be targeting tactical-operational levels. The title of the Conference will be: "Maritime Interdiction Operations in a non-permissive Environment". In addition to NATO and European invitees, invitations have been sent to non-NATO nations, like China, India, Japan, Nigeria and Singapore. If these invitations are accepted, the conference will surely become very special.

The "NMIOTC journal" will continue to be edited on a six-monthly basis. The next edition will be issued in August 2010.

At the same time, efforts will continue to bring a broader Allied representation in the Centre by adding more staff officers and especially trainers, from NATO and Partner nations.

During this year, the Centre will also participate actively in exercise planning and execution (Phoenix Express 2010, Niriis 2010, Alexandroupolis 2010, and other NATO and National exercises).

Close contact with NATO Operational Commands and Standing NATO Maritime Groups (SNMGs) will continue to be fostered, and NMIOTC will participate in all NATO WGs relative to MIO. It is also important to establish closer contact with relevant training centers / COE's, for mutual support.

Epilogue

Maritime Interdiction Operations are not the most important or difficult operations that a naval unit will be called upon to execute. However, it must be stressed that unlike the police, the coast guard and other law enforcement agencies, the navy officers and crews are not so frequently dealing with the civilian world during the conduct of what are considered their core tasks. In addition, MIO are usually conducted in the High Seas, where International Law at Sea prevails. But this law is not understood in the same way by all actors. Also, actions undertaken at the tactical or even at unit level, can very easily ignite reactions at the strategic level. The NMIOTC, situated at a strategic geographical position, is well placed to provide this just-in-time operational training at the tactical, unit, and individual levels, to the standards that have been commonly agreed by the Alliance, including parters. Also, being an active member of an increasing number of working groups related to Maritime Security, the NMIOTC tends to become a significant contributor to the Alliance in maritime affairs.

Phoenix Express 2009

Boarding during EU operation ATALANTA (Courtesy HS SALAMIS)

***Commodore Constantine Mazarakis–Ainian HN**, graduated the Academy with the rank of Ensign in 1980. In addition to staff courses, he attended the Hellenic Naval War and National Defense Colleges and is a naval helicopter pilot. He has also completed a post-graduate course on "Strategic Analysis and Conflict Crises Management" from the Scottish Centre for International Security (University of Aberdeen).*

During his career he has been appointed on board surface ships as communications, operations and executive officer, and has commanded a Fast Patrol Boat and a Frigate. He is also a helicopter pilot

TACTICAL NETWORKING TESTBED MIO EXPERIMENTATION ©

By Dr. Alex Bordetsky and Dr. Arden Dougan

Beginning in 2004, a team of Naval Postgraduate School (NPS) researchers together with partners from the Lawrence Livermore National Laboratory (LLNL), started a new interagency experimentation program, which is now collectively known as the TNT MIO Experiments (TNT for Tactical Networking Testbed, MIO for Maritime Interdiction Experiments).

The experimentation process involves field experiments with Lawrence Livermore National Laboratory, USCG and First Responders (San Francisco Bay, New York/New Jersey), and is supported by Homeland Defense (HLD) and HLS S&T Programs and Department of Energy (DoE) agencies. These experiments are conducted twice a year and are also supported by overseas partners from Sweden, Germany, Greece, Denmark, and Singapore. This series of experiments is being conducted to test the technical and operational challenges of searching large cargo vessels and inter-

dicting small craft possessing nuclear radiation threats. One goal is to test the applicability of using a wireless network for data sharing during a MIO scenario to facilitate "reach back" (a current technologically challenging operational gap) to experts for radiation source analysis and biometric data analysis. This technology is being tested and refined to provide networking solutions for MIOs where subject matter experts at geographically distributed command centers collaborate with a boarding party in near real time to facilitate situational understanding and selection of the most appropriate course of action .

Each MIO experiment represents a step forward in evaluating the use of networks, advanced sensors, and collaborative technology for rapid MIO response, including the ability to search for radiation sources, set up ship-to-ship and ship-to-shore communications while maintaining network connectivity with command and control (C2) organizations, and collaborating with experts on the radiological threat and biometrics identification.
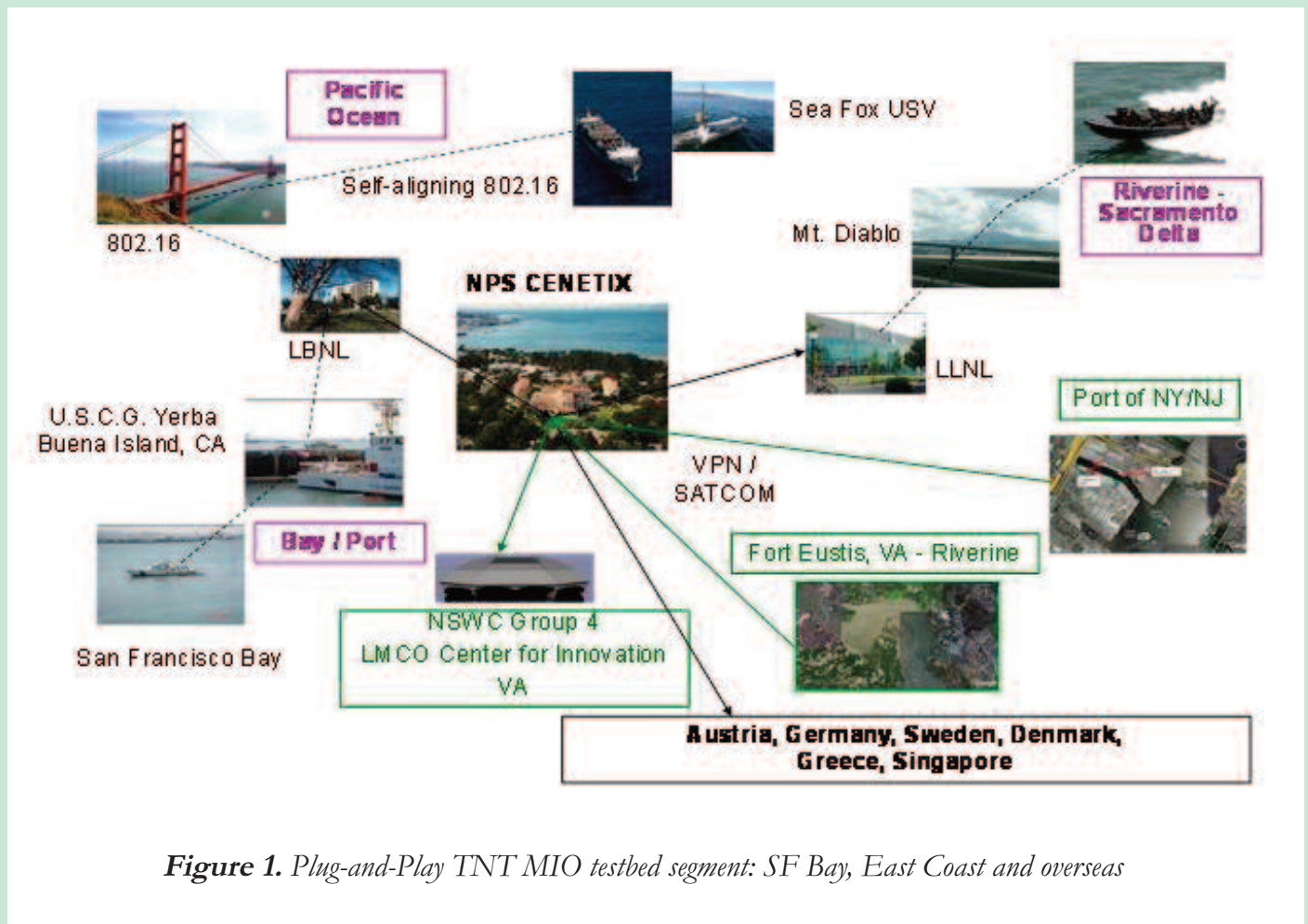
Figure 1. *Plug-and-Play TNT MIO testbed segment: SF Bay, East Coast and overseas*
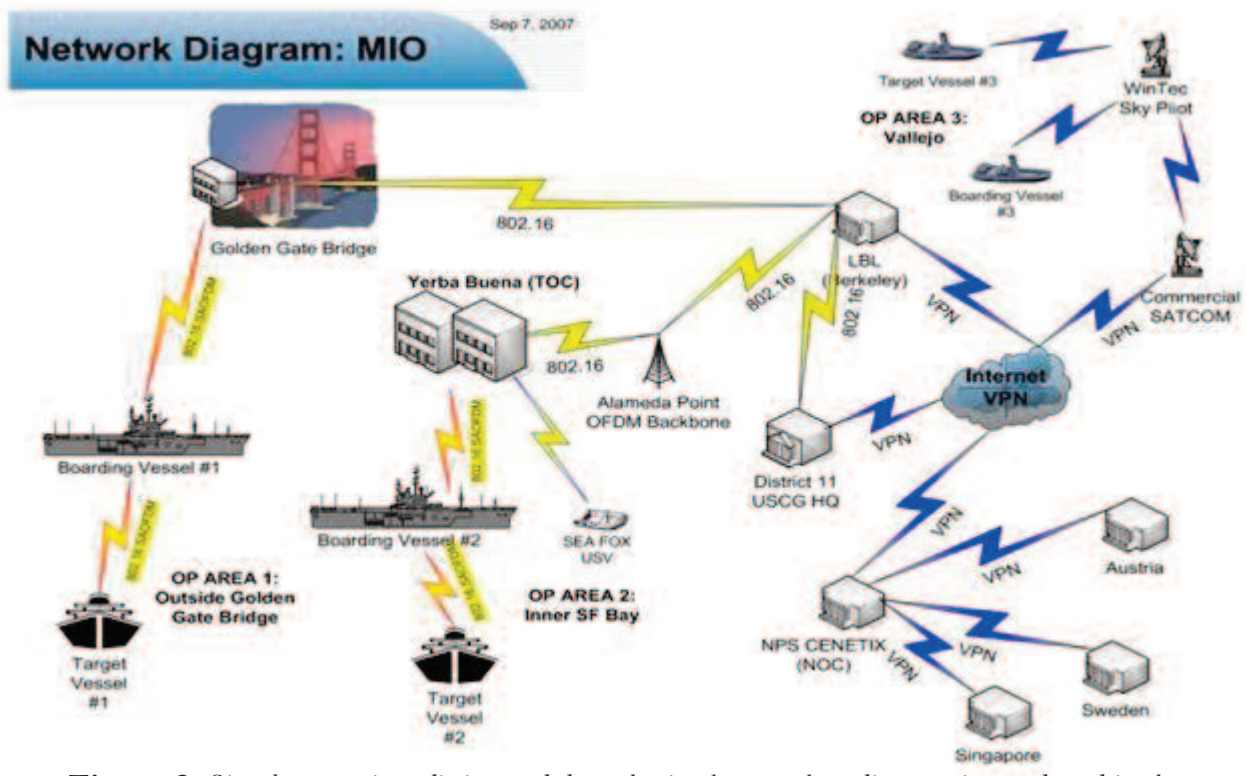
Figure 2. Simultaneous interdiction and data sharing between boarding parties conducted in three geographically distributed locations, including data sharing and collaboration with additional overseas sites.

In the core of TNT MIO experimentation is a unique testbed (Fig. 1 and 2), which enables sustainability and evolution of the experimentation process. From an operational standpoint, the TNT MIO testbed represents a unique geographically distributed field model of specialized sensor-unmanned systems-decision maker clusters.

• **San Francisco:** New sensor, unmanned systems, and networking technology; data sharing and collaboration with USCG and marine police units, multiple small boat interdiction, DoE reachback

• **Ft. Eustis:** Riverine operations, data sharing and collaboration with Naval Special Wafare (NSW), US-SOCOM, Army swimmers and divers, speed boats, and unmanned surface vehicles, and utilization of the C2 Center at Lockheed Martin Center for Innovation

• **Port Authority NYNJ-ARDEC:** Data sharing and collaboration with NY-NJ area Police and FD first responders, interoperability with DHS Joint Situational Awareness System (JSAS)

• **Swedish NWC:** Wearable sensor and Unmanned Surface Vehicle (USV) swarm, interoperability with BFT

• **Danish Naval Systematic Center:** Diver detection in the port security area, interoperability with NATO Maritime Boarding Systems

• University of Bundeswehr: Check points in the smuggling routes, tagging and monitoring

• **NATO MIO TC in Crete**: Expert Center for Maritime Interdiction Operations.

Figures 3-7 illustrate the TNT MIO testbed in action during the MIO 08-4 multiple agency search of the large cargo vessel in the Port of Newark and interagency data sharing on simultaneous small craft interdiction in the Port of Newark, Sweden, and Denmark. Such real-time data sharing between remote nuclear radiation detection experts, boarding officers, and local commanders at different geographical locations, allows to associate findings into holistic pattern of the emerging threat and to assist boarding officers in properly assessing otherwise low detection levels. For example, if a boarding officer was acting alone, the low level radiation source that was found on board vessel of interest, might've been neglected due to the lack of information on similar experiences of other boarding teams. However, by getting real-time input (including video feeds) on findings from the other locations, the same low level source could be correctly evaluated by its content and look as a part of a lot more significant threat.
Also, multipoint collaboration between the small craft interdiction crews, allows for positional and video sur

Figure 3. *Data sharing on simultaneous small craft interdiction; Port of Newark*
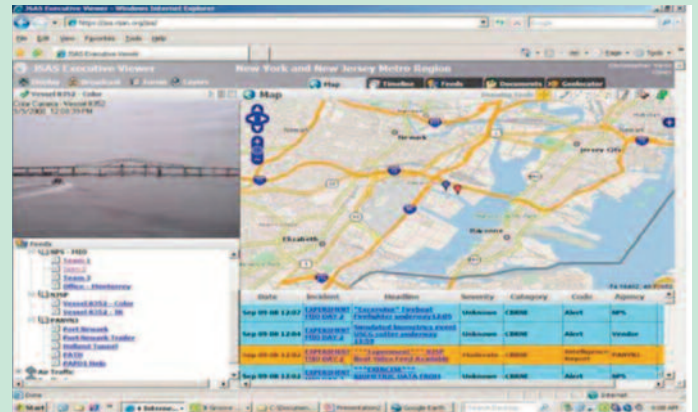
Figure 4. *PANYNJ JSAS portal for sharing video/text alerts on small boat interdiction: NJ State Police patrol and Fire Department NY video/text alert exchange*

veillance awareness sharing in association with the detection alerts. Figure 4 illustrates how the video feed on a suspect vessel leaving the Birth 17th rendezvous area is associated in the JSAS view (right frame) with expert alert on results of the primary drive-by detection analysis. The expert alert stated that the residue on the boat detected during the primary screening appeared to be suspicions. This triggered the incident commander to send a patrol boat with sensor closer to suspect vessel for an immediate secondary stand-off screening.

Figure 5. *Shared video surveillance feed from the NSWC in Karlskrona, Sweden, on the Piraya USV drive-by detection of the suspect vessel (Actual feedback from the camera)*

Figure 6. *Viewing the JSAS alerts at the MIO TOC in Sweden*
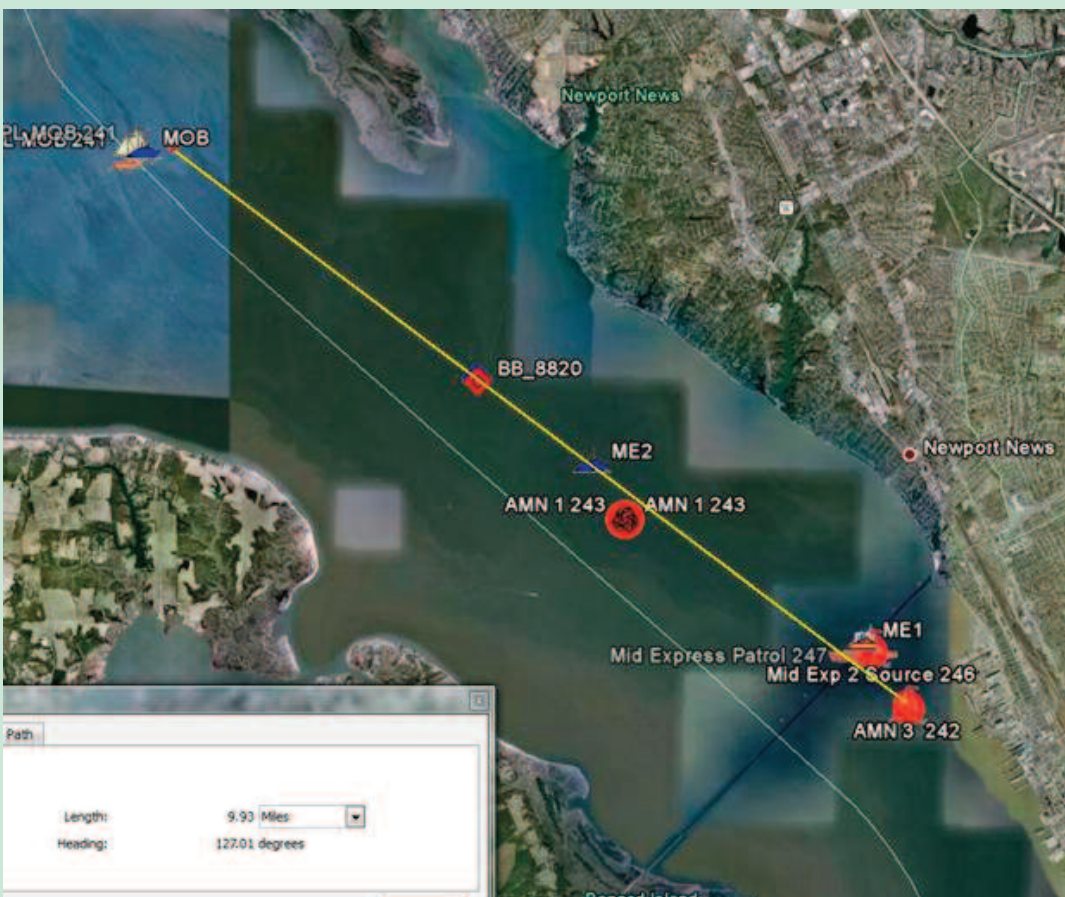
Figure 7 . *Synergy of extending mesh network by unmanned surface vehicles during a high-speed riverine chase of the target vessel.*

detection distance. As the distance from the Mobile Operations Base (MOB) increased, two manned boats (ME2 and AMN 1-243) and USV (BB-8820) became needed to quickly extend the MIO mesh network for keeping the detection process (reachback to remote experts) uninterrupted beyond the 12nm zone. The USV was operated remotely over the alternative control link for taking needed relay node position. Once within the broadband wireless link reach to its neighbors the USV maintained mesh networking with the boats on-the-move automatically.

In September of 2009 the TNT MIO Experiment moved to NMIOTC in Crete. In result of productive cooperation with NMIOTC team, the first TNT MIO experiment involving cargo vessel search and standoff detection of small boats conducted collaboratively by coalition patrol crews has been successfully executed.

It included IED finding through networking and collaboration of the US and Hellenic swimmers (Fig. 8 and 9) as well as sharing and transfer of the situational awareness information between the patrol crew members from NMIOTC personnel playing different boarding party and command roles.

In the part of the high-speed stand-off detection captured in Figure 7, the patrol boat with sensor (ME1) was following on target vessel keeping needed

Figure 8. *Hellenic swimmers are departing on joint tagging and tracking experiment*

Figure 9. *US swimmers with the experimental networking gear (image below) are joining Hellenic team for the IED evaluation.*

Figure 10. *Shared SA view on the netwok-enabled joint swimmer action*

Learning how to assist with networking on-the-move, collaborate, develop and share situational awareness on joint findings appeared to be one the main lessons learned by the international crews. Figure 12 illustrates these results of successful dialog between Czech, Romanian and Bulgarian boarding crews during the cargo vessel search.

Figure 11. *Collaboration and data sharing on the source detection on board large vessel.*

Figure 12. *Collaboration between coalition patrol boats in detecting and following on target vessel*

In Fig. 12 Romanian (PB Team 1) and Bulgarian (PB Team 2) are exchanging vessel detection findings and assisting each other in maintaining networking with the TOC, while at high-speed persuit.

All together in result of the MIO 09-2 experiment with NMIOTC the coalition boarding officers and combat swimmers learned vital operational constraints associated with tagging, tracking, detecting, setting up choke point, continuing stand-off detection at high speed by means of mesh networking and sharing the situational awareness environment.

MARITIME INTERDICTION OPERATIONS SMALL CRAFT DETECTION ©

By Dr. A. Dougan*, D. Trombino, W. Dunlop, Dr. A. Bordetsky

The Naval Postgraduate School has been conducting Tactical Network Topology (TNT) Maritime Interdiction Operations (MIO) experiments with Lawrence Livermore National Laboratory (LLNL) since early in 2005. In this work, we are investigating cutting edge technology to evaluate use of networks, advanced sensors and collaborative technology for globally-supported maritime interdiction operations. Some examples of our research include communications in harsh environments, between moving ships at sea; small boat drive-by radiation detection; network-centric collaboration with global partners; situational awareness; prototype sensors & biometric instruments. Since 2006, we have studied the concept of using a small vessel with fixed radiation sensors to do initial searches for illicit radioactive materials.

In our work, we continue to evaluate concepts of operation for small boat monitoring. For example, in San Francisco Bay we established a simulated choke point using two RHIBs. Each RHIB had a large sodium iodide radiation sensor on board, mounted on the side nearest to the passing potential target boats. Once detections were made, notification over the network prompted a chase RHIB also equipped with a radiation sensor to further investigate the potential target. We have also used an unmanned surface vessel (USV) carrying a radiation sensor to perform the initial discovery. The USV was controlled remotely and to drive by boats in different configurations. The potential target vessels were arranged in a line, as a choke point and randomly spaced in the water. Search plans were problematic when weather, waves and drift complicated the ability to stay in one place.

A further challenge is to both detect and identify the radioactive materials during the drive-by. Our radiation detection system, ARAM, Adaptable Radiation Area Monitor, is able to detect, alarm and quickly identify plausible radionuclides in real time. We have performed a number of experiments to better understand parameters of vessel speed, time, shielding, and distance in this complex three-dimensional space.

At the NMIOTC in September 2009, we employed a dual detector portal followed by a chase. In this event, the challenge was to maintain communications after a lapse. When the chase went past the line-of sight reach of the Tactical Operational Center's (TOC) antenna, with interference from a fortress island in Suda Bay, Wave Relay extended the network for continued observation. Sodium iodide radiation detectors were mounted on two Hellenic Navy SEAL fast boats. After making the detection one of the portal boats maintained line-of sight while the other pursued the target vessel. Network access via Wave Relay antennas was maintained until the conclusion of the chase scenario.

Summary

Progress has been made in the detection of radioactive materials in the maritime environment. The progression of the TNT MIO experiments has demonstrated the potential of the hardware to solve the problems encountered in this physically challenging environment. There continue to be interesting opportunities for research and development. These experiments provide a variety of platforms and motivated participants to perform real-world testing as solutions are made available.

Dr. Dougan, D. Trombino, W. Dunlop *are members of the Lawrence Livermore Natioanal Laboratory in California, USA.*
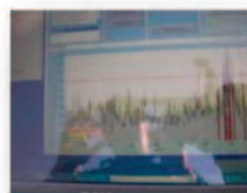
portal   detect   chase

FIRESTORM- NETWORK EFFECTS DECISION SUPPORT TOOL ©

By Mr. George Papanagopoulos and Mrs. Ketula Patel,
US ARMY RDECOM-ARDEC

ARDEC personnel participated with Firestorm in the NATO MIO 2009 Exercise, organized by the Naval Postgraduate School and executed simultaneously in the USA and the NMIOTC, in Greece. The experiments included small boat stand-off detection, patrol transfer activities, swimmer tracking and large vessel search. ARDEC's Firestorm team in Souda Bay provided a shared situational awareness environment, two dismount tracking solutions, and PDAs. But what is Firestorm, and why was it developed?

In order to meet the network centric lethality requirements of future force mounted and dismounted combat systems, a highly flexible, scalable, open and standards based effects Decision Support Technology was needed to enable the seamless integration and processing of distributed multi-sensor targeting feeds and delivery of required effects on target. Firestorm was developed to meet this future force requirement by providing an extensive repository of effects planning, coordination, de-confliction, execution and collaboration decision support components and tools executable within a component/plug-in based architecture in the C++ environment, and capable of running on various platforms, including Linux, Windows and Window Mobile. The system was designed with high component modularity and low coupling, while mindfully implementing the key tenets of open-architectures, allowing for easy integration and interoperability with other network enabled systems, sensors and third party applications.

Firestorm employs Bayesian networks for track management and classification of sensor data, as well as distributed algorithms for allocating and pairing weapons with targets and delivering the right effect without information overload to the Warfighter. A few of the challenges the team was faced with and overcame were determining the asset priority, accuracy of fused information, ease of use of the software system and limited bandwidth on the wireless network. The challenges were addressed by participating in many user experiments which led us to implement a unique methodology to tackle the problems.

This is a ground-breaking program in terms of implementation of advanced concepts for manned and unmanned systems in combat operations that provides net-centricity and networked lethality at all echelons. In addition to shared situation awareness, the Warfighter is also provided with significant tasking capabilities for both manned and unmanned systems, to provide a robust set of typical taskings including but not limited to move, patrol, engage, and battle damage assessment orders. The Warfighter is given the ability to task a system without needing to explicitly control it, allowing for the concept of a joint manned-unmanned team, for which target handoff and sharing of SA data between humans and unmanned systems working together in a small squad sized team is of critical importance.

Firestorm automates many of the time critical functions and tasks performed by the Future Combat Teams, i.e., course of-action analysis, movement planning, fire planning, tactical fire control, and fires coordination. Firestorm enhances battlefield visualization and provides for total asset visibility for operations, support, and evaluation of mission critical tasks. Firestorm manages and supports the timely exchange of battlefield information, effects coordination, and targeting required to integrate fire support assets. By using the concept of a plug-in architecture, Firestorm is furthering the concept of software reuse for multiple applications. The idea is to develop an architecture which not only contains numerous decision aiding components which can be reused, but which also contains a repository of components which can be used, along with the core backplane, to tailor various decision aiding applications for multiple uses. For instance, by adding and removing various components from the repository, the architecture can be used to configure a decision aiding application for naval tactical fire control. By using other components, a decision aiding application can be built for mortar fire direction on a PDA or a tailored situation awareness and network fires application on a wearable PC for dismounted operations.

We hope this short article provides an insight into Firestorm, a Network Effects Decision Support Tool that was used during the Naval Postgraduate School experiment at NMIOC and the US.

George Papanagopoulos and **Ketula Patel** *are members of the US Army Research Center (USARDEC)*

PICO SATELLITES IN MIO TRACKING WMD MATERIALS ©

By Lt. Georgios Mantzouris H.N.

Introduction

In a complex maritime environment it is important to be able to localize, verify, search, track and tag maritime assets at sea, in critical sea lines of communication, transporting sensitive cargo materials. In the emerging environment of network-controlled Maritime Interdiction Operations (MIO), tagging and tracking of hazardous materials, illegally transported by means of large merchant vessels and small craft around the world, remains a major technological and operational challenge. The emerging technology of Pico satellites could provide a unique tactical capability for extending craft surveillance into low earth orbit and maintaining ubiquitous situational awareness between partners operating in maritime patrol areas as well as with remote expert and command centres around the globe.

In the following paragraphs an innovative project between the Naval Postgraduate School and NMIOTC is briefly introduced, which emerged based on the ideas of Dr. Alex Bordetsky, on applying the Pico satellite technology to maritime awareness tasks, such as WMD counter-proliferation efforts through the sea lines of communication.

Pico Satellite Mission Critical Parameters

Regarding Maritime Interdiction Operations (MIO) there are numerous reasons why we try to use space based technologies instead of more traditional solutions. Here, we are not going to analyze all the effects and parameters that the use of Pico satellites brings. We will only mention the elements that are needed in order to integrate pico satellites in MIO operations with respect to Weapons of Mass Destruction Trafficking. The NPS research and experimentation in which NMIOTC is involved will be using Pico satellites, such as the Tubesat satellite bus, which is less than a kilogram of net weight. Up to now there are no commercial Pico satellite buses in orbit that are able to reroute information from a maritime warfare operational area back to a network operation center.

In order for the Pico satellite technology to be antagonistic with respect to other already existing systems, this new technology must meet some "Mission Critical Parameters"

Such parameters would be:
- Pico Satellite Operational Lifetime and Operating Principles.
- Real or Near Real time Tracking Capabilities.
- Accuracy of Tracking.
- Available Data Transmission Techniques and Data Channels.
- Video and Reach Back Capability.
- Tactical use in MIO
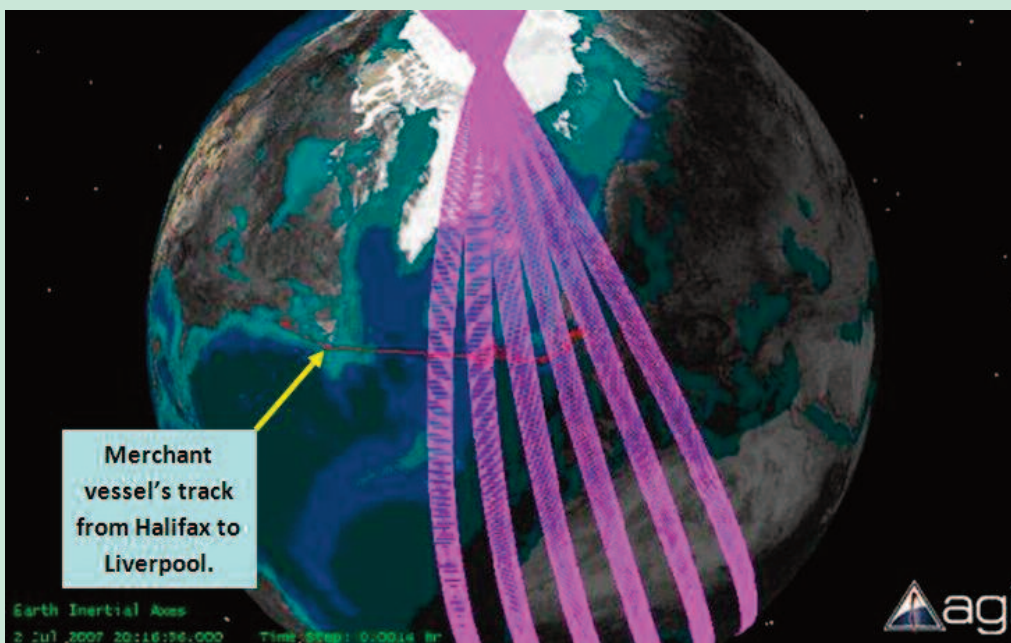
The purple lines above depict a LEO small satellite track as it passes over the Atlantic Ocean and Europe. A merchant vessel's track is depicted with the red line through its journey from Halifax to Liverpool. During this trip the ship sends AIS signals to the small satellite. Similarly to this notion, NPS Pico satellite will receive messages from a boarding officer on board a vessel for the existence of an illicit WMD material. Then these messages will be forwarded to a Network Operation Center for further analysis and execution of advisory procedures (Courtesy UTIAS).
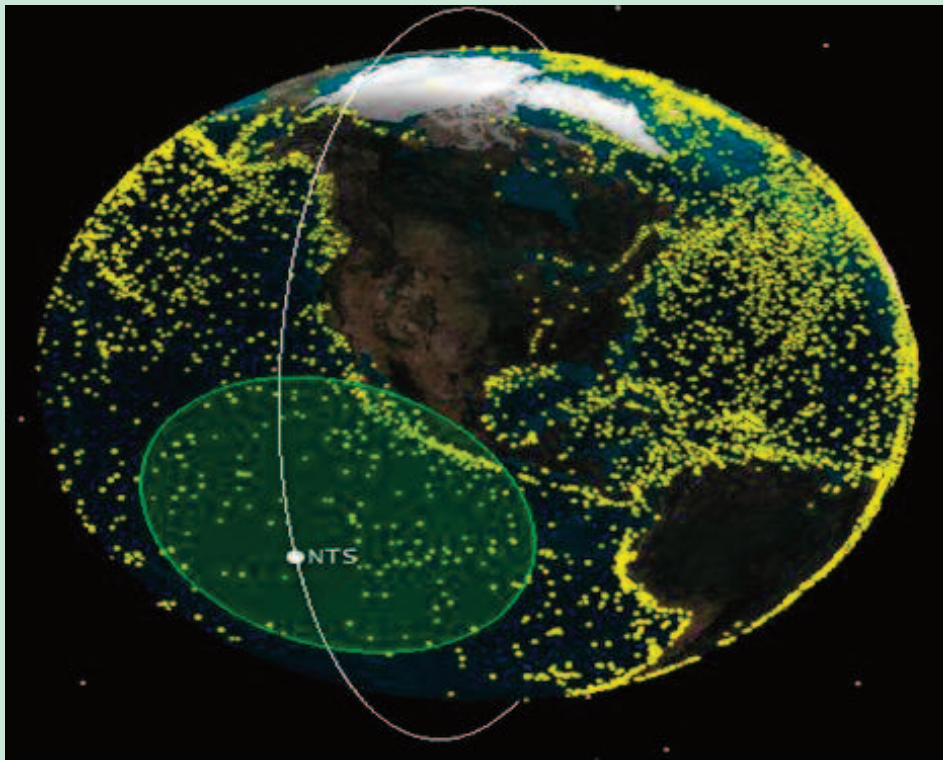
Illustration of the AIS messages recovered during the first six months of NTS micro satellite, illustrating the maritime traffic density around the Earth. Same types of messages regarding WMD in MIO are going to be received from the NPS Pico satellite during its operation. (Courtesy: UTLAS)

NMIOTC involvement in NPS Pico Satellite experimentation

Maritime Interdiction of CBRN is mostly conducted on the tactical level but very rarely does this level possess the detailed knowledge needed for decision-making without recourse to reach-back support. Since actions and decisions at the tactical level are time-sensitive, this can create problems. NMIOTC-NPS cooperation is trying to address this issue and create solutions for boarding officers by using NMIOTC Seals playing at the tactical level and NPS playing the role of reach-back support facility enabler in the execution of scenarios and associated experiments. This problem is researched in the context of compliant boardings, but some aspects of non-compliant boardings are also scrutinized.

MIO scenarios for implementation are chosen, that make maximum use of the need for use of this asset. There are, of course, limitations to the extent of application of this technology within available funding and means. The intent is, to create Maritime Situational Awareness situations that can provide the basis for experimentation on MSO/MIO requiring the use of pico satellites. These scenarios will be tested in up-coming experiments that are going to be executed at NMIOTC in co-ordination with the NPS specialized team under the leadership of Dr. Alex Bordetsky, who is a global leading scientist in this field.

Satellites with Space Maritime Tracking Capability have been around for not so many years. Research started from academic institutions and today is available commercially primarily in applications of space maritime tracking of merchant vessels around coastal waters and in the primary sea lines of communications (e.g. Gibraltar).

The number of users around the world that are trying to apply pico satellite technology for the tracking of merchant vessels that may be transferring or carrying illicit cargo is small. NMIOTC cooperation with the Naval Postgraduate School pico satellite experiment is breaking new ground in this area and will hopefully disclose issues and provide solutions to some of the problems that a tactical commander at sea has, when reach-back

Tubesat Pico satellite *pictures (courtesy Interorbital Company). This Pico satellite is going to be used from NPS in order to send and receive messages regarding WMD in Maritime Interdiction Operations. The amazing fact though is that as it can be seen from the right picture this pico satellite is weighting only 0.75 kgr and it has the dimensions of a typical small glass of water. With this technology the cost of using pico satellites in WMD MIO operations is minimal for every possible user.*

support is needed in real-time, within limited bandwidth resourses. For this case, the use of Tubesat Pico satellite technology, is being explored.

Tubesat Pico Satellite

Tubesat is a new promising Pico Satellite that is going to be used by the NPS as the experimental test-bed. It is a standalone Pico-satellite with capability of earth from space video imaging with on board processing and with total mass of 0.75 kg. 0.2 kg of the total mass can be utilized for experiments (in our case MIO experiments). Tubesat is designed to operate for up to 3 months and from a 310 km orbit with an orbital longevity of three weeks to three months, depending on the solar weather (satellite orbital decay). Total earth coverage will require approximately 4-6 Tubesat Picosatellites to be in orbit at the same time. NMIOTC under the strong cooperation that has initiated with the Naval Postgraduate School will host an experiment this year trying to receive and send data to this experimental pico satellite instead of using other satellite paths, as happened in the past, like iridium or GPS. By applying the use of pico satellite, NPS experts will try to maintain the reachback capability on a 24/7 basis giving hopefully worldwide the message that we can cover maritime areas of interest and receive and send back and forth information to a Network Operation Center. By this way, a ship operating in a remote sea area will have the capability to communicate directly with advisors ashore and confirm the existence of WMD materials on board merchant vessels, through the boarding officer. This experiment with Tubesat Pico satellites is covering an area where there is no ongoing research from any other institution that is dealing with maritime environment.

Conclusions

The above mentioned co-operative action between NMIOTC and NPS has to be tested in the very small timeframe that the Tubesat Picosatellite is going to stay in orbit (three weeks to three months). It is assumed that this timeframe is adequate enough in order to execute WMD MIO experiments and finally acquire important results.

The proliferation of WMD in Maritime Interdiction Operations through Picosatellites is a really innovative and pioneering approach. Naval Postgraduate School along with the help of NMIOTC's premises and personnel is going to implement new technologies trying to fill the research gap that still exists in scientific community. It is a totally new and promising project and the usability of these data channels has not yet been assessed. The question addressed is whether the unique set of features of Pico satellites can be used beneficially in future implemented WMD MIO scenarios in order to make identification, search, tracking and tagging of illicit WMD materials a procedure that we will be able to be executed in a fast and efficient way through Pico satellites.

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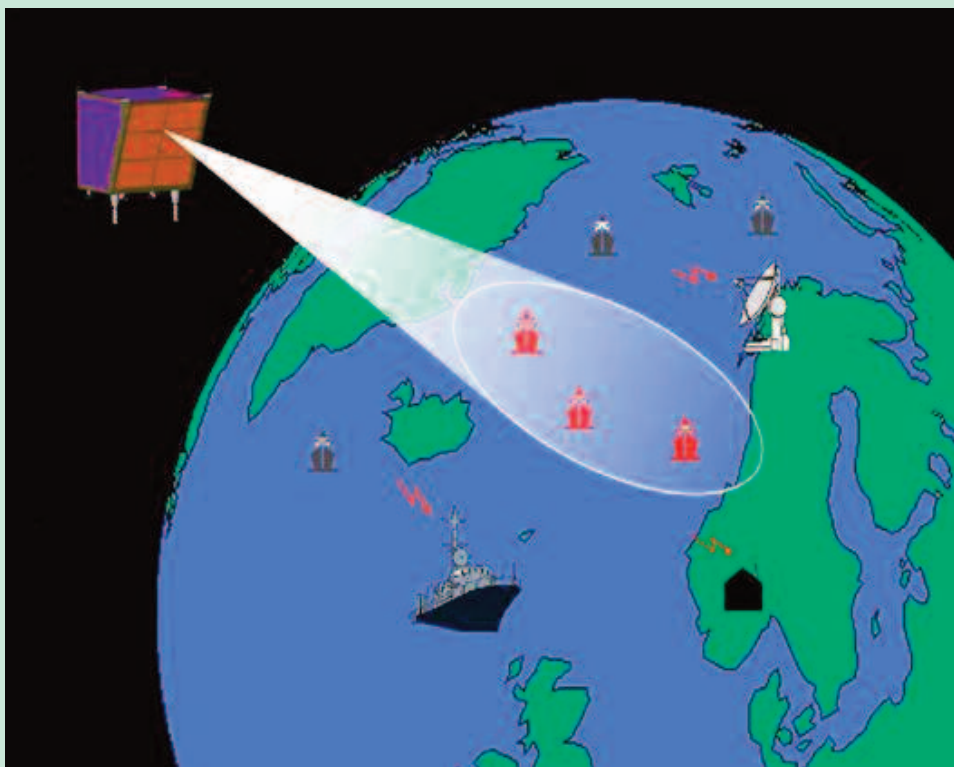
NPS Pico satellite will cover critical sea lines of communication trying to track and tag WMD materials that are being transferred illicitly. A boarding officer on board the merchant vessel can send critical info through the Pico satellite channel and receive back important advice on how to handle the mission. There is a need of 4-6 pico satellites in order to cover the whole earth using polar orbits for 24 hours a day 7 days per week.

WMD MIO Training in NMIOTC

By Capt.(A) M. Kaltenbrunner CZ/A

NMIOTC was activated on 20 September 2007, while full operational capability was declared in 17 March 2008. The first "WMD MIO related training" within NMIOTC facilities had been conducted much earlier.

The first mission undertaken was cooperation with SACT in a "**Limited Objective Experiment (LOE1**)"aiming at the operational evaluation of CBRN detection materiel. The experiment started in July 2007 and is still ongoing. LOE1 provided insight from boarding instructors from the Hellenic Forces about the impact of current SOPs of three hand-held stand-off RN detectors to be used during boarding operations for search and inspection. The boarding instructors from the NMIOTC received training on each instrument before the tests. Then the detectors were tested in several training sessions and search operation sequences onboard NMIOTC Training Ship ARIS. Infrastructure, assets and the expertise of the staff, allowed the formulation of a set of requirements for operationally usable detection devices. Several Nations participated in this experiment either actively or as observers. In particular representatives from the Turkish Navy, the Czech Army (representative from JCBRN-D COE), and the Norwegian armed forces attended and actively contributed to the data acquisition and the searches.

The experiment continued in November 2007 in Norway as the second phase LOE2 aiming at evaluating the detection performance of stand-off radiological and nuclear sensors, both hand-held and vehicle mounted radiation detection systems to be operated from platforms such as RHIBs or helicopters.

In parallel the NMIOTC has initiated an ongoing **cooperation with Naval Postgraduate's School MIO experimentation team**, lead by Professor Alex Bordetsky. In September 2009, a MIO experimentation exercise was conducted at NMIOTC with a US team, where techniques associated with MIO environment were tested and assessed.

In this MIO experimentation exercise NMIOTC cooperated with NPS on the experiment *"Networking and Interagency Collaboration on Maritime-sourced Nuclear Radiation Threat and Small Craft Interdiction"*. This experiment focused in evaluation of the use of networks, advanced sensors, and collaborative technology for rapid Maritime Interdiction Operations (MIO), including the ability to search for radiation sources, set up ship to ship and ship to shore communications while maintaining network connectivity with command and control (C2) organizations and collaborating on the scale of the radiological threat. (detect the radioactive sources, teams transmit the spectral information via JSAS to the DNDO Reach-back to receive real-time identification of the items).

The boarding instructors from the NMIOTC practically participated on different tasks:

- **Cargo Vessel Search** *(search for radioactive sources) simulated onboard NMIOTC Training Ship ARIS*.
- **High Speed stand-off detection with radiation detectors onboard**. *For this purpose, a check point was created, with two RHIBs with stand-off R/N sensors checking suspected vessel (with radioactive source) passing through. After positive detection teams transmitted the spectral information for Reach-back)*.
- **Swimmers with sensors** – *tracking CBRN material on small crafts (Hellenic and US combat swimmers with special equipment marked a suspected vessel for tracking)*.
- **Multiple vessel search** *with small boats*.
- **Collaboration and C2 Maturity evaluation** *with NATO Partners*.

This event provided valuable experience to all participants for better understanding of the problems of coordination, communication and sharing of information during MIO.

WMD MIO training in NMIOTC:

NMIOTC current training is divided in four series which includes a number of modules and refers to command teams and boarding teams separately while the FTX (Final Tactical Exercise) refers to the whole unit. CBRN Defence training is mostly included in lessons provided in 3000 course *"BT Practical issues"*. During the lessons we provide for BT models of situations and special circumstances before and during the boarding operation and flow chart for reaction. Theoretical part of lesson **"3080 Boarding under multiple threats"** is focused on CBRN threat assessment. The NMIOTC provides Boarding Teams with the most important information about the signs and symptoms of CBRN agents, detection techniques and also ways of reaction in case of positive detection, response and First aid. At the present time this part of the course is theoretical only, but practical training for Boarding Teams is actually being incorporated as part of the 3080-Boarding under multiple threats module, and as part of training included in the 3030-Tactical sweep practical module. Practical training will include detection and survey techniques, response and protection of BT in accordance with tactical needs.

Exercise "Prism Flame 2009" and R/N detection training

NMIOTC instructors gained valuable experience from cooperation with US EUCOM – ETSG. In 2009 NMIOTC hosted twice this practical R/N detection training supported by special material and expertise speakers from ETSG. The first "Prism Flame" exercise was conducted in June 2009 and the second Boarding Team training in R/N detection took place in September 2009. Training was provided to US and Greek boarding teams as well as to NMIOTC boarding instructors and was focused on R/N detection procedures during MIO.

Initially, all trainees received training on each instrument (Handheld detectors – HRM / LRM / RAD-PACK, PDR-78 and Mobile Radiation Detection Systems - MPS) and theoretical lessons about "Principles of Radiation Protection", "Field Techniques and Mission Planning". Preparation included also practical MIO Climbing Training (container inspection) and Waterborne OPS in RHIB.

On completion of the training in MIO Boarding procedures a practical examination (MIO Full Mission Profile) was conducted onboard a US Maritime Prepositionning Ship at anchor. There the Boarding Teams were tested in searching radioactive sources onboard large vessel.

WMD MARITIME INTERDICTION Seminar / Course

Besides the present practical and theoretical training there is a new (ongoing) project related to WMD and CBRN in MIO – new course "WMD Maritime Interdiction Course".

The aim of the course will be to provide students on political, legal, operational and tactical dimensions of WMD Maritime Interdiction Operations. It will be opened to Military and Law Enforcement Officers with Responsibilities for Maritime Interdiction.

First step in realization of this idea was The Weapons of Mass Destruction Seminar in Maritime Interdiction Operations environment (WMD MIO). It was conducted at NMIOTC premises from 19th to 23rd October of 2009. There was a total participation of 16 speakers and 34 attendees from different countries and organizations. *)

The initial notion for the execution of the seminar was conceived through discussions with WMD Center NATO HQ (WMDC). It was estimated from the beginning that there is an increasing operational need for countering the proliferation of Weapons of Mass Destruction in the maritime environment and that there exists a need for conducting a high level seminar and a course under in this important field.

Following feedback from this seminar, NMIOTC is in the process of preparing a pilot course on WMD Maritime Interdiction. This is planned to be executed in NMIOTC installations with the participation of NMIOTC sea trainers/instructors, and invited subject matter experts, from 21 to 25 June 2010. The course is planned to be open for NATO and partner nations and will include theoretical and practical issues.

NMIOTC is confident that with ACT guidance and assistance, a valuable NATO course will be soon available for personnel involved in any way with MIO, to provide them with the opportunity of acquiring precious basic knowledge for counter proliferation of WMD in the maritime environment.

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*) All participants were widely recognized professionals and subject matter experts (SME's) on their respective areas coming from the following organizations: NATO WMD Center, US Defence Threat Agency (DTRA), Joint CBRN Defence COE – Czech Republic, Operational Experimentation Branch (ACT), Organization for the Security and Cooperation in Europe (OSCE), World Customs Organisation (WCO), Defense Against Terrorism (DAT Center of Excellence – Turkey), NATO Maritime Interdiction Operations Center (NMIOTC), Italian Defence General Staff, CC MAR Naples, Belgian-Netherlands Maritime Warfare Center, Romanian Navy General Staff, Hellenic Defense General Staff, Hellenic Army General Staff, Hellenic Navy General Staff, Hellenic Navy Fleet Command, Hellenic Police, Hellenic Coast Guard.

Captain (A) Milos KALTENBRUNNER *is an Officer from Czech Republic Army currently serving in NMIOTC as a Senior Instructor and CBRN specialist. He has graduated from the University of Vyskov in 1995 with a Bachelor in Military Chemistry. He has been appointed in various positions within the Czech Republic Chemical Corps. He has participated in peacekeeping missions in Former Yugoslavia and Bosnia (Operation SFOR II), in Kuwait (Operation Enduring Freedom) and in Iraq in Operation Iraqi Freedom. He has been a member in NATO response and CBRN forces.*

VELLEROFONTIS ©
MARITIME SITUATIONAL AWARENESS
THROUGH UNMANNED MINI HELICOPTERS

by Professor Ioannis Koukos

The rapid evolution of the Unmanned Aerial Vehicle (UAV) in all branches of military could not leave the Navy indifferent, despite the limitation that naval and maritime missions may impose on a UAV. In order to test various ideas about UAV applicability the Hellenic Naval Academy was encouraged by Naval General Staff to get a mini Helicopter from the commercial air model market and modify it so it can carry out tasks pertaining to needs of Naval Surveillance missions. The need for short take-off and landing on a ship upper deck dictated the choice of rotating wing UAV i.e. Helicopter instead of a fixed Wing Unmanned Airplane. The Helicopter duped Vellerofontis out of the mythical Greek hero that rode the winged horse Pegasus, was equipped with remote controlled video camera and the necessary links to send down to the mother ship views of sea surface and coast that could not be obtained by optical means from the ship.

The Academy's Telecommunication Lab with the funding of the Hellenic National Defense General Staff constructed, with the contribution of the Chief Petty Officer serving at the Hellenic Command Amphibious Forces John Koutsoulas, a low cost Unmanned Air Vehicle (UAV) – Mini Heli, capable of being remotely controlled from the ground, equipped with an also remotely controlled video camera. The UAV can be seen in the following photo:

Fig 1: Hellenic Naval Academy's (HNA) Mini Heli on the Ground

On September 2006, a number of test flights were conducted at the Hellenic Naval Academy under

Mini helicopter technical characteristics and specifications

Characteristics	Specifications
Engine	2-stroke Zenoah - G26, 26 cc
Fuselage	J.R. Propo
Fuel	unleaded GAS
Fuel Capacity	½ lt.
Fuel Consumption	½ lt. for every 20$^{238}_{93}$1 min
Main rotor diameter	1,85 m
Max-min RPM	1300-1800 r.p.m.
Method of attitude changing	Pitch / not Flap
Flight Bar	Stabilizes the Heli against the wind / Adds maneuverability
Useful load	~4 Kgr
Speed	80-100 Km/h
Radius	~ 7 n.m. (one way)
UAV's Radio Control	
Flight Receiver	Spectrum AR 7000
Camera receiver	FM 72 MHz (VHF)
Camera transmiter	2,4 GHz, 600 mWatt (ISM Band)
Ground Equipment	
Flight Radio control	Spectrum DX7 SE
Camera radio control	J.R. Propo 6103
TV video receiver	DVB-T / Pinnacle 310E PC-TV
Camera Field of View	30o FOV

the supervision of Professor I. Koukos with the help of Chief Petty Officer John Koutsoulas and the Special Scientist at the Communications Laboratory Dr. George Vardoulias. In the initial flights a Sony Video Camera was fitted at the UAV's fuselage with the use of shock absorbers for reduced shock interference. It was capable of rotating its sensor horizontally and vertically by the remote control equipment.

Due to weight issues the first camera which was used was replaced with a considerably smaller webcam with the same remotely control capabilities. Some shock

Fig 2: (a) *Heli Control Unit*

(b) *The Mini – Heli at its first test flight*

problems were noticed but were easily resolved. Also, the operation of the spark-plug was causing some interference to the video signal but that was resolved too. A directional antenna was used for the video signal for improving the signal strength. A "Black Widow" Brand 2,4 GHz receiver delivers streaming video image at an interface Pinnacle 310E PC-TV unit and the final image can be seen through an Acer Laptop. It can also be HD recorded for later use. Overall the system is made of the following two (2) critical parts:

1. The flying unit and the camera with a Flight control receiver, a Camera control receiver and a Video transmitter.

2. The ground unit with a Flight radio control unit, a Camera control unit, a Video receiver and a Video conversion unit so that real time video can be seen with the use of a laptop. Two (2) users are needed to operate the whole system. One for flying the Heli and one to control the cam.

The main drawback of the mini heli is its inability to fly out of the pilots visual range because he is the one controlling the unit's course, speed, altitude and does all the necessary maneuvers dictated by the camera user. Therefore in the future, it is essential that the heli is equipped with an autopilot assisted by a GPS receiver capable of guiding the UAV through predefined waypoints or with the man-in-the-loop philosophy which means that the pilot can alter its course, speed, etc. In order to materialize this upgrade, the team has already done the initial design and the conceptual model has been established.

Vellerofontis is an Unmanned Air Vehicle (UAV) – Mini Heli suitable for use from all type of ships or from the premises of NMIOTC, capable of carrying a day camera or an IR camera for night operations with real time streaming video back to its control station. It is able to carry 10 kgr of equipment in maximum and it is fully autonomous flying at predefined waypoints, or merely pilot controlled by man-in-the loop philosophy. The monitoring of its flight can be made through elec-

tronic maps and HSI/ADI indicators (Horizontal Situation Indicator / Attitude Direction Indicator).
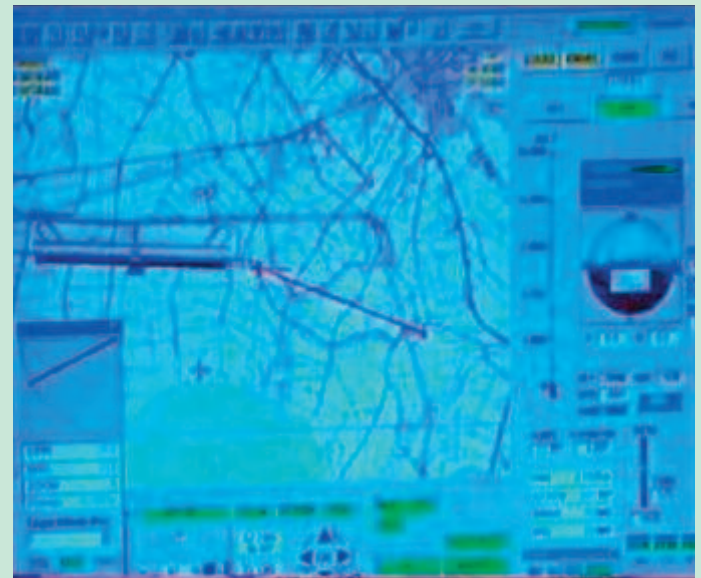
Fig 3: *Computer screen capture of the electronic map interface with instruments*

The mini heli can be fitted with the following capabilities:

1. Secure Image transmission, day or night video surveillance and secure transmission back to the camera terminal/user.

2. Autonomous flight system with predefined waypoints or man in the loop process during flight. Also and in order for the Image transmission system to be fully operational there is a need to apply thoroughly the following parts:

1. Sensor: Electro optical video camera with zoom capability (or IR camera or even Synthetic Aperture Radar).

2. Camera mounting platform for horizontal and vertical scoping

3. Processor for video compression and encryption

4. Video signal Transmitter based on the IEEE 802.16 protocol for high data rate transmission at 3, 5 GHz Commercial Off The Shelf.

5. **Microwave antenna** for video transmission to the base. A donut type lobe will be used but a tetrabolic antenna is also an option for increased range and
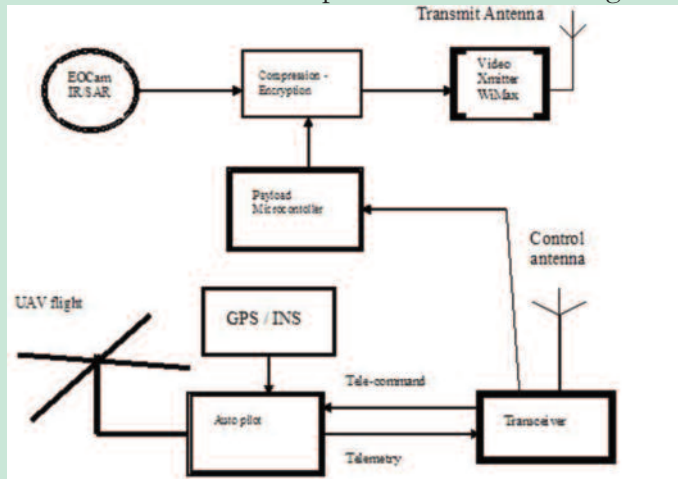
Fig.4: *Payload and Flight Control Block Diagram*

signal quality

Below we can see the electronics diagram of the mini unmanned aerial vehicle which is simple to be applied and executed based on the fact that all the parts can be found commercially.

Finally we need to mention that the ground unit system is comprised of several important components. The ground system parts make the system fully operational. These parts are listed hereunder in detail:

1. **Parabolic antenna**: For high quality video receiving, with servo mechanism to center the UAV throughout it's flight.

2. **Signal Receiver** IEEE 802.16 type for decompression and description.

3. **Video Monitor** for video projection.

4. **Recorder** for video recording.

5. Remote flight interface, computer based software for controlling the UAV (setting waypoints, altering course, speed, altitude, etc. and real time instruments).

6. **Transceiver** and UHF **antenna** for remote control of the UAV.

Conclusion

Vellerofontis is a new and promising project with its main advantage to be the low cost. As far as we can understand from the previous brief analysis it is not a mini unmanned vehicle that can be used operationally in a warfare environment, as it is now. But at the same time it is a perfect solution for the application of new emerging technologies in the maritime arena. One of these examples could be the tracking and tagging of WMD materials in Maritime Interdiction Operations. It has the capability of streaming video back to a central computer, it has the capability of carrying an IR sensor or a camera, so it is more than obvious and if there is a WMD sensor available at low net weight, it can be applied in order to send evaluation signals back to a cen-

tral network station for the existence of WMD materials on board merchant vessels. In parallel, it can be applied in numerous different maritime interdiction scenarios that can be used for training purposes in NMIOTC's courses. This will give the opportunity to the students of acquiring the knowledge of WMD proliferation techniques or MIO generally through practical training simulated scenarios.

Another example could be the uncovering of a suspicious ship or pirates only by hovering over it and streaming video to a central monitor on a warship or for our purposes in NMIOTC during the execution of the antipiracy training scenarios that NMIOTC is applying through the antipiracy training. This example is even more applicable to maritime interdiction operations training due to the fact that the mini heli can send video inputs to the leader of the boarding team before he starts the actual boarding operation. For that reason it could be a very precious part in NMIOTC's training..
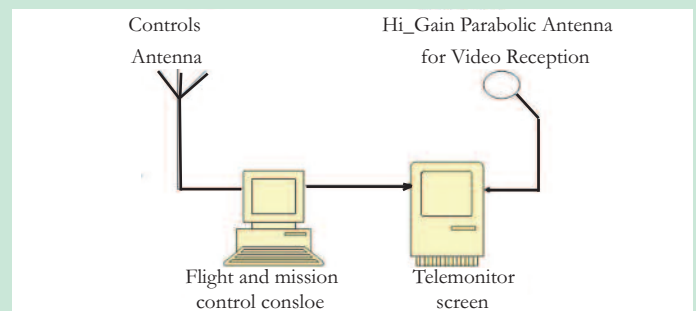
Fig. 5: *Ground Control & Monitor System*

The scientific team from HNA represented from Professor Ioannis Koukos, is more than eager to cooperate with NMIOTC in this direction in order to find all the possible ways of adjusting the use of VELLERE-FONTIS to NMIOTC's training material. Under the auspices of the Hellenic's National General Staff the mini heli can be transferred to NMIOTC's premises for the first experimental MIO scenario trying to uncover areas of possible cooperation in MIO scenarios that as have been investigated up to now are more than obvious that exist in more than one areas.

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 UAVs for various Naval and Maritime Applications. Vellerofontis is the project that he ran under the auspices of the Hellenic General Staff.
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IMPROTANCE OF FUTURE NETWORKS AND CAPABILITIES FOR MARITIME SECURITY

By LCDR K.Tsakonas, H.N.

The future, always brings with it uncertainty and poses challenges to international security that cannot always be predicted early on and in an accurate way. Preventing crises is much better than trying to respond to them.

The Alliance, for the foreseeable future will most probably continue and even enhance opportunities to deepen cooperation and mutual understanding, establish trust, promote interoperability and build partner capacity. This will be especially true in the area of Maritime Security. The NATO Maritime Situational Awareness (MSA) Concept, already in effect, is such a case.

Recognizing the importance of Maritime Security, the NATO Summit at Riga and at Bucharest, advocated increased cooperation between organizations in order to enhance the ability to detect and react to events that threaten collective security, and stressed the importance of enhancing civil-military interface. Based on the experiences of past years and operations, the international community needs to work more closely together and take a comprehensive approach to address successfully the security challenges of today and tomorrow.

The significance of intelligence within the context of maritime interdiction ops, has often been noted. Cooperation between all actors within the maritime domain, and efficient elaboration of the products of this cooperation is continuously developing.

Within this perspective, enhanced capabilities, provided by novel technologies, become a very challenging and demanding sector for probing. Newly developed technologies, as well as better exploitation of existing technologies have permitted achievement of better overall situational awareness, by obtaining and processing of large volumes of information, use of data fusion and analytical management tools.

A very good example is the use of an existing and technologically rather old system, the AIS **(i)** , that following its declaration as mandatory for merchant vessels above 300 tons gross weight, enhanced operational and tactical commanders' situational awareness through presentation of a Recognized Maritime Picture (RMP) dealing with numbers quite difficult to handle. Some years ago the maritime white shipping picture was very limited, showing a very small number of ships in the maritime environment. Still, information existed out there, but the challenge for the alliance was how to harness and share. When NATO began fitting its ships, aircraft and submarines with the Automatic Identification System (AIS), and then coupled this with a network capability like Maritime Safety and Security Information System (MSSIS) **(ii)** , this had a profound effect on related operations.

Exploitation of a multitude of open sources, can provide information relevant to fill the gaps in Maritime Surveillance, and provide background and historical data, but only by processing of enormous volumes of data. In addition, co-operation with International Organizations provides even more sources of intelligence.

But still, can all this volume of information be processed in an intelligent way? Can we recognize the relevant and significant data which should continue to be processed through our intelligence cycle? Can we perform an effective data mining process **(iii)** , and use our data warehouses **(iv)** in order to guide our decision making process away from the tactical level? Even further, can we analyze these data while at the tactical level

or bring expert advice from distant centers to the tactical commander through dynamically expanding communications and intelligence networks?

From a wider perspective, the alliance needs to undergo transformation to improve intelligence collection, analysis, production and dissemination in support not only of situational awareness, but of tactical decision making and analysis process as well.

> To enhance efficiency of intelligence production capability, the intelligence process must be able to perform data fusion and data mining, over raw data residing in vast data warehouses.

Data fusion **(v)** is the process of combining data or information to estimate or predict entity states. Data mining is the process of determining patterns, trends, relationships and associations in large data sets that are not so obviously declared in the raw data, collected by great number of different sources. This sector, being in the center of research during the last years, should be included in the interests of the alliance.

Another interesting answer to the question of how we can bring experts and expert systems assistance to the tactical level, is to focus our efforts on building tactical networks or network-centric systems, in which multiple sensors or geographically distributed units of highly mobile decision makers transfer and analyze data while operating on the move in distant areas. Such a network would easily scale up to big numbers of cooperating nodes, providing tactical extension to our data mining process and our communication abilities. The idea of bringing, for example, the CBRN or MIO experts advice, to the command team that is planning and executing a Maritime Interdiction Operation, or to a boarding team performing a dynamic boarding on a vessel, led NMIOTC to participate in experiments such as the one guided by Naval Postgraduate School. Many global academic, military and civil entities cooperate in these experiments, and NMIOTC had the chance to assist in the research with its expertise in the Maritime Interdiction aspects. In these experiments, the focus is on both adapting emerging and commercially available technologies to military requirements as well as on investigating new social networking/collaboration elements associated with the addition of such technologies to the battle space and maritime security operational domain. During last fall, the Centre hosted an experimental process, providing support in many aspects.

Building a network is not something new. But building a network with ad hoc topology and configuration, bringing distant groups or individuals cooperating and sharing knowledge and expertise, is something we need to experiment on. The ad hoc network topology reconfiguration is a powerful control option, but it requires techniques for adaptive remote management. In the same direction, NMIOTC is planning to include into the MIO training scenarios, the use of an experimental unmanned helicopter in cooperation with the Hellenic Naval Academy. Through this effort, new tactics generation is expected, which will enrich the abilities of a MIO commander or unit to conduct an initial approach, increasing the safety of the boarding team and decreasing cost and human effort.

From an even wider perspective, the support that NMIOTC could provide (beyond training, simulation and think tank hosting) can vary: From simple exploitation of its network and communication capabilities such as NATO Secret WAN, fast Internet, VPN, VTC, to the full support spectrum of a MIO operational shell with communication networks, tactical picture, local AIS, MCCIS **(vi)** and MSSIS.

The involvement of NMIOTC, with its subject matter expertise, within the safe and secure environment that Souda bay provides, enables the conduct of closely controlled experiments that can enhance the Alliance's current proactive posture that is based on continuous transformation of the Alliance's maritime capabilities. The NMIOTC, in addition to the training of maritime forces that need to be forward deployed, provides a test-bed for enhanced interoperability, for deeper cooperation between institutions and agencies, and for exploration of new technologies, thus promoting collective security, for both NATO and non-NATO nations.

(i) *The Automatic Identification System (AIS) is a short range coastal tracking system used on ships and by Vessel Traffic Services (VTS) for identifying and locating vessels by electronically exchanging data with other nearby ships and VTS stations. Information such as unique identification, position, course, and speed can be displayed on a screen or an ECDIS. AIS is intended to assist the vessel's watchstanding officers and allow maritime authorities to track and monitor vessel movements, and integrates a standardized VHF transceiver system such as a LORAN-C or Global Positioning System receiver, with other electronic navigation sensors, such as a gyrocompass or rate of turn indicator. The International Maritime Organization's (IMO) International Convention for the Safety of Life at Sea (SOLAS) requires AIS to be fitted aboard international voyaging ships with gross tonnage (GT) of 300 or more tons, and all passenger ships regardless of size. It is estimated that more than 40,000 ships currently carry AIS class A equipment. Ships outside AIS radio range can be tracked with the Long Range Identification and Tracking (LRIT) system with less frequent transmission.*

(ii) *The Maritime Safety & Security Information System (MSSIS) was developed by the Volpe National Transportation Systems Center at the U.S. Department of Transportation's Research and Innovative Technology Administration and is available to nations worldwide to improve global maritime safety, security, commerce and environmental stewardship. MSSIS is a freely-shared, unclassified, near real-time data collection and dis-tribution network. Its member countries share data from Automatic Identification System (AIS), coastal radar, and other maritime-related systems. MSSIS combines the data from participating nations into a single data stream through secure Internet-based servers. Through MSSIS, participating governments can view real-time AIS data from around the world in a wide range of geographic display options, including text, photo overlays, electronic charts, and Google Earth. Displays can also integrate additional features such as user-provided radar overlays.*

(iii) *Data mining is the process of extracting patterns from data. Data mining is becoming an increasingly important tool to transform these data into information. It is commonly used in a wide range of profiling practices, such as marketing, surveillance, fraud detection and scientific discovery.*

(iv) *A data warehouse is a repository of an organization's electronically stored data. Data warehouses are designed to facilitate reporting and analysis.*

(v) *Data fusion, is generally defined as the use of techniques that combine data from multiple sources and gather that information in order to achieve inferences, which will be more efficient and potentially more accurate than if they were achieved by means of a single source. Fusion processes are often categorized as low, intermediate or high, depending on the processing stage at which fusion takes place. Low level fusion, (Data fusion) combines several sources of raw data to produce new raw data. The expectation is that fused data is more informative and synthetic than the original inputs. For example, sensor fusion is also known as (multi-sensor) Data fusion and is a subset of information fusion.*

(vi) *MCCIS: NATO Maritime Command and Control Information System.*

Lt Cdr K. Tsakonas *received his Bachelor degree 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 also served in the operations and inspections branch of the Hellenic Fleet Command . 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.*

PIRACY IN THE 21ST CENTURY ©

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

Most of us think of pirates as a 17th century phenomenon when historic pirates roamed the Atlantic. However, the profession has survived until now. The Straits of Maluku used to be the base of pirate operations; but, recently the coast of Somalia, the Gulf of Aden, and the western Indian Ocean have become the ground for a new found piracy. From the vicinity of Mogadishu and central/southern Somalia, piracy has been reborn and is thriving.

Ancient Chinese warlords, the Romans, Napoleon in France, the Nazis, and even General Eisenhower in Europe voiced one concept: to be successful you must know your enemy. Who is he? What is his source of strength and his modus operandi? This knowledge is necessary to form effective plans to fight.

Somalia and perhaps Yemen are the homes of the modern day pirates in the western Indian Ocean and the Gulf of Yemen. Both nations lack a strong Government which could deal with piracy. Somalia, with a large population of young men between the ages of 19 and 30, unemployed and without much hope for job, very poor and uneducated, provide a fertile ground for recruiting youths willing to risk death for material or spiritual gains. Al Shabaab, a very militant Islamic organization keen to Jihadist concepts and financed by Iran and conservative wealthy Arab nations, has been formed to force Sharia law and anti-western ideas on So-

malia. To this large number of lost youth Al Shabaab and its ideology becomes a haven. It furnishes young men with life's necessities and with hopes for a more affluent future. In the name of Islam it also gives them a purpose for being. The barely existing Somali government can do little to stem this tide.

After some extensive weapons training and salesmanship skills, these young men form the actual pirate units. Using mother vessels to immune interdiction under the laws of the sea, these modern day pirates head out in search of commercial vessels which are usually unarmed. Upon discovering their prey, the heavily armed pirates take smaller craft from the mother ship to capture commercial ships for ransom. These extortionist ransoms provide wealth for the pirates and a paradigm for other youths seeking affluence; therefore, the numbers of pirates increase.

A key element to the pirates' success, as well as to those who fight piracy, is intelligence. Without it the pirates would wander around the endless ocean indefinitely looking for unarmed and unprotected ships. This effort would be too unpredictable to succeed. Instead, these pirates must know what ships are coming to the Gulf of Aden or the Indian Ocean, when and from where.

Pirate organizations are appraised of ship movements by informers located at or near the Suez Canal, the Red Sea, the Straits of Hormuz, the coast of Djibouti, and the Somalia Coast. The sources of this intelligence are of much concern and interest to naval forces operating under UN auspices. These UN forces also

Photos from Operation EU ATALANTA
(Courtesy HS SALAMIS)

need this same intelligence in order to counter the pirates' plans. With this knowledge, the UN forces could intercept and escort vessels as they cross the open ocean. The plan would be similar to the system used by air traffic controllers. At the point of departure, a unique number would be given to each ship which would be monitored as it crosses the Straits of Hormuz until it reaches the safety of the Indian Ocean. Such a plan can be used to alert aviation assets that could quickly respond when a pirate attack is imminent.

The concept of various navies operating under UN control deprives the pirate-controlled nation of propaganda to be gained when just a single nation controls the anti-piracy efforts.

"From the Halls of Montezuma to the shores of Tripoli......" is the US Marine Corps hymn. It refers to the time when Moroccan and Libyan pirates raided commercial shipping in the Mediterranean Sea in the early 1800's. When these pirates attacked US shipping, the President of the United States sent US Marines to at-

tack the control center of the piracy. The Bey in command ran for his life, and piracy soon ended.

This solution can be repeated. The UN could send a military force into Somalia and eliminate a major controlling center of piracy. The UN could increase financial and economic aid to the frail Somali Government, create jobs for the unemployed youths, and eliminate poverty as a cause for piracy. However, the time for these might have passed, and the chaos may already be too wide-spread for this solution to succeed.

This leaves only strong and properly executed anti-piracy measures to eliminate the risk. The concept should be early detection of piracy operations, followed by decisive engagement of pirate actions in order to render piracy too costly for the participants.

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

In **conclusion**, building a protective system analogous to air traffic control would be an excellent first step towards eliminating modern piracy in that region of the world.

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.*

ANTI-PIRACY OFF THE SOMALI COASTS: INITIAL AND ONGOING OPERATIONS

by Lt N. Sartzis, H.N.

The rise in Piracy in the Gulf of Aden has focused attention to an area, that would have otherwise remained in the shadow. First, international interest was roused by the suicide attack on USS COLE, on 12 October 2000, that cost the lives of 19 and injured 39 of the crew.

From a total number of only 10 to 15 incidents in 2004, the waters of the Gulf of Aden saw acts of

Puntland *is the area of Somalia that holds the largest numbers of active pirates*

piracy and hijacking spiraling rapidly to 80 in 2008, and growing increasingly audacious in nature. In an attempt to counter this rising menace to world maritime trade, the UN Security Council first adopted Resolution 1816 in June 2008, authorizing nations to deploy warships for counter-piracy operations in Somali territorial waters. This was followed by Resolution 1838, in October 2008, urging all maritime states to dispatch naval units to fight piracy, off the HOA.

More than 25000 ships passing Suez channel annually

Dominated by the Horn of Africa (HOA), the Gulf of Aden forms a funnel for 25,000 merchant ships annually transiting the Suez Canal carrying energy and raw material to Europe and finished goods to Africa and Middle East representing more than 20% of the global trade. The abjectly poor Somali Republic, which occupies most of the Horn, has been a no man's land for the past 3 decades and is the African equivalent of Afghanistan, the most destabilizing factor in East Africa.

Although a new era began with the formation of the Interim government being elected in Djibouti in Jan 2009, the situation in Somalia still is far from ideal for a sovereign state. Various Clans still exercise local control, although signs exist of state institutions recovering in the Puntland area, where local authorities are participating in meetings with Coalition Naval Force Commanders.

NATO was very quick to react to the threat posed by piracy in the Gulf of Aden, initially with Operation Allied Provider, that commenced in October 2008 after the North Atlantic Council (NAC) agreed to the UN Secretary General's request for assistance. The NATO task force - Standing NATO Maritime Group 2 (SNMG2) - provided close protection to the World Food Programme (WFP) chartered ships and conducted deterrence patrols in the area most susceptible to crim-

inal acts against merchant shipping. At the time of the operation, SNMG2 was commanded by Rear Admiral Giovanni Gumiero, Italian Navy, who was appointed to this post in July 2008. He reported to the Commander of Allied Component Command Maritime Naples.

6 November 2008: *Rear Admiral Giovanni Gumiero meeting with the press in Mombassa, Kenya.*

On 12 December 2008, NATO completed its mission to escort World Food Programme (WFP) chartered vessels delivering humanitarian aid today. NATO provided an escort on eight occasions which resulted in the safe delivery of 30,000 metric tons of humanitarian aid to Somalia.

Mogadishu today

The European Union's Operation ATALANTA, the first European naval operation immediately followed in December 2008 – initially for a 12 month period - to help combat the incidents of piracy occurring in the Gulf of Aden and the Somali Basin. Primary task for the EU mission is protection of the World Food Program shipping for safe delivering of humanitarian aid to Somalia. This mission is also tasked with the protection of merchant shipping transiting the Gulf of Aden, the Somali Basin, and deterrence of acts of piracy or criminal activity in the area. Conduct of these three

principal activities by the European Union force does not discriminate against vessel, flag state, type or owner. Assistance may be provided to any vessel. It is worth noting that the EU mission in this area is separate to both the NATO naval group operating in the area and warships provided by third nations such as Russia, Japan, India and China .

Meantime, NATO stepped in again, with Operation Allied Protector that helped to deter, defend against and disrupt pirate activities in the Gulf of Aden and off the Horn of Africa.

From 24 March until 29 June, the operation was conducted by SNMG1 vessels. The first phase of Operation Allied Protector was undertaken as the force left for NATO's first ever deployment to South East Asia. It made a short visit to Karachi (Pakistan) on 26-27 April. However, with the increase in pirate attacks, on 24 April NATO had already decided to cancel the other two port visits planned to Singapore and Australia. As such, the second phase of the operation, which was meant to take place as SNMG1 made its return journey towards European waters end June, was brought forward to 1 May.

In January 2009, the US Combined Maritime Forces (CMF) established, in MANAMA, Bahrain, Combined Task Force 151 (CTF-151) specifically for counter-piracy operations. Even before that, since August 2008, the CMF had created a "Maritime Security Patrol Area" (MSPA) in the Gulf of Aden, in order to support the international efforts against piracy. Coalition efforts included CTF-150 assets patrolling the area with ships and aircraft. However, the charter for CTF-150, established at the outset of Operation Enduring Freedom, was for the conduct of Maritime Security Operations (MSO) in the Gulf of Aden, the Gulf of Oman, the Arabian Sea, Red Sea and the Indian Ocean. Operations included the deterrence of destabilizing activities, such as drug smuggling and weapons trafficking.

The establishment of CTF-151 allowed CTF-150 assets to remain focused on those activities, giving CTF-151 the ability to focus solely on the counter-piracy mission.

CTF 151 is a multinational task force that conducts counter-piracy operations in and around the Gulf of Aden, Arabian Sea, Indian Ocean and the Red Sea.

Meanwhile, from 29 June 2009, the NATO Standing NATO Maritime Group 2 (SNMG2) took over responsibility from SNMG1 as part of the then ongoing Operation Allied Protector. On 17 August 2009, Oper

28 Jan 2010: HMCS Fredericton intercepting a suspected pirate skiff while conducting counter piracy patrols as part of NATO Operation OCEAN SHIELD in the Gulf of Aden. At 07:44 a.m. local time (10:44 p.m. EST), HMCS Fredericton received reports from her helicopter during aerial patrols in the International Recommended Transit Corridor (IRTC) that they had spotted a small skiff loitering beside the shipping corridor approximately 45 nautical miles away from the ship

ation Ocean Shield, supplanted Operation Allied Protector, following a North Atlantic Council (NAC) approval of the mission. Operation Ocean Shield built on the experience gained during Operation Allied Protector, and develops a distinctive NATO role based on the broad strength of the Alliance by adopting a more comprehensive approach to counter-piracy efforts.

While at-sea counter-piracy operations will continue to be the focus, a new element of regional-state counter-piracy capacity building has been developed for Opera-

Greek Frigate HS NIKIFOROS FOKAS escorting MV Breeze

tion Ocean Shield. NATO's capacity building effort aims to assist regional states, upon their request, in developing their own ability to combat piracy activities. This element of the operation is designed to complement the efforts of existing international organisations and forces operating in the area and will contribute to a lasting maritime security solution off the Horn of Africa.

Other nations have, in the meantime joined in the effort to protect against piracy in the area. Chinese, Russian, Indian, and other naval units have joined in the operational area. Coordination between all actors in the area seems to be working well, although some national units seem more focused in the protection of their own flagged merchant vessels.

Rear Admiral Jose Domingos Pereira da Cunha, Commander SNMG1 visiting the Chinese frigate FFG Chao Hu on 11 January 2010 during a NATO port visit to Salalah, Oman. The meeting focused on cooperation between NATO and the Chinese Navy in the international efforts to tackle piracy off the coast of Somalia.

The role of international naval forces cannot be underestimated when it comes to stemming piracy. But it must be kept in mind that earlier this year we saw the largest international armada of warships assembled since the Second World War patrolling those waters, and during that time attacks in the region soared to their highest levels: 144 incidents between January and July of 2009, compared with 24 in the same period in 2008 (IMB stats). Of course the area of operations is larger than 2.000.000 nm² and pirates are operating near Djibouti as well near Seychelles.

The EU Operation ATALANTA and the NATO Operation OCEAN SHIELD forces patrol in the Gulf of Aden and the Somali Basin along with the provision of Maritime Patrol Reconnaissance aircraft covering these areas. Both operations are commanded from Northwood in the United Kingdom, where the
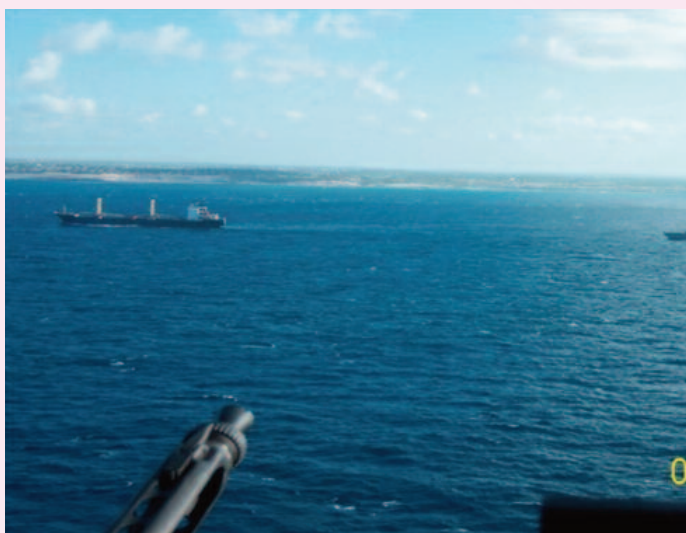
Maritime Security Centre – Horn of Africa (MSC-HOA) has been established to provide 24 hour manned monitoring of merchant traffic in the affected areas. A website has been established by MSC-HOA where vessels, are strongly urged to register and provide details of their transits in the specific area in order to coordinate appropriate protection arrangements either from EU NAVFOR, NATO forces, or the other third nations naval forces operating in the region.

An Internationally Recommended Transit Corridor (IRTC) has been established within the Gulf of Aden and coalition Naval Forces are operating group transits (GT) through the IRTC, with recommended times of entry dependent on vessels' speed, published in the Maritime Security Centre – Horn of Africa (MSC-HOA) website. Vessels are advised that these are not convoys and are not to wait for warships or other Mer-

Golf of Aden safety corridor

Dubai Princess, employing pirate evasion tactics

chant Vessels but are to proceed at the recommended times and vessels of different speeds will converge in high risk areas at the critical times. Vessels may be contacted by warships in the vicinity if they have registered their transit details on the MSC-HOA website. Eastbound vessels are recommended to transit the corridor in its southern transit lane, and westbound vessels in its northern transit lane.

The IRTC is not a Traffic Separation Scheme, nor is it marked with navigational aids and vessels are to comply with the requirements of the International Regulations for the Preventions of Collisions at Sea at all times. The premise behind the IRTC and the GT is that it allows coalition forces to ensure that the areas of highest risk within the Gulf of Aden are sanitized at the times of greatest risk, being around sunrise and sunset, and that groups of vessels are together in these locations at these times. It is worth noting that, even though a lot of attacks have occurred to date, only one vessel has been taken hostage at night due to the constant pres-

ence of warships in the area. On occasion, the passage of individual warships along the IRTC may be published on the MSC-HOA website in the "Alerts" section.

One single hijacking can involve many nations. For example, a ship can be owned by a company in one country, operated by a shipping company located in a second country, bear the flag of a third country, become hijacked in the waters of a fourth country, and carry crew members from many countries. And, if arrests are made, the pirates can be prosecuted in another country!

The longest-running hijacking was that of the Nigerian tugboat T/B Yenegoa Ocean and its 11-member crew, which were held for eight-and-a-half months. Equipped with small skiffs, firearms, grapnels and ladders, pirates have proven their ability to attack all types of vessels, from tourism yachts to oil supertankers, as well as cargo box ships, fishing vessels, barges and tugboats.

Usually, the pirates leave the crews of the occupied MVs physically unharmed, but the psychological affect on them is tremendous. Spending their captivity on board their vessels, they are guarded by a dozen or more young pirates who are under the effect of a powerful local narcotic (Khat) which makes them unpredictably aggressive.

Most pirates are 20–35 years old and come from the region in northeastern Somalia known as Puntland.

Pirates accomplished a miraculous task!!

According to some intelligence analysts, the armed pirates are approximately 1000 people, but with the harsh economic conditions, the majority of the extremely poor people would be willing to work as pirates, especially when they see others become rich in a very short period of time. Often, the shipping companies are forced to pay the ransom which are about 2 million USD and in some occasions reaching the 3.2 million USD (MV FAINA) and even more, 5 – 7 million USD in the case of the MV MARAN CENTAURUS.

Ransom is not divided in equal shares among the pirates, and for sure the vast amount of it is travelling to unknown destinations… Does piracy provide funds to extremists or international terrorism? There is no such proof at this time but nothing should be excluded. After all, piracy is considered to be a new form of terrorism and for that, it should be confronted vigorously by all nations and by all means if we would like to see significant results soon.

Ransoms are being delivered by parachute

Analysts and intelligence people support the idea to fight piracy on land before they sail to hunt their prey. That seems to be very difficult as nowadays most of the western countries have little or no connections within Somalia making things more complicated. Right now, the very poor people suffering from famine have nothing to lose but their lives, which cost around 20 USD (according to arrested pirates if they fail and disappoint their clan leader, he could sell them for 20 USD each to another clan!).

Somali pirates dhow

A Greek frigate resting between hard patrolling periods in port Seychelles

Independent of what actions are to be taken inside Somalia, I believe it is essential to continue our effort at sea immediately. We need to ensure that crews of merchant vessels feel that they are protected and not alone, and make the pirates feel that they are in danger at all times making their profession not attractive to others. A lot of effort and money has been spent with limited results as has frequently been said. The reason for this is twofold: warships are not designed to accommodate prisoners for long periods of time and prosecution of detainees is a time consuming process, that keeps a valuable unit out of patrol, impacting adversely on the conduct of its operational tasks.

NMIOTC offers lessons to the coalition ships that are heading to the area preparing the crews of the situation they will face in the HoA. For this reason a data base with lessons learnt has been created that is continuously updated. The Center is on line with the Force Headquarters of both operations: ATALANTA and OCEAN SHIELD for keeping itself current with developments and status of ongoing operations.

In spite of the measures taken by the Coalition Forces and local actors to stop piracy, piracy will still remain as threat and concern to merchant vessels sailing around the world, and especially in the area of the Golf of Aden and the Horn of Africa…. After all, the profession of pirates has been exercised since ancient times. It will not stop now!

Lt N. Sartzis *is currently serving as an instructor in NMIOTC specialized in Antipiracy Operations. He has served in different Greek Frigates as Operations Officer participating in Operation Active Endeavour, Operation UNIFIL and Operation EU Atalanta. He has graduated from the British PWO (Principal Warfare School) training and has extensive knowledge in Maritime Interdiction Operations.*

DETERRING PIRACY IN HIGH-RISK WATERS ©
LONG RANGE ACOUSTIC DEVICES PROVING EFFECTIVE IN MARITIME SAFETY

By Mr. Scott Stuckey, Vice President, American Technology Corporation

Over the past decade, international shipping has been continually threatened by pirate activity off the coast of East Africa and in the Strait of Malacca. The threat has been particularly concentrated in the waters off Somalia and has escalated significantly since 2005. Heavily armed pirates, violent attacks, and ship seizures dominate maritime news, along with increased, but often unsuccessful government-led efforts to patrol and enforce maritime safety for cargo vessels traveling in these high-risk waters. Somali pirates carried out a record number of attacks in 2009 despite the best efforts of international warships to monitor and curtail pirate activity. Though security experts and senior military officers have recommended that ships can and should take measures to protect themselves from pirates and armed robbers, many disagree on the response and the level of escalation of force that should be taken.

In the past, commercial shipping companies have not typically armed crewmen. According to the IMO (International Maritime Organization), flag States should strongly discourage carrying and the use of firearms by seafarers for personal and ship protection. Their concerns focus on the potential for minimally trained personnel escalating an already dangerous situation to one that becomes deadly.

Comprehensive anti-piracy plans must include methods of detection, assessment or determination of intent, and execution of pre-planned reaction procedures that include the use of non-lethal, and if required, lethal force. Technology advances support the development of this layered defense strategy, allowing ships to equip themselves with pirate deterrent options that may avoid implementing lethal defensive measures. The Long Range Acoustic DeviceTM (LRAD®), developed and innovated by American Technology Corporation, is an important and proven tool in this effort, demonstrating effectiveness in a wide range of vessel safety and security applications. In particular, commercial vessels using LRAD can effectively address two key issues in maritime safety and anti-piracy defense – determining intent of nearby vessels and influencing or shaping their behavior.

Lessons Learned

LRAD was developed to assist U.S. Navy security personnel in their mission to prevent another USS Cole-style terrorist attack and safeguard against the loss of lives and critical operational assets. In response to the growing threat to maritime security, American Technology Corporation has worked closely with military, commercial shipping and security firms over the past seven years to make LRAD a highly effective long-range communication and deterrence system. The U.S. Navy has contracted for 270 LRAD 1000X® units for its large surface combatant vessels to support escalation of force decisions and prevent terrorist incidents. Additionally, more than 60 cruise ships and many merchant and commercial vessels currently sail with LRAD aboard.

Whether or not ship security personnel employ lethal or non-lethal capabilities, response strategies against armed threats require a carefully thought-out "detect, assess and engage" process. Shipping companies must supply the necessary tools to ensure expedient progression through this process, ensuring enough time to safely and effectively react to any threat. LRAD extends the engagement envelope and provides critical time and distance for teams to assess threats, safely directing civilians and their vessels away from potential threats, or identifying, assessing and deterring targets with hostile intent. LRAD provides the tactical decision time and distance that may be the difference in successfully deterring or defeating a threat. Following the Cole Commission Report, ADM Gehman made this statement:
"Deterrence, the ability to deter an opponent, is a rather sophisticated capability. … It involves vigilance, it involves the visible appearance of readiness and resoluteness and the impression that you are able to react to the terrorist." LRAD answers this requirement providing an undeniable appearance of readiness through loud, clear and directed communication.

Proven Performance

LRAD systems are easy to use through a simple, familiar, and standardized interface. Manual or autonomous systems are designed for around the clock operation in harsh maritime conditions. Working in conjunction with state-of-the-art remote sensing and detection systems,

LRAD provides communication and deterrence with no disruption to the crew, navigation or other on-board equipment.

Broadcasting a focused, directional audio beam, LRAD can transmit in the language of choice and offer a loud, firm and highly intelligible communication. LRAD provides security teams with a powerful, penetrating warning tone that can be followed by clear voice transmissions in host nation languages to warn and shape the behavior of potential hostile entities. LRAD employs directed sound technology to move the security engagement envelope from 50 meters (without LRAD), to excess of 3000 meters. Once nearby vessels are hailed, ship and crew can more effectively determine the vessel's intent and any associated threat level. This advance in early guaranteed communication is critical in defining next steps -- commercial vessels can either com-

LRAD provides vessel/platform operators the ability to determine the intent of a potential threat at the earliest possible moment and at the greatest distance.

By deploying LRAD's long distance warning tone, shipmasters can change pirate behavior and create safety zones for the entry of law enforcement personnel. Powerful deterrent tones are projected directly to the threat target, initiating behavior change that preserves time and distance for crewmen to scale their response and prepare for additional escalation by law enforcement. Furthermore, LRAD provides a multi-spectral deterrent effect when complemented with optional integrated high powered white lights and lasers. By employing consecutive hailing and warning messages beyond 3000 meters, by the time a threat is within 500 meters, security personnel can be sure that the target has heard and clearly understood the warnings.
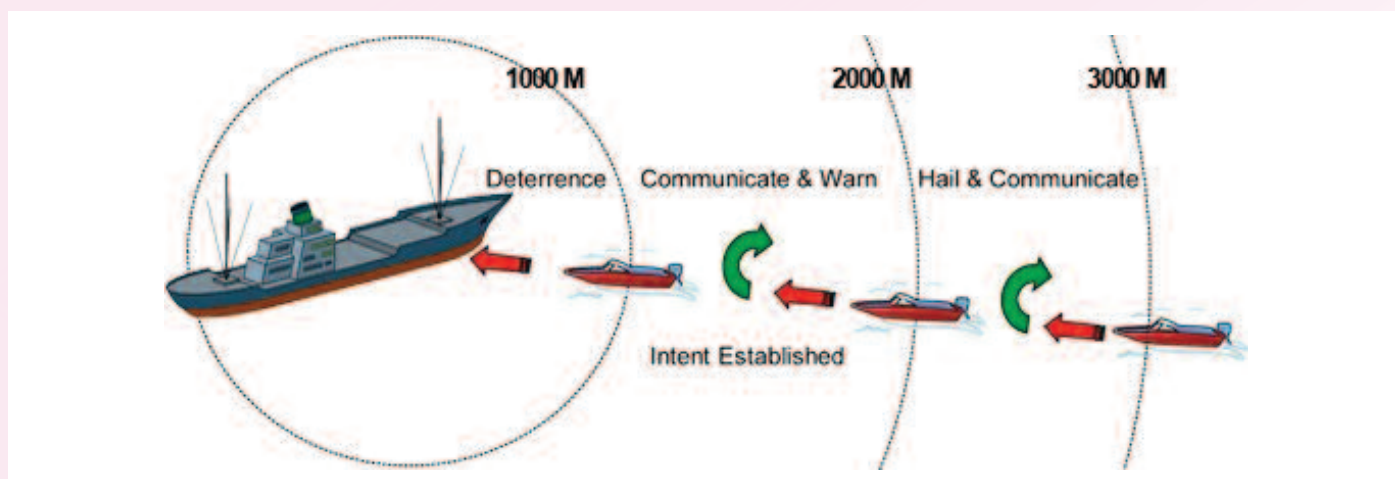
fortably stand down, or deploy LRAD's powerful warning tone as an option to lethal responses.

Once a commercial vessel deploys LRAD, most attackers conclude that the ship is prepared to defend itself and a warning has been sent to coalition patrols in the surrounding area. Pirates are made aware they have lost the advantage of surprise and the commercial vessel they are approaching is prepared to make their attack as difficult as possible.

LRAD in Action

In May of 2009 LRAD was used by the Military Sealift Command ship (MSC) USNS Lewis and Clark as part of its successful avoidance of a pirate attack. Shipboard lookouts spotted two pirate skiffs approximately two nautical miles away. The crew immediately began evasive maneuvers including increasing the ship's speed. Embarked security teams also deployed verbal warnings via LRAD, and the pirates abandoned their pursuit. According to news released by the US Navy, "The actions taken by Lewis and Clark were exactly what the US Navy has been recommending to prevent piracy attacks – for both commercial and military vessels," said Captain Steve Kelley, Commander, Task Force 53, to which Lewis and Clark is operationally assigned. "Merchant mariners can and should use Lewis and Clark's actions as an unequivocal example of how to prevent a successful attack from occurring."

Military Sealift Command ship (MSC) USNS Lewis and Clark (T-AKE-1) was approached by suspected pirates off the eastern coast of Somalia and took evasive action to prevent a successful attack. Source: United States Navy website (www.navy.mil)

In 2009 additional high profile attacks were thwarted using LRAD on the MV Green Ridge, Maersk Alabama and several cable-laying vessels and oil tankers. LRAD are currently deployed with naval forces from Portugal, Norway, Sweden, Australia, Korea, Singapore and the Netherlands as well as the Japanese Maritime Self Defense Force.

Moving Forward

In a May 2009 Senate Subcommittee Hearing on Piracy on the High Seas, Captain Richard Phillips of the M/V Maersk Alabama called for LRADs as an element in a "…comprehensive, multi-faceted plan to combat…". He was proven correct when the M/V Maersk Alabama successfully deployed LRAD along with other defensive measures to deter a pirate attack off the northeast coast of Somalia in November 2009.

In the same Senate meeting, the U.S. Coast Guard announced it was requiring U.S.-flagged ships to post guards and submit anti-piracy security plans for review and approval. Ship owners will ultimately be allowed to determine whether or not those embarked security forces will be armed or unarmed, making LRAD an even more critical component in determining intent and threat levels.

Successfully deployed on both commercial and military vessels around the world, LRAD has proven invaluable as part of a multi-faceted approach to fight piracy. Determining potential threats quickly and at a safe distance provides vigilant crews with the time and distance required to react, scale their defensive re

sponse and communicate with maritime law enforcement agencies and coalition forces. With piracy attacks continuing to escalate, and heavily armed pirates remaining elusive at sea, LRAD is quickly becoming an essential capability in maritime security's fight against 21st century pirates.

*Mr. **Scott Stuckey** has been with American Technology Corporation for more than five years helping to deploy LRAD on military and commercial vessels. He is a retired Commander from the US Navy and has earned a Bachelor of Science from Rensselear Polytechnic Institute and a Masters in Business Administration.*

UNIT TRAINING IN NM

By Lt Stiliyan STANCHEV, BGN

BULGARIAN FRIGATE DRAZKI

"This was very efficient and beneficial education for us. It applied both to seamen and officers."– Replica by a participant from the boarding team of the Bulgarian frigate DRAZKI upon completion of two – day training in NATO Maritime Interdiction Operational Training Center (NMIOTC), located on the island of Crete.

The training took place on 28th and 29th October 2009. Due to the tight schedule of the Bulgarian frigate, participating in Active Endeavour in Mediterranean Sea, NMIOTC had only two days to complete the training. Because of the short term more attention was paid to Boarding Team practical training which is Course Series 3000 from the Course Catalogue. After discussing with the Commanding Officer of BGS DRAZKI and the BO, the following modules were picked:

3020	Small Arms Training
3030	Tactical Sweep
3040	Crew control/ Suspect Crew handling
3080	Boarding under multiple threats

Bulgarian Boarding Team was taught how to use **fire arms** and more important how to manage the situation in order to avoid using fire arms. All the tricky sit-

uations were discussed first and then trained onboard NMIOTC training ship Aris.

Crew control and Suspect Crew handling taught the Bulgarian boarding team not only how to deal with compliant or non compliant crew members but also arrest and search techniques.

The most precious knowledge of course was the experience of working together with the NMIOTC instructors in an international environment and the opportunity to share their experience.

Lt Stiliyan Stanchev graduated from the Bulgarian Naval Academy in 2002. He served as communication staff officer in the Bulgarian Navy in different units since 2007. For 2 years he was protocol officer in Bulgarian Navy Headquarters. Since 2009 he serves in NMIOTC as Exercise Planning Staff Officer.

IOTC - 2 EXAMPLES

By Lt. Decebal CIOBANITA (RON)

ROMANIAN FRIGATE REGINA MARIA

Between 23th and 24st of November 2009, for the first time Romanian frigate crew members followed the NMIOTC partial training of "2000 - 3000" courses, taking advantage of the period spent in Souda Bay, during a Port Visit for replenishment, while participating in Operation Active Endeavour (OAE). The Boarding Team members of ROS REGINA MARIA were trained in the following training modules:

(1) Tactical Sweep (Module 3030) - During this module, the trainees learned step by step the room clearing fundamentals. They also learned and executed techniques on how to clear corners, ladders and stairwells. Additionally they learned and executed tactical movement in passageways, compartments and open decks.

(2) Crew Control / Suspect Crew Handling (Module 3040) - The Module's main objective is to improve the Boarding Party's skills necessary to safely approach, neutralize and secure crew of a suspect vessel (SV). During this module, the trainees learned and put into practice a full skill set of dealing with compliant or non compliant crew members and also arrest and searching techniques.

There was a total participation of twelve (12) trainees, who are serving as Boarding Team members onboard the ship.

Despite the fact that the port period for replenishment was limited, they successfully completed these two modules of the whole practical 3000 course, including theoretical training. During the training there was full coverage concerning security issues of the trainees and cooperation and exchange of experiences between instructors and trainees was excellent. Taking into account that it was the first time that a Romanian ship participated in training in NMIOTC, it can be said that the outcome was beneficial for both sides, due to the fact that exchanging ideas and training experiences with countries that are participating in Operation Active Endeavour (OAE) is two-way process, providing NMIOTC trainers and personnel with feedback from

the crews of units that are deployed operationally. On the other hand, the ship's crew took the most out of this training experience due to the fact that they received NATO training in Maritime Interdiction Operations that has been most recently updated.

Lt D. Ciobanita *graduated from the Romanian Naval Academy in 2000. He served for eight years onboard Romanian Minewarfare Ships and Squadron. He is currently serving in NMIOTC as Exercise Planning Staff Officer.*

CROSS-DIMENSIONAL APPROACH TO ©
MARITIME SECURITY COOPERATION

By CDR Harvey L. Scott, USN (Retired)

Over 90% of global trade is conducted across the world's ocean waterways. This huge and constant traffic has resulted in increased reliance on the timely delivery of products that connect countries together via maritime shipping. The establishment and maintenance of security along these maritime waterways is crucial to the global economy but requires a concerted effort among all nations. Disruption of shipping and port operations has the potential to impact negatively on many states simultaneously and threats to the shipping lanes require collective efforts to effectively counter them. As the world's individual national economies become more closely integrated, it is critical that nations coordinate and collectively integrate their security activities to secure the seas.

A number of national and international organizations address maritime security as a critical element of their comprehensive security plan. These include the International Maritime Organization (IMO), NATO's Operation Active Endeavor (part of its overall Maritime Situational Awareness initiative); US work in Maritime Domain Awareness; Turkey and the Russian Federation's Operation Black Sea Harmony; the Proliferation Security Initiative; Finland's work in the Baltic Sea. All of these contribute to increasing maritime security using both military and civilian instruments. Additionally, the US has initiated the following programs designed to improve their cooperative maritime security. Container Security Initiative

The Container Security Initiative (CSI) aims to ensure all containers that pose a potential risk for terrorism are identified and inspected at foreign ports before they are placed on vessels destined for the United States. U.S. Customs and Border Patrol (CBP) have stationed multidisciplinary teams of U.S. officers from both CBP and lmmigration and Customs Enforcement (lCE) to work together with host foreign government counterparts to implement the initiative. Their mission is to target and prescreen containers and to develop additional investigative leads related to the terrorist threat to cargo destined for the United States. Their mission is to target and prescreen containers and to develop additional investigative leads related to the terrorist threat to cargo destined for the United States.

Secure Freight Initiative

Launched jointly with the Department of Energy's National Nuclear Security Administration (NNSA), the Secure Freight Initiative (SFI) involves the deployment of a combination of existing technology and proven nuclear detection devices. Containers from participating ports are scanned for radiation and information risk factors before they are allowed to depart for the U.S. Data gathered on containers bound for the United States in foreign ports participating in the Secure Freight Initiative is transmitted in near real-time to U.S. Customs and Border Protection (CBP) officers working in overseas ports and to the US Department of Homeland Security (DHS) National Targeting Center. This data is then combined with other available risk assessment information, such as currently required manifest submissions, to improve risk analysis, targeting and scrutiny of high-risk containers overseas.

Customs Trade Partnership Against Terrorism

The Customs Trade Partnership against Terrorism (C-TPAT) is a voluntary government/business initiative designed to build cooperative relationships that strengthen and improve overall international supply chain and U.S border security. C-TPAT recognizes that U.S Customs and Border Protection (CBP) can provide the highest level of cargo Security only through close cooperation with the ultimate owners of the international supply chain, such as importers, carriers, consolidators, licensed customs brokers and manufacturers. Through this initiative, CBP is working with businesses to ensure the integrity of their security practices and communicate and verify the security guidelines of their business partners within the supply chain.

The issue of illicit material transport via the oceans waterways has also become an area of increased concern and in particular the potential transport of nuclear materials and weapons of mass destruction (WMD). The international community has built a nuclear security framework to combat the threat of nuclear terrorism. This framework is based on a series of legally binding and non-binding international instruments including the 2007 International Convention for the Suppression of Acts of Nuclear Terrorism and United Nations Security Council Resolutions 1373 (2001), 1540 (2004), and 1735 (2006), as well as the 2005 Convention

for the Suppression of Acts of Nuclear Terrorism and the 1979 Convention on the Physical Protection of Nuclear Material and its Amendment.

In 2006, the International Atomic Energy Agency (IAEA) established a Border Monitoring Working Group with the European Union and the United States to promote and coordinate international cooperation on detection monitoring activities at border crossing points and certain locations in certain states related to the illicit trafficking of nuclear and radioactive material. Participants use the group as a vehicle to discuss and exchange information on plans and programs to facilitate improved coordination.

The United Nations Office of Drugs and Crime (UNODC) has also organized a container security initiative. In partnership with the World Customs Organization (WCO), the UNODC is working to promote stronger container controls. The focus of the program is to assist national governments to identify and inspect high-risk containers. The UNODC also oversees a variety of border training programs throughout the world and one of the priority areas focuses on threats of nuclear or one of the priority areas with regard to threats of nuclear or radiological terrorism.
Ongoing NATO initiatives include Chemical, Biological, Radiological and Nuclear Defense, Harbor/Vessel Protection, Critical Infrastructure Protection, Information Sharing and Threat Assessments.

The goal of all these initiatives is reduce the key risks to security, namely: illicit maritime cross-border movements of, inter alia, terrorists, illicit drugs, conventional weapons as well as WMD and associated materials. However, as there are so many initiatives – these and a host of others - the time is now right to explore the potential for improved coordination. Coordination is crucial if gaps are to be removed and a clear, shared perspective of risks and threats is to be achieved.

The first step in coordination would be focused on enhanced information sharing in direct support to the work organizations are currently accomplishing today. The goal is to reduce risk and to enhance security. The proposed next step in achieving this goal is to increase cooperation and information sharing, thereby bolstering efforts already in place by both national and international organizations.

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Photos from Boarding in
EU Operation ATALANTA
(Courtesy HS SALAMIS)

IS ARTICLE 105 LOSC STILL RELEVANT?

By *Lt Panagiotis Sergis, H.N.*

The recent growth in the piracy activity off the coast of Somalia has put strain into the existing legal framework of dealing with this disturbing phenomenon. It is off course beyond the scope of this short article to present every legal difficulty arising out of the ongoing operations at the Gulf of Aden and Somalia Basin. Rather, its aim is to focus on the second part of Article 105 LOSC, the provisions of which pose perplexing legal questions, regarding the jurisdiction over the arrested pirates and their seized equipment.

The piracy provisions of LOSC are generally considered as reflecting existing customary law on the subject. As far as the suppression of piracy is concerned, in accordance with Article 105 LOSC 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 **(1)**. 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 supported also by the drafting history of the Article. The drafters had the intention to limit the trials to the capturing state **(2)**.

Despite the provisions 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 **(3)**. Most of the arrested pirates are transferred to regional countries, in order to face prosecution. For example, EU has 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 has 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, there does not seem to exist any viable alternative at this time.

Although there are claims that such transfers from capturing states to third states is of dubious legality, the view of the present writer is that we have a relatively large 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 **(4)**. 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 the knowledge of the present writer, 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 **(5)**. As long as the human rights of the arrested pirates are safeguarded **(6)**, there is no legal difficulty to acknowledge that a customary rule has emerged, regarding the potential transfer to third states. The jurisdictional problem is not the only issue raised by Article 105 LOSC. Other difficult legal questions are related to the procedure for disarming pirates and the legal basis for the operations to secure the release of the captured ships and personnel by the pirates. We will deal with these issues at a subsequent article.

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(1) Dr Douglas Guilfoyle approach on the matter is totally different. He asserts that "[n]othing in Article 105…affects the right of a State with custody of a suspected criminal to either prosecute that person…or transfer them to another State for prosecution (subject

to applicable human rights law)." In accordance with customary international law every state has jurisdiction to prosecute a pirate subsequently present within its territory (Dr Douglas Guilfoyle, Treaty Jurisdiction over pirates: A Compilation of Legal Texts with Introductory notes, Paper prepared for the 3d meeting of Working Group 2 of the CGPCS). It is the view of the present author that 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. It is the view of the present author that 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.

(2) For more details about the drafting history of the Article, refer to Eugene Kontorovich, International Legal Responses to Piracy off the Coast of Somalia, ASIL Insights (www.asil.org/insights090206.cfm)

(3) Nations have tried to established new mechanisms for the prosecution of the suspected pirates. There were calls for the establishment of an international or a regional court with jurisdiction over piracy, but the prospects are rather faint.

(4) H.W.A. Thirlway, International customary law and codification, Leiden 1972, p. 130-132.

(5) The International Law Commission found no need for express article in the VCLT 1969 regarding this ground of termination of a treaty provision, because it found the basis for it on the consent of the parties (Antony Aust, Modern Treaty Law and Practice, Cambridge 2002, p. 250-251).

(6) Provisions safeguarding the human rights of the transferred persons can be found for example in the treaties in force between EU and regional countries.

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Article 105
Seizure of a pirate ship or aircraft

On the high seas, or in any other place outside the jurisdiction of any State, every State may 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 regard to the ships, aircraft or property, subject to the rights of third parties acting in good faith.

Article 106
Liability for seizure without adequate grounds

MARITIME SECURITY: THE CAPTAIN'S PERSPECTIVE ©

By Capt. James K. Staples, Master Mariner

Security has always been a concern on board merchant vessels. The implementation of ISPS and now the new anti-piracy annex to security plans, merchant mariners now find themselves with even more tasks to perform on board. The question we should ask ourselves today is, "Are the vessels secure or are they just compliant?"

Over the past couple decades we maintained a vigilant watch when it came to stowaways, thieves and pirates. The basic security plan back then consisted of gathering all our safety equipment and stowing it in a safe location; this would prevent the stevedores, line handlers or whoever boarded the vessel from stealing the brass nozzles or fire hose couplings, which they would melt down and resell as a vase or artifact back to the crews. A gangway watch was maintained and prior to sailing a stowaway search would be conducted. On vessels where stowaways had been discovered a 24-hour watch would be maintained on the stowaway until he could be turned over to the authorities on arrival at the next port and repatriated back to the port of origin, if it could be arranged. If not, crews had to transport the stowaway back to the port he or she boarded your vessel.

The threat to the crew from the stowaway was minimal; we never worried about being held hostage or held for ransom. Stowaways were looked upon as a nuisance rather than a threat. This has changed in today's world; stowaways are now looked upon as a threat to the vessel, crew and possibly national security. The incident with the USS Cole and the MT Limburg has changed forever how we look at a small fishing vessel approaching. Never did we think that a radical fanatic would drive his small boat into the hull loaded with explosives.

Pirates have always roamed the seas. During the 1970s and '80s we worried about the South China Sea and the Straits of Malacca pirates. Staying off the coast in the South China Sea kept you relatively safe from boardings, and not until we neared Singapore and the straits did we start our pirate watches. The pirates then usually just robbed the crew of money or whatever they could steal. They were thieves and robbers, not murderers and kidnappers. Now the pirates might hijack the vessel and its crew for ransom. Piracy was a lucrative business even back then with very little risk for the pirate. Today that remains the same.

September 11, 2001 changed the shipping industry in terms of security. Following ISM we were faced with the ISPS code. Security was now the main concern and the safety and integrity of the vessel its cargo and the crew became a major focal point. Measures would be put in place on board merchant vessels, which would encompass security procedures to keep a vessel safe from terrorism. The vessel security plan was born and a new role was implemented. A vessel security officer had the responsibility to keep records on drills, training and compliance. This added responsibility would fall on either the Captain or Chief Mate on most vessels.

Certain pre-arrival documentation had to be sent ahead to the next port of arrival concerning security; if errors were found it could hold up the vessel from making entry. No two forms the same. Every country seemed to want similar information, but nothing uniform, which added more time the Master spent on his computer sending and answering e-mails.

If we look at the procedures made in the airports after 9-11 we see two major changes added when it comes to security and passenger-terminal safety: technology and additional personnel. Adding personnel on ships would also help with the detection and deterrence of certain dangers including pirates.

The growing feeling amongst crews while holding safety meetings is one of mistrust for the owner-operator. The crew members ask why the owner-operator will not give them equipment to help keep them safe when it comes to piracy and vessel security. Crew members believe they shouldn't have to think about learning how to survive as a hostage according to the IMO in a hostile environment while the owner-operator tries to negotiate the release of the crew, which can last seven months or longer. Some owners claim they are negotiating for the quick and safe release of the crew. If in the eyes of the crew the owner is uncaring and untrusting this only makes the Master's job of maintaining discipline more difficult.

For every merchant seaman who has ever signed aboard, the new assignment becomes home and the crew becomes shipmates. A bond develops and the crew watches out for each other. To have your home turned into your prison is deplorable, and a crew member turning on a shipmate is intolerable. All we have to do is look at the situation that occurred on the M.V.Ariana, when a brutal beating to a female crew member caused her to have a miscarriage. Merchant crews are not trained to be under such mental anguish, being deprived from their families and the basic human needs of an individual while on board as a hostage.

As any Master will tell you, the greatest responsibility he has is to ensure the safe and healthy return of his crew. Keeping the crew safe is and always has been the first priority of any shipmaster. But how can Masters be expected to watch out for the welfare of the crew during dangerous transits in high risk areas if they are not given the support or equipment they need?

Being a merchant seaman is inherently a very dangerous profession.

We have the latest technology when it comes to collision avoidance, navigation or firefighting. I can not imagine a company that would ever let a vessel go to sea without firefighting equipment or pumps to pump out water. Safety equipment is usually added aboard because of a knee jerk reaction in the industry after a tragic accident.

Fire on board is probably the greatest enemy we have 24 hours a day, 365 days a year. What if we took the same approach to fighting fire as we do to piracy, using passive resistance and maybe just abandoning the vessel when a fire breaks out? Thankfully we do not, we brave the situation and try to extinguish the flames with the tools and training we have been given. Piracy should be no different.

Who will be looking out for the Flags of Convenience crews, who do not have the same good fortune of working for first-rate owners and flag states? Who will help the crew of the M.V. Ariana-which has a Greek owner, Maltese flag and a Ukrainian crew-with the proper medical treatment they must receive? Will the owner be responsible, or the flag state? Or will it be up to the Ukrainian government to help these innocent sailors who had the misfortune to fall into the hands of pirates? Should the IMO be held accountable? Should the UN provide teams of UN doctors to help in the healing process for post traumatic stress disorder that may take a lifetime, or will the crew be forgotten and left to fend for themselves? Will the crew return to sea, or must they now find a new profession? Loss of life occurred on board the Ariana; is the Master now criminally liable, and is the owner or ship Management Company liable? These are all questions that need to be answered if the IMO is to expect a merchant seaman to learn to survive as a hostage. We must remember that the problem for the crew concerning piracy does not end when the crew has been released or the ransom paid-it continues as a different phase for them.

The piracy question will not be solved easily. We need to look at the vessels and find answers to help in the prevention of piracy boardings. Security plans should not be a one-size-fits-all approach. Crews need to be trained in detection and deterrence; vessels need to be enhanced with new technology and defensive measures, which will detect and prevent boardings. Crews need proper training in hostage situations, on what they can expect and how to survive. We can not rely on our Navies to keep us safe while we transit high-risk areas; merchant seamen need to rely on their own skills and training as the first line of defense in any act of terrorism or piracy. Shipping companies need to provide seafarers the skills and security training to keep the crews safe.

The controversial question of putting trained armed security teams aboard will be floated and discussed for years. This is a question I will ponder upon as I write from the Captain's perspective.

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.

FATIGUE AND MARITIME INTERDICTION OPERATIONS: IS THERE AN ISSUE? ©

"When … in full physical and moral contentment, men consider war and battle they are animated by a noble ardor that has nothing in common with reality. How many of them, however, even at that moment, would be ready to risk their lives? But oblige them to march for days and weeks to arrive at the battle ground, and on the day of battle oblige them to wait minutes, hours, to deliver it. If they were honest they would testify how much the physical fatigue and the mental anguish that precede action have lowered their morale, how much less eager to fight they are…"
Colonel Ardant du Picq (1880)

by *LCDR P. Matsangas HN*

The traditional definition of Maritime Interdiction Operations (MIO) encompasses the activities by naval forces to divert, disrupt, delay, or destroy the enemy's surface military potential before it can be used effectively against friendly forces. Therefore, MIO span over an extended range of missions from war to other than war (OOTW) including non-wartime anti-piracy and anti-slavery campaigns. Time-wise, a boarding mission may last a few hours, whereas the whole interdiction operation may extend to months at sea. The human element is considered one among the significant components of this system (for further information on the broader role and integration of the human in the military systems and operational readiness, refer to (Alberts, Garstka, & Stein, 1999; Booher, 2003; Meijer & De Vries, 2005)), albeit not without misconceptions or misunderstandings regarding the human attributes (abilities or constraints).

As with other forms of military operations, effective MIO include the optimized integration of planning, conducting and implementing all needed activities. Therefore the human is part of this system in multiple roles, like designer, planner, decision maker, operator, warfighter, and maintainer. Foremost though, is the fact that the human is conducting the mission, the human decides, fights, detects, boards on a ship, etc, not the automated systems assisting the human in his/her mission. All these human roles are conducted in an environment where cutbacks in military spending—and the desire to do more with less—have led to increasing pressure for military personnel to work longer hours with less time off, and generally increased operational tempo (Miller, Shattuck, & Matsangas, Accepted for publication 2009). Given the aforementioned perspective, this article will focus on fatigue, a major factor related to human performance in the maritime operational environment [for

more information on the numerous stressors in the military operational environment, refer to (Department of the Army, 1991, 2009; Hancock & Szalma, 2008; Operational Stress Management (ADFP 714), 1997)].

Fatigue

The need for sleep is an event dominating human activities and is central to our ability to perform both physical and cognitive tasks. The quantity and quality of sleep, to a great extent, determine how well humans function within a system. Consequently, the lack of adequate sleep is perceived by humans as fatigue, a condition characterized by a lessened capacity for work and reduced efficiency of accomplishment, usually accompanied by a feeling of weariness and tiredness. Fatigue can be a physiological response to physical exertion, emotional stress, boredom or lack of sleep; in this article fatigue is assumed to be the outcome of sleep deprivation, both chronic and acute.

Human sleep requirements are known to change in a fairly predictable manner over the course of a lifetime. At the age range of junior enlisted and junior officer ranks an individual requires from 8.5 to 9.25 hours of sleep per night (this age group is still in late adolescent and young adult sleep category). By the time individuals reach their mid-20s though the middle age years, sleep requirements are fairly stable at around 8 hours per night. There are three underlying mechanisms that are related to sleep, and therefore account for much of the variance in human performance (Miller & Firehammer, 2007):

• Human performance fluctuates based on fatigue due to acute or chronic sleep deprivation. Like many naturally occurring processes, the requirement for sleep is normally distributed, with some individuals requiring more than 8 hours of sleep and some individuals requiring less.

• Performance variations due to normal circadian rhythm, which is the human's natural daily cycle and governs aspects like alertness.

• Disruption of circadian rhythms from jet lag or shift work. Both of these conditions, diminished performance and health risks, are partly due to disrupted circadian rhythms or "circadian desynchrony."

Fatigue is affecting human in a complicated manner and at multiple levels. Research has clearly shown that sleep deficits are associated with significantly reduced cognitive performance. Under reduced or restricted sleep conditions, the following characteristics

Figure 1: *Snapshots of operational sleep during US Armed Forces operations*

have been observed (Miller & Firehammer, 2007):

- We do not think clearly;
- We become irritable;
- We do not communicate well with each other;
- We become withdrawn and less willing to resolve issues and problems;
- Our ability to ward off disease is impaired;
- We experience fatigue throughout our work and leisure hours;
- Our ability to carry out mental tasks is compromised.

In particular, psychomotor vigilance is dramatically deteriorated when sleep is restricted. Vigilance is crucial for many military tasks including watch-standing and tactical operations. When vigilance is degraded, important information is invariably missed, placing both service members and the mission at greater risk (Meijer & de Vries, 2007; Miller et al., Accepted for publication 2009).

Obviously, during military missions, the consequences of degraded performance can be much greater than those in the civil arena. Military members not only
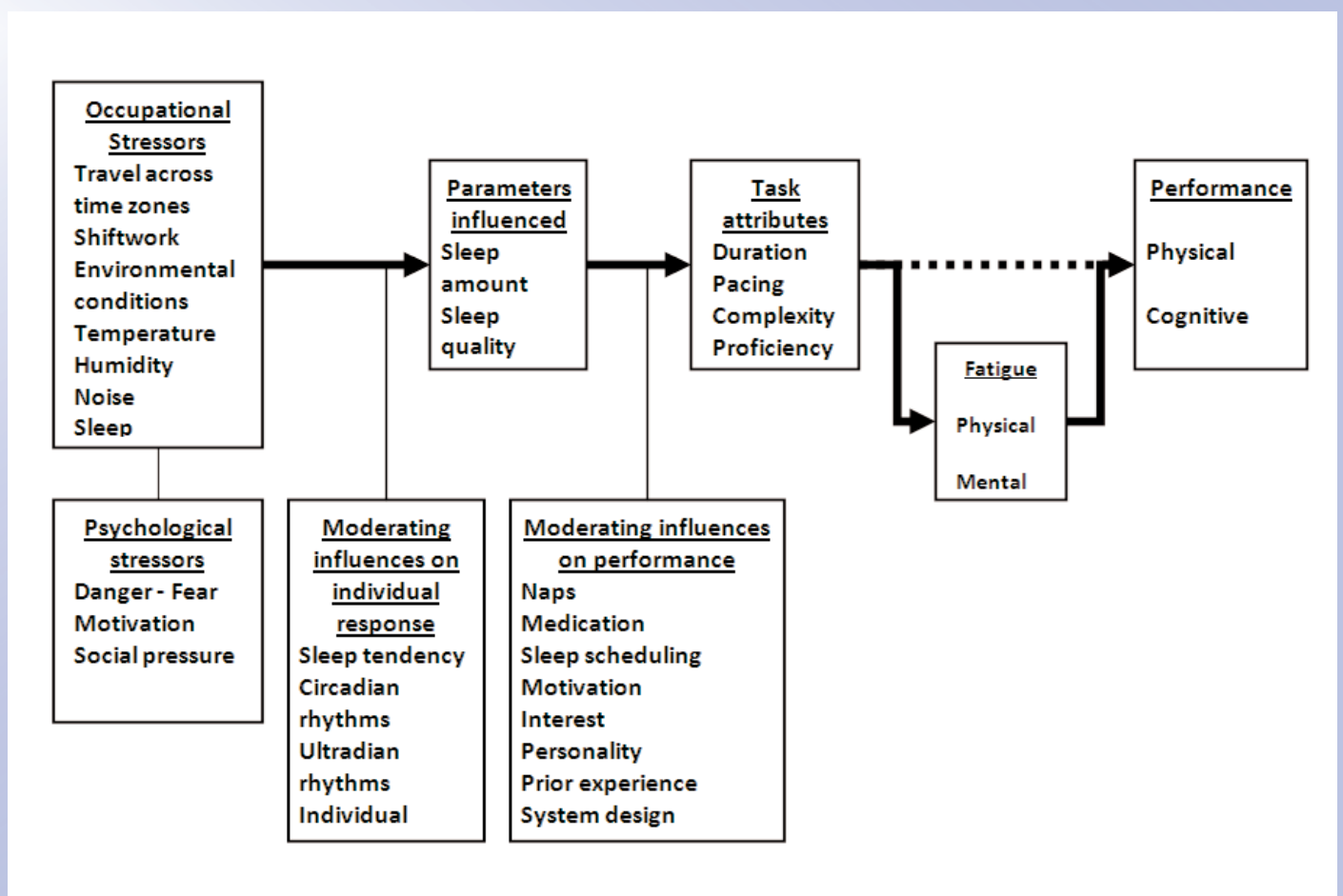

Figure 2: *Fatigue associated stressors, related to military personnel operational performance (Matsangas, McCauley, & Miller, 2008)*

have to cope with a hostile environment, they must also maintain vigilance and exercise good judgment, while ensuring they protect those in their own unit. The final outcome is the personnel's inability to effectively conduct a task. A comprehensive review of the effects of fatigue on personnel performance during military operationally unaccepted. Whereas sleep promoting agents may cause "hangover", sleep impairing agents decrease sleep recuperative effects.

The best way to overcome fatigue is through adequate amounts of quality sleep, although this may be
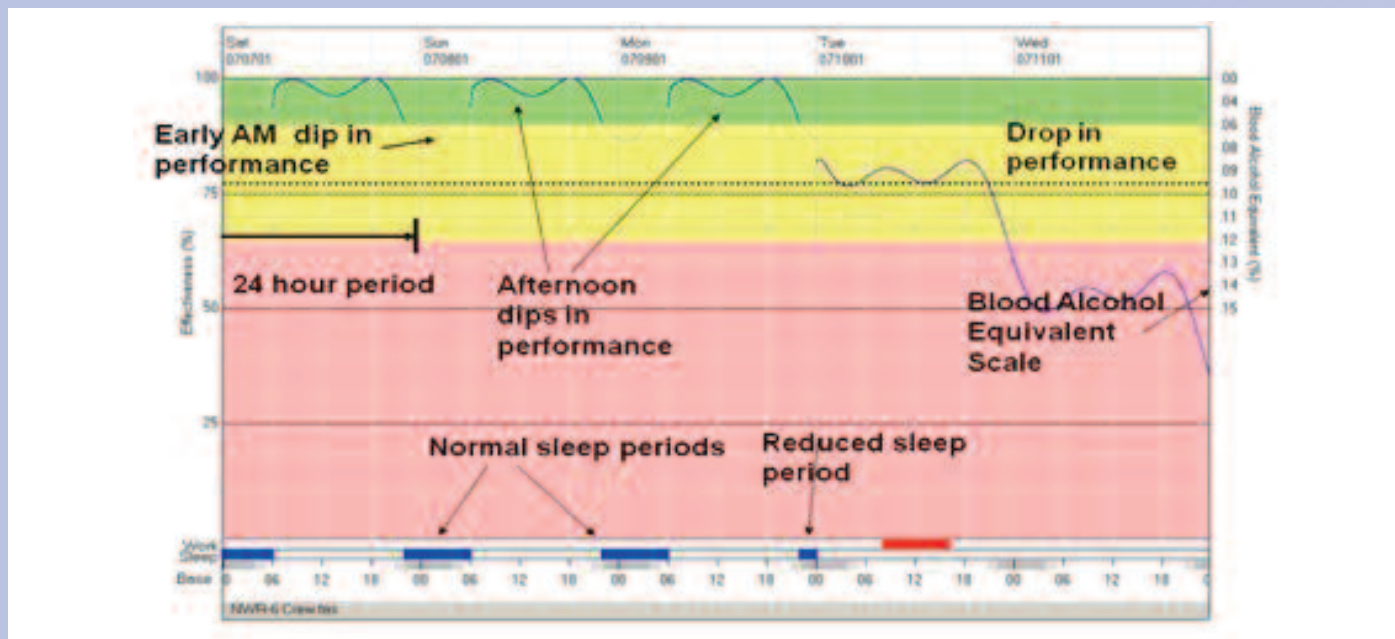
Figure 3: *Typical multiday performance variation depicted from FAST analysis*

ations can be found in (Miller, Matsangas, & Shattuck, 2008).

The following figure depicts a conceptual diagram of how different factors and associated stressors can be related to military personnel operational performance.

The perception of fatigue effects on personnel operational performance is often characterized by two significant misconceptions, the effect of motivation, and the self-ability to compensate for impaired performance. Both of these ideas are related to the widely accepted attitude among those in the military encouraging stoic denial of the need for sleep (Davenport & Lee, 2007; Shay, 1998). Unfortunately, research has clearly depicted that none of these ideas are true; motivation can only partially compensate for sleep deprivation (Pigeau, Angus, & O'Neil, 1995), whereas sleep-deprived human are not adept at determining when their performance is impaired.

Countermeasures

Fatigue countermeasures can be placed into two categories: pharmacological agents (i.e., drugs of either the prescription or non-prescription variety) and non-pharmacological agents (for more information refer to (Miller et al., 2008)). Pharmacological agents have a long history in the military but their consequences may be quite difficult to achieve in the operational environment. Optimized sleep hygiene should be high among the commanders' priorities. Napping and appropriate scheduling of work and rest, when possible, can be effective in the field (Miller et al., Accepted for publication 2009). Tools are available to assist in optimizing scheduling. The Fatigue Avoidance Scheduling Tool or FAST™ is one such tool that is used by various military services including the U.S. Air Force, U.S. Navy and U.S. Marines (Eddy & Hursh, 2001).

Another tool used by the U.S. Navy is the Navy Standard Workweek (NSWW), the official guidance for sustained personnel utilization under projected wartime or peacetime conditions (OPNAVIST 1000.16K). NSWW includes a standardized version of one week of work performed while at sea (Department of the Navy, 2007). In this methodology, the 168 hours in one week are divided into two categories: Available Time for duty (81 hours) and Non-Available Time (87 hours). The Available Time consists of tasks required to be performed by crew members and includes work or maintenance, watch-standing, training and attending meetings. Non-Available Time is comprised of all personal time that is allotted to the crew, and includes messing, sleeping (56 hours on a weekly basis, on average eight hours of sleep per day), and free time. Although the guideline is not restrictive for the commanding officer, "extending

working hours on a routine basis could adversely affect such matters as moral, retention, safety, etc., and as a policy, such extensions should be avoided" (Department of the Navy, 2007).

Conclusions

Maritime interdiction operations evolve in a "24-7" activity conducted over an extended period of time. Human logistics should not only include food and supplies, but must also account for known needs like sleep and rest. Personnel endurance can be a significant factor in mission effectiveness, although it is on the hands of the commanders to decide whether this will be in his favor of or the adversary.
Finally, we should consider the following comment by Shay (1998):

"Pretending to be superhuman is very dangerous. In a well-led military, the self-maintenance of the commander, the interests of his or her country, and the good of the troops are incommensurable only when the enemy succeeds in making them so. It is time to critically reexamine our love affair with stoic self-denial, starting with the service academies. If an adversary can turn our commanders into sleepwalking zombies, from a moral point of view the adversary has done nothing fundamentally different than destroying supplies of food, water, or ammunition. Such could be the outcome, despite our best efforts to counter it. But we must stop doing it to ourselves and handing the enemy a dangerous and unearned advantage."

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NEGOTIATIONS ...
...A PROCEDURE THAT NEEDS TO BE ENHANCED

by Lt A. Pothitos H.N.

There is a large number of well informed authors who claim that modern society has achieved much, within a very short period of time. Throughout the centuries, mankind has been discovering, communicating and trading, using the sea lines. Nowadays the majority of trade is still conducted through the sea lanes, covering over 80% of global needs. These existing and continuously expanding sea routes all around the globe,have rapidly increased the need for Maritime Forces to secure, in parallel with their main duties, these commercial sea lanes, in order to maintain world trade stability.

The art of Negotiation is not needed only within the context of the rules of the market. Negotiation techniques become very important in any situation where an agreement is needed to be reached between two or more parties. As an example, a hostage situation demands negotiators.

In general, in the simplest form, we could agree that Negotiation is the process by which two parties, each in pursuit of its own interests, try to reach an agreement by submission and consideration of offers until a mutually acceptable compromise is achieved.
Naval Forces today, have to focus in Maritime Operations Other Than War (MOOTW). Arms Control, Combat Terrorism, Maritime Interception Operations, Protection of Shipping are examples of what this category of Operations (OOTW) are dealing with. It is important to remember that they differ from ordinary wartime military operations. MOOTW focus on deterring war and promoting peace and for that specific reason we have to contribute towards training taking a different approach. Maritime Interdiction Operations are one case in which Negotiation techniques might be needed. Merchant Vessels (MV) can be interrogated, examined (papers and cargo), searched for prohibited items, diverted or seized. With proper Negotiation techniques, the negotiation process can make the difference between a simple querry and the need to divert an uncooperative merchant ship.

Source: Saner (2000)
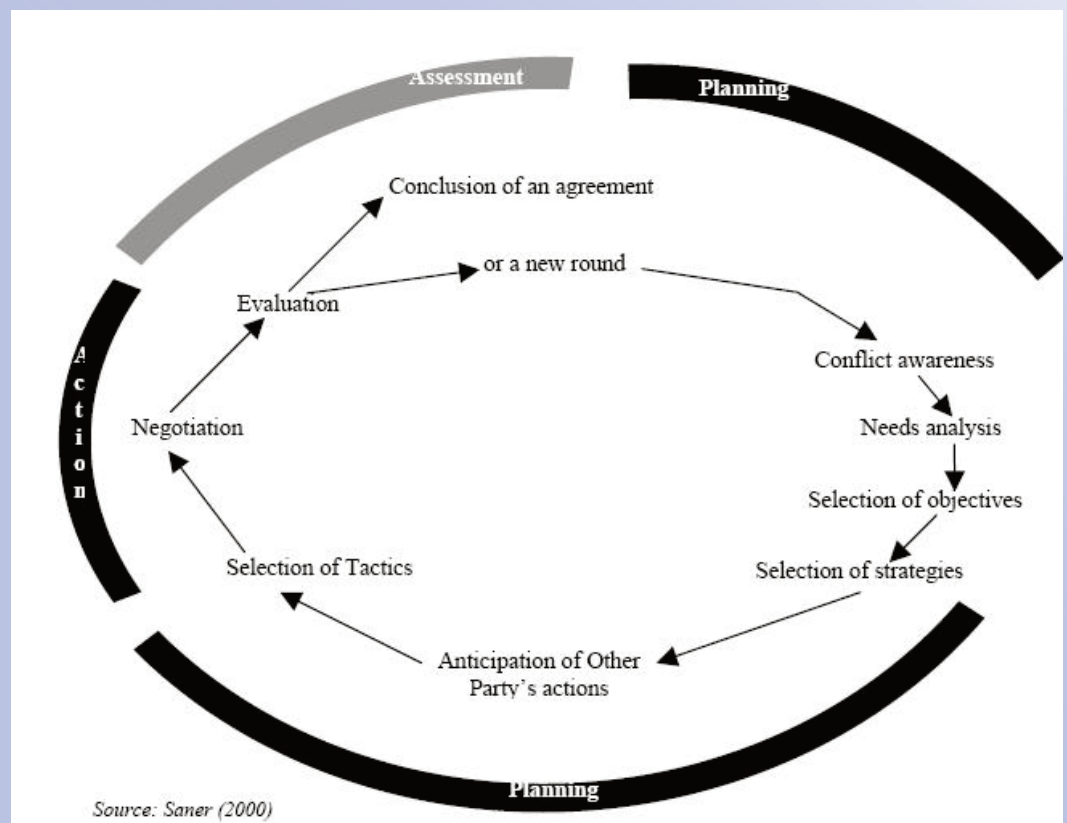
One who is involved in a negotiation process, needs to always keep in mind that this procedure involves advance planning and team preparation. Good negotiation skills of the Negotiator, good knowledge of the subject of negotiation, detailed analysis and skillful planning are also important aspects of a successful Negotiation process. Don't be so enthusiastic before reaching and implementing the final agreement! During the negotiation and after reaching what seems to be the final agreement, attentive evaluation step by step is needed in order to verify that opponent's actions are completely in line with what has been agreed. Eventually the implementation of an agreement will lead us in terminating the process, or a new round will begin with new inputs and additional needs. Negotiation life time can be endless, a circle that goes over and over again, until both sides finally manage to meet their goals.

Due to the importance of the negotiation techniques, especially for those who schedule and conduct Maritime Interdiction Operations (MIO) the NMIOTC, has included, within its courses, a training module introducing aspects of this technique. The NMIOTC itself, tries to acquire knowledge and experience in this area, through the police, due to the fact that this type of negotiation resembles more to what could be the worst nightmare of a Commanding Officer at sea: having to negotiate the release of one of his own crew! The course seems to be highly appreciated. Not only does the ships' Command Group know of incidents that have previously happened but also they can examine these cases in detail.

The ability to deal and Negotiate with the other part, the ability to maintain a difficult situation stable, can prove useful to the TG Commander as well.

Negotiations are not that easy, it is obvious. A Negotiation process is not that simple. We cannot write down "recipes" for each case because every case differs from another. However, an understanding of negotiation techniques, may make the difference, between a simple short discussion, and a difficult, uncomfortable, or even difficult situation.

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Lt A. Pothitos *graduated from the Hellenic Naval Academy in 1998 and has served onboard various Hellenic frigates and Destroyers as Communications and Intelligence Officer as well as Operations Officer. He has been appointed to numerous NATO missions such as Operation Unifil in Lebanon and Operation Active Endeavour. He has also graduated from the Greek "Negotiations course" which was executed in conjunction with the Police Department. Now he is serving as a staff officer and instructor in NMIOTC.*

THE INTERNATIONAL BORDER MANAGEMENT, CRIME AND TERRORISM AGENCY ©

A COMPREHENSIVE APPROACH TO BORDER SECURITY & MANAGEMENT

by Mr. Henry Bolton

The International Border Management, Crime and Terrorism Agency was established in 2010 to assist states in developing and enhancing their capacities to address Transnational Organised Crime and Terrorism. The Agency's approach is based upon three premises:

1)　There exists a powerful nexus between borders, transnational organised crime and terrorism;

2)　Border management, if comprehensively approached, provides an unrivalled opportunity to address both crime and terrorism whilst concurrently exploiting beneficial social, cultural and trade opportunities;

3)　There are three dimensions to security and a weakness in any one reduces stability.

The three security dimensions (i) are:

1)　Political/military (military, crime, terrorism);

2)　Economic;

3)　Human

Borders provide a unique opportunity to tackle a number interacting threats and challenges concurrently. They are a factor across the three dimensional political/military, economic/environmental and human security spectrum and are a physical, legislative and conceptual point at which states are able to legitimately concentrate resources, surveillance, checks and controls to address a range of issues; as such they also provide states with an opportunity to develop inter-agency and international cooperation mechanisms which add depth to security and multiply the effect of greater resource concentration. Efficient and effective maritime, air and land border management, supported by a thorough analytical capacity, greatly enhances all other national and international efforts to counter transnational organised crime, terrorism and insurgency. Allowing agencies, systems or command levels to operate within their own localised perception of the world, as is often the case and commonly deeply impeded in institutional culture, is seriously flawed. Greater integration is required. As a term "Integration" is often used in the border security context, but invariably poorly understood. It in fact refers to the principle of harmonisation, compatibility and mutual support of all the various agencies, processes and systems of border management, at sea, in the air or on land, as elements of one inclusive system requiring practical as well as legislative cohesion and co-ordination. Integration is a conceptual principle that has significant value. The information exchange, joint planning and operational cooperation that it facilitates are invaluable. Integration enables the efficient utilisation of financial, material and human resources and permits overlap and duplication to be minimised and allows gaps to be identified and filled as a matter of deliberate planning and policy.

Integration is also commonly misrepresented as a model, or as a structural approach due to its close association with border management in the Western Balkan States and the political imperative common in that region resulting from the requirements of EU accession. Integration however is not a model, nor is it a structure or standard; it is a principle that must permeate institutional culture and which may be facilitated by structural reorganisation, training and reform.

The author was involved in the early development of the Integrated Border Management Concept and later, in 2006, whilst Senior Border Issues Advisor to the Organisation for Security and Cooperation in Europe, realising that integration was not being applied correctly and generally was applied without context, introduced the concept of a "Comprehensive Approach" to border security and management. The International Border Management, Crime and Terrorism Agency which the author now heads up, has refined the Comprehensive Approach and now defines it as having four elements, the IDEA **(ii)** is:

1.　Integration

Recognition, and application, of the principle of integration: Treating the various agencies, processes, issues and systems of border management, whether maritime, land or aviation related, at the local, regional and national levels, as all elements of one inclusive system requiring practical as well as legislative cohesion and coordination.

2.　Dimensions

Security and stability are dependent upon their three dimensions: political/military, economic/environmental and human. All border security and management related activity should be planned taking this fact into account, and be placed within this context

*Diagram **iii** (see endonte)*

The International Border Management, Crime and Terrorism Agency Defines Comprehensive Border Management as:
"The application of the principle of integration, within the context of the three security dimensions, tailored to the character of the local environment and supported by the capacity to analyse, and adapt to, the unique interacting and constantly evolving matrix of factors that define that environment."

3. Environment

Design and application of border security and management structures, legislation, systems, procedures and capacities must not only apply the principle of integration but must be tailored to the unique environment within which they are to be applied.

That environment, itself influenced and defined by a large number of factors, including inter-alia the nature of the border regime itself, geography, climate, politics, economic strength and resources, trade and market conditions, culture, legislation and the local character of the three security dimensions.

4. Analysis and Adaptability

The matrix effecting the border environment is influenced by a broad array of factors, including the border regime itself. Many of these factors interact, evolve and change and so, therefore, does the environmental context within which border management must be placed. This places a requirement on border management structures and systems to have the capacity to analyse complex relationships and associations in order to identify and ideally predict any changes within the environment and to adapt accordingly. Analysis and the ability to adapt are crucial elements in maintaining efficient and effective border security and management.

Diagram **iii** attempts to visualise the comprehensive approach. It shows different agencies (in green), the responsibilities that may be allocated to them across all three security dimensions (political/military, eco-

nomic/environmental and human), the fact that they are all linked by the integrated principle, but are all within, and in fact themselves a part of, a unique environment influenced by a range of factors (shown in the blue arrows) and that the whole is supported by analysis that aids situational understanding and facilitates system adaptability:

The diagram is only indicative. There will inevitably be a far greater range and quantity of factors influencing a states' border security and management regime than are shown in this diagram and every environment will be unique and constantly evolving. However all the factors and the interaction between them, across the three dimensions, at sea, in the air or on land and at the local, regional, national and international levels, need to be fully understood if measures developed to enhance security and the fight against transnational organised crime and terrorism are to be appropriate, effective and themselves not damaging. In such an operating environment every agency becomes a member of the team. Every team member brings various skills and abilities to the collective effort and all harmonise their systems and train, develop and practice their tactics together in order to achieve the overall desired impact – to detect, deter, disrupt and defeat the aims the opposition.

The reality is that when facing the asymmetric opponent – and the organised criminal is in this respect no different from the terrorist - a large number of actors need to respond harmoniously and with increasing rapidity to a shifting set of risks, threats and situational factors. Not only are situational factors shifting at ever increasing rates, but the increasing thematic array of potential threats, from WMD trafficking, through people smuggling to piracy, and their increasingly complex interaction and transnational character, requires incredibly efficient mechanisms to counter them. Regional, thematic and functional expertise, effective information exchange and joint analysis, assessment and review processes are vital in developing sufficiently agile responses. Such processes must identify strengths and weaknesses in the team's own play, detect developments in the opposition's play and support decisions relating to both pro-active and reactive counter measures. Such an approach is going evade all our efforts unless we are prepared to demand and undergo a top to bottom shift in the institutional culture that exists throughout most government agencies, particularly the armed forces and law enforcement. Pride, influence, competition and institutional inertia within agencies is perhaps our greatest challenge.

IBCTA assistance
The IBCTA, being able to draw on the exten-

sive and probably unparalleled experience of its staff in this field, is uniquely placed to assist national authorities, international organisations and the private sector in understanding and applying Integrated and Comprehensive border management, through:
• providing briefings, workshops, presentations and training
• providing consultancy services
• participating in, assisting with, or undertaking Comprehensive Border Management (CBM) assessments
• providing technical advice and assistance in developing, implementing and reviewing CBM

(i) The three pillars described were developed as the three dimensions of security by the Organisation for Security and Cooperation in Europe (OSCE – www.osce.org) and are intrinsic to that organisation's structures and operations
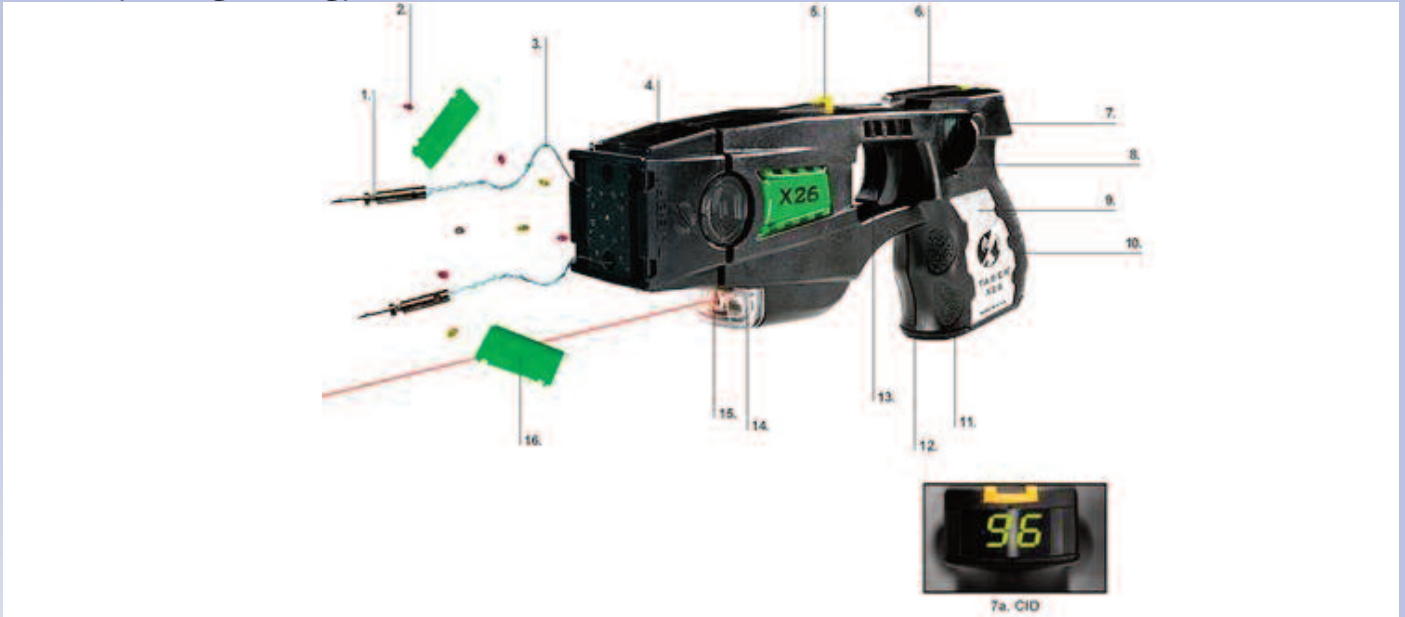
 (iii) Ditto

Mr. Henry Bolton is the Director of the "International Border Management, Crime and Terrorism Agency", a non-governmental organization established to assist with policy development, and the translation of policy into operational impact. Previously he was the Senior Border Issues Advisor to the OSCE and the UK's bi-lateral transnational organized crime adviser to the Former Yugoslav Republic of Macedonia's Ministry of Interior and Security Service from 2003 to 2006. He is the author of the National Border Management Strategies of both the Former Yugoslav Republic of Macedonia and the Republic of Tajikistan and advised the Georgian government on reform of the State Department of the State Border Guard. He gave expert evidence to the US Congressional Committee on Prevention of WMD Proliferation and Terrorism in 2008 and now focuses his efforts on addressing the nexus between organized crime and terrorism. Henry is a Reserve Army officer who has seen operational tours in Central America and Bosnia, Kosovo and FUROM. He is a former police officer, in which role he and was instrumental in developing criminal intelligence systems and disaster, major incident and crisis management procedures.

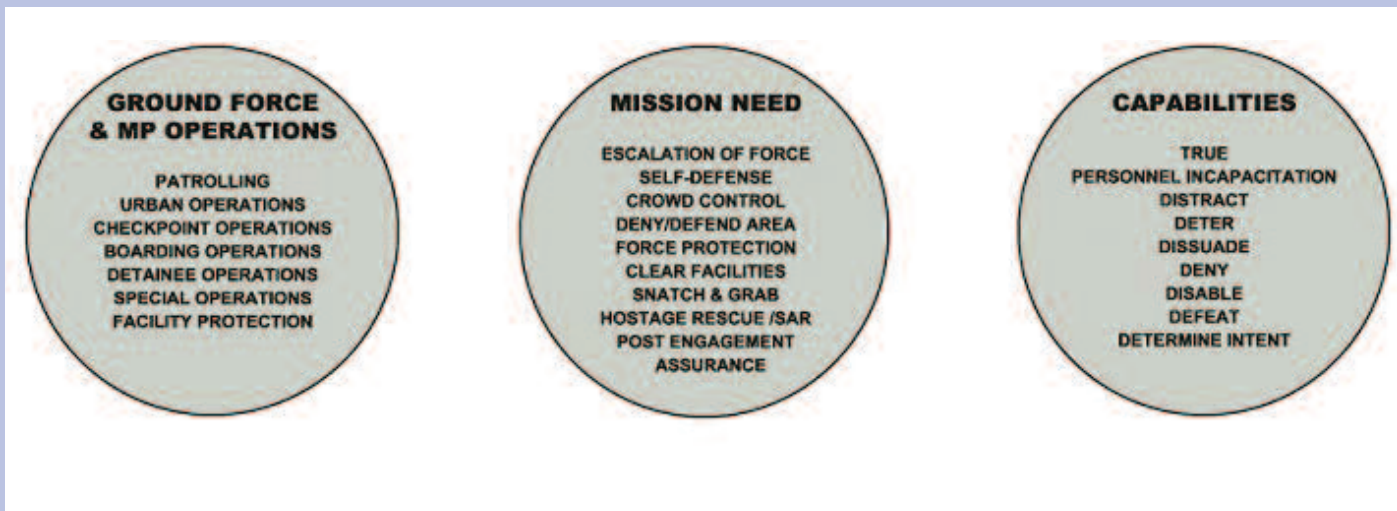# TASER NEURO MUSCULAR INCAPACITATION (NMI) ©

By Mr Agis Anargyrou

The TASER Neuro Muscular Incapacitation (NMI) technology over-rides the command and control system of the human body to immobilize the target. The human brain uses electrical impulses to control all movement throughout the body. The TASER X26 transmits similar electrical impulses into the nervous system, stimulating the alpha motor neurons that control movement, temporarily impairing control of major muscle groups regardless of the size or pain-tolerance of the target.

Because TASER NMI infiltrates the human neural network, a hit anywhere on the body can be effective - a key advantage over alternative technologies:

Escalation of Force Options

The TASER ECD is the most effective use-of-force option that overrides a subject's ability to move, shoot, or complete his/her intended task. The target is physically debilitated due to uncontrollable muscle contractions that leaves the subject physically incapacitated:

TASER X26 & TASER Cartridge Features

1 PROBES - Barbed probes attach to skin or clothing (skin penetration is not required)

2 AFIDs - Serialized identification tracking system

3 TASER WIRE - Up to 35 feet or 10.6 meters maximum range

4 TASER CARTRIDGE - Design allows for quick reloading, even under stress

5 HIGH VISIBILITY SIGHTS

6 ILLUMINATION SELECTOR - Choose between four modes: laser and light illumination, laser only, light only, or stealth mode

7 (CID) CENTRAL INFORMATION DISPLAY - Two-digit display on the back of the TASER X26 that provides information on DPM power level, spark duration, TASER X26 status data, and illumination selector

8 SAFETY SWITCH (Ambidextrous) - Arms TASER X26, activates laser and lights

9 STAINLESS STEEL SHOCK PLATES

10 Digital Power Magazine (DPM) RELEASE BUTTON

11 TEXTURED GRIP ZONES

12 DPM - All weather lithium power pack with integrated digital memory. From -5°F to 122°F, rated up to over 150 firings at 77°F

13 TRIGGER - Activates the automatic Shaped Pulse™ Technology electrical cycle

14 LOW INTENSITY LIGHTS (LIL) - LED lights provide extra illumination at night while inhibiting the target's visual acuity

15 LASER SIGHT - High visibility deterrent and targeting aid allows for easy, instant aiming

16 BLAST DOORS - The color of the doors determine the type of cartridge and its range

GROUND FORCE & MP OPERATIONS	MISSION NEED	CAPABILITIES
PATROLLING	ESCALATION OF FORCE	TRUE PERSONNEL INCAPACITATION
URBAN OPERATIONS	SELF-DEFENSE	DISTRACT
CHECKPOINT OPERATIONS	CROWD CONTROL	DETER
BOARDING OPERATIONS	DENY/DEFEND AREA	DISSUADE
DETAINEE OPERATIONS	FORCE PROTECTION	DENY
SPECIAL OPERATIONS	CLEAR FACILITIES	DISABLE
FACILITY PROTECTION	SNATCH & GRAB	DEFEAT
	HOSTAGE RESCUE /SAR	DETERMINE INTENT
	POST ENGAGEMENT ASSURANCE	

The TASER® X26 uses a replaceable cartridge containing a compressed nitrogen propulsion system to deploy two small probes that are attached to the TASER X26 by insulated wires. The TASER X26 transmits NMI impulses through these wires into the remote target at distances from direct contact up to 35 feet (10.6 meters).

TASER X-RAIL Mounting System

The TASER X-Rail™ mounting system allows the attachment of the TASER X26 device to assault rifles through a Picatinny Rail. The TASER X-Rail was originally developed by TASER International to support the U.S. military efforts in Iraq and Afghanistan. The integration of the TASER X-Rail and TASER X26 into a weapons platform allows the warfighter to make split second transitioning between lethal force and the TASER ECD option.

TASER Technology — Be First to Engage with Scalable Force Options

Hesitation can be lethal. In the current operational environment, the only constant is uncertainty. Many times, hostile intent cannot be fully identified until enemies have already fired on allied forces or detonated an explosive device.

TASER scalable force options give warfighters a much needed early intervention capability that enables soldiers to pro-actively engage emerging potential threats when hostile intent is uncertain.

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 Operations.

NATO Maritime Interdiction Operational Training Center

2010 Annual Conference
June 29 - July 1
Chania, Crete Isl. , Greece

Maritime Interdiction Operations in a Non Permissive Environment (Anti / Counter Piracy and non Consensus Boarding Operations)

The NATO Maritime Operational Training Center organizes the First Annual Conference where a number of significant speakers from Academia and Military Organizations will present their views on the topic. The participants, coming from the civilian and military Maritime community as well as other relevant domains are expected to contribute to the achievement of the Conference Objectives.

The aim of the conference is to:

• Examine the conceptual, legal and operational parameters of MIO related Operations (including WMD and piracy), when compliance is not given.

Objectives:

• Examine the level of political will to deal with current challenges in the maritime environment.

• Describe the legal framework governing interaction between State Forces and non state actors involved (companies, crew). Examine impact on operations.

• Discuss the Force requirements in terms of composition and capabilities for the em ployment in MIOps in a non permissive environment. Include support needed/ available from shore based entities (Intel Fusion Centers , CBRN Battalion, etc).

• Reveal impact of lack of common TTPS on operational effectiveness.

• Highlight the importance of adequate intelligence and situational awareness at all levels of the decision making process. Present latest developments in MSA in support of MIOs.

• Highlight uncertainties and difficulties that the BT members face onboard a suspect vessel. Describe of the "ideal boarding conditions" and identify of capabilities.

• Propose ways to minimize risks imposed by the 'gray areas' between compliance and non compliance or opposition of a vessel, to accept inspection.

• Present case studies and lessons learned.

• Provide proposals for adjustments in Education and Training to cover identified gaps.

APPLY NOW !!!
FOR NEXT SEMESTER'S NATO ACCREDITED MIO COURSES

COURSE 1000: COMMAND TEAM – THEORETICAL TRAINING

MODULE	TITLE	2010	2011
1010	MIO Operational Planning	04 - 08 OCTOBER	03 - 07 OCTOBER
1020	MIO Messages		
1030	Intel Support to MIO		
1040	Legal Issues – ROE		
1050	MIO Phases		
1060	Units Organization		
1070	Air Assets		
1080	Psychological Aspects		

COURSE 2000: BOARDING TEAM THEORETICAL ISSUES

MODULE	TITLE	2010	2011
2010	Actions Other than tactical Sweep Onboard Suspect Vessel	04 - 06 OCTOBER	03 - 05 OCTOBER
2020	Inspection / Detection Techniques		
2030	Intel Gathering on MIO Targets		
2040	Tactical MIO Planning		
2050	Boarding Team Psychology		
2060	Suspect Vessel Crew Psychology		

COURSE 3000: BOARDING TEAM PRACTICAL ISSUES

MODULE	TITLE	2010	2011
3010	Container Inspection	07 - 15 OCTOBER	06 - 14 OCTOBER
3020	Small Arms Training		
3030	Tactical Sweep		
3040	Crew Control / Suspect Crew Handling		
3050	Small Boat Handling		
3060	RHIB Insertion		
3070	Heliborne Insertion / Extraction		
3080	Boarding Under Multiple Threats		

COURSE 4000: NAVAL UNIT FINAL TACTICAL EXERCISE

MODULE	TITLE
4010	Evaluation of Command Team ability to plan and execute MIO in accordance with NATO doctrines and procedures
4020	Evaluation of Boarding Team's ability to plan and conduct VBSS in accordance with NATO doctrines and procedures
4030	Evaluation of Ship's internal organization, ship's equipment condition and utilization related to MIO

COURSE 5000: MARITIME OPERATIONALTERMINOLOGY

MODULE	TITLE	2010/2011
5000	Maritime Operational Terminology	20 SEPT. - 01 OCT. 2010
The aim of this Course is to train NATO, PfP, MD and ICI Naval Officers and crews, in the use of Maritime Operational Terminology and Operational Planning Process, used by NATO Maritime Forces, through the introduction of various aspects of NATO Naval Operations.		19-30 SEPT. 2011

OTHER AVAILABLE COURSES, ACREDITATION PENDING

WEAPONS OF MASS DESTRUCTION MIO COURSE (WMD MIO COURSE)

MODULE	TITLE
WMD MIO	Weapons of Mass Destruction MIO COURSE

The aim of the "WMD MIO course" is to provide participants with an orientation on political, legal, operational and tactical dimensions of WMD in MIO. The course is one week long and include presentation on WMD/CBRN agents and their means of delivery, CBRN intelligence and CBRN Threat Assessment, Prevention of the Proliferation of WMD and the Political Background, Asymmetric Threats in Maritime Environment, Maritime Counter-Proliferation Ops and the Rule of Law, SIBCRA Capabilities and Procedures, MIO in a CBRN environment, MIO Tactics, Techniques and Procedures, Boarding Team Issues, Merchant Shipping documentation and CBRN EOD as well as a Final Tactical Exercise which is executed on the last day.

SUPLEMENTARY TRAINING SCENARIOS AVAILABLE UPON REQUEST

NMIOTC is providing practical antipiracy training to Naval Units before they proceed to participate in a real operation, using three different scenarios as follows:
• Small Boat Investigation
• Pirate Mother Ship Identification / Visiting / Boarding / Seizing
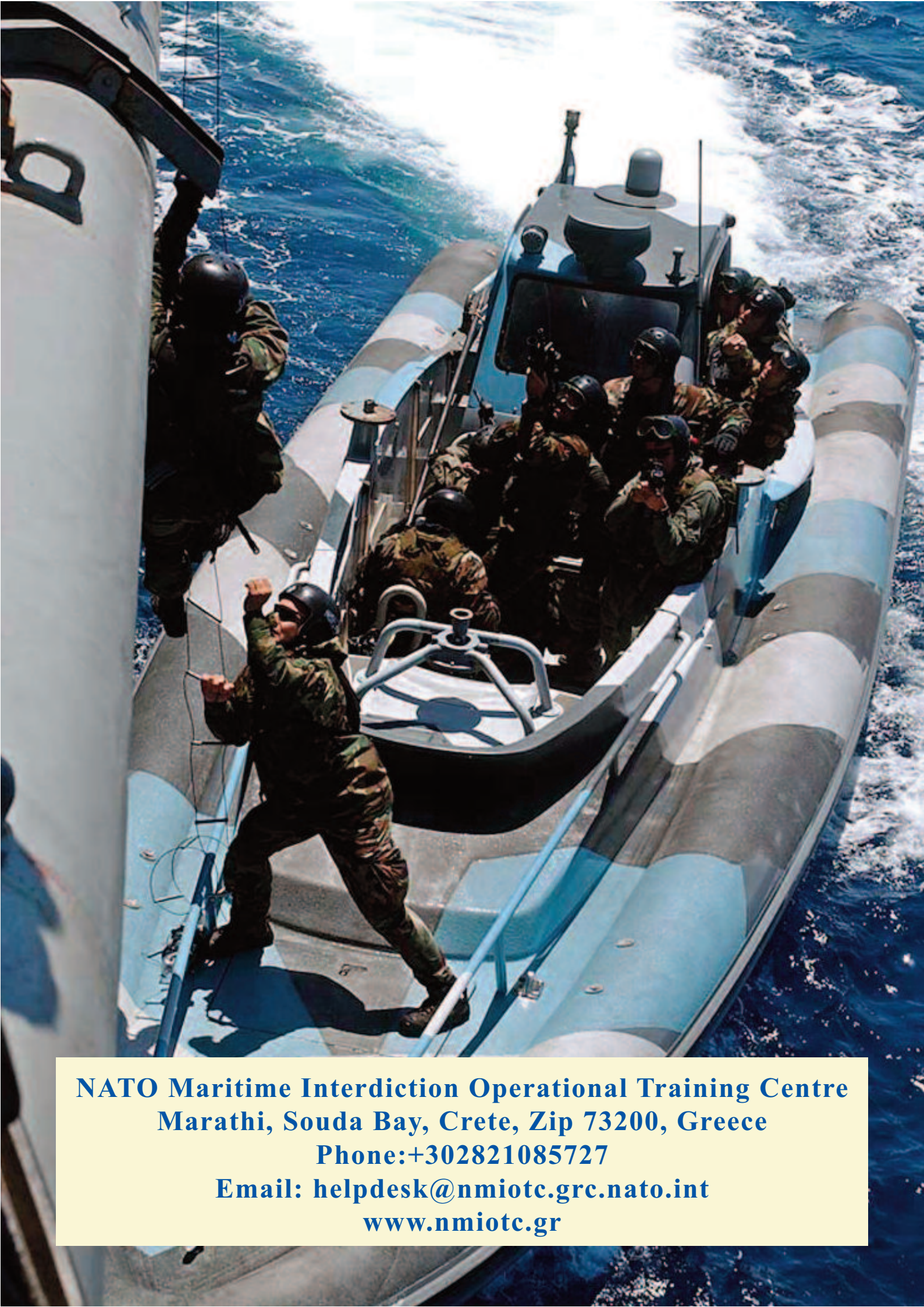• Protection of a Merchant Ship from Pirate Attack at Sea.

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
or for any further inquiries please send email to:
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