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To: Dr. J. Appleget, Senior Lecturer, Naval Postgraduate School

Subj: EXECUTIVE SUMMARY – TEAM CANADA WARGAME

1. Purpose. The objective of the wargame conducted was to explore the effectiveness of non-lethal weapons in Maritime Interdiction Operation (MIO) focusing on Visit, Board, Search & Seizure (VBSS). The wargame was conducted to assist Canadian Navy and NATO forces to come up with a potential weapon outfit for boarding team which involves both lethal and non-lethal weapons. This memorandum provides the analysis background, framework, findings and key takeaways that resulted from the developed wargame.

2. Background. There is a wide range of possible scenarios that involve MIO. They can include operations in support of law enforcement (drug interdiction, seizing illegal fishing vessels, enforcing environment regulations, etc.), counter piracy and counter terrorism operations, embargo enforcement, etc. One of the major parts of MIO is Visit Board Search and Seizure (VBSS) operations. VBSS constitutes maritime boarding actions and tactics, designed to seize unfriendly and hostile vessels; to counter terrorism, piracy and smuggling; and to conduct customs, safety and other inspections. This involves sending the boarding party from a frigate or destroyer involved in MIO to the target vessel via Rigid Hull Inflatable Boat (RHIB) or helicopter. MIO generally constitutes stopping the vessel, VBSS and escorting the vessel to nearby port (if required). The wargame was developed as a card game for VBSS part and a directed discussion followed by survey was conducted to capture the players' responses for the escorting phase.

3. Analysis Purpose and Objectives. The primary objective of the analysis plan was to determine the outcomes associated with the weapon choices and subsequent use by the players under a varying threat environment. These results were used to analyze which weapons were chosen and used the most by the players and also the lethality associated with those weapons. Data recorded included the type of injury caused by use of a specific weapon.

4. Analysis Methods. The analysis team recorded feedback from players during and after the game. The data collection sheet included the weapon chosen, action taken by the boarding team, resulting outcome adjudicated by the white cell by using

adjudication spreadsheet developed in MS Excel (see Appendix A). At the end of each turn, players were asked to record their personal remarks on the effectiveness of weapon chosen and how different choices may have resulted in a different outcome for the given scenario. At the end of the turn-by-turn game, the workbook containing all player-input values was saved for analysis. Players were asked to fill out survey questionnaires for feedback on metrics such as severity, Likelihood of certain occurrences, Risk, Cost and Trade-offs associated with non-lethal weapons. Upon conclusion of VBSS game, proceedings of directed discussion on escort phase was conducted which was followed by the survey to answer questions associated with the protection of mother-ship during escort phase.

5. Analysis findings. The wargame provided insights into the popularity of weapons among players and also the lethality associated with each weapon. Following graphs show the results associated with weapons chosen and the types of injuries caused by weapon type. The graphs also look at the correlation between different factors such as number of times a weapon was used to number of injuries caused by that weapon.

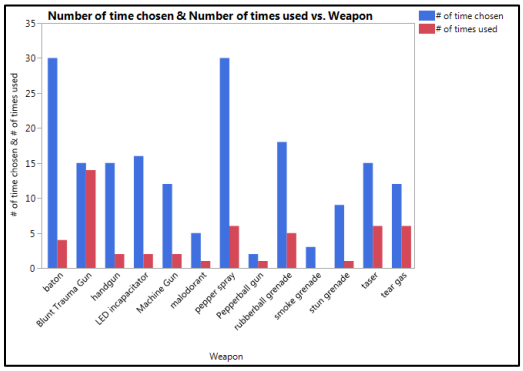

Figure 1

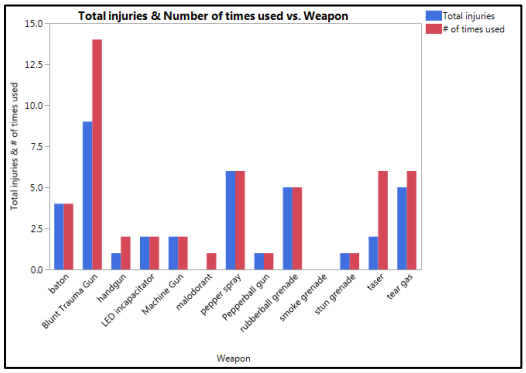

Figure 2

Figure 1 shows the number of times a weapon was chosen and also the number of time that weapon was used. From the graph we can see that blunt trauma gun was used in highest proportion when chosen. We can also see that the pepperball gun is the least popular among the others and the smoke grenade is never used when chosen. Figure 2 shows the total injuries caused by a weapon with the number of times that weapon was used. We see that blunt trauma gun caused more injuries by if we look at the number of times it was used, it has relatively better performance than other weapons. Same is depicted in graph showing proportion of injuries in Figure 4. Another interesting factor was considered for results which was number of times a weapon missed the target as shown in Figure 3.

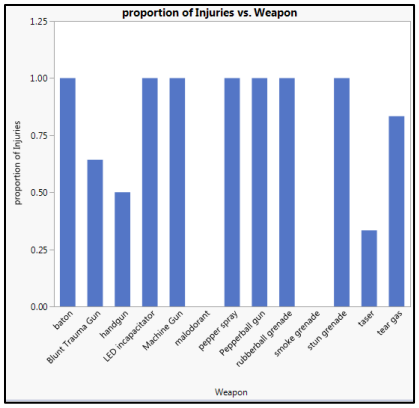

Figure 3

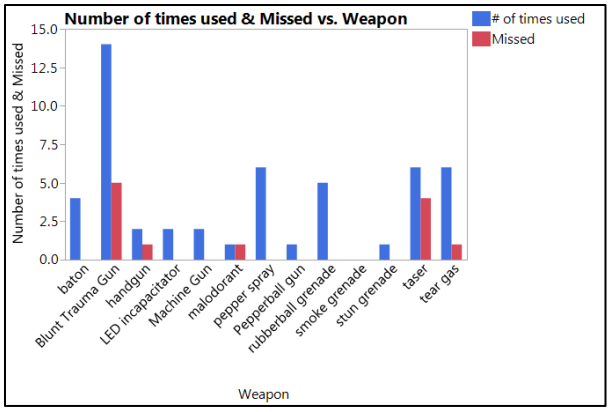

Figure 4

The results for the lethal weapon only case are summarized in Figure 5 as shown below:

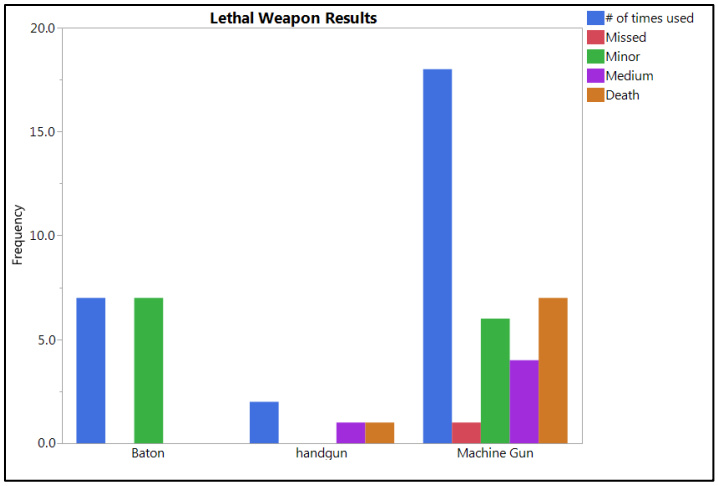

Figure 5

It can be seen that machine gun was the most preferred weapon in that case and proportions of different types of injuries can also be seen in the figure.

6. SCHOOLS OF THOUGHT ANALYSIS (SOTA). After gathering the results of the surveys, SOTA was conducted on the answers given by the participants. Branch of service for each participant is shown in Figure 6.

Participants - Service

- **AD** – Marine Corps
- **HO** – Marine Corps(P)*
- **NA** – Navy*
- **JE** – Marine Corps(P)
- **HY** – Navy*
- **AB** – Navy
- **IM** – Navy*
- **AP** – Army
- **TA** – Navy*
- **SH** – Marine Corps**

(P) Pilot
* Seen conduct of a VBSS operation
** Been in a VBSS operation himself/herself

SOTA was conducted on Risk Likelihood, Risk Severity, NLW benefits, Costs and Tradeoffs. Grouping of answers for all participants has been encircled accordingly. Results of SOTA are appended below:

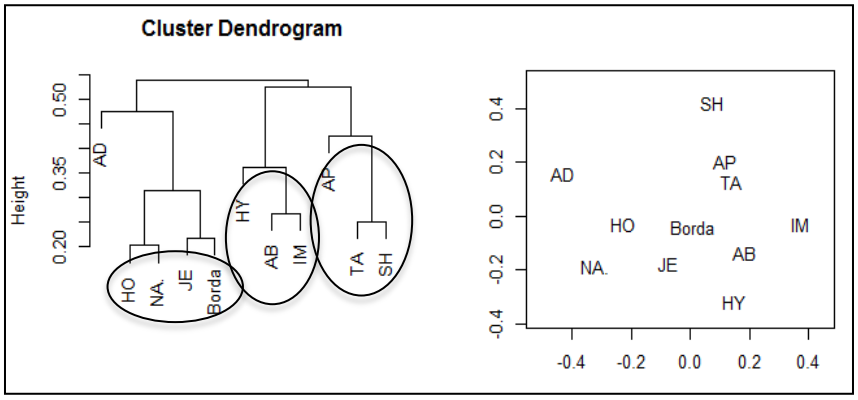

Figure 7: Risk Likelihood SOTA

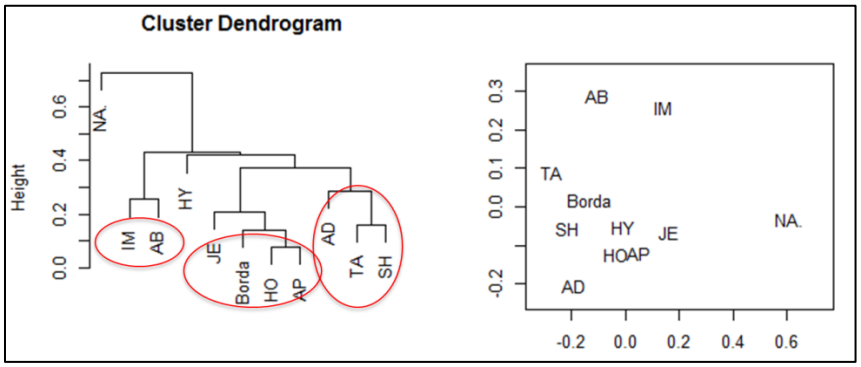

Figure 8: Risk Severity SOTA

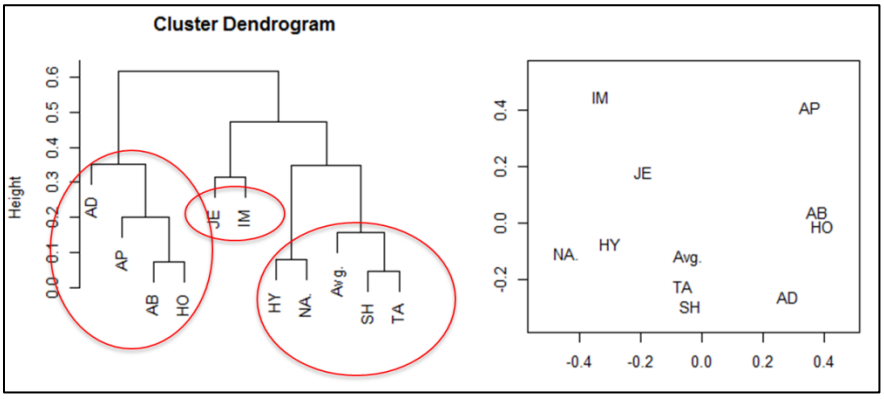

Figure 9: NLW associated Benefits SOTA

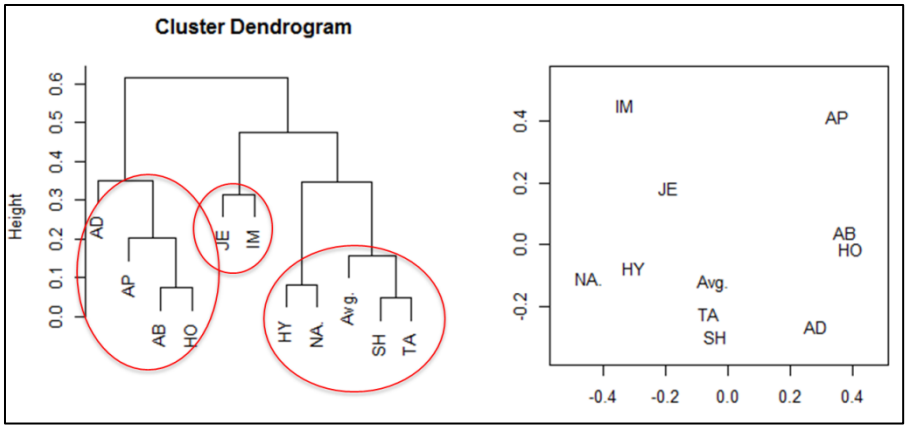

Figure 10: NLW associated Costs SOTA

7. Mother-ship Protection during Escort Phase. The directed discussion on protection of mother ship during escort phase comprised of two types of results; individual answers to questions regarding procedures & potential weapon usage and answers to survey questions by the participants. SOTA was conducted on the survey results, outcomes of which are appended below:

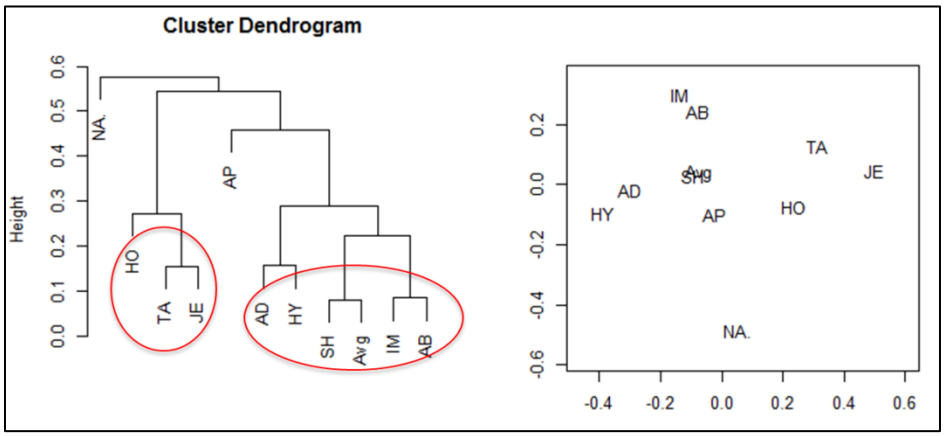

Figure 11: Mother-ship Protection SOTA

The detailed answers to question discussed during the directed discussion session are attached as Appendix 1. Handbook created for the game which includes the details on methodology of gameplay, data collection and management plan (DCMP) along with the questionnaires used for post-game survey and the scenario used during the conduct of the game is attached as Appendix 2.

8. Recommendations. Following recommendations are made based on the results of this wargame:

a. The game developed may be used as a training aid to train boarding teams on situation handling and

understanding repercussions associated with their actions.

b. Use of NLWs by the boarding party can be effective in de-escalating certain situations.
c. ROEs for handling and use of NLWs need to be developed very carefully. Soldiers may be hesitant to use NLWs in an escalating situation naturally.
d. The game may be played with more players and diversity of results can be collected for further insights into problem.

APPENDIX 1 TO EXECUTIVE SUMMARY - TEAM CANADA WARGAME

PROTECTION OF MOTHER SHIP DURING ESCORTING OF THE SEIZED VESSEL

Small boat is a great threat in the maritime environment because of their low cost, ease of deployment and success record. The aim is to stop this threat before it reaches the mother ship. Following are the results from discussion on question with players.

Q1. What could be initial actions by the escort?

- Track small boats entering a predetermined assessment zone with available sensors: navigation radar/surface radar
- Ready to deploy organic helicopter and RHIB. One or two RHIBs can easily intercept the threat and warn it while shouldering the mother ship.
- An initial classification of boat by using visual sighting capabilities.
- Initial warnings by using of marine VHF 16.
- Evaluate its intent (friendly or hostile) towards mother ship, monitor its course and speed changes by using both radars and visual sighting.
- The mother ship can change its course to see whether the small boat is following it.

Q2. How do actions change after visual confirmation of identity of the boat?

- After visual confirmation, if small boat is unclassified, the mother ship uses all its means to attract the boat's attention. There are many non-lethal capabilities as well as lethal capabilities to warn and deter this boat. These weapons can be installed on the mother ships and organic units.
- In order to intercept a fast attack boat, a faster platform needs to be employed. These are helicopters, RHIB boats, or unmanned systems.
- Helicopters are extremely useful against small boats. Their speed and maneuverability capability is a great advantage. Helicopters are the only choice to defend the mother ship without putting its life in a risk. Helicopters also can be equipped with non-lethal weapon capabilities. The main disadvantage is the helicopters may not be available all the time when we needed. So, non-lethal capabilities should be explored.
- RHIB boats are highly maneuverable platforms with their shallow drafts. They can easily intercept the threat with their

high speed capability. These boats might be armed lethal or non-lethal weapons to neutralize threats.

- Unmanned Aerial Vehicles are useful to conduct a sufficient ISR and can be used for early detection and visualization of small boats.
- The Protector USV plays a prominent role in minimizing safety risk to the sailors and armed forces by avoiding them to be directly in contract with the potentially mission critical operations.
- Long Range Acoustical Devices (LRAD) is a military grade weapon system that sends out mid to high frequency sound waves designed to disorient and possibly incapacitate personnel. I can be used for prevention of unlawful acts and dangerous approach of a target to a guarded entity. It can transmit the signals within a range of up to 5,000 meters. The effectiveness of LRAD may depend on the range, the numbers and their locations on the mother ship.
- The Area Denial System (Silent Guardian™ Protection System) is a type of non-lethal weapon, directs electromagnetic energy. It is used to stop and deter adversary boats from relatively long range. It can save countless lives by providing a way to stop individuals without causing injury, before a deadly confrontation develops. It is designed for area denial, perimeter security and crowd control.
- Laser weapon system (LaWS) is also a directed-energy weapon. This weapon could take a target out of action easily. It proved how effective it is in small boat engagements. Fast engagement of this weapon is a great advantage against small boat threats.
- Big waves can be considered as a nightmare for small boats. It is a hard task for them to keep a steady course in massive waves. Creating artificial waves on the way of approaching fast boats would swallow fast boats and therefore save the mother ship from a considerable damage.
- The other non-lethal capabilities would be:
    - Non-lethal slippery foam
    - Dazzle Gun
    - Optical Devices
    - Flares
- Helicopter and RHIB is considered as the most effective way in order to intercept the threat. Based on the discussions, the weapons are ordered according to their importance level.

1. Helicopter
2. RHIB
3. LRAD
4. LaWS
5. Close-in Weapon System (CiWS)

6. Unmanned Aerial Vehicles (UAV)
7. The Area Denial System
8. Optical Devices
9. Flares

Q3. Terrorists may be using the tourist boat for deception?

Terrorist organizations may build some deception tactics towards mother ship. It is a possibility that terrorist organizations would have a great purchasing power to buy an expensive touristic boat to deceive military warships. This should be considered as a great deception tactic and every fast moving boat should be considered as a threat to mother ship.

Q4. What if the tourists are drunk and do not know what they are doing?

If it is believed that the boat is suspicious and would be touristic boat, it needs to be intercepted when it enters predetermined assessment zone. The helicopter or RHIB boat is the appropriate mean to stop or deter the small boat. Non-lethal capabilities such as optical devices, flares etc. are useful to take the attention.

Q5. Possibility of selecting homeports with little or no likelihood of such an incident occurring? Is it possible all the time?

It is not possible everytime to select a homeport. We expect that small boat can pose a serious threat to the mother ship in shallow waters. Selecting a route to homeport out of shallow waters would reduce the risk. Also geographic location makes all the difference and therefore pre-determining which ports to take the ship can be challenging.

Q6. When should the escort make the switch from non-lethal to lethal, if at all?

While non-lethal weapons provide an option to reduce risk against the threat, lethal force may be required to protect the mother ship. The time is a big factor on deciding to apply non-lethal or lethal force. Fast boats should be tracked in longer distances. When they are monitored entering predetermined assessment zone, non-lethal capabilities should be used according to escalation of the conflict. If the commander has no option to stop the threat, he can switch to lethal capabilities such as main gun, close-in weapon system, special force engagement, or helicopter capabilities (hellfire). There is no

formula to determine which activity or set of activities to employ. It is just a decision process.

Q7. How effective can the non-lethal weapons be in such a scenario?

Addressing non-lethal weapons in this scenario may not be enough. The threat is fast boat and the incident happens in a short time. To intercept an asymmetric like fast boat requires highly maneuverable platforms such as helicopters and RHIB boats.

APPENDIX 2 TO EXECUTIVE SUMMARY - TEAM CANADA WARGAME

See the attached “Wargame Handbook and Log”