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Seabed Warfare and Target Folder Processes (Continuatio

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SEABED WARFARE AND TARGET FOLDER PROCESSES

EXECUTIVE SUMMARY

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Project Summary

Seabed warfare and open water strikes on targets of opportunity will include fighting in a joint theater-level environment. Prior to any open hostilities, it is imperative that the intelligence capabilities can establish areas or specific items of interest. In this unclassified but controlled unclassified information report, specific systems will not be named. There are three major participants in this study, the intelligence community, U.S. Navy undersea, and the Joint Task Force (JTF). These three participants are compared to find the best organizational "fit" to complete a joint task force input. Here, we assume that there are means for detection by platforms with acoustic intelligence (ACINT) capabilities; however, processes for assessing and assigning targets in a rapid fashion for inclusion into the Joint Fires Target Folders are immature at best, and difficult to describe and perform at worst. What is working, and what is not is described in general terms. Finally, an analysis employing Monterey Phoenix in a simple scenario and the observe, orient, decide and act (OODA) "loop" is provided, revealing that there are many paths through even a simple problem, with the potential of "emergence" of a system of systems arising. Monterey Phoenix was used to determine if a larger scale simulation could be conducted in future research.

This work's penultimate finding is that the ACINT paths do not support the needs of target folder planning or the use of this data to support time-critical decisions. The Joint Task Force Commander should determine from current and soon-to-be sensors what capabilities and limitations exist, with regard to making acoustic data available to the Joint Task Force Commander and adding to the Joint Targeting Folder processes.

Keywords: *acoustics intelligence; joint warfare; fires planning process; seabed warfare; autonomous sensors; OODA loop; observe, orient, decide, act loop*

Background

The general premise of this work is to adapt seabed and undersea warfare to the existing joint fires process and provide recommendations for any modifications required to allow joint fires processes to accommodate seabed warfare targeting procedures more-readily, especially determining the process and information. In this effort, "seabed warfare" means specifically targets of interest that are laying on the seabed floor, such as acoustic devices, communications listening devices near cables that enable fiber optic information to flow between nations, mines that are outside the littoral zones and anything in the water column that could be targetable under circumstances of critical time targeting. As such, the term "seabed warfare" is a general term.

Target acquisition, within time scales that allow them to be positively identified and meet criteria for kinetic or non-kinetic kill, will be part of the criteria for inclusion in Joint Targeting Folders. The first part of this effort was to review the Joint Planning Process documents to determine where the ACINT is mentioned as part of the target folder definition process. Here it is obvious that the term is not included, and that the processes are mostly general discussions of operations guidance. Second, a very crude determination of what current and near-term sensors are, was developed. This is important because it is obvious that getting data from these sensors and into the processes is difficult, and the physics related to acoustics in the ocean are very much involved.

Finally, revisiting the OODA loop was envisioned as a new way to relate to the problem. That is, sensors need to "observe" (find) from other acoustic energy in the ocean, that which is important. The "orient" segment means getting that data from the ocean and into a stream of data

transmission. This is a current technical problem. Once, (and if) the data is transferred, it needs to be properly tagged with meta-data so that there is some contextual reference to that data. Finally, it needs to get to the right place, at the right time so decisions can be made. Other problems outside of the physics are the logistical support for these sensors (a separate NRP project) and the risks being taken as part of that support. Of interest at this last phase of the investigation is the use of Monterey Phoenix (MP). MP is used here to show that the negative feedback loops inside of the ACINT data stream can cause emergent behaviors that are not elicited by inspection alone.

Findings and Conclusions

As the maritime undersea competition continues to increase, relying to a very great extent on autonomy and manned platforms together, a new configuration of how ACINT is gathered, its command and control, and interconnectedness to the stream of other information has to be updated. A review of pertinent documents and instructions makes it clear that acoustic intelligence is an area in which there exists a large gap. Current Joint Publications do not include this intelligence directly, instead they rely more on "if it is important, it will get there." This is no longer adequate. Acoustic intelligence needs to be part of the planning process within the United States Navy in general and made available to the Joint Task Force Commander as theater target folders are being prepared.

A review of the OODA loop from different approaches shows that acoustic intelligence is not likely to be integrated in a timely way, except for prosecution of a target that is immediately within view. Instead, it is the entire panoply of new sensor capabilities that need to be tied together in an analytic and products "delivery system" to make the information useful for kinetic and non-kinetic warfare.

This research confirms what has already been known within the undersea community but is being further compounded by increased complexity of the systems architectures being proposed. It is highly related to another problem (logistics of undersea warfare) that is a separate and ongoing Naval Research Program project

This research recommends the following actions:

1. Consider restructuring the organization around ACINT. Use of machine learning and focused artificial intelligence may be useful in getting the right data to the right place at the right time.
2. Create human-machine partnerships within the processing system so that context, intent, and timeliness can be better served.
3. Resolve authorities and priorities for data analysis and return to fleet users or to archives for later use.
4. Solve command and control and technical problems first. Meta tagging of data is essential. Logistics support of sensors is another topic but should not be intermingled here.
5. Use simulation and modeling tools to aid in sensing where it is needed most, with the right kind of acoustic sensors. Monterey Phoenix was used here and helps to show emergent behaviors.
6. Use war game sensor types, fields, logistics, data processing within a forward force scenario in the Indo-Pacific region.
7. Update the Joint Publications to reflect the role of ACINT and inclusion within Joint Targeting Folders.
8. The seabed is going to become increasingly important as an area of warfare. More funding and attention needs to be paid to think through problems and to implement recommendations above.

Recommendations for Further Research

This research does not explicitly solve the problem of Joint Task Force inclusion of acoustic intelligence in Target Folders, but rather describes the problem in a more rigorous way. Future research will have to consider the command and control of sensor assets and physics of the ocean in which to communicate data, and new strategies for employing these assets. Although the initial figures at the beginning of this report show where areas of opportunity exist, there are likely areas that we are not yet considering that are equally important. Finally, these capabilities are both offensive and defensive, and they are tied to policy decisions with our partners in the region. All of these are rich areas for further research.

Acronyms

ACINT	acoustic intelligence
JTF	Joint Task Force
MP	Monterey Phoenix
OODA	observe, orient, decide and act