CCICADA Initiates the DMARA Project to aid the

Coast Guard's Resource Allocation Challenges in the Arctic

USCG photo by Petty Officer 2nd Class Eric J. Chandler

The Arctic is a major area of emphasis for the U. S. Coast Guard (USCG) because of the rapidly changing climate and resulting impact on ice conditions and the stress on USCG areas of responsibility. Following on two visits to USCG District 17 (D17) offices in Juneau, Alaska, by CCICADA partners from Rensselaer Polytechnic Institute (RPI), CCICADA has reached agreement with D17 to undertake a project to formulate models designed to analyze and support decisions concerning current, anticipated, and proposed operations of the Coast Guard in the Arctic, specifically in the Bering Strait region. The Dynamic Modeling for Arctic Resource Allocation (DMARA) project has been developed in conjunction with USCG D17 leadership, and USCG D17 Operations and Logistics staff, consistent with D17 Arctic Shield 2013 priorities.

Three specific modeling questions related to USCG resource allocation were identified for further investigation under the DMARA Project: (1) deployment and resource allocation of communications technology for vessel tracking and monitoring in the Bering Straits; (2) dynamic models of the USCG supply chain in D17; and (3) logistics planning for oil spill response resources in the Arctic. Phase 1 of the project will focus primarily on question 3 - resource allocation modeling for oil spill response.

Further Details:

Resource allocation in the Arctic is a persistent and complex challenge that is at the center of many USCG missions, including navigational safety, oil spill response, search and rescue, and traffic management. The Arctic is an immense, seasonally-variable waterway with very little development along its shores. Access to the Chukchi and Beaufort Seas in the western Arctic Ocean occurs through the Bering Strait, a focus of growing interest as marine traffic increases in warmer and longer ice-free Arctic seasons. The Arctic is an environmentally harsh and sensitive area with little commercial, maritime or safety infrastructure, and great distances to access resources in the case of a maritime, personnel casualty or oil spill event.

In the Arctic, as elsewhere, logistics--the procurement, maintenance and transportation of materials, facilities and personnel—is dependent upon existing infrastructure. Lack of infrastructure makes logistics challenging and heightens the need for comprehensive and thoughtful resource allocation models. In the absence of shore-based infrastructure, long-range planning for refueling and replenishment are required. Distances between ports, coupled with the

unpredictability of weather, sea states and environmental conditions, complicate access, deployment and supply of critical resources, as well as removal of waste and, in the case of oil spills, recovered product and waste. Public expectations for four-season response capability in the event of an incident also increase the need for thoughtful and flexible planning and robust resource allocation models.

Currently, USCG policy favors seasonal surges of technology, personnel and equipment, supported by industrial contracts for deployable resources, rather than shore-based, pre-positioned assets. Initially, the DMARA project will assess the tradeoffs and net benefits associated with different asset allocation strategies in the Arctic/Bering Strait for oil spill response, one of the USCG key Arctic missions. Other missions—search and rescue, navigational safety or traffic management, etc.—can be explored in follow-on efforts.

Barrow Sunset - photo by William 'Al' Wallace, RPI

The DMARA project will provide the USCG with robust models that will permit examination of persistent resource allocation challenges, as well as examine strengths and vulnerabilities of existing and potential bilateral agreements for oil spill response. Included in this assessment will be an examination of the net benefits of development of deepwater port resources in various settings (Port Clarence, Kotzebue, Kodiak, etc.), and an examination of the importance of rail and/or road transportation infrastructure linking Nome, Kotzebue and Point Clarence, between 65N and 66N on the Seward Peninsula. The models will also consider tradeoffs and options associated with forward deployment, surge deployment and permanent deployment of needed resources for USCG Arctic oil spill response. Other USCG missions, such as navigational safety, search and rescue, or traffic management, can be investigated in subsequent projects.

The first phase of the DMARA project will develop a model that allows decision-makers to assess the tradeoffs between pre-event resource expenditures and post-event response results, including time to an appropriate response and impacts of an incident. The portion of the model considering post-event response will incorporate constraints on the transport of resources from their initial locations to a spill site or appropriate staging area. The modeling approach will be flexible enough to consider response capabilities for multiple distinct geographical regions (e.g., Bering Strait, North Slope Borough, Northwest Borough, Chukchi Sea, Beaufort Sea, etc.) and can incorporate regional priorities. The model can examine resource allocation and budget expenditures over a long planning horizon (5-10 years) and thus can assess various levels of investment into long-term infrastructure capabilities, permanent pre-positioned resources, and seasonal resource surges.

Following development of the initial project, the goal of a follow-on long-term study is to develop models that provide the USCG with robust plans for other missions in the face of dynamic uncertainties. The proposed models can focus both on near-term (e.g., as drilling in the

Arctic scales up) and long-term (e.g., the 'steady-state' of Arctic drilling operations) response capabilities of the USCG. The models can consider not only *where* to locate response equipment, resources, and bases but *when* to locate these response resources. The timing of this location becomes important in both planning robustly for the uncertainties in the environment and in how Arctic operations will scale up over the near-term.