



US-CA Senior National Naval Representative and Maritime Technologies Forum 2021



Coalition Underwater Mine & IED Defeat (CUMID)

Presentation to

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Cmdre Christopher Robinson, Director General Naval Force Development (CA)

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31 March 2021

US POCs:

Dr. Tory Cobb, ONR; Mr. Jack Fenwick, NIPO; Mr. John Woods, OPNAV N94

Dr. Daniel Sternlicht, Mr. Jose Salas, Ms. Sonja Smith, NSWCCD

CA POC: Dr. Anna Crawford, DRDC

NO POC: Mr. Øivind Midtgaard

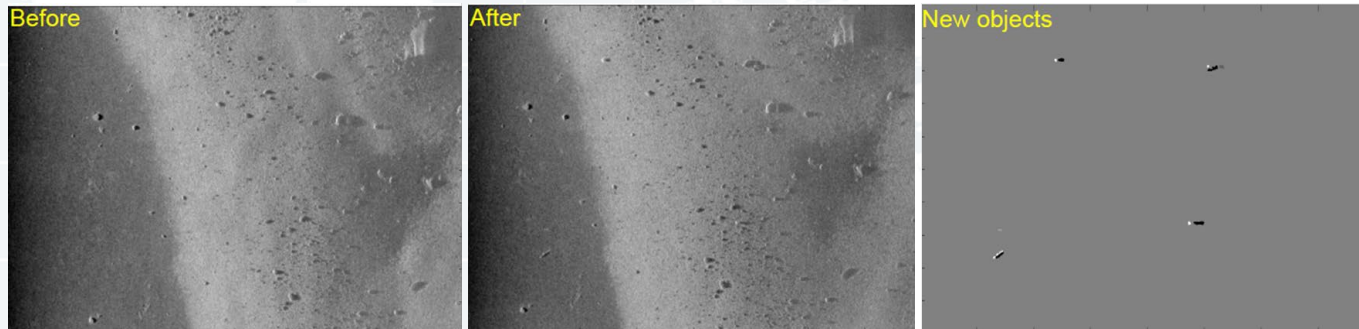
UNCLASSIFIED//REL USA, CAN, NOR

US-CA-NO CUMID Overview

International Agreements: CUMID trilateral PA under the International Cooperative Engagement Program for Polar Research (ICE-PPR) MOU

Objective: Increase effectiveness of mine counter-measures by maturing and incorporating techniques for *automated seabed change detection* (ACD)

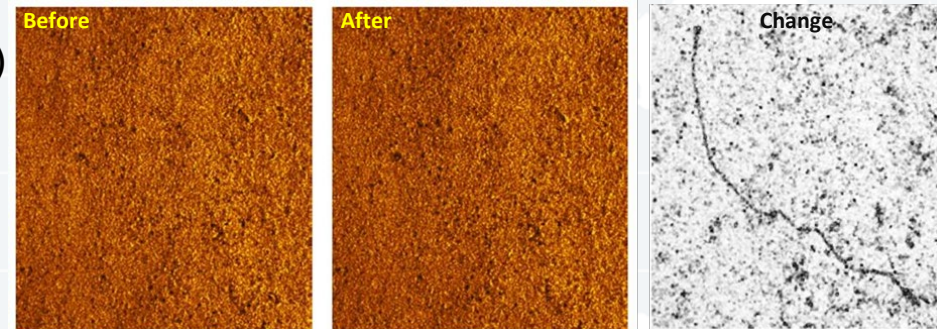
- Automatically detect differences in before/after sonar images of the same scene



- Improve detection performance
 - Reduce false alarm rates through removal of stationary clutter; Increase fraction of huntable seafloor areas
- Increase detection rates for objects with Low signatures or Unknown signatures (IEDs)

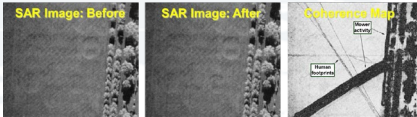
Technical Focus Areas:

- Algorithm robustness
- Performance assessment
- Operator displays, tools and decision aids



SAS Image-Based ACD Historical Timeline

SAR Change Detection

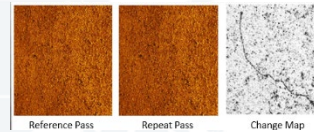


1st Image Correlation
ACD Exp with SAS

US, CA, NO
SAS ACD Programs
Commence

US, CA, NO
CUMID Partnership
Established

CUMID WKSHP CA
CUMID WKSHP NO



SAS ACD
Key Publications

CUMID/ACD
IoA
Conference
Session

NATO
WKSHP IT



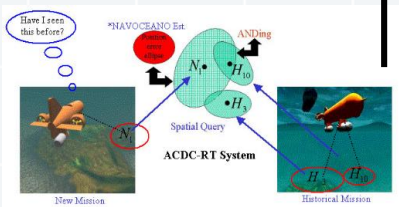
1990

2010

2015

2020

CA Blink Comparator



1st Image Correlation
ACD Exp with SLS

SAS ACD Key Experiments
Larvik / Panama City / Italy
Baseline ACD-Processors

NO Long-Interval
ACD Demonstration
MCM Insite Perf Tool

US ACD Technique Meets
EOD TTA Requirements
EOD MOEs Established

SAS ACD Simulations

CUMID
Operator Summit Part 1
Panama City, USA

Signing of
ICE-PPR
MOU

Manual & Contact Correlation
Change Detection Tools for SLS



HISAS on HUGIN (FFI)

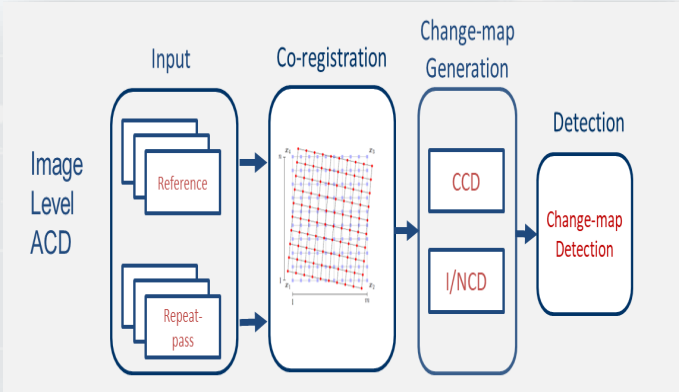


KRAKEN Aquapix (DRDC)



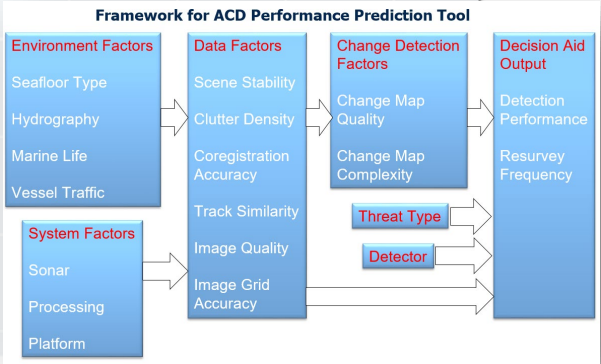
SSAM (ONR)

ACD Algorithms, Displays, Tools, Decision Aids



Leverage team strengths in algorithm development

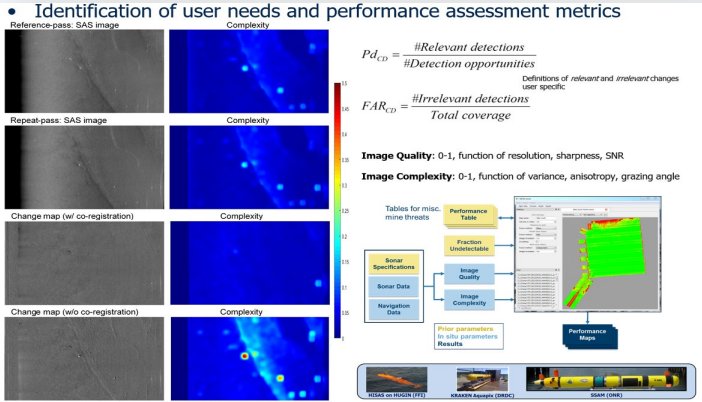
Performance prediction:
How well will it work in the future?
What is required resurvey frequency?



CUMID: CONCEPTS AND PRINCIPLES OF LAYERS OF PERFORMANCE ANALYSIS

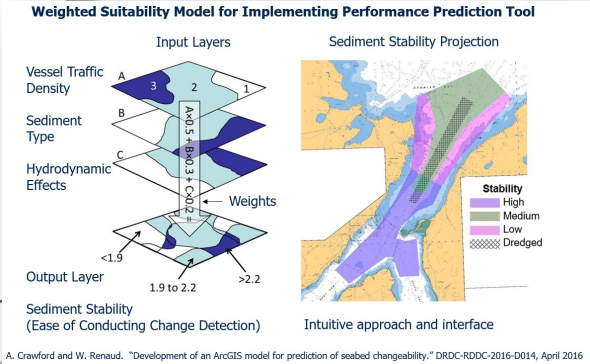
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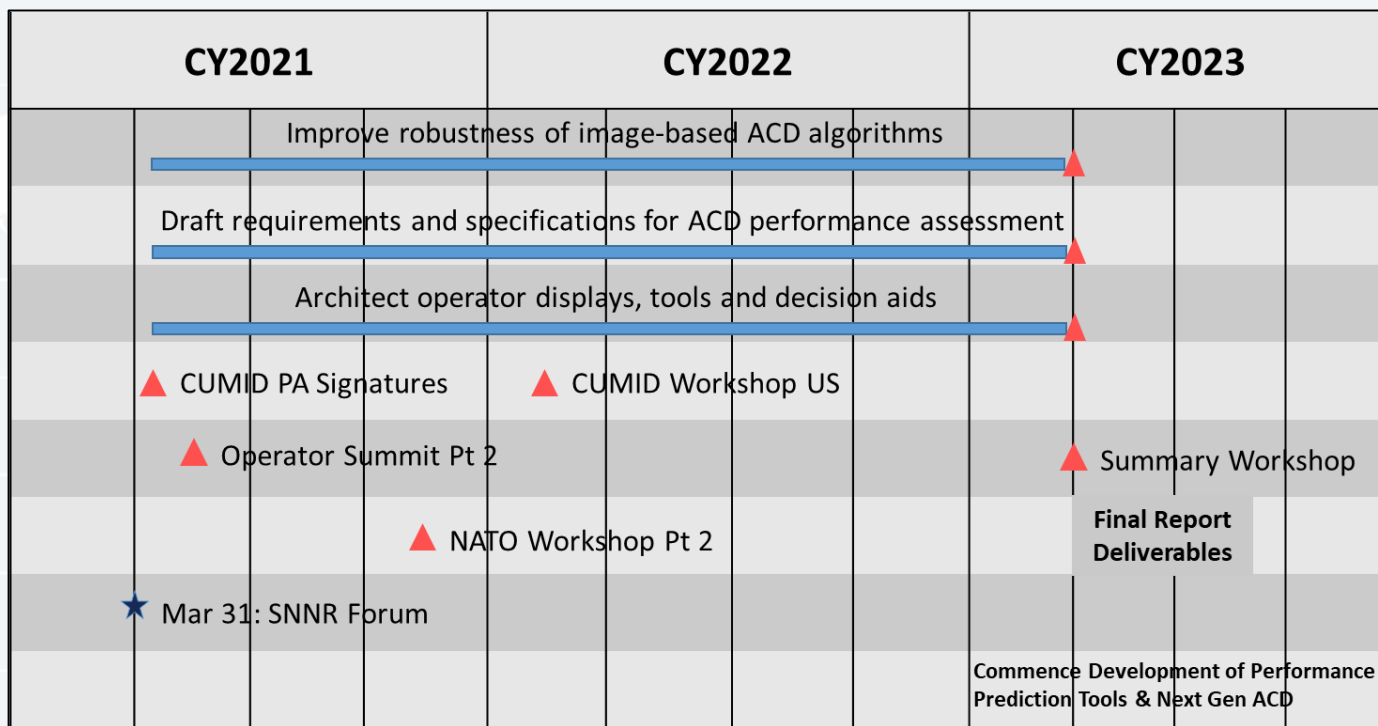
Performance estimation:
How well is it working now?

Emphasis on Operational Decision Aid that is Physical, Chart-based, Intuitive, and Straight forward to use.



A. Crawford and W. Renaud. "Development of an ArcGIS model for prediction of seabed changeability." DRDC-RDDC-2016-D014, April 2016

CUMID Schedule / End-State / Challenges



- **Anticipated End-State:** Introduction of ACD into Naval MCM tools for improved hunting in cluttered areas and for new threat identification
- **Challenges:** Covid-19 posture complicates interactive workshops.
 - Mitigation: CY2020 and early CY2021 workshops conducted virtually. Follow-on workshops in person if possible.
- **Related efforts**
 - US MK18 MOD 2 Program of Record
 - Potential for joint experimentation in BALTOPS experiments